

TABLE 5-2: ROCKY FLATS FACILITY WASTE DISPOSAL AREAS

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Spray Fields North of the Plant	H,I-3,4	<p>These spray fields were used shortly after the present landfill became operational in 1986, to spray water from two ponds over ground surfaces to enhance evaporation. The East Landfill Pond, also known as the existing landfill pond, and the West Landfill Pond were used to intercept groundwater that may have been contaminated by landfill leachate. The South Area Spray field was used first, until runoff was found to be draining into North Walnut Creek. Use of that field was discontinued, and use of the North Area Spray Field was also found to flow into North Walnut Creek. Spraying was then moved to the Pond Area Spray Field, and drainage flowed back into the existing landfill pond. In September of 1973, tritium and strontium were detected in landfill pond water. Several metals and radionuclides have been detected in a downgradient bedrock groundwater monitoring well installed in 1989, but may represent natural background conditions (USDOE, 1991b).</p> <p>In May of 1981, the West Pond was covered over as part of an expansion project for the existing landfill (USDOE, 1991b).</p>
Trenches A, B, C	H,I-4	<p>Trench A appeared to be active from 1964 to about 1974. Trench B was active in 1959, with date of closure unknown. Trenches A and B received uranium- and/or plutonium-contaminated sludge from the sewage treatment plant. Trench C is actually two separate trenches, that apparently were active from 1964 until 1974. Materials placed in Trenches C have not been identified, but sewage sludge is most probable. Several metals and radionuclides and TCE have been detected in a groundwater monitoring well in Trench A. Metals and radionuclides may represent background (USDOE, 1991b).</p> <p>The trenches are no longer active. A road was built across Trenches A and C in 1978 (USDOE, 1991b).</p>
Contaminated Concrete Slab Burial Area	I-5	<p>A concrete slab with direct count (non-removable) americium contamination was buried here (Owen and Steward, 1974). The concrete slab was later excavated, and the contaminated portion of the slab was cut off for off-site disposal (Owen and Steward, 1974).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Nickel Carbonyl Bottle Disposal Area	J-6	<p>Between March and August of 1972, approximately 185 pounds of nickel carbonyl ("X-gas", Ni(CO)₄) contained in seven 25-pound cylinders, two 5-pound cylinders, and one lecture bottle were disposed of. A "dry well" hole about fifteen feet deep and three feet in diameter was drilled in a remote area of the plant site, and the cylinders were opened by individuals wearing supplied air packs and suspended in the hole until they were drained. In some cases, the chemical ignited immediately after release to the well. In other cases, the well remained silent for long periods before a muffled ignition occurred. Samples at the lip of the hole indicated concentrations around 10 parts per million during the disposal (Hobbs, 1972).</p> <p>The map location is the approximate location where empty nickel carbonyl bottles were buried after the chemical was destroyed by burning during the 1957 fire in Building 771 or when ready for discard. Explosive charges were used to destructively vent the cylinders and ignite any residual gas (Owen and Steward, 1974).</p> <p>There are reports that an additional 12 cylinders were vented and buried one-half mile north and west of the current sanitary landfill (Smith, 1975).</p>
East Area Spray Field	L,M-5	<p>The East Spray Field became operational in 1989 to provide additional area for spray evaporation of water from Pond B-3, which is sewage treatment plant effluent and local surface runoff (USDOE, 1991b).</p> <p>Use of this area was discontinued shortly after it became operational in late 1989 due to problems with excessive runoff (USDOE, 1991b).</p>
Radioactive Soil Dump Area	K,L-5,6	<p>The Soil Dump Area received 50 to 75 dump truck loads of soil containing low levels of plutonium. The soil was excavated during construction of Parking Area No. 334 in the middle of the western half of the plant production area, and had been put there after excavation near Building 774, the waste treatment plant (USDOE, 1991b).</p>
Trench T-1	K-7	<p>Approximately 25,000 kg of depleted uranium chips in 125 drums were deposited in the trench during 1952-1962. The drums were covered with about 2 feet of fill dirt (Owen and Steward, 1974).</p> <p>Depleted uranium was put in the trench primarily due to the hazards of transporting the metal. All drums buried were from Building 444 (Putzier, 1970).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Trenches T-2 through T-8	J-8 K,L,M-7	<p>Approximately 100,000 kg of sanitary sewage sludge and about 275 flattened empty drums contaminated with uranium were disposed of in these trenches. Activities ranged from 800 to 8,000 dpm/g. T-4 also contains some uranium-plutonium contaminated asphalt planking from the 207 solar ponds. Estimated total alpha activity is between 100 and 150 mCi (Owen and Steward, 1974).</p> <p>The first sludge buried on the plant site dates back to July, 1954. Trenches T-2 through T-8 were used for sludge burial up to August 14, 1968, when the sanitary landfill became operational. Concentrations of radioactivity in the dried sludge have not varied much over the years; the maximum reported was 7,900,000 dpm/kg in June 1960, and the minimum was 840,000 dpm/kg in August, 1964. Earlier activity was primarily uranium, with probable increasing plutonium fraction leading up to primarily plutonium composition in later years (Putzier, 1970).</p> <p>Some contaminated asphalt planking discarded from Pond 2A repair work was buried in Trench T-4. Contamination was principally uranium, with minor Pu contamination possible. No quantitative data are available (Putzier, 1970).</p>
Trenches T-9, T-10, and T-11	L,M,N-7	<p>Trenches T-4 through T-11 are all located just east of the East Access Gate outside the security fence. The trenches, approximately 50 by 300 feet in size, were used from 1954 to 1968 for the disposal of flattened drums contaminated with uranium and plutonium. Activity ranges were from 800 to 8,000 dpm per gram. Trenches T-4 and T-11 also contain some uranium and plutonium-contaminated asphalt planking from the solar evaporation ponds and quantities of sanitary sewage sludge (USDOE, 1986).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Mound Area	K-7	<p>A total of 1,045 drums of oil and solid waste were buried. Most contamination was depleted uranium, with some enriched uranium and possibly low-level plutonium (Owen and Steward, 1974).</p> <p>The first mound burial was in April, 1954. Drums were buried here steadily up to March, 1957, at which time uranium contaminated oil from 90 drums was burned. In April, 1957, another 79 were burned. The final burial was in September, 1958, involving 89 plutonium contaminated oil drums from Building 776. The distribution of waste drum sources was as follows:</p> <p>From B-444; 1298 drums of oils, stillbottoms, sand, perclene From B-776; 89 drums of oils with carbon tetrachloride From B-881; 85 drums of oils From B-991; 79 drums of concentrated dry waste From B-771; 46 drums of oils with carbon tetrachloride From B-441; 9 drums of dry waste, paper, glass</p> <p>Assuming similar concentrations of plutonium as from 903 area drums, the mound contained about 285 grams of plutonium. After September, 1958, oil and coolant drums were moved to the mound area but were not buried. In July of 1959, they were moved across the road to begin accumulation in the Building 903 drum storage area (Putzier, 1970).</p> <p>Complete Retrieval and off-site disposal were achieved in May, 1970. No plutonium was detected. Soil samples ranging from 0.8 to 112.5 dpm/g were attributed to 903 Area infiltration (Owen and Steward, 1974).</p>
Pallet Burn Site	J-7	<p>An area southwest of oil burn pit number 2 was used to destroy wooden pallets in 1965. The materials that may have been spilled on the pallets is unknown (USDOE, 1986). A 1974 summation of incidents affecting soils near Rocky Flats indicated on two maps the presence of a "pallet destruction area" south of Building 991. Other than indicating the site was active in 1968, no discussion was provided (Owen and Steward, 1974).</p> <p>There are also indications of pallet disposal activities in a burning pit south of Building 881 in 1965. In May of 1965, a pallet containing 3 sheets (60 kg) of depleted uranium was inadvertently burned in that pit. After discovery of the event, two barrels of contaminated soil were removed for shipment to Arco, Idaho for disposal (Young, 1965).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Oil Burn Pit #2	J-7	<p>A total of 1,082 drums of oil containing uranium were burned during 1957 and 1961-1965. The resulting approximately 10,000 cubic feet of residues and some flattened drums were covered with backfill (Owen and Steward, 1974).</p> <p>A burning pit was cut near the mound, and burning of the contents of 169 drums took place in March and April of 1957. Oil burning area #2 is actually two parallel trenches essentially side by side near the mound. No further burning occurred until June 1961, after which time oils were burned frequently. May 1965 was the last month any burning took place. The total number of drums burned on-site was 1093, but it is not clear how many were 30-gallon or 55-gallon drums. About 250-300 emptied drums were flattened and probably buried in trenches 3, 4, 5, 6, 7, and 8 or mounded over in the burning pit areas (Putzier, 1970).</p> <p>The pit was cleaned up and removed in the 1970s (USDOE, 1986).</p>
Reactive Metal Destruction Site (the 952 area)	K-8	<p>Approximately 400 to 500 pounds of metallic lithium were destroyed over 1956 to 1970. Residues, primarily non-toxic lithium carbonate, were buried. Smaller quantities of other reactive metals (sodium, calcium, and magnesium) and some solvents were also destroyed in this location (Owen and Steward, 1974).</p>
Gas Detoxification Area	K-8	<p>Building 952, utilized for Toxic Gas Storage, was located in this general area. The gas detoxification area referred to (USDOE, 1987 and Helmstadt, 1988) was most likely associated with the nickel carbonyl cylinders that were stored in Building 952 and later destroyed as described under Nickel Carbonyl Bottle Disposal Area in this table (Hobbs, 1972).</p>
903 Drum Storage Area	J-7,8	<p>From 1958 through 1967, approximately 5,240 drums of oil containing radioactivity were stored at this location. Of these drums, 3,570 contained plutonium. Corroded drums lead to deposition of plutonium over an area of 98,000 square feet, which was covered with asphalt and fill material in November, 1969 (Owen and Steward, 1974).</p> <p>Over 1959 to 1966, the distribution of drum sources was as follows: B-776 (69%), B-881 (17%), B-444 (8.6%), B-883 (3.5%), B-771 (2.5%). Drums were moved to the area after 1966. Some of the uranium contaminated oils at the 903 area were burned. The contents of 191 drums were processed for Pu recovery at the 903 filter plant. With the transfer of contents into new drums, the equivalent of 4826 55-gallon drums were transported to Building 774 for solidification. Of these, 3572 contained Pu contaminated coolant (Putzier, 1970).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
<p>800 Area Radioactive Site</p> <p>Liquid Dumping Area</p> <p>Chemical Burial Area</p>	<p>IJ-8,9</p> <p>I-8</p> <p>I-8</p>	<p>From 1951 until 1972, portions of the "Hillside Area" near Building 881 were used as oil sludge pits, chemical burial sites, liquid disposal sites, solvent drum storage sites, and fire damage refuse disposal sites. As a result, soil and groundwater have been contaminated with volatile organic compounds including carbon tetrachloride, TCE, and PCE. Alluvial groundwater contains 1,1,1-TCA, and chloroform. Uranium was the only radionuclide occurring above estimated background concentrations (USDOE, 1990). One of the Solid Waste Management Units (SWMUs) in the 881 Hillside area, SWMU 130, is sometimes called the 800 Area Radioactive Site #1 (Helmstadt, 1988).</p>
<p>Contaminated Soil Burial</p>	<p>I-8</p>	<p>Plutonium contaminated soil from the periphery of Building 774 waste storage tanks was buried here. The soil averaged 250 dpm per gram. The 240 drums of soil were buried under 3 feet of fill dirt (Steward, 1973).</p>
<p>Asphalt and Soil Burial</p>	<p>I-8</p>	<p>Approximately 320 tons of plutonium-infiltrated asphalt and soil from the 1969 Building 776 fire were buried in 1969 under 1 to 2 feet of fill dirt. Less than 1 mCi of plutonium is estimated to be dispersed in about 250 cubic yards of material, with an estimated alpha activity of about 7 dpm/g. About 60 cubic yards of plutonium contaminated soil from the Building 774 waste storage tank area was placed on top of the asphalt disposal area in 1972, and covered with 3 feet of fill dirt. Estimated activity of the soil was less than 250 dpm/g total long-lived alpha (Owen and Steward, 1974).</p> <p>Total contained plutonium is estimated at 0.97 mCi or about 14 milligrams (Putzier, 1970).</p>
<p>Oil Sludge Pit</p>	<p>I-9</p>	<p>Approximately 30 to 50 drums of oil sludge from a storage tank cleanout were emptied into a pit, which was then backfilled. No radioactivity was involved (Owen and Steward, 1974).</p>
<p>Concrete Slab Disposal Area</p>	<p>H-8</p>	<p>An area of several hundred square feet northwest of Building 881 was involved in storage of a contaminated concrete slab in 1958. The slab had been removed from the east side of Building 776 (Owen and Steward, 1974).</p> <p>The slab was later broken up, removed, and the area cleaned (Owen and Steward, 1974).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Original Landfill	F,G-9	<p>The original plant landfill was used from 1952 to 1968 to dispose of general plant wastes. An estimated 20 kg of depleted uranium ash is buried along with normal plant waste, including small quantities of various chemicals. The 20 kg of depleted uranium resulted when 60 kg was inadvertently burned and only 40 kg were recovered. (Owen and Steward, 1974). The landfill may have received nonradioactive hazardous chemical wastes generated at the plant, including solvents. A reported old graphite dump located south of Building 440 that might have received beryllium and uranium was actually the original plant landfill (USDOE, 1986).</p>
Former Incinerator	D-9	<p>From 1952 to August, 1968, all combustible noncontaminated waste from the Rocky Flats Plant was incinerated in Facility 219 along the west access road. All noncombustible noncontaminated trash and ashes from the incinerator were dumped adjacent to the incinerator and covered with dirt (Seastone, 1973). Small quantities of depleted uranium contaminated combustibles were burned along with the general combustible plant refuse over the years 1952 to 1968. It is estimated that less than 100 grams of depleted uranium would be involved (Piltingsrud, 1973). The incinerator burned office-type wastes and some depleted uranium chips. Ashes were put into pits located adjacent to the incinerator or were pushed over the side of the hill into the Woman Creek drainage. Incineration was discontinued and the incinerator demolished in the early 1960s (USDOE, 1986).</p>
Incinerator Ash Pits I-1 through I-4	D,E-9	<p>An estimated 100 grams of depleted uranium was burned with general combustible waste in the nearby incinerator from 1952 through 1968. Ashes from the incinerator were buried in these trenches (Owen and Steward, 1974).</p> <p>Some unknown quantity of depleted uranium contaminated incinerator ashes were dumped in an area south of West Road and within a few hundred feet southeast and southwest of the incinerator (Putzier, 1970).</p> <p>Ashes from operation of the incinerator were put into pits located adjacent to the incinerator or were pushed over the side of the hill into the Woman Creek drainage. Incineration was discontinued and the incinerator demolished in the early 1960s. The ash pits were covered with fill (USDOE, 1986).</p>
Concrete Wash Pad	D-9	<p>There have been reports that material from Buildings 444 and 881 was placed between the original sanitary landfill and the incinerator ash pits. More recently, cement trucks were washed in that area (Smith, 1975).</p> <p>It appears that the area was used to dispose of waste concrete from plant construction activities. It is also likely that concrete trucks were washed down in this area after delivering concrete (USDOE, 1991e).</p>

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
West Spray Field	A,B,C,D-7,8,9	From 1982 to 1985, the West Spray Field was spray irrigated with water from solar evaporation ponds that contained elevated levels of nitrates and other wastes. The practice may have contaminated the ground water and the water in the soil lying just above the ground water (USDOE, 1991d).
Lithium Metal Destruction Areas	F-7	Approximately 400 to 500 pounds of metallic lithium were destroyed over 1956 to 1970. Residues, primarily non-toxic lithium carbonate, were buried. Smaller quantities of other reactive metals (sodium, calcium, and magnesium) and some solvents were also destroyed in this location (Owen and Steward, 1974). Building 335 is located over an old lithium metal destruction site. Lithium metal was disposed of at this location by placing it in trenches and reacting it with water. Residues were covered with soil (USDOE, 1986).
Soil Burial Area, Building 334 Parking Lot Area	G-7	<p>Soil containing low levels of plutonium was placed near Building 334 after excavation near Building 774, the waste treatment plant. The volume of the soil containing plutonium and the associated concentrations are not known (USDOE, 1991b).</p> <p>Between 50 to 75 dump truck loads of soil were removed during construction of Parking Area No. 334 and placed in the Soil Dump Area on the northeast side of the plant (USDOE, 1991b).</p>
Oil Burn Pit #1	F-7	<p>Ten drums of oil containing depleted uranium were burned in August 1956. The residue was covered with backfill. The area is now located under Building 335 and involves approximately 70 cubic feet of depleted uranium residue (Owen and Steward, 1974).</p> <p>The first oil was burned in August 1956 in what was referred to as the garage oil burning pit (Putzier, 1970).</p> <p>Building 335 was constructed over burn pit number 1 and a lithium metal destruction site (USDOE, 1986).</p>
Solvent Burning Ground	G-7	A "solvent burning ground", designated at solid waste management unit number 171, is listed in various documents (Helmstadt, 1988; EN-589 and USDOE, 1987). Building 335 has been used in the past, and still is to some degree, for training of fire department personnel. The original, preconstructed building was placed in an area north of Building 331 after the 1969 fire (PAC 700-157.7). Experiments took place to test heat and water effects on different types of materials, for example, filter pleenums. When this area was first used for training purposes, magnesium chips coated with a water soluble material were burned. Diesel fuel was the main material that was used. Gasoline was utilized to ignite the diesel fuel. The fire fighters may have also used waste solvents.

DESCRIPTION	MAP AREA	NATURE OF DISPOSAL ACTIVITY
Scrap Metal Disposal Area	H-6	Scrap metal components, mostly from original construction, were buried in this area. Although no detectable radioactive or chemical contamination was observed, some pieces came from process areas and low level contamination of a small percentage is possible (Owen and Steward, 1974).
Former Cooling Tower Blowdown Retention Ponds	F,G-8	These small ponds were used to contain water from cooling towers. Hexavalent chromium is present. Some quantity of lithium was also destroyed in the two eastern-most ponds. These ponds were covered with fill (Owen and Steward, 1974) and may have been used to bury small amounts of depleted uranium (USDOE, 1986).
Present Landfill	G,H-3,4	Started operation in 1968, and currently in use. Materials with less than Minimum Detectable Activity radioactivity (500 dpm/60 square cm direct or 50 dpm/square ft smear) are accepted for burial. From August 1968 to February 1970, approximately 1,000 kg of sanitary sewage sludge, with 800 to 8,000 dpm/g of alpha activity, were buried. Estimated total activity was 1 to 1.5 mCi. Recent surveys have detected other radionuclides, including tritium, in small quantities (Owen and Steward, 1974).