



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

1998 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 1998 was 58,891 cubic feet (1,667.6 cubic meters) with a total radioactivity level of 72,667.1 curies¹ (2,688,682.8 gigabecquerels)². The waste was contained in 2,026 packages in a total of 240 shipments.

There are waste classes established and defined by the 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, etc. from nuclear power plants; and Class C wastes include nuclear power plant wastes such as irradiated reactor components.

Ninety-four percent (94%) of waste transported was Class A, two percent (2.0%) Class B, one percent (1.0%) was Class C, and three percent (3.0%) was listed as not classified (NA) on LLRW manifests. The United States Nuclear Regulatory Commission (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 many still do. This waste, if it were classified, would be primarily Class A.

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¹Curie (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.

²Becquerel - 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, approximately thirty-four percent (34%) of the volume and seventy-three percent (73.0%) of the activity was generated in New York State. This consisted of 19,965 ft³ (565.3 m³) with a total activity of 53,125 Ci (1,965,625 GBq). Because of the difficulty in segregating out the generator states in consolidated shipments, New York State generated waste in broker consolidated shipments is not included in the thirty-four percent (34%). Generally, about half of the LLRW volume in New York State broker collections is New York State generated. Therefore, the 1998 consolidated shipment of 5,869 ft³ should also reflect this. The remaining sixty-six percent (66%) 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 and Maine, and in consolidated shipments from brokers. Massachusetts was the single greatest out-of-state contributor, with 5,120.7 ft³ (145 m³) and 17,902.4 Ci (662,387 GBq).

New York State generated waste was sent for treatment or disposal primarily to the GTS Duratek facility in Oak Ridge, TN; Chem-Nuclear Disposal Facility in Barnwell, SC; and the Manufacturing Science Corporation in Oak Ridge, TN. Other treatment or disposal facilities that received waste transported through New York State include Envirocare of Utah in Clive, UT; Perma-fix Facility in Gainesville, FL; Allied Technical Group, Richland, WA; F.W. Hake Associates, Memphis, TN; Molten Metal Technology of Tennessee, Oak Ridge, TN; NSSI, Inc., Houston, TX; U.S. Ecology-Hanford Reservation, Richland, WA; U.S. Ecology, Oak Ridge, TN; Thomas Gray & Associates, Orange, CA; American Ecology, Oak Ridge, TN; Diversified Scientific Services, Inc., Kingston, TN; and RSO, Inc. Laurel, MD. 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 or treatment.

Waste was carried by thirteen (13) permitted transporters, consisting of two (2) New York State based brokers, two (2) out-of-state brokers, and nine (9) 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 low-level radioactive waste (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.

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 F (Appendix G after March 1, 1998). After March 1, 1998, all licensees were required to use Appendix G (instead of Appendix F) which, among other things, requires the use of the new NRC uniform manifest (form 540, form 541, etc.). Disposal facilities were allowed to require the use of the new uniform manifest before the March 1, 1998 date, and many of the generators completed the new manifest forms and sent them along with their shipments prior to March 1, 1998.

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 transporters 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 (NDL, Inc. and Radiac Research Corporation) frequently make collections from New York State LLRW generators and those of neighboring states and store the waste at their facilities for a 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 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). These wastes termed Class B "stable" 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 "intruder protected" 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 account for less than ten percent (10%) of the volume of all LLRW generated in New York State. These wastes are generated primarily by nuclear power plants.

SECTION II: LLRW TRANSPORT BY NEW YORK STATE BROKERS

Radiac Research Corporation (RRC) and NDL, Inc. are the two New York State licensed brokers previously reported in this data base report. NDL, Inc., however, did not perform any broker waste collections in 1998. A total of 53 manifests from RRC were entered into this data base for the year 1998. 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 1,225.4 ft³ (34.7 m³) of LLRW in 1998 from New York and other states. The waste was contained in 187 packages and had a total activity of 255 Ci (9,435,000 MBq). RRC and NDL, Inc. shipped 5,869.7 ft³ (166.2 m³) out of the State in consolidated shipments for disposal during that same time period (See Table IV-1, page 12).

The breakdown of broker collections for the two New York State licensed brokers is:

NDL No collections for 1998

RRC 1,225.4 ft³ (34.7 m³) - 100% of total volume 255 Ci (9,435,000 MBq) -
100% of total activity

Origin and Destination

RRC collected LLRW from five states other than New York during 1998. This waste was brought back to their facility in Brooklyn, New York. The following list in Table II-1 is in order of volume in cubic feet (ft³).

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

Generators	Volume		Activity		Number of Collections
	ft ³ (cubic feet)	m ³ (cubicmeters)	Ci (curie)	Mbq (mega-becquerel)	
New York	796	22.5	0.559	20,683	27
New Jersey	264	7.5	254.347	9,410,839	13
Massachusetts	107	3.0	0.046	1,702	6
Pennsylvania	43	1.2	0.043	1,591	1
Connecticut	15	0.4	0.000*	1	1
Ohio	0.7	0.02	0.000*	5	1
Totals	1,225.7	34.7	254.995	9,434,821	53

* Please Note: Actual activity was 0.000018 Ci for Connecticut and 0.00013 Ci for Ohio

Collection Frequency

LLRW was collected by RRC several days a week except for holidays, weekends, and in all months except February, September, and November. These LLRW collections consisted mainly of local pickups and return of the waste to the broker's facility. RRC on the average performed approximately six collections per month for the nine-month period that collections occurred. The minimum number of collections per month was one and the maximum number was 17. A total of 32 generators were serviced by RRC during 1998. Approximately half (15) of these generators were located in New York State.

Waste Categories

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	AU	39	73.6
Scintillation vials	AU	3	5.7
Other	AU/AS	5	9.4
Sealed sources	C	4	7.5
Biological - not carcass	AU	1	1.9
Demolition rubble	AU	1	1.9
Totals		53	100%

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 no New York State broker shipments designated as “Exclusive Use” in 1998. For the most part the Type A packaging used consists of 55 gallon (7.5 ft³), 30 gallon (4.01 ft³), or 5 gallon (.67 ft³) metal drums or metal/wood boxes.

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. There were no packages collected by brokers that had “Yellow III” labels on them in 1998.

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

ADCOM Express, Inc. (ADCO) and Teledyne-Brown Engineering (TBE) are the two out-of-state LLRW brokers that transported waste within or through New York State during 1998. A total of 32 manifests were submitted to the Department by these two brokers during 1998. These out-of-state brokers are required to submit manifests for collections that originate in, or pass through New York. ADCO performed seven LLRW collections servicing primarily universities and hospitals. TBE performed 25 New York State manifested collections. The manifests submitted indicate that all collections performed by these two brokers were from New York State generators.

The total activity of LLRW collected by these brokers was 30.467 Ci (1,127,294 MBq). The total volume collected was 844.4 ft³ (23.9 m³). The breakdown by broker is:

ADCO	399 ft ³ (11.3 m ³) - 47% of total volume 0.160 Ci (5,954.7 MBq) - <1% of total activity
TBE	444.9 ft ³ (12.6 m ³) - 53% of total volume 30.306 Ci (1,121,322 MBq)- 99% of total activity

Origin and Destination

New York State generators produced the LLRW for all 32 collections by out-of-state brokers. There were no manifests submitted to the Department from these two brokers that showed LLRW 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 399 ft³ of LLRW went back to ADCO in Illinois and 445 ft³ went back to TBE in New Jersey.

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

Shipment Frequency

LLRW was not collected by out-of-state brokers in the months of February, April, and August. During the nine-month period of 1998 in which the collections were performed, waste was collected approximately 3.5 times per month. The month of

December had the highest number of collections (7). The waste types (i.e., compactible trash, etc.) 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 32 shipments carried by ADCO and TBE 17 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 the two 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.

Nine non-broker transporters and two New York State based brokers transported LLRW from or through New York State directly to a disposal facility or a licensed waste processor. These transporters carried 56,821.3 ft³ (1,609 m³) of LLRW in 155 shipments within or through New York State during 1998. This is less than the volume of LLRW transported in previous years by these transporters (80,621 ft³ in 164 shipments).

The total activity of the LLRW transported in the 155 shipments by non-broker transporters and brokers in consolidated shipments was 72,381.6 Ci (2,678,120,754 megabecquerels). This represents an increase in activity from 1997.

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 almost exclusively 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

Seven states, other than New York State, had 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**

State of Origin	Total Volume		Total Activity	
	ft ³ (cubic feet)	m ³ (cubic meters)	Ci (curie)	Mbq (megabecquerel)
Broker Consolidated ¹	5,869.7	166.2	9.402	347,874
New York ²	18,325.0	518.9	53,124.487	1,965,606,019
Maine	20,898.3	591.8	290.584	10,751,608
Massachusetts	5,120.7	145.0	17,902.360	662,387,320
Virginia	1,255.0	35.5	0.497	18,389
Connecticut	4,808.6	136.2	106,748.000	3,949,676
Pennsylvania	420.6	11.9	163.072	6,033,664
New Jersey	85.0	2.4	0.003	111
New Hampshire	38.3	1.1	784.489	29,026,093
Totals	56,821.2	1,609.0	72,381.642	2,678,120,754

¹ Note that only a portion of this waste was generated in New York State.

² Note that this does not include waste in broker consolidated portion.

A total of 15 different TSDFs were used by New York State permitted transporters during 1998. These facilities are:

GTS Duratek, Oak Ridge, TN;
Barnwell Waste Management Facility, Barnwell, SC;
Envirocare of Utah, Clive UT;
F.W. Hake Associates, Memphis, TN;
Allied Technical Group, Inc. (ATG), Richland, WA;
Molten Metal Technology of Tennessee, Oak Ridge, TN;
Manufacturing Science Corporation (MSC) Oak Ridge, TN;
Perma-Fix, Gainesville, FL;
NSSI, Inc., Houston, TX;
U.S. Ecology-Hanford Reservation, Richland, WA;
U.S. Ecology, Oak Ridge, TN;
Thomas Gray & Associates, Orange, CA;
American Ecology, Oak Ridge, TN;
Diversified Scientific Services, Inc. (DSSI), Kingston, TN; and
RSO, Inc., Laurel MD.

The majority (70% 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 material was processed prior to final disposal elsewhere. The Barnwell Waste Management Facility in Barnwell, SC, received about thirteen percent (13%) by volume. The remaining seventeen percent (17%) 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 ³ (cubic feet)	m ³ (cubic meters)	Ci (curie)	Mbq (megabecquerel)
GTS Duratek	40,503.4	1,146.9	173.578	6,422.386
Barnwell	7,369.0	208.7	71,073.366	2,629,714,542
Environcare	1,971.0	55.8	0.083	3,071
F.W. Hake	1,173.0	33.2	0.018	666
ATG, Inc.	1,148.8	32.5	1,061.881	39,289,597
Molten Metal	1,047.7	29.7	60.588	2,241,756
MSC	911.5	25.8	0.203	7,511
Perma-Fix	822.2	23.3	0.768	28,416
NSSI, Inc.	592.0	16.8	0.207	7,659
US Ecology-Hanford	501.5	14.2	0.805	29,785
US Ecology-Oak Ridge	447.3	12.7	9.375	346,875
Thomas Gray	317.5	9.0	0.028	1,036
American Ecology	7.5	0.2	0.019	703
DSSI	4.1	0.1	0.000	7
RSO, Inc.	4.1	0.1	0.722	26,714
Totals	56,820.6	1,609.0	72,381.641	2,678,120,670

Shipment Frequency

One hundred and fifty-five (155) shipments of LLRW were transported out of or through New York State during 1998 by non-broker transporters or New York State brokers in consolidated shipments. This averages out to about 12.9 shipments per month. The number of shipments ranged from two to 30 per month. Of the 155 shipments, 93 were shipments of Class A LLRW, 13 of Class B, 16 of Class C, and 33 that had no waste class designation on the manifest because it is not required for shipments to waste processors.

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 A unstable (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 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 provide 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 is 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 1,704 LLRW packages were transported by these transporters during 1998. A total of 98 of the 155 shipments transported by non-broker transporters and New York State brokers in consolidated shipments were designated as “exclusive use.”

Transporters

NDL, Inc. and RRC are the only New York State based brokers that, in addition to local broker collections, also transport LLRW directly to disposal or processing facilities in consolidated shipments and direct pickups for disposal. NDL, Inc. and RRC transported 5,869.7 ft³ (166.2 m³) of LLRW with a total activity of 9.402 Ci (347,874 MBq) in 1998 in consolidated shipments. In addition, NDL, Inc. carried 1,302.5 ft³ (36.9 m³) of LLRW with an activity of 0.497 Ci (18,389 MBq) in direct pickups for disposal. The other transporters include:

Hittman Transport Services, Inc. (24,491.4 ft³ [693.5 m³], 169.6 Ci [6,275,200 Mbq]);
T.A.G. Transport, Inc. (8,542.6 ft³ [241.9 m³], 1,061 Ci [39,257,000 Mbq]);
Tri-State Motor Transit (TRISM) (8,276.3 ft³ [234.3 m³], 70,647.2 Ci [2,613,946,400 Mbq]);
Kindrick Trucking Company (4,078.8 ft³ [115.5 m³], 341.4 Ci [12,631,800 Mbq]);
International Waste Removal (1,861.4 ft³ [52.7 m³], 0.029 Ci [1,073 Mbq]);
Dart Trucking, Inc. (1719.6 ft³ [48.7 m³], 9.7 Ci [358,900 Mbq]);
Hazmat Environmental Group (501.5 ft³ [14.2 m³], 0.8 Ci [29,600 Mbq]);
Priority Transport (135.9 ft³ [3.8 m³], 8.21 Ci [303,770 Mbq]); and
R & R Trucking (41.67 ft³ [1.8 m³], 133.7 Ci [4,946,900 MBq]).

SECTION V: COMPARISON WITH NYSERDA DATA

The volume and activity of LLRW mentioned 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 240 manifests with their associated continuation sheets were received by the NYSDEC from all LLRW transporters for 1998 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. A substantial amount of LLRW (almost half) collected by New York State based brokers was generated in states other than New York. These states are primarily in New England. RRC collected 1,225.4 ft³ (34.7 m³) of LLRW with a total activity of 255 Ci (9,435,000 MBq). RRC and NDL, Inc. shipped in consolidated shipments about 5,869.7 ft³ (166.2 m³) with an activity of 9.4 Ci (347,874 MBq) for disposal.
2. The two out-of-state brokers permitted under Part 381 to transport LLRW within New York collected a total of 844.4 ft³ (23.9 m³) with a total activity of 30.467 Ci (56,821 MBq). One hundred percent of this waste was generated in New York State.
3. A total of 56,821 ft³ (1,609 m³) of LLRW having a total activity of 72,381.640 Ci (2,678,120.7 GBq) was transported into, within, or through New York State in 1998 by non-broker transporters and brokers in consolidated shipments. These shipments were en route to TSDFs located outside New York. This is a smaller volume of waste than was transported in previous years.
4. The LLRW disposal facility in Barnwell, SC, received thirteen percent (13%), by volume, of the waste transported from or through New York State. The GTS Duratek LLRW treatment facility in Oak Ridge, TN, received approximately seventy percent (70%) of the waste. About three percent (3%) of the LLRW was transported to Envirocare of Utah in Clive, UT. Twelve and one half percent (12.5%) went to facilities such as: Perma-Fix, Gainesville, FL; F.W. Hake Associates, Memphis, TN; ATG, Richland, WA; Molten Metal Technology of Tennessee, Oak Ridge, TN; MSC, Oak Ridge, TN; NSSI Inc., Houston, TX; U.S. Ecology, Oak Ridge, TN; U.S. Ecology-Hanford Reservation, Richland, WA; Thomas Gray & Associates, Orange, CA; DSSI, Kingston, TN; and RSO, Inc., Laurel, MD. The remaining one and one half percent (1.5%) of the waste was

transported to the broker storage facilities of Teledyne Brown Engineering in Westwood, NJ, and ADCOM Express in Tinley Park, IL. The majority of the waste taken to treatment or broker storage facilities is eventually transported to the Barnwell disposal facility in Barnwell, SC.

5. 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 six collections per month. Broker collections in New York by out-of-state brokers averaged about three and one half collections per month.
6. In 1998, a total of 155 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 12.9 shipments per month. The range of shipments was two to 30 per month.
7. New York State based brokers and out-of-state brokers transported primarily Class A LLRW. One shipment of Class C sealed sources was however recorded in 1998. Approximately ninety-four percent (94%) of the LLRW volume transported by non-broker transporters or brokers in consolidated shipments was Class A waste. About two (2%) of the LLRW was Class B. About one percent (1%) was Class C waste, and three percent (3%) was not assigned a waste class because it was being shipped to a waste processor.
8. Contaminated compactible trash constituted the major waste type carried by both New York State brokers and out-of-state brokers. Scintillation vials, biological, sealed sources, and demolition rubble 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) compactible trash, mixed bed ion exchange resins, contaminated soil and debris, contaminated equipment, irradiated reactor components, evaporator bottoms, filter media, and non-compactible dry active waste.
9. Transporters permitted under Part 381 in 1998 performed a total of 53 in-state broker collections and 187 shipments to TSDFs. The latter 187

shipments consisted of 32 out-of-state broker shipments and 155 non-broker transporter and broker consolidated shipments.

10. Part 381 has provisions for exemption from permit and manifest requirements, provided that the applicant can meet existing criteria (381.5(a)-(f)). To date, six applicants have applied for and received exemptions.

11. The safety record for LLRW transport in New York State is excellent. Only seventeen (17) transportation events occurred in New York State during the period 1971 to 1998, 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 17 LLRW transportation events during this 27-year period (1971-1998), six 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 maintained at the Sandia National Laboratory in Albuquerque, New Mexico.