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A SUMMARY OF INCIDENTS INVOLVING  
USAEC SHIPMENTS OF RADIOACTIVE  
MATERIAL, 1962

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Division of Operational Safety  
Industrial Safety and Fire Protection Branch, AEC  
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and  
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UNITED STATES ATOMIC ENERGY COMMISSION  
INDUSTRIAL SAFETY AND FIRE PROTECTION BRANCH  
DIVISION OF OPERATIONAL SAFETY



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## INTRODUCTION

This summary has been prepared to present information pertaining to incidents sustained by the AEC in the transportation of radioactive materials. The incidents presented herein cover the period from January 1, 1962, through December 31, 1962. Previous documents, AECU-3613, "A Summary of Transportation Incidents in Atomic Energy Activities, 1949-1956," and TID-16764, "A Summary of Incidents Involving USAEC Shipments of Radioactive Material, 1957-1961," reviewed earlier experience.

In the period covered by this report, there were fourteen incidents reported. Ten (71.5%) of the fourteen incidents did not result in release of radioactive materials. Of the remaining four cases, which did involve radiation releases, there were none that presented any serious consequences or involved costly cleanup.

Tables 7 and 8 illustrate the shipment and vehicle damage experience for the period covered by this report. It is interesting to note that of the fourteen incidents included only one shipment incurred any damage due to the accident in which it was involved. At the same time the vehicles involved suffered damage ranging from none to almost total destruction.

In this summary, the incidents have been classified in accordance with the scheme used in TID-16764.

Table 1—INCIDENT EXPERIENCE BY MODE OR LOCATION

Mode	No. of incidents		
	1962	1957-1961	1949-1956
Truck Incidents	8	21	9
Rail Incidents	5	11	2
Air Incidents	0	0	1
Terminal Incidents	<u>1</u>	<u>15</u>	<u>1</u>
Total	14	47	13

Table 2—INCIDENT EXPERIENCE BY CLASS OF RADIATION RELEASE

Class	No. of incidents		
	1962	1957-1961	1949-1956
I	9	29	6
II	1	7	2
III	2	7	0
IV	2	3	3
V	0	1	1
VI	0	0	1
Total	14	47	13

Table 3—INCIDENT EXPERIENCE BY YEAR

Year	No. of incidents
1949	1
1950	1
1951	1
1952	2
1953	0
1954	1
1955	2
1956	5
1957	6
1958	5
1959	15
1960	12
1961	9
1962	<u>14</u>
Total	74

Table 4—INCIDENT EXPERIENCE BY MONTHS

Month	No. of incidents		
	1962	1957-1961	1949-1956
January	2	4	0
February	1	2	2
March	0	2	1
April	1	5	1
May	2	3	1
June	0	5	0
July	2	9	1
August	2	2	1
September	1	4	1
October	1	2	2
November	0	6	1
December	2	3	2
Total	14	47	13

Table 5—INCIDENT EXPERIENCE BY TYPE, IRRESPECTIVE OF MODE (UNLESS SPECIFIED)

Type	No. of incidents		
	1962	1957-1961	1949-1956
Handling	1	15	0
Impact (Collision—Truck)	4	10	7
Impact (Collision—Air)	0	0	1
Impact (Collision—Rail)	1	2	0
Fire	2	5	3
Vehicle or Equipment Failure	0	5	0
Leakage of Containers	3	4	0
Derailment (Rail)	2	3	2
Tiedown Failure	1	2	0
Aerial Dispersal	0	1	0
Total	14	47	13

Table 6—INCIDENT EXPERIENCE BY TYPE OF MATERIAL INVOLVED

Type of Material	No. of Incidents		
	1962	1957-1961	1949-1956
Source Material	8	14	10
Radioisotopes	1	10	0
Irradiated Fuel Elements	1	8	1
Special Nuclear Material	3	4	0
Radioactive Waste	1	3	0
Empty Containers	0	3	0
Contaminated Machinery	0	3	0
Unknown	0	2	2
Total	14	47	13

Table 7—SHIPMENT DAMAGE EXPERIENCE (1962)

Description	No. of Incidents
No Damage	10
Leakage (Not due to impact, etc.)	3
a. Drum, animal experiments (Not properly packed)	
b. Fuel element container (Design error)	
c. Drum, sludge	
Total loss (Type A container—consumed in fire)	1
Total	14

Table 8—VEHICLE DAMAGE EXPERIENCE (1962)

Description	No. of Incidents
No Damage	1
Minor damage	5
Decontamination necessary (Ref: Table 7—Leakage)	3
Truck (50% destroyed)	1
Rail—Major accidents	4
a. 1—Fire	
b. 3—Derailment and/or collision	
Total	14

## **CLASS I RADIATION RELEASE**

The vehicle has been involved in an accident or package damage is suspected. The shipment is delayed or stopped. No radioactive material is released and there is actually no loss of integrity to the package.



# CLASS I

## CASE 1

### *Description of Operation*

Truck shipment of source material

### *Nature of Incident*

Impact

*Date: October 19, 1962*

### *Type of Radioactive Material Involved*

Uranium hexafluoride

### *Radiation Consequences of Incident*

None

### *Details of Incident*

While pulling out of a driveway, a private passenger car collided with the right side of the truck.

### *Nature of Injuries or Loss*

The truck suffered minor damage while the shipment remained intact and undamaged. The driver of the passenger car was taken to the hospital for examination.

# CLASS I

## CASE 2

### *Description of Operation*

Truck shipment of source material

### *Nature of Incident*

Impact

*Date: December 14, 1962*

### *Type of Radioactive Material Involved*

Uranium hexafluoride

### *Radiation Consequences of Incident*

None

### *Details of Incident*

A private passenger car collided with the rear of a truck carrying uranium hexafluoride in cylinders.

### *Nature of Injuries or Loss*

The driver of the passenger car suffered head and rib injuries. The cylinders were not damaged and only minor damage was inflicted on the truck. The shipment was delayed several hours.

# CLASS I

## CASE 3

### *Description of Operation*

Truck shipment of source material

### *Nature of Incident*

Jackknife and overturn of vehicle

*Date: April 30, 1962*

### *Type of Radioactive Material Involved*

Uranium hexafluoride

### *Radiation Consequences of Incident*

None

### *Details of Incident*

The tractor-trailer carrying the radioactive shipment jackknifed on the wet pavement, skidded off the road and overturned. An emergency truck righted the tractor-trailer, which proceeded under its own power to its destination after minor repairs.

### *Nature of Injuries or Loss*

There were no personal injuries and no damage to the cargo. The tractor-trailer suffered minor damage.

# CLASS I

## CASE 4

### *Description of Operation*

Truck shipment of source material

### *Nature of Incident*

Impact and overturn

*Date: July 1, 1962*

### *Type of Radioactive Material Involved*

Uranium hexafluoride

### *Radiation Consequences of Incident*

None

### *Details of Incident*

A tractor-trailer truck, carrying a 10-ton cylinder of  $UF_6$ , ran off the road striking four trees before colliding solidly with a telephone pole which caused the trailer to jackknife and overturn. The trailer came to rest on top of the cylinder in one lane of the highway. The incident took place at a slight curve in the highway in clear weather with no witnesses. The cause of the accident was attributed to the driver falling asleep at the wheel.

### *Nature of Injuries or Loss*

The driver suffered major injuries. The tractor was a total loss and the trailer suffered minor damage. The undamaged cylinder was reloaded on another trailer and continued on to its destination after a delay of approximately 24 hours.

# CLASS I

## CASE 5

### *Description of Operation*

Truck shipment of special nuclear material

### *Nature of Incident*

Fire

*Date: January 26, 1962*

### *Type of Radioactive Material Involved*

Metallic enriched uranium and plutonium

### *Radiation Consequences of Incident*

None

### *Details of Incident*

The canvas cover of the trailer and tarpaulins protecting the shipment caught fire while en route, presumably by a cigarette tossed from a passing vehicle. The fire was extinguished by couriers.

### *Nature of Injuries or Loss*

There was a minor delay in shipment. The canvas covers were destroyed and the vehicle suffered minor burn damage.

# CLASS I

## CASE 6

### *Description of Operation*

Rail shipment of source material

### *Nature of Incident*

Derailment

*Date: January 29, 1962*

### *Type of Radioactive Material Involved*

Approximately fifty (50) tons of natural uranium slugs

### *Radiation Consequences of Incident*

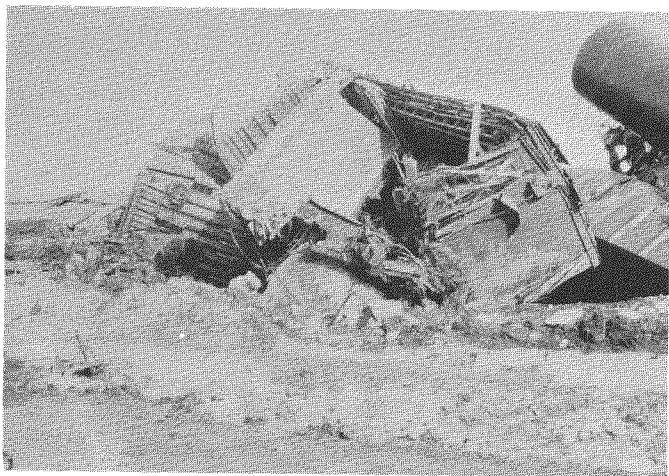
None

### *Details of Incident*

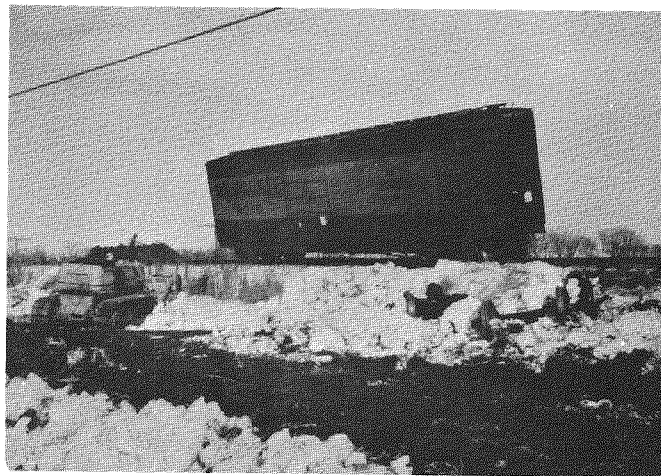
The railroad car carrying the shipment was derailed en route to its destination. The car left the tracks but remained in an upright position on the roadbed.

### *Nature of Injuries or Loss*

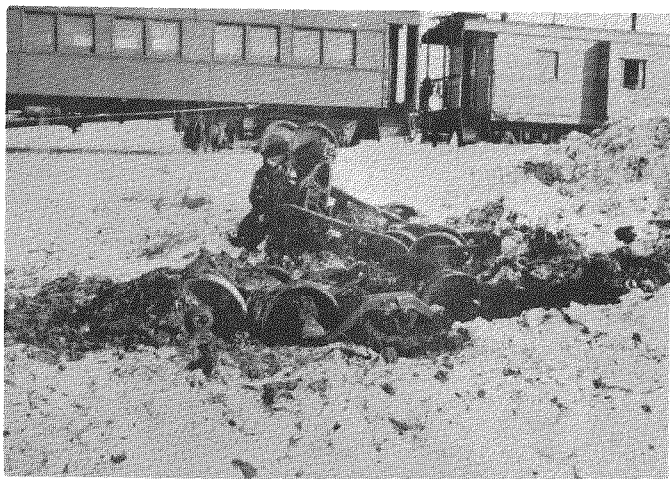
The running gear of the car was replaced by the railroad at the site and the car was taken in for a thorough inspection prior to continuing its trip. The load did not shift within the car and there was no loss or damage of material.



Scene showing wreckage of some of the train cars.



Car carrying shipment of slugs.



Wreckage scene of wheels from other cars.



Wreckage scene showing damage to other cars.

# CLASS I

## CASE 7

### *Description of Operation*

Rail shipment of special nuclear material

### *Nature of Incident*

Derailment

*Date: December 3, 1962*

### *Type of Radioactive Material Involved*

Metallic enriched uranium

### *Radiation Consequences of Incident*

None

### *Details of Incident*

Twenty-four cars of a 67-car freight train were derailed. The shipment, carried in two Government cars immediately behind the engine, remained upright and intact, although the cars were from four to twelve feet off the track on the edge of a shallow ditch. A pullman courier coach, located immediately to the rear of the Government cars, rode up the rear end of the second Government car, thereby suffering extensive damage. The train was traveling at an estimated speed of 38 m.p.h. at the time of the accident.

A special train was made up of the still operable Government cars and they proceeded to their destination without further incident.

### *Nature of Injuries or Loss*

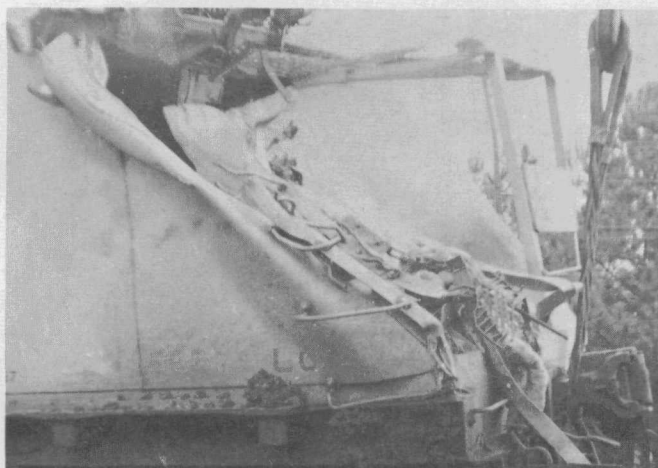
The shipment was delayed approximately 1½ days. One of the couriers was bruised on the head and another suffered a bruised foot. Estimates of the repair costs: coach—\$9500; first Government car—\$1000; second Government car—\$5000.



Overall wreck scene.



Courier car and second Government car.



Closeup of damage to second Government car.



Courier car rode up end of Government car.

# CLASS I

## CASE 8

### *Description of Operation*

Rail shipment of source material

### *Nature of Incident*

Emergency stop

*Date: May 2, 1962*

### *Type of Radioactive Material Involved*

Metallic uranium

### *Radiation Consequences of Incident*

None

### *Details of Incident*

The train carrying the radioactive shipment could not make a grade and the emergency brakes were applied, shaking up the entire train. Shipping containers remained intact, but were shaken loose within their shoring.

### *Nature of Injuries or Loss*

Minor delay in shipment while shoring was tightened.

# CLASS I

## CASE 9

### *Description of Operation*

Air shipment of source material

### *Nature of Incident*

Suspected spill in terminal

*Date: February 13, 1962*

### *Type of Radioactive Material Involved*

Metallic depleted uranium

### *Radiation Consequences of Incident*

None

### *Details of Incident*

An airline employee reported a leaking package and "burn sensations" on hands.

### *Nature of Injuries or Loss*

The aircraft was delayed several hours during the investigation. It was determined that the package was wet by rain and that there had been no damage and no injury.



## **CLASS II RADIATION RELEASE**

The package integrity is breached. However, there is no release of radioactive materials.



## CLASS II

### CASE 1

#### *Description of Operation*

Rail shipment of special nuclear material

#### *Nature of Incident*

Rear end collision

*Date: August 14, 1962*

#### *Type of Radioactive Material Involved*

Metallic enriched uranium

#### *Radiation Consequences of Incident*

None

#### *Details of Incident*

A special shipment, consisting of three Government-owned railroad cars located near the end of a regular freight train, was struck from the rear by another freight train moving at a higher rate of speed.

#### *Nature of Injuries or Loss*

Five escorts suffered minor injuries and were treated at the scene. The escort car was totally destroyed and the other cars were considerably damaged.

#### *Damage Estimates*

Commission property - \$15,000; other Federal property - \$60,800.\*

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\*This loss is due entirely to physical damage of cars. The radioactive material did not contribute to the loss.



## **CLASS III RADIATION RELEASE**

Radioactive material is released, but is confined to the package or the vehicle.



## CLASS III

### CASE 1

#### *Description of Operation*

Truck shipment of waste material

#### *Nature of Incident*

Leakage en route

*Date: July 29, 1962*

#### *Type of Radioactive Material Involved*

23 55-gallon drums of radioactive waste

#### *Radiation Consequences of Incident*

Truck required decontamination

#### *Details of Incident*

During a routine shipment of (animal experiments) waste to the burial ground, the tractor-trailer stalled at a local filling station. At that time, leakage and odor were noticed coming from the truck, and a radiological assistance team was called in. It was determined that one of the 23 drums involved had ruptured due to internal pressure en route, thereby creating a public relations and nuisance problem, as the radiation involved was very low-level gamma of 1 mr/hr.

#### *Nature of Injuries or Loss*

Slight delay of shipment and the load of drums was buried at a nearby burial ground.

## CLASS III

### CASE 2

#### *Description of Operation*

Rail shipment of radioisotopes

#### *Nature of Incident*

Fire

*Date: September 14, 1962*

#### *Type of Radioactive Materials Involved*

5 millicuries of Calcium 45  
1 millicurie of Strontium 85  
1 millicurie of Sulphur 35

#### *Radiation Consequences of Incident*

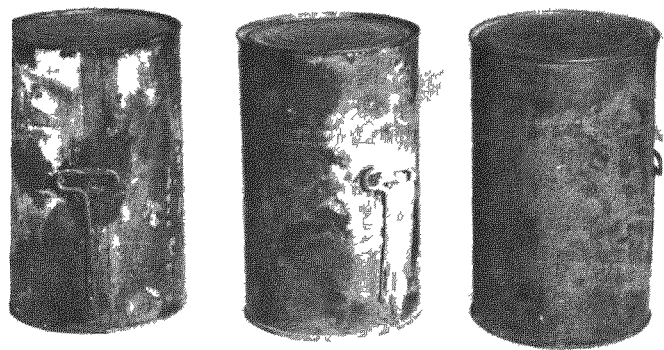
None. Upon removal of the isotope containers no trace of contamination could be found on the railroad car or surroundings.

#### *Details of Incident*

Fire broke out in the railway express car carrying the isotope shipment. The car was cut out of the train and isolated. The local fire department was called in but did not extinguish the fire upon observing that the car contained radioactive material. The fire was allowed to burn itself out. The radiological assistance team removed the damaged shipment and returned it to the shipper.

#### *Nature of Injuries or Loss*

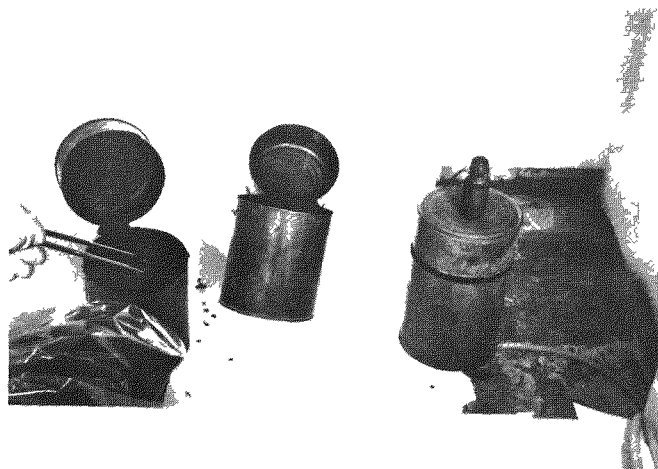
Major damage to the railway car and loss of the isotope shipment. Although the isotope shipment was a loss, it is of interest to note that the shipping containers contained the isotopes sufficiently to eliminate all radiation hazards during the incident, and the packages exceeded the anticipated safety performance. See photos.



Cans as taken from fire.



Cans after opening.



Removal of bottles.



Bottles.



## **CLASS IV RADIATION RELEASE**

Radioactive material is released to the ground or trafficway with no runoff or aerial dispersal.



## CLASS IV

### CASE 1

#### *Description of Operation*

Truck shipment of source material

#### *Nature of Incident*

Leakage discovered in terminal

*Date: May 7, 1962*

#### *Type of Radioactive Material Involved*

Uranyl nitrate in sludge

#### *Radiation Consequences of Incident*

Terminal floor and truck required decontamination

#### *Details of Incident*

A truckload of drums of sludge from a plating operation containing about 5% normal uranium arrived at an intermediate terminal and was found to be leaking. The truck was then isolated and a radiological assistance team was called in. Several small puddles of the solution were discovered on the floor of the terminal and underneath the rear of the truck. The truckbed was also soaked with the solution. The puddles on the terminal floor were removed first so that the terminal could resume operations. The contaminated solution beneath the truckbed was cleaned up next and absorbent materials were placed in and around the load to absorb any further leaks. The truck was released and proceeded to its destination without further incident.

#### *Nature of Injuries or Loss*

The shipment was delayed for approximately 24 hours. A four-man radiological assistance team was involved for approximately 24 hours.

## CLASS IV

### CASE 2

#### *Description of Operation*

Truck shipment of irradiated fuel elements

#### *Nature of Incident*

Leakage en route

*Date: August 21, 1962*

#### *Type of Radioactive Material Involved*

Fission products contained in plutonium fuel elements

#### *Radiation Consequences of Incident*

Trailer required extensive decontamination and a small portion of street surfacing material required removal and burial.

#### *Details of Incident*

Routine monitoring of a shipment at its destination disclosed that the shipping container was leaking. All points at which the truck had stopped en route were surveyed and contamination (45 mrad/hr beta-gamma at the surface) was discovered at one location only.

#### *Nature of Injuries or Loss*

The cost of decontaminating and holding the truck amounted to \$2,237.55. Removal and replacement of a portion of the street surface cost \$96.03.

## **CLASS V RADIATION RELEASE**

Radioactive material is released, resulting in aerial dispersal.

No incidents occurred that fall within this Class.



## **CLASS VI RADIATION RELEASE**

Radioactive material is released and enters a watercourse, either directly or after spilling to the ground or trafficway.

No incidents occurred that fall within this Class.