

PDR.

800512008



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 22, 1980

MEMORANDUM FOR: Kenneth L. Pierson, FHWA-DOT
Arthur Warren, FAA-DOT
James Shuler, MTB-DOT
Ralph J. Jones, SD-NRC
Richard E. Cunningham, NMSS-NRC
A. W. Grella, IE-NRC

FROM: Marie Janinek, State Relations Officer
Office of State Programs

SUBJECT: FIRST QUARTERLY REPORT (THIRD YEAR) FROM GEORGIA ON
TRANSPORTATION SURVEILLANCE PROGRAM

Enclosed is the first quarterly progress report (third year) submitted by Georgia on its transportation surveillance program under contract with NRC and DOT. The report covers the period, October 1, 1979, to December 31, 1979.

Any comments you might have on the report would be appreciated.

Marie Janinek
Marie Janinek
State Relations Officer
Office of State Programs

Enclosure:
Report fm Willard D. Ingram dtd 4/15/80

April 22, 1980

Distribution List for First Quarterly Report (Third Year) submitted by
Georgia on Transportation Surveillance Program.

W. Carriker, MTB/DOT
A. Heubner, CT
U. Clark, FL
P. Shuler, FL
W. Ingram, GA
B. Kahn, Georgia Tech.
M. Neuweg, IL
D. Mills, KY
O. Thompson, MD
D. Van Farowe, MI
J. Hennigan, MI
M. McCarty, MI
J. Vaden, NV
F. Cosolito, NJ
H. Shealy, SC
T. Strong, WA
J. O'Reilly, Reg. II
L. Ledbetter, SLO, GA
D. Hopkins, SD-NRC
A. Tse, SD-NRC
S. Bernstein, SD-NRC
V. Hodge, NMSS-NRC
D. Gibbons, LASL
W. Kerr, SP-NRC
F. Young, SP-NRC
M. Janinek, SP-NRC (4 w/o Encl.)
PDR: "Transportation Surveillance"
PDR: "Georgia"



April 15, 1980

Marie Janinek
Office of State Programs
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555 (Mail Stop 7711-MNBB)

Dear Ms. Janinek:

In accordance with the terms of modification no. one to Contract No. NRC-06-78-362, ten copies of the first quarterly progress report are enclosed.

Sincerely,

A handwritten signature in cursive script, which appears to read "Willard D. Ingram".

Willard D. Ingram
Environmental Radiation Specialist
Radiological/Occupational Health Unit

WDI:ck

Enclosures: as stated

cc: G. Wayne Schumann



GEORGIA INSTITUTE OF TECHNOLOGY

ENVIRONMENTAL RESOURCES CENTER
205 OLD CIVIL ENGINEERING BLDG.
ATLANTA, GEORGIA 30332

(404) 894-2375

TO: Dr. Wayne Schumann, Director Attn: Mr. Willard Ingram
Radiological-Occupational Health Unit, Georgia DHR
FROM: Dr. Bernd Kahn, Director Environmental Resources Center
DATE: April 7, 1980
SUBJ: Fifth Quarterly Report of Progress (October 1-December 31, 1979)
of Extended State Transportation Surveillance Program - Radioactive
Materials - under agreement between Georgia Department of Human
Resources and Georgia Institute of Technology

Measurements by TLD of the radiation exposures of persons who work with
transported-RAM were collected for periods ending October 25 and December
13 to complete thirteen months of measurement at approximately 4-week
intervals. These results for 101 workers have been compiled and are being
presented in the annual report for October 1978 - September 1979. In brief,
the following distribution of exposures, averaged on a weekly basis, was found:

Table with 4 columns: Category, No. of Workers, person-weeks, Avg. gross exposure rate, mR/week. Rows include control, no detect. RAM exposure, slight RAM exposure, elevated RAM exposure, and insufficient data.

The net exposure rate value due to RAM is the above value minus the natural
radiation background of 1.5 mR/week. Exposures were considered to be "elevated"
if the average weekly gross rate exceeded 11.1 mR, i.e. 500 mR/year due to
RAM. Workers were placed in the "insufficient data" category if fewer than
8 weeks of radiation data could be collected for them due to changes in jobs
or their lack of cooperation. These measurements provide an overview of
the exposure rate of drivers, handlers, and supervisors and indicate that
the workers that receive highest exposures are usually drivers for certain
routes. These measurements are being continued at reduced frequency,
in that TLD's are now being collected at 3-month intervals.

Radiation exposures in vehicles were monitored on a continuing basis, both
by placing TLD's behind drivers' seats for 4-week period and with survey
instruments when the loaded vehicles arrived or departed at the Purolator
terminal. The TLD values are summarized in the annual report. The survey

results given in Table 1 show that in three instances the dose rate exceeded 10 mrem/hr 6 ft from the sides of a vehicles, and in one instance it exceeded 2 mrem/hr at the driver's seat. In a few other instances, dose rates were maintained at low values despite TI values of the order of 100 per load. Observations concerning monitored RAM shipments are presented in the appendix.

Site monitoring with TLD's exposed at terminals where RAM are handled was continued on a quarterly basis with the results shown in Table 2. The radiation background is in the range 14-26 mR/quarter. Elevated values were observed at a number of RAM storage locations, the highest being 450 mR/quarter at the Purolator terminal.

Examination of shipment records to describe the transport of RAM in the state by origin, destination, radioisotope, quantity, and exposure potential was continued, with data summarized in Tables 3 to 6. The information from the Purolator terminal in Tables 3-5 can be compared with that in previous reports (see Report for Third Quarter, Table 7) to indicate the continuing major changes in shipments. These include:

- September 19, 1978: First indication that Skycab delivered RAM to Purolator Terminal for distribution to Georgia, Florida, Alabama, and Tennessee.
- February 1979: Associated Courier started to deliver RAM to Atlanta and Orlando eliminating transport by Purolator (Ryder Truck).
- April 1979: Associated Courier started to deliver RAM to Charlotte, N.C. via Atlanta, to eliminate transport by Purolator to Charlotte.
- September 1979: New England Nuclear began shipping RAM to Atlanta and Tennessee on its own trucks in place of transport by Baltimore Airways; this also eliminated transport by Purolator from Charlie Brown or Atlanta Airports to its terminal.

Table 6 presents radioisotope RAM shipments for a full year from the Nuclear Radiation Center, Georgia Institute of Technology, where these are produced by activation in a research reactor. Waste RAM from the Center and other schools in Atlanta were shipped to Barnwell for burial as indicated in Table 7.

The results of gamma-ray spectral analysis with a Ge(Li) detector of smears obtained during surveys of radiopharmaceutical packages and RAM transport vehicles are shown in Table 8. This table presents results

for all elevated values collected in the indicated period; all other smears contained no detectable radioactivity. The elevated levels are, in all cases, very low compared to regulatory contamination limits. Most notable is the detection of Se-75 on many of the containers.

This third year of study of transporting RAM in Georgia will respond as follows to the conclusions developed from observations in the two previous years of study:

Worker exposure--1. The greatest potential for exposure is to drivers who transport large TI values, which currently means numerous Mo-99 generators. Elevated exposures resulted from proximity of the Mo-99 containers to the drivers and loading and unloading by drivers. These major shipments will continue to be surveyed to document exposures, advise use of exposure reduction procedures, and assure that any new regular shipments in this continuously changing pattern of RAM transportation are maintained at low personnel exposure levels.

2. Handling RAM at terminals usually results in minor radiation exposure because the packages are handled quickly and remain in place only briefly and handlers are rotated through varied assignments. Occasional elevated exposures occur when supervisors become careless with regard to storing RAM at locations near workers or permitting workers to remain near such storage. Efforts will be made to examine techniques that are effective in maintaining good practices for avoiding extended workers exposure to RAM stored at terminals.

3. On the request of U.S. DOT staff, exposure rates from Mo-99 generators will be determined as a function of stacking configuration and distance per specified TI for packages from several suppliers. These measurements will be performed next quarter.

Population exposure--Surface contamination of packages, excessive exposure rates near vehicles and accidents that result in radioactive contamination or radiation exposure have been very infrequent; the resulting population exposure would have been extremely low. The major concern usually is directed toward the potential for exposure due to an accident, in view of relatively frequent RAM shipment on Georgia roads. Information on the frequency and exposure potential will be collected in continuation from past years. The recently promulgated regulations by the Georgia DOT that require registration of transporters and notification of specified RAM shipments may permit a more complete survey of this activity and also provide the opportunity for more representative monitoring of vehicles in transit.

Compliance--Infractions of transport regulations have been relatively minor with respect to potential overexposure. The main source of exposure has been shipment of large TI values per vehicle, but even this practice has recently been reduced. Documentation of items of noncompliance and elevated exposure rates due to shipments of large TI values will be continued.

Recommendations for exposure reduction--Discussions with workers and supervisors in the course of monitoring RAM handling have led to noticeable reductions of worker radiation exposure as the importance of maximum distance, sufficient shielding and minimum time for exposure were emphasized. A problem in

Page four
April 7, 1980
Fifth Quarterly Report

maintaining good practices, however, is the rapid turnover and reassignment of personnel. Procedures for coping with this problem will be considered, notably requirements for personnel dose measurements at frequent intervals to identify elevated exposure situations promptly, and simple but frequently repeated training programs.

Table 1
Vehicle Monitoring Results

Date	Location	Vehicle #	Route	Radiation Levels (mrem/hr)			Transport Index	Excessive Removable Contamination	Package Placement	Proper Shipping Documents	Placard	Remarks
				Cab	Surface	Six ft						
<u>October, 1979</u>												
18	Ga. Tech	2-160	Atlanta to Barnwell S.C.	0.06	0.8	0.13	LSA	none	Cask secured to trailer	yes	yes	Cask USA 6144/B
25	Note 1	15207	014	0.0	16	unk	16.6	unk	Rear	yes	yes	
		15181	028	0.0	19	unk	15.5	unk	Rear	yes	yes	
		15170	305	0.0	5	unk	2.2	unk	Right rear	yes	yes	
		16152	Atlanta to Birmingham	0.2	15	0.9	3.5	unk	Right rear	yes	no	Note 3
27	Note 2	P83094	Note 2	0.5	95	15.	252.5	yes	Rear	yes	yes	Inbound Atlanta
		P83094	Note 2	0.5	95	13	198.3	yes	Rear	yes	yes	Outbound Atlanta
		XRC92U	Note 4					unk	Full		yes	Note 5
28	Note 6	55	Note 6	0.03	12	1.0	104.9	yes	Front	yes	yes	
		15209	015	0.5	18	1.8	27.5	unk	Rear	yes	yes	
		15164	005	0.1	3.6	0.4	2.0	unk	Left Rear	yes	no	Note 7
		16721	400	0.8	10	unk	14.3	unk	Rear	yes	yes	
		15219	080	1.6	unk	unk	22.2	unk	Middle Rear	yes	yes	
		15145	008	0.3	15	1.5	14.2	unk	Rear	yes	yes	
		15214	028	0.3	60	5	94.2	unk	Rear	yes	yes	
		15189	101	1.4	10	1.4	20.2	unk	Rear	yes	yes	
<u>November, 1979</u>												
27	Note 8 Ga. Tech	544	Note 8	0.11	9.	1.1	LSA	none	Cask	yes	yes	
		88?	Atlanta to Barnwell, S.C.	0.03	1.3	0.1	LSA	none	Trailer Full	yes	yes	Note 9
<u>December, 1979</u>												
1		XRC92U	Note 4	3.0	70	unk	unk	none	Full	Note 10		Note 10
		XRC92U	Note 4	0.8	50	3.5	unk	none	Rear	yes	yes	Note 11

	P83094	Note 2 and 12 (0.9 sleeper)	0.5	100	18	196.3	yes	Rear	yes	yes	Note 13
2	15212	080	1.2	33	1.5	21.6	unk	Left Rear	yes	yes	Note 14
	15214	028	0.7	100	6	95.9	unk	Rear	yes	yes	
	16724	400	1.4	30	4	43.4	unk	Rear	yes	yes	
	15223	015	0.4	48	1.3	34.4	unk	Rear	yes	yes	
13	16144	028	0.07	65	unk	18.1	unk	Right rear	yes	yes	Note 15
	15227	305	0.04	10	unk	2.2	unk	Left rear	yes	no	Note 16
	15207	015	0.04	25	unk	17.8	unk	Rear	yes	yes	Note 17
16	NEN55	Note 6	0.2	18	1.4	110.1	none	Front	yes	yes	Note 18
	15212	080	1.4	10	unk	17.2	unk	Rear	yes	yes	
	15223	015	0.1	unk	unk	33.4	unk	Rear	yes	yes	
	15224	028	0.8	60	unk	98.1	unk	Rear	yes	yes	
	16719	400	2.0	35	2.3	45.3	unk	Middle	yes	yes	Note 19
	15145	08	1.4	18	1.0	15.5	unk	Left Rear	yes	yes	
	15190	100	1.0	10	1.0	20.9	unk	Rear	yes	yes	

Notes:

1. All locations at Purolator Terminal Atlanta, Georgia unless otherwise noted.
2. Associated Courier, St. Louis, MO to Memphis, TN; Birmingham, AL; Atlanta, GA; Charlotte, NC; Orlando, FL; and Ft. Lauderdale, FL.
3. Vehicle monitored while parked outside terminal building; driver had not arrived from Birmingham yet. Unknown if placards were displayed when vehicle actually departed.
4. Skycab, East Brunswick, NJ to Charlotte, NC; Atlanta, GA. and Orlando, FL.
5. Skycab driver did not grant permission to monitor vehicle. After off-loading RAM for Atlanta, Ga., the driver and assistant repositioned RAM destined for Orlando, Florida towards rear of vehicle. Prior to departing terminal, driver gave permission to place a TLD behind driver's seat and driver accepted new personnel TLD. The driver said that his current TLD was in his other van. TI of 101.1 was off-loaded at Atlanta, Georgia per freight bills.
6. New England Nuclear, Billerica, MA through Nashville, TN and Atlanta, GA to Oak Ridge, TN and return to Billerica, MA. Trailer has lead shielding installed on sides and front end.

7. Vehicle was noted departing terminal without displaying placards. Subsequently, vehicle returned and driver mentioned that he displays the placards in the morning when he departs on his route.
8. LSA shipment (7.46 Ci) in cask 6722/A from Browns Ferry enroute to Barnwell, SC was monitored at rest area at I-20 near Conyers exit. Subject shipment had been used for an exercise in which GA. officials participated with TVA authorities, who called a simulated radioactive shipment accident.
9. Consolidated shipment was LSA from Emory University, Morehouse College and Georgia Institute of Technology. Upon arrival at Barnwell, S.C. it was reported that the 2-ton contaminated shield leg punctured the base of the container and slightly contaminated the trailer, which required decontamination.
10. Total TI was unknown; however, per freight bills for RAM off loaded at Atlanta, GA., TI was 104.9. Skycab driver does not have a compilation of RAM TI by destination. TI is only shown on individual freight bills. Driver's log does reflect number of pieces and weights by destination for road scale checks. Only left side of vehicle had placard displayed. Some RAM packages fell out when rear door was opened.
11. Skycab vehicle was remonitored outside terminal after driver repositioned RAM destined for Orlando, FLA. towards rear of vehicle. Reading in sleeper was 4.2 mR/Hr. TI was unknown. This Skycab driver is always cooperative. Driver wore company dosimeter on his belt.
12. Associated Courier, St. Louis, MO route now terminates at West Palm Beach instead of Ft. Lauderdale, FL
13. RAM packages were stacked very high and some appeared to have fallen from top of stack toward rear of trailer. Previously, Mo-99 Generators were stacked only four generators high.
14. Reading in cab was 3.3 mR/hr until driver and trainee moved RAM towards rear of vehicle.
15. Temporary driver was ready to depart with only two placards displayed. Discussed problem with driver who immediately displayed other two placards.
16. A new Purolator truck did not have placards. Discussed problem with driver and supervisor, who made a note to correct problem.

17. Front placard was missing. Discussed problem with driver and supervisor.
18. Driver mentioned that Oak Ridge facility was closed during past 3 weeks, hence they would pick up the cask on Tuesday.
19. Only four foot separation distance between driver and RAM.

Table 2

Site Radiation Monitoring With TLD's

TLD Location	Quarterly Exposure, mR	
	<u>8/15/79 to 11/14/79</u>	<u>11/14/79 to 2/13/80</u>
Terminal A, Airborne		
1C * Office, under desk	---	15
2 RAM Area, south wall	---	33
Terminal B, Airlift Intl.		
1C Office, on wall	M +	34
2C Breakroom, on wall	M	M
3 Left side RAM area, on wall	51	39
4 Center RAM on wall	M	M
5 Right side RAM area, on wall	M	46
6 Pillar south/east side outbound area	24	20
7 Wall, south side Outbound area	45	43
8 Pillar, west end Outbound area	M	16
9 Pillar, west end Outbound Area	M	18
Terminal C, Delta Cargo Terminal		
1C North wall	32	29
2C East wall	31	30
3 Inbound RAM (Hazardous Holding area	46	38
4 Outbound RAM	19	M
5 East wall between doors 6 & 7	26	31
6 Pillar, east side opposite doors 6 & 7	32	27

Terminal D, Eastern Cargo Terminal

1	RAM Area, Terminating Bins 3 & 4	66	41
2	RAM Area, Terminating Bins 1 & 2	54	52
3C	Steel pillar, SE end of terminal	16	15
4	RAM area, Outbound	22	26
5	RAM Area, Inbound on steel pillar	15	14
6	RAM Area, Terminating Bins 2 & 3	53	41
7	RAM Area, Terminating Bins 4 & 5	52	31
8	Left side of pickup door #1	30	22

Terminal E, Emery Air Freight

1C	Office, under desk	M	16
2	RAM Area on post	32	14

Terminal F, Federal Express

1C	Office	M	22 (a)
2	End of roller conveyor, east end terminal	23	21
3	Bin pkg holding area outside office ---		20

Terminal G, Flying Tigers

1C	Office	22	22
2	Wall left corner RAM area	36	98
3	On pillar center of RAM area	34	88

Terminal H, Profit by Air

1C	Office	M	17
2	RAM area, east wall	19	18
3	RAM area, post to left of east wall	20	20

Terminal I, Purolator

1C	Breakroom on water fountain	M	15
2	West wall, between door 2 & 3	34	54
3	By dispatcher's window inside cabinets	320	290
4	North wall, left side men's latrine	72	68
5	South wall, between doors 4 & 5	270	200
6	South wall, between doors 7 & 8	M	450
7	North wall, by door 16	92	62
8	South wall, between doors 1 & 2	57	35
9	East side between doors A & B	690	560
10	East side between doors B & C	560	440

* Denotes Control TLD

+ M: Missing

Note: a. F (1C) TLD was attached to file cabinet in office which was subsequently moved out in the terminal area in a fenced storage area.

Table 3
 Summary of Weekend RAM Shipments Distribution by Purolator Courier,
 Atlanta, Georgia, from New England Nuclear (NEN), Mallinckrodt (M) and Squibb (SQ)

1979 Date	Source	Destination	1-131	Mo-99	Misc.	Activity, curie	II	LTD	Category				Totals
									I	II	III	Unk.	
July 28	NEN	AL	0	11	21	12.7	40.0	3	11	6	12	0	32
Sept. 1	NEN	AL	0	11	14	12.6	39.7	0	10	3	12	0	25
30	NEN	AL	0	11	20	12.3	38.3	1	11	8	11	0	31
July 28	NEN	GA	0	15	17	17.8	53.8	1	12	4	15	0	32
Sept. 1	NEN	GA		16	15	19.1	56.2	0	11	3	17	0	31
30	NEN	GA	0	16	20	19.4	58.3	1	14	4	17	0	36
July 28	NEN	FL (1)	0	3	2	4.1	12.0	0	2	0	3	0	5
Sept 1	NEN	FL (1)	0	4	2	5.9	17.1	0	1	1	4	0	6
30	NEN	FL (1)	0	5	3	7.2	21.1	1	1	1	5	0	8
July 28	M	GA	18	18	3	16.5	40.5	1	0	17	21	0	39
Sept 1	M	GA	18	19	3	17.6	40.4	3	0	16	21	0	40
29	M	GA	21	19	2	17.6	40.7	1	0	21	20	0	42
July 28	M	FL *	6	54	1	86.3	122.9	0	0	5	56	0	61
Sept 1	M	FL *	Data not available										
29	M	FL *	7	52	0	85.7	123.7	0	0	4	55	0	59
July 28	M	NC *	7	39	0	32.8	79.2	0	0	6	40	0	46
Sept 1	M	NC *	Data not available										
29	M	NC *	6	42	1	52.7	87.4	0	0	4	45	0	49
July 28	SQ	AL	6	15	2	27.4	43.8	0	0	3	20	0	23

1979 Date	Source	Destination	I-131	Mo-99	Misc.	Activity, curie	II	LTD	Category				Totals
									I	II	III	Unk.	
Sept 1	SQ	AL	4	16	2	27.9	42.4	0	1	3	18	0	22
Sept 29	SQ	AL	1	16	2	27.3	38.3	1	0	1	17	0	19
July 28	SQ	GA	3	19	2	29.0	40.1	2	0	1	21	0	24
Sept 1	SQ	GA	1	17	4	26.1	35.8	1	0	4	17	0	22
29	SQ	GA	0	16	1	24.0	32.8	0	0	1	16	0	17
July 28	SQ	FL (1)	0	3	0	4.7	6.6	0	0	0	3	0	3
Sept 1	SQ	FL (1)	0	2	0	4.6	5.4	0	0	0	2	0	2
29	SQ	FL (1)	0	4	0	7.4	9.5	0	0	0	4	0	4
July 28	SQ	TN	5	11	1	19.5	35.0	1	0	1	15	0	17
Sept 1	SQ	TN	4	12	0	19.9	30.4	0	0	1	15	0	16
29	SQ	TN	1	11	0	18.8	26.1	0	0	0	12	0	12
Oct 27	M	NC (2)	5	42	2	41.9	85.3	0	0	4	45	0	49
Dec 1	M	NC (2)	7	43	0	41.2	79.2	0	0	3	47	0	50
15	M	NC (2)	Data Not Available-----										
Oct 27	SQ	AL	0	15	1	26.7	35.5	1	0	0	15	0	16
Dec 1	SQ	AL	0	16	1	27.2	37.8	0	0	1	16	0	17
16	SQ	AL	2	15	2	26.8	38.0	1	0	2	16	0	19
Oct 27	SQ	GA (3)	1	15	3	23.8	31.7	2	0	1	16	0	19
Dec 1	SQ	GA (3)	1	15	0	23.3	31.8	0	0	1	15	0	16
16	SQ	GA (3)	3	16	0	24.6	35.6	0	0	2	17	0	19
Oct 27	SQ	FL (1)	0	2	0	5.1	5.4	0	0	0	2	0	2

* Purolator no longer distributes Mallinckrodt RAM to NC and FLA. Associated Courier provides this service .

- Notes:
1. RAM routed through Montgomery, Alabama.
 2. Mallinckrodt RAM on Associated Courier, St. Louis; tractor trailer enroute to states indicated.
 3. RAM destined to Rome, Georgia and Ft. Oglethorpe, Georgia are routed to Chattanooga, TN on the express run and then sent back to the final destination.

Table 5

Summary of Weekday (Thursday) RAM Shipments Distribution by Purolator
 Courier, Atlanta, Georgia, from Squibb (SQ) and Roche (R)
 (Delivered to Atlanta, Ga. by Skycab in Carrier Van)

1979 Date	Source	Destination	I-131	Mo-99	Misc.	Activity, curie	II	LTO	Category				Totals
									I	II	III	Unk.	
Sept 13	SQ	AL	0	11	0	7.6	23.2	0	0	0	11	0	11
	R	AL	0	0	2	-	-	2	0	0	0	0	2
	SQ	GA	0	4	0	2.2	6.8	0	0	0	4	0	4
	R	GA	0	0	2	-	-	2	0	0	0	0	2
	SQ	FL	0	2	0	1.5	4.4	0	0	0	2	0	2
	R	FL	0	0	2	-	-	2	0	0	0	0	2
	R	KY	0	0	2	-	-	2	0	0	0	0	2
	SQ	TN	0	6	0	4.0	12.2	0	0	0	6	0	6
	R	TN	0	0	1	-	-	1	0	0	0	0	1
Sept 20	SQ	UNK	0	26	1	unk	54.2	1	0	0	26	0	27

Date 1978	Destination	Shipping Mode	Isotope	Activity, curie	Ti	Category					Remarks
						Ltd	I	II	III	Unk	
<u>1979</u>											
Jan. 5	University of Florida	U. FL. Vehicle	Co-60	0.0002	0.1			X			
Jan. 15	Med. Research Foundation, GA	Hand Carried	Y-90	1.4	0.7			X			
Jan. 22	University of Nebraska Florida State University	Fed. Express Fed. Express	Na-24 P-32	0.0001 10 uci	- -			X X			
Jan. 31	Med. Research Foundation, GA	Hand Carried	Y-90	0.1	0.2			X			
Feb. 1	Georgia State University	Hand Carried	Tb-161	30 uci	0.5			X			
Feb. 9	Emory University, GA Georgia Marine Institute, GA	Hand Carried U.S. Mail	Zn-69 C-14	0.001 0.00001	3.0 -		X		X		
Feb. 12	U.S. EPA, AL	Greyhound Express	Fe-55	1 uci	-	X					Fish
Feb. 13	Med. College of Georgia	Hand Carried	F-18	0.0045	1.5			X			
Feb. 14	Med. Research Foundation, GA	Hand Carried	Y-90	0.63	0.5			X			
Feb. 21	Med. Research Foundation, GA SRP, SC	Emery Air Freight Personal Vehicle	Y-90 Ta-182	1.7 0.005	1.0 0.8			X X			
Feb. 27	New York University	Fed. Express	H-3	1.4	-			X			
Feb. 28	University of Arkansas	U.S. Mail	Act. Products	Trace	-	X					
March 6	Bell Telephone, PA University of Arkansas	Fed. Express U.S. Mail	Cd-115 Fe-59	0.0005 Trace	0.1 -		X		X		
March 7	Bell Telephone, PA	Fed. Express	Ru-103	50 uci	0.1			X			
March 9	University of Kentucky	Ky. Vehicle	Na-24	0.0006	0.5			X			

Date 1978	Destination	Shipping Mode	Isotope	Activity, curie	II	Category					Remarks
						Ltd	I	II	III	Unk	
March 9	University of Kentucky	UKY Vehicle	Na-24	0.001	0.9				X		
March 21	Med. Research Foundation, GA	Hand Carried	Y-90	2.0	0.8				X		
March 29	University of Arkansas SRP, SC	Fed. Express SRP Veh	H-3 Ta-182	0.0005	0.2				X		
				0.005	0.8				X		
April	NONE										
May 16	University of Arkansas	U.S. Mail	Zn-65	0.0009	-	X					
May 24	Med. College of Georgia	Hand Carried	F-18	0.003	0.5				X		
May 28	University of Florida	Univ Truck	Co-60	10 uci	0.7				X		
May 31	University of Arkansas	ABF Truck Line	H-3	0.0008	0.6				X		
Jun 5	SRP, SC	Georgia Tech Veh	Co-60	7 uci	0.1				X		
Jun 12	Babcock & Wilcox, VA	Fed. Express Fed. Express	Depleted U Th-232	700 grams	0.2				X		
				0.00016							
Jun 15	University of Arkansas	ABF Truck Lines	Zn-65	0.0002	0.9				X		
Jun 18	United Tech Research Center, CT	Fed. Express	Cr-51	1 uci	-	X					
Jun 29	University of Georgia	State Vehicle	C-14	0.005	0.1				X		
July 6	United Tech Research Center, CT	U.S. Mail	Cr-51	0.001 uci	-						Exempt

Date 1978	Destination	Shipping Mode	Isotope	Activity, curie	Tl	Category					Remarks
						Ltd	I	II	III	Unk	
July 12	University of Arkansas	U.S. Mail	Zn-65	0.0001	-	X					
July 25	E. I. DuPont, Savannah River, SC	Ga. Highway Express	Ta-182	0.0001	2.0				X		
Aug. 3	University of Texas	Fed. Express	Kr-85	0.13	0.5			X			
	University of Florida	Fla. Vehicle (Sole Use)	H-3 Co-60	0.54 0.0003		1.5			X		
Aug. 6	Proctor & Gamble, OH	Fed. Express	Na-24	0.002	0.3			X			
Aug. 9	United Tech Research Center, CT	Fed. Express	Cr-51	15 uci	0.1			X			
		Fed. Express	Cr-51								
Aug. 15	E.I. DuPont SRP, SC	Overnite	Cr-51	0.0001	0.2			X			
Aug. 21	Med. College of Georgia	Hand Carried	F-18	0.003	0.7			X			
Aug. 23	E.I. DuPont, SRP, SC	Hand Carried	H-3	0.31	-			X			
Sept. 5	Applied Physical Tech, Georgia	APT. Personal Vehicle	Co-60	0.0007	0.4			X			
Sept. 7	University of Texas	Fed. Express	Kr-85	0.10	0.4			X			
	University of Texas	Fed. Express	H-3 Kr-85	0.88 0.08		0.4			X		
Sept. 7	Center for Neurochemistry, NY	U.S. Mail	H-3	0.88	-	X					
			H-3	0.0001							
Sept 10	Bureau National de' Metrologie, France	Aircraft	Ba-133	4 uci	0.1			X			
	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0005	0.5			X			

Date 1978	Destination	Shipping Mode	Isotope	Activity, curie	TI	Category					Remarks
						Ltd	I	II	III	Unk	
Sept 10	University of Arkansas	U.S. Mail	LSA	-	-	X					No labels Required
	University of Miami	U.S. Mail	Zn-69	5 uCi	-	X					No labels required
Sept 11	Applied Physical Tech, GA	APT. Personal Vehicle	Co-60	0.0007	0.4			X			
Sept 17	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0005	0.2			X			
Sept 24	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0003	0.7			X			
Oct. 1	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0002	0.5			X			
Oct. 3	U.S. Geological Survey, VA Proctor & Gamble, OH	Fed. Express	Na-24	0.0002	0.9			X			
		Fed. Express	Na-24	0.0005	0.3			X			
Oct. 4	University of Arkansas	U.S. Mail	LSA	-	-	X					No labels required
	U.S. Army Engineers MS Med. Research Foundation GA	Fed. Express Hand Carried	Kr-85 Y-90	0.3 uCi 0.328	- 0.3	X			X		
Oct. 5	Law Eng. & Testing, GA Med. Research Foundation, GA	Hand Carried	Kr-85	9 uCi	0.1	X					
		Hand Carried	Y-90	0.0004	0.4			X			
Oct. 8	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0004	0.9			X			
Oct. 10	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0004	1.3				X		
Oct. 11	Health Physics Off. University Park, PA	Unknown	H-3	0.302	-			X			
Oct. 12	Univ. of Texas	Fed. Express	H-3	2.88	1.9				X		
			Kr-85	0.81							

Date 1978	Destination	Shipping Mode	Isotope	Activity, curie	II	Category					Remarks
						Ltd	I	II	III	Unk	
Oct. 15	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0006	1.6				X		
Oct. 17	U.S. Geological Survey, VA University of Kentucky	Fed. Express	Na-24	0.0004	1.7				X		
		U. Ky. Vehicle	Na-24	50 uCi	0.2			X			
Oct. 18	Florida State University	Fed. Express	Sm-153	0.0001	2.0				X		
Oct. 19	Emory University, GA	Hand Carried	Cd-111m Br-80	0.0005	unk				X		
				0.020							
Oct. 22	Sunoco Products, SC	Fed. Express	Kr-85	2.2	5.0				X		
			H-3	5.0							
Oct. 23	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0002	0.1			X			
	Sunoco Products, SC	Emery Air Freight	Kr-85 H-3	2.2 5.0	6.0				X		
Oct. 24	U.S. Geological Survey, VA	Fed. Express	Na-24	200uCi	0.3			X			
	Sunoco Products, SC	Emery Air Freight	Kr-85 H-3	2.2 5.0	5.0				X		
Oct. 25	University of Arkansas	Fed. Express	Pa-233	15 uCi	0.2			X			
	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0002	0.7			X			
Oct. 25	Wyle Lab, Huntsville, AL	U.S. Mail	Activation Products	-	-	X					
Oct. 26	University of Texas	Fed. Express	Kr-85	1.16	1.8				X		
			H-3	1.26							
Oct. 29	University of Texas	Fed. Express	Kr-85	0.74	1.0				X		
			H-3	1.70							
Oct. 29	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0004	0.9				X		
Oct. 31	U.S. Geological Survey, VA	Fed. Express	Na-24	0.0004	1.2				X		

Table 7

RAM Shipments from Georgia Institute of Technology Reactor
To Barnwell, South Carolina for Burial

<u>Date</u>	<u>Shipping Mode</u>	<u>Isotope</u>	<u>Activity, curie</u>	<u>TI</u>	<u>Remarks</u>
<u>January 1979</u>					
18	Thurston Transportation Company	LSA	unk	-	Combined ship- ment-Ga. Tech 62 pieces, Emory 205 pieces, Morehouse 11 pieces <u>Total 279 pieces</u>
<u>April 1979</u>					
17	Thurston Transportation Company	LSA	unk	-	Combined ship- ment-Ga. Tech 22 pieces, Emory 147 pieces, Morehouse 7 pieces <u>Total 176 pieces</u>
<u>October 1979</u>					
18	Home Transportation Company	RAM Waste Sr-90	47.724	-	Cask CNSI 15-160B Secured to Trailer

Table 8

Surface Contamination Measured by Smears of Vehicles and RAM Packages
(At Purolator Courier, Atlanta, Georgia Unless Otherwise Noted)

Date 1979	Area, cm ²	Object Smear	Radionuclide Level, pCi/100 cm ²					
			Se-75	Mo-99	I-131	Co-57	Cs-137	Co-60
May 5	103,000	# Mo-99, 10 packages, Mallinckrodt	0.02	0.12	0.01	-	-	-
July 28	12,000	I-131, 9 packages, Mallinckrodt	0.02	<0.02	<0.02	-	-	-
	14,000	Mo-99, 9 packages, Mallinckrodt	0.06	<0.02	<0.02	-	-	-
	5,000	Associated Courier Vehicle Steering Wheel and Rear of Trailer Bed	0.32	<0.02	<0.02	0.06	-	-
Sept. 1	15,000	Mo-99, 9 packages, Mallinckrodt	0.02	0.11	<0.02	0.01	-	-
	13,000	I-131, 9 packages, Mallinckrodt	<0.02	<0.02	0.06	-	-	-
8	400	Spent Fuel NL Trailer #73372, Turkey Point to Ohio. Tri-State Transportation Company	<1	-	<1	0.5	1.9	5.3
20	5,600	Skycab Veh. 532 KOG, Rear of Bed	<0.03	<0.02	0.075	-	-	-
29	8,300	Mo-99, 5 packages, Mallinckrodt	0.12	0.11	-	0.02	-	-
	20,000	Mo-99, 4 packages, Squibb	0.02	<0.02	<0.02	-	-	-
	5,600	Associated Courier Trailer, Rear of Bed	0.86	0.11	-	0.16	-	-
October 27	5,600	Associated Courier Trailer, Rear of Bed	0.7	0.1	<0.1	0.2	-	-
	28	3,000	NEN Trailer, Rear of Bed	<0.02	<0.02	<0.02	0.05	-
Dec. 1	1,900	Associated Courier Trailer, Rear of Bed	0.54	<0.2	0.21	0.13	-	-
	520	Associated Courier Assistant Driver, Bottom of Shoes	1.0	0.24	0.34	0.19	-	-

APPENDIX A: OBSERVATIONS

1. On October 16, Mr. Powell of Florida Power and Light called to advise that two shipments of spent fuel have been rerouted through Atlanta, GA to by-pass Louisiana, to depart this date. Subsequent shipments from Turkey Point to Nevada will also be routed through GA.
2. On October 25, a meeting was held with supervisory personnel at Easter Cargo Terminal to discuss problem with individual who was issued TLD #5. Subject TLD was found at Purolator and had a reading of 36 mR for the period September 27-30, 1979. The TLD for August and September showed 34 mR. It was the consensus that subject individual placed the TLD on a RAM package. Subsequently, in meeting with subject individual the importance of the study was stressed to gather factual data for individual doses. TLD #5 for individual for period October 25 to December 13, 1979, had a reading of 9.3 mR, which is in range of other personnel doses.
3. On October 27 at Purolator Terminal, a Mallinckrodt RAM package, Bill #J026483 containing I-131, 0.013 Curie, TI 0.4, destined for Memorial Medical Center, Savannah, Georgia, had Y III labels white bill of lading showed labels as yellow II.
4. On October 27 at Purolator Terminal, the Skycab driver delivering Squibb RAM would not give permission to monitor his vehicle. No readings were obtained. Other Skycab drivers have been cooperative. The driver claimed that two other Skycab drivers had been hospitalized for radiation exposure, but this could not be verified. On December 1, 1979, Skycab vehicle was monitored and driver was cooperative.
5. On October 27 at Purolator Terminal, the Associate Courier Trailer delivering Mallinckrodt RAM again showed reading over 10 mR at six feet from surface. This was discussed with drivers.
6. On October 27, 1979 at Purolator Terminal, undeveloped film was found near east end of terminal where the exposure rate reading was 0.5 mR/hr. On October 28, a dolly containing Dyna Color Film was located at south end of terminal where the exposure rate reading was 0.7 mR/hr. Box was marked "Do Not Xray". On December 1, a dolly with film was located at east end of terminal where the exposure rate reading was 2.5 mR/hr. Squibb RAM was 17 feet away. The supervisors were informed and immediately moved the film.
7. On November 27, 1979, a simulated accident involving a RAM shipment of waste from the Browns Ferry, Alabama, Nuclear Power Plant enroute to Barnwell, South Carolina was held on I-20 at Conyers rest area. The exercise was designed to test alert notification and response. Local police, firemen, local and state officials and TVA officials participated. Local news and TV stations covered the exercise.

8. On November 29, it was learned that a RAM package had been run by a forklift at Kenworthy Air Freight at North Cargo Building, Atlanta, Georgia. Georgia EPD-DNR staff responded. The package, White I labels, containing H-3, 12.25 mCi and C-14, 100 uCi was crushed, but the vials remained intact. No contamination was found on swipes of vials. The package had been shipped from Becton Dickinson Immuno Diagnostics, Orangeburg, New York to Gainesville, Florida. The package was recovered by Profit by Air representative for repackaging.
9. On December 1 at Purolator Terminal, two RAM packages of I-131 from Squibb were checked. Both boxes had yellow III labels with a recorded TI of 0.3. Box #31265F had recorded activity of 0.009991 curie and other box #31298F had activity of 0.01 curie. The freight bill on later box had recorded 0.006470 curie for the activity.
10. On December 1 at Purolator Terminal, a package containing H-3 from Becton Dickinson was checked and it was noted that a Profit by Air envelope partially covered one of the white I labels. Action will be taken next quarter to contact Profit by Air representative to make them aware of the problem with envelopes and air bills covering the labels.
11. On December 2 at Purolator Terminal, two RAM packages from New England Nuclear were checked. Ga-67 package to University Hospital, Augusta, Georgia had yellow II labels, with TI of 0.5 and 0.018 curies; however, the bill of lading reflected yellow III labels with TI of 1.0. A Co-57 package to Memorial Hospital Waycross, Georgia had yellow II labels with TI of 0.1 and 0.005 curies; however, bill of lading reflected TI of 0.2 and 0.003 curies.
12. On December 4, information was received from the Georgia Environmental Protection Division, Department Natural Resources, that a shipment of nuclear waste from Plant Farley, Alabama enroute to Barnwell, SC was involved in a minor traffic accident in Albany, Georgia on October 22, 1979. The accident was minor and no damage was sustained to the cask.
13. On December 13, 1979, at Purolator Terminal, it was noted that an Amersham RAM package with Y II labels had a Profit by Air air-bill envelope over one label and a Profit by Air label partially covering the other yellow II label. The purchase order number was 8908157 to University of Alabama.