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Comprehensive Remedial Investigation/Feasibility Study for the Central Facilities Area Operable Unit 4-13 at the Idaho National Engineering and Environmental Laboratory

Book 1



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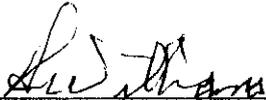
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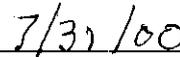
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Approved by:



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ABSTRACT

This remedial investigation/feasibility study for Operable Unit 4-13 defines the potential risks at Waste Area Group 4, describes the background and regulatory history of the Idaho National Engineering and Environmental Laboratory, describes the field investigations, and characterizes the potential risks. The appendix includes the following tables; contaminant screening, facility analysis screening, ecological functional-group, analytical data, and risk calculation.

The assumptions for preparation of the feasibility study, preliminary remedial action objectives, and preliminary applicable or relevant and appropriate requirements are presented.

EXECUTIVE SUMMARY

This remedial investigation/feasibility study (RI/FS) for Waste Area Group (WAG) 4, Operable Unit (OU) 4-13, was prepared under the *Federal Facility Agreement and Consent Order (FFA/CO)* for the U.S. Department of Energy Idaho Operations Office (DOE-ID) at the Idaho National Engineering and Environmental Laboratory (INEEL).

Background of the INEEL

The INEEL is a government-owned reservation managed by the U.S. Department of Energy (DOE). It is located in southeast Idaho on the Eastern Snake River Plain (ESRP) and occupies an approximate area of 2,305 km² (890 mi²). The U.S. Atomic Energy Commission established the National Reactor Testing Station, which later became the Idaho National Engineering Laboratory, in 1949. It was first used to build, test, and operate nuclear facilities. The U.S. Navy and the U.S. Army Air Corps used a portion of the site at the Central Facilities Area (CFA) from the early 1940s to the 1950s for gunnery and bombing ranges. The name was again changed to the INEEL in 1997 to reflect the emphasis on environmental operations.

Regulatory History

The INEEL was added to the U.S. Environmental Protection Agency's (EPA's) National Priorities List of Superfund sites on November 21, 1989 as published in the Federal Register (40 CFR 300). DOE-ID, EPA, and the State of Idaho signed the FFA/CO for the INEEL in December 1991. The goal of this agreement is to ensure that potential releases of hazardous substances to the environment from the INEEL are investigated and remediated in accordance with the *National Oil and Hazardous Substances Pollution Contingency Plan*. The FFA/CO divides the INEEL into 10 WAGs. CFA is designated as WAG 4, which currently consists of 52 potential release sites divided into 12 administrative OUs. This RI/FS encompasses all sites and OUs at WAG 4. The potential release sites include landfills, spills, ponds, storage tanks, drywells, and a sewage treatment plant. Potential contaminants at the sites include volatile organic compounds, semivolatile organic compounds, radionuclides, petroleum wastes, heavy metals, polychlorinated biphenyls, pesticides, and herbicides. Releases of hazardous materials may have occurred at CFA at locations other than the 52 release sites designated in the FFA/CO. All facilities at CFA were evaluated for releases and management control plans intended to prevent future releases.

Objectives

The objectives of this remedial investigation are to:

1. Identify data gaps that remain following the performance of previous investigations as identified in the *Work Plan for Waste Area*

Group 4 Operable Unit 4-13 Comprehensive Remedial Investigation/Feasibility Study (RI/FS) (McCormick et al. 1997).

2. Define the nature and extent of contamination at WAG 4.
3. Define contaminant transport mechanisms and develop exposure scenarios.
4. Determine the current and future cumulative and comprehensive risk posed by the contaminants of concern to human health and the environment.
5. Develop remedial action objectives and general response actions.
6. Develop and evaluate the appropriate remedial alternatives based on CERCLA criteria.

The first objective was addressed in the *Work Plan*. The second, third, and fourth objectives are addressed in this RI/BRA. The fifth and sixth objectives are addressed in the feasibility study.

Nature and Extent of Contamination

The 52 WAG 4 sites were evaluated and screened in the OU 4-13 RI/FS *Work Plan* (McCormick, et al., 1997). Sites retained for further evaluation and risk assessment are evaluated in this remedial investigation. The nature and extent of contamination for each site retained in the *Work Plan* was determined using data collected during the OU 4-13 field investigation, removal actions that occurred from 1995 through 1997, and other RI/FS and Track 2 investigations.

Sites Evaluated for Nature and Extent of Contamination for the Baseline Risk Assessment

OU 4-02: CFA-13 Dry Well (South of CFA-640). This site consisted of a subsurface concrete structure that was excavated during the 1997 WAG 4 non-time critical removal action. All concrete and piping were removed and samples were collected from the excavation. Screening of these data for the BRA indicated that all potential contaminants at the site were below background and risk-based concentrations. CFA-13 was eliminated from further evaluation in the BRA.

OU 4-02: CFA-15 Dry Well (CFA-674). This site consisted of dry well near Building CFA-674. The dry well was excavated and disposed during the 1997 WAG 4 non-time critical removal action. Verification samples were collected in the excavation. Screening of these data for the BRA indicated that all potential contaminants are below background and risk-based concentrations. CFA-15 was eliminated from further evaluation in the BRA.

OU 4-05: CFA-04 Pond (CFA-674). This site consists of a shallow pond that was used for disposal of mercury contaminated wastes from a laboratory formerly located in building CFA-674. A time-critical removal action was performed at the pond in 1995 in which 218 m³ (285 yd³) of mercury-contaminated soil was removed and retorted. The pond and surrounding area was further evaluated in the OU 4-13 field investigation to define the extent of contamination in areas not included in the removal action. Samples were collected from the pond sediments, along the pipeline that ran from the building to the pond, from the staging area where retort equipment was used, and from geophysical anomalies near the pond. These data indicate that surface and subsurface soils in the pond bottom are contaminated with arsenic, mercury, U-234, and U-238. Consequently, CFA-04 will be evaluated for further remedial action.

OU 4-05: CFA-17 Fire Department Training Area, Bermed and CFA-47 Fire Station Chemical Disposal. These two sites are contiguous and were formerly used for fire training exercises. Wastewater containing unburned fuel and products of combustion were discharged to a small bermed area and an asphalt pad. A non-time critical removal action was performed in 1997 at the sites. Approximately 4,051 m³ (5,298 yd³) of petroleum-contaminated soil was removed down to top of basalt. All contaminants were removed from the surface and subsurface soils. Contaminants were detected in samples collected from soils directly on the basalt and it is assumed that contamination extends into the basalt to an unknown depth.

OU 4-06: CFA-06 Lead Shop (outside areas). This site consisted of the area surrounding Building CFA-687 where lead scrap was stored on the ground. A time-critical removal action was performed in 1996 to remove lead and arsenic-contaminated soil to a cleanup level of 400 mg/kg and 23 mg/kg, respectively. Approximately 153 m³ (200 yd³) of contaminated soil, asphalt, and lead were from the site. Verification data collected during the action were evaluated in the screening section of the BRA. The site was eliminated from further evaluation in the BRA as a result of the removal action.

OU 4-06: CFA-43 Lead Storage Area. This site consisted of a storage yard where lead scrap was stored on the ground. A time-critical removal action was performed in 1996 to remove lead and antimony-contaminated soil to a cleanup level of 400 mg/kg and 23 mg/kg, respectively. Approximately 304 m³ (400 yd³) of contaminated soil was removed. Verification data collected during the action were evaluated in the screening section of the BRA. The site was eliminated from further evaluation in the BRA as a result of the removal action.

OU 4-06: CFA-44 Spray Paint Booth Drain (CFA-654). This site consisted soil contamination from a former spray paint booth outlet from Building CFA-654. Wastewater from the drain included lead that discharged to the ground next to the building. A time-critical removal action was performed in 1996 to remove lead-contaminated soil to a cleanup level of 400 mg/kg, which was confirmed by verification data. These data were evaluated in the screening

section of the BRA. The site was eliminated from further evaluation in the BRA as a result of data collected during the removal action.

OU 4-07: CFA-07 French Drain E/S (CFA-633). This site consisted of two french drains that received laboratory wastewater, located next to Building CFA-633. The drains were removed during a time-critical removal action performed concurrently with the Track 2 investigation in 1995. Verification data collected after removal of the drains indicated that lead, Cs-137, and Pu-238 are present at depths of 3.7 m (12 ft). Contamination is assumed to exist at CFA-07 from 3.7 to 7.1 m (12 to 23.5 ft) where basalt is encountered.

OU 4-07: CFA-12 French Drains (2) (CFA-690) (south drain only). This site consisted of two concrete french drains that received laboratory wastewater, located next to Building CFA-690. The drains were removed during a time-critical removal action performed concurrently with a Track 2 investigation in 1995. Verification data collected after removal of the drains indicated that pentachlorophenol, Am-241, Ba-133, Cs-137, and U-238 are present at a depth of 2.4 m (8.5 ft). Contamination is assumed to exist at the site from 2.4 to 5.6 m (8.5 to 18.5 ft) where basalt is encountered.

OU 4-08: CFA-08 Sewage Plant (CFA-691), Septic Tank (CFA-716) and Drainfield, and CFA-49 Hot Laundry Drain Pipe. These two sites consist of potential contaminant releases from the sewage treatment plant, structures, and the drainfield. The site was evaluated as a Track 2 investigation in 1995 and in 1997 as part of the OU 4-13 RI/FS. Samples collected in the vicinity of the treatment plant and along the drainfield discharge piping indicated no releases from plant structures or piping. Data collected from the drainfield indicate the presence of Cs-137, and Pu-239/240 in the surface sediments, however the entire interval from the surface to a depth of 5.5 m (18 ft) is assumed to be contaminated.

OU 4-09: CFA-10 Transformer Yard Oil Spills. This site consists of a yard where electrical transformers were stored and welding operations occurred. Data collected during the Track 2 investigation indicated the presence of lead in the surface soils. The depth of contamination is assumed to cover the yard to a depth of 3 m (10 ft).

OU 4-09: CFA-26 CFA-760 Pump Station Fuel Spill. This site consists of a potential release of 209,700 L (55,400 gal) of diesel fuel from an above-ground storage tank. Data collected during the Track 2 investigation indicated the presence of petroleum contamination in the subsurface, which resulted in the site being retained for evaluation in the RI/FS. Petroleum contamination is present in the basalt. The screening process utilized in the *Work Plan* resulted in elimination of all exposure pathways with the exception of the groundwater pathway. The groundwater pathway was further evaluated in the BRA, which resulted in elimination of the site from further evaluation.

OU 4-09: CFA-42 Tank Farm Pump Station Spills. This site consisted above-ground bulk storage fuel tanks and pump station where spills and leaks of

unused fuel occurred. Petroleum contamination was discovered during a Track 2 investigation in 1995 and a time-critical removal action was performed in 1996. Approximately 1,797 m³ (2,350 yd³) of petroleum contaminated soil was removed. There was a possibility that more contamination was present and consequently an additional non-time-critical removal action was performed. An additional 4,921 m³ (6,437 yd³) of soil was removed from the site in addition to all buildings and tanks. Verification data collected at the site indicate that all contaminants in the soil above the basalt were removed, petroleum contamination is present in basalt.

OU 4-09: CFA-46 Cafeteria Oil Tank Spill (CFA-721). This site consisted of a leak from a 18,927 L (5,000 gal) underground diesel fuel tank. The tank was removed along with contaminated soil above the basalt in 1994. Verification samples and visual observations made during the removal indicated that fuel had leaked into the basalt and under Building CFA-668. The site was retained for further evaluation of the groundwater pathway in the BRA.

OU 4-11: CFA-05 Motor Pool Pond. This is the site of an unlined evaporation pond. The pond received waste from an equipment wash bay at the CFA Service Station from 1951 to 1985. Soil samples collected during the OU 4-11 RI/FS indicated the presence of radionuclides that do not pose unacceptable risk. The OU 4-11 Record of Decision determined that no further action would be required at the pond. However, evaluation of the groundwater pathway was deferred to the OU 4-13 RI/FS.

OU 4-13: CFA-51 Dry Well at North End of CFA-640. This site consisted of a small drywell located near Building CFA-640. The drywell was removed during the demolition of the building. Data collected at the time of removal were screened in the *Work Plan* and in the BRA. The results of the screening process indicate that all contaminants present are below background or risk-based concentrations. The site was therefore eliminated from further consideration in the BRA.

OU 4-13: CFA-52 Diesel Fuel UST (CFA-730) at Bldg. CFA-613 Bunkhouse. This site consisted of an 1,893 L (500 gal) underground storage tank. Data collected during tank removal in 1996 indicated that the tank had leaked. Data collected at the time of removal were screened in the *Work Plan* and in the BRA. The results of the screening process indicate that all contaminants present are below background or risk-based concentrations. The site was therefore retained for further consideration in the BRA for the groundwater pathway.

OU 4-13: Field Data Collection. The OU 4-13 field investigation involved collection of samples at the CFA-04 Pond, CFA-10 Transformer Yard, and CFA-08 Drainfield sites. The CFA-04 Pond is a site of mercury contaminated waste disposal from laboratory operations. Contaminated soil and calcine were removed from the pond sediments during a removal action in 1995. The sampling objectives at CFA-04 were intended to determine the extent of mercury contamination in and around the pond, if leaks from the pipe from building

CFA-674 to the pond were a source of contamination, if subsurface geophysical anomalies were sources of contamination, and the topographic features of the pond. Additional data were collected in 1998, which focused on the low areas of the pond and the windblown area. Mercury was detected at all the 88 locations. Data from three of the locations indicate that soils are RCRA hazardous for mercury. Data collected at these sites are representative of contamination in the sediments and surrounding areas.

The CFA-10 Transformer Oil Spills was used for welding operations. Process knowledge indicates that the yard site was not used to routinely dispose of waste, although some accidental spill of solid metals may have occurred. Data collected at the yard indicate the presence of lead in the soil above the EPA-screening level of 400 mg/kg.

The CFA-08 Drainfield was used to dispose of effluent from the sewage treatment plant. The drainfield received wastewater containing radiological and other wastes from the water treatment process at the plant. The sampling objectives at CFA-08 were intended to determine the extent of Cs-137 contamination in the sediments, the vertical and lateral extent of contamination at the alluvium-basalt interface adjacent to the drainfield, and the topographic features of the drainfield. Data collected at these sites are representative of contamination in the sediments and surrounding areas.

Data were collected in 1997 at CFA-13, CFA-15, CFA-17, CFA-42, and CFA-47 during a non-time critical removal action. Sites CFA-13 and -15 were drywells removed during the action. Sites CFA-17 and -47 were used for training fire personnel by burning petroleum and other chemicals. Soil contaminated with petroleum products was removed and treated or disposed. The sampling objectives were intended to determine the source and location of contamination. Contaminants present at the site were removed and treated or disposed down to the top of basalt. Samples collected at the soil-basalt interface indicate that petroleum contamination was released into the basalt.

Facilities Analysis

Facilities at CFA, the Fire Department Training Area, and the Weapons Range Complex were evaluated to determine the potential impact on cumulative risk at WAG 4 and the potential for future releases. Facilities (any building or structure) are grouped into the following general categories; craft shops, offices, general services, and laboratories. Management procedures used to mitigate potential releases to the environment were also evaluated. These procedures cover the following operations: safety analysis reports for nuclear facilities, RCRA contingency plans, spill avoidance and response plans, emergency plan implementation, tank management, hazardous waste, explosives safety, and other operations. The results of the analysis screen indicated that 19 tank sites were retained for further evaluation in the RI/FS. These tanks were modeled in this OU 4-13 RI/BRA using GWSCREEN to assess the potential for contamination to groundwater from potential leaks. The potential risk to groundwater from tank releases is outside the unacceptable risk range.

Baseline Risk Assessment Results

The baseline risk assessment (BRA) evaluated the potential adverse health effects on human and ecological receptors from potential contaminant releases. The BRA assesses potential risks for current and future land use scenarios.

The results of the human health BRA indicate that sites CFA-04, CFA-08, and CFA-10 pose unacceptable risk to human receptors. The contaminants and potential risks or hazard quotients are summarized below.

- CFA-04: the highest potential risk is posed by the presence of mercury in the pond (HQ=80) for a future resident at year 100.
- CFA-08: the highest potential risk is posed by the presence of Cs-137 in the drainfield surface soil (2E-04) for a current occupational worker.
- CFA-10: the primary contaminant at this site is lead. Lead has been measured in the surface soil in concentrations greater than 400 mg/kg, which is the EPA screening concentration.

Sites CFA-04 and -10 also show elevated risks to ecological receptors with HQs of up to 30,000 for mercury at CFA-04 and 5,000 for lead at CFA-10.

CFA-04, -08 and -10 will be submitted for the Feasibility Study phase of the WAG 4 RI/FS.

The results of the ecological risk assessment indicate that sites CFA-01, -02, -05, -13, -42, and -43 also pose potential risks to ecological receptors. The contaminants and potential risks are summarized below.

- CFA-01: Chrysene and silver have HQs of up to 200 and 10, respectively
- CFA-02: The HQ for lead is 950. Organic chemicals are also present.
- CFA-05: Cadmium, copper and lead are the primary contaminants with HQs of 2,000, 90, and 200, respectively.
- CFA-13: The primary contaminants are copper, lead and silver with HQs ranging from 10 to 20.
- CFA-41: TPH contamination is present with an HQ of 20.
- CFA-43: Lead is present with an HQ of 300.

The BRA data and results for these sites will be submitted for further evaluation in the WAG 10 OU 10-4 RI/FS.

Applicable or Relevant and Appropriate Requirements

The applicable or relevant and appropriate requirements are presented in Section 12. These ARARs were developed along with the development of the remedial alternatives.