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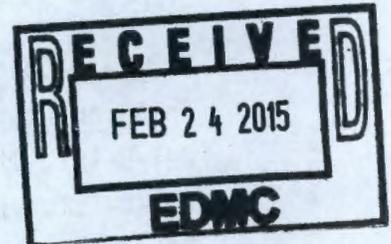
ARH-2015 PART 4
March 30, 1971

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RADIOACTIVE CONTAMINATION IN UNPLANNED
RELEASES TO GROUND WITHIN THE CHEMICAL
SEPARATIONS AREA CONTROL ZONE THROUGH
1970

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Contract AT(45-1)-2130

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RADIOACTIVE CONTAMINATION IN UNPLANNED
RELEASES TO GROUND WITHIN THE CHEMICAL
SEPARATIONS AREA CONTROL ZONE THROUGH 1970

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RADIOACTIVE CONTAMINATION IN UNPLANNED RELEASES
TO GROUND WITHIN THE CHEMICAL SEPARATIONS AREA
CONTROL ZONE THROUGH 1970

INTRODUCTION

The following information summarizes the data regarding sites containing unconfined radioactive materials resulting from unplanned releases to soil storage in the chemical processing area of the Hanford reservation. Each site is identified with the location, description and history of the event given as well as the amount and kind of radioactive material present. Included are spills, process transfer line leaks, informal burial sites, locations contaminated by airborne radioactive particulates and spreads of radioactivity by animals. The report covers releases from plant startup in 1944 through calendar year 1970.

Not all underground line leaks could be identified from above ground measurements. Additional line leaks are expected to have occurred which could not be identified by liquid level measurements. Such leaks would be expected to be small.

Sites included are being plotted on Key Plan Area Maps H-2-44500 and H-2-44510.

Locations indicated in the report as "approximate" are in the course of being surveyed. Other site locations have been surveyed.

Much of the material has been taken from HW-60807, "Unconfined Underground Radioactive Waste and Contamination in the 200 Areas - 1959", by K. F. Baldrige, dated July 15, 1959. The assistance given by B. J. McMurray, L. E. Scott, L. L. Lundgren and G. L. Hanson in preparing the report is gratefully appreciated.

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<u>Zone Identification</u>	<u>Coordinates and Reference Drawing</u>	<u>Date of Incident</u>	<u>Description and Comments</u>	<u>Isotope and Curie Content</u>
218-E-13 Concrete from encasement, West of Purex	Approximate center N-40180 W-49175 H-2-44500 Sheet 7	1966 August	Contaminated concrete from the underground pipe encasement was left in the excavation during repair.	Approximately 1 Ci. Fission Products
Spill on Route 4-S on the 200 East Area Hill	No coordinates presently established Sec 12 T 12N R 26E H-6000 Sheet 1	1954 December	A trailer carrying 1600 gallons of UNH solution overturned and spread contamination on the road and into the borrow pit. Maximum dose rates were 60 mrad/hr on the road surface. Most of the contamination was removed. The remainder was washed off the road and covered. All remaining traces of contamination were dug up and taken to 200 West Dry Waste Burial Ground in December 1970.	Less than 10 nCi/gm of soil. Uranium
241-B-151	Approximate N-44000 W-52950 H-2-44500 Sheet 7	1951 1952	The area around the diversion box was contaminated as a result of diversion box work in the fall of 1951 and again in the summer of 1952. Most of the contamination was removed. That remaining was covered with approximately one foot of clean soil.	Approximately 10 Ci. Fission Products
241-B-152	Approximate N-45000 W-53000 H-2-44500 Sheet 7	1954	An incident which occurred during the spring of 1954 while performing diversion box work contaminated an area approximately 50 feet square. A portion of the contamination was removed and buried. The remainder was covered with several inches of clean fill dirt.	Approximately 1 Ci. Fission Products
241-B-153	Approximate N-45100 W-52900 H-2-44500 Sheet 7	1954 1955	Contamination spread associated with work being done in the 153 B diversion box during 1954 and 1955 caused a general buildup of contamination. An area 50' x 100' is marked as a radiation zone. The contamination was covered with clean gravel.	Approximately 1 Ci. Fission Products
Break in the liquid waste transfer line near 241-B-153 Diversion Box	Approximate N-45100 W-52900 H-2-44500 Sheet 7	1968	A leak in the transfer line from 9-2 tank in 221-B Plant to the 110-B underground storage tank was found near the 241-B-153 diversion box on January 4, 1968. The volume which leaked to the ground has been estimated at 5,400 gallons. The contaminated ground was covered with clean gravel.	4780 Ci ¹⁴⁴ Ce 340 Ci ¹⁰⁶ Ru 850 Ci ⁹⁵ ZrNb

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<u>Zone Identification</u>	<u>Coordinates and Reference Drawing</u>	<u>Date of Incident</u>	<u>Description and Comments</u>	<u>Isotope and Curie Content</u>
241-B-154 Ground contamination	Approximate N-42550 W-52800 H-2-44500 Sheet 7	1946	Metal waste solution was spread over the ground around the diversion box as a result of work associated with replacement of a leaky jumper in the box in 1946. The contamination was covered with approximately one foot of clean soil.	Approximately 1 Ci. Fission Products
Near 241-BX-153 and 241-BX-155 Ground contamination	Approximate N-45300 W-53200 H-2-44500 Sheet 7	1955 October	A spill that occurred during pressure testing of lines and jumpers in the 155-BX diversion box caused ground contamination to a maximum dose rate of 22.6 rads/hr at surface. The effected area is approximately 200 feet square. It has been covered with clean soil.	Approximately 10 Ci. Fission Products
242-B to 207-B Waste Line	Approximate N-44950 W-52600 H-2-44500 Sheet 7	1963 June	Five leaks in the line were discovered in June 1953. No determination of activity below ground surface was made at that date. The area was covered with about two inches of clean soil.	Approximately 10 Ci. Fission Products
221-B, R-3 Line Leak	Approximate N-42575 W-53450 H-2-44500 Sheet 7	1946	A leak during 1946 from an underground metal waste line south of the 221-B Building resulted in the spread of an unknown quantity of activity to an area 100 feet wide by 500 feet in length. A portion of the ground above the leak caved in, but was subsequently backfilled with several feet of clean gravel. During subsequent construction activity the major portion of the radioactivity was excavated and removed to the 200 E Dry Waste Burial Garden.	Approximately 10 Ci. Fission Products
216-B-3 Pond Dike Break	N-43700 W-41000 to N-45000 W-36000 H-2-44500 Sheet 7	1958	The B-3 pond dike broke in 1958 and flooded down a ravine to the east of the B-3 pond. (The area has been released from a Radiation Zone status)	
Near 241-CR-151 diversion box Liquid radioactive waste transfer line break	Approximate N-42600 W-48460 H-2-44500 Sheet 7	1969 October	A leak in the line from the Purex Plant to the 102-C tank was found October 19, 1969. The volume which leaked to ground has been estimated at 36,000 gallons. The contamination was covered with clean gravel.	360 Ci. ⁹⁰ Sr 720 Ci. ¹³⁷ Cs 360 Ci. ¹⁴⁴ Ce 1080 Ci. ⁹⁵ ZrNb 1080 Ci. ¹⁰³ Ru

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<u>Zone Identification</u>	<u>Coordinates and Reference Drawing</u>	<u>Date of Incident</u>	<u>Description and Comments</u>	<u>Isotopes and Curie Content</u>
Near 241-C-152 diversion box Liquid radioactive waste transfer line break	Approximate N-42570 W-48685	1969 December	A leak in the line from tank 105-C to B Plant was found December 19, 1969. The volume which leaked to ground has been estimated at 2,600 gallons. The contaminated soil was covered with clean gravel.	11,300 Ci. ¹³⁷ Cs 260 Ci. ¹⁴⁴ Ce 130 Ci. ¹⁰⁶ Ru 260 Ci. ⁹⁵ ZrNb 100 Ci. ¹³⁴ Cs
241-CR Steam cleaning pit	Approximate N-42800 W-48200 H-2-44500 Sheet 7	1954	A pit for steam cleaning heavy equipment was dug during 1954 northeast of the 103 CR tank. The pit has since been covered. It is within the perimeter of 241-C Tank Farm.	Less than 10 nCi/gm. of soil Fission Products
218-E-3 Construction scrap pit	N-37496 W-56554 to N-37525 W-56512 to N-37609 W-56570 to N-37579 W-56612 H-2-44500 Sheet 7	1954	This pit located in the southwest corner of 200 East Area received metal slip forms, barrels and timbers from 202-A construction work that had been contaminated with Ruthenium ¹⁰⁶ emitted from the Redox stack. In February 1971 the pit was uncovered. Surveys determined no detectable alpha, beta, or gamma activity remained in the soil or on equipment.	
218-E-6 B stack shack burning pit	N-42161 W-53496 H-2-44500 Sheet 7	1955	Contaminated wooden forms, a shack and other wooden items, were removed from 291-B stack area during clean up of the exclusion area in the fall of 1955. A trench approximately four feet deep was dug and the contaminated items were burned. The remaining ashes were covered with soil. This site was excavated to determine the remaining activity. Pieces of partially burned wood and ashes were uncovered at a depth of four feet. Radioactivity was non-detectable. (The zone has been released from a Radiation Zone status)	
241-ER-151 Catch tank leak	Approximate N-41937 W-54702 H-2-44500 Sheet 7	1953 March	About 1700 gallons of contaminated acid was lost to the ground through a leaking catch tank. No ground surface contamination was detected.	Approximately 10 Ci. Fission Products

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<u>Zone Identification</u>	<u>Coordinates and Reference Drawings</u>	<u>Date of Incident</u>	<u>Description and Comments</u>	<u>Isotopes and Curies Content</u>
B-C Cribs outer-area	Sections: 10, 11, 14, 15, 22, 23 and small portion of 13 and 24. T-12-M R-26-E	1960	Early in 1960 animal burrows were observed dug into the residue salts in the bottom of the BC liquid waste trenches. Radioactive feces from coyotes and rabbits were subsequently spread over the surrounding sagebrush covered desert land to the east, south and west of the trenches. The bulk of the radioactivity remaining is fixed in rabbit droppings scattered over approximately four square miles of ground surface.	Approximately 1/2 Ci. Cesium 137 and strontium 90
216-S-4 Culvert pipes (cooling water well)	N-36110 W-76630 N-36045 W-76630 N-36045 W-76575 N-36110 W-76575 H-2-44510 Sheet 4	1953 to 1955	241-S - 101 and 104 tank condensate and cooling water was piped from 241-S tank farm into two metal culvert pipes placed on end to a depth of 20 feet.	Approximately 1 Ci. Fission Products
216-S-207 Redox retention basin	Approximate N-34220 W-75200 H-2-44510 Sheet 4	1954	The basin became highly contaminated from coil leaks in the 202-S Building. Its use was discontinued in 1954. The basin concrete surfaces were subsequently covered with soil.	Approximately 10 Ci. Fission Products
Open ditch to the Redox Chemical Sewer trenches	Approximate N-33800 W-75425 N-32300 W-77150 H-2-44510 Sheet 1	1955 May	The ditch to the chemical sewer trenches overflowed during May 1955 contaminating an acre of ground between the open ditch and the soil trench. The maximum dose rate detected was 1R/hr at the ground surface. The contamination was covered. Following the incident, the ditch was dredged, and the sludge removed and placed in low spots on both sides of the ditch and covered with two feet of soil. (This area has been released from Radiation Zone status.)	
216-S-15 (110-S tank condenser cooling wastes)	Approximate N-36066 W-75450 H-2-44510 Sheet 4	1951 to 1952	Receiving pond east of the 241-S tank farm. A maximum dose rate of 10 rads/hr was observed at the surface of the pond. It was covered with two feet of dirt.	Approximately 1 Ci.

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240-S-151 Behind Redox 202-S Building	Approximate center N-34600 W-73875 H-2-44510 Sheet 4	1953 January- February	Diversion box work in January and February 1953 resulted in extensive ground spread of beta-gamma contamination. An area of approximately 1000 square feet of gravel. Recent samples allow this area to be removed from Radiation Zone status.	
233-S Floor overflow	Approximate center N-34625 W-74050 H-2-44510 Sheet 4	1969 January	Plutonium contaminated water backed up in the 233-S Filter House drain line and overflowed into a low spot in the ground directly north of the 233-S Filter House. An area of 150 square yards (10 x 15 yards) was effected. Twenty-eight yards of clean gravel were spread over the spill.	Approximately 0.1 gm of plutonium
23rd and Camden	Approximate center of line break N-43151 W-75375		Roadside spill of liquid waste solution from an underground broken line on the south east corner of 23rd and Camden. The liquid surfaced and ran across the road to the west side, then south in the borrow pit to near 22nd street.	Approximately 10 Ci. Fission Products
	West side of Camden from 23rd St. to beyond 22nd St. Approximate N-41600 W-75525 N-43100 W-75525 H-2-44510 Sheet 4	1966 May	Radioactive liquid waste again surfaced from the line break when it was mistakenly tested in 1966. Liquid from the break ran only to the near edge of Camden street opposite the break. The major portion of the contaminated soil was buried in the solid waste burial grounds. Three feet of clean fill dirt was placed over the remaining contamination.	
Buried canyon cell blocks	Approximate center N-44450 W-76200 H-2-44510 Sheet 4		Ten cell cover blocks from the 221-T canyon were buried in a trench on the west side of the railroad tracks just south of the 216-T-4 ditch underpass to the 216-T-4 pond. The blocks are covered with one or two feet of soil. At the time of burial these blocks had previously been steam cleaned in the 221-T canyon. Some of the block surfaces contained "fixed" radioactivity to a maximum of 1500mrads/hr where the surfaces	Approximately 0.1 Ci. Fission Products

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			fabrifilmed to fix all contamination before being removed from the canyon. Block bails for possible block recovery can be seen above ground. (This zone is included in the 218-W-4 Industrial Burial grounds)	
Buried Railroad rails	Approximate center N-44050 W-76350 H-2-44510 Sheet 4	1954	Two sections of railroad track contaminated during the fall of 1954 to a maximum of 300 mrads/hr were buried in two trenches 15 x 30 x 4 feet deep and covered with clean soil. (To be moved to 218-W-4)	Approximately 0.1 Ci. Fission Products
South shoulder of 23rd Street Contamination spread	Approximate N-43175 W-74025 N-43175 W-77500 H-2-44510 Sheet 4	1966 September	Strontium 90 in the form of particulate matter spread from a used diversion box jumper as it was being transported via truck from the 200 West dry waste burial ground to the 221-T canyon. The jumper had just previously been removed from the 241-TX-153 Diversion Box. The spread extended from 500 feet, west of the west railroad crossing on 23rd Street to Bridgeport and 23rd Street. Spots of contamination (maximum 500 mrads/hr) were removed from the road surface, and contamination on the shoulder of the road and in the borrow pit was covered with six inches of soil. Speck concentration approximated one per square yard of ground surface along the shoulder of the road.	Approximately 1 Ci. of 90 Sr
221-T, R-19 Waste line leak	Approximate center N-43550 W-73430 H-2-44510 Sheet 4	1947	A leak in the underground metal waste line at the southeast corner of 221-T Building in the spring of 1947 resulted in the spread of an unknown amount of activity to the ground. A maximum dose rate of 20 R/hr was detected. The area was subsequently covered with several feet of gravel.	Approximately 10 Ci. Fission Products

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153-TX Diversion box Contamination spread	Approximate center N-41300 W-75400 N-41350 W-75400 H-2-44510 Sheet 4	1968 September	Ground and road contamination along Camden Avenue and adjacent ground surfaces resulted from two plumes of airborne contamination that floated northeast and southeast from the 153-TX diversion box depositing strontium 90 over an area running 250 yards north and south along Camden and extending from 75 to 100 yards east of Camden. Particles up to 700 mrads/hr were found. The road contamination was covered with a new tar mat, the sides of the roads were "fixed" with tar, and the field to the east of Camden Avenue was turned under to cover the particulate material.	Approximately 1 Ci. Strontium 90
216-T-20, near 241-TX-155 Diversion Box Overflow to Hillside	Approximate center N-41425 W-74900 H-2-44510 Sheet 4	1950	The 241-TX-155 diversion box overflowed and ran down the hillside to the west. No record was made of the approximate radioactivity to ground. Soil samples taken in 1970 were less than detectable. (The area has been released from a Radiation Zone status.)	
Leak in a Process line from 105-TX to 118-TX	Approximate N-41750 W-75700 H-2-44510 Sheet 4	1954	Leakage of first cycle waste was discovered in 1954 with maximum dose rates of 4.5 R/hr observed at four feet above the surface of the spill. An area approximately 100 feet by 125 feet was covered with soil.	Approximately 10 Ci. Fission Products
Leak from Redox to 224-U - UNH Line	Approximate N-35025 W-74500 H-2-44510 Sheet 4	1954	During the summer of 1954 a leak occurred in the UNH line near the northwest corner of the Redox exclusion area. The contamination was covered with a clean soil. (The area has been removed from a Radiation Zone status.)	
224-U Buried Contamination	Approximate N-37925 W-73270 H-2-44510 Sheet 4	1954 March	Contamination from a leak at 224-U Building during 1954, was spread to an area southeast of the 224-U Building. This contamination was buried	Less than 10

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Acid Spill 221-U Building Section 1-R through 5-R	Approximate N-38730 W-73050 N-38550 W-73230 H-2-44510 Sheet 4	1957 March	Reclaimed acid spilled onto the ground at the northeast end of the 221-U Building in March 1957, contaminated an area 65 feet by 90 feet. The spill was covered with three inches of sand and gravel.	Approximately 1 Ci.
Metal Drum Burial	Approximate N-35000 W-72730 H-2-44510 Sheet 4	1962	Approximately fifty 55 gallon oil drums, contaminated with ruthenium 106 from a Redox particle spread in 1952, were buried about 500 feet directly east of the northeast corner of the Redox exclusion area fence and covered with six feet of soil. The ruthenium has now decayed. (Removed from a Radiation Zone status.)	
Redox to 224-U UNH line Leak		1955 September	A leak occurred in the UNH line from Redox to 224-U Plant in September 1955 at a location just outside and to the north of the Redox exclusion area. The contamination was removed to the 200 West solid waste burial ground. (Removed from Radiation Zone status.)	
U-152 Interface crud Burial	Approximate N-38270 W-73900 H-2-44510 Sheet 4	1956	Approximately 7000 gallons of interface crud, activated charcoal, and diatomaceous earth containing about one curie of fission products was transferred from the 288-U tank to a hole in the ground at coordinates N-38270, W-73900. The contamination was covered with clean soil.	Approximately 1 Ci. Fission Products
224-U Building Leaking Flange Line	Approximate N-38050 W-73200 Ref. Sketch F-8 HEW-60807	1955 March	A leaking flange line from the 224-U Building in March 1955 caused ground contamination three feet square located 90 feet east of 224-U. The contaminated dirt was removed. (Removed from Radiation status.)	

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216-U-7 221-U Vessel Vent Blower Pit Trench Drain	Approximate N-38670 W-73090 H-2-44510 Sheet 4	1953 June	In June 1953 an estimated 300 pounds of uranium (UNH solution) overflowed into the 221-U Building vessel vent blower pit and then to ground through the french drain. (This is in the established radiation zone on the southeast of 221-U Building near R-3 entrance.)	13.6 kg Uranium
Old Burning Pit	Approximate N-40550 W-72400 H-2-44510 Sheet 4	1950	Contamination was discovered in the spring of 1950 in the old burning ground approximately 1500 feet east of the 221-U facility. An area of 150 square feet of ground was found to be contaminated at a maximum dose rate of 45 rads/hr at surface. The area was covered with 10 feet of soil.	Approximately 1 Ci. Fission Products
218-U-9 Metal Scrap Burial Redox	N-35508 W-74555 N-35647 W-74458 N-35510 W-74458 N-35467 W-745556 H-2-44510 Sheet 4	1954 September	Solid waste burial site containing sheet metal insulation cover taken from a chemical storage tank, and other metal scrap from the Redox facilities contaminated with ruthenium 106 activity. The activity has now decayed. (Removed from Radiation Zone status.)	

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