
Transportation of Radioactive Material in Washington State

September 1980 - September 1981

Prepared by E. L. Gronemyer

Department of Social and Health Services
State of Washington

Prepared for
U.S. Nuclear Regulatory
Commission
and
U.S. Department of Transportation

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ABSTRACT

The receipt and survey of shipments of low level radioactive waste at the US Ecology disposal facility near Richland, Washington, continued during the second year of the contract. Washington State Radiation Control personnel inspected essentially all incoming shipments of radioactive waste to assure compliance with appropriate DOT shipping regulations, State of Washington Radiation Control regulations, and the conditions of US Ecology's radioactive materials license. The surveillance activities at the Richland site involved considerably more time, effort, and expense than any other activity associated with the transportation contract. Even though radioactive waste being transported to the Richland disposal site do not cross major portions of the state, the potential for radiological hazards exists. Surveillance activities associated with this contract have shown, however, that transportation violations have decreased significantly since 1979.

Other than waste, essentially all other shipments of radioactive materials through and within the state of Washington are radiopharmaceuticals. Especially in the Seattle area, the largest quantity of shipments involve radiopharmaceuticals transported via the state's only licensed nuclear pharmacy. Additionally, several airline companies operating from Sea-Tac Airport carry radioactive packages to the airport for distribution in Seattle. From Sea-Tac, courier companies deliver packaged radioactive materials to Seattle, Tacoma, and neighboring areas.

Contract studies involved inspections at all facilities or operations in the state handling radioactive materials. One of the main purposes for the study was to determine the extent to which personnel were being exposed to radiation through direct handling of packages containing radioactive materials or working in the vicinity of stored packages. Radiation exposures to transportation workers were studied and it was determined that excessive radiation was not being received by individuals in the course of transporting radioactive materials.

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We wish to thank the management and staff of the radioactive materials carriers, commercial airlines, nuclear pharmacy, and US Ecology for their cooperation in permitting access to and providing pertinent information for the second year study. We also wish to thank Marie Janinek, U.S. Nuclear Regulatory Commission for her patience and expert advice regarding contract details and arrangement of report information. Additionally, we wish to thank the reviewers of the quarterly reports for their excellent comments and guidance.

CONCLUSIONS AND RECOMMENDATIONS

Following the second year of the Surveillance Contract, the Washington State Radiation Control Program has concluded that the transport of radioactive materials in our state does not present a significant or unusual radiation hazard to personnel during routine handling and storage of packaged radioactive materials. During this year, the surveillance studies included those materials being transported by taxis, buses, airlines, trains, ships, common carriers and contract carriers. Many of the transport methods or systems were never studied before by Washington State, therefore, requirements of the transportation contract led to important insight into intrastate transport of radioactive materials.

In this report, we have attempted to document the important findings of our surveillance program and make appropriate conclusions regarding our findings. Of all of the surveillances performed under the contract, it was determined that employees of delivery companies (airport couriers using small vans to transport packaged radioactive materials) receive the greatest exposures. Results from our TLD studies involving the airport courier companies along with film badges worn by delivery company personnel, did indeed bear out the fact that higher radiation exposures were received by this group. Even though van drivers and package handling personnel received more radiation, it was also determined that their radiation exposures did not exceed 25 percent of the annual exposure limit for radiation workers.

Excluding personnel working at the low level radioactive waste disposal site, it was concluded that airport courier personnel were more routinely exposed to radiation resulting in the accumulation of higher radiation readings. Thus being the case, it is recommended that any future studies of transport methods in Washington, definitely focus on the airport couriers.

During our contacts and visits to the airport couriers, suggestions for improving handling and storage procedures by our inspectors had been incorporated by various companies. Improvements in their programs should lead to an overall reduction in personnel radiation exposures. With the conclusion of the transport contract, the true results of our suggested improvements at the transport companies may never be known.

INTRODUCTION

Effective September 9, 1981, the Washington State Radiation Control Program completed the second year of radiological investigations and studies authorized under contract #NRC-06-79-305. During the second year of the contract period, the program concentrated its surveillance on transportation in those cities or areas where major quantities of packages containing radioactive materials were being handled. The major emphasis for the contract was placed on the surveillance of radioactive waste shipments arriving at US Ecology's low level radioactive waste disposal facility near Richland, Washington. Other surveillance activities were concentrated at major distribution points such as Sea-Tac Airport in Seattle, and the transport of radioactive materials in and around the Seattle area. Also during the second year of the contract, considerable emphasis was placed on the transport of radioactive materials by and to Washington State radioactive materials licensees.

Following the second year of the contract, the Washington State Radiation Control Program decided further studies dealing with the transportation of radioactive materials were unnecessary and not cost effective. Transportation studies performed during the two-year contract period were adequate to assure the state that personnel exposures were being maintained at reasonable levels and generally not in excess of 25 percent of the maximum recommended limits. The surveillance program readily identified companies transporting large volumes of radioactive material packages. Once identified, our inspection efforts concentrated on the busier companies. In summary, it was determined that personnel handling radioactive materials packages in the State of Washington were receiving acceptable levels of radiation which was confirmed by our own thermoluminescent dosimetry (TLDs) studies and the examination of film badge records of employees working for the different transport companies.

SCOPE OF WORK

The second year of the contract involved more precise surveillance and involvement with the actual transport of radioactive materials in Washington State. The scope of the second year surveillance program is outlined below:

1. To provide a full-time inspector at the US Ecology radioactive waste burial site near Richland, Washington, in order to survey and accept all incoming shipments of radioactive materials. In addition, the inspector was to observe the unloading of all containers of radioactive materials prior to being placed in the burial trench.
2. To determine the degree to which Washington State licensees are complying to U.S. Department of Transportation rules and regulations.
3. To determine the levels of radiation being received by employees of companies shipping radioactive materials under Department of Transportation (DOT) rules and regulations. These companies are either generally licensed or exempt from Washington State licensing requirements.
4. To evaluate data and findings concerning personnel radiation exposures and levels of compliance with DOT rules and regulations.
5. To make appropriate recommendations to reduce personnel exposures and decrease the number of violations against DOT regulations.

INSTRUMENTATION AND CALIBRATION

During the year of this contract, Washington State Radiation Control personnel performed surveys with instruments from the following inventory of portable survey equipment, which includes the following: 18 Technical Associates Model CPM-5 Cutie Pies (C.P.'s); six Technical Associates TBM-3 geiger counters; four Johnson GSM-5 geiger counters; six Ludlum Model 2 geiger counters; two Ludlum Model 3 geiger counters; and two Ludlum Model 19 geiger counters. Instruments also available include an Eberline PAC-3G; Eberline PAC-ISAGA; and three Eberline Rascals Model PRS-1.

Survey meters and equipment are calibrated by a 90 millicurie Cesium 137 source owned by the Radiation Control Program. The calibration facility is located in our offices in the Smith Tower in Seattle and is available for calibration of instruments any time of the day. Our instrument calibration program requires the calibration of portable survey meters at a frequency not to exceed three months.

GENERAL DISCUSSION

The data collected for this reporting period is presented in Appendices A through F. Each appendix includes pertinent data accumulated in accordance with a certain surveillance objective as described below. All the information in the appendices was accumulated or generated during the contract period beginning September 10, 1980 and extending through September 9, 1981. Information included in this report was compiled by Washington State radiation control personnel. A discussion and explanation of each appendix is as follows:

Appendix A

Appendix A shows the number of radioactive waste shipments received at the US Ecology site, the shipments in noncompliance, and the total noncompliance items. The totals were accumulated during the 12 months of this contract period. Of the total 1,947 shipments inspected, 166 shipments were in noncompliance with a total of 194 noncompliance items determined.

In addition, Appendix A shows the monthly accumulation of waste received at the site in cubic feet, activity in curies, source material in kilograms, and number of containers received. In this report, all numbers have been rounded off to show approximate values. Monthly totals vary considerably, but an overall annual total of 1.5 million cubic feet of waste was accepted at the site during the second year of this contract. The 12-month total for the second year of the contract indicates 74,000 curies of activity were also received. Source material in kilograms amounted to 965,826 for the same period. The number of containers of radioactive waste received during this report period was 144,000 containers. During the contract period, the definition of "container" was changed to differentiate between a cask containing 18 drums and a cask containing one resin liner. The discrepancy in the total number of containers would not be significant and the error less than one percent.

Page 5 of Appendix A is a map showing the Hanford area operated by the U.S. Department of Energy (DOE). In the center of the Hanford site map the location of the radioactive waste burial site operated by U.S. Ecology has been identified. At the present time, U.S. Ecology has 100 acres of land which has been committed for radioactive waste burial. The hundred acres was subleased from the State of Washington and it represents only ten percent of the acreage leased to Washington State by DOE. The other 900 acres leased to the State of Washington is being held in reserve for expansion by US Ecology, Inc., or some other related nuclear business. Page 6 of Appendix A shows the Hanford site in relation to the state boundaries.

Shipments of radioactive waste entering the State of Washington for disposal at US Ecology's low level radioactive waste burial site near Richland, Washington, must enter the state at the Port of Entry (POE) weight station northeast of Spokane or the Plymouth weight station located approximately 25 miles south of Kennewick.

Port of entry weight stations are manned 24 hours a day, seven days a week by Washington State police. In addition to other functions performed by state police at the weight stations, all radioactive waste shipments are checked for radioactivity prior to entering the state. Also, all tractors and trailers hauling radioactive waste are given an equipment safety inspection by state police personnel. Details of the safety inspection can be found in Appendix E of this report.

Presented on page A-7 is a detailed comparison of data collected at the waste disposal site at Hanford during the 1979-80 transportation surveillance program versus data collected at the Hanford site during this year's study (1980-81). Although the total number of shipments received at the site increased from 668 last year to 1,947 this year, the total percentage of shipments in noncompliance decreased from 12.5 percent last year to 8.5 percent this year. An even more dramatic and important decrease occurred concerning violations considered severe enough to warrant temporary or permanent suspension of a site use permit. Last year, 3.7 percent of the shipments contained severe violations, while this year the total was only 1.1 percent. These significant decreases in violations of relevant state, federal, and site regulations can be attributed to a variety of factors. Among these factors is the increased awareness of RAM transport regulations brought about by inspections and subsequent enforcement actions carried out as part of the Washington State Transportation Surveillance program.

Appendix B

Appendix B of this report shows details of inspections performed at generally and specifically licensed facilities, involved with the shipment of radioactive materials. In all cases, the inspection information has been condensed and only that information pertaining to the shipment of radioactive materials or DOT rules and regulations has been included.

The inspection summaries in Appendix B are not all inclusive. Personnel of the Washington State Radiation Control program performed inspections at other locations in the State of Washington with details and findings which were not pertinent to transportation. Results of our compliance inspections summarized in Appendix B indicate that the transport of radioactive materials in the State of Washington does not appear to be a major radiological protection problem.

Appendix C

Appendix C of this report shows volumes of radioactive waste originating in each state and various regions of the United States. For the purpose of accumulating data from different states and different regions, five regions were formed. Regions formed included the following: midwest; northeast; northwest; southeast; and southwest.

In addition to monthly totals, an approximate annual total for the different states and different regions is included as page C-13. The totals show that the northwest region, which includes Washington State with an operational low-level radioactive waste burial site, contributes approximately three

percent of the nation's radioactive waste. With the formation and state ratification of the Northwest Interstate Compact and with only three percent of the nation's waste generated in the region, it appears that there may be a drastic reduction in volumes of radioactive waste being disposed in the northwest upon implementation of the exclusionary provisions of the Compact. Implementation is contingent on Congressional consent of the Compact.

The information in Appendix C was derived from records maintained by Radiation Control personnel in the Olympia office. For the purposes of this report, the annual totals were accumulated from September 1, 1980 through August 31, 1981. In reference to the accumulated totals, it is interesting to note that Massachusetts contributed the largest volume of waste, or about 220,000 cubic feet. The state with the second highest contribution of waste to the Richland site was Illinois with 216,000 cubic feet, and California was third highest with 195,000 cubic feet. The northeast region contributed the largest volume of waste or 581,000 cubic feet. The southeast region is the second highest contributor of rad waste to the Richland site with an accumulated total of 379,000 cubic feet. The volume of waste from the northeast region was equivalent to 38 percent; from the southeast region was equivalent to 25 percent; midwest 20 percent; southwest 14 percent; and the northwest contributed three percent. The annual totals are shown on page C-13 of Appendix C.

Appendix D

Appendix D is a tabulation of violations and deficiencies noted during surveillance activities performed by a Washington State on-site inspectors at the Richland site. The deficiencies are determined on a day-by-day basis as rad waste is accepted at the low level radioactive waste site. However, prior to acceptance of a load of rad waste, an extensive amount of paperwork is reviewed and thorough radiological surveys are performed to assure compliance with DOT rules and regulations. The document review includes each item listed on the radioactive shipment record (RSR); the state police inspection report; sole use instructions if applicable; and the Washington State shipment certification form. All of the above mentioned records or certifications must be present and properly completed prior to acceptance of the vehicle.

Following the document acceptance review, radiological surveys are performed on the vehicle prior to being moved from the acceptance holding area of the site. Radiological surveys include geiger-mueller meter and/or ionization chamber (C.P.) readings around the vehicle, including the driver's cab, underneath the trailer, both sides of the trailer, and the front and rear of the trailer. Also, wipe samples are taken from the exterior surface of the trailer on both sides and the rear doors prior to opening the trailer for load inspection. The wipe samples are surveyed with an appropriate survey meter. A liquid scintillation counter belonging to US Ecology is used to analyze wipe samples if the load includes a low energy beta emitter such as carbon-14 or tritium.

As the back doors of the trailer are opened, additional smears are taken from the floor at the end of the trailer and at least two smears from containers in the trailer. These wipe samples are analyzed for radioactivity with a pancake probe geiger-mueller instrument and again wipe samples may or may not be analyzed in the liquid scintillation counter, depending on the radionuclides present. Providing the document package is acceptable and radiation and contamination levels are in compliance with DOT rules, the vehicle containing radioactive waste is approved for container offloading.

During the year of this contract, at least one and sometimes two radiation control personnel have been at the site performing surveillance duties and observing the offloading of radioactive waste containers. Also, an NRC inspector has been assigned to the site once every four weeks. Through the on-site routine surveillance program, many items of noncompliance with DOT regulations and license conditions were determined. Although it may appear as though many violations were found, the relative health hazards associated with these violations are minimal. The percentage of health associated violations have diminished considerably since the beginning of the state's on-site routine surveillance program. The more severe violations, such as ruptured or leaking containers, are now rare. The more frequent and predominant routine violations now include: inadequate bracing, incorrect or missing documents, and improper or inadequate placarding.

In Appendix D, violations determined during the year of this contract are summarized. Also shown is the date a warning letter was issued to the company responsible for the violation. Appendix D does not show the date that the warning letter was satisfactorily answered or the issue resolved. The more severe violations resulted in temporary suspension of the company from site use, and Appendix D shows the suspension date and the resolved date or reinstatement date. A minor violation requires only a telephone call and the violation is listed, but the date of the telephone warning is not shown. Telephone warnings do not require a written response or a commitment on the part of the generator.

Appendix E, Vehicle Inspection Results

In Appendix E, minor deficiencies against truckers and/or trailers are listed. The information in Appendix E was taken from the state police inspection forms issued to truckers at the weight stations at the two ports of entry prior to being permitted to enter Washington State. When an inspection at one of the weight stations reveals major mechanical deficiencies, the truck carrying radioactive material is not permitted to enter the state of Washington. A truck turned away at the weight station requires documentation of mechanical repair before state police will reinspect the vehicle. Trucks arriving at the disposal site must produce the state police inspection certification form prior to acceptance and unloading of the shipment of radioactive waste at the US Ecology site.

If for some reason a truck hauling radioactive waste bypassed the weight stations and arrives at the site without the state police inspection certificate, that vehicle is impounded. Radiation Control personnel at the site then inform the state police that a vehicle carrying radioactive waste

arrived at the rad waste burial site without state police inspection. The uninspected vehicle is impounded at the site until such time as state police arrive to perform the necessary vehicle safety inspection. The time involved in waiting for the state police inspection could cause a lengthy delay in the site acceptance and unloading of the vehicle's radioactive contents.

Appendix F - Thermoluminescent Dosimeter (TLD) Studies

During the second year of the contract, the program to determine the potential for radiation exposure to personnel was continued by the placement of TLDs at various facilities handling radioactive materials (RAM). The TLDs were placed in work areas, cabs of delivery vehicles, and near RAM storage or holding areas. At each TLD placement location, adequate time was allowed to determine an average radiation exposure reading, usually a one-month period. In many locations, TLDs were left for a longer period of time, thereby allowing for a more precise radiation exposure average to be obtained.

Our TLD studies and the routine inspection of personnel monitoring records for individuals working with radioactive materials confirm that unusual or unwarranted radiation exposures were not occurring. The study indicated the need for focusing on specific storage or holding areas and radioactive materials package handling techniques to further reduce exposure to radiation. In some cases, radioactive material holding areas were moved or modified or worker locations were changed in order to reduce personnel exposures. In one case, a courier added a small trailer to their transport vehicle to give additional distance between the driver and the radioactive cargo.

In some of the initial studies, we placed TLDs in known or suspected radiation areas. The placement of TLDs in those areas was to firmly establish that area as a radiation area and inform personnel accordingly. As expected, our studies verified the higher radiation exposure areas around radioactive waste storage areas, radiography camera storage cabinets, and packaged yellowcake storage pads. In all cases, following the initial TLD exposure, further studies of radiation exposure levels in the suspected radiation areas was discontinued. The TLD readings from the suspected radiation areas do not represent radiation levels received by personnel.

Appendix F of this report provides results of our studies and the locations throughout the state where TLDs were placed. We feel certain that the TLD survey was sufficiently extensive to assure that inadvertent high radiation exposures to personnel were not likely. New handling or storage procedures were recommended when further exposure reductions appeared possible. Since it was determined that personnel radiation exposures were not unusual or excessive, radiation control personnel do not plan an extensive follow-up study at any of the facilities where TLDs were placed.

APPENDIX A

APPENDIX A

SHIPMENTS RECEIVED

September 8, 1980 Through September 9, 1981

Period	Total Shipments Received	Loads in Noncompliance	Total Non-Compliance Items
September 8-12, 1980	32	1	1
September 15-19	26	12	15
September 22-26	22	5	14
September 29 - October 3	22	0	0
October 6-10	24	5	5
October 13-17	32	4	4
October 20-24	32	11	11
October 27-31	23	6	6
November 3-7	27	9	11
November 10-14	25	1	1
November 17-21	28	5	6
November 24-26	26	1	1
December 1-5	19	3	5
December 8-12	51	2	2
December 15-19	40	3	3
December 22-26	6	2	8
December 29 - January 2, 1981	16	2	3
January 5-9, 1981	17	2	2
January 12-16	35	3	3
January 19-23	36	3	3
January 26-30	32	4	4
February 2-6	36	0	0

APPENDIX A

SHIPMENTS RECEIVED

September 8, 1980 Through September 9, 1981

Period	Total Shipments Received	Loads in Noncompliance	Total Non-Compliance Items
February 9-13	37	1	1
February 16-20	37	4	5
February 23-27	42	3	3
March 2-6	40	1	1
March 10-13	30	2	2
March 16-20	44	0	0
March 23-27	52	1	1
March 30 - April 3	44	4	4
April 6-10	52	2	3
April 13-17	62	5	6
April 20-24	51	2	2
April 27 - May 1	61	1	3
May 4-8	58	1	1
May 11-15	59	5	5
May 18-22	63	3	0
May 26-29	57	3	3
June 1-5	55	4	6
June 8-12	56	1	1
June 15-19	61	1	4
June 22-26	65	8	8
June 29 - July 3	52	2	2
July 6-10	18	1	1

APPENDIX A

SHIPMENTS RECEIVED

September 8, 1980 Through September 9, 1981

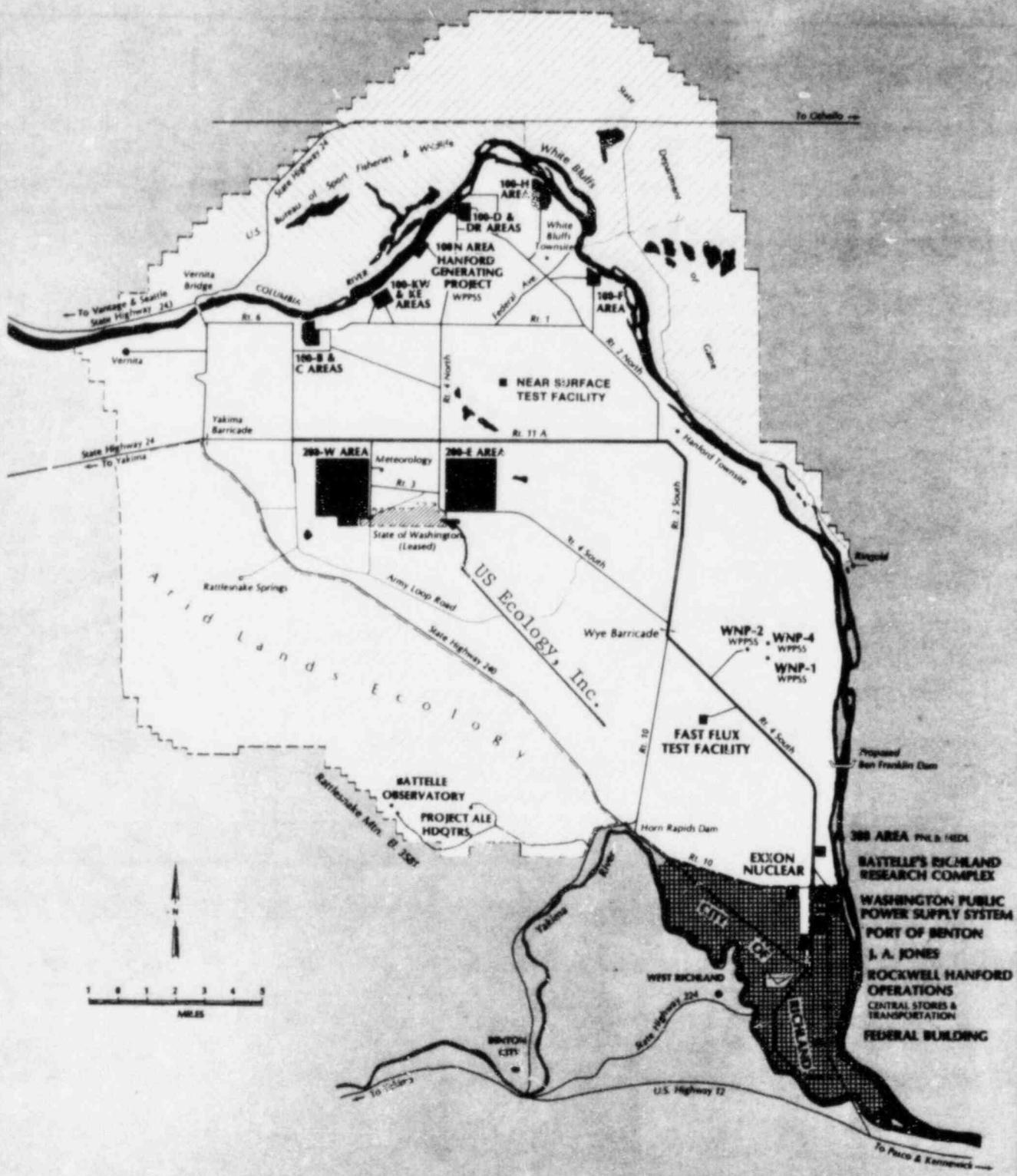
Period	Total Shipments Received	Loads in Noncompliance	Total Non- Compliance Items
July 13-17	18	4	4
July 20-24	23	1	1
July 27-31	32	1	1
August 3-7	21	5	5
August 10-14	33	3	3
August 17-21	33	4	4
August 24-28	40	1	1
August 31 - September 4	29	2	2
September 7-9	<u>15</u>	<u>0</u>	<u>0</u>
12-MONTH TOTALS	1,947	166	194

APPENDIX A

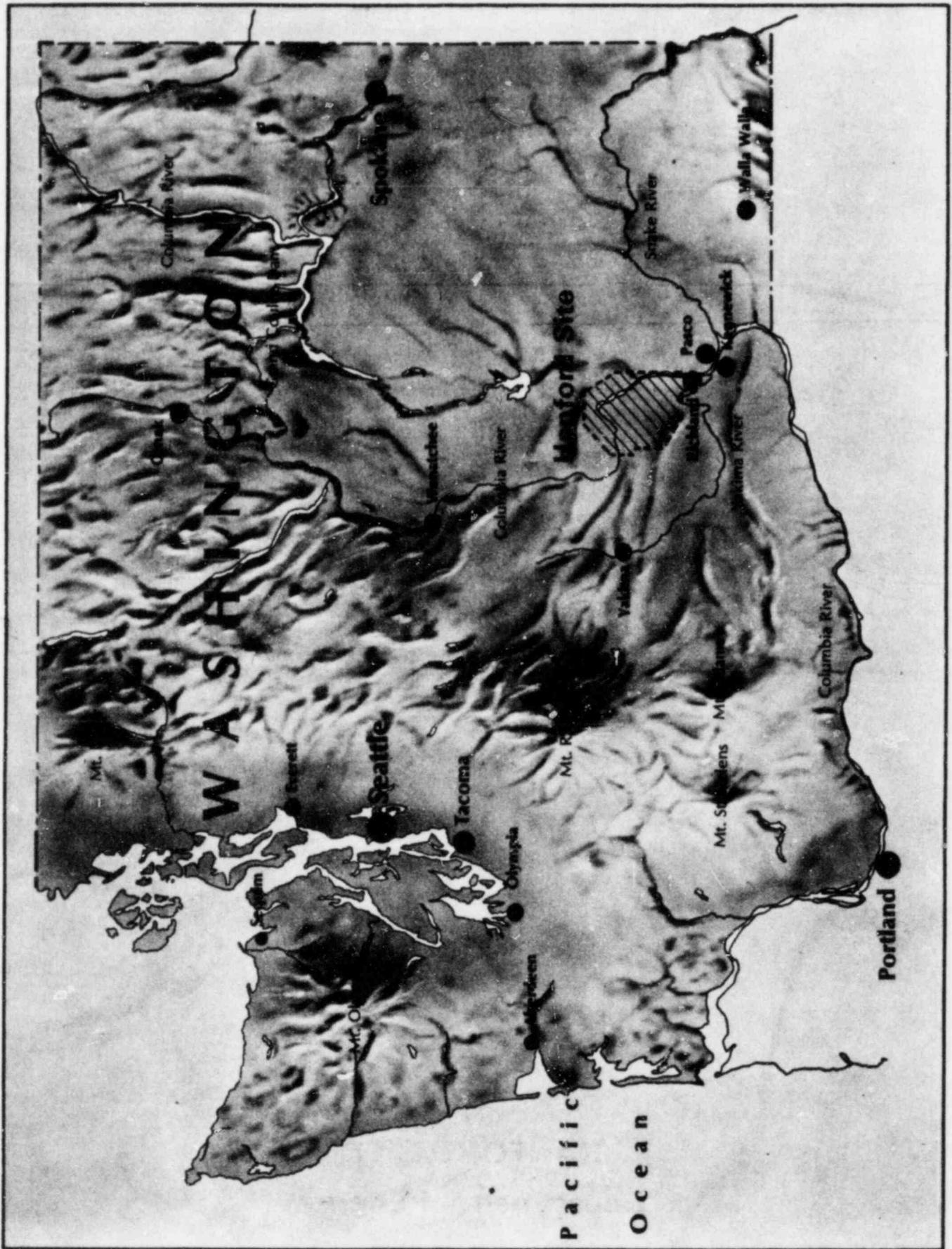
MONTHLY TOTALS

September 1980 through August 1981

Month	Cubic Feet	Curies	Source Material (Kilogram)	Containers
September 1980	89,653.73	652.62	29,133.49	11,126
October	97,160.56	31,572.47	19,675.76	9,814
November	90,115.62	867.04	23,222.64	10,312
December	115,321.45	3,428.82	24,467.57	10,231
January 1981	89,642.93	568.15	51,806.74	9,512
February	184,236.45	651.27	89,665.85	14,308
March	152,372.31	2,637.19	182,230.37	14,463
April	141,680.95	1,478.69	196,367.07	14,660
May	156,807.50	21,619.62	150,068.61	15,324
June	216,390.00	7,719.09	69,489.55	19,265
July	80,635.93	1,028.98	56,988.38	6,505
August	<u>100,991.81</u>	<u>1,965.04</u>	<u>72,710.84</u>	<u>8,698</u>
12-MONTH TOTALS	1,515,009.24	74,188.98	965,826.87	144,218



HANFORD SITE
Department of Energy



APPENDIX A

COMPARISON OF INSPECTION RESULTS
 FOR 1979-80 AND 1980-81 STUDY PERIODS
 AT US ECOLOGY WASTE BURIAL FACILITY,
 HANFORD, WASHINGTON

CATEGORY	SEPT 1979 - SEPT 1980*	SEPT 1980 - SEPT 1981
Total Cubic Feet of Waste Received	589,131	1,522,974
Total Number of Shipments	668	1,947
Number of Shipments in Noncompliance	83	166
Percent of Total Shipments in Noncompliance	12.5%	8.5%
Number of Shipments with Severe Violations**	25	22
Percent of Total Shipments with Severe Violations	3.7%	1.1%
Number of RAM Transport Vehicles Inspected at Port of Entry to Washington State	NOT AVAILABLE	1,806
Number of RAM Transport Vehicles in Noncompliance	NOT AVAILABLE	501
Percent of Total Number of Inspected RAM Transport Vehicles with Violations	NOT AVAILABLE	27.7%

* Data obtained from NUREG/CR-2037, TRANSPORTATION OF RADIOACTIVE MATERIAL IN WASHINGTON STATE, June 1981

** Refer to Attachment 2 of Appendix D for an explanation of severity categories

APPENDIX B

APPENDIX B

This appendix lists Washington State licensees, generally licensed carriers, and federal facilities visited during the second year of the contract. Visits or inspections were completed at the licensee's facilities in order to determine compliance with applicable license conditions and Washington State Rules and Regulations for Radiation Control. As part of the inspection procedure, the licensee's methods and procedures for receiving, storing, and transporting radioactive materials were also determined for compliance with U.S. Department of Transportation Regulations.

Routine compliance inspections of Washington State licensees continued throughout the past year in parallel, or as part of the activities associated with the transportation contract. The number of licensees inspected were far in excess of the fewer in number listed in this appendix. Therefore, the main purpose for this appendix is to indicate the degree of involvement and emphasis placed on the transportation of radioactive materials (RAM) in Washington State. During these inspections we endeavored to impress upon the RAM handlers that DOT rules do apply, compliance is necessary and appropriate radiological procedures are extremely important.

Disregarding the total number of compliance inspections performed, this appendix lists only those licensees where the receipt or transport of RAM was part of their program and DOT regulations were applicable. Of the places visited, Section A, Part I, shows licensees that were cited for not complying fully with Department of Transportation (DOT) regulations. Section A, Part II, lists licensees inspected where items of noncompliance were determined other than DOT violations. The violations in Part II would be those against license conditions and/or state rules and regulation. Part III lists licensees inspected with no items of noncompliance being found.

Section B lists handlers of radioactive materials operating in Washington State that are generally licensed or exempt from specific licensing by Washington State. Part I of Section B lists the handlers inspected where violations against DOT regulations were determined. Part I also shows facility inspections where no violations were found. Part II lists inspections of interest where unusual circumstances were observed. In some cases violations against DOT regulations were found.

Section A

Part I Washington State Licensees With DOT Violations

1. St. Elizabeth Hospital, Yakima - The inspection at St. Elizabeth Hospital resulted in two items of noncompliance against DOT regulations. The inspector found their use of a shipping container that did not meet DOT 7A Type A specifications. A violation against 49 CFR 173.398(b). The licensee was also cited for no label specification or shipping papers. Violation against 49 CFR 172.203(d) (iv).

2. X-Ray, Incorporated, Seattle - Two trucks belonging to X-Ray, Inc., used for transporting sources were observed, one at the field inspection site and one at the Seattle office. The truck at the office location did not contain radioactive material, however placards were observed on only three sides with the front of the vehicle being unplacarded. A truck at a field site carrying radioactive sources was also observed to be in violation of 49 CFR 172.504 for failure to properly placard the front of the vehicle.
3. MWM Nuclear Medical Services, Inc., Seattle - MWM is a mobile nuclear medicine licensee utilizing two vans in their mobile nuclear medicine operations. Ammunition boxes are used to transport radiopharmaceuticals. No test data were on file to indicate that boxes being used had met the requirements for a DOT 7A Type A package. This is contrary to 49 CFR 173.398(b) and was cited as an item of noncompliance. No other items of noncompliance were observed.

The item of noncompliance was brought into compliance by the purchase of containers certified as meeting DOT 7A Type A specifications.

4. Grays Harbor Community Hospital, Aberdeen - The licensee had, on occasion, transported radiopharmaceuticals to another hospital in the same town. Prior to transporting, a syringe containing a single dose was placed in a lead pig, boxed, labeled, and secured with tape. The box used was a DOT 7A Type A cardboard box. The label also listed the name of the material and the date of the shipment. The licensee was cited for violation of 49 CFR 172.203(d) (iii) which covers additional description requirements on shipping papers. The activity in terms of curies or millicuries was not recorded on the shipping papers.

Transporting radioactive materials for the above purposes was a very limited, nonroutine procedure. The citation against DOT regulations has been corrected.

5. Pacific Testing Laboratory, Seattle - Pacific Testing Laboratory (PTL) transports radiography sources in a company-owned trailer. Their trailer was noted to be placarded only on three sides instead of the required four. This was cited as an item of noncompliance against 49 CFR 172.504 of DOT regulations. According to the radiographer, the sign must have been accidentally torn loose or stolen during the previous night's work. The placard mounting case was also missing from the side of the vehicle. Pacific Testing Laboratories cooperated by replacing the placard holder and sign within the designated time suggested by the department, thus correcting the violation.
6. Flow Industries, Incorporated, Kent - A gauge mounted on a trailer and transported to various job sites as necessary by truck. The shipping papers contained inadequate information pertaining to: nuclear form, amount, transportation index, and labeling. This was cited as an item of noncompliance against requirements for shipping papers, 49 CFR 172.203(d)(1).

During transport, the device/package had not been properly labeled with a required Yellow II label. This was cited as an item of noncompliance against 49 CFR 172.403(c). A letter, dated March 24, 1981, was sent to the licensee by the department and instructed the licensee to respond in writing to the department within 30 days describing the corrective measures planned to bring activities into full compliance. The proposed corrective procedures adequately corrected this item of noncompliance.

7. CH₂M Hill, Incorporated Bellevue - The licensee was cited because gauges were not accompanied by shipping papers containing the information required by DOT regulations; that is, transportation index, form, labeling, and content. The licensee adequately described a program of corrective action.

8. Hammond, Collier and Wade-Livingston Associates, Inc. - The licensee was cited for not having shipping papers accompanying the transport of a radioactive gauge. Shipping papers did not contain the required information of 49 CFR 172.203(d)(1).

The licensee was instructed to respond in writing within 30 days of receipt of the letter sent by the department on March 24, 1981, describing the actions planned to bring their activities into full compliance. The licensee responded within 30 days with adequate procedures.

9. Haberman, Robertson and McNamara, General Hospital of Everett - Transportation of RAM is performed by Everett General Hospital across town to Providence Hospital. Procedures appeared adequate with the exception of the following DOT regulations: Type of packaging not stated, chemical and physical form not stated, type of label used, and a survey documenting the label. These violations were cited against Title 49 CFR, paragraphs 172.202 and 172.203. The cited violations were subsequently corrected.

10. Pittsburgh-Des Moines Steel Company, Richland - This company performs field radiography work at Washington Public Power Supply Systems (WPPSS) units 1 and 2 construction sites. All radiography sources used by Pittsburgh-Des Moines Steel Company (PDMSC) are delivered to their office location at unit 1. Shipment records maintained at the unit 1 office indicated that all iridium shipments were within acceptable radiation levels with proper labeling, marking, and security seals. However, the licensee was cited for not having proper shipping name, hazard class, chemical physical form, or transport index on shipping papers. This was cited as an item of noncompliance, Title 49 CFR, paragraphs 172.202 and 172.203(d). New procedures incorporated by the licensee appeared to adequately correct this item of noncompliance.

11. Bestco, Richland - The only item of noncompliance found was improper transport index entry on shipping papers and labels. This licensee was cited against Title 49 CFR, paragraphs 172.403(g)(3) and 172.203(d)(1)(v). Corrective procedures were formulated by the licensee.

12. Davis & Moores, Seattle - Licensee is in possession of one moisture density gauge for use at temporary job sites within the state of Washington. During this inspection, only one item of noncompliance was determined, that being lack of shipping papers. This item was addressed by the licensee and satisfactorily resolved as of July 27, 1981.
13. Hong Consulting Engineers, Edmonds - This company is a small consulting engineering firm with a portable gauge. Licensee was cited with noncompliance to DOT Hazardous Materials Shipping Paper Requirement. Corrective action was taken as of September 21, 1981.
14. Issaquah Health Research Institute, Issaquah - Shipments of radioactive materials to the institute appear to have been appropriately packaged and labeled; however, shipments were not accompanied by shipping papers. This was in noncompliance with DOT regulations and WAC 402-19-500. The licensee formulated new corrective procedures in order to avoid future violations against DOT regulations.
15. Materials Testing and Consulting, Mount Vernon - The licensee was in possession of a portable gauge containing a radioactive source. At the time of this inspection, it was noted that no shipping papers accompanied the gauge during transport to and from job sites. The licensee was cited against 49 CFR 172.203(d)(1). New procedures incorporated by the licensee corrected the shipping paper violation.
16. PureGro Company, Pasco - On the date of this inspection, the licensee did not have proper shipping papers to accompany the gauge during transport to and from job sites. This is a violation of Code of Federal Regulations 172.203(d)(1) requiring specific information on shipping papers of Radioactive Material, and WAC 402-19-500(4)(a). The noncompliance citation was corrected within the allowed time.
17. Spink Engineering, Richland - At the time of this inspection, the licensee did not have proper shipping papers to accompany the gauge to and from job sites. This is a violation of Code of Federal Regulations 172.203(d)(1) requiring specific information on shipping papers of Radioactive Material, and WAC 402-19-500(4)(a). Corrective procedures were formulated by the licensee.

Part II Washington State Licensees With Violations, Not DOT

<u>Licensee</u>	<u>Items of Noncompliance</u>
1. Riverton Hospital, Riverton	a. Personnel were not routinely wearing film badges while handling radioactive materials (WAC 402-24-070)
2. West Seattle General Hospital, Seattle	a. Improper transfer of RAM (WAC 402-19-400) b. No storage or disposal records (WAC 402-12-080)

Part II Washington State Licensees With Violations, Not DOT

<u>Licensee</u>	<u>Items of Noncompliance</u>
3. Northgate Hospital, Seattle	a. Inadequate disposal records (WAC 402-24-170)
4. Yang Laboratories, Seattle	a. Nonapproved absorbent b. No site use permit (WAC 402-19-530)
5. General Testing Laboratories, Poulsbo	a. RSO no longer employed b. Different pocket dosimeter being used
6. Centralia General Hospital, Centralia	a. Excess radiation reading on wall in waiting room (WAC 402-24-040(1)(a))

Part III Washington State Licensees With No Violations

1. Northwest Radiological Associates, Seattle 9/4/80 and 12/17/80 - No shipments of radioactive waste were recorded during the past year. Personnel exposures were noted as minimal and no items of noncompliance were observed. DOT regulations as applicable were being adhered to.
2. Anvil Corporation 9/18/80 - Anvil Corporation is primarily involved in field radiography. Two trucks are available for transporting sources from one radiography location to another. Trucks were observed to be appropriately placarded. Shipping papers required for transporting radioactive sources appeared to be properly prepared.
3. Mason Clinic, Seattle 10/9-10/80 - The therapy department of Mason Clinic ships Ir-192 sources back to the Alpha Omega Company in packages properly labeled and with completed shipping papers. All DOT requirements appeared to be adhered to and no items of noncompliance were found. No other materials are being transferred.
4. St. John's Hospital, Longview 11/12/80 - All shipments of radioactive materials are ordered directly from the manufacturer with delivery to the hospital made by Tradewinds. The only transporting of radioactive material has been the return of spent generators to the manufacturer. Generators are repackaged, monitored, relabeled, and shipped with properly completed shipping papers. DOT regulations appeared to be followed with the return of the packaged spent generators.
5. Northwest Radiopharmaceutical Services, Seattle 12/17/80 - Northwest Radiopharmaceutical Services (NRS) prepares and delivers isotopes for medical purposes throughout the state of Washington. For deliveries within Seattle, Tacoma, and Everett areas, NRS leases four vehicles. The vehicles were inspected during this review of their program. There were no packages containing radioactive material being transported at the time of this inspection. No DOT type violations were observed.

6. St. Francis Xavier Cabrini Hospital, Seattle 12/18/80 - All DOT regulations appear to be followed during receipt and transport of radiopharmaceuticals used in the hospital's nuclear medicine department. No items of noncompliance were observed or noted.
7. Radiological Associates, Spokane 12/29/80 - Radiology Associates handles only those radioactive materials required for medical purposes. In most all cases, they use material packaged and marked with White I labels. All isotopes used by Radiological Associates are individual doses as supplied by Holy Family Hospital in Spokane. No items of noncompliance were found during this inspection.
8. Welk Brothers Metal Products, Spokane 12/29/80 and 2/19/81 - This is a radiographer located near the Spokane Airport and licensed to possess a Cesium 137 calibrator with source strength not to exceed 100 millicuries. Additionally, Iridium 192 sources up to 100 curies are authorized for radiography purposes. From licensee's records, it appeared that Iridium 192 sources are shipped three or four times per year to and from Automation Industries. No DOT violations were noted.
9. Valley General Hospital, Renton 12/30/80 - Valley General returned unused radiopharmaceuticals to Northwest Radiopharmaceutical Services for credit to their account on several occasions during the past year. Labeling and paperwork appeared adequate. No DOT violations were noted.
10. Western Nuclear Incorporated, Wellpinit 1/6-7/81 - Yellowcake (U_3O_8) is the only material shipped by the licensee. Transfer records were available for inspection. The shipper verified that square or point radioactive placards are placed on the trailer and the words "Radioactive Materials" are stamped on the invoice. The licensee also checks to see that the trailer doors have a security seal and are locked, records the seal number, and checks to see that the driver has a copy of the Driver Radiation Training form. The licensee's security guard notes that these checks have been made and signs the transfer record. No DOT regulations were noted during this inspection.
11. Puget Sound Blood Center, Seattle 2/17 and 3/5/81 - This licensee performs diagnostic research and is responsible for the acquisition, testing, and compatibility of blood for the King County (Seattle) and Puget Sound area. Isotopes used are mainly I-125, I-129, C-14, Cr-51, and H-3. All applicable DOT regulations regarding receipt of radioactive materials appeared to be followed by this licensee.
12. Olympic Memorial Hospital, Port Angeles 3/26/81 - This licensee receives a 1.5 curie Mo-99 generator routinely once per week from Mallinckrodt. Gallium 67 and Thallium 201 are ordered as needed from Northwest Radiopharmaceutical Services in Seattle. All isotopes are delivered to the hospital from Seattle by Purolator Courier Corporation. All applicable DOT regulations appeared to be followed.

13. HCS Corporation, Kent 3/25/81 - This company inspects, maintains, refurbishes, and installs/removes radiation shielding windows. All items, both incoming and outgoing, are shipped by common carrier. All DOT regulations appeared to be followed.
14. St. Luke's Memorial Hospital, Spokane 4/8/81 - The primary radiopharmaceutical used at St. Luke's is Tc-99m which is procured by standing order from E. R. Squibb in the form of a 440 mCi mini-tech generator. Iodine 133 is used by the hospital and procured from Mediphysics or Holy Family Hospital. Records indicated that all DOT regulations were met on all shipments.
15. Stevens Memorial Hospital, Edmonds 4/12/81 - The major radiopharmaceutical being used at Stevens Memorial was 99 mTc. A 500 millicurie molybdenum generator was being received on standing order weekly from Mallinckrodt. The return of 99mTc generators to Mallinckrodt is the only activity to which DOT regulations apply. Applicable DOT regulations appeared to be followed.
16. Shorewood Osteopathic Hospital, Seattle 4/15/81 - Records indicate 99mTc as being the most used isotope. Other isotopes used but rather infrequently were Ga-67 and I-131 Hippuran. DOT regulations did not appear to be applicable to this licensee's use of radioisotopes.
17. Atlas Foundry, Seattle 4/23/81 - This is one of the major industrial Radiography facilities in the state. Radioactive sources on hand at the time of this inspection were a Tech OPS model 520 containing 200 curies of Cobalt 60 and a Unitron model 110AB containing 210 curies of Ir-192.

Receipts and shipping papers for the radioactive sources on hand, and for incoming and outgoing radiographic sources logged during past months appeared to satisfy the requirements of DOT and state regulations.
18. Group Health Services Center, Renton 5/7/81 - All radioisotopes are delivered to the laboratory by a commercial carrier and only medical technologists receive and unpack the contents. The licensee did not indicate that the packages were surveyed upon receipt. All solid radioactive waste resulting from nuclear medicine uses is packaged in 55 gallon drums and picked up by a broker, Ralph Baltzo and Associates. All DOT regulations appeared to be followed at this facility.
19. United Nuclear Industries, Inc., Richland 5/19/81 - There were no items of noncompliance noted during the inspection of April 4, 1980, and no items of noncompliance were observed during this inspection. Records reviewed indicated that DOT regulations were being adhered to.
20. Western Washington University, Bellingham 5/19/81 - The licensee was in possession of a Seaman Nuclear roof gauge model RM-75 containing 40 mCi of AM-241:Be. This gauge was received May 15, 1981. All labeling and shipping papers as well as records of receipt appear adequate. It was noted that the permanent label on the gauge as well as the shipping papers refer only to 40 millicuries of AM-241. No reference is made to the Beryllium encapsulation.

The licensee was also in possession of 32 grams (2 curies) of Pu:Be contained in a NUMEC type C neutron howitzer. This source was picked up at the University of Washington by van. A DOT/NRC Nuclear Materials Transaction Report for this transfer was on hand. Date of transfer was April 3, 1981. All DOT regulations appeared to be followed.

21. Lockheed Shipbuilding and Construction, Seattle 5/22/81 - This facility contains two vaults for performing piece work radiography. Aboard ship, radiography is also performed at the licensee's address. All RAM are ordered from Gamma Industries. Iridium 192 sources are ordered approximately every five months. Other sources on hand included Co-60. All DOT regulations appeared to be followed.
22. Mid Valley Hospital, Omak 5/26/81 - The scope of this program is fairly small. The principle isotope used is on standing order (Molybdenum 99 generator) with other material (I-131 capsules) ordered as needed. Generators arrive every other Monday afternoon from Squibb Corporation. Iodine 131 capsules are received from Mallinckrodt. The deliveries are made to Mid Valley Hospital by Silver Wheels Freightlines, Inc. All DOT regulations appeared to be followed.
23. Interstate Industrial Uniform Laundry, Bremerton 6/11/81 - At the time of this inspection, the laundry had only two customers: Portland General Electric and Puget Sound Naval Shipyard. Procedures used for transportation of contaminated clothing appeared adequate. No DOT violations were observed or apparent.
24. Chicago Bridge and Iron, Satsop Nuclear Power Plant 6/18/81 - This company performs radiographic work at the nuclear power plants under construction at the Satsop site approximately 30 miles west of Olympia. Radiography sources are received and shipped as necessary for maintaining a source of adequate strength. Shipping papers and associated paperwork reviewed during this inspection appeared to satisfy DOT regulations and department requirements.

Section B

Part I Generally Licensed Carriers

1. Medical Express, Seattle 10/80 - This company delivers isotopes prepared by Northwest Radiopharmaceuticals to the south Seattle area on a daily basis. The company utilizes one small pickup with canopy for making deliveries. The canopy is equipped with four permanent hinged folding placards. In addition, every Friday morning, Medical Express picks up a Mo-99 generator from Federal Express at the King County Airport arriving by air from Union Carbide, Tuxedo, New York. No DOT violations were observed during this inspection.
2. Purolator Courier Corporation, Seattle 10/80 - Purolator operates a large fleet of courier vans mainly in the Seattle area with any one delivering packages containing radioactive material (RAM). During inspection, it was learned through the company's Senior Regional Operations Manager that placards are routinely attached to all four

sides of the vehicle when delivering a package or packages with Yellow III labels. Although there were no packages containing RAM to be inspected, various bills of lading were observed. Most packages originate from Amersham Corporation, Arlington Heights, Illinois and New England Nuclear, Boston, Massachusetts. No DOT violations were observed.

3. Airborne Air Freight, Seattle 10/80 - This company delivers packages containing RAM from the Seattle area to Alaska three or four times per month. All packages delivered had "white one" labels attached. Due to the small number of packages and apparent low radiation levels, this freight forwarder was considered to be a company requiring no special radiological controls. No DOT violations were observed.
4. Steve Sivak, Walla Walla 10/80 - This carrier is not generally licensed; however, this operation is covered by a license issued by the State of Washington. Mr. Sivak is an x-ray technician at St. Mary's Hospital in Walla Walla, Washington. As a part-time job, he is contracted by Mallinkrodt Corporation to deliver technetium generators to St. Mary's Hospital, Kadlec Hospital in Richland, and Our Lady of Lourdes Hospital in Pasco. The three generators are delivered to Mr. Sivak in Walla Walla by the Tradewinds Company on the same day they arrive in Portland, Oregon by air. The three packages are labeled Yellow III; hence, placards were required. Even though an unusual delivery service, no DOT violations were determined as a result of this inspection.
5. Active Air Freight, Spokane 10/80 and 12/29/80 - This company delivers most of the packages containing RAM from the Spokane Airport to various places in Spokane. Generally the isotopes delivered by Active Air Freight are I-131, I-125, Cr-51, and Tl-201. These isotopes are flown in by Cascade, Republic, and United Airlines from American Parcel Service, Hungtinton Park, California, Northwest Radiopharmaceuticals, Seattle, Washington, Mallinkrodt Company, St. Louis, Missouri, New England Nuclear, North Billerica, Maine, and General Electric, San Jose, California.

Active Air Freight employs one driver and utilizes a pickup truck with canopy which is placarded when transporting radioisotopes. Deliveries in Spokane are made to Deaconess Hospital, Holy Family Hospital, Sacred Heart Medical Center, St. Luke's Memorial Hospital, Rockwood Clinic, Veterans Hospital, and Spokane Valley General Hospital. No DOT violations were observed during these inspections.

6. Coronet Enterprises, Spokane 10/80 - This is a company in Spokane which operates a taxi and freight service. The taxi service includes Yellow, Checker, Diamond, Radio City, and Lilac City Cab companies. According to a company supervisor, the cabs have not transported packages containing RAM except for perhaps once or twice in the last year. However, weekend emergencies have been made on an infrequent basis. No DOT violations were observed.

7. Federal Express, Seattle 12/17/80, 4/7/81, 4/10/81 - Federal Express handles a large number of packages containing radioactive materials. During the December 17 inspection, records were reviewed which described the return of a package to the shipper. Federal Express returned the package after four violations of DOT regulations were determined. This company is a major distributor of packaged radioactive materials (RAM) in the Seattle area. Their procedures for handling and storing RAM appear to be adequate. No DOT violations against this company were observed at any time during these inspections.
8. Emery Air Freight, Seattle 12/17/80 - Emery handles a very small number of packages containing radioactive materials. The small amount that is delivered displays only White I labels. There were no packages observed during the time of this inspection. No DOT violations were observed.
9. Flying Tigers Line, Seattle 12/17/80 - This airline handles a moderate number of packages containing radioactive materials. Packages are delivered directly by Flying Tigers or stored within their hazardous cargo area while awaiting transfer to appropriate flights. No DOT violations were observed during this inspection.
10. Wein Air Alaska, Seattle 12/17/80 - Air Alaska does not handle any packages containing radioactive materials.
11. Eastern Airlines, Seattle 12/17/80 - Eastern handles a moderate number of packages containing radioactive materials on their routine flights to Sea-Tac Airport. There were no packages containing radioactive materials observed during the time of this inspection. Eastern's largest shipments arrive at Seattle-Tacoma Airport Saturday mornings at approximately 6:30 a.m. Shipments usually consist of four or five Mo-99 generators (all labeled Yellow III) originating at Mallinckrodt Company, St. Louis, Missouri. Airport Drayage Company delivers the generators to hospitals in the Seattle area. No DOT violations were noted.
12. Republic Airlines, Seattle 12/17/80 - Republic handles about one package per week, chiefly I-131 (labeled Yellow III) sent from Burbank, California. The package(s) are picked up by Tradewinds Company for delivery in Seattle. No DOT violations were observed.
13. Western Airlines, Seattle 12/17/80 - Western Airlines handles packages containing radioactive materials only two or three times per year. There were no packages being handled or retained during the time of this inspection; however, it was learned that most of the time Western merely transfers a package(s) from one airline company to another similar to the way ordinary luggage is transferred. No DOT violations were observed.
14. Pacific Western Air Cargo, Seattle 1/15/81 - Three packages originating from Atomic Energy Commission of Canada Ltd., Vancouver, B.C., were forwarded by Pacific Western from Seattle-Tacoma Airport to three

locations within the United States. The destinations were Texas A&M University via Continental Airlines, University of Connecticut via Flying Tiger Lines, and Mayo Clinic via Northwest Airlines. An independent survey of the packages indicated that the highest surface reading on any one package was 2.2 mR/hr. No DOT violations were observed.

15. Thai Airways International, Ltd., Seattle 1/15/81 - Thai Airlines, located at Seattle-Tacoma Airport, was inspected on January 15, 1981. It was learned through one of their supervisors that packages containing radioactive materials are rarely handled, apparently no radioactive materials packages within the last three months. There appeared to be no radiological hazards at Thai Airways.
16. British Airways Air Cargo, Seattle-Tacoma Airport 1/15/81 - It was learned through one of their supervisors that there has been little or no packages containing radioactive materials handled, apparently none within the last three months. No radiological exposure problems seem apparent with this airline company.
17. Western Air Cargo, Seattle 4/7/81 - This company handles packages containing RAM for the following six airlines: Western Airlines, Trans World Airlines, Scandinavian Airlines, American Airlines, Air Oregon, Reeve Aleutian Airlines. One package was inspected and was determined to be in compliance with state and DOT regulations. Western delivers one package every Sunday morning at 7:45 a.m. to Airport Drayage. All other deliveries were unscheduled.
18. Airport Drayage, Seattle 4/7/81 - Airport Drayage was inspected; however, no packages containing RAM were observed. This company handles many packages during the month. Procedures appeared to be adequate and no unusual radiation exposures to personnel should occur. No DOT violations were determined.
19. Eastern Airlines, Seattle 4/7/81 - Eastern Airlines was inspected but no packages containing RAM were observed. Procedures for handling RAM were reviewed with a company representative. Procedures appeared adequate, and no DOT violations were observed.
20. Burlington Northern Air Freight, Seattle 4/30/81 - Burlington delivers only a limited number of packages containing RAM. Once every two or three years a package with a White I label will pass through their facility. No DOT violations were observed.
21. United States Post Office, Sea-Tac Airport 4/30/81 - The post office at Sea-Tac is directly connected with all Seattle and Tacoma post offices for air mail deliveries. Most of the large airlines operating out of the Sea-Tac Airport carry mail. Postal trucks deliver mail to and from Sea-Tac Terminal Annex and/or Tacoma on a routine basis. The postal service office at Sea-Tac rarely handles packages with RAM. However, they did direct Radiation Control Program personnel to the Bulk Mailing Center located in Federal Way. This facility transports packages containing RAM on a very infrequent basis. No radiological hazards were determined and no violations were observed.

22. United Parcel Service (UPS), Seattle 4/30/81 - UPS, located in south Seattle, is an extremely large operation delivering on the average of 120,000 packages to and from the Seattle area per day. On the average, ten packages per day contain RAM and are not handled separately from all other packages, as they are labeled Radioactive White I. No DOT violations were observed.
23. Consolidated Freightway, Kennewick, Washington 2/18/81

Shipments of radioactive materials (RAM) are handled approximately two times per month at the Consolidated Freightway (CF) terminal in Kennewick. Recently, all shipments have originated at Rockwell International, Richland, Washington. According to information obtained from the assistant terminal manager nearly all shipments are labeled White I. Rarely does CF handle a Yellow II labeled package and no recent record reflects the handling of Yellow III. Packages containing RAM are shipped from CF the same day they arrive, since no overnight storage facilities are available for RAM packages.

Occasionally a fully loaded trailer of radioactive waste arriving from out-of-state will park overnight at CF. Loaded trailers are parked in the back part of their fenced property away from the office area. Full trailer loads of radioactive waste that park for the night are never tampered with; trailers are sent the next day directly to the Richland, Washington radioactive waste burial site.

Part II - Unusual Inspections

1. Canadian General Electric - 10/7/1980

A Washington State inspector was dispatched to Pier 37, Seattle waterfront to inspect a shipment of natural uranium dioxide fuel bundles destined for Korea from Canadian General Electric Peterborough, Ontario. By the time the inspector arrived at Pier 37, the shipment of nuclear fuel had already left port. It was determined that the shipment had been monitored and approved for ship loading by a Seattle based representative of Department of Emergency Services (DES). Apparently, the DES inspector surveyed, inspected and released the fuel bundles from the transport truck for loading on the ship. The ship left the Seattle port soon after having the fuel loaded and secured.

The DES representative had obtained pictures of the fuel bundle packages and copies of shipment documents as requested by the state inspector. Upon examination of shipping papers, the state inspector determined that the radioactive materials certification was missing.

On Wednesday, October 8, at 11:00 p.m., an attempt to contact the generator-shipper, Canadian General Electric Company, Peterborough, Ontario, to advise them of the missing document was unsuccessful. However, the person responsible for the shipping documents at Canadian General Electric was contacted on October 9 and copies of the shipping papers were requested. On October 20, 1980, copies of the requested

papers arrived at our office here in Olympia. It was determined and acknowledged by the shipper that the radioactive materials certification was not included as part of the shipping records. The certification would be included with all future shipping documents according to Canadian General Electric Company.

2. Port of Tacoma - 11/17/1980

A representative of the Port of Tacoma requested by phone, someone from the Radiation Control Program perform an inspection at Pier No.2 after longshoremen refused to handle eight 30 gallon drums containing RAM. All of the drums had Yellow II labels attached. A survey of the drums supported the labeling information since the highest surface reading obtained was 4.9 millirem per hour.

Freight of this nature was not a routine type and it had lead to some consternation for the longshoremen. Upon the completion of the inspection, Port officials were instructed to call the Radiation Control Program in Olympia anytime containers of RAM arrived at the docks and there were doubts about the associated radiological hazards. No DOT violations were found during this inspection.

3. Puget Sound Naval Shipyard, Bremerton - 12/17/80

On December 17, 1980, a Washington State Radiation Control Inspector was invited to Puget Sound Naval Shipyard (PSNS) to observe and inspect a shipment of radioactive waste prior to departing for US Ecology, Richland, Washington. The State Inspector met with PSNS personnel responsible for preparing the shipment and a representative from the broker, Southwest Nuclear. Following the meeting, the State Inspector was satisfied that representatives from the Navy and Southwest Nuclear understood all appropriate packaging and shipping regulations.

Approximately mid-morning of the 17th, the tractor trailer transport vehicle arrived at PSNS. Following truck arrival, PSNS personnel began the loading operation by moving the 36,000 lb. LSA cask from its position in building No. 513 to a TSMT trailer, #54415.

At approximately 14:00 the load had been secured on the trailer and the radiological surveys were performed. Maximum readings were as follows:

120 mr/hr on bottom of trailer; 70 mr/hr on right side of trailer;
40 mr/hr on left side of trailer; 50 mr/hr on top of trailer; 7
mr/hr at six feet; 0.7 mr/hr in occupied portion of tractor #929.

The State Inspector and Southwest Nuclear personnel, reviewed all shipping papers for accuracy. The PSNS check list was completed and signed off. The paperwork package was given to the truck driver after he was briefed and found ready to depart. At approximately 14:30, the truck departed PSNS for US Ecology, Richland, Washington. No shipping or unloading problems occurred with this transfer.

4. Tradewinds, Seattle - 2/15/1981

Tradewinds new aluminum trailers for carrying RAM were discussed. The trailers when used were towed behind delivery vehicles for added distance and radiological protection. Also discussed was a study conducted two years ago by Reynolds Electric on potential radiation exposure problems at Tradewinds. The owner of Tradewinds stated that he never received any results or feedback from that study. From our visits and findings during the first year of the contract, no unusual radiological hazards were noted at Tradewinds. This contact verified that new handling procedures were in effect and more emphasis was now being placed on radiation safety.

5. Puget Sound Naval Shipyard, Bremerton, Washington - 2/26/81

On February 26, 1981, a Washington State Radiation Control Program Inspector again visited Puget Sound Naval Shipyard (PSNS) in Bremerton, to observe the loading and shipment of approximately 100 drums and two boxes of LSA designated radioactive waste. It was determined prior to loading that the Washington State vehicle inspection would be performed at PSNS to save unloading if a major problem was found with the vehicle. Inspectors from the Washington Weight Control Section were called to the shipyard to perform the inspection. The vehicle inspection took approximately 45 minutes to complete with no problem found except a brake out of adjustment. The brake was adjusted and the vehicle was approved for loading.

Prior to loading the wooden boxes, the State Inspector noticed that a seam on one of the boxes was not tight. Apparently, the separation had occurred due to the heavy box contents. The crate deficiency was mentioned to PSNS personnel preparing the waste for shipping. It was agreed that the crate would be repaired and sealed prior to shipping.

After bracing was added to secure the load and prior to departing from PSNS, the truck and trailer were inspected with all transport criteria found satisfactory. Maximum radiation levels detected were: Surface of trailer 120 mr per hour; inside cab 0.2 mr per hour; at six feet from trailer 8 mr per hour; and no detectable surface contamination was found.

The driver took control of the trailer at 6:00 p.m. and left PSNS heading for Richland, Washington.

6. Alpha-Omega Services, Inc.- 3/3/81

On March 3, 1981, Alpha-Omega removed for disposal a Cobalt 60 source (approximately 3500 Ci) from a no longer being used teletherapy unit at Holy Family Hospital in Spokane. After source removal the teletherapy machine and related equipment was also removed.

A Washington State Inspector observed the removal and transfer of the source. The source removal took approximately two minutes. Radiation levels were not in excess of 2mr/hr in the unrestricted areas outside the shielded treatment room. Shipping papers contained the following: date of March 14, 1981, Curies: 3500, Bill of Lading No 6185, Labeling: Yellow III, TI 4.0, reading of 2.5mr/hr at three feet, and 6.0mr/hr at surface. No items of noncompliance were noted during this inspection, and all DOT regulations appeared to be followed prior to source shipment.

7. Gelco Courier Service, Inc. - 5/12/81

Gelco has the authority to deliver packages containing RAM but none have been carried. They have determined that it is not cost-effective to deliver a small number of packages containing RAM so they refer customers elsewhere. If a customer wished to utilize Gelco for a large number of packages on a routine basis, they would consider starting delivery of RAM.

APPENDIX C

REGIONAL BREAKDOWN

VOLUMES OF WASTE IN CUBIC FEET

MIDWEST		NORTHEAST	
Illinois.....	18,305.44	Connecticut.....	
Indiana.....		Delaware.....	
Iowa.....		Maine.....	
Kansas.....		Maryland.....	2468.02
Michigan.....	2172.0	Massachusetts.....	3995.26
Minnesota.....	1125.0	New Hampshire.....	4552.43
Missouri.....	300.0	New Jersey.....	16,409.39
Nebraska.....		New York.....	6485.55
North Dakota.....		Pennsylvania.....	
Ohio.....		Rhode Island.....	
South Dakota.....		Vermont.....	
Wisconsin.....			
Midwest Total.....	21,902.44	Northeast Total.....	33,910.65
NORTHWEST		SOUTHEAST	
Alaska.....		Alabama.....	
Idaho.....		Arkansas.....	
Montana.....		Dist. of Columbia...	
Oregon.....	2701.0	Florida.....	
Utah.....	247.5	Georgia.....	
Washington.....	450.0	Kentucky.....	
Wyoming.....		Louisiana.....	
Northwest Total...	3398.5	Mississippi.....	
SOUTHWEST		North Carolina.....	4187.75
Arizona.....		Oklahoma.....	
California.....	18,641.22	South Carolina.....	
Colorado.....		Tennessee.....	71.66
Hawaii.....	229.01	Texas.....	7312.5
New Mexico.....		Virginia.....	
Nevada.....		West Virginia.....	
Southwest Total...	18,870.23	Southeast Total...	11,571.91
GRAND TOTALS			
Region	Volume	Percent	
Midwest	21902.44	24%	
Northeast	33910.65	38%	
Northwest	3398.50	4%	
Southeast	11571.91	13%	
Southwest	18870.23	21%	
TOTAL VOLUME	89653.73		

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	14,058.83
Indiana.....	
Iowa.....	375.0
Kansas.....	
Michigan.....	3313.79
Minnesota.....	5337.00
Missouri.....	
Nebraska.....	
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	23,084.62

NORTHEAST	
Connecticut.....	
Delaware.....	
Maine.....	
Maryland.....	2468.02
Massachusetts.....	2622.72
New Hampshire.....	3608.62
New Jersey.....	14,694.83
New York.....	6878.3
Pennsylvania.....	
Rhode Island.....	
Vermont.....	
Northeast Total...	30,272.49

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	
Oregon.....	
Utah.....	
Washington.....	1014.84
Wyoming.....	870.4
Northwest Total...	1885.24

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	
Georgia.....	
Kentucky.....	
Louisiana.....	
Mississippi.....	
North Carolina.....	3997.5
Oklahoma.....	
South Carolina.....	
Tennessee.....	
Texas.....	16,102.5
Virginia.....	
West Virginia.....	
Southeast Total...	20,100.0

SOUTHWEST	
Arizona.....	
California.....	21,818.21
Colorado.....	
Hawaii.....	
New Mexico.....	
Nevada.....	
Southwest Total...	21,818.21

GRAND TOTALS		
Region	Volume	Percent
Midwest	23084.62	24%
Northeast	30272.49	38%
Northwest	1885.24	2%
Southeast	20100.0	21%
Southwest	21818.21	22%
TOTAL VOLUME	97160.56	

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	13,054.72
Indiana.....	
Iowa.....	
Kansas.....	
Michigan.....	712.5
Minnesota.....	6863.72
Missouri.....	60.0
Nebraska.....	100.0
North Dakota.....	
Ohio.....	645.0
South Dakota.....	
Wisconsin.....	540.0
Midwest Total.....	21,975.94

NORTHEAST	
Connecticut.....	
Delaware.....	
Maine.....	
Maryland.....	3758.02
Massachusetts.....	9494.46
New Hampshire.....	
New Jersey.....	4677.63
New York.....	9174.64
Pennsylvania.....	4123.89
Rhode Island.....	
Vermont.....	
Northeast Total...	31,228.64

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	37.5
Oregon.....	1327.50
Utah.....	
Washington.....	472.5
Wyoming.....	
Northwest Total...	1837.50

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	
Georgia.....	637.5
Kentucky.....	
Louisiana.....	
Mississippi.....	
North Carolina.....	2963.90
Oklahoma.....	
South Carolina.....	
Tennessee.....	185.94
Texas.....	17,742.0
Virginia.....	
West Virginia.....	
Southeast Total...	21,529.34

SOUTHWEST	
Arizona.....	
California.....	13,544.2
Colorado.....	
Hawaii.....	
New Mexico.....	
Nevada.....	
Southwest Total...	13,544.2

GRAND TOTALS		
Region	Volume	Percent
Midwest	21975.94	24%
Northeast	31228.64	34%
Northwest	1837.50	3%
Southeast	21529.34	24%
Southwest	13544.20	15%
TOTAL VOLUME	90115.62	

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	18,981.02
Indiana.....	1,101.0
Iowa.....	
Kansas.....	
Michigan.....	2,170.0
Minnesota.....	1,877.52
Missouri.....	
Nebraska.....	
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	24,129.54

NORTHEAST	
Connecticut.....	7,236.0
Delaware.....	
Maine.....	
Maryland.....	3,630.0
Massachusetts.....	6,688.02
New Hampshire.....	
New Jersey.....	4,677.63
New York.....	10,109.59
Pennsylvania.....	2,382.4
Rhode Island.....	
Vermont.....	
Northeast Total...	34,723.64

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	37.5
Oregon.....	2350.22
Utah.....	
Washington.....	1036.96
Wyoming.....	
Northwest Total...	3387.18

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	
Georgia.....	750.0
Kentucky.....	
Louisiana.....	
Mississippi.....	
North Carolina.....	16,739.7
Oklahoma.....	
South Carolina.....	
Tennessee.....	109.68
Texas.....	23,004.9
Virginia.....	465.0
West Virginia.....	
Southeast Total...	41,069.28

SOUTHWEST	
Arizona.....	
California.....	12011.81
Colorado.....	
Hawaii.....	
New Mexico.....	
Nevada.....	
Southwest Total...	12011.81

GRAND TOTALS		
Region	Volume	Percent
Midwest	24,129.54	21%
Northeast	34,723.64	30%
Northwest	3387.18	3%
Southeast	41,069.28	36%
Southwest	12,011.81	10%

TOTAL VOLUME 115,321.45

REGIONAL BREAKDOWN
VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	14,942.42
Indiana.....	94.53
Iowa.....	
Kansas.....	
Michigan.....	1,793.35
Minnesota.....	2,477.01
Missouri.....	
Nebraska.....	
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	19,307.31

NORTHEAST	
Connecticut.....	10,854.0
Delaware.....	
Maine.....	
Maryland.....	3,860.12
Massachusetts.....	16,012.12
New Hampshire.....	
New Jersey.....	
New York.....	8,233.39
Pennsylvania.....	2,890.46
Rhode Island.....	
Vermont.....	
Northeast Total...	41,850.09

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	
Oregon.....	1132.50
Utah.....	
Washington.....	538.07
Wyoming.....	
Northwest Total...	1670.57

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	
Georgia.....	
Kentucky.....	112.5
Louisiana.....	
Mississippi.....	
North Carolina.....	1,607.5
Oklahoma.....	
South Carolina.....	
Tennessee.....	84.21
Texas.....	17,691.6
Virginia.....	
West Virginia.....	
Southeast Total...	19,495.81

SOUTHWEST	
Arizona.....	
California.....	7319.15
Colorado.....	
Hawaii.....	
New Mexico.....	
Nevada.....	
Southwest Total...	7319.15

GRAND TOTALS		
Region	Volume	Percent
Midwest	19,307.31	22%
Northeast	41,850.09	47%
Northwest	1,670.57	2%
Southeast	19,495.81	22%
Southwest	7,319.15	7%
TOTAL VOLUME	89,642.93	

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	26,637.71
Indiana.....	
Iowa.....	
Kansas.....	
Michigan.....	2583.0
Minnesota.....	1740.0
Missouri.....	
Nebraska.....	375.0
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	31,335.71

NORTHEAST	
Connecticut.....	
Delaware.....	
Maine.....	
Maryland.....	5150.2
Massachusetts.....	34,932.07
New Hampshire.....	
New Jersey.....	8290.85
New York.....	15,895.58
Pennsylvania.....	2867.8
Rhode Island.....	
Vermont.....	
Northeast Total...	67,136.5

NORTHWEST	
Alaska.....	60.00
Idaho.....	44.11
Montana.....	
Oregon.....	2501.91
Utah.....	
Washington.....	1089.52
Wyoming.....	
Northwest Total...	3695.54

SOUTHEAST	
Alabama... ..	
Arkansas.....	
Dist. of Columbia...	
Florida.....	832.5
Georgia.....	9735.0
Kentucky.....	82.5
Louisiana.....	
Mississippi.....	
North Carolina.....	16,647.1
Oklahoma.....	
South Carolina.....	
Tennessee.....	304.48
Texas.....	34,659.0
Virginia.....	
West Virginia.....	
Southeast Total...	62,260.58

SOUTHWEST	
Arizona.....	
California.....	19718.12
Colorado.....	
Hawaii.....	90.00
New Mexico.....	
Nevada.....	
Southwest Total...	19,808.12

GRAND TOTALS		
Region	Volume	Percent
Midwest	31335.71	17%
Northeast	67136.50	38%
Northwest	3695.54	2%
Southeast	62260.58	35%
Southwest	19808.12	8%

TOTAL VOLUME 184,236.45

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	21,160.12
Indiana.....	22.5
Iowa.....	
Kansas.....	
Michigan.....	2112.5
Minnesota.....	
Missouri.....	
Nebraska.....	
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	23,295.12

NORTHEAST	
Connecticut.....	5472.0
Delaware.....	
Maine.....	
Maryland.....	
Massachusetts.....	34,942.82
New Hampshire.....	
New Jersey.....	4652.83
New York.....	18,073.39
Pennsylvania.....	2777.3
Rhode Island.....	
Vermont.....	
Northeast Total.....	65,918.34

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	
Oregon.....	2998.0
Utah.....	
Washington.....	8339.4
Wyoming.....	
Northwest Total...	11,337.40

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	1942.5
Georgia.....	2430.0
Kentucky.....	420.0
Louisiana.....	
Mississippi.....	21,150.0
North Carolina.....	7063.0
Oklahoma.....	
South Carolina.....	
Tennessee.....	
Texas.....	5240.0
Virginia.....	1845.55
West Virginia.....	
Southeast Total...	40,091.05

SOUTHWEST	
Arizona.....	49.01
California.....	11,081.19
Colorado.....	
Hawaii.....	
New Mexico.....	592.7
Nevada.....	7.5
Southwest Total...	11,730.40

GRAND TOTALS		
Region	Volume	Percent
Midwest	23295.12	15%
Northeast	65918.34	43%
Northwest	11337.40	7%
Southeast	40091.05	26%
Southwest	11730.40	8%

TOTAL VOLUME 152,372.31

REGIONAL BREAKDOWN

VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	17,646.83
Indiana.....	165.0
Iowa.....	
Kansas.....	120.0
Michigan.....	1347.51
Minnesota.....	4388.11
Missouri.....	
Nebraska.....	107.0
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	23,774.45

NORTHEAST	
Connecticut.....	10,854.0
Delaware.....	
Maine.....	
Maryland.....	5205.0
Massachusetts.....	36,630.32
New Hampshire.....	
New Jersey.....	5777.37
New York.....	7621.19
Pennsylvania.....	804.3
Rhode Island.....	
Vermont.....	1147.5
Northeast Total...	68,039.68

NORTHWEST	
Alaska.....	
Idaho.....	7.5
Montana.....	
Oregon.....	777.50
Utah.....	
Washington.....	1851.80
Wyoming.....	
Northwest Total...	2636.80

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	
Georgia.....	8137.0
Kentucky.....	
Louisiana.....	
Mississippi.....	
North Carolina.....	5059.5
Oklahoma.....	
South Carolina.....	
Tennessee.....	276.02
Texas.....	7632.77
Virginia.....	
West Virginia.....	
Southeast Total...	21,105.29

SOUTHWEST	
Arizona.....	
California.....	23,795.13
Colorado.....	
Hawaii.....	1453.60
New Mexico.....	876.00
Nevada.....	
Southwest Total...	26,124.73

GRAND TOTALS		
Region	Volume	Percent
Midwest	23774.45	17%
Northeast	68039.68	49%
Northwest	2636.80	2%
Southeast	21105.29	14%
Southwest	26124.73	18%

TOTAL VOLUME 141,680.95

REGIONAL BREAKDOWN
VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	20,504.2
Indiana.....	5,800.5
Iowa.....	
Kansas.....	
Michigan.....	
Minnesota.....	4,305.6
Missouri.....	
Nebraska.....	307.5
North Dakota.....	210.0
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	31,127.80

NORTHEAST	
Connecticut.....	3,630.0
Delaware.....	
Maine.....	
Maryland.....	3,923.02
Massachusetts.....	27,445.25
New Hampshire.....	592.5
New Jersey.....	10,524.37
New York.....	11,939.81
Pennsylvania.....	1,393.5
Rhode Island.....	
Vermont.....	
Northeast Total...	59,448.45

NORTHWEST	
Alaska.....	
Idaho.....	2,501.7
Montana.....	
Oregon.....	
Utah.....	
Washington.....	1,366.19
Wyoming.....	
Northwest Total...	3,867.89

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	
Georgia.....	9,406.7
Kentucky.....	470.32
Louisiana.....	
Mississippi.....	
North Carolina.....	10,528.5
Oklahoma.....	
South Carolina.....	
Tennessee.....	
Texas.....	9,893.03
Virginia.....	1,426.86
West Virginia.....	
Southeast Total...	31,725.41

SOUTHWEST	
Arizona.....	9,645.5
California.....	20,130.92
Colorado.....	
Hawaii.....	112.5
New Mexico.....	
Nevada.....	749.0
Southwest Total...	30,637.92

GRAND TOTALS		
Region	Volume	Percent
Midwest	31,127.80	20%
Northeast	59,448.45	38%
Northwest	3,867.89	3%
Southeast	31,725.41	20%
Southwest	30,637.92	20%

TOTAL VOLUME 156,807.5

REGIONAL BREAKDOWN
VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	28,964.10
Indiana.....	4,355.50
Iowa.....	
Kansas.....	
Michigan.....	4,444.62
Minnesota.....	7,110.17
Missouri.....	
Nebraska.....	
North Dakota.....	
Ohio.....	262.50
South Dakota.....	
Wisconsin.....	
Midwest Total.....	45,136.89

NORTHEAST	
Connecticut.....	
Delaware.....	
Maine.....	2,160.00
Maryland.....	8,372.54
Massachusetts.....	17,844.70
New Hampshire.....	695.50
New Jersey.....	13,048.71
New York.....	25,231.97
Pennsylvania.....	887.98
Rhode Island.....	
Vermont.....	
Northeast Total...	68,241.40

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	37.50
Oregon.....	4794.63
Utah.....	1387.50
Washington.....	1381.51
Wyoming.....	
Northwest Total...	7,601.14

SOUTHEAST	
Alabama.....	
Arkansas.....	10,922.00
Dist. of Columbia...	
Florida.....	4,447.00
Georgia.....	26,653.50
Kentucky.....	1,165.00
Louisiana.....	
Mississippi.....	
North Carolina.....	12,739.50
Oklahoma.....	
South Carolina.....	885.00*
Tennessee.....	295.55
Texas.....	5,120.00
Virginia.....	186.62
West Virginia.....	
Southeast Total...	61,414.17

SOUTHWEST	
Arizona.....	
California.....	32,600.33
Colorado.....	735.00
Hawaii.....	580.87
New Mexico.....	80.20
Nevada.....	
Southwest Total...	33,996.40

GRAND TOTALS		
Region	Volume	Percent
Midwest	45,136.89	21%
Northeast	68,241.40	32%
Northwest	7,601.14	3%
Southeast	61,414.17	28%
Southwest	33,996.40	16%
TOTAL VOLUME	216,390.00	

*Chem-Nuclear Shipment (Vials)

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	10,399.05
Indiana.....	
Iowa.....	
Kansas.....	
Michigan.....	1155.0
Minnesota.....	4163.6
Missouri.....	
Nebraska.....	
North Dakota.....	
Ohio.....	15.0
South Dakota.....	
Wisconsin.....	
Midwest Total.....	15,732.65

NORTHEAST	
Connecticut.....	
Delaware.....	
Maine.....	2160.0
Maryland.....	1321.2
Massachusetts.....	12,200.43
New Hampshire.....	
New Jersey.....	8111.98
New York.....	8173.01
Pennsylvania.....	7944.8
Rhode Island.....	
Vermont.....	
Northeast Total...	39,911.42

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	
Oregon.....	
Utah.....	660.00
Washington.....	956.66
Wyoming.....	
Northwest Total...	1,616.66

SOUTHEAST	
Alabama.....	
Arkansas.....	
Dist. of Columbia...	
Florida.....	3427.5
Georgia.....	3787.5
Kentucky.....	172.50
Louisiana.....	
Mississippi.....	1474.0
North Carolina.....	705.0
Oklahoma.....	90.0
South Carolina.....	
Tennessee.....	231.76
Texas.....	6400.0
Virginia.....	
West Virginia.....	
Southeast Total...	16,288.26

SOUTHWEST	
Arizona.....	
California.....	5459.44
Colorado.....	525.00
Hawaii.....	
New Mexico.....	
Nevada.....	1102.50
Southwest Total...	7086.94

GRAND TOTALS		
Region	Volume	Percent
Midwest	15,732.65	20%
Northeast	39,911.42	49%
Northwest	1,616.66	2%
Southeast	16,288.26	20%
Southwest	7,086.94	9%
TOTAL VOLUME	80,635.93	

REGIONAL BREAKDOWN
VOLUMES OF WASTE IN CUBIC FEET

MIDWEST	
Illinois.....	11,606.96
Indiana.....	
Iowa.....	
Kansas.....	
Michigan.....	1,805.00
Minnesota.....	6,116.02
Missouri.....	180.00
Nebraska.....	
North Dakota.....	
Ohio.....	
South Dakota.....	
Wisconsin.....	
Midwest Total.....	19,707.98

NORTHEAST	
Connecticut.....	
Delaware.....	
Maine.. ..	1,080.00
Maryland.....	1,336.65
Massachusetts.....	18,545.76
New Hampshire.....	
New Jersey.....	5,758.71
New York.....	5,387.50
Pennsylvania.....	8,684.56
Rhode Island.....	
Vermont.....	
Northeast Total...	40,793.18

NORTHWEST	
Alaska.....	
Idaho.....	
Montana.....	
Oregon.....	2,968.40
Utah.....	2,610.00
Washington.....	250.00
Wyoming.....	
Northwest Total...	5,803.40

SOUTHEAST	
Alabama.....	
Arkansas.....	7.50
Dist. of Columbia...	
Florida.....	2,100.00
Georgia.....	1,960.00
Kentucky.....	
Louisiana.....	
Mississippi.....	
North Carolina.....	14,469.00
Oklahoma.....	
South Carolina.....	
Tennessee.....	111.61
Texas.....	5,655.00
Virginia.....	
West Virginia.....	
Southeast Total...	24,303.11

SOUTHWEST	
Arizona.....	
California.....	9,289.14
Colorado.....	
Hawaii.....	
New Mexico.....	
Nevada.....	1,095.00
Southwest Total...	10,384.14

GRAND TOTALS		
Region	Volume	Percent
Midwest	19,707.98	20%
Northeast	40,793.18	40%
Northwest	5,803.40	6%
Southeast	24,303.11	24%
Southwest	10,384.14	10%
TOTAL VOLUME	100,991.81	

REGIONAL BREAKDOWN
 VOLUMES OF WASTE IN CUBIC FEET
 ANNUAL TOTAL - SEPTEMBER 1980 - AUGUST 1981

MIDWEST

Illinois.....	216,261.40
Indiana.....	11,539.03
Iowa.....	375.00
Kansas.....	120.00
Michigan.....	23,609.27
Minnesota.....	45,503.75
Missouri.....	540.00
Nebraska.....	889.50
North Dakota.....	210.00
Ohio.....	922.50
South Dakota.....	--
Wisconsin.....	540.00
Midwest Total.....	300,510.45

NORTHEAST

Connecticut.....	38,046.00
Delaware.....	--
Maine.....	5,400.00
Maryland.....	41,492.79
Massachusetts.....	221,353.93
New Hampshire.....	9,449.05
New Jersey.....	96,624.30
New York.....	133,203.92
Pennsylvania.....	34,756.99
Rhode Island.....	--
Vermont.....	1,147.50
Northeast Total...	581,474.48

NORTHWEST

Alaska.....	60.00
Idaho.....	2553.31
Montana.....	75.00
Oregon.....	21551.66
Utah.....	4905.00
Washington.....	18,747.45
Wyoming.....	870.40
Northwest Total...	48,762.82

SOUTHEAST

Alabama.....	--
Arkansas.....	10,929.50
Dist. of Columbia...	--
Florida.....	12,749.50
Georgia.....	63,497.20
Kentucky.....	1,422.82
Louisiana.....	--
Mississippi.....	22,624.00
North Carolina.....	96,707.95
Oklahoma.....	90.00
South Carolina.....	885.00
Tennessee.....	1,670.91
Texas.....	156,453.30
Virginia.....	3,924.03
West Virginia.....	--
Southeast Total...	370,954.21

SOUTHWEST

Arizona.....	9694.51
California.....	195,383.89
Colorado.....	1260.00
Hawaii.....	2465.98
New Mexico.....	672.90
Nevada.....	3830.00
Southwest Total...	213,307.28

GRAND TOTALS

Region	Volume	Percent
Midwest	300,510.45	19.84%
Northeast	581,474.48	38.38%
Northwest	48,762.82	3.21%
Southeast	370,954.21	24.49%
Southwest	213,307.28	14.08%

TOTAL VOLUME 1,515,009.24

APPENDIX D

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name*	Non-Compliance	Warning Letter Date	ACTION TAKEN**	
				Suspension Date	Reinstatement Date
9-08-80	15	No sole use instructions			
9-15-80	8	Unsigned certification			
9-15-80	15	Improperly signed certification			
9-15-80	23	No sole use instructions			
9-15-80	5	Loose bung	9-24-81		
9-15-80	12c	Shipping papers inconsistent			
9-15-80	21	Shipping paper inconsistent			
9-17-80	24	Certification			
9-17-80	25	Loose ring	9-24-81		
9-17-80	6	Labeling - Nonspecified container	9-24-81		
9-17-80	22	Labeling			
9-18-80	1	Labeling			
9-19-80	5	Improperly signed certificate			
9-22-80	16	Broken ring	9-22-80		
9-22-80	25	Loose ring	9-22-80		
9-22-80	26	Missing seals	9-22-80		
9-24-80	27	No sole use instructions	9-25-80		
9-25-80	28	No LSA marking	9-25-80		
9-30-80	25	Inadequate drums	9-25-80	10-6-80	12-8-80

*See Attachment 1 to Appendix D

**See Attachment 2 to Appendix D

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
10-06-80	29	Leaker		10-15-80	12-9-80
10-06-80	12c	Excessive radiation levels in cab	10-6-80		
10-06-80	30	1 missing label	10-6-80		
10-06-80	31	1 missing label	10-6-80		
10-06-80	32	No labels on one (1) drum	10-6-80		
10-13-80	21	Leaker		10-13-80	10-27-80
10-14-80	3	Miss labeling	10-27-80		
10-15-80	50	Loss of drum integrity		10-16-80	10-27-80
10-16-80	34	Leaker		10-16-80	11-10-80
10-20-80	1	No T.I. on label	10-24-80		
10-21-80	15	Nonspecified container			
10-22-80	6	Nonspecified container			
10-23-80	35	No T.I. on label			
10-24-80	1	Labeling	10-24-80		
10-24-80	36	Labeling	10-24-80		
10-24-80	37	Labeling	10-24-80		
10-24-80	38	Labeling	10-24-80		

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
10-24-80	1d	Loose bolt and ring	10-24-80		
10-24-80	11	No sole use instructions	10-24-80		
10-27-80	3	No sole use instructions			
10-27-80	10	No sole use instructions			
10-27-80	5	No sole use instructions			
10-29-80	5	Seals; broken ring			
10-30-80	10	Excessive radiation levels		10-30-80	11-10-80
11-03-80	39	Placarding	11-3-80		
11-03-80	22	Placarding	11-3-80		
11-04-80	24	No marking on drum	11-5-80		
11-04-80	12a	Defective placard			
11-05-80	107	No vehicle inspection			
11-05-80	20	No sole use instructions	11-6-80		
11-05-80	22	No sole use instructions	11-6-80		
11-05-80	1	Loose ring - labeling	11-6-80		
11-06-80	35	No sole use instructions	11-7-80		
11-11-80	41	Certification unsigned	11-11-80		

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
11-17-80	43	Overlabeling			
11-17-80	25	Bracing	11-17-80		
11-18-80	3	Nonspecified drum	11-18-80		
11-20-80	25	Leaker		11-20-80	12-2-80
11-20-80	42	Leaker		11-20-80	12-8-80
11-26-80	42	Loss of drum integrity		11-26-80	12-8-80
12-01-80	24	No sole use instructions			
12-02-80	44	No sole use instructions			
12-05-80	14	Insufficient placarding	12-5-80		
12-08-80	12b	Lack of bracing			
12-10-80	45	Obsolete WA State certification			
12-15-80	5	Broken Closure			
12-16-80	25	Incomplete shipping papers			
12-18-80	5	Shipment left at NECO site without approval			
12-22-80	45	Overplacarding			
12-22-80	46	Incomplete WA State certification; lack of proper shipping name on shipping papers; lack of bracing; no weight marking; no LSA marking; leaking drum		12-22-80	2-23-81

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
1-81	22	Lack of bracing			
01-05-81	11	1 drum - no labeling	1-5-81		
01-06-81	16	Loss of drum integrity		1-6-81	1-27-81
01-12-81	47	No broker signature on WN State certification			
01-12-81	25	No broker signature on WN State certification			
01-15-81	42	Loss of package integrity		1-15-81	2-23-81
01-19-81	22	Inconsistent shipping papers	1-19-81		
01-19-81	42	Use of non 7A containers			
01-20-81	47	Inadequate bracing	1-20-81		
01-27-81	48	No sole use instructions	1-27-81		
01-30-81	15	No sole use instructions	1-30-81		
01-29-81	42	Lack of signature on WN State certification			
01-26-81	12b	Lack of LSA marking			
02-17-81	24	Punctured drum		2-17-81	4-6-81
02-18-81	42	Loose ring and lid			
02-18-81	5	No sole use instructions			
02-20-81	49	Incomplete certification no bracing			

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
02-23-81	23	Inadequate bracing			
02-25-81	5	Mislabeled			
02-27-81	8	Lack of bracing			
03-06-81	12b	Inaccurate drum count			
3-12-81	47	No LSA markings	3-20-81		
3-12-81	5	Improper bracing	3-20-81		
3-24-81	51	No exclusive use instructions			
3-30-81	8	No bracing			
4-01-81	102	No bracing			
4-03-81	103	Prohibited placarding			
4-03-81	3	Incomplete and illegible certification			
4-08-81	24	No bracing			
4-14-81	6	Inadequate closure devices on drums	4-22-81		
4-14-81	5	Improper bracing	4-14-81		
4-15-81	16	Prohibited placarding			
4-15-81	25	2 leakers			(No Suspension)
4-17-81	49	2 leakers; no security seals; inadequate shipping papers		4-17-81	8-3-81

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
4-21-81	22	One label and multiple misplaced labels	4-21-81		
4-22-81	12a & 106	Mislabel			
4-29-81	40	No bracing, no sole use instructions, holes in boxes		5-4-81	6-15-81
5-05-81	33	Site use permit missing for each generator			
5-11-81	42	Inadequate bracing			
5-11-81	105	Inadequate shipping papers			
5-12-81	43	Inadequate bracing			
5-12-81	21	Inadequate bracing			
5-13-81	100	Inadequate bracing and prohibited placarding			
5-20-81	6	Bracing, prohibited placarding and inadequate paperwork			
5-20-81	100	Inadequate shipping papers			
5-21-81	27	No exclusive use instructions			
5-21-81	56	No exclusive use instructions			
5-21-81	57	2 leakers and 1 loose rim		5-21-81	6-15-81
5-26-81	3	No site use permits for 3 generators			
5-27-81	2	Open and partially open pails		6-1-81	6-15-81
5-28-81	42	No exclusive use instructions			
6-01-81	7	Leaker		6-10-81	7-27-81

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	Warning Letter Date	ACTION TAKEN	
				Suspension Date	Reinstatement Date
6-01-81	30	2 unmarked drums, broken weld and leaker	6-15-81		
6-02-81	15	Inadequate shipping papers			
6-03-81	5	Prohibited placarding and lack of generator certification	6-10-81		
6-08-81	5	No generator name on RSR			
6-19-81	52	No certification		6-24-81	7-7-81
6-22-81	19	High radiation levels			
6-23-81	1b	Miss labeled drum			
6-23-81	1c	Incorrect RSR information			
6-23-81	1	Broker for above loads			
6-24-81	9	Missing placard			
6-25-81	6	Inadequate bracing			
6-26-81	14	No transport index on label			
6-29-81	20	Inadequate bracing			
6-30-81	6	2 leakers and inadequate bracing		6-30-81	
7-08-81	104	Bracing reminder			
7-13-81	15	Improper certification			
7-14-81	53	Improper certification			

SUMMARY-SECOND YEAR SHIPPING VIOLATIONS

Inspection Dates	Company Name	Non-Compliance	ACTION TAKEN		
			Warning Letter Date	Suspension Date	Reinstatement Date
7-14-81	100	Inadequate bracing and Expired W.U.T.C. safety sticker			
7-17-81	22	Improper certification			
7-22-81	16	Seals missing from drums	8-4-81		
7-30-81	24	Seals missing from drums; No T.I. on shipping papers; missing site use permit #			
8-03-81	22	Missing site use permit #			
8-04-81	23	Broker for shipment of unauthorized S.N.M.; leaker	8-4-81		8-12-81
8-04-81	54	Shipment of unauthorized special nuclear material	8-4-81		8-12-81
8-06-81	42	Loose ring on drum			
8-07-81	17	Inadequate bracing			
8-10-81	100	No W.S.P.* inspection report			
8-13-81	20	Wrong permit #			
8-14-81	101	No W.S.P. inspection report			
8-17-81	1	Loose ring on drum Missing labels on drums			
8-18-81	34	High radiation levels			
8-19-81	42	Noncontrasting colors on drums			
8-20-81	55	Noncontrasting colors on drums			

*Washington State Police

BROKERS AND COMPANIESCompany Number

1	US Ecology, Inc. (broker for 1a-1d)
1a	Amersham
1b	Western Michigan University
1c	New Mexico State University
1d	Upjohn Company
2	University of Washington
3	Radiac Research
4	Nebraska Public Power (Cooper Nuclear)
5	Southwest Nuclear Company
6	Nuclear Diagnostic Labs
7	Wyoming Mineral Corporation
8	Teledyne Isotopes
9	TMI - Metro Edison
10	Northern States Power
11	New England Nuclear
12a	Commonwealth Edison, Quad Cities
12b	Commonwealth Edison, Zion
12c	Commonwealth Edison, Dresden
13	Three M Company
14	Ralph Baltzo & Associates
15	Atomic Disposal
16	Honeywell, Inc.
17	Thomas Gray & Associates
18	GE Medical Systems Division

BROKERS AND COMPANIES (CONTINUED)Company Number

19	Consumers Power Company
20	Trojan - Portland General Electric
21	Midwest Research
22	Interex
23	Chem Nuclear
24	Radiation Services Organization
25	Todd Research and Technical Institute
26	Christ Hospital
27	University of Maryland
28	Carolina Power
29	Mt. Sinai Medical Center
30	Colgate Palmolive
31	Corning Glass Works
32	Roche Clinical Labs
33	Gamma Corporation
34	Consumers Power
35	N.C. Industries
36	William Beaumont
37	South Bend Medical Center
38	Children's Hospital
39	Massachusetts Institute of Technology
40	Nuclear Specialties
41	Pathology Associates
42	Nuclear Metals
43	University of Minnesota
44	Virginia Electric and Power Company

BROKERS AND COMPANIES (CONTINUED)Company Number

45	University of Colorado - Denver
46	University of Colorado - Boulder
47	Northeast Nuclear Energy
48	Hershey Medical Center
49	Isotex
50	Power Authority of the State of New York
51	Interlab Associates
52	Nuclear Radiation Development
53	National Jewish Hospital
54	University of Rochester
55	Western Zirconium
56	Radiation Management Corporation
57	Army Materials and Mechanics Research Center

CARRIERS

100	Tri-State Motor Transit
101	IML
102	Consolidated Freightways
103	Pacific Intermountain Express
104	Ringsby Freight Company
105	Hacke Trucking
106	Hittman
107	Garrett Freightlines

APPENDIX D

SEVERITY CATEGORIES

The Washington State Radiation Control Program has developed a demerit system in order to standardize violations into six separate categories according to the severity of the violation. This will enable the department to become more consistent in dealing with various violations. The six categories are as follows:

1. Verbal or telephone notification of an observed situation either from the Washington State inspector at the Hanford waste disposal site or from the Radiation Control Program home office in Olympia, Washington. This discussion will not become a formal record nor will it be documented.
2. Warning letter only of which a copy will be retained on file for an indefinite period. The warning will be used as a future reference in evaluating site users for various discrepancies and/or violations.
3. Suspension of a site use permit for a period of not less than one week during which time the site use permit holder shall submit corrective procedures to the Washington State Radiation Control Program Reinstatement Committee in order to prevent a recurring violation or violations thereafter. Reinstatement shall follow provided the committee by majority vote approves of the corrective procedures.
4. Suspension of site use for a period of not less than one month during which time the permit holder shall submit to the Washington State Radiation Control Program Reinstatement Committee corrective procedures in order to prevent a recurring violation or violations thereafter. Reinstatement shall follow provided the committee approves by majority vote the corrective actions submitted.
5. Suspension of site use for a period of not less than one month during which time the permit holder shall attend an administrative hearing in Olympia, Washington. The Radiation Control Program Reinstatement Committee shall be present at the hearing.
6. Revocation of a site use permit.

APPENDIX E

APPENDIX E

VEHICLE INSPECTION RESULTS

Period (1980)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
9/9-9/12	15	9	9/9	24	1, 2(b)
			9/9	2	1
			9/10	1	2(b)
			9/11	12	1, 3
			9/11	25	1, 3, 5
			9/11	25	6
			9/11	2	1, 2(d)
			9/11	2	1, 2(a)
			9/12	2	2(b), 3
			9/15-9/19	26	11
9/15	2	1			
9/15	2	1, 2(c)			
9/15	2	1, 2(d)			
9/15	2	1, 3, 7, 8			
9/15	1	1, 3			
9/16	1	2(d)			
9/17	1	2.A			
9/17	1	1			
9/17	7	1			
9/22-9/26	20	11	9/19	2	8
			9/22	2	1
			9/22	8	2(a)
			9/22	1	4
			9/22	1	2(c)
			9/22	1	1, 2(c), 8
			9/22	1	1
			9/24	25	8
			9/24	2	1
			9/24	1	1, 2(c)
9/29-10/3	22	8	9/25	25	1
			9/25	1	1
			9/29	1	1
			9/29	1	1
			9/29	1	8
			9/29	1	1
			9/29	1	1
			9/29	1	2(d)
			10/1	25	1
			10/6-10/10	24	5
10/7	1	3, 8			
10/7	1	3, 8			
10/8	1	1			
10/9	1	3, 6			
10/13-10/17	32	9	10/13	2	1
			10/13	2	1

VEHICLE INSPECTION RESULTS

Period (1980)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
10/13-10/17			10/14	1	2(a), 3
			10/14	2	1, 3, 8
			10/15	1	1
			10/15	1	2(d)
			10/15	1	1, 2(c)
			10/15	1	1
			10/17	2	1, 3, 6
10/20-10/24	32	19	10/20	1	1, 6
			10/20	1	1, 3
			10/20	1	1, 3
			10/20	1	8
			10/20	1	1, 3
			10/20	1	2(c)
			10/20	1	1, 2(d)
			10/21	2	1
			10/21	2	1
			10/21	1	1
			10/21	2	1, 8
			10/23	13	1, 3
			10/23	25	1
			10/24	1	1
			10/24	1	2(b)
			10/24	1	3
			10/24	2	1
10/24	1	2(d)			
10/24	2	7			
10/27-10/31			10/27	1	1, 2(b)
			10/27	1	1
			10/27	1	2(c)
			10/27	2	2(d)
			10/30	25	1
			10/30	1	2(b)
			10/30	2	2(c), 5
10/31	1	3			
11/3-11/7	27	9	11/3	2	8
			11/3	1	1, 7
			11/3	1	1
			11/5	1	1, 8
			11/6	1	1
			11/6	3	1
			11/6	2	8
			11/7	1	1
11/7	2	1			
11/10-11/14	25	5	11/10	2	7
			11/10	2	1
			11/11	1	2(c)

VEHICLE INSPECTION RESULTS

Period (1980)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
			11/11	26	1
			11/14	25	1
11/17-11/21	28	15	11/17	5	1
			11/17	1	2(c)
			11/17	2	1, 3
			11/17	1	2(b)
			11/17	2	7
			11/18	2	1
			11/18	1	1
			11/19	1	2(a), 8
			11/19	2	1
			11/19	15	8
			11/20	25	1
			11/20	3	1
			11/20	27	1
			11/21	1	1
			11/21	1	1
			11/21	1	3
11/24-11/26			11/24	2	7
			11/24	1	8
			11/24	1	3
			11/25	2	1
			11/25	1	1, 8
			11/25	1	1
			11/26	2	2(a)
			11/26	1	1
			11/26	3-26	1
12/01/-12/05	19	8	12/01	1	1
			12/01	1	1
			12/01	3	1
			12/02	1	1
			12/02	2	1, 8
			12/03	1	2(b)
			12/03	25	1
			12/04	25	1

VEHICLE INSPECTION RESULTS

Period (1980-1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
12/08/-12/12/80	51	13	12/08	1	1, 6
			12/08	2	4
			12/08	2	7
			12/08	2	1, 2(c), 8
			12/10	1	3
			12/10	1	1, 3, 8
			12/11	2	1
			12/11	2	2(b), 2(c)
			12/11	1	2(d)
			12/11	1	1
			12/11	1	2(d)
			12/12	1	1
			12/12	2	2(d)
			12/15-12/19/80	40	5
12/15	12	1			
12/15	1	2(b)			
12/15	2	1			
12/16	1	1			
12/22	28	1, 2(a)			
12/22	28	1			
12/29	1	2(b)			
12/29	1	1, 3			
12/29	1	1(b)			
12/30	29	1(b)			
12/31	29	8			
12/31	1	1			
12/31	1	3			
01/05-01/09/81	17	5	01/08	1	1
			01/09	29	1, 2(c), 7
			01/09	2	2(d)
			01/09	2	8
			01/09	2	7
01/12-01/16	35	15	01/12	1	2(b)
			01/12	1	2(b)
			01/12	29	2, 3
			01/13	15	8
			01/14	1	2(b), 8
			01/14	2	1, 2(b)
			01/14	29	1
			01/15	2	1
			01/15	2	8
			01/15	29	2
			01/15	1	3

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
			01/16	1	1
			01/16	2	1
			01/16	2	1, 2
01/19-01/23	36	15	01/19	2	1, 2(b)(d)
			01/19	29	1
			01/19	29	8
			01/19	29	1
			01/19	29	1
			01/19	29	1
			01/19	29	3
			01/19	29	7
			01/19	29	1
			01/19	1	1
			01/20	1	1
			01/20	2	1
			01/21	15	2(b)(d)
			01/22	15	3
			01/23	30	1
01/26-01/30	32	11	01/26	1	1
			01/26	2	1
			01/26	29	1
			01/26	29	1
			01/27	1	1
			01/27	29	1,3,2(a),2(b),8
			01/28	29	1
			01/29	2	1
			01/29	29	1
			01/30	29	1
			01/30	1	1, 2(b)
			01/30	29	1
			01/30	29	1
02/02-02/06	36	18	02/02	1	1, 6, 3
			02/02	1	3
			02/02	1	8
			02/02	2	1
			02/02	1	1
			02/02	15	1
			02/02	2	1
			02/02	15	3
			02/03	15	8
			02/03	9	8
			02/04	1	2(c), 3
			02/04	2	1, 8
			02/04	2	2(c)
			02/04	15	1, 3
			02/05	1	1

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
			02/05	29	1
			02/05	2	1
			02/06	1	2(a)
02/09-02/13	35	1	02/09	2	1, 3
02/17-02/20	34	19	02/17	2	1, 2(c)
			02/17	1	1
			02/17	5	1
			02/17	1	3
			02/17	29	2, 3
			02/17	2	8
			02/17	2	1
			02/17	1	1, 8
			02/17	2	1, 3
			02/17	2	2
			02/17	2	7
			02/17	2	1
			02/17	1	2
			02/18	29	1, 8
			02/18	29	1, 2
			02/18	3	2
			02/18	29	1
			02/19	26	2
			02/20	2	8
02/23-02/27	42	23	02/23	1	2
			02/23	2	2
			02/23	1	7
			02/23	15	8
			02/23	1	1, 8
			02/23	15	2, (b)
			02/25	1	1, 2
			02/25	2	3
			02/25	15	2(d), 3
			02/25	29	2
			02/25	2	1
			02/26	1	1
			02/26	29	1, 7
			02/26	1	8
			02/26	2	7
			02/26	15	3
			02/26	20	1, 2
			02/26	2	2, 8
			02/27	1	1
			02/27	2	1
			02/27	2	2, 8
			02/27	1	6
			02/27	2	1

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
03/02-03/06	40	18	03/02	1	2
			03/02	1	6
			03/02	1	7
			03/02	1	1
			03/03	15	8
			03/03	3	8
			03/03	2	1, 8
			03/03	15	2(a)(b)
			03/03	15	2(a)(b)
			03/03	29	1
			03/05	2	1
			03/06	1	2(b)
			03/06	1	8
			03/06	1	2(d)
			03/06	1	1
			03/06	1	8
			03/06	3	2(d)
			03/06	2	1, 8

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance			
3/10-3/13	41	12	3/9	1	2d			
			3/9	15	2b			
			3/9	15	3, 7			
			3/9	1	1, 7			
			3/10	2	1, 7			
			3/10	15	2d, 3, 8			
			3/12	15	5			
			3/13	3	2d			
			3/13	2	6, 7			
			3/13	1	1, 2b, 2c, 5			
			3/13	2	2d, 7, 8			
			3/13	2	1			
			3/16-3/20	44				
3/23-3/27	53	15	3/23	1	1, 7			
			3/23	1	1			
			3/23	15	3			
			3/23	1	1, 2a			
			3/23	1	1			
			3/23	1	1, 2a, 5			
			3/23	1	1			
			3/24	1	5			
			3/24	1	1			
			3/24	15	1			
			3/25	2	1, 26			
			3/25	15	7			
			3/27	1	3, 5, 6			
			3/27	1	1			
			3/27	15	8			
			3/30-4/3	44	20	3/30	2	2c, 2d
						3/30	1	3
3/30	15	1						
3/30	15	1, 7						
3/30	2	7						
3/30	1	1						
3/30	2	5						
3/30	1	2d						
3/30	15	2b						
3/31	1	2d						
3/31	1	1, 3						
3/31	15	7						
4/1	2	2b						
4/1	1	1						
4/2	2	2d, 3						
4/3	5	1						
4/3	1	1, 2c						
4/3	15	1, 2b, 2c						

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
4/6-4/10	52		4/6	1	1
			4/6	2	1
			4/6	2	8
			4/6	1	1, 3
			4/6	1	1
			4/6	2	1
			4/7	1	3
			4/7	1	1
			4/7	15	2d
			4/8	13	3
			4/8	20	1
			4/8	1	1
			4/9	15	2c
			4/9	15	8
			4/10	1	1
			4/10	1	1
4/13-4/17	62	13	4/13	1	2b, 2d
			4/13	1	5
			4/13	1	1
			4/13	1	2c
			4/13	1	2c
			4/13	15	7, 8
			4/14	1	7
			4/14	5	1
			4/15	1	1
			4/16	1	1
			4/17	1	1
			4/17	20	1
			4/17	1	1
4/20-4/24	51	16	4/20	1	1
			4/20	1	1
			4/20	1	1
			4/20	15	2c, 2d, 3
			4/21	16	1, 2c
			4/21	1	1
			4/21	15	7
			4/21	3	1
			4/21	1	1
			4/21	1	1
			4/22	5	1
			4/22	15	2c, 2d
			4/22	7	5
			4/22	1	1, 2b
4/22	1	1			
4/24	1	1			

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
4/27-5/1	61	10	4/28	1	1
			4/28	1	3
			4/28	3	5
			4/28	15	2d, 7
			4/29	15	3, 5
			4/29	15	3
			4/29	15	3
			4/30	1	2c
			5/1	15	7
			5/1	15	1
5/4-5/8	58	6	5/4	1	7
			5/4	1	1
			5/4	2	7
			5/4	1	5
			5/4	16	1
			5/4	1	5, 8
			5/4	1	1
			5/4	1	1
			5/5	15	3, 5
			5/5	1	1
5/11-5/15	59	13	5/11	15	1, 5
			5/11	2	5
			5/12	1	1
			5/12	1	8
			5/12	1	1
			5/12	15	3
			5/12	1	1
			5/13	15	8
			5/13	6	7
			5/14	1	1
			5/15	3	1
			5/15	2	1
			5/15	5	2d
			5/18-5/22	63	21
5/18	2	5			
5/18	2	1, 5			
5/18	2	1			
5/18	1	1			
5/18	5	1			
5/18	2	1, 2b			
5/18	15	1			
5/18	1	7			
5/19	2	7			
5/19	16	1			

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
			5/19	15	1, 3
			5/19	15	7
			5/20	15	8
			5/21	1	7
			5/22	1	1
			5/22	1	1
			5/22	20	1
			5/22	3	1
			5/22	18	1
			5/22	1	1
5/26-5/29	57	3	5/26	1	2a
			5/26	1	3
			5/29	13	1, 2c
6/2-6/5	55	12	6/1	20	7
			6/1	1	1
			6/1	20	7
			6/1	1	1
			6/1	1	1
			6/1	1	1
			6/1	1	1
			6/2	1	1
			6/2	1	1
			6/3	1	1
			6/4	1	2b
			6/5	1	2a
6/8-6/9	26	3	6/8	20	1
			6/8	1	5
			6/9	1	5, 6

VEHICLE INSPECTION RESULTS

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
6/10-6/12	28	7	6/10	2	1
			6/11	1	8
			6/11	1	1
			6/11	1	1
			6/11	15	1, 8
			6/12	13	7
			6/12	1	1
6/15-6/19	61	18	6/15	20	2.D, 8
			6/15	1	3
			6/15	2	2.D
			6/15	1	8
			6/15	1	1
			6/16	2	7
			6/17	13	1
			6/18	1	8
			6/18	1	2.C
			6/18	9	2.A
			6/19	3	1
			6/19	22	1
			6/19	1	2.C
			6/19	1	1
			6/19	2	1
			6/19	1	1
6/22-6/26	65	14	6/19	1	1
			6/19	9	1
			6/22	16	1
			6/22	1	1
			6/22	1	1
			6/22	1	1
			6/22	1	1
			6/23	1	1
			6/24	1	1
			6/24	1	1
			6/25	1	1
			6/25	1	1
			6/25	1	1
			6/25	15	1, 8
			6/26	1	1
6/29-7/03	52	2	6/26	1	2.B
			6/29	1	1
			6/30	15	1
			7/07	2	1
			7/09	15	7
7/06-7/10	18	2	7/13	1	1
			7/14	2	7
			7/14	15	4
7/12-7/18	18	6			

Period (1981)	Total Vehicles Inspected	Vehicles in Noncompliance	Date	Carrier Number	Items of Noncompliance
			7/16	5	
			7/16	1	8
			7/17	1	1
7/20-7/24	23	4	7/21	1	1, 2.D
			7/23	2	3
			7/23	3	7
			7/24	3	1
7/27-7/31	32	7	7/27	1	1
			7/27	1	1, 8
			7/27	1	1, 2.B
			7/29	1	1
			7/29	15	1, 2.A
			7/31	15	8
8/03-8/07	21	1	8/03	1	1, 2.2
8/10-8/14	34	7	8/10	13	1
			8/10	15	8
			8/10	1	1, 5
			8/10	3	1
			8/11	1	1, 6
			8/12	1	5
			8/13	1	7
8/17-8/21	31	8	8/17	1	1
			8/18	16	1
			8/18	2	7
			8/19	3	1
			8/19	15	8
			8/19	1	2.a
			8/21	3	1
			8/21	2	2, 8
8/24-8/28	40	8	8/24	1	1, 7
			8/25	1	1
			8/25	31	8
			8/27	2	3
			8/27	1	3
			8/27	1	1, 3
			8/27	15	3
			8/28	2	3
8/31-9/4	29	7	8/31	1	2
			9/1	1	7
			9/1	1	1
			9/3	1	3
			9/3	15	3
			9/4	15	1, 8, 8
			9/4	1	1
9/7-9/9	15	3	9/8	1	1
			9/9	1	1
			9/9	1	2, 8

APPENDIX E

TYPES of VIOLATIONS and SHIPPERS

- | | |
|--|---|
| 1. Brakes | 1. Tri State Motor Transit |
| 2. Lights | 2. Home Transport |
| a. Headlights | 3. IML |
| b. Brakelights | 4. McKays Trucking |
| c. Turn signal | 5. Hittman |
| d. Tailights | 6. Omega Particles |
| 3. Low air warning device | 7. A.W.C |
| 4. No inspection or expired 90 day sticker | 8. Consolidated Freightways |
| 5. Structural, frame, springs | 9. Garrett Freightlines |
| 6. Steering components | 10. Washington State University |
| 7. Tires | 11. U S Ecology |
| 8. Other | 12. Atomic Disposal |
| | 13. Chem Nuclear |
| | 14. University of Washington |
| | 15. P.I.E. |
| | 16. Radiation Service Organization |
| | 17. Nuclear Diagnostics Labs. |
| | 18. Arizona Radiation Regulatory Agency |
| | 19. Transport International |
| | 20. Hacke Trucking |
| | 21. Ailstate |
| | 22. Rinsby |
| | 23. Ralph Baltzo |
| | 24. McLean |
| | 25. N. L. Industries |
| | 26. Silver Eagle |
| | 27. Rollins |

- 28. Ringsby
- 29. Ryder
- 30. Bristow
- 31. -M (Owner)

APPENDIX F

APPENDIX F

THERMOLUMINESCENT DOSIMETER STUDIES

This appendix show results of TLD's after being placed and exposed at various facilities throughout the State of Washington where personnel were routinely handling RAM packages or potentially exposed due to the transport of RAM. Through this study we determined that personnel exposures were not exceedingly high and at no time close to maximum recommended limits. Our TLD recorded values were also verified by company furnished personal exposure devices worn by many of the RAM package handlers. The department is convinced that radiation exposures to personnel working with the transit of radioactive materials in Washington State has been reasonable and generally necessary for the nature of the work being performed.

DOSIMETER RESULTS

<u>Company</u>	<u>TLD Number</u>	<u>Exposure Days</u>	<u>Average Daily Reading in Millirems</u>
1. Active Air Freight delivery pickup cab	018	123	1.01
Active Air Freight (office)	041	39	1.74
2. Airport Drayage delivery van cab	001	49	2.28
private vehicle	002	49	1.87
private vehicle	003	49	7.24
hazardous cargo area	024	49	6.56
hazardous cargo area	021	72	4.86
office wall near storage area	022	72	7.01
cargo storage	038	28	8.32
3. Boeing hood in materials lab	013	98	5.90
loading dock	043	28	1.85
4. Eastern Airlines hazardous cargo area	012	49	2.17
	023	72	7.76
5. Emery Air Freight hazardous cargo area	015	49	1.22
6. Federal Express van delivering to the University of Washington	004	-lost-	
van delivering to the University of Washington	028	66	1.11

DOSIMETER RESULTS

<u>Company</u>	<u>TLD Number</u>	<u>Exposure Days</u>	<u>Average Daily Reading in Millirems</u>
van delivering to Capitol Hill	024	52	1.60
van delivering to Everett	027	69	1.35
van delivering to Tacoma	029	66	1.22
office area	045	25	1.35
7. Republic Airlines hazardous cargo cage	010	49	1.34
8. Western Airlines hazardous cargo cage	030	72	2.81
9. Interstate Industrial Laundry	015 049	54 33	1.15 2.06
10. Medical Express	042	28	3.85
11. Port of Entry-Plymouth (north window)	037	44	0.95
(south window)	039	41	1.24
(south window)	020	23	4.53
(south window)	025	57	1.94
(north window)	026	57	2.20
12. Port of Entry - Spokane station window (traffic side)	019	123	0.88
13. Flying Tiger Lines hazardous cargo hold area	011	49	2.63
14. Northwest Radiopharmaceuticals four company owned vehicles	006 007 008 009	49 49 49 49	1.15 1.53 1.86 1.41

DOSIMETER RESULTS FROM AREAS OF KNOWN RADIATION

<u>Company</u>	<u>TLD Number</u>	<u>Exposure Days</u>	<u>Average Daily Reading in Millirems</u>
1. Boeing radioactive waste storage shed	014	98	12.94
2. Dawn Mining (uranium mill) Yellow Cake storage pad	047 050	39 52	8.31 7.97
3. Western Nuclear (uranium mill) Yellow Cake storage area (outside)	016 048	52 39	9.98 10.95
4. Welk Brothers (Radio- grapher) source storage area	017 046	52 39	5.31 6.10

To further establish the concept that reasonable radiation exposures were being received by personnel, we obtained copies of personnel dosimeter results from carriers routinely handling radioactive material (RAM) packages. The personnel dosimeter results obtained did reflect and document the reasonable radiation exposures that personnel were receiving. Reasonable in this study does not imply, however, that in all cases radiation exposures were as low as reasonably achievable (ALARA). We were satisfied that there was direct correlation between our TLD results and results recorded by personnel dosimeters being worn by RAM handlers.

The dosimeter records reviewed from the busier carriers showed average monthly exposures ranging from minimal (<10 mrem) to 40 mrem. Quarterly radiation exposures shown on the same records ranged from minimal to an average of 130 mrem.

NRC FORM 335 (7-77)		U.S. NUCLEAR REGULATORY COMMISSION BIBLIOGRAPHIC DATA SHEET		1. REPORT NUMBER (Assigned by DDC) NUREG/CR-2949	
4. TITLE AND SUBTITLE (Add Volume No., if appropriate) Transportation of Radioactive Material in Washington State (September 1980-September 1981)				2. (Leave blank)	
7. AUTHOR(S) E. Lee Gronemyer, C. E. Ingersoll, S. P. Matthews and J. A. Waite				3. RECIPIENT'S ACCESSION NO.	
9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Radioactive Waste Program Department of Social and Health Services State of Washington Olympia, WA 98504				5. DATE REPORT COMPLETED MONTH YEAR March 1982	
12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Office of State Programs U. S. Nuclear Regulatory Commission Washington, D. C. 20555 (Sponsored jointly with U. S. Department of Transportation)				6. (Leave blank)	
13. TYPE OF REPORT Transportation Surveillance Study (2nd year)				PERIOD COVERED (Inclusive dates) September 1980 to September 1981	
15. SUPPLEMENTARY NOTES For the period September 9, 1979 to September 8, 1980				14. (Leave blank) see NUREG/CR-2037	
16. ABSTRACT (200 words or less) <p>The receipt and survey of shipments of low-level radioactive waste at the U. S. Ecology disposal facility near Richland, Washington, continued during the second year of the joint NRC/DOT contract. Washington State Radiation Control personnel inspected essentially all incoming shipments of radioactive waste to assure compliance with appropriate DOT shipping regulations, State of Washington Radiation Control regulations, and the conditions of U. S. Ecology's radioactive materials license. Surveillance activities associated with this contract have shown that transportation violations have decreased significantly since 1979.</p> <p>Other than waste, essentially all other shipments of radioactive materials through and within the state of Washington are radiopharmaceuticals. Especially in the Seattle area, the largest quantity of shipments involve radiopharmaceuticals transported via the state's only licensed nuclear pharmacy.</p> <p>Contract studies involved inspections at all facilities or operations in the state handling radioactive materials. Radiation exposures to transportation workers were studied and it was determined that excessive radiation was not being received by individuals in the course of transporting radioactive materials.</p>					
17. KEY WORDS AND DOCUMENT ANALYSIS			17a. DESCRIPTORS		
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