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

1999 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 1999 was 70,060 cubic feet (1,983.9 cubic meters) with a total radioactivity level of 4,480.3 curies[1] (165,771.1 gigabecquerels)[2]. The waste was contained in 1,979 packages in a total of 330 shipments.

LLRW waste classes are 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, and sealed sources; and Class C wastes include sealed sources and nuclear power plant irradiated reactor components.

Based on waste volume, ninety-eight percent (98%) of waste transported was Class A, less than two percent (1.8%) Class B, and less than one percent (0.2%) was Class C. 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 in 1999, all generators did so.

[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 1999, approximately seventy-six percent (75.8%) of the volume and seventy-one percent (71.0%) of the activity was generated in New York State. This consisted of 53,078.6 ft^3 (1,503 m^3) with a total activity of 3,201.03 Ci (118,438.1 GBq). The remaining twenty-four percent (24.2%) 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 10,729 ft^3 (303.8 m^3) and 1,069 Ci (39,553 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; and the Allied Technology Group (ATG) in Oak Ridge, TN. Other treatment or disposal facilities that received waste generated in New York State or surrounding New England states include Perma-fix Facility in Gainesville, FL; Allied Technology Group (ATG), Richland, WA; F.W. Hake Associates, Memphis, TN; NSSI, Inc., Houston, TX; U.S. Ecology-Hanford Reservation, Richland, WA; U.S. Ecology, Oak Ridge, 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 ten (10) permitted transporters, consisting of two (2) New York State based brokers, two (2) out-of-state brokers, and six (6) 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 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 1999, 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 forty-eight (48) LLRW manifests for broker waste collections in 1999. A total of eighty-four (84) manifests were submitted by RRC for the year 1999. 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 2,670.7 ft^3 (75.6 m^3) of LLRW in 1999 from New York and other states. The waste was contained in 389 packages and had a total activity of 21.9 Ci (810,300 MBq). NDL Organization, Inc. collected 1,316.5 ft^3 (37.3 m^3) of LLRW in 1999. The waste was contained in 216 packages and had a total activity of 0.889 Ci (32,893 MBq).

New York State based brokers collected a total of 3,987.2 ft^3 (112.9 m^3) of LLRW with a total activity of 22.789 Ci (843,193 MBq). The breakdown of broker collections for the two New York State licensed brokers is:

NDL 1,316.5 ft^3 (37.3 m^3) - 33% of total volume and 0.889 Ci (32,893 MBq) 3.9% of total activity

RRC 2,670.7 ft^3 (75.6 m^3) - 67% of total volume and 21.9 Ci (810,300 MBq) 96.1% of total activity

RRC and NDL Organization, Inc. shipped 3933.4 ft^3 (111.38 m^3) out of the State in consolidated shipments for disposal during that same time period (See Table IV-1, page 11).

Origin and Destination

RRC collected LLRW from eight (8) states other than New York during 1999. This waste was brought back to their facility in Brooklyn, New York. NDL Organization, Inc. collected LLRW from six (6) states other than New York during 1999. The following list in Table II-1 is in order of volume in cubic feet (ft^3).

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	2860 .00	80.98	21.396	791,652	84
New Jersey	471.24	13.34	0.703	26,011	20
Connecticut	267.25	7.56	0.149	5,513	8
Pennsylvania	238.27	6.74	0.450	16,650	7
Vermont	60.00	1.69	0.077	2,870	2
Massachusetts	49.77	1.41	0.017	629	5
Rhode Island	23.80	0.67	0.00136	50	2
New Hampshire	8.00	0.22	0.0019	70	1
Maine	7.50	0.21	0.00005	2	1
Delaware	0.70	0.02	0.00001	<1	1
Ohio	0.70	0.02	0.00012	5	1
Totals	3,987.23	112.90	22.795	843,415	132

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 1999. 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 eleven (11) collections per month for the 12-month period. The minimum number of collections per month was one and the maximum number was 22. A total of 79 generators were serviced by RRC and NDL Organization, Inc. during 1999. Forty-three (43) 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	64	48.5
Scintillation Vials	AU	18	13.6
Other	AU/AS	14	10.6
Glassware/Labware	AU/AS/B/C	10	7.6
Aqueous Liquids	AU	8	6.0
Incinerable Trash	AU	8	6.0
Animal Carcass	AU	4	3.0
Solidified Liquids	AU	2	1.5
Non-Compactible DAW	AU	1	0.7
Sealed Sources	C	1	0.7
Contaminated Equip.	AU	1	0.7
Demolition Rubble	AU	1	0.7
Totals		132	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 1999. 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 or wood fiber boxes or plastic pails 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 were no packages collected by brokers that had "Yellow III" labels on them in 1999.

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 1999. A total of 18 manifests were submitted to the Department by these two brokers during 1999. These out-of-state brokers are required to submit manifests for collections that originate in, or pass through New York. ADCO performed ten (10) LLRW servicing primarily universities and hospitals. TBE performed eight (8) 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 2.393 Ci (88,541 MBq). The total volume collected was 581.4 ft^3 (16.46 m^3). The breakdown by broker is:

ADCO	202.9 ft^3 (5.74 m^3) - 35% of total volume
	2.081 Ci (76,997 MBq) - 87% of total activity

TBE	378.5 ft^3 (10.71 m^3) - 65% of total volume
	0.311 Ci (11,507 MBq)- 13% of total activity

Origin and Destination

New York State generators produced the LLRW for all 18 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 203 ft^3 (5.75 m^3) of LLRW went back to ADCO in Illinois and 379 ft^3 (10.7 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 July, October, and December. During the nine-month period of 1999 in which the collections were performed, waste was collected approximately two (2) times per month (average). The month of September had the highest number of collections (6). 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 18 shipments carried by ADCO and TBE, 12 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.

Six 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 1999. These transporters carried 65,491.38 ft^3 (1,854.5 m^3) of LLRW in 180 shipments within or through New York State during 1999. This is more than the volume of LLRW transported in 1998 by these transporters (56,821.3 ft^3 [1,609 m^3] in 155 shipments).

The total activity of the LLRW transported in the 180 shipments by non-broker transporters and brokers in consolidated shipments was 4,455.2 Ci (164,842,400 MBq). This represents a decrease in activity from 1998 (72,381 Ci [2,678,097,000 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

Seven 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]	2,580.86	73.08	1.299	48,063
Broker Consolidated[2]	1,352.57	38.30	129.830	4,803,710
New York[3]	49,334.96	1,397.01	3,194.955	118,213,335
Maine	241.30	6.83	5.299	196,063
Massachusetts	10,728.95	303.81	1,068.915	39,549,855
Vermont	990.60	28.05	52.258	1,933,546
Connecticut	4.00	0.11	0.00*	<1
Pennsylvania	67.80	1.91	0.046	1,694.6
New Jersey	1.34	.03	0.046	1,694.6
New Hampshire	189.00	5.35	2.531	93,647
Totals	65,491.38	1,854.48	4,455.179	164,842,400

[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 actual activity for Connecticut was .0000035 Ci (3.5 FCi)

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 11 different TSDFs were used by New York State permitted transporters during 1999. 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 Technology Group, Inc. (ATG), Richland, WA;
Allied Technology Group, Inc. (ATG), Oak Ridge, TN;
Perma-Fix, Gainesvile, FL;
NSSI, Inc., Houston, TX;
U.S. Ecology-Hanford Reservation, Richland, WA;
U.S. Ecology, Oak Ridge, TN;
Diversified Scientific Services, Inc. (DSSI), Kingston, TN; and

The majority (44% 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 seventeen percent (17%) by volume. The GTS Duratek Facility in Oak Ridge, TN received about eighteen percent (18%). This waste was processed prior to disposal. The remaining twenty-one percent (21%) 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	11,862.5	335.9	131.212	4,854,844
Barnwell	11,054.4	313.0	4,293.464	158,858,168
Environcare	29,041.0	822.3	2.475	91,575
F.W. Hake	1,040.0	29.4	0.007	259
ATG, Inc. (Richland)	3,453.7	97.8	2.530	93,610
ATG, Inc. (Oak Ridge)	6,534.0	185.0	0.652	24,124
Perma-Fix	413.5	11.7	0.333	12,321
NSSI, Inc.	10.7	0.303	0.060	2,220
US Ecology-Hanford	2040.0	57.8	4.431	163,947
US Ecology-Oak Ridge	34.7	1.0	20.006	740,222
DSSI	6.8	0.2	0.009	333
Totals	65,491.3	1854.5	4,455.180	164,841,660

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

Shipment Frequency

One hundred and eighty (180) shipments of LLRW were transported out of or through New York State during 1999 by non-broker transporters or New York State brokers in consolidated shipments. This averages out to about 15 shipments per month. The number of shipments ranged from one to 57 per month. Of the 180 shipments, 171 were shipments of Class A LLRW, five (5) of Class B, and four (4) 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 1,292 LLRW packages were transported by these transporters during 1999. A total of 139 of the 180 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 3,933.4 ft^3 (111.38 m^3) of LLRW with a total activity of 131.131 Ci (4,851,847 MBq) in 1999 in consolidated shipments. The other transporters include:

Hittman Transport Services, Inc. (18,559.4 ft^3 [525.5 m^3], 3,391.06 Ci [125,469,220 MBq]);

T.A.G. Transport, Inc. (11,688.8 ft^3 [331.0 m^3], 3.44 Ci [127,280 MBq]);

Tri-State Motor Transit (TRISM) (7,820 ft^3 [221.4 m^3], 0.385 Ci [14,245 MBq]);

Kindrick Trucking Company (1040 ft^3 [29.4 m^3], 0.007 Ci [259 MBq]);

International Waste Removal (19,761 ft^3 [559.5 m^3], 0.616 Ci [22,792 MBq]);

Radiac Research Corporation (direct shipment) (34.68 ft^3 [0.98 m^3], 20.0 Ci [740,222 MBq]); and

Hazmat Environmental Group (2,654 ft^3 [75.1 m^3], 908.5 Ci [33,614,500 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 330 manifests with their associated continuation sheets were received by the NYSDEC from all LLRW transporters for 1999 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 1999 performed a total of 132 in-state broker collections and 198 shipments to TSDFs located outside of New York State. The latter 198 shipments consisted of 18 out-of-state broker shipments and 180 non-broker transporter and broker consolidated shipments.

2.. ***New York State Based Brokers*** - A substantial amount of the LLRW (28%) collected by New York State based brokers was generated in states other than New York. These states are primarily in New England. RRC collected 2,670.7 ft^3 (75.6 m^3) of LLRW with a total activity of 21.9 Ci (810,300 MBq). NDL Organization, Inc. collected 1,316.5 ft^3 (37.3 m^3) of LLRW with a total activity of 0.889 Ci (32,893 MBq). RRC and NDL Organization, Inc. shipped in consolidated shipments about 3,933.4 ft^3 (111.4 m^3) with an activity of 131.1 Ci (4,851,773 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 581.4 ft^3 (16.4 m^3) with a total activity of 21.9 Ci (88,541 MBq). One hundred percent of this waste was generated in New York State.

4. ***Non-Broker Transporters*** - A total of 65,491.38 ft^3 (1,854.5 m^3) of LLRW having a total activity of 4,455.183 Ci (164,841,771 MBq) was transported into, within, or through New York State in 1999 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 1998.

5. ***TSDF's*** - The LLRW disposal facility in Barnwell, SC, received seventeen percent (17%), by volume, of the waste transported from or through New York State. The GTS Duratek LLRW treatment facility in Oak Ridge, TN, received approximately eighteen percent (18%) of the waste. About forty- four percent (44%) of the LLRW was transported to Envirocare of Utah in Clive, UT. The remaining twenty-one percent (21%) went to facilities such as: Perma-Fix, Gainesville, FL; F.W. Hake Associates,

Memphis, TN; ATG, Richland, WA; ATG, Oak Ridge, TN; NSSI Inc., Houston, TX; U.S. Ecology, Oak Ridge, TN; U.S. Ecology-Hanford Reservation, Richland, WA; 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 eleven collections per month. Broker collections in New York by out-of-state brokers averaged about two collections per month.

7. ***Non-Broker Transporter Shipment Frequency*** - In 1999, a total of 180 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 15 shipments per month. The range of shipments was one (1) to 57 per month.

8. ***Waste Class*** - New York State based brokers and out-of-state brokers transported primarily Class A LLRW. Approximately ninety-eight percent (98%) of the LLRW volume transported by non-broker transporters or brokers in consolidated shipments was Class A waste. Less than two (1.8%) 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) 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.

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 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 1999, 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 28-year period (1971-1999), 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.