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

2000 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 2000 was 111,549 cubic feet (3,158.7 cubic meters) with a total radioactivity level of 36,449.2 curies[1] (1,348,620.4 gigabecquerels)[2]. The waste was contained in 2,527 packages in a total of 564 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 (99.3 %) of waste transported was Class A, less than one percent (0.5%) Class B, and less than one percent (0.2%) was 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 2000, all generators did so.

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[1]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.

[2]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 2000, approximately sixty-two percent (61.8%) of the volume and eight percent (8.0%) of the activity was generated in New York State. This consisted of 68,931 ft^3 (1,951.9 m^3) with a total activity of 3,184.34 Ci (117,820.7 GBq). The remaining thirty-eight percent (38.2%) 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, and Maine, and in consolidated shipments from brokers. Massachusetts was the single greatest out-of-state contributor, with 32,047 ft^3 (907.5 m^3) and 1,222.4 Ci (45,228.8 GBq).

New York State generated waste was sent for treatment or disposal primarily to the Envirocare facility in Clive, Utah (contaminated asbestos, miscellaneous debris and soil); GTS Duratek facility in Oak Ridge, TN; Chem-Nuclear Disposal Facility in Barnwell, SC; U.S. Ecology-Hanford Reservation, Richland, WA; and the Allied Technology Group (ATG) in Richland, WA. Other treatment or disposal facilities that received waste generated in New York State or surrounding New England states include: Allied Technology Group (ATG), Oak Ridge, TN; Studsvik Processing Facility, Erwin, TN; and Diversified Scientific Services, Inc. (DSSI), Kingston, TN. 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 twelve (12) permitted transporters, consisting of two (2) New York State based brokers, two (2) out-of-state brokers, and eight (8) 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 (NDL Organization, 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 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). These wastes termed 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 2000, 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) and NDL Organization, Inc. are the two New York State licensed brokers previously reported in this data base report. NDL Organization, Inc. submitted eighty-six (86) LLRW manifests for broker waste collections in 2000. A total of one hundred and ninety-nine (199) manifests were submitted by RRC for the year 2000. 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 6521.79 ft^3 (184.7 m^3) of LLRW in 2000 from New York and other states. The waste was contained in 990 packages and had a total activity of 15.66 Ci (579,420 MBq). NDL Organization, Inc. collected 2111.37 ft^3 (59.8 m^3) of LLRW in 2000. The waste was contained in 322 packages and had a total activity of 1.832 Ci (67,795 MBq).

New York State based brokers collected a total of 8,633.1 ft^3 (244.5 m^3) of LLRW with a total activity of 17.491 Ci (647,189 Mbq) from within and outside New York State. The breakdown of broker collections for the two New York State licensed brokers is:

NDL 2,111.37 ft^3 (59.8 m^3) - 24.5% of total volume and 1.832 Ci (67,795 MBq) 10.5% of total activity

RRC 6,521.79 ft^3 (184.7 m^3) - 75.5% of total volume and 15.66 Ci (579,420 MBq) 89.5% of total activity

RRC and NDL Organization, Inc. shipped 4,420.13 ft^3 (125.2 m^3) out of the State in consolidated shipments for disposal or treatment during the same time period (See Table IV-1, page 11).

Origin and Destination

RRC collected LLRW from five (5) states other than New York during 2000. This waste was brought back to their facility in Brooklyn, New York. NDL Organization, Inc. collected LLRW from seven (7) states other than New York during 2000. The following list in Table II-1 tabulates the states from which waste was collected in the year 2000.

TABLE II-1
ORIGIN OF LLRW IN NYS BROKER COLLECTIONS

Generators	Volume		Activity		Number of Collections
	ft^3 (cubic feet)	m^3 (cubic meters)	Ci (curie)	MBq (megabecquerel)	
New York	4,665.43	132.11	6.212	229,844	163
New Jersey	892.19	25.26	10.264	379,768	41
Connecticut	1,640.43	46.45	0.707	25,159	24
Pennsylvania	72.27	2.05	0.071	2,627	3
Vermont	52.5	1.49	0.002	74	1
Massachusetts	1,292.59	36.6	0.223	8,251	50
Rhode Island	None	None	None	None	0
New Hampshire	16.4	0.46	0.010	370	1
Maine	0.68	0.02	0.00001	<1	1
Delaware	None	None	None	None	0
Illinois	0.67	0.02	0.00001	<1	1
Totals	8,633.1	244.46	17.491	647,189	285

Collection Frequency

LLRW was collected by RRC and NDL Organization, Inc. several days a week, except for holidays and weekends, and in all months of 2000. These LLRW collections consisted mainly of local pickups and return of the waste to the broker's facility. RRC and NDL Organization, Inc. performed approximately twenty-three (23) collections per month for the 12-month period. The minimum number of collections per month was five (5) and the maximum number was 48. A total of 123 generators were serviced by RRC and NDL Organization, Inc. during 2000. Sixty-six (66) 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	113	39.7
Scintillation Vials	AU	103	36.2
Other	AU/AS	6	2.1
Glassware/Labware	AU/AS/B/C	1	0.3
Aqueous Liquids	AU	28	9.8
Incinerable Trash	AU	9	3.2
Animal Carcass	AU	7	2.5
Contaminated Lead	AU	1	0.3
Non-Compactible DAW	AU	1	0.3
Sealed Sources	B/C	8	2.8
Organic Liquid	AU	6	2.1
Demolition Rubble/Soil	AU	2	0.6
Totals		285	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 fifteen (15) New York State broker shipments designated as "exclusive use" in 2000. The Type A packaging used for local broker collections consists primarily of 55 gallon (7.5 ft^3), 30 gallon (4.01 ft^3), or 5 gallon (.67 ft^3) metal drums. In some cases wood fiber boxes (5.0 ft^3) or plastic pails (.67 ft^3) 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. There was one package collected by a broker that had a "Yellow III" label on it in 2000.

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 2000. A total of 87 manifests were submitted to the Department by these two brokers during 2000. These out-of-state brokers are required to submit manifests for collections that originate in, or pass through New York. TBE performed eight (8) New York State manifested collections from New York State generators. ADCO performed seventy-nine (79) LLRW collections servicing primarily universities and hospitals. The manifests submitted indicate that nine (9) of the 79 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 62.833 Ci (2,324,821 MBq). The total volume collected was 1,690.49 ft^3 (47.87 m^3). The breakdown by broker is:

ADCO 1,448.2 ft^3 (41.0 m^3) - 85.6% of total volume
62.547 Ci (2,314,246 MBq) - 99.5% of total activity

TBE 242.29 ft^3 (6.86 m^3) - 14.4% of total volume
0.2859 Ci (10,578 Mbq) - 0.5% of total activity

Origin and Destination

New York State generators produced the LLRW for 17 of the 87 collections by out-of-state brokers. There were 70 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 1,448.2 ft^3 (41.0 m^3) of LLRW went back to ADCO in Illinois and 242.29 ft^3 (6.86 m^3) 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 January, April, June, August, October, and December. During the six-month period of 2000 in which the collections were performed, waste was collected approximately fourteen (14) times per month (average). The months of May, July, March and November had the highest number of collections (16). The waste types (i.e., 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 87 shipments carried by ADCO and TBE, 82 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.

Eight (8) 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 during 2000. These transporters carried 101,225.62 ft^3 (2,866.4 m^3) of LLRW in 192 shipments within or through New York State during 2000. This is more than the volume of LLRW transported in 1999 by these transporters (65,491.38 ft^3 [1,854.5 m^3] in 180 shipments).

The total activity of the LLRW transported in the 192 shipments by non-broker transporters and brokers in consolidated shipments was 36,368.893 Ci (1,345,649,041 MBq). This shows an increase in activity from 1999 (4,455.2 Ci [164,842,400 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

Seven (7) 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

State of Origin	Total Volume		Total Activity	
	ft^3 (cubic feet)	m^3 (cubic meters)	Ci (curie)	MBq (megabecquerel)
Broker Consolidated[1]	3,781.74	107.08	3.193	118,167
Broker Consolidated[2]	638.39	18.07	8.957	331,420
New York[3]	60,005.33	1,699.16	3,173.984	117,437,415
Maine	234.53	6.64	2,556.621	94,594,977
Massachusetts	29,894.60	846.52	1,160.912	42,953,744
Vermont	2,982.35	84.45	23,062.570	853,315,120
Connecticut	3,524.68	99.80	6,358.201	241,913,459
Tennessee	7.5	0.21	0.0009	34
New Jersey	67.5	1.91	0.492	18,208
New Hampshire	89.0	2.52	43.960	1,626,520
Totals	101,225.6	2,866.4	36,368.893	1,345,649,041

[1] Portion of broker consolidated shipment generated in New York State.
[2] Portion of broker consolidated shipments generated in other states
[3] 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 eight (8) different TSDFs were used by New York State permitted transporters during 2000. 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;
Allied Technology Group, Inc. (ATG), Oak Ridge, TN;
Studsvik Processing Facility, Irwin TN;
U.S. Ecology-Hanford Reservation, Richland, WA; and
Diversified Scientific Services, Inc. (DSSI), Kingston, TN

The majority (55% by volume) of the waste transported by non-broker transporters and brokers in consolidated shipments went to the Envirocare Facility in Clive, UT. The Barnwell Waste Management Facility in Barnwell, SC, received about five percent (5.0%) by volume. The GTS Duratek Facility in Oak Ridge, TN received about twenty-seven percent (27%). This waste was processed prior to disposal. The remaining thirteen percent (13%) 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	27,573.61	780.79	1.902	70,374
Barnwell	5,426.53	153.66	36,306.059	1,343,324,183
Environcare	55,711.1	1,577.56	9.000	333,000
ATG, Inc. (Richland)	5,006.0	141.75	11.403	421,911
ATG, Inc. (Oak Ridge)	174.5	4.94	32.850	1,215,450
Studsvik Processing	175.0	4.95	2.788	103,156
US Ecology-Hanford	7,084.0	200.59	4.396	162,652
DSSI	74.87	2.12	0.492	18,204
Totals	101,225.62	2,866.4	36,368.893	1,345,649,041

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

Shipment Frequency

One hundred and ninety-two (192) shipments of LLRW were transported out of or through New York State during 2000 by non-broker transporters or New York State brokers in consolidated shipments. This averages out to about 16 shipments per month. The number of shipments ranged from seven (7) to 28 per month. Of the 192 shipments, 178 were shipments of Class A LLRW, six (6) of Class B, and eight (8) 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 Al 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 971 LLRW packages were transported by these transporters during 2000. A total of 100 of the 192 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 4,420.13 ft^3 (125.16 m^3) of LLRW with a total activity of 12.151 Ci (449,587 MBq) in 2000 in consolidated shipments. The other transporters include:

Hittman Transport Services, Inc. (39,150.41 ft^3 [1,108.6 m^3], 35,256.5 Ci [1,304,490,500 MBq]);

T.A.G. Transport, Inc. (1,837 ft^3 [52.0 m^3], 8.598 Ci [318,126 MBq]);

Tri-State Motor Transit (TRISM) (25,324 ft^3 [717.0 m^3], 0.2322 Ci [8,591 MBq]);

Kindrick Trucking Company (5,721.6 ft^3 [162.0 m^3],1,054.319 Ci [39,009,803 MBq]);

International Waste Removal (22,951.0 ft^3 [649.9 m^3], 0.0565 Ci [2,090 MBq]);

Buffalo Fuel Corporation (310.48 ft^3 [8.8 m^3], 0.00675 Ci [249.8 MBq]) ;

Priority Transport (439.0 ft^3 [12.4 m^3], 32.1448 Ci [1,189,358 MBq]); and

Hazmat Environmental Group (1,004.5 ft^3 [28.4 m^3], 4.3892 Ci [162,400 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 NYSERDA 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 are eventually determined to be LLRW at these out-of-state facilities and are 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 NYSERDA.

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 NYSERDA 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 NYSERDA 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 NYSERDA 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 564 manifests with their associated continuation sheets were received by the NYSDEC from all LLRW transporters for 2000 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 2000 performed a total of 287 in-state broker collections and 279 shipments to TSDFs located outside of New York State. The latter 279 shipments consisted of 87 out-of-state broker shipments and 192 non-broker transporter and broker consolidated shipments.

2.. ***New York State Based Brokers*** - A substantial amount of the LLRW (46%) collected by New York State based brokers was generated in states other than New York. These states are primarily in New England. RRC collected 6,521.8 ft^3 (184.7 m^3) of LLRW with a total activity of 15.66 Ci (579,420 MBq). NDL Organization, Inc. collected 2,111.37 ft^3 (59.8 m^3) of LLRW with a total activity of 1.832 Ci (67,795 MBq). RRC and NDL Organization, Inc. shipped in consolidated shipments about 4,420.13 ft^3 (125.2 m^3) with an activity of 12.151 Ci (449,587 MBq) for disposal (see #4 below).

3. ***Out-Of-State Brokers*** - The two out-of-state brokers permitted under Part 381 to transport LLRW within New York collected a total of 1,690.49 ft^3 (47.87 m^3) with a total activity of 62.833 Ci (2,324,821 MBq). Twenty-eight percent (28%) of this waste was generated in New York State.

4. ***Non-Broker Transporters*** - A total of 101,225.62 ft^3 (2,866.4 m^3) of LLRW having a total activity of 36,368.893 Ci (1,345,649,041 MBq) was transported into, within, or through New York State in 2000 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 1999.

5. ***TSDF's*** - The LLRW disposal facility in Barnwell, SC, received five percent (5.0%), by volume, of the waste transported from or through

New York State. The GTS Duratek LLRW treatment facility in Oak Ridge, TN, received approximately twenty-seven percent (27%) of the waste. About fifty-five percent (55%) of the LLRW was transported to Envirocare of Utah in Clive, UT. The remaining thirteen percent (13%) went to facilities such as: ATG, Richland, WA; ATG, Oak Ridge, TN; U.S. Ecology-Hanford Reservation, Richland, WA; Studsvik Processing Facility, Erwin, TN; and DSSI, Kingston, TN. A small amount of the waste was also transported to the broker storage facilities of Teledyne Brown Engineering in Westwood, 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-three (23) collections per month. Broker collections in New York by out-of-state brokers averaged about fourteen (14) collections per month.

7. ***Non-Broker Transporter Shipment Frequency*** - In 2000, a total of 192 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 16 shipments per month. The range of shipments was seven (7) to 28 per month.

8. ***Waste Class*** - New York State based brokers and out-of-state brokers transported primarily Class A LLRW. Approximately ninety-nine percent (99.3%) of the LLRW volume transported by non-broker transporters or brokers in consolidated shipments was Class A waste. Less than one percent (0.5%) of the LLRW was Class B. Less than one percent (0.2%) 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, 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) contaminated soil and debris, compactible trash, non-compactible dry active waste, contaminated equipment, mixed bead ion exchange resins, evaporator bottoms, filter media, and irradiated reactor components.

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)). To date, 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 seventeen (17) transportation events occurred in New York State during the period 1971 to 2000, 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 29-year period (1971-2000), six (6) 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.