TID-5360(Suppl.1)(Rev.)

MASTER

A SUMMARY OF

INDUSTRIAL

ACCIDENTS

**IN
USAEC
FACILITIES
1956**

August 1967

(DTIE Issuance Date)

UNITED STATES ATOMIC ENERGY COMMISSION

Division of Technical Information

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United States Atomic Energy Commission
Industrial Safety & Fire Protection
Branch
Division of Operational Safety

PREFACE

"A Summary of Industrial Accidents in USAEC Facilities—1956," TID-5360 (Suppl. 1) Revised, is a reprint of a document entitled, "A Summary of Incidents Involving Radioactive Material in Atomic Energy Activities, January-December 1956," TID-5360 (Suppl.), which was originally published in 1957.

The new edition, rather than being an exact duplicate of the original, has been revised to incorporate the same type of title, format, and contents as appear in the more recent issues of the TID-5360 series.

The following additions have been made:

1. A listing of all 1956 incidents which meet the criteria given at the end of the listing.
2. Narrative descriptions of fatalities.

The narrative descriptions of radiation incidents occurring during 1956, which appeared in the original document, have been retained (with some editing), and a few added.

Several incidents, not reportable using the criteria set forth in this revision, were included in the original document. These are repeated, for the sake of consistency, as the final section of this publication.

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Industrial Accidents and Radiation Exposure Incidents

USAEC Facilities, 1956

No.*	Date	Operations Office & Contractor	Injuries* & Exposures	AEC Property Damage	Remarks
56-1	1-10	OR—Union Carbide Nuclear Co.	0	\$ 480,134	Large process pressure vessel failed from fatigue.
56-2	1-14	SR—E. I. du Pont de Nemours & Co.	0	5,243	Turntable dropped and damaged while being moved by crane.
56-3	1-18	AL—Reynolds Electric & Engineering Co. & Los Alamos Scientific Laboratory	4 exposed	0	While recovering samples from nuclear test area, four men received estimated exposures of 28, 19, 14, and 4 rem, respectively. (see page 6).
56-4	1-26	OR—Union Carbide Nuclear Co.	0	13,091	Fire in metal bins where sponge rubber stored. Believed to have been started as heater with electric fan blew on rubber, raising its temperature to spontaneous ignition point. Damage to rubber stock, \$8,213; to metal storage bins, \$1,400; to building \$3,478. Damage lessened by automatic sprinklers.
56-5	2-1	OR—Oak Ridge National Laboratory	0	0	Inserted shutdown mechanism set up waves creating supercritical geometry in cylinder containing uranium solutions. See page 6).
56-6	2-12	SR—E. I. du Pont de Nemours & Co.	0	30,000	Heavy water moderator loss due to leak in heat exchanger.
56-7	2-21	OR—Government	0	0	Truck carrying radioactive material crowded off highway by oncoming car. No damage to shipment. (See page 7).
56-8	2-22	HA—General Electric Co.	0	39,800	During attempts to clear plugged line in plutonium concentrator cell, contamination spread occurred. Costs due to cleanup. (See page 7).
56-9	2-25	OR—National Lead Co.	0	7,200	Windstorm caused damage to various buildings and equipment.
56-10	3-1	SR—E. I. du Pont de Nemours & Co.	0	10,000	High winds vibrating jumper caused it to loosen, resulting in failure of 13.8 KV feeder line.
56-11	3-5	HA—General Electric Co.	0	37,000	Failure of electrical equipment caused fire in metal waste recovery building. Damage to building, \$5,000; to electrical equipment and instruments, \$32,000.

See page 5 for footnotes.

INDUSTRIAL ACCIDENTS AND RADIATION EXPOSURE INCIDENTS (Cont'd.)
USAEC Facilities, 1956

No.*	Date	Operations Office & Contractor	Injuries† & Exposures	AEC Property Damage	Remarks
56-12	3-11	OR—Goodyear Atomic Corp.	0	22,720	Explosion and fire in 100,000 KVA power transformer in electrical switchyard. Explosion caused by high current electrical fault in transformer, resulting in major power loss to process buildings. Second fire occurred nine days later when welding sparks ignited oil-soaked windings of damaged transformer.
56-13	3-19	HA—Government	0	18,806	Fire, started by child in trash shed, resulted in extensive damage to drugstore.
56-14	3-24	HA—Government	0	3,393	Train derailed. One car, containing scrap uranium, demolished and contents spilled. Shipment salvaged with minor loss. (See page 8).
56-15	4-11	OR—St. Louis Erection Co.	1 killed	0	During installation of girders, ironworker, helping to guide beam into place, lost his balance when beam was dropped by crane and plunged 17' to ground. He died as result of broken neck. (See page 14).
56-16	4-19	HA—Government	0	16,400	Train derailed. Car, containing 45 tons of uranium compound, immersed in river, removed intact. (See page 8).
56-17	4-26	OR—Government	0	0	Truck transporting radioactive material in accident. Driver required hospitalization; no damage to cargo. (See page 8).
56-18	4-30	AL—Los Alamos Scientific Laboratory	1 exposed	0	Employee hospitalized fourteen days for radiation burn and subsequent skin grafting to proximal phalanx palmar surface of middle finger of left hand as result of beta burn received while decontaminating tool. (See page 9).
56-19	5-14	OR—Union Carbide Nuclear Co.	2 killed 1 injured	0	Zirconium in drum in salvage yard exploded, followed by fire, resulting in death of two salvage handlers from second- and third-degree burns received. Another employee was burned severely and his right arm blown completely off above the elbow. (See page 14).

INDUSTRIAL ACCIDENTS AND RADIATION EXPOSURE INCIDENTS (Cont'd.)
USAEC Facilities, 1956

No.*	Date	Operations Office & Contractor	Injuries† & Exposures	AEC Property Damage	Remarks
56-20	6-6	AL—Holmes & Narver	0	11,190	Generator short-circuited when cap from bearing housing oil filler hole dropped into stator enclosure. Ensuing fire confined to stator winding.
56-21	6-16	SR—E. I. du Pont de Nemours & Co.	1 exposed	0	Internal exposure estimated at 18.6 rem due to tritium assimilated by employee when he attempted to recover a plastic bag in a process cabinet. (See page 9).
56-22	6-18	HA—General Electric Co.	3 exposed	8,500	Highly concentrated plutonium solution backed up in instrument line of air-operated valve and approximately a pint escaped into control room. Three employees received internal depositions of soluble plutonium. Build-grossly contaminated. (see page 10).
56-23	6-21	OR—Union Carbide Nuclear Co.	0	21,093	Fire, cause undetermined, involving 600 grams of hydride powder, drawn into combustible filters, igniting filters and alloy hydride dust in filtering system.
56-24	6-22	SR—E. I. du Pont de Nemours & Co.	0	30,602	Heavy water moderator loss due to leak.
56-25	6-26	AL—Los Alamos Scientific Laboratory	1 killed	10,650	Accidental detonation of experimental explosive caused fatal multiple blast injuries to technician. (See page 15).
56-26	7-2	NY—Sylvania Electric Products, Inc.	1 killed	35,000	Thorium explosion in metallurgy laboratory, followed by fire. Chemical engineer died as result of extensive second- and third-degree burns received. (See page 10).
56-27	7-3	SF—Los Alamos Scientific Laboratory	0	0	Critical experiment—too rapid assembly caused system to become prompt critical. (See page 11).
56-28	7-9	OR—Union Carbide Nuclear Co.	0	0	Truck overturned and burned when braking system failed on downgrade. No loss of slightly radioactive material. (See page 11).

INDUSTRIAL ACCIDENTS AND RADIATION EXPOSURE INCIDENTS (Cont'd.)
USAEC Facilities, 1956

No.*	Date	Operations Office & Contractor	Injuries & Exposures	AEC Property Damage	Remarks
56-29	7-23	ID-Phillips Petroleum Co.	5 exposed	0	When highly radioactive reactor component was placed in position where not shielded adequately because of lowered water level, five employees received radiation exposures estimated as 21.5, 10.6, 6.2, 6.15, and 3.9 rem, respectively. Three others received estimated exposures of less than 3 rem. (see page 12).
56-30	7-24	AL-Swinerton & Walberg	1 killed	0	Employee killed when car he was driving overturned on curve. He died from crushed chest and internal injuries. (See page 15).
56-31	8-4	CH-Westinghouse Electric Corp.	0	10,000	Basement flooded during heavy rainstorm damaging files, stationery, and other supplies.
56-32	8-26	AL-Eichleay Corp.	1 killed 2 injured	500	An ironworker was electrocuted when a truck crane struck and broke an overhead high-voltage line. Two other employees received second- and third-degree burns. (See page 16).
56-33	9-5	SR-E. I. du Pont de Nemours & Co.	0	7,472	Failure of a temporary transformer damaged blower motors.
56-34	9-19	AL-ACF Industries	1 killed	0	Pipefitter received internal injuries when truck knocked him down and backed over him while he was working on hydrant. (See page 16).
56-35	10-3	AL-Holmes & Narver	0	8,636	Dynamite storage magazine partially collapsed because of uneven distribution of sand covering it.
56-36	10-9	AL-Sandia Corp.	0	19,624	Fire in two unattended capacitor life testers, origin undetermined. Equipment destroyed.
56-37	10-21	OR-Goodyear Atomic Corp.	3 injured	0	Five employees burned by hot water and/or steam released from recirculating water system. Three received first-, second-, and third-degree burns; two minor burns.
56-38	10-23	OR-Union Carbide Nuclear Co.	0	8,500	Fire in plant exhaust and filtering system destroyed filter media.
56-39	11-11	SR-E. I. du Pont de Nemours & Co.	0	80,000	Heavy water moderator loss due to leak in heat exchanger.

INDUSTRIAL ACCIDENTS AND RADIATION EXPOSURE INCIDENTS (Cont'd.)
USAEC Facilities, 1956

No.*	Date	Operations Office & Contractor	Injuries† & Exposures	AEC Property Damage	Remarks
56-40	11-11	OR—Union Carbide Nuclear Co.	1 injured	2,053,000	Intense localized fire from lube oil-process gas re- action spread to metal deck roof where fire got out of control due to com- bustible vapor barrier in roof deck. Damage lim- ited to upper story of building. Guard captain, attempting to escape from fire by open hatchway, fell approximately 15' suffer- ing compound, com- minuted fracture of right kneecap and simple frac- ture of right thigh.
56-41	11-16	SR—E. I. du Pont de Nemours & Co.	0	38,000	Heavy water moderator loss due to leak in reactor heat exchanger.
56-42	12-8	SR—E. I. du Pont de Nemours & Co.	0	9,000	Reactor safety rod latches damaged when dropped accidentally.
56-43	12-9	SR—E. I. du Pont de Nemours & Co.	0	60,000	Heavy water moderator loss due to leak in reactor heat exchanger.
56-44	12-11	HA—Government	0	100	Semitrailer loaded with two casks containing radio- active slugs went over an embankment. Containers remained intact. (See page 12).

*Division of Operational Safety, USAEC Headquarters, File Number.

†Lost-time injury as defined in USA Standards Institute Z16.1.

In preparing this revision, including the foregoing tabulation, we thoroughly reviewed our 1956 files and records, and included all those accidents and incidents meeting our current criteria, as set forth below, although portions of it were not in effect in 1956:

1. Loss of or Damage to Government Property of \$5,000 or more.
2. Injury or Death
 - a. Fatal or imminently fatal injury.
 - b. Five or more injuries in one accident.
3. Radiation Exposures
 - a. 25 rem+ whole body; 150 rem+ skin; 375 rem+ feet, ankles, hands and/or forearms.
 - b. When in calendar quarter exposure exceeds: 3 rem whole body; 10 rem skin; 25 rem feet, hands, ankles and/or forearms.
 - c. 25 rem+ external whole body during calendar year.
 - d. Any dose which exceeds (N-18) 5 rem.
 - e. Internal body deposition which exceeds RPG's.
 - f. Any release of radioactive material offsite which exceeds RPG's.
 - g. Any unplanned release of radioactive material which exceeds, in 24 hours, 5000 × Appendix B, Table II—10CFR20.
4. Public Interest
 - a. Any accident or radiation exposure which gives rise to an inquiry by members of the public; or an inquiry from the press; or which the field office manager believes to have public information significance.
 - b. Any offsite accident involving vehicles carrying AEC shipments of radioactive materials.
5. Miscellaneous
 - a. Any accident in which an atomic or nuclear weapon (under the jurisdiction of AEC) is involved and where damage is inflicted to persons or private property.
 - b. Any injury or industrial illness following cumulative or massive exposure to internal or external ionizing radiation which might reasonably be expected to have caused the illness or injury and when so diagnosed by a physician competent in nuclear medicine.

ACCIDENTS AND INCIDENTS IN AEC FACILITIES INVOLVING RADIOACTIVE MATERIAL-1956

Radiation Exposures

Las Vegas, Nev., Jan. 18, 1956—Ref: 56-3

Nature of Incident

Four employees were exposed to radiation.

Description of Operation

Recovering samples from a nuclear test area.

Details of Incident

When the prescribed time after a shot had elapsed, four employees, dressed in the proper protective clothing, were recovering samples from a nuclear test area.

It had been prearranged to have a monitor enter the area in advance of the men; however, they entered the area to redeem the samples without the monitor.

Nature of Exposure or Loss

The four men received estimated external radiation exposures of 28, 19, 14, and 4 rem, respectively. There were no injuries.

Solution Criticality

Oak Ridge, Tenn., Feb. 1, 1956—Ref: 56-5

Nature of Incident

Neutron and gamma ray exposure.

Description of Operation

Physics parameters being measured in critical facility.

Details of Incident

A falling cadmium scram sheet set up a wave motion which created a super prompt critical condition in a test cylinder, 30" in diameter, containing 5" of uranium solution (27.7 kg of uranium 235). The number of fissions in the burst was estimated to be about 1.6×10^{17} .

Nature of Exposure or Loss

No serious exposures resulted, since all personnel were shielded by a minimum of five feet of concrete. There was no significant property damage and all of the uranium was recovered.

Truck Transporting Radioactive Material Overturned

Near Monterey, Tenn., Feb. 21, 1956 — Ref: 56-7

Nature of Incident

A truck was crowded off of a highway.

Description of Operation

Interplant shipment of radioactive material.

Details of Incident

While rounding a curve, a truck carrying radioactive materials was crowded off a highway by an oncoming car. The truck hit a soft shoulder, broke off a utility pole, struck an unoccupied parked car, and ended up on its side in a ditch. The load was transferred to another truck.

Nature of Exposure or Loss

There were no personal injuries and the load was undamaged.

Plutonium Contamination Incident

Hanford, Wash., Feb. 22, 1956 — Ref: 56-8

Nature of Incident

Contamination by plutonium carried by flushing solution.

Description of Operation

Cleaning of a plutonium concentrator cell line by means of steam pressure.

Details of Incident

The plant had been shut down to clear a plugged line in the plutonium concentrator cell. In the course of the work, inadequate venting resulted in the system being pressurized with air. Plutonium-containing flushing solution and mist were forced into the gallery from temporary instrumentation connected to the tank, contaminating about 300 feet of the gallery, and causing extensive skin and clothing contamination of an employee. Another employee also received hand and clothing contamination, but to a lesser extent.

Nature of Exposure or Loss

There were no significant radiation exposures. Decontamination of the first employee was successful and the hands of the second employee were readily cleaned. Bioassay results indicated internal deposition slight. The costs for plant decontamination and equipment replacement were \$39,800.

Railroad Car Containing Scrap Uranium Demolished

Between St. Maries and St. Joe, Idaho, Mar. 24, 1956 — Ref: 56-14

Nature of Incident

A train was derailed; one car contained scrap uranium.

Description of Operation

Scrap uranium was being transported between plants by rail.

Details of Incident

A train containing a carload of scrap uranium was derailed by a combination rock and snow slide. The car containing the scrap uranium was demolished and the contents spilled onto the right-of-way.

Nature of Exposure or Loss

All of the material was recovered, with the exception of approximately sixty pounds of uranium scrap believed to be buried under the earth and rock. Further search for the uncovered scrap was not considered economically justifiable.

Derailment Of Freight Car Transporting Uranium Compound

Near Thompson Falls, Mont., Apr. 19, 1956 — Ref: 56-16

Nature of Incident

A train was derailed; one car contained 45 tons of uranium compound.

Description of Operation

Transporting drums of uranium compound by rail.

Details of Incident

Twenty-six cars of a freight train were derailed as a result of a broken rail. The car containing the uranium compound was immersed in a river; however, the car was removed from the river intact and all of the material was recovered.

Nature of Injuries or Loss

No health hazard was involved. The cost of the recovery operation was \$16,400.

Truck Transporting Radioactive Material

Near Bardstown, Ky., Apr. 26, 1956 — Ref: 56-17

Nature of Incident

A truck accident.

Description of Operation

Interplant shipment of radioactive material.

Details of Incident

A truck carrying radioactive materials was in an accident.*

Nature of Exposure or Loss

The driver was injured to the extent of requiring hospitalization.* There was no damage to the cargo.

Beta Radiation Burn

Los Alamos, N. Mex., Apr. 30, 1956 — Ref: 56-18

Nature of Incident

An employee received a beta radiation burn.

Description of Operation

During a routine radiochemistry procedure, a tool used for preparing neutron sources was removed from a hot cell to be decontaminated.

Details of Incident

The tool was removed from the hot cell into the radiation room by the use of a long pole, placed in a bucket (by hand), and taken to the sink for decontamination. During this process, the employee noticed that his pocket dosimeter was offscale. He went immediately to the monitoring station.

Nature of Exposure or Loss

The employee received a beta burn, apparently when the tool was placed in the bucket by hand, and was hospitalized fourteen days for treatment of the burn and subsequent skin grafting to the proximal phalanx palmar surface of the middle finger of the left hand.

Tritium Exposure

Aiken, S. C., June 16, 1956 — Ref: 56-21

Nature of Incident

An employee was exposed to tritium.

Description of Operation

An employee entered a ventilated area to make an equipment change.

*Details of the accident and the nature of the driver's injuries are not available at this printing.

Details of Incident

When the employee opened the door of the process cabinet around the extraction furnace, the plastic bag pulled off the ring and, due to the lower pressure, was drawn into the space (contaminated) between the furnace and the cabinet wall. Instinctively, the employee attempted to grab the bag but failed, so he inserted one hand and arm up to his shoulder into the port to retrieve the bag.

Nature of Exposure or Loss

The employee received an internal tritium exposure estimated at 18.6 rem.

Exposure To Plutonium

Hanford, Wash., June 18, 1956 — Ref: 56-22

Nature of Incident

Escape of plutonium solution.

Description of Operation

Normal operations in a chemical plant control room.

Details of Incident

Some highly concentrated plutonium solution backed up in the instrument line of an air-operated valve and about a pint escaped into the control room.

Nature of Exposure or Loss

Personnel exposure to airborne plutonium occurred, in addition to extensive skin and clothing contamination, which necessitated admitting one employee to the hospital for observation, decontamination, and special treatment. Two other employees were given treatment at the hospital in connection with inhaled plutonium.

Gross contamination of the operating areas resulted from the incident. Decontamination costs were approximately \$8,500.

Thorium Explosion

Bayside, N. Y., July 2, 1956 — Ref: 56-26

Nature of Incident

A thorium explosion occurred in a metallurgy laboratory.

Description of Operation

Burning of thorium metal for conversion to oxide in a hood.

Details of Incident

One of the employees in the laboratory (wearing protective equipment) took a piece of thorium metal about the size of a golf ball from a drum, which contained 30 to 40 pounds of the

material, and placed it on a tray, located inside the ventilated burning hood, by means of a pair of tongs. (Some of the metal in the form of wafers had already been fired in the tray to act as a source of ignition for the new material.) There was a sharp explosion, followed almost immediately by a second blast.

Nature of Injuries or Loss

Nine persons received injuries as a result of the explosion; four of these were hospitalized because of burns (some second- and third-degree; some minor) and other injuries, one dying about five weeks later as a result of complications of extensive second- and third-degree burns. Except for four laboratory workers, the analyses of urine specimens from all persons associated with the incident (firemen, policemen, etc.) showed no detectable intake of radioactive materials. The four men directly involved did not exceed the permissible body burden for uranium or thorium.

During the first four hours after the explosion, measurements were made both inside and outside of the building for alpha surface contamination and for direct radiation from beta and gamma; no significant radiation was evident.

Government property damage amounted to approximately \$35,000.

Honeycomb Excursion

Los Alamos, N. Mex., July 3, 1956 — Ref: 56-27

Nature of Incident

An inadvertent criticality due to too rapid assembly.

Description of Operation

Critical facility used to simulate design features of complicated reactors.

Details of Incident

While the cart was in motion at a speed of about 0.2 inches per second, the system became prompt critical, a burst occurred, and the scram system ejected beryllium control rods (reducing reactivity), and reversed the motion of the cart. The burst yield was 3.2×10^{16} fissions.

Nature of Exposure or Loss

There were no radiation exposures nor was there any property damage as a result of the incident.

Interplant Shipment Accident

Monterey, Tenn., July 9, 1956 — Ref: 56-28

Nature of Incident

A trailer-truck overturned and caught fire.

Description of Operation

Transportation of slightly radioactive material.

Details of Incident

The braking system of a trailer-truck failed on a downgrade and the driver lost control of the unit as he attempted to negotiate an "S" curve. The vehicle skidded across the highway into a soft ditch, plowed up the shoulder for approximately 100 feet, then climbed an embankment on the left side of the road, overturned, and burned.

Nature of Injuries or Loss

The driver was treated for minor burns and bruises resulting from the accident. There was no loss of material.

Exposure During Reactor Shutdown

Idaho Falls, Idaho, July 23, 1956 — Ref: 56-29

Nature of Incident

Eight men received radiation exposures from a large gamma source.

Description of Operation

A reactor was shut down for scheduled refueling.

Details of Incident

Six employees were working on the reactor top adjacent to the reactor tank opening, while two men were present as observers and advisors. All were exposed to radiation when a highly radioactive reactor component was placed in a position where it was not adequately shielded because of lowered water level in the reactor tank. The moving of the component and the coincident lowering of the water level were done to facilitate insertion and removal of experiments in the reactor.

Nature of Exposure or Loss

Five of the employees received radiation exposures estimated at 21.5, 10.6, 6.2, 6.15, and 3.9 rem, respectively. Three others received estimated exposures of less than 3 rem.

Radioactive Shipment Accident

Pleasant Valley, Oreg., Dec. 11, 1956 — Ref: 56-44

Nature of Incident

A semitrailer, loaded with two casks containing radioactive slugs, went over an embankment.

Description of Operation

Radioactive slugs were being transported between plants by a semitrailer.

Details of Incident

On a rainy morning (temperature 26°, resulting in a glazed road), a semitrailer was coming out of a downgrade "S" curve when the trailer started slipping toward the right on the outside of the curve. The trailer went over the bank and was dragged behind the tractor which was maintaining traction on the shoulder. The weight of the trailer (21 tons) was straining on the kingpin and fifth wheel and, as the trailer slipped further down the 25° slope, the fifth wheel tore loose from the tractor causing the tractor to flip over on its right side. The trailer started rolling down the embankment. The rear cask broke loose during the roll and stopped in an inverted position on a shelf about 30 feet below the road surface. The trailer continued rolling to an upright position where it stopped with the forward cask still secured to the bed, although it had slipped to the left about 12 inches and flattened the stainless pan side.

Nature of Injuries or Loss

Neither the driver nor the relief driver was seriously injured; the latter was sent to the hospital for temporary observation. There was no permanent injury.

An instrument survey was made of the equipment, area, and personnel and no contamination was found. All slugs remained safely in the casks.

ACCIDENTS INVOLVING FATALITIES IN AEC ACTIVITIES —1956

Fatal Fall

Weldon Spring, Mo., Apr. 11, 1956 — Ref: 56-15

Nature of Accident

Fall.

Description of Operation

Connecting a steel beam between two stationary columns.

Details of Accident

While a beam was being lowered into position during the installation of structural steel, the crane suddenly dropped the beam. An ironworker, helping to guide the beam into place, lost his balance when the beam was dropped, and plunged 17' to the ground.

Nature of Injuries or Loss

The ironworker died as the result of injuries associated with a broken neck.

Two Die From Burns

Oak Ridge, Tenn., May 14, 1956 — Ref: 56-19

Nature of Accident

Explosion of zirconium metal salvage.

Description of Operation

Removing scrap metal to make way for an access roadway.

Details of Accident

After giving instruction to three of his men, a salvage yard foreman walked away to get work underway in another area of the yard. At that time, a violent explosion was heard. Per-

sonnel working in the area heard the roar of the explosion, felt a pronounced concussion wave, and observed a tower of smoke rising approximately 100 feet in the air, with red-colored fire at the base. The same men, some of whom were as much as 100 to 150 feet away from the explosion, had to take cover in order to avoid the debris that was thrown into the air by the explosion.

It was concluded by the Investigating Committee that the explosion occurred in a drum of finely-divided zirconium metal.

Nature of Injuries or Loss

Two men died from the second- and third-degree incendiary burns received over 80-90% of their bodies; a third employee was burned severely and his right arm blown completely off above the elbow. There was no significant property damage.

Accidental Explosive Detonation

Los Alamos, N. Mex., June 26, 1956 — Ref: 56-25

Nature of Accident

Accidental detonation of explosive.

Description of Operation

Exploratory work with thallous azide.

Details of Accident

Thallous azide was being transferred from an oven to bottles. Four pans of the material had been emptied into bottles and the empty pans laid aside. Two pans appear to have been on a table, and at least one of these contained a substantial amount of the explosive. A technician was holding a scoop in his right hand in proximity to the explosive in the pan when the explosion occurred. The exact cause of the explosion is undetermined.

Nature of Injuries or Loss

The technician was killed instantly. Examination of the body revealed that it was seriously burned from head to foot, and that the hand holding the scoop was badly mutilated.

Damage to the wall and floor surfaces in the area in which the explosion occurred and to a panel truck parked outside amounted to \$10,650.

Motor Vehicle Accident

Near Boulder, Colo., July 24, 1956 — Ref: 56-30

Nature of Accident

Single car accident.

Description of Operation

Returning a Government car to a project.

Details of Accident

A Government car, while being driven by a contractor employee, skidded off the road, turned over, and landed on its top in 3½' of water, pinning its occupant in the car.

Nature of Injuries or Loss

The contractor employee, sole occupant of the car, was killed. The cause of death was a crushed chest and internal injuries.

Electrocution

Pittsburgh, Pa., Aug. 26, 1956—Ref: 56-32

Nature of Accident

Crane struck 13,800-volt overhead powerline.

Description of Operation

Unloading equipment from a truck with a crane.

Details of Accident

While a piece of equipment was being lifted by a crane, the crane struck a 13,800-volt overhead powerline.

Nature of Injuries or Loss

Three riggers received second- and third-degree burns, one being pronounced dead upon his arrival at the hospital.

The property damage, including replacement of the powerline, amounted to less than \$500.

Hit By Truck

Buffalo, N. Y., Sept. 19, 1956—Ref: 56-34

Nature of Accident

Hit by a commercial truck.

Description of Operation

A pipefitter was performing maintenance work on a hydrant.

Details of Accident

As a pipefitter was working on a hydrant, a vendor's truck, while backing up, knocked him down. Apparently, the right rear wheel of the truck passed over a portion of his chest.

Nature of Injuries or Loss

The pipefitter died a month later of bronchial pneumonia secondary to multiple rib fractures received at the time of the accident.

ACCIDENTS AND INCIDENTS INCLUDED IN ORIGINAL TID-5360 (SUPPL.) (NOT REPORTABLE USING CRITERIA SET FORTH IN THIS REVISION)

Cobalt 60 Exposure

Milford, Conn., Jan. 10, 1956

Nature of Incident

A workman picked up an encapsulated 1.28-curie cobalt 60 source.

Description of Operation

A cobalt 60 source, attached to a string and suspended to a lower floor level, was being used on a construction job to radiograph welds.

Details of Incident

A construction contractor employee removed the cobalt 60 capsule from the string, placing the capsule in his shirt pocket. He transferred it several minutes later to the glove compartment of his automobile.

Nature of Exposure or Loss

The employee received an estimated whole body gamma dose of 22 to 26 rem and an estimated dose to two small skin areas of approximately 3,000 to 4,000 rem each (penetrating radiation at that area was 150 to 200 rem to spleen). There were no injuries and no blood changes were detected. Three others in his car pool were exposed to doses estimated at less than 7 rem.

Slight Contamination Of Construction Area

Oak Ridge, Tenn., Jan. 16, 1956

Nature of Incident

The work area of a construction company was slightly contaminated as a result of nearby laboratory operations.

Description of Operation

Constructing a building.

Details of Incident

A construction area was slightly contaminated when radioactive dust was ejected from a nearby laboratory. As a routine precautionary measure, 26 employees were required to remove articles of clothing, such as caps, gloves, coats, and shoes, for cleaning.

Nature of Exposure or Loss

There were no significant radiation exposures.

Plutonium Contamination To Hands

Hanford, Wash., Jan. 17, 1956

Nature of Incident

Plutonium contamination of an employee's hand.

Description of Operation

Manually handling radioactive material.

Details of Incident

An operator was doing routine work when a plutonium-bearing organic solution caused deterioration of his rubber gloves.

Most of the initial skin contamination (about 100 milligrams of plutonium) was removed by washing, although it required a period of 50 days to remove the remaining 200 micrograms of radioactive material.

Nature of Exposure or Loss

Bioassay results obtained several months after the incident indicated that the internal deposition of soluble plutonium did not exceed 5% of the maximum permissible body burden.

Remarks

The main objective of the decontamination procedures was to minimize absorption through the skin.

Gamma Exposure Incident

Ft. Belvoir, Va., May 14, 1956

Nature of Incident

Fifteen to twenty-five employees were exposed to gamma rays.

Description of Operation

Radioactive iridium 192 was being used for field X-raying of welds in a construction area.

Details of Incident

After a welder completed taking X-rays of welds with a 32-curie iridium 192 source attached to a piece of string, he replaced the source in its container. The string was left hanging outside the container; however, the top of the container was not in place securely. During the day, the string became entangled and the source was pulled out of the container. This resulted in the workmen in the area becoming exposed to the source.

Nature of Exposure or Loss

The highest radiation exposure was estimated to be 4.5 rem.

Contamination Incident

Los Alamos, N. Mex., June 21, 1956

Nature of Incident

Contaminated blotting paper blew around the room during an experiment.

Description of Operation

Experiment involved highly radioactive material.

Details of Incident

During the course of the experiment, the piece of blotting paper, which had become contaminated with radioactive material, blew around the room for some unexplained reason, causing contamination of the area. There was a possibility that all of the occupants of the room were exposed.

Nature of Exposure or Loss

Ten exposures were within permissible occupational exposure. No dollar loss due to contamination was involved.

Jacket Fails On Source

Eniwetok, June 23, 1956

Nature of Incident

Plutonium oxides were released from a plutonium alloy instrumentation source.

Description of Operation

Plutonium instrumentation source stored in trailer.

Details of Incident

Plutonium oxides were released when the jacket failed on the source stored in a house-type trailer. The failure of the jacket caused contamination to about 15 persons and their

living quarters, including clothing and bedding. Decontamination was carried out according to standard procedure and items too heavily contaminated to be made usable were buried at sea.

Nature of Injuries or Loss

Bioassays were made on all personnel exposed and it was found that all body burdens were negligible and well below permissible amounts.

Dockside Test Operations Result In Slight Exposure

SEAWOLF, Aug. 19, 1956

Nature of Incident

Seven persons were exposed to radiation.

Description of Operation

Dockside test operations on the SEAWOLF.

Details of Incident

Seven men received minor radiation doses, the highest of which was 1.1 rem. The exposure occurred during a testing procedure and was not the result of a malfunction of the nuclear reactor or of normal plant operations.

Nature of Exposure or Loss

No radioactivity was released nor were there any significant radiation exposures.

Plutonium Contamination Incident

Hanford, Wash., Sept. 21, 1956

Nature of Incident

A plutonium-bearing solution splashed on an employee.

Description of Operation

A container of plutonium-bearing solution was being prepared for shipment.

Details of Incident

In filling the container, some of the solution rested in the recess at the mouth of the container in which the gasket sits. When the cover was applied, drops of the solution splashed out onto the employee's chest and face and into his mouth. Decontamination procedures were instituted and all accessible parts of his body were adequately cleaned.

Nature of Injuries or Loss

The employee was sent to the hospital (no lost time) for observation. Biological tests indicated that the amount of plutonium in his body, as a result of ingestion, was below the permissible body burden.

Spontaneous Massive Thorium Fire

Detroit, Mich., Sept. 22, 1956

Nature of Incident

A spontaneous fire occurred in a drum of thorium metal pellets en route to an AEC licensee.

Description of Operation

Shipment of thorium pellets.

Details of Incident

Within a few minutes after a shipment of thorium pellets was transferred from a rail car to a truck, smoke was noted rising from the load. The smoke was found to be coming from a drum, which was pushed from the truck and allowed to burn itself out. The fire lasted about two and one-half hours.

Nature of Exposure or Loss

No one was injured or received any significant radiation exposure.