Appendix D

Release Site Field Investigation Summaries

Table D-1. CPP-15 field investigation summary.

Release Site: CPP-15

Summary of Release: On March 28, 1974, a liquid (spent solvent) was reportedly found on the ground inside and outside the Solvent Burner Building (CPP-629). A leak of spent solvent was determined to have occurred from the ground surface flange directly above the solvent feed tank for the solvent burner. Quantity of spill is unknown. Subsequent investigation determined that a jet line, used to remove water from the solvent tank, allowed stack condensate to back up the line during construction in the area, overfilling the tank. Beta and gamma radiation readings were as high as 3 R/hr in the contaminated soil, which was removed and placed in drums. Uncontaminated soil was used to backfill the excavation. In 1983 the Solvent Burner Building was dismantled and the furnace/burner unit; furnace duct; control shed; piping, valves and controls within the shed; piping penetrating the shed; solvent feed tank; and contaminated soil in the area were removed. Interviews with demolition personnel indicated the soil excavation exceeded 10 ft below grade and was very thorough, however, no post excavation sampling was performed. The 1993 Track 2 was performed on the basis of the demolition and removal activities and recommended no further action. In September 1995, construction personnel excavating soil encountered elevated radiological readings (1.5 R/hr) at a depth of 8.5 ft beneath the concrete footing (remnant of the old stack pre-heater). Soil samples were collected in the area of the contaminated footing. The highest contamination was from Cs-137 at 10.5 ft below grade, which confirmed that not all the contaminated soil was removed in 1983.

Fractional radionuclide activity[a]: 1.3%

Summary of required field investigation: Phase I probehole installation and gamma logging; Phase II sampling and analysis.

	Categories of Decision Inputs				Field Investigation Summary	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-15 exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	No, site comprises > 1% of total TF activity and extent to E not bounded.	No, site comprises > 1% of total TF activity and distribution not resolved.	No, site comprises > 1% of total TF activity and composition not resolved.	No-need Kd values for groundwater risk COPCs, primarily Pu; also groundwater modeling input data.	2-4 probeholes or as needed to establish extent to east.	One or more coreholes through hot spot based on Phase I results. Sampling and analysis for COPCs identified in Section 3.3.2.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	No.	No.	No-need analysis for waste characterization to assess retrieval and disposal alternative.	No- need treatability study to assess in situ/ex situ treatment.	As stated above.	RCRA characterization for samples recovered from coreholes through hot spot. Collect and archive samples for treatability studies.

a. $Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$ where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-2. CPP-16 field investigation summary.

Release Site: CPP-16

Summary of Release: In January 16, 1976, low-level diverted contaminated service wastewater drained out the bottom of an open-bottom valve box into the soil beneath the valve box during a routine transfer from tank WM-181 to PEW tank WL-102. Based on process knowledge an upper limit of about 3,500 gal leaked onto the soil. The amount of soil contaminated during the spill is estimated at 1604 ft^3 containing 1.1 Ci of Cs-137. Estimated contaminants are Cs-137, Sr-90, uranium and plutonium isotopes, and some inorganic constituents. Excavation records during valve box replacement incomplete on soil removed/replaced with backfill. Track 2 recommended No Further Action.

Fractional radionuclide activity[a]: NA, source has been removed.

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Field Investigation summary	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-16 exceed allowable levels, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-3. CPP-20 field investigation summary.

Release Site: CPP-20

Summary of Release: Until 1978, acidic (i.e., pH < 2) radioactive liquid waste from INEEL facilities was transported and unloaded via transfer hoses to an underground storage tank just north of building CPP-604. The waste was destined for treatment in the PEW evaporator. Small spills would occasionally occur through holes in the pressurized transfer line as waste was being unloaded, resulting in soil contamination. It has been reported that the spills were cleaned up as they occurred, but no records exist documenting the types, quantities, and locations of the spills or verifying the effectiveness of cleanup activities. The entire CPP-20 area was excavated down to the top of the CPP-604 tank vault (~30 ft below the building access door) and to 40 ft off the north edge of the vault in 1982. Reportedly, the bottom 10 ft was backfilled with 5 mR/hr or less soil (backfill source was likely the tank farm) and the remaining 30 ft with clean soil. Portions were excavated a second time between 1993 and 1994. Reportedly, the eastern portion of CPP-20 was excavated to a depth of 40 ft. At valve box C-30, contaminated soil was encountered and removed. Reportedly, the bottom 10 ft was backfilled with 3 mR/hr or less soil, and the remainder with clean soil from CFA. In 1992, a Track 2 was performed on the basis that the contaminated soil had been previously removed. The site was recommended for no further action, contingent on the backfill being evaluated in the OU 3-13 BRA, which was performed in 1997.

Fractional radionuclide activity[a]: <1%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Field Investigation Strategy	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-20 exceed allowable levels, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Properties information is not needed to resolve Decision Statement 1.	None required.	None required.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None required.	None required.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	None required.	None required.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-4. CPP-24 field investigation summary.

Release Site: CPP-24

Summary of Release: In 1954 in the vicinity of a tank WM-180 riser, a bucket of approximately 1-gal of radioactive waste (400 mR/hr) was accidentally dumped. The spill covered a 3- × 6-ft area. The liquid would have contained mercuric nitrate, nitric acid, and radionuclides. The contamination from the spill was reportedly cleaned up and documented in a radioactivity incident report. Though the exact location of this spill is unknown, radiation surveys in the area revealed no radiation levels above background.

Fractional radionuclide activity[a]: <0.01%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-24 exceed allowable levels, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Properties information is not needed to resolve Decision Statement 1.	None required.	None required.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None required.	None required.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	None required.	None required.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source terms; and to parameters needed to evaluate in situ or ex situ treatment. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-5. CPP-25 field investigation summary.

Release Site: CPP-25

Summary of Release: In August 1960 a transfer line from tank WC-119 to the PEW evaporator feed tank (WL-102) ruptured. An unknown quantity of liquid waste was released adjacent to the north side of building CPP-604. At the time of the incident, radiation readings in the contaminated soil reportedly ranged from 2 to 4 R/hr. Approximately 9 yd^3 of soil was removed after the spill, and the side of the building was washed. No records exist to verify the effectiveness of these cleanup activities. Area excavated again during the 1982 to 1983 fuel processing facility upgrade project and excavations were filled with clean fill in the upper 30 ft and with 3 to 5 mR soil from 30 to 40 ft.

Fractional radionuclide activity[a]: < 0.01%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-25 exceed allowable levels, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Properties information is not needed to resolve Decision Statement 1.	None required.	None required.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None required.	None required.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	Yes-source removed. No RA required.	None required.	None required.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table C-6. CPP-26 field investigation summary.

Release Site: CPP-26

Summary of Release: On May 10, 1964 waste lines PUA 1220, 1222, and 1223 (first-cycle extraction) were being decontaminated with steam when a steam leak occurred at a hose coupling connecting the steam line and decontamination header near CPP-635. Approximately 10 to 15 gal of first-cycle raffinate contaminated steam/liquid was released. Sampling was performed on the mud that formed from liquid dripping from the failed coupling. The mud was reportedly cleaned up, solidified, and sent to the RWMC. A surface radiation survey after the 1964 incident detected between 2 and 10 mR/hr in the soil, with one area as high as 200 mR/hr of gross radiation. At most, an estimated 30 to 45 Ci of Cs-137/Sr-90 contamination may remain at the site of the release. The 1992 OU 3-07 Track 2 investigation hand augured three boreholes in the tank farm soil near the steam release site. The contamination detected in the three boreholes had concentrations of Cs-137, Sr-90, plutonium, and uranium at 4 to 5 ft below the tank farm liner.

Fractional radionuclide mass[a]: <1.0%

Summary of required field investigation: No further investigation required

	Categories of Decision Inputs				Field Investigation Summary	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-26 exceed allowable levels, requiring control of the exposure pathway.	Yes-contamination bounded areally.	Yes-contamination bounded areally.	Yes-analysis for soil exposure risk drivers performed.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-site adequately bounded for groundwater modeling.	Yes-fractional radionuclide activity <1%.	Yes-fractional radionuclide activity <1%.	Yes-fractional radionuclide activity <1%.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-7. CPP-27 field investigation summary.

Release Site: CPP-27

Summary of Release:

In 1974, a release site from a corroded pressure relief line at 12 ft bgs was discovered with soil up to 25 R/hr. It was suspected that the release may have started as early as ~1961 and resulted from two wastes being released. From February 24, 1964, to August 30, 1974, ~115,000 gal of acidic waste (first-cycle aluminum waste) leaked onto the WCF calciner cell floor, which was transferred from WCF to the PEW collection tank. The Cs-137/Sr-90 activity was about 3,000 µCi/mL. It was estimated that < 100 gal of this waste, plus 100 to 300 gal of other waste (rain water, pump-leaked PEW solution, or water from the solvent hold tank) having considerably lower concentrations of radionuclides, were leaked to the soil. An estimated total of 1,000 to 3,000 Ci of activity was released. In 1974 a total of ~275 yd^3 of soil was removed and disposed at the RWMC, leaving an estimated 25 mCi at the site. In 1983, contaminated soil on the northeast corner of this site was encountered and attributed to the corroded line, but from a separate release designated CPP-33. In 1987, 10 observation boreholes were drilled to the basalt to determine the extent of contamination. Direct radiation readings ranged from none detected to 50,000 counts per minute (cpm). The activity at the northern edge of this site was attributed to the backfill (25 mR/hr) used during excavations and most of the contamination appeared to be in the southwest portion of this site (20 mR/hr at 20 ft bgs). In 1990, a 113-ft borehole, CPP-33-1, was made and analyzed for the full suite of constituents (VOCs, SVOCs, metals, dioxins and furans, cyanide, and radionuclides). Cs-137 and Sr-90 were the primary contaminants and the highest activities were between 7 and 29 ft bgs. This was attributed to contaminated backfill.

In 1992 during the OU 3-08 Track 2 investigation of CPP-27, three boreholes (CPP-27-1, CPP-27-2, and CPP-27-3) were drilled and samples collected for VOCs, metals, select anions, pH, and radionuclides. The sample results from CPP-27-1 (drilled to 46-ft bgs) indicate a different source of contamination than the corroded pressure-relief line leak responsible for site CPP-27. Borehole CPP-27-1 encountered contamination at a depth of 6-ft bgs, which is about 6-ft higher than the pressure-relief line leak (12-ft bgs). Elevated levels of Cs-137 and slightly elevated levels of alpha contamination were encountered. Borehole CPP-27-1 was drilled in an area of CPP-27 that was not previously excavated or investigated, but near the base of the Main Stack and the northern edge of former site CPP-29 (discovered in November 1974). Reportedly, site CPP-29 was completely excavated during the 1983 construction of the new main stack's concrete base, which extends over former site CPP-29. Site CPP-29 consisted of two areas of soil contaminated from radioactive liquid (0.6 µCi/mL gross beta, pH 6.8) that leaked from the base of the stack. One soil area was on the north side of the main stack and the other on the west side. The total area was stated to be 8-ft^2 and a few inches deep.

Fractional radionuclide mass[a]: <1.0%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-27 exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-site adequately bounded for groundwater modeling.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-8. CPP-28 field investigation summary.

Release Site: CPP-28

Summary of Release: Discovered October 1, 1974, site CPP-28 resulted from a 1/8-in inadvertent penetration of a waste transfer line (3"PWA-1005) during construction. Approximately 120-gal of first-cycle waste was released containing about 720 Ci of Cs-137/Sr-90 over a period of about 18 years at a depth of 7 ft bgs. In 1974 soil at 1 R/hr at 6 ft bgs was unearthed during tank farm upgrade activities. The nature and extent of contaminated soil was determined with six soil borings, drilled on October 10, 1974 and sampled for beta-gamma constituents. Trenching operations beginning on October 22, 1974 encountered soil (up to 75 R/hr gross beta-gamma) at depths < 2 ft beneath the encasement. Efforts to excavate to depths below the encasement in the central zone of contaminated soil were abandoned because of handling and exposure problems. A total of 56 yd^3 of contaminated soil containing about half of radionuclide inventory were removed from the release site. After trenching operations, monitoring test pipes were installed at 11 locations up to 20 ft bgs and interval gamma radiation measurements taken. From the data, it was estimated that the zone of soil contamination was ~9 ft in diameter by 2 to 3 ft in average depth below the pipe encasement at 7 ft bgs. Calculations made during the investigation estimated that approximately 128 ft^3 of contaminated soil remained and approximately 360 Ci of Cs-137/Sr-90 activity remained. During the 1982 to 1983 and 1993 to 1994 tank farm upgrades, portions of sites CPP-28, -20, -25, and -79 were excavated. Excavation depths ranged from 0 to 35 ft bgs, with most being completed at approximately 15 ft bgs. Field beta/gamma radiation measurements encountered during excavation ranged from 0 to 5 R/hr. Contamination removed during this construction is believed to be minor.

Fractional radionuclide activity[a]: 1.3%

Summary of required field investigation: Phase II sampling and analysis

	Categories of Decision Inputs				Field Investigation Summary	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-28 exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None required.	None required.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-bounded by gamma probes in 1974.	Yes-determined by gamma probes in 1974.	No. Need analysis for COPCs identified in Section 3.3.2 to assess source term estimate used in 3-13 BRA.	No. Need K_d values for groundwater risk COPCs, primarily Pu; also groundwater modeling data cited in Section 4.2.8.	None required.	Sampling and analysis for COPCs identified in Section 3.3.2. Collect and analyze continuous core from one boring through hot spot.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-bounded by gamma probes in 1974.	Yes-determined by gamma probes in 1974.	No. Need analysis for waste characterization to assess retrieval and disposal alternative.	No. Need treatability study to assess in situ/ex situ treatment.	None required.	Collect and analyze continuous core from one boring through hot spot for waste characterization including RCRA constituents. Collect and archive treatability study samples.

a. $Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$ where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie.

This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-9.10 CPP-30 field investigation summary.

Release Site: CPP-30

Summary of Release: Site CPP-30 was discovered in 1975 and covered an area of 400 ft^2 near valve box B-9 with radiation levels up to 1 R/hr. The area was contaminated during a one-time preventative maintenance activity in which residual decontamination solution from the floor of the valve box contaminated personnel clothing and equipment, which were brought to the surface and inadvertently placed on blotter paper that covered the ground surface. The contamination spread to the soil either through handling or tears in the blotter paper. Reportedly, the contaminated soil was removed, placed in 55-gal drums, and disposed of at the RWMC. Subsequent surface radiation surveys in the area performed in 1991, 1992, and 2001 have not shown radiation levels above background. This site was recommended in the Track 2 investigation as a no further action site, because the entire area has been excavated in the past and the contaminated soil removed.

Fractional radionuclide mass[a]: <1.0%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-30 exceed allowable levels, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Properties information is not needed to resolve Decision Statement 1.	None required.	None required.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None required.	None required.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None required.	None required.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-10. CPP-31 field investigation summary.

Release Site: CPP-31

Summary of Release: Site CPP-31 resulted from the release of 14,000-gal of second- and third-cycle extraction waste and evaporator bottoms. The release occurred during a transfer from WM-181 to WM-180 due to valve WRV-147 being open or partially open during the transfer, which corroded a carbon-steel line allowing a release to the soil. In 1975 thirty-three wells were installed to investigate the site. Soil samples were measured for direct radiation and analyzed for radionuclides. The contaminant distribution appears to be associated with zones of preferential movement in the horizontal direction, mainly along waste transfer lines 3"PWA-601/602 connecting valve boxes A-5 and A-6 to WM-182 and waste transfer lines 3"PWA-609/610 buried approximately 11 to12 ft bgs. In the 1980s, ten additional observation wells (81-series) were installed. As a part of the 1992 OU-3-07 Track 2 investigation, radiation profile surveys were performed on 10 existing wells, including eight of the 81 series wells. A comparison of those results to previous subsurface radiation profile measurements were inconclusive as to whether contaminant migration has occurred. Based on the number of monitoring wells installed and their associated radiation profiles, the lateral and vertical extent of the contaminated soil appears to be adequately bounded, with the exception of the area east of valve box A-6 along the piping runs of 3"PWA-1005 and 3"PWA-1030. Monitoring wells A53-18 and A53-25 encountered contaminated soil but did not provide the vertical extent of contamination at those locations. Based on reviews of data from other probes, it is likely that the contamination as measured by gamma-logging does not extend deeper than 25 ft bgs. The volume of soil exceeding a 1 R/hr activity level was estimated to be 800 yd^3 from the 1975 field data. However, a more accurate source term for the CPP-31 release was calculated using process knowledge (DOE\ID 2000). Based on the distribution of radionuclides associated with the WM-181 tank for the 1972 time period approximately 23,800 Ci of Cs-137/Sr-90 activity was released in 1972.

Fractional radionuclide activity[a]: 84%

Summary of required field investigation: Phase II sampling and analysis

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-31 exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None required.	None required.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-areal and vertical extent bounded by gamma probes.	Yes-determined by gamma probes in 1974.	No-need analysis for COPCs identified in Section 3.3.2 to assess source term estimate used in 3-13 BRA.	No-need K_d values for groundwater risk COPCs, primarily Pu; also groundwater modeling data cited in Section 4.2.8.	None required.	Sampling and analysis for COPCs identified in Section 3.3.2. Collect and analyze continuous core from one boring through hot spot.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes-bounded by gamma probes in 1974.	Yes-determined by gamma probes in 1974.	No-need analysis for waste characterization to assess retrieval and disposal alternative.	No- need treatability study to assess in situ/ex situ treatment.	None required.	Collect and analyze continuous core from one boring through hot spot for waste characterization including RCRA, TRU. Collect and archive treatability study samples.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-11. CPP-32E field investigation summary.

Release Site: CPP-32E

Summary of Release: In December 1976 site CPP-32E was identified from a surface radiation reading of up to 2 R/hr. Located on the southwest side of valve box B-4, this soil site was contaminated from a release of first cycle waste water vapor condensate from the standpipe (air vent tube and view port pipe) that extends out of the valve box B-4. An area of approximately 8 ft^2 and extending to a depth of about 1 ft bgs was contaminated. It is unknown if any cleanup of the site occurred after it was in 1976. In 1977, this surface release was covered with 2.5 ft of soil and the tank farm membrane. During the OU 3-07 Track 2 investigation in 1992, two boreholes installed at the CPP-32E site to a depth of 5-ft (top of concrete valve box) and soil samples were collected. During field screening, the highest beta/gamma radiation reading, 900 cpm above background, was detected between 1.4 and 2.9 ft below the membrane about 2.5 ft below the current ground surface. This depth is roughly equivalent to the ground surface at the time of the release. At the bottom of the borehole, the beta-gamma radiation had decreased to 250 cpm above background. The samples were analyzed for VOCs, two metals (mercury and cadmium), gamma-emitting radionuclides, gross alpha and gross beta radiation, and Sr-90. The gross alpha concentrations were within normal background, of the gamma-emitting radionuclides, only Cs-137 at concentrations ranging from 133 pCi/g to 277 pCi/g and Eu-154 at concentrations, ranging from 0.456 pCi/g to 0.811 pCi/g were detected.

Fractional radionuclide mass[a]: <0.01%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-32E exceed allowable levels, requiring control of the exposure pathway.	Yes-bounded by release estimate.	Yes-bounded by release estimate.	Yes-bounded by release estimate.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-site is adequately bounded for groundwater modeling.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-12.CPP-32W field investigation summary.

Release Site: CPP-32W

Summary of Release: In December 1976 site CPP-32W was identified from a surface radiation reading of up to 2 R/hr. Located ~50-ft northwest of valve Box B-4, this soil site was contaminated from the aboveground 2-in.diameter transfer line used to pump water from tank sumps to the PEW evaporator. This area is approximately 6 ft^2 and extends to a depth of about 1 ft. It is unknown if any cleanup of the site occurred after it was discovered. In 1977, this surface release was covered with 2.5 ft of soil and the tank farm membrane. During the OU 3-07 Track 2 investigation in 1992 no soil samples were collected from CPP-32W because the exact release location was not known and it was undesirable to penetrate the tank farm membrane unnecessarily. Previous studies of the tank farm have assumed the sample results from site CPP-32E are representative of the contaminant concentrations at site CPP-32W. Using the CPP-32E sample results and the estimated contaminant soil volume, it was determined that less than 1 curie of Cs-137/Sr-90 activity was released.

Fractional radionuclide mass[a]: <1.0%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-32W exceed allowable levels, requiring control of the exposure pathway.	Yes-bounded by release estimate.	Yes-bounded by release estimate.	Yes-bounded by release estimate.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-site is adequately bounded for groundwater modeling.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-13. CPP-33 field investigation summary.

Release Site: CPP-33

Summary of Release: In 1983 release site, CPP-33, was discovered north of site CPP-27. This contamination is thought to be from a separate release involving the 12-in carbon-steel corroded pressure relief line associated with CPP-27 that ran from the waste storage tanks to the INTEC stack. From the 1974 investigation of CPP-27, it was suspected that the line was corroded as early as ~1961 from two wastes being released. From February 24, 1964, to August 30, 1974, ~115,000 gal of acidic waste (first-cycle aluminum waste) leaked onto the WCF calciner cell floor, which was transferred from WCF to the PEW collection tank. It was estimated that < 100 gal of this waste, plus 100 to 300 gal of other waste (rain water, pump-leaked PEW solution, or water from the solvent hold tank) having considerably lower concentrations of radionuclides, were leaked to the soil at site CPP-27. In 1983, at site CPP-33, approximately 14,000 yd^3 of soil were removed. Of this total, approximately 2,000 yd^3, exceeding 30 mR/hr of beta-gamma radiation, was removed and disposed of at the RWMC. The remaining 12,000 yd^3 was disposed of in trenches located in the northeast corner of INTEC. The excavated area was backfilled and a portion covered by an asphalt road. Reportedly, some residual contamination remained below and to the sides of the excavated area. This was confirmed by the investigations done within site CPP-27's boundary.

In 1987, 10 observation boreholes were drilled to the basalt at CPP-27, south of CPP-33, to determine the extent of contamination. Direct radiation readings ranged from none detected to 50,000 counts per minute (cpm). The activity at the northern edge of this site was attributed to the backfill (25 mrem/hr) used during excavations and most of the contamination appeared to be in the southwest portion of site CPP-27 (20 mrem at 20 ft bgs). In 1990, a 113-ft borehole, CPP-33-1 (just south of CPP-33), was made and analyzed for the full suite of constituents (VOCs, SVOCs, metals, dioxins and furans, cyanide, and radionuclides). Cs-137 and Sr-90 were the primary contaminants and the highest activities were between 7 and 29 ft bgs. This was attributed to contaminated backfill. In 1992 the OU 3-08 Track 2 investigation placed three boreholes labeled CPP-27-1, CPP-27-2, and CPP-27-3 in site CPP-27 and collected samples for VOCs, metals, select anions, pH, and radionuclides. The low levels of contamination in the northern and eastern edges of this site appear to be from the backfill of the 1983 excavation.

Fractional radionuclide mass[a]: <1.0%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-33 exceed allowable levels, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-source removed.	Yes-source removed.	Yes-source removed.	Yes-source removed.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-14. CPP-58 field investigation summary.

Release Site: CPP-58 (E and W)

Summary of Release: Site CPP-58E resulted from a 1976 release of an estimated 20,000-gal of PEW evaporator condensate due to a failure of a transfer line between the PEW evaporator and the service waste diversion system in CPP-751. The line is buried 6 ft bgs. An estimated 51 mCi of H-3, 2 mCi of Sr-90, 4 mCi of Ru-106, 2 mCi of Cs-137, and 1 mCi of Ce-144 (~60 mCi total) were released. The contaminated soil was reportedly left in place and covered with clean soil. As part of the 1992 Track 2 investigation, two boreholes were made at the CPP-58E site, 13 samples were collected and analyzed for VOCs, selected metals (mercury and cadmium), fluoride, nitrate, nitrite, pH, and radionuclides. Cs-137 and Sr-90 were present above background levels below 6 ft bgs, consistent with the release. The analysis indicates the Sr-90 contamination has migrated downward. The contaminated zone is estimated as being present from 6 to 46 ft bgs.

Site CPP-58W resulted from releases of PEW evaporator condensate (dilute low- and intermediate-level radioactive liquid waste) in 1954. The leak was from a transfer line buried 6 to 8 ft bgs between CPP-604 and CPP-601. No information is available on how often the transfer line was used, how long the pipe leaked, the quantity of condensate released, or the length, width, or depth of contamination. Since the time of the release, building CPP-649 was constructed on top of the area where the spill occurred. If the contaminated soil was not removed during excavation for the building footers, then this soil would be underneath the building. The presence of the building precluded the collection of soil samples from CPP-58W for the OU 3-13 BRA.

A contaminated soil volume of 520,000 ft^3 for the entire site was assumed, extending to the top of the basalt. Using an average Cs-137 activity based on soil samples, it was determined that approximately 1.3 Ci of Cs-137/Sr-90 activity remained in the soils.

Fractional radionuclide mass[a]: <1.0%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-58 exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-site adequately bounded for groundwater modeling.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-15. CPP-79-Shallow field investigation summary.

Release Site: CPP-79-Shallow

Summary of Release: Site CPP-79 Shallow resulted from a release of 2,500 gal (an estimated 7 Ci of Cs-137/Sr-90 activity) of dilute calcine decontamination solutions at 10 ft bgs. Two separate releases occurred, in July and August of 1986 from the WCF and NWCF sump tanks to the PEW evaporator feed tank. Based on an investigation in 1986, it was concluded that the missing waste from the two transfers found its way into the soil through leaks in the split clay-tile encasement after the waste backed up into valve box A-2 and flowed to the west into the encasements of 3"PUA-203 and 3"PUA-1013. This waste contained low-level radioactivity, metals, and traces of organic compounds (I-129, 65 pCi/mL; H-3, 18,900 pCi/mL; gross beta, 260,000 pCi/mL; uranium 8.4 E-2 ± 1.1E-2 mg/L). During the OU 3-07 Track 2 investigation in 1992 one soil boring, CPP-79-1, was installed in CPP-79. Based on field monitoring and soil analytical results from borehole CPP-79-1, at a depth between 14 to 22 ft bgs, gross alpha emission is slightly in excess of background levels and gross beta emissions are up to eight times the background level. The low level of radionuclides found at this depth indicates a spill of decontamination solution with dilute radioactivity. Samples collected above 28 ft bgs had relatively low activities of radionuclides, consistent with a release of WCF and NWCF decontamination solutions. The highest gross alpha, beta, and Cs-137 activities were from the sample collected from 14 to 16 ft bgs. The Cs-137 concentration in this sample was 20.9 ± 1.5 pCi/g; the Sr-90 activity was 54.4 ± 3.46 pCi/g. This sample also had detectable levels of U-238 and -235 near background levels and Pu-238 and -239 slightly above background concentrations. The lateral extent of CPP-79 Shallow around borehole CPP-79-1 is provided by the results of samples from boreholes A-61 to the west and A-62 to the east. It is believed that most of the contaminated soil at this site was removed during the 1993 to 1994 tank farm upgrade project. The amount of activity was not documented during the excavation activities. Soil was excavated down to an approximate depth of 30 ft below the tank farm surface.

Fractional radionuclide mass[a]: <1%

Summary of required field investigation: No further investigation required.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-79 (shallow) exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	Yes-site adequately bounded for groundwater modeling.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	Yes-fractional radionuclide activity < 1%.	None.	None.
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	Yes.	Yes.	Yes.	Yes.	None.	None.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.

Table D-16. CPP-79 Deep field investigation summary.

Release Site: CPP-79 Deep

Summary of Release: Site CPP-79 Deep (31 to 41 ft bgs) was discovered during the OU 3-07 Track 2 investigation in 1992. One soil boring, CPP-79-1, was installed near the CPP-79 release site. Contamination at this depth is characterized by radionuclide concentrations that are two to three orders of magnitude greater than those detected at CPP-79 Shallow (14 to 30 ft bgs) and may be the result of a release of first, second, and/or third cycle wastes. Samples were collected from CPP-79-1 and screened in the field for gross beta-gamma radiation. Some samples were analyzed for volatile organic compounds (VOCs), mercury, cadmium, nitrate/nitrite, pH, and radionuclides. A sample from 33.5 to 34 ft bgs had a contact surface radiation level of 400 mR/hr beta-gamma. The CPP-79 field logbook indicates the highest measured radioactivity was 1.2 R/hr, which was measured from a sample collected from the 32- to 33.3-ft depth interval at the open end of the split-spoon sampler. Subsequent measurements made in the laboratory where the split-spoon sampler was disassembled under controlled conditions ranged from 400 to 800 mR/hr beta-gamma and 200 to 300 mR/hr beta. The sample measured high gross alpha (8.09E+5 ± 9.71E+4 pCi/g) and beta (1.89E+7 ± 1.52E+6 pCi/g) activities. Isotopic analysis of this soil sample also detected high concentrations of Cs-137 (3.37E+7 ± 1.06E+6 pCi/g), Sr-90 (5.41E+6 ± 4.91E+3 pCi/g), Pu-239/Pu-240 (8.99E+04 pCi/g), Pu-238 (2.76E+05 pCi/g) and Am-241 (1.66E+4 ± 2.18E+3 pCi/g). This analysis shows that CPP-79 Deep's contamination is not from the reported WCF and NWCF decontamination solutions associated with site CPP-79-Shallow. It is also not believed to be from the release at CPP-28. During the 1982 to 1983 tank farm upgrades, the area between CPP-28 and CPP-79 was extensively excavated and there was no evidence of highly contaminated soil between these two sites, which suggests the two sites are independent. The source and release mechanism for the CPP-79 Deep contamination has not been definitively determined. The two boreholes, A-61 and A-62, were installed west and east of CPP-79 in 1993. The contamination encountered at A-61 was above background (field measurement of 10 to 12 mR/hr), and is believed to be from contaminated backfill. Because there is only one highly contaminated soil sample (CPP-79-1), the extent of contamination both laterally and vertically is not known.

Fractional radionuclide mass[a]: 13.3% (lower bound estimate)

Summary of required field investigation: Phase I probing and gamma logging and Phase II sampling.

	Categories of Decision Inputs				Remaining Data Gaps	
Decision Statements	Extent known adequately to resolve decision statement?	Distribution known adequately to resolve decision statement?	Composition known adequately to resolve decision statement?	Properties[b] known adequately to resolve decision statement?	Phase I	Phase II
1. Determine whether or not soil exposure risks to future workers at CPP-79 Deep exceed allowable levels, requiring control of the exposure pathway.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Yes. No contamination present at depths < 4 ft bgs.	Properties information is not needed to resolve Decision Statement 1.	None.	None.
2. Determine whether or not contaminants are transported out of the tank farm soils to the SRPA at rates sufficient to result in COPC concentrations exceeding allowable levels at the exposure point, requiring control of the exposure pathway.	No-extent not determined or bounded. Need to determine in order to establish source term because no process knowledge of the release is available.	No- need to determine to establish source term since no process knowledge of the release is available.	No-without process knowledge of the release the entire COPC list identified in Section 3.3.2 should be sampled for.	No-need K_d values for groundwater risk COPCs, primarily Pu; also groundwater modeling data cited in Section 4.2.8.	Probe N to S between CPP-28 and tank vault wall; then W to E bracketing CPP-79-1 (6-8 probeholes or as needed to define extent based on field results). Gamma log to determine areal extent, estimate vertical extent of initial release.	Sampling and analysis for COPCs identified in Section 3.3.2. Collect and analyze continuous core from one boring through hot spot.

Release Site: CPP-79 Deep						
3. Determine whether or not a remedial action that includes [GRA][c] best meets FS evaluation criteria to mitigate excess risks, relative to other alternatives.	No-extent not determined or bounded.	No-distribution not determined.	No-need analysis for waste characterization to assess retrieval and disposal alternative.	No- need treatability study to assess in situ/ex situ treatment.	As stated above.	Collect and analyze continuous core from one boring through hot spot for waste characterization. Collect and archive samples from hot spot for treatability studies.

a. $$Fractional\ activity = \frac{Ci_s}{\sum Ci_s} \times 100\%$$

where Ci_s is total curies released at a specific site, and $\sum Ci_s$ is total curies released for all tank farm known release sites, based on values cited in Table 3-Curie. This fractional mass is used to help determine the level of investigation rigor required, and the potential for significant groundwater contamination resulting from a given release site.

b. Properties refer to physicochemical parameters for fate and transport modeling of groundwater contamination source term; and parameters needed to evaluate in situ or ex situ treatment for release sites that present significant risks to groundwater. Knowledge of properties is not needed for sites that do not pose significant groundwater risks based on the estimated fractional radionuclide mass present.

c. General Response Actions (GRAs) to be evaluated include No Action; Institutional Controls; Containment (including capping); Treatment (in situ and ex situ); Retrieval; and Disposal.