CERTIFICATION DOCKET
FOR THE FORMER SITE OF THE
RADIOACTIVE LIQUID WASTE TREATMENT PLANT (TA-45)
AND THE EFFLUENT RECEIVING AREAS OF
ACID, PUEBLO, AND LOS ALAMOS CANYONS,
LOS ALAMOS, NEW MEXICO

DEPARTMENT OF ENERGY

Office of Nuclear Energy

Office of Terminal Waste Disposal and Remedial Action

Division of Remedial Action Projects

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INTRODUCTION TO THE CERTIFICATION DOCKET FOR THE FORMER SITE OF THE RADIOACTIVE LIQUID WASTE TREATMENT PLANT (TA-45) AND THE EFFLUENT RECEIVING AREAS OF ACID, PUEBLO, AND LOS ALAMOS CANYONS, LOS ALAMOS, NEW MEXICO

Description of the Formerly Utilized Sites Program at the Former Site of the TA-45 Treatment Plant and Acid, Pueblo, and Los Alamos Canyons

The Department of Energy's Office of Nuclear Energy, Office of Terminal Waste Isolation and Remedial Action, Division of Remedial Action Projects (and/or the predecessor agency, offices, and divisions) has reviewed the past activities of the Manhattan Engineer District and Atomic Energy Commission at the former site of the radioactive liquid waste treatment plant (TA-45) and the effluent receiving areas of Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico. Because documented confirmation of compliance with current radiological standards was not available, a radiological survey was conducted during 1976 and 1977. The results indicated widespread low-level contamination throughout the canyons and higher levels in certain areas of Acid Canyon and at the former treatment plant site.

The Department determined that remedial action was required at two areas on the TA-45 site. This work was conducted during August and September 1982, and consisted of excavation of contaminated soil and rock and disposal in a solid radioactive waste burial ground at Los Alamos National Laboratory (LANL). The Canyons did not require any remedial action.

Purpose

The material in this docket consists of documents supporting the certification that the radiological conditions at the former TA-45 treatment

plant site and Acid, Pueblo, and Los Alamos Canyons are in compliance with radiological guidelines and standards determined to apply to this site and that unrestricted use of these areas will not result in any measurable radiological hazard to the general public.

The certification docket contains only the material deemed most pertinent to the certification of the TA-45 site and associated canyons; a more comprehensive package of records will be archived by the Department of Energy through the Assistant Secretary for Management and Administration. Copies of this docket will be maintained by the Department at the DOE Reading Room in Washington, D.C., so that it will be accessible to members of the general public.

Property Identification

The area immediately involved in the decontamination activities (TA-45) is owned by the County of Los Alamos. The County also owns Acid Canyon and Pueblo Canyon to a point about 1190 m west of the County line. The remainder of Pueblo Canyon and a short segment of Los Alamos Canyon downgradient from its confluence with Pueblo Canyon are Department-controlled lands. The remainder of Los Alamos Canyon down to its confluence with the Rio Grande runs through the San Ildefonso Pueblo Indian Reservation.

Docket Contents

The history of Los Alamos National Laboratory radioactive waste operations relating to the TA-45 treatment plant and Acid, Pueblo, and Los Alamos Canyons is described in the final radiological survey report published in May 1981. Exhibit I of this certification package briefly discusses this history and later developments at the site.

Radiological surveys of the former treatment plant site and associated canyons were conducted in 1976 and 1977. Post-remedial action surveys were performed in August and September 1982. Documents referenced in this

certification package related to the radiological characterization of the former TA-45 treatment plant site and Acid, Pueblo, and Los Alamos Canyons include:

- Los Alamos National Laboratory, "Radiological Survey of the Site of a Former Radioactive Liquid Waste Treatment Plant (TA-45) and the Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," (DOE/EV-0005/30), May 1981.

- Bechtel National, Inc., "Final Report on the Remedial Action at the Acid/Pueblo Canyon Site, Los Alamos, New Mexico," (DOE/OR/20722-15), March 1984.

- Ferenbaugh, R.W., T.E. Buhl, A.K. Stoker, and W.R. Hansen, (Los Alamos National Laboratory), "Environmental Analysis of Acid/Middle Pueblo Canyon, Los Alamos, New Mexico," (LA-9409-MS), August 1982.

- Gunderson, T., T.E. Buhl, R. Romero, and J. Salazar (Los Alamos National Laboratory), "Radiological Survey Following Decontamination Activities Near the TA-45 Site," (LA-9831-MS), July 1983.

Documents relating to compliance with the National Environmental Policy Act include:

- Vaughn, William A., Assistant Secretary for Policy, Safety and Environment, to Robert W. Ramsey, Jr., Program Manager, Remedial Action Program," National Environmental Policy Act (NEPA) Determination for the Proposed Remedial Action, Acid/Middle Pueblo Canyon FUSRAP Site, Los Alamos, New Mexico," June 30, 1982.

- Ferenbaugh, R.W., T.E. Buhl, A.K. Stoker, and W.R. Hansen, (Los Alamos National Laboratory), "Environmental Analysis of Acid/Middle Pueblo Canyon, Los Alamos, New Mexico," (LA-9409-MS), August 1982.

Documents indicating the concurrence of local government in the performance of the remedial action include:

- Valencia, Harold E., Department of Energy, Area Manager, to Neil G. Seeley, County Administrator, Incorporated County of Los Alamos, "Formerly Utilized Sites Remedial Action Program (FUSRAP) Acid/Pueblo Canyon and Bayo Canyon," July 14, 1982.

- Seeley, Neil G., County Administrator, Incorporated County of Los Alamos, to Harold E. Valencia, Department of Energy, Area Manager, "Formerly Utilized Sites Remedial Action Program (FUSRAP) Acid/Pueblo Canyon and Bayo Canyon," July 28, 1982.

Remedial action criteria were adopted from several sources. The uranium-in-soil criterion was chosen to be consistent with the conservative criterion used for a previous remedial action at the former Kellex Corporation site in Jersey City, New Jersey. Criteria for transuranic and fission product concentrations in soil came from the following two reports, respectively:

- Healy, J.W., "An Examination of the Pathways from Soil to Man for Plutonium, Los Alamos National Laboratory (LA-6741-MS), 1977.
- Healy, J.W., J.C. Rodgers, and C.L. Wienke, "Interim Soil Limits for D&D Projects," Los Alamos National Laboratory (LA-UR-79-1865-Rev.), 1979.

In addition, the following documents indicate adoption of remedial action criteria:

- Keller, E.L., Department of Energy, to Robert W. Ramsey, Jr., Department of Energy, "Remedial Action Criteria for New Mexico FUSRAP Sites," August 20, 1981.
- Keller, E.L., Department of Energy, to R.L. Rudolph, Bechtel National, Inc., "Criteria for Remedial Action at Acid/Pueblo and Bayo Canyons; Request for Cost/Benefit Analysis of Remedial Action Options at the Canyons," March 17, 1982.

The following reports describe the actual decontamination work and post-remedial action survey results:

- Bechtel National, Inc., "Final Report on the Remedial Action at the Acid/Pueblo Canyon Site, Los Alamos, New Mexico," (DOE/OR/20722-15), March 1984.
- Gunderson, T., T.E. Buhl, R. Romero, and J. Salazar (Los Alamos National Laboratory), "Radiological Survey Following Decontamination Activities Near the TA-45 Site," (LA-9831-MS), July 1983.

Documents indicating the final certification of the former TA-45 treatment plant site and Acid, Pueblo, and Los Alamos Canyons include:

- Baublitz, J.E., Director of the Division of Remedial Action Projects, to F.E. Coffman, Director of the Office of Terminal Waste Disposal and Remedial Action, "Recommendation for Certification of Decontamination for the Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," signed by D.H. Groelsema for Baublitz, August 17, 1984.

- Coffman, F.E., Director of the Office of Terminal Waste Disposal and Remedial Action, "Statement of Certification: The Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and the Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons," August 28, 1984.

- Coffman, F.E., Director of the Office of Terminal Waste Disposal and Remedial Action, Federal Register Notice, "Department of Energy, Office of Environmental Protection, Safety, and Emergency Preparedness Certification of the Radiological Condition of the Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," signed August 28, 1984.

EXHIBIT I

SUMMARY OF ACTIVITIES AT THE FORMER SITE OF THE RADIOACTIVE LIQUID WASTE TREATMENT PLANT (TA-45) AND ACID, PUEBLO, AND LOS ALAMOS CANYONS, LOS ALAMOS, NEW MEXICO

Site Function

Acid, Pueblo, and Los Alamos Canyons are deep, interconnected ravines that served as the discharge area for radioactive wastes resulting from research and processing operations associated with nuclear weapons development at the Los Alamos National Laboratory. Beginning in late 1943 or early 1944, untreated liquid waste from general laboratory, process chemistry, and radiochemistry operations was discharged from the main acid sewer line terminating at the head of the south fork of Acid Canyon. These effluents contained a variety of radionuclides including tritium and isotopes of strontium, cesium, uranium, plutonium, and americium. The majority of this material has been distributed throughout lower Pueblo Canyon. By June 1951, a treatment plant (TA-45) had been designed and constructed to remove plutonium and other radionuclides from the waste streams. It began processing radioactive and other laboratory wastes by a flocculation-sedimentation-filtration process that was 98 to 99 percent efficient at removing plutonium.

From startup until mid-1953, the TA-45 plant treated wastes only from the original main technical area (TA-1). Beginning in June 1953, additional radioactive liquid wastes from a new plutonium research laboratory complex (TA-3) were piped to TA-45. Further additions to the system came in September 1953, from the Health Research Laboratory (TA-43). Initially, the TA-3 waste was very dilute, and levels were monitored to determine whether treatment was required to meet criteria established for TA-45 releases. If treatment was not required, the raw waste was discharged to Acid Canyon. By December 1953,

treatment was required about 70 percent of the time. In 1958, liquid wastes containing primarily fission products from a new radiochemistry facility (TA-48) were added to the TA-45 load.

In July 1963, wastes from TA-3 and TA-48 were redirected to a new Central Waste Treatment Plant (TA-50). Liquid wastes from TA-43 were redirected to the Sanitary Sewer because only small quantities of very dilute wastes were being generated by that time. Processing of TA-1 wastes continued at TA-45 until operations ceased in May 1964. The last releases to Acid Canyon, untreated low-level liquid wastes containing fission products from TA-1 decommissioning activities, occurred through June 1964.

TA-45 was decommissioned in late 1966 and decontamination work in Acid Canyon continued into 1967. By June 1967, the treatment plant site and Acid Canyon were deemed sufficiently free of contamination to be released from Atomic Energy Commission control without restriction. The property was then transferred to Los Alamos County.

Site Description

The Los Alamos National Laboratory is situated on the Pajarito Plateau, a series of mesas consisting of soft volcanic rock and separated by canyons eroded by intermittent streams. The TA-45 plant was located on a mesa that forms the south rim of Acid Canyon. Liquid wastes flowed from Acid Canyon into Pueblo Canyon, then into Lower Los Alamos Canyon, and finally into the Rio Grande (Figure 1). Acid Canyon is located in Tract L and Parcel I, Eastern Area No. 3. Pueblo Canyon is located in Parcel I, Eastern Area No. 3 and Pueblo Canyon Parcel, Eastern Los Alamos County Tracts and Parcels.

Access to the TA-45 site and Acid Canyon from the Town of Los Alamos is by Canyon Road, which runs just to the south of the former TA-45 site. Access to lower and middle Pueblo Canyon is by dirt road off State Road 4, west of the junction of Pueblo and Los Alamos Canyons. The boundary of the site has been designated to encompass approximately one acre, with a residential subdivision

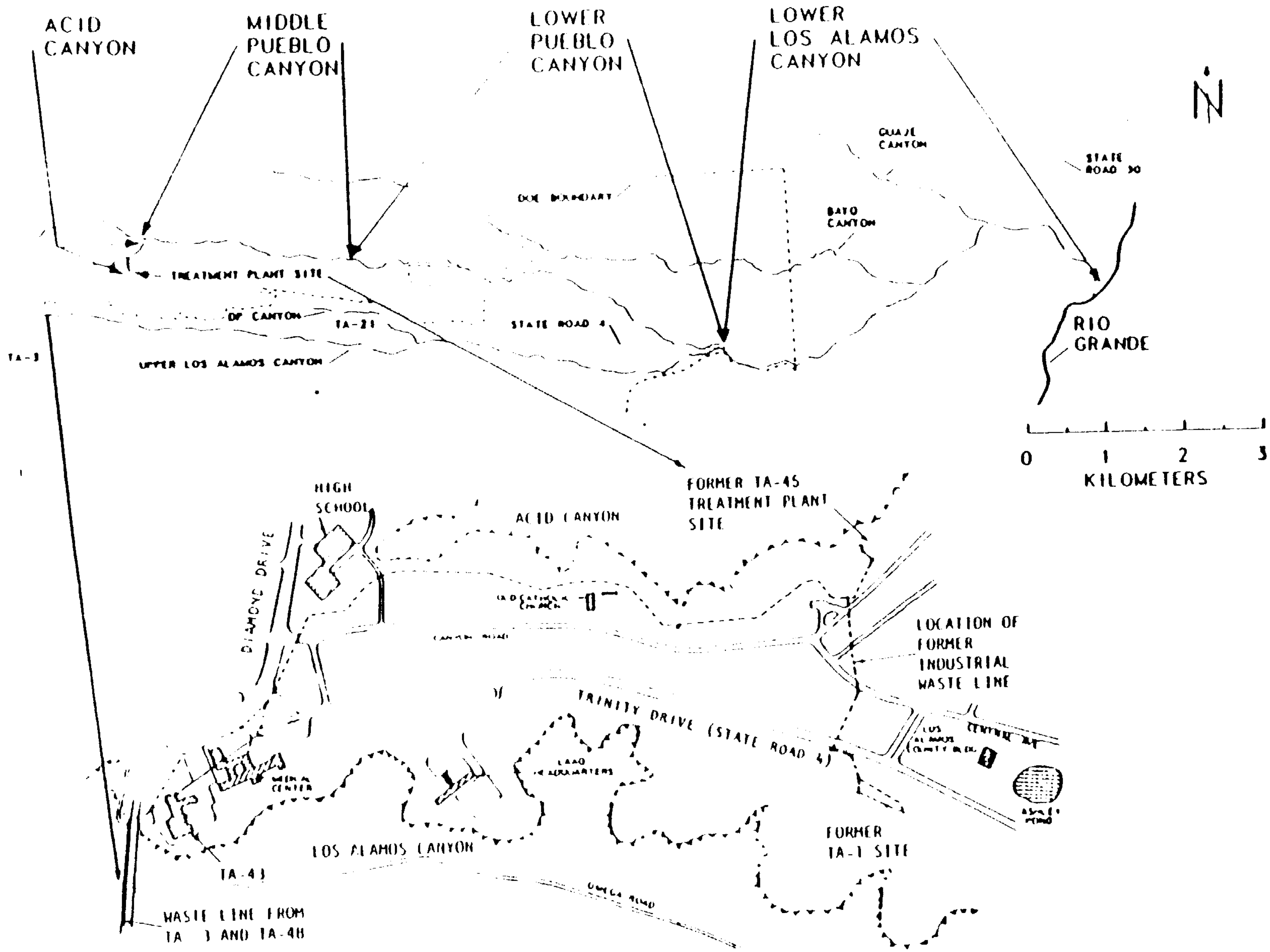


Figure 1. Former Liquid Waste Handling Facilities and Location Relative to Effluent Receiving Canyons (After FBDU 409-321)

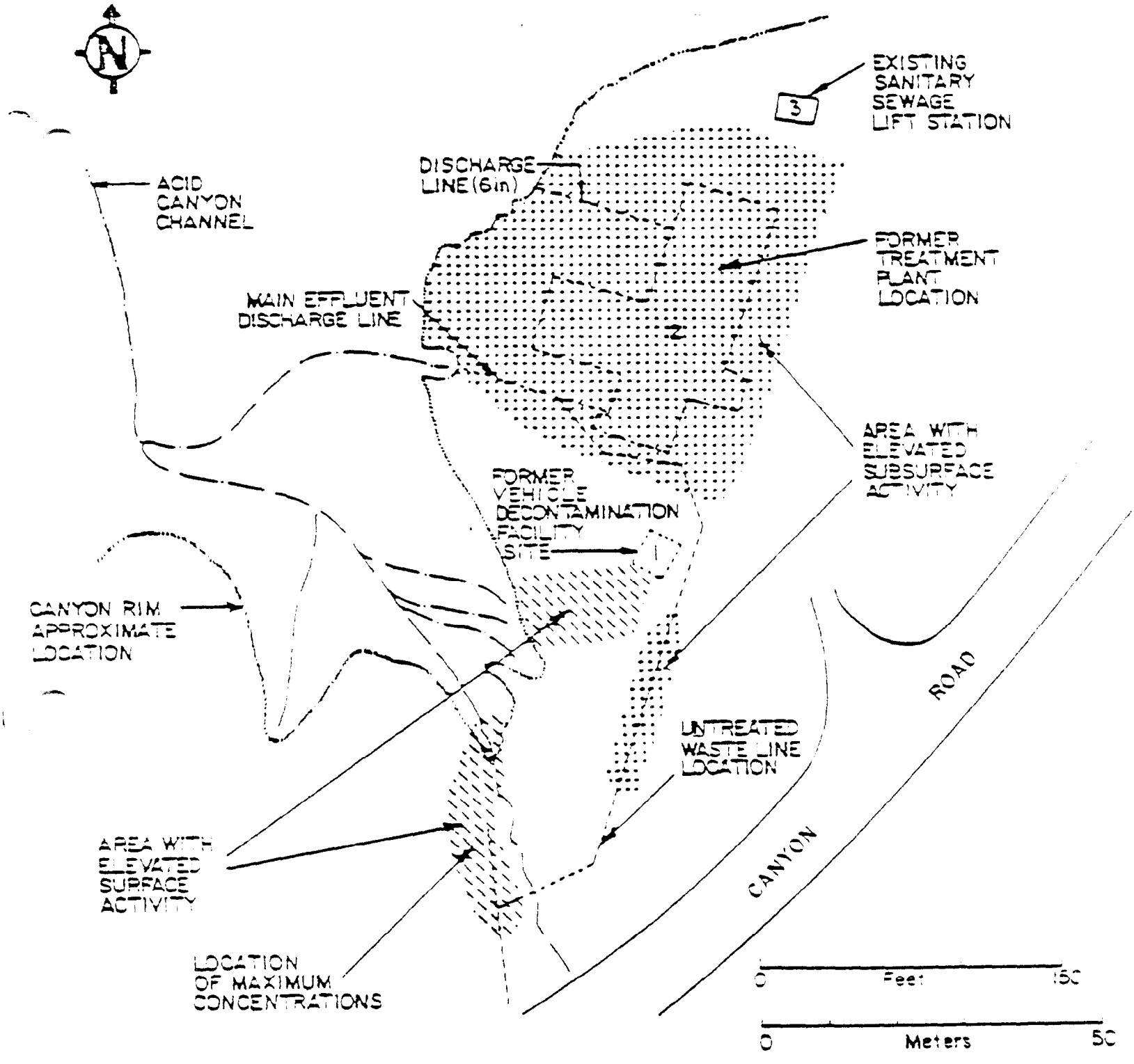
situated to the north and the Town of Los Alamos lying to the south and west. Present uses of the canyon areas on County and DOE lands include picnicing, trail riding (horses and motorcycles), hiking, firearms practice, woodcutting, and pinyon nut gathering. The County is presently using the former TA-45 site as a landfill and has covered the former treatment plant site to a depth of about 5 m. The area surrounding the former vehicle decontamination facility, the cliffs, and the drainages have remained basically unchanged since the original decontamination was completed in 1967.

Resurveys of the site in 1976 and 1980 indicated that some near-surface contamination (top 10 inches) remained near the location of the former industrial waste discharge line, near the former vehicle decontamination facility, and on the canyon floor just below the former industrial waste discharge line. Concentrations of radioactive material at a 2 m x 5 m spot near the former decontamination facility and a 100 m^2 area near the former untreated industrial waste discharge line exceeded remedial action criteria (Figure 2).

In addition, plutonium is present at above-background levels in all the channels and banks from the discharge points in Acid Canyon, through Middle and Lower Pueblo Canyon, and in Lower Los Alamos Canyon. The concentrations generally decline with increasing distance from the discharge points. None of these areas are sufficiently contaminated to require remedial action.

Owner History

Los Alamos was selected in November 1942 as the site for Project Y, part of the U.S. Army Corps of Engineers' Manhattan Engineer District. The War Department acquired the Los Alamos Ranch School, which consisted of 54 buildings, and about 14.6 km^2 of school and other private holdings. About 186 km^2 of additional land were acquired from other government agencies, with the total land area approximating present-day Los Alamos County. The first construction contract was let in December 1942; in January 1943, the University of California assumed responsibility for operating the site. Control of the lands was transferred to the Atomic Energy Commission in 1947.



Source: DOE/EV-0005/30

NOTE: Crosshatched areas denote elevated radiological contamination. Only the two "areas with elevated surface activity" require remedial action.

Figure 2. Upper Acid Canyon Site Map, Pre-Remedial Action

After decontamination and decommissioning, the treatment plant site, Acid Canyon, and the portion of Pueblo Canyon east of Acid Canyon were transferred to Los Alamos County by quitclaim deed on July 1, 1967. The transfer was subject to the reservation of a 100-foot-wide easement for continued access to and maintenance of sampling locations and test wells in or adjacent to the stream channel in Acid and Pueblo Canyons.

Radiological History and Status

Data have been collected since 1945 on the presence of radioactivity in the environment as a result of liquid waste operations at Los Alamos. The initial study, made in September 1945, consisted of collection and analyses of surface water samples in Acid/Pueblo and Los Alamos Canyons. Water or sediments were sampled at additional stations in July 1946 and May 1947. Plutonium and polonium were found at varying concentrations throughout the canyons with concentrations generally decreasing downgradient as the untreated wastes were diluted with sanitary effluent and storm runoff, and by adsorption or ion exchange with sediments in the stream channel.

From 1949 to 1971, the U.S. Geological Survey, Water Resources Division, studied the effects of release of industrial effluents on the environment and geohydrology of the area. The data collected are summarized in a series of reports covering the period 1949 through 1967. Environmental data gathered subsequently by LANL were also published in a series of reports from 1970 through 1975. Radiochemical quality of effluents, surface, and groundwater available for the period 1958 through 1967 include gross-beta activity, total plutonium, and total uranium. From 1967 through 1975, measurements were made for gross alpha and beta activity, ^{238}Pu, ^{239}Pu, tritium, and total uranium. Generally, the concentrations of radionuclides decreased downgradient in the canyons, with most of the activity attached to bank soils or more stable inactive channel sediments.

The first survey of Acid Canyon for purposes of clean-up was made on August 31, 1965. Decontamination and decommisioning of the TA-45 liquid waste treatment plant began on October 4, 1966. All contaminated equipment, plumbing, and removable fixtures were taken to solid radioactive waste burial areas on the LANL site. The super structure and concrete foundation for the treatment plant (TA-45-2) and the building and concrete slab of the vehicle decontamination facility (TA-45-1) were demolished and all debris removed to the disposal areas. Soil south and west of the treatment plant building was removed to a depth of one foot and placed in the dump because of earlier spills in those areas. Buried waste lines, manholes, and contaminated soil in the vicinity of the vehicle decontamination facility where wastewater had drained into the ground were also removed to the disposal sites. These operations generated approximately 516 dump-truck loads of debris. Concurrent decontamination of portions of Acid Canyon included removal of contaminated tuff from the cliff face where the effluent had flowed and removal of contaminated rock, soil, and sediment from the canyon floor. Waste from these operations totalled about 94 dump truck loads. In the spring of 1967, other portions of buried waste lines in the TA-45 area, more contaminated rock, and the flow-measuring weir from Acid Canyon were removed. By July 11, 1967, the TA-45 site and Acid Canyon were considered sufficiently free of contamination to allow unrestricted access. Remaining residual radioactivity was confined to generally inaccessible spots and was not considered to be a health hazard.

As noted above, water quality monitoring by USGS continued until 1971. In 1972, LANL performed a radiation survey of the Canyon bottom in the midreach of Pueblo Canyon. With the exception of tritium, which was slightly elevated, concentrations of radionuclides in soil and vegetation was similar to regional background.

In early 1976, the Energy Research and Development Administration identified the Acid/Pueblo Canyon site as one of the locations to be re-evaluated under the Formerly Utilized Sites Remedial Action Program. LANL performed a new survey of the area in 1976 and 1977, examining ground surfaces with

portable radiation detection equipment and taking air, soil, and sediment samples. Soil and sediment samples were subsequently analyzed for gross alpha activity, gross beta-gamma activity and concentration of specific isotopes, including ^{238}Pu, $^{239}Pu/^{240}Pu$, total uranium, ^{90}Sr, ^{137}Cs, ^{232}Th, ^{226}Ra, ^{241}Pu, and ^{241}Am. A final survey report was issued in May 1981. The results of the survey indicated that the Acid/Pueblo Canyon site should be considered for remedial action.

Remedial action criteria adopted for this site included external exposure rates and radionuclide concentrations in soil. The radiation exposure rate criterion was based on the annual limit for population exposures of 170 mR. External radiation levels were therefore limited to 0.02 mR/hr above background. Criteria adopted for radionuclide concentrations in soil were: 100 pCi/g for ^{90}Sr, ^{238}Pu, and ^{239}Pu; 80 pCi/g for ^{137}Cs; 20 pCi/g for ^{241}Am; and 40 pCi/g for natural uranium.

Concentrations of plutonium in soil and external gamma radiation exceeded criteria at two locations: near the former vehicle decontamination facility and at the untreated liquid waste outfall. These areas were designated for remedial action. Additionally, two small areas in Acid Canyon, below the canyon rim in an area of limited access, approach or exceed the ^{239}Pu criteria. The contamination is absorbed into the tuff to a depth of a few centimeters along the flowpath of the former untreated waste effluent. Because of its relative inaccessibility and stability, this material is not considered to present a significant hazard either from exposure to the population or future transport and contamination of Lower Pueblo Canyon. Therefore, no remedial action is required for this area.

Ford, Bacon & Davis Utah, Inc., prepared an engineering evaluation in October 1981 to determine options and costs for remedial action at the Acid/Pueblo Canyon site. On February 8, 1982, the Office of Environmental Protection, Safety, and Emergency Preparedness notified the Office of Nuclear Energy that the Acid/Pueblo Canyon site required consideration for remedial action. A supplementary engineering evaluation was prepared by the remedial

action contractor, Bechtel National, Inc., in July 1982, and an environmental analysis published by LANL in August 1982. The engineering evaluation indicated that remedial action at the two general areas requiring decontamination would involve removal of rock and soil totaling about 230 m^3 in volume.

A National Environmental Policy Act review determined that the proposed remedial action did not constitute a major federal action having the potential for significant environmental impacts. Therefore, no environmental impact statement was required. The LANL environmental analysis was adopted by the Department of Energy as a formal environmental assessment and a "finding if no significant impact" was signed by the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness on June 30, 1982.

Initial decontamination activities were carried out from August 2-13, 1982. This work was performed by the Zia Company of Los Alamos and included construction of a temporary vehicle decontamination pad, installation of a debris/sediment barrier, excavation of the contaminated material, and disposal of the material at the LANL Radioactive Waste Disposal Area G (TA-54). Eberline Instrument Company took radiological readings and soil samples for laboratory analysis for confirmation of cleanup. Results of verification measurements indicated additional cleanup was required to satisfy the remedial action criteria, and this work was accomplished between September 27-30, 1982. A total of 390 cubic yards of contaminated material was excavated during the remedial action.

Compliance with remedial action criteria was confirmed by near-surface gamma-ray measurements and soil samples. All soil samples and gamma-ray measurements at the former vehicle decontamination facility were well below criteria. At the untreated waste outfall, five soil samples exceeded the remedial action criterion for ^{239}Pu. Although the maximum concentration was 370 pCi/g, the concentration averaged over the 100 m^2 involved in the decontamination was 36 pCi/g. Therefore, the remedial action criterion was satisfied. All gamma-ray measurements and soil concentrations of other radionuclides were well below remedial action criteria. Therefore, the remedial action was considered successfully completed.

EXHIBIT II

DOCUMENTS SUPPORTING THE CERTIFICATION OF THE FORMER SITE OF THE RADIOACTIVE LIQUID WASTE TREATMENT PLANT (TA-45) AND ACID, PUEBLO, AND LOS ALAMOS CANYONS

Bechtel National, Inc., "Final Report on the Remedial Action at the Acid/Pueblo Canyon Site, Los Alamos, New Mexico," (DOE/OR/20722-15), March 1984.

Gunderson, T., T.E. Buhl, R. Romero, and J. Salazar (Los Alamos National Laboratory), "Radiological Survey Following Decontamination Activities Near the TA-45 Site," (LA-9831-MS), July 1983.

Vaughn, William A., Assistant Secretary for Policy, Safety and Environment, to Robert W. Ramsey, Jr., Program Manager, Remedial Action Program," National Environmental Policy Act (NEPA) Determination for the Proposed Remedial Action, Acid/Middle Pueblo Canyon FUSRAP Site, Los Alamos, New Mexico," June 30, 1982.

Valencia, Harold E., Department of Energy, Area Manager, to Neil G. Seeley, County Administrator, Incorporated County of Los Alamos, "Formerly Utilized Sites Remedial Action Program (FUSRAP) Acid/Pueblo Canyon and Bayo Canyon," July 14, 1982.

Seeley, Neil G., County Administrator, Incorporated County of Los Alamos, to Harold E. Valencia, Department of Energy, Area Manager, "Formerly Utilized Sites Remedial Action Program (FUSRAP) Acid/Pueblo Canyon and Bayo Canyon," July 28, 1982.

Keller, E.L., Department of Energy, to Robert W. Ramsey, Jr., Department of Energy, "Remedial Action Criteria for New Mexico FUSRAP Sites," August 20, 1981.

Keller, E.L., Department of Energy, to R.L. Rudolph, Bechtel National, Inc., "Criteria for Remedial Action at Acid/Pueblo and Bayo Canyons; Request for Cost/Benefit Analysis of Remedial Action Options at the Canyons," March 17, 1982.

Baublitz, J.E., Director, Remedial Action Projects, to F.E. Coffman, Director, Office of Terminal Waste Disposal and Remedial Action, "Recommendation for Certification of Decontamination for the Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," signed by D.H. Groelsema for Baublitz, August 17, 1984.

Coffman, F.E., Director, Office of Terminal Waste Disposal and Remedial Action, "Statement of Certification: The Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and the Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons," August 28, 1984.

Coffman, F.E., Director, Office of Terminal Waste Disposal and Remedial Action, Federal Register notice: "Department of Energy, Office of Nuclear Energy, Certification of the Radiological Condition of the Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," signed August 28, 1984.

The following published documents are included in this package by reference:

- Los Alamos National Laboratory, "Radiological Survey of the Site of a Former Radioactive Liquid Waste Treatment Plant (TA-45) and the Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," (DOE/EV-0005/30), May 1981.

- Ferenbaugh, R.W., T.E. Buhl, A.K. Stoker, and W.R. Hansen, (Los Alamos National Laboratory), "Environmental Analysis of Acid/Middle Pueblo Canyon, Los Alamos, New Mexico," (LA-9409-MS), August 1982.

- Healy, J.W., "An Examination of the Pathways from Soil to Man for Plutonium, Los Alamos National Laboratory (LA-6741-MS), 1977.

- Healy, J.W., J.C. Rodgers, and C.L. Wienke, "Interim Soil Limits for D&D Projects," Los Alamos National Laboratory (LA-UR-79-1865-Rev.), 1979.

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FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP)
CONTRACT NO. DE-AC05-81OR20722

FINAL REPORT ON THE REMEDIAL ACTION AT THE ACID/PUEBLO CANYON SITE

LOS ALAMOS, NEW MEXICO

MARCH 1984

Bechtel Job 14501
Bechtel National, Inc.
Nuclear Fuel Operations

DOE/OR/20722-15

FINAL REPORT ON REMEDIAL ACTION AT THE ACID/PUEBLO CANYON SITE LOS ALAMOS, NEW MEXICO

MARCH 1984

Prepared for

UNITED STATES DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE
Under Contract No. DE-AC05-81OR20722

By
Bechtel National, Inc.
Advanced Technology Division
Oak Ridge, Tennessee

ABSTRACT

The Acid/Pueblo Canyon site (TA-45) was designated in 1976 for remedial action under the Formerly Utilized Sites Remedial Action Program (FUSRAP). During the period 1943-64 untreated and treated liquid wastes generated by nuclear weapons research activities at the Los Alamos Scientific Laboratory (LASL) were discharged into the two canyons. A survey of the site conducted by LASL in 1976-77 identified two areas where radiological contamination exceeded criteria levels. The selected remedial action was based on extensive radiological characterization and comprehensive engineering assessments and comprised the excavation and disposal of 390 yd^3 of contaminated soil and rock.

This document describes the background to the remedial action, the parties involved in administering and executing it, the chronology of the work, verification of the adequacy of the remedial action, and the cost incurred.

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ABBREVIATIONS

cm	centimeter
ft	foot
ft^3	cubic foot
gal	gallon
in.	inch
m	meter
m^2	square meter
µCi/cc	microcurie per cubic centimeter
uR/h	microroentgen per hour
mR	milliroentgen
mR/h	milliroentgen per hour
pCi/g	picocurie per gram
pCi/l	picocurie per liter
yd^3	cubic yard

1.0 INTRODUCTION

In 1974 the Atomic Energy Commission (AEC) initiated a survey program to identify and radiologically characterize all formerly utilized U.S. Army Corps of Engineers' Manhattan Engineer District (MED) and AEC sites involved with nuclear materials. With the establishment of the Department of Energy (DOE) in 1977, the responsibility for this survey program was assigned to the Assistant Secretary for the Environment (ASEV), who entitled it the Formerly Utilized Sites Remedial Action Program (FUSRAP). Since mid-1979 FUSRAP responsibilities have been shared variously by the ASEV and the Assistant Secretary for Energy Technology [now Assistant Secretary for Nuclear Energy (ASNE)]. Effective in 1982 all major responsibilities (site identification, radiological characterization, determination of the need for remedial action, implementation of the remedial action, including waste disposal or stabilization of residual material, and post remedial action certification) were consolidated and became the responsibility of ASNE.

Following identification of a site and determination of whether DOE has authority to undertake remedial action, radiological survey records are reviewed. If such data are lacking or incomplete, further surveys are conducted as necessary. The FUSRAP Project Management Contractor (PMC) and its subcontractors prepare a series of engineering studies and environmental reports for the site to evaluate remedial action alternatives. Documentation required by the National Environmental Policy Act (NEPA) as part of this evaluation is prepared by the Argonne National Laboratory (ANL). The action that is deemed appropriate by DOE based on the NEPA process evaluations is then implemented with consideration for public safety and in compliance with the Atomic Energy Act of 1954, as amended, and related Nuclear Regulatory Commission (NRC) or applicable federal, state, and local licensing requirements.

Remedial action at the Acid/Pueblo Canyon site was administered by DOE through its FUSRAP Lead Field Office, the Oak Ridge Operations (ORO) Office and FUSRAP PMC, Bechtel National, Inc. (BNI). The Los Alamos National (formerly Scientific) Laboratory (LANL) and DOE Los Alamos Area Office (LAAO) provided support to DOE-ORO and BNI.

2.0 SITE DESCRIPTION AND BACKGROUND

Acid and Pueblo Canyons are among numerous canyons cut into the Pajarito Plateau in northcentral New Mexico, approximately 100 km (60 mi) north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe. Acid Canyon is a small tributary near the head of Pueblo Canyon; it and Middle Pueblo Canyon lie within the townsite of Los Alamos (Figure 2-1). The remedial action site (TA-45) is accessible from Canyon Road, which runs just south of the former TA-45 Waste Treatment Plant as shown on Figure 2-1.

Presently both canyons are used for recreational activities. However, future residential and associated light commercial development is conceivable.

The site was designated a former MED/AEC site because untreated and treated liquid wastes generated by nuclear weapons research activities at the LANL during the period 1943-64 were discharged into the two canyons. From late 1943 until 1951 untreated liquid wastes were discharged. The effluents contained isotopes of strontium, cesium, uranium, plutonium, americium, and tritium. In 1951 a waste treatment plant (TA-45) at Acid Canyon became operational, discharging treated wastes into the canyon until 1964 at which time all wastes were diverted to a new plant (TA-50) located south of Los Alamos Canyon within the present LANL site.

The AEC began decontamination and decommissioning of the TA-45 plant and its associated vehicle decontamination facility in late 1966. Both facilities were demolished and the contaminated building materials, sewer pipe, and soil from the vehicle decontamination facility disposed of at the LASL radioactive waste disposal areas. Portions of the Acid Canyon cliff face were also decontaminated and some contaminated rock, soil, and sediment removed from the canyon floor. By July 1967 the areas around the TA-45 plant and in Acid Canyon were considered sufficiently free of contamination to permit release from federal government control (Reference 1).

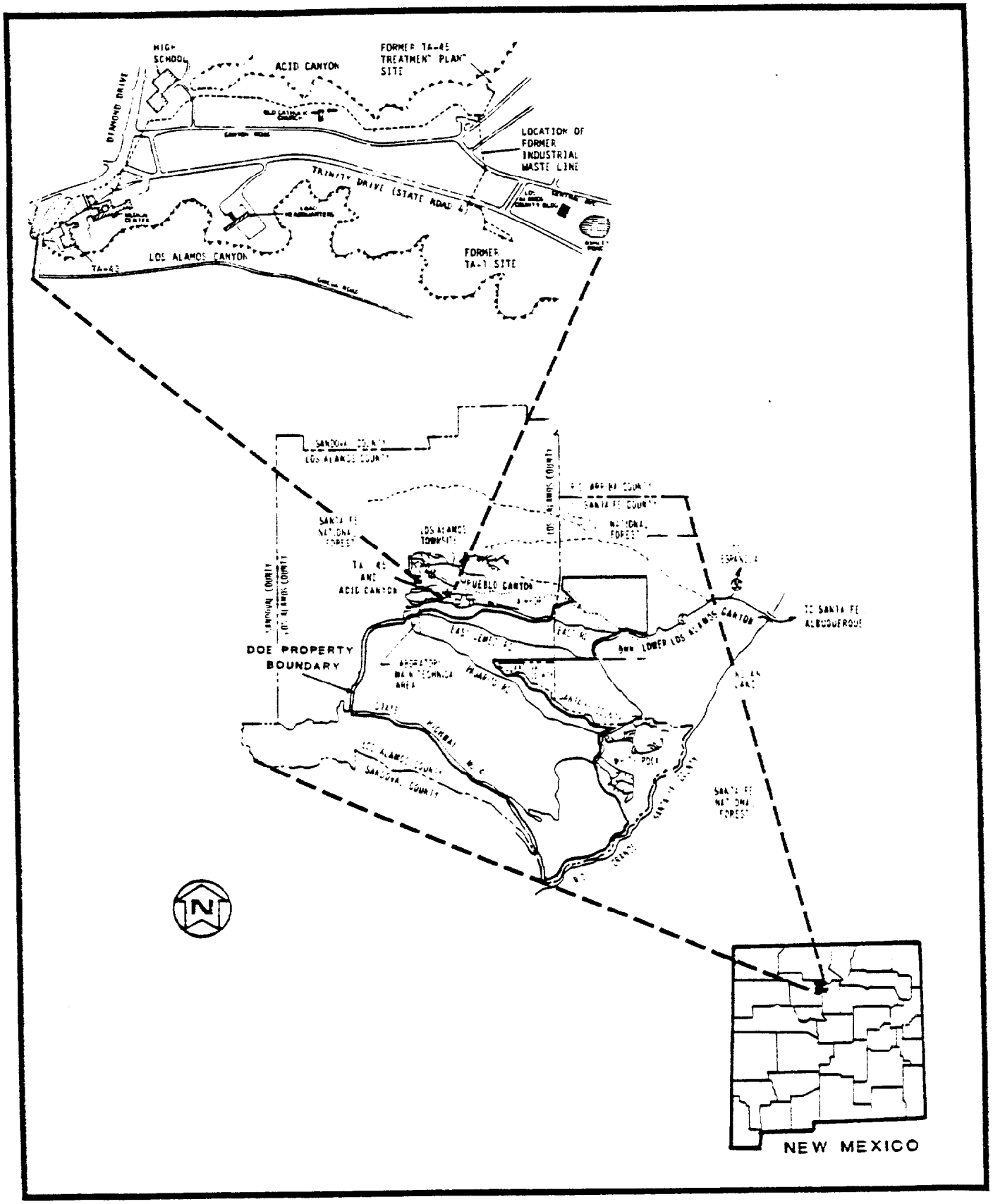

FIGURE 2-1 LOCATION OF ACID/PUEBLO CANYON SITE

On July 1, 1967 the AEC transferred to the County of Los Alamos ownership of the former TA-45 site, Acid Canyon, and the portion of Pueblo Canyon encompassing the channel from Acid Canyon eastward to a point approximately 1,190 m (3,900 ft) west of the Los Alamos-Santa Fe county line. The transfer was in accordance with the provisions of the Community Disposal Act, subject to the reservation of an easement for continued access to and maintenance of sampling locations and test wells in and adjacent to the channel in Acid and Pueblo Canyons.

Low-level residual contamination in the channels was monitored periodically as part of routine environmental surveillance conducted by LASL. In 1976 the Acid/Pueblo Canyon site was identified as warranting reevaluation with modern instrumentation and analytical methods to determine whether further corrective measures were required. LANL undertook the resurvey in 1976-77; its final report was issued in 1981 (Reference 1). This and a supplemental survey conducted in 1980 by Ford, Bacon and Davis, Utah (FBDU) indicated that contamination in the areas of the former untreated waste effluent outfall and former vehicle decontamination facility exceeded the cleanup criteria levels specified in Subsection 4.1 of this document.

BNI performed an engineering evaluation of the site based on the LANL and FBDU data. In this study BNI presented three remedial action scenarios: no action, minimal action, and decontamination and disposal (Reference 2). LANL prepared the associated environmental analysis report (Reference 3) and ANL prepared the required NEPA analysis documentation (Reference 4). Decontamination and restoration was approved by DOE; BNI, as FUSRAP PMC, was assigned the responsibility for implementation.

3.0 FUSRAP ORGANIZATION FOR THE ACID/PUEBLO CANYON REMEDIAL ACTION

3.1 ADMINISTRATIVE ORGANIZATION

Remedial action at the Acid/Pueblo Canyon site was administered by the Technical Services Division of DOE-ORO. BNI, as FUSRAP PMC, planned, managed, and implemented the work for DOE-ORO, beginning in early 1981.

BNI selected Professional Land Surveying (PLS) of Santa Fe, NM, and the Zia Company of Los Alamos, New Mexico to implement the remedial action. BNI was also responsible for radiological monitoring of site personnel and activities. Monitoring was performed by its radiological support subcontractor, Eberline Instrument Corporation (EIC) of Albuquerque, New Mexico. EIC supports BNI in this role at all FUSRAP sites.

Argonne National Laboratory (ANL) is the contractor responsible to DOE-ORO for the NEPA process for all FUSRAP sites, including the Acid/Pueblo Canyon site.

The DOE-LAAO facilitated contacts among BNI, LANL, the Zia Company, local officials, and the media during preparation for and conduct of remedial action. LANL supplied EIC with protective clothing required in the conduct of the health physics program (dust masks, shoe covers, gloves, etc.); members of its Environmental Surveillance Group conferred with and advised BNI, EIC, PLS, and Zia during remedial action and provided oversight support. Use of the LANL Radioactive Waste Disposal Area G (TA-54) was arranged between DOE-ORO and LANL, using Zia for transportation of the wastes.

3.2 FIELD ORGANIZATION

The site organization consisted of a BNI Site Superintendent who directed the activities of site representatives from PLS (civil survey), the Zia Company (excavation and transportation services),

and EIC (radiological control and health physics). The BNI Site Superintendent also acted as liaison with the representatives of DOE-ORO, DOE-LAAO, and LANL.

The PLS team consisted of a party chief/instrument man and a rodman. The Zia Company team consisted of a site engineer and working foremen of the crafts in the work crews (operating engineers, drivers, carpenters, iron workers, and laborers). An average of eight Zia personnel worked on the site each day. EIC personnel comprised two health physics technicians.

4.0 REMEDIAL ACTION

4.1 APPLICABLE CRITERIA

Remedial action criteria applicable to the Acid/Pueblo Canyon site were the external exposure rates specified by 40 CFR 192 (Reference 5) and the radionuclide concentrations in soil listed in Table 4-1 (References 2, 7, and 8). The radiation exposure rate criterion was based on the annual limit for population exposures of 170 mR. For control purposes, an exposure rate of 0.02 mR/h (20 μR/h) above background was used. Background exposure rates in the Los Alamos area are 9.4-17.4 μR/h. Soil criteria for two separate pathways, food cultivation/ingestion and resuspension/inhalation, were considered. The former is the more restrictive pathway and provides the most conservative criteria against which to evaluate the adequacy of remedial action. However, the latter was the more realistic basis for evaluation in the case of Acid/Pueblo Canyon since the terrain on and near the remedial action site is unsuitable for cultivation.

4.2 SITE CHARACTERIZATION

The areas in Acid Canyon requiring remedial action were defined by the radiological survey conducted by LANL in 1976-77. LANL reviewed records of the treatment plant and data on types and amounts of contaminants discharged, environmental monitoring and hydrogeologic studies, and special radioecology research studies. These data were compiled to provide points of comparison and a basis for planning the acquisition of new data, most of which consisted of multiple analyses of several hundred sediment and soil samples for the radionuclides listed in Table 4-1. Additional data on concentrations of these contaminants in air were obtained and gamma surveys performed.

As shown in Figure 4-1, four areas were contaminated in excess of background concentrations. However, only the two designated as having elevated surface activity were contaminated in excess of the

TABLE 4-1

SOIL CLEANUP CRITERIA FOR REMEDIAL ACTION

AT ACID/PUEBLO CANYON*

Radionuclide	Criteria (pCi/g)	
	Food Cultivation/ Ingestion	Resuspension/ Inhalation
Strontium-90	100	2×10^6
Cesium-137	80	7×10^6
Plutonium-238	100	7600
Plutonium-239	100	7600
Americium-241	20	---
Uranium (natural)	40**	2200
Radium-226	5**	7000

*Criteria are applied as average concentration per 100 m^2 areas.

**After extensive health effects studies, the limit for uranium (natural) was increased to 75 pCi/g in November 1983 (Reference 9). Based on these and other studies, the limit for radium-226 was also modified in November 1983 to provide for 5 pCi/g in the first 15-cm soil layer and 15 pCi/g in successively deeper 15-cm layers (Reference 9).

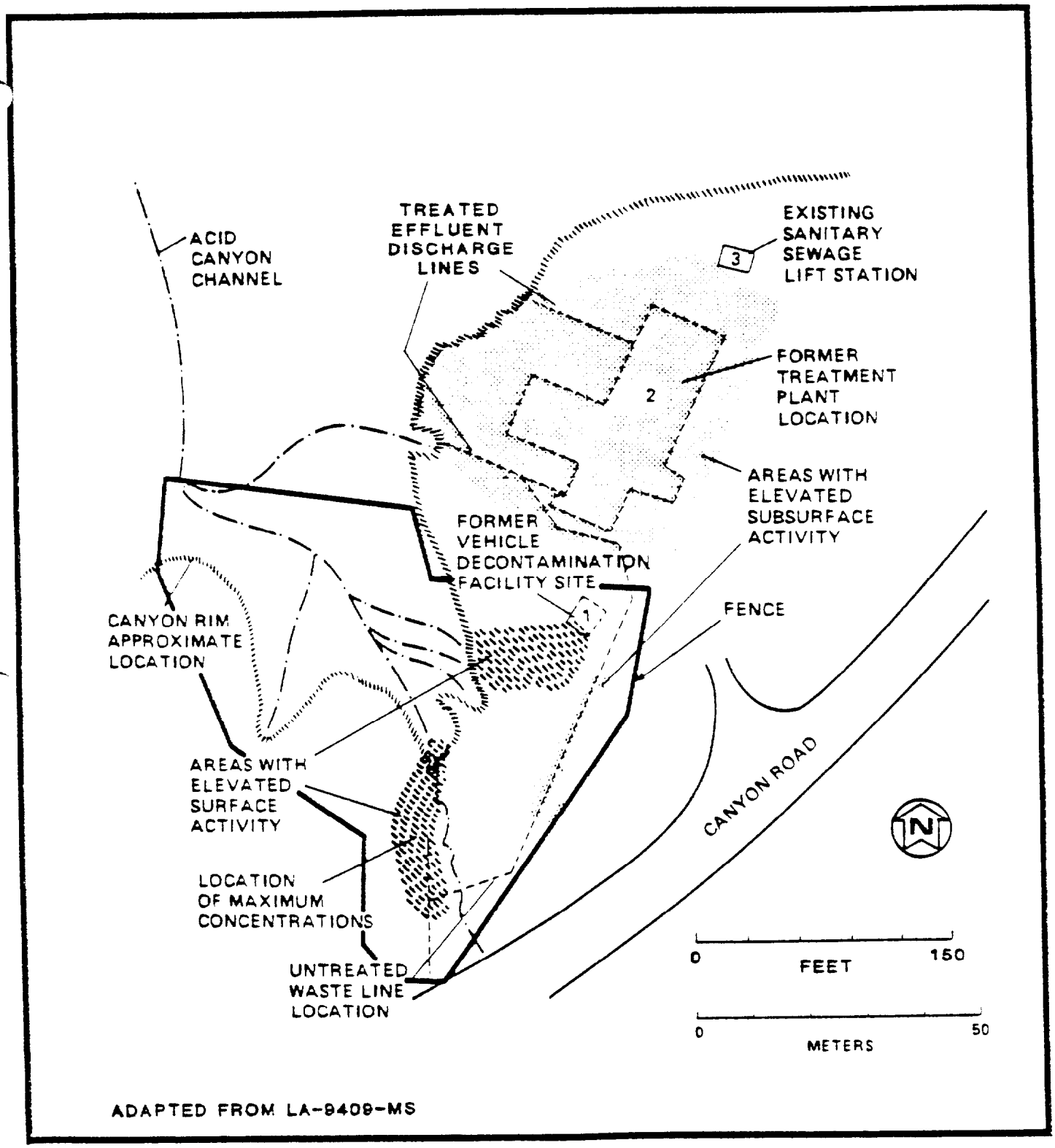

FIGURE 4-1 AREAS OF RESIDUAL RADIOACTIVITY AT ACID CANYON

criteria presented in Table 4-1. The LANL radiological survey data for these two areas are presented in Table 4-2 and Figure 4-2. The placement of individual data points was accomplished by extrapolating from small ungridded LANL drawings; therefore, accuracy of placement on Figure 4-2 is ± 1.5 m (5 ft).

Soil sampling was undertaken in 1980 by FBDU to supplement the LASL data and to verify expected background radionuclide concentrations in the Acid Canyon area. Results confirmed the LASL designation of remedial action areas.

4.3 PREPARATIONS FOR REMEDIAL ACTION IMPLEMENTATION

The decontamination and restoration scenario approved by DOE specified that the location of the two general areas requiring decontamination would be reestablished using coordinates from previous LASL surveys, a section of the chain-link fence enclosing upper Acid Canyon would be removed to permit access for remedial action, a barrier would be erected across the upper canyon to prevent loss of excavated material, and 30 to 45 cm (12 to 18 in.) of soil and volcanic tuff would be removed and disposed of at the LANL Radioactive Waste Disposal Area G (TA-54). Field measurements made before and during excavation would determine whether further excavation was required to meet criteria levels. The excavated and disturbed areas would be left to stabilize and revegetate naturally.

BNI engineers prepared drawings, specifications, and other subcontract documents preparatory to the issuance of civil survey and excavation subcontracts. A civil survey subcontract package was issued for bids on June 17, 1982. Bids were solicited from firms local to Los Alamos. Three bids were received and evaluated; the subcontract was awarded to PLS on July 28, 1982.

TABLE 4-2

ACID CANYON PRE-REMEDIAL ACTION

RADIOLOGICAL SURVEY DATA

COORDINATES[1]		pCi/g				
X	Y	Plutonium 239	Plutonium 238	Americium 241	Cesium 137	Strontium 90
25	35	38.0	0.3	N/A	78.0	183.0
27	17	0.6	0.0	N/A	1.8	1.5
30	10	34.0	0.3	N/A	0.3	0.6
30	30	42.0	0.3	N/A	176.0	229.0
35	30(2)	5.8	0.3	4.0	2.9	N/A
45	60(2)	0.5	0.1	3.0	39.0	N/A
40	30(2)	200.0	1.8	32.0	47.0	N/A
45	80(2)	1.0	0.1	1.0	2.4	N/A
50	0	4.0	0.1	N/A	1.0	1.1
50	45(2)	20.0	0.2	4.0	153.0	N/A
100	0	0.3	0.01	N/A	0.3	0.4
133	68	86,900.0	326.0	55.0	10.7	1.0
136	62	163,000.0	696.0	1,200.0	1.1	0.9
139	0	0.2	0.0	N/A	1.8	2.6
139	72	3690.0	26.4	106.0	36.0	5.1
140	65	433.0	2.7	10.0	25.1	1.8
141	57	16,300.0	70.4	126.0	2.3	2.4
145	67	61.0	0.08	1.5	2.2	0.5
146	57	64.0	0.26	0.9	1.9	0.9
157	0	0.2	0.01	N/A	0.7	0.5
157	48	259.0	1.1	N/A	0.1	0.2
172	33	44.0	0.3	N/A	0.3	0.5
187	20	12.0	0.1	N/A	2.2	2.9

(1) Based on extrapolation of data presented in DOE/EV-0005/30

(2) Data collected by BNI

N/A Not analyzed

Source: LANL (Reference 1)

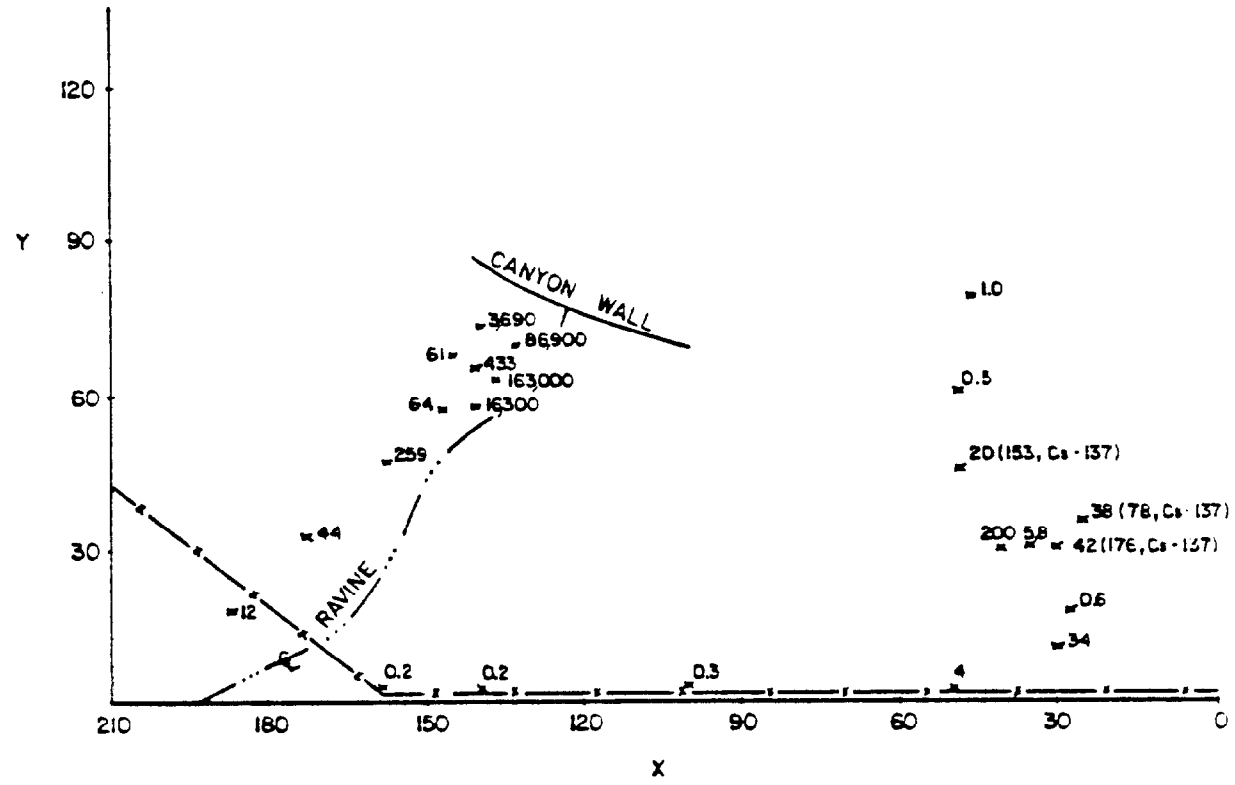

FIGURE 4-2 PRE-REMEDIAL ACTION PLUTONIUM-239 CONCENTRATION IN SOIL IN pCi/g (CESIUM-137 INCLUDED TO INDICATE MIXED FISSION PRODUCT CONTAMINATION)

A Memorandum Purchase Order for the excavation and transportation of the contaminated material was issued on July 22, 1982 to the Zia Company. As the prime construction contractor for LAAO, Zia already had the required clearances to operate on the LANL disposal area and experience with radioactive decontamination.

4.4 CHRONOLOGY OF REMEDIAL ACTION

On August 2, 1982 part of the chain-link fence enclosing Acid Canyon was removed to permit access to the remedial action areas, the debris/sediment barrier was installed, and the erection of a vehicle decontamination pad was begun (Figure 4-3). The following day the pad was completed and the site survey grid was tied to the New Mexico State Plane System and the LANL survey grid. PLS established a 4.6 m x 4.6 m (15 ft x 15 ft) grid over the remedial action area so that pre-remedial action contours could be recorded for subsequent comparison with post-remedial action contours to determine the volume of material removed.

Excavation commenced on August 4 in the area where the untreated effluent discharge line had been located. Contaminated material was excavated in 15 to 20 cm (6 to 8 in.) lifts by a backhoe and loaded directly into 18-yd^3 capacity dump trucks lined with reinforced plastic. Excavation was started at the point farthest from the loading point so that contaminated material was not moved over non-contaminated areas. When it was necessary to load over a non-contaminated area, that area was covered with plastic, which was rolled up and disposed of at the end of the operation. A water truck was maintained at the site during excavation so that the excavation area could be wetted to control dust. Hot spot excavation at the former vehicle decontaminations facility was performed manually with spades and shovels. Contaminated earth was loaded into 55-gal drums that were hoisted into dump trucks by an 18-ton hydraulic crane. All contaminated materials were disposed of at the LANL Radioactive Waste Disposal Area G (TA-54).

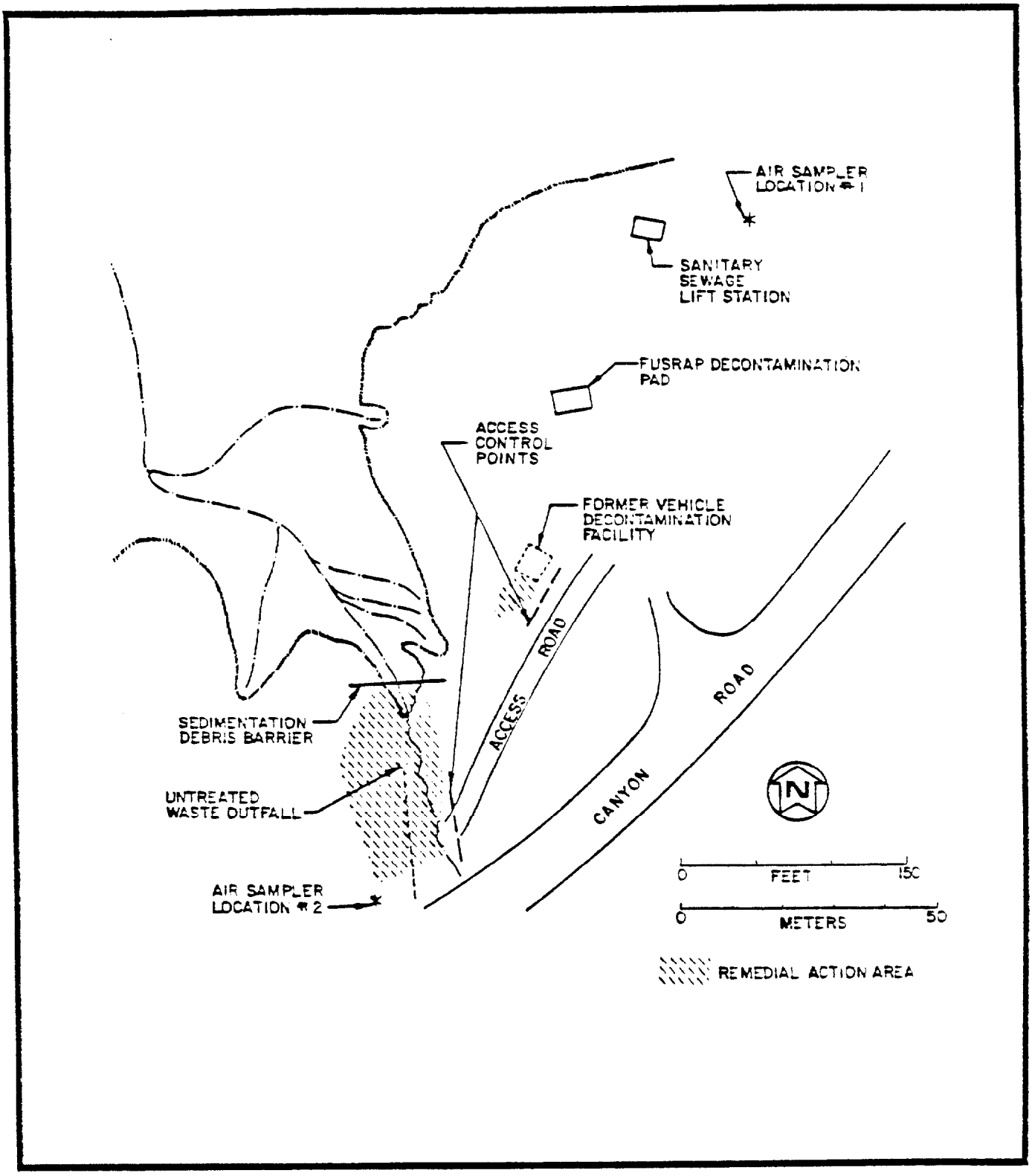

FIGURE 4-3 MAP OF UPPER ACID CANYON SITE DURING REMEDIAL ACTION

Following excavation EIC took radiological readings and soil samples for laboratory analysis to confirm satisfactory cleanup. While awaiting the results of this analysis, the fence was restored and equipment checked for contamination prior to release from the site. All equipment was found to be non-contaminated. The temporary decontamination pad remained in place; its drainage system was filled in and the debris/sediment barrier was removed from the canyon rim.

Laboratory results indicated that two spots of contamination remained in the untreated waste outfall area. These were excavated and disposed of on August 13 and EIC resurveyed and resampled the areas. The site was closed while awaiting laboratory results of the resampling, although arrangements were made for additional excavation if necessary. Sample analysis indicated that further excavation was required in the untreated waste outfall area. Final excavation was performed from September 27 to September 30, 1982. A total of 390 yd^3 of contaminated material was excavated in implementing the remedial action.

Backfilling the excavated area was impractical since the material removed was primarily sandstone and tuff. Backfill material placed on the site would have been highly susceptible to erosion.

After excavation activities were completed the site grid was reestablished for the final radiological survey to verify compliance with criteria for unrestricted release. Verification of compliance is discussed in greater detail in subsection 5.6.

The above work was conducted in accordance with accepted practices and in compliance with the Zia Company safety policies, the BNI FUSRAP Health and Safety Program, FUSRAP Radiological Protection Program, and BNI Nuclear Fuels Operation Quality Assurance Program as amended for FUSRAP (References 10, 11, and 12).

5.0 RADIOLOGICAL SUPPORT

Support of remedial action by the BNI/EIC health physics staff included access control, personnel training, personnel radiation exposure monitoring, and environmental monitoring. In addition, they established excavation limits in the field following analysis of data from the 1976-77 LANL radiological survey, performed surveys during excavation to determine the effectiveness of the remedial action, and conducted post-remedial action surveys to confirm that decontamination criteria were met.

5.1 ACCESS CONTROL

Access to the area was controlled through a point of entry located at the southeast corner of the untreated waste discharge area as shown in Figure 4-3. All personnel entering the controlled area (hatched sections of Figure 4-3) were issued shoe covers and gloves. When activities created a high potential for generating dust all workers were issued dust masks.

When leaving the controlled area all personnel were monitored for contamination. Vehicles were similarly monitored. A decontamination pad wash down area was provided for vehicles. However, during the remedial action activities all vehicles were found to be non-contaminated. Controlled vehicle/material logs were maintained throughout remedial action operations and are now on file at the BNI office in Oak Ridge, Tennessee.

5.2 PERSONNEL TRAINING

A radiological safety orientation program was presented to all personnel involved with construction and excavation activities prior to their beginning work. Emphasis was placed on the need for personal protection, contamination control, and monitoring procedures. All training was documented by signed statements from each attendee acknowledging his understanding of the material

presented. These statements and a list of references and training aids used in the orientation are on file at the BNI Oak Ridge office.

5.3 PERSONNEL MONITORING

Radiological monitoring of personnel involved in remedial action was conducted to ensure compliance with protection standards. Personnel were monitored by means of bioassay, dosimetry, and lapel air samplers.

5.3.1 Bioassay

Urine specimens were collected from Bechtel and PLS onsite personnel prior to beginning work and prior to their termination from the job. Specimens were shipped to the EIC Albuquerque laboratory for plutonium-239, cesium-137, and mixed fission products analyses.

Personnel employed by the Zia Company were on a bioassay program as part of their routine job functions at Los Alamos and were, therefore, not included in the FUSRAP bioassay program.

All results from the FUSRAP bioassay program for the remedial action at Acid/Pueblo Canyon were below detectable limits. The detection limit for plutonium-239 is 0.1 pCi/l, for cesium-137 is 30 pCi/l, and for fission products is 15 pCi/l.

5.3.2 Dosimetry

Workers who did not already have an assigned radiation monitoring badge were issued a thermoluminescent dosimeter (TLD) badge. TLD badges were issued prior to the beginning of work and collected upon termination of the job. Results showed that no workers were exposed to gamma radiation levels distinguishable from natural background. All TLD exposure records are on file at the BNI Oak Ridge office.

5.3.3 Lapel Air Samplers

Personnel operating heavy equipment within the remedial action area wore lapel air samplers during all excavation. All results of lapel air samples were less than detectable quantities. Detection limits are less than 25 percent of the applicable concentration guide for controlled areas per DOE Order 5480.1A, Chapter XI (Reference 11).

5.4 ENVIRONMENTAL MONITORING

The radiological safety program also provided air quality surveillance. During initial excavation two continuous air samplers were deployed. As shown in Figure 4-3, one was positioned near the access control point to determine pre-excavation radiation levels and one was northeast of the decontamination pad. These samplers were run intermittently for four days. Composite samples of filters for each unit were analyzed for plutonium-238 and -239, americium-241, cesium-137, strontium-90, and isotopic uranium. All results were less than 1×10^{-13} µCi/cc. During the final excavation only the location near the access control point was monitored. Analysis for gross alpha contamination indicated that all results were less than 1×10^{-13} µCi/cc. These results are less than 10 percent of the most restrictive concentration guides for controlled areas per DOE Order 5480.1A, Chapter XI, 2×10^{-12} µCi/cc for alpha emitters (plutonium-239) and 1×10^{-9} µCi/cc for beta emitters (strontium-90).

5.5 IN SITU SURVEYS TO ESTABLISH EXCAVATION LIMITS

Excavation limits that had been defined from survey data collected by LANL were verified or modified as required. Survey techniques included surface gamma measurements, near-surface gamma measurements, and surface beta-gamma measurements as described below. The same techniques were used to detect hot spots and to determine post-remedial action compliance with release criteria.

5.5.1 Near-Surface Gamma Measurements

Near-surface gamma measurements were made on a 1.5-m x 1.5-m (5-ft x 5-ft) grid using a 5 cm x 5 cm detector (Eberline Model SPA-3) coupled to a rate meter/scaler (Eberline Model PRS-1). Measurements were made at a height of 1 m (3 ft) above the ground surface. The system was calibrated in μR/h.

5.5.2 Surface Gamma Measurements

Surface gamma measurements were made on a 1.5-m x 1.5-m (5-ft x 5-ft) grid using a 5 cm x 0.2 cm NaI detector (Eberline Model PG-2) coupled to a rate meter/scaler (Eberline Model PRS-1). Measurements with the PG-2 were made at approximately 2-3 cm (1 in.) above the ground surface.

5.5.3 Surface Beta-Gamma Measurements

Surface beta-gamma measurements were made on a 1.5-m x 1.5-m (5-ft x 5-ft) grid using a pancake geometry Geiger Mueller probe (Eberline Model HP-210) coupled to a rate meter/scaler (Eberline Model PRS-1). Measurements using the HP-210 were made approximately 1 cm (0.5 in.) above the ground surface.

5.6 DETERMINATION OF COMPLIANCE

Following excavation soil samples were collected on a 1.5-m x 1.5-m (5 ft x 5 ft) grid over the remedial action areas. Samples were collected to a depth of 5 cm (2 in.) where soil was available. Much of the area was barren sandstone or tuff following the excavation of the contaminated overburden. At points where soil was not present, the upper 5 cm (2 in.) of tuff was chipped from the surface to form the sample.

Samples were pre-treated prior to analysis by drying, crushing, and thoroughly blending. Pre-treated samples were analyzed by gamma scanning using a germanium detector or prepared using wet chemistry

techniques for determination of concentrations of alpha- or beta-emitting radionuclides. By the nature of the waste streams constituting the source of the contaminants, plutonium-239 was the most prevalent radionuclide and was used as the controlling radionuclide for analysis of verification samples collected in the untreated waste outfall area. At the vehicle decontamination facility, cesium-137 and strontium-90 were the most prevalent radionuclides and were used as the controls for verification sample analysis.

For plutonium analyses, the pre-treated sample was aliquotted and the plutonium was leached from the aliquot. The plutonium recovered was electroplated on a metal counting planchet and the plutonium-238 and plutonium-239/240 activities were determined by alpha spectrographic analysis. The total efficiency of the process was determined through use of a tracer.

Determination of americium-241 utilized a similar methodology that was specific to americium rather than plutonium. Analysis of the sample for americium-241 utilized alpha spectrographic analysis.

Determination of strontium-90 concentration in the sample utilized the yttrium ingrowth technique. As with plutonium the sample was aliquotted, leached, and electroplated on a metal counting planchet prior to analysis.

Compliance with remedial action criteria listed in Table 4-1 was determined by the above analyses of soil samples and measurements of near-surface gamma radiation.

Verification was based primarily on the soil sample analyses due to the types of radiation emitted by the radionuclides of interest (alpha, beta, and low energy gamma-rays). External exposure rates were measured to complement soil sample analyses for the few gamma emitters that were present, cesium-137 and radium-226 and its daughters.

While in situ measurements were made during all phases of the remedial action (surface gamma and surface beta-gamma measurements) to guide excavation, they were of little or no use in determining compliance and were not included as part of this summary of the data.

5.7 POST-REMEDIAL ACTION STATUS

The migration route of the waterborne contamination and the 1976-77 LANL survey indicated that no contamination above criteria existed east of the ravine into which the untreated waste flowed. There is a clear line between contaminated and uncontaminated soil denoted by the east bank of the ravine. Therefore, samples for verification of the adequacy of the remedial action were collected within the area that was bounded on the east by the east bank of the ravine.

Within the untreated waste outfall area, the remedial action covered an area of approximately 100 m^2 (1,000 ft^2); therefore, data were averaged over the remedial action area to determine compliance with criteria. Post-remedial action sample data are presented in Table 5-1 and on Figure 5-1. The average concentration in soil in the remedial action area was 36 pCi/g plutonium-239. The maximum measured soil concentration was 370 pCi/g plutonium-239. A total of five samples within a small area in the ravine exceeded the criterion for plutonium-239 based on the more stringent food cultivation/ingestion pathway. In this area the average concentration of plutonium contamination was 226 pCi/g. Utilizing the more appropriate resuspension/inhalation pathway, all soil sample data were less than 5 percent of the criterion (7600 pCi/g). In view of the small size of this area relative to the site as a whole and the average concentration of plutonium-239 in the entire remedial action area, it was concluded that no additional remedial action was warranted based on plutonium-239 concentrations.

Plutonium-238 concentrations over the remedial action area were insignificant at less than 2 pCi/g or less than 2 percent of the food cultivation/ingestion pathway criterion for plutonium-238 (100 pCi/g).

TABLE 5-1

ACID CANYON POST-REMEDIAL ACTION

SOIL SAMPLE DATA

COORDINATES		pCi/g				
X	Y	Plutonium 239	Plutonium 238	Americium 241	Cesium 137	Strontium 90
40	35	N/A	N/A	5.4±0.5	8.5±0.9	N/A
60	30	N/A	N/A	0.4±0.1	1.2±0.1	N/A
123	63	140±10	0.7±0.6	N/A	N/A	N/A
125	60	200±10	2±1	N/A	N/A	N/A
125	65	230±10	1.2±0.6	N/A	N/A	N/A
125	70	1.9±0.6	0.3±0.3	N/A	N/A	N/A
130	50	18±2	0.2±0.3	N/A	N/A	N/A
130	55	82±3	0.5±0.2	N/A	N/A	N/A
130	60	77±4	0.2±0.3	N/A	N/A	N/A
130	65	190±30	0.5±0.5	N/A	N/A	N/A
130	70	370±10	1.4±0.6	N/A	N/A	N/A
135	45	2±1	0.1±0.1	N/A	N/A	N/A
135	50	11±2	0.1±0.3	N/A	N/A	N/A
135	55	31±3	0.2±0.3	N/A	N/A	N/A
135	60	7±1	0.2±0.4	N/A	N/A	N/A
135	65	2±1	0.1±0.2	N/A	N/A	N/A
135	70	4±1	0.0±0.1	N/A	N/A	N/A
140	45	2±1	0.0±0.3	N/A	N/A	N/A
140	50	6±1	0.1±0.2	N/A	N/A	N/A
140	55	21±3	0.2±0.3	N/A	N/A	N/A

TABLE 5-1
(continued)

COORDINATES		pCi/g				
X	Y	Plutonium 239	Plutonium 238	Americium 241	Cesium 137	Strontium 90
140	60	17±2	0.4±0.3	N/A	N/A	N/A
140	65	0.4±0.3	0.1±0.1	N/A	N/A	N/A
140	70	0.3±0.3	0.0±0.1	N/A	N/A	N/A
145	50	11±1	<0.1	N/A	N/A	N/A
145	55	6±1	0.5±0.5	N/A	N/A	N/A
145	60	7±1	0.1±0.1	N/A	N/A	N/A
145	65	5±1	0.4±0.4	N/A	N/A	N/A
145	70	2.4±0.4	0.1±0.1	N/A	N/A	N/A
150	45	40±2	0.8±0.3	<1	<1	<0.9
150	50	17±2	<0.2	N/A	N/A	N/A
150	55	20±3	0.6±0.5	N/A	N/A	N/A
150	60	5±1	0.0±0.1	N/A	N/A	N/A
150	65	3±1	0.2±0.3	N/A	N/A	N/A
150	70	0.5±0.2	0.0±0.1	N/A	N/A	N/A
150	75	16±1.5	0.07±0.15	<1	2.3±0.2	1.2±0.5
150	0	0.9±0.3	0.06±0.08	<1	<1	<1
150	15	0.6±0.3	0.003±0.009	<1	0.1±0.1	0.6
150	30	2.2±0.5	0.4±0.2	0.3±0.3	0.6±0.1	<0.6
155	50	24±1	0.1±0.1	N/A	N/A	N/A
155	55	11±1	0.1±0.1	N/A	N/A	N/A
155	60	0.5±0.2	0.0±0.1	N/A	N/A	N/A
155	65	5±1	0.1±0.2	N/A	N/A	N/A

TABLE 5-1
(continued)

COORDINATES		pCi/g				
X	Y	Plutonium 239	Plutonium 238	Americium 241	Cesium 137	Strontium 90
165	0	0.09±0.13	0.05±0.09	<1	0.1±0.1	<0.7
165	15	2±0.5	0.08±0.13	<1	0.3±0.1	<0.9
165	30	6±0.8	0.4±0.2	<1	<1	<0.6
165	45	2.5±0.5	0.3±0.2	0.3±0.1	0.3±0.1	<0.6
180	50	0.3±0.2	0.2±0.2	<1	<1	<0.7

N/A Not analyzed

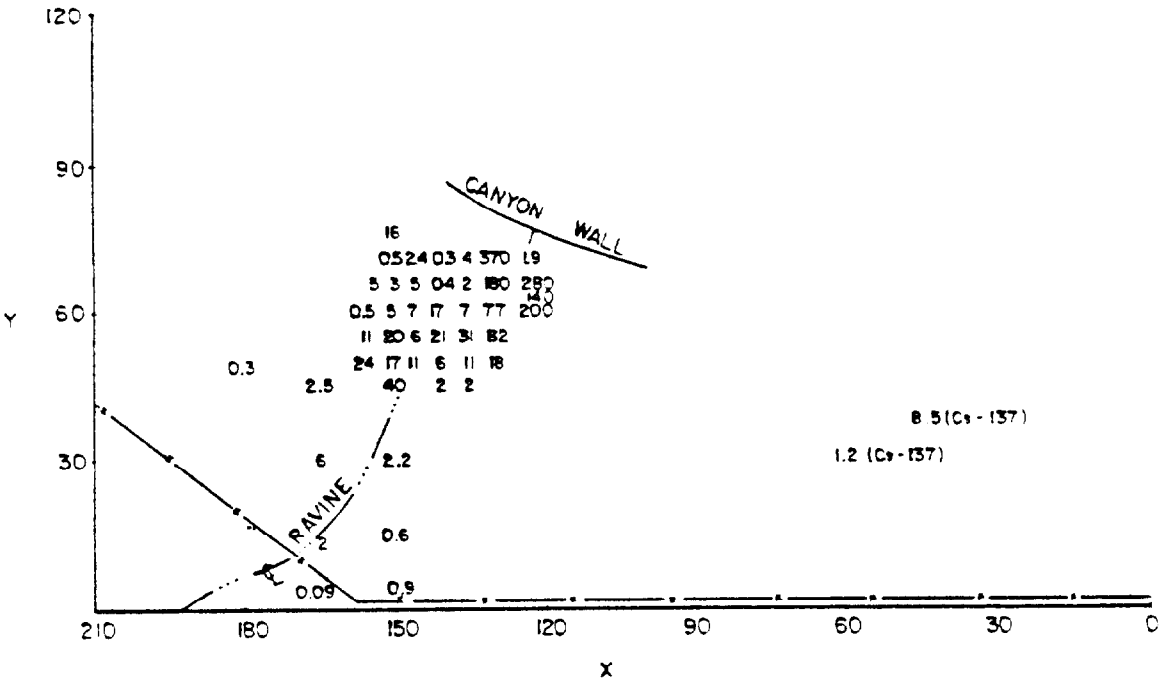

FIGURE 5-1 POST-REMEDIAL ACTION PLUTONIUM-239 CONCENTRATION IN SOIL IN pCi/g (CESIUM-137 INCLUDED TO INDICATE MIXED FISSION PRODUCT CONTAMINATION)

In addition to plutonium analyses, samples collected after the excavation initiated on August 4, 1982 were analyzed for americium-241, cesium-137, and strontium-90. Concentrations of these radionuclides were less than one percent of the applicable guide. Therefore, soil samples collected after hot spot excavation were analyzed only for plutonium-238 and -239. Those samples that were from portions of the site not included in the hot spot cleanup were included for verification purposes. Therefore, 11 soil samples in Table 5-1 include analyses for americium-241, cesium-137, and strontium-90.

Post-remedial action external exposure rates near the untreated waste outfall are presented in Table 5-2. The average exposure rate was 17 μR/h compared to the Los Alamos area average, 9.4 to 17.4 μR/h.

Within the former vehicle decontamination facility area, verification of the adequacy of the remedial action was based on soil sample analysis for the primary contaminants, cesium-137 and strontium-90, and external exposure rates. Based on two soil samples taken in this area the concentration of cesium-137 after remedial action was less than 10 percent of the criterion.

While the primary contaminants were cesium-137 and strontium-90, spotty plutonium-239 contamination also existed in the area as evidenced by one of ten pre-remedial action samples. However, based on these ten samples, the maximum permissable area averaged concentration of plutonium-239 (100 pCi/g) was not exceeded. The requirement to perform remedial action in the vehicle decontamination area was based on the concentrations of cesium-137 and strontium-90 in the soil. Therefore, no analysis for plutonium-239 was performed on post-remedial action samples collected from this area.

The external exposure rate near the former vehicle decontamination facility was 23 μR/h.

TABLE 5-2

ACID CANYON POST-REMEDIAL ACTION

EXTERNAL EXPOSURE RATES (INCLUDING BACKGROUND)

COORDINATES		EXPOSURE RATE (μR/h)
X	Y	
Former Vehicle Decontamination Facility		
35	30	32
40	30	22
45	40	22
45	45	19
50	45	21
	AVERAGE	23
Untreated Waste Outfall		
135	60	18
140	50	19
140	55	19
140	60	17
145	45	17
150	0	14
150	5	16
150	10	17
150	15	17
150	20	17
150	25	17
150	30	18
150	35	18
150	40	17
150	45	17
150	50	17
150	55	17
150	60	17

TABLE 5-2
(continued)

COORDINATES X	Y	EXPOSURE RATE (μR/h)
Former Vehicle Decontamination Facility		
150	65	17
150	70	18
150	75	17
155	0	15
155	5	15
155	10	17
155	15	17
155	20	17
155	25	18
155	30	17
155	35	17
155	40	17
155	45	17
155	50	18
155	60	17
160	0	15
160	5	15
160	10	15
160	15	16
160	20	16
160	25	18
160	30	17
160	35	17
160	40	16
160	45	17
160	50	18
160	55	18
160	60	17

TABLE 5-2
(continued)

COORDINATES X	Y	EXPOSURE RATE (μR/h)
Former Vehicle Decontamination Facility		
160	75	16
165	0	15
165	5	16
165	10	15
165	15	16
165	20	16
165	25	17
165	30	17
165	35	16
165	40	17
165	45	17
165	50	18
165	55	18
165	60	17
170	0	16
170	30	16
170	40	17
170	45	17
175	50	17
180	50	17
185	50	16
	AVERAGE	17

Background exposure rates in the Los Alamos area range from 9.4 to 17.4 μR/h.

Based on the above analyses and measurements, both the untreated waste outfall and former vehicle decontamination facility were in compliance with the remedial action criteria cited in Table 4-1. Compliance was confirmed by the LANL Environmental Surveillance Group (Reference 13).

5.8 ANALYSIS OF REMAINING CONTAMINATION BEYOND THE TWO REMEDIAL ACTION AREAS

In the first 100 m (30 ft) of the active channel below the rim of Acid Canyon the estimated concentration of plutonium-239 is 154 pCi/g. The maximum concentration measured by the LANL survey was 629 pCi/g. Over the 750 m (2300 ft) length of Acid Canyon the average concentration of plutonium-239 in the active channel is 30.6 pCi/g, while in the banks of the active channel it is 110 pCi/g (Reference 1).

Based on the rough terrain in the canyon and the minimal number of plausible pathways to man there, it was determined that remedial action in the channel was not required. Plausible pathways include resuspension/inhalation and erosion into Lower Pueblo Canyon where gardening is possible. The remedial action criterion for resuspension/inhalation is 7600 pCi/g, which is significantly higher than the contamination levels in Acid Canyon.

While the food/gardening pathway in Acid Canyon was eliminated from consideration, material now in Acid Canyon will eventually erode into Lower Pueblo Canyon. Based on data collected by LANL, the dilution factor between Acid and Lower Pueblo Canyons is six. Consequently, material from Acid Canyon, once diluted and dispersed, will not significantly alter the concentrations of plutonium-239 now in Lower Pueblo Canyon. The maximum concentration of plutonium-239 expected in Lower Pueblo Canyon would be approximately 20 pCi/g or 20 percent of the cleanup criteria based on the sum of all pathways.

Based on extrapolation of calculations performed in the 1976-77 LANL radiological survey, the home gardener in Lower Pueblo Canyon would be expected to receive an annual dose of 0.3 mrem to bone and 2 mrem to lung. These doses are a small fraction of the 1500 mrem limit for exposure to the general public specified in DOE Order 5480.1A (Reference 14) and represent an insignificant health risk.

6.0 COST

The total cost of the remedial action at Acid/Pueblo Canyon was $1,037,800. Extensive radiological characterization and subsequent engineering analysis were the major cost contributors. In-depth characterization was essential to ensure that all contaminants were located and identified. In addition, LANL performed extensive modeling of the migration of contaminants from Acid Canyon to Lower Pueblo Canyon to determine whether remedial action was required in the channel of Acid Canyon. This large data base was then assessed in detail to establish the most cost-effective remedial action option. After methodical review of several alternatives, each of which involved a significant amount of preliminary engineering effort, excavation of the contaminated material and disposal at a designated disposal site was selected. This engineering effort resulted in a minimum-cost remedial action solution for the Acid/Pueblo Canyon site which complied fully with all established criteria.

The construction costs were allocated in FY 1982. With the completion of the remedial action, these costs were reduced and in FY 1983 unexpended funds were returned to FUSRAP. The $19,000 cost for disposal of the 390 yd^3 at the LANL site is quite reasonable (approximately $\$1.80/ft^3$).

The BNI project costs for FY 1981 were directly influenced by the DOE-ORO policy to apportion all first-year FUSRAP program start-up costs among FUSRAP sites active during that fiscal year. Since BNI assumed the role of the PMC for FUSRAP in April 1981, its start-up costs were applied to eight active sites, including Acid/Pueblo Canyon. The actual cost of FY 1981 activities attributable to each site was not firmly defined because manhour accounting procedures were not fully operational. Consequently each site was allocated an approximately equal share of start-up costs rather than a proportionate one based on actual manhours expended.

The Acid/Pueblo Canyon Cost Summary (Table 6-1) provides a breakdown of cost by fiscal year and discipline. The construction cost appears low when compared with engineering/characterization, radiological, and management costs. Comparison of these costs based on the volume of contaminated material removed is not a valid indication of program effectiveness for two reasons. First, the construction cost was minimized by effective front-end engineering/characterization, which in turn minimized the amount of excavation required. A more appropriate comparison would include radiological/safety and licensing with construction since the former is essential to verification of the remedial action. Second, the costs associated with engineering, radiological characterization, safety, environmental assessment, documentation, and management are less directly related to the volume of contaminated material handled whereas construction cost is a more direct function of this volume.

TABLE 6-1

ACID/PUEBLO CANYON

COST SUMMARY

	1981	1982	1983	Total
ENGINEERING/CHARACTERIZATION				
BNI	18,000	26,600	6,600	51,200
FBDU	32,200			32,200
LANL	59,400	144,000		203,400
NLO	53,000			53,000
ENVIRONMENTAL ANALYSIS				
ANL		43,000		43,000
LANL	74,600	181,000		255,600
RADIOLOGICAL/SAFETY & LICENSING				
BNI	9,000	4,700	8,900	22,600
EIC		32,600	13,800	46,400
LANL-DISPOSAL			6,000	6,000
CONSTRUCTION				
BNI		9,200	[900]	8,300
ZIA		45,000	[25,700]	19,300
PLS		1,400	[300]	1,100
LANL-DISPOSAL			19,000	19,000
MANAGEMENT & SUPPORT				
BNI		89,400	2,100	91,500
APPORTIONED START-UP COST	185,200*			185,200
TOTAL	431,400	576,900	29,500	1,037,800

*Includes 1981 BNI Management and Support Costs.

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LA-9831-MS

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Radiological Survey Following Decontamination Activities Near the TA-45 Site

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RADIOLOGICAL SURVEY FOLLOWING DECONTAMINATION ACTIVITIES NEAR THE TA-45 SITE

by

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ABSTRACT

Three areas at the site of a former radioactive liquid waste treatment plant at Los Alamos National Laboratory were decontaminated during 1982 by Bechtel Corporation, with health physics support provided by Eberline Instrument Corporation, under the Department of Energy's Formerly Utilized Sites Remedial Action Program (FUSRAP). Before decontamination, there were above-background concentrations of gross alpha, gross beta, ^{238}Pu, $^{239,240}Pu$, ^{241}Am, ^{90}Sr, and ^{137}Cs in the surface soils. These combined concentrations were above operational decontamination guidelines for surface soil contamination. After cleanup operations, radionuclide concentrations in surface soils at all three sites were within decontamination guidelines.

I. INTRODUCTION

This evaluation of current radiological conditions at the site of a former radioactive liquid waste treatment plant [Technical Area 45 (TA-45)] at Los Alamos National Laboratory is based on analyses of soil samples taken from TA-45. The study was undertaken to supplement the Formerly Utilized Sites Remedial Action Program (FUSRAP) sponsored by the U.S. Department of Energy (DOE). FUSRAP is designed to evaluate the public health aspects of and need for remedial action at sites used by the former U.S. Army Corps of Engineers Manhattan Engineer District (MED) and U.S. Atomic Energy Commission (AEC).

II. BACKGROUND

Liquid radioactive wastes were generated by research with nuclear materials at Los Alamos, New Mexico, for the World War II MED atomic bomb project starting in 1943 and, subsequently, by work conducted for the AEC. Untreated effluents were discharged into Acid Canyon from 1944 until 1951. A treatment plant at TA-45 was constructed on the rim of Acid Canyon (Fig. 1) and discharged treated effluents from 1951 until 1964.

The radioactive liquid waste treatment plant was decommissioned in late 1966, and decontamination work in Acid Canyon continued into 1967. By June 1967, the treatment plant site and Acid Canyon were deemed sufficiently free of contamination to be released from AEC control without restriction. The treatment plant site, Acid Canyon, and part of Pueblo Canyon were transferred to Los Alamos County by quitclaim deed on July 1, 1967. Radiation surveys during the period of use and after decommissioning and decontamination indicated that there were some low-level residual contaminants, especially in the water-runoff channels. These have been monitored over the years as part of the routine environmental surveillance programs conducted by the Los Alamos National Laboratory (ESG 1982).

Early in 1976, the Energy Research and Development Administration (ERDA) identified Acid and Pueblo Canyons and the site of the former radioactive liquid waste treatment plant above Acid Canyon in Los Alamos as locations once used in, or affected by, operations of the U.S. Army MED and/or AEC. The areas were subsequently resurveyed in 1976-77 for residual contamination as part of FUSRAP under the auspices of ERDA and its successor agency, DOE (ESG 1981).

Under FUSRAP, Bechtel Corporation, with health physics support provided by Eberline Instrument Corporation, decontaminated an untreated radioactive waste-line discharge area southwest of the former TA-45 site during July, August, and October 1982 (Figs. 1, 2, and 3). In August and November of 1982, the Los Alamos National Laboratory's Environmental Surveillance Group (H-8) surveyed these decontaminated areas for above-background radionuclide soil concentrations to document postdecontamination conditions.

At the time of the cleanup (July, August, and October 1982), soil guidelines covering decontamination at FUSRAP sites had not been issued. To provide an operational framework for this decontamination, soil guidelines for the Acid and Pueblo Canyons cleanup project were used [(FBD 1981) and (Ferenbaugh 1982)]. These guidelines are listed in Table I.

In March 1983, general guidelines governing above-background concentrations of radionuclides in soils at the FUSRAP sites were published by the DOE (ORO 1983). These "FUSRAP guidelines," listed in Table II, are approximately the same as those in Table I. The $^{238}U/^{234}U$ limit of 40 pCi/g (Table I) differs from the natural uranium FUSRAP limit of 75 pCi/g (Table II). The

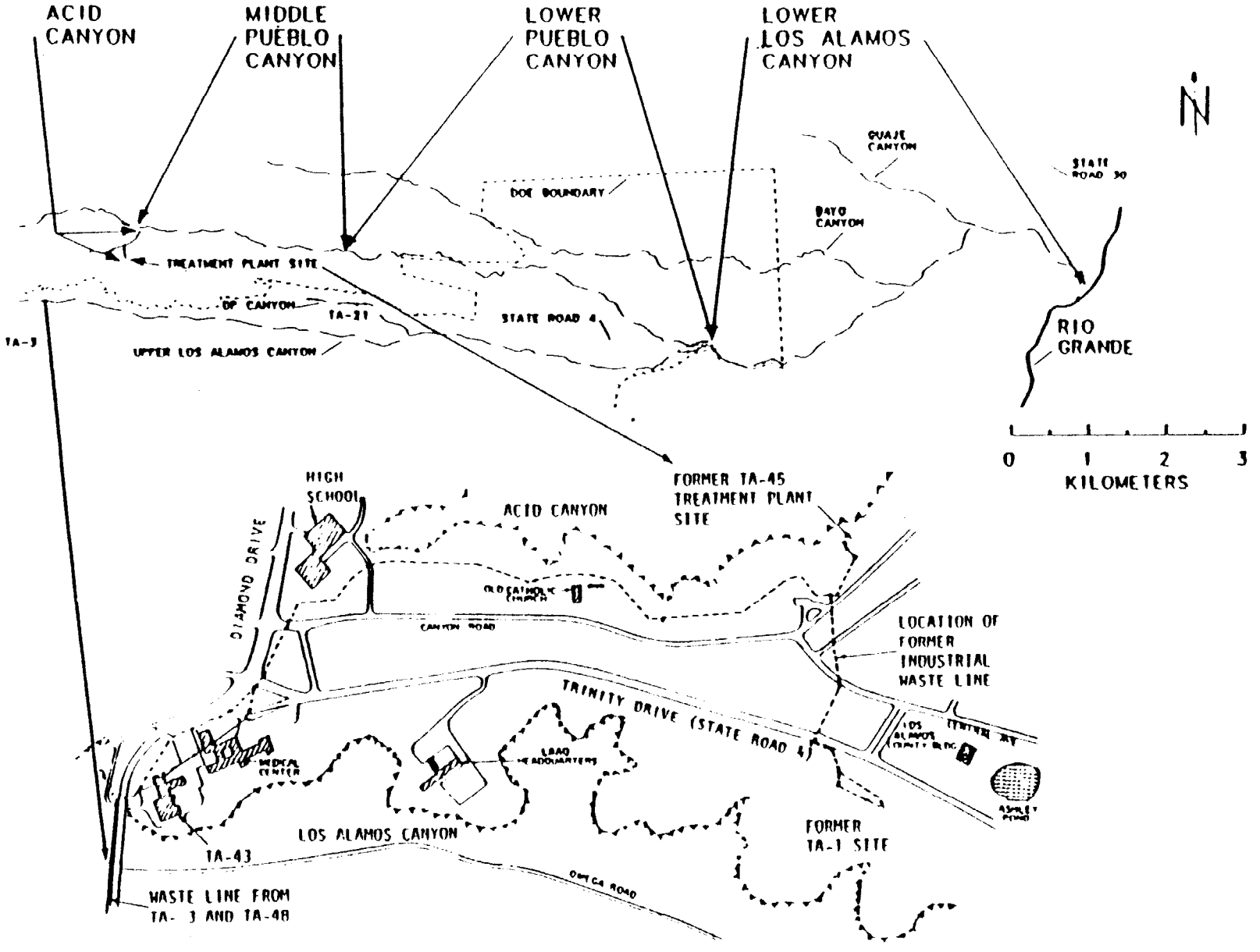

Fig. 1. Former liquid waste-handling facilities and relation to effluent receiving canyons.

Fig. 2. Untreated radioactive waste-line discharge point.

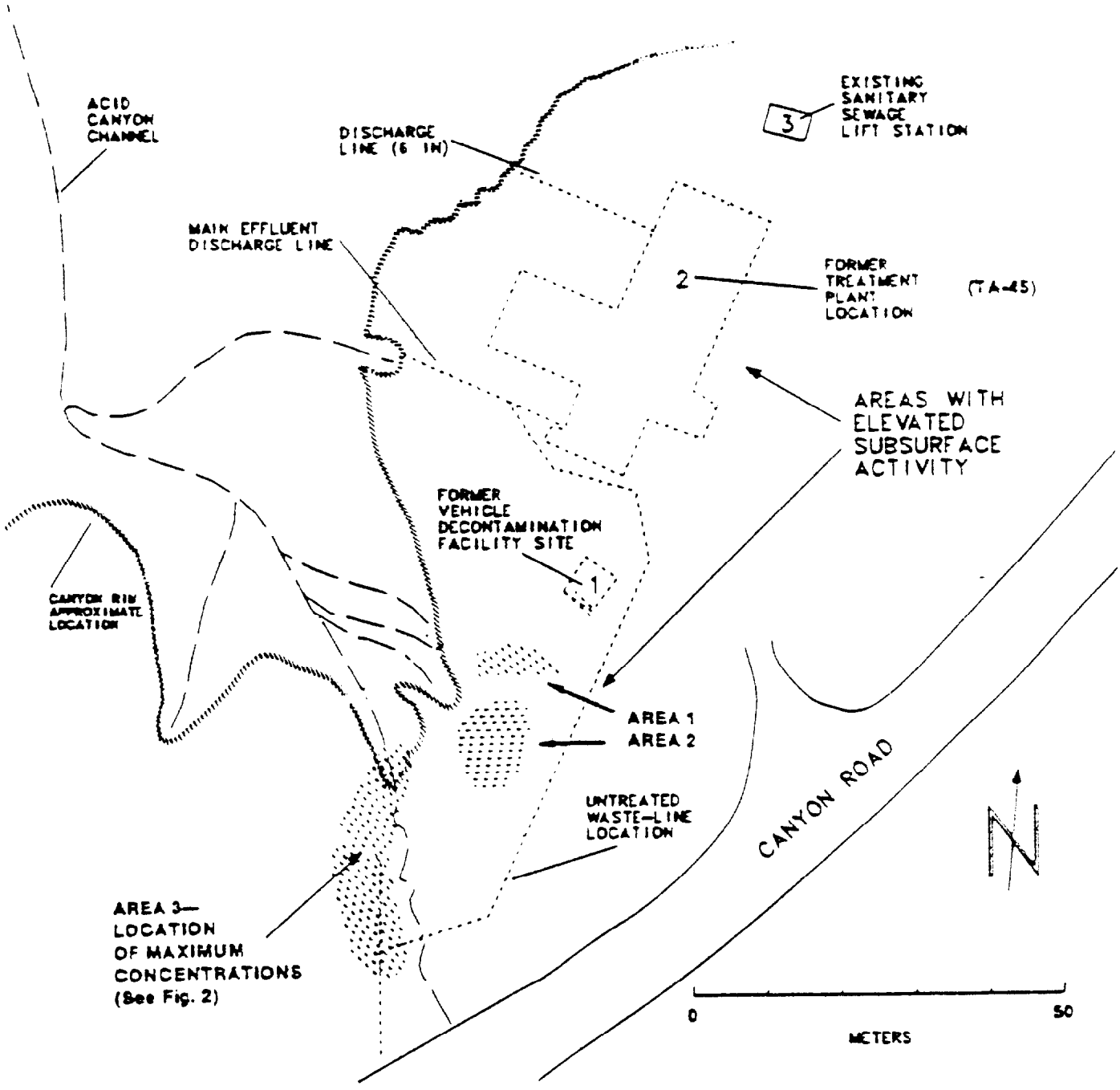

Fig. 3. Locations of Areas 1, 2, and 3 in vicinity of former liquid waste-handling facility (TA-45).

TABLE I

PROPOSED CRITERIA FOR SOIL CLEANUP ACTION

Radionuclide	Concentration (pCi/g above background)
^{241}Am	20
^{239}Pu	100
^{238}Pu	100
$^{238}U/^{239}U$	40
^{232}Th	20
^{230}Th	280
^{228}Th	50
^{137}Cs	80
^{90}Sr	100

TABLE II

SURFACE SOIL FUSRAP GUIDELINES
(ORO 1983 and Gilbert 1983)

Radionuclide	Radionuclide Soil Guideline (RSG) (pCi/g above background)
^{241}Am[a]	20
^{241}Pu[a]	800
$^{239,240}Pu$[a]	100
^{238}Pu[a]	100
Natural uranium[b]	75
^{238}U[b]	75
^{230}Th[b]	300
^{226}Ra[b]	15
^{137}Cs[a]	80
^{90}Sr[a]	100
^{3}H (pCi/mℓ) soil moisture[a]	5200

[a]These guidelines are based on radiation exposure from a 100- by 100-m contamination area. The guidelines are the average radionuclide concentrations from the 100- by 100-m area.

[b]Guidelines for the radionuclides in the ^{238}U decay series are based on the assumption that a 140- by 140- by 1.5-m homogeneous waste field is exposed at the ground surface. The guidelines are the average radionuclide concentrations from the 140- by 140- by 1.5-m area.

40 pCi/g limit refers only to the ^{238}U, but the ^{238}U is assumed to be in equilibrium with ^{234}U (Healy 1979). If both the ^{238}U and ^{234}U were to be included in the limit, it would be 80 pCi/g (40 pCi/g of ^{238}U and 40 pCi/g of ^{234}U), which is approximately the same as the 75 pCi/g FUSRAP guideline.

We decided to use the more general FUSRAP guidelines (Table II) in this report, even though they only became available after the cleanup was completed. These guidelines will also be applied at other FUSRAP sites. The two sets of soil guidelines are approximately the same numerically, but the FUSRAP limits differ from the previous guidelines, because they specify the area over which radionuclide concentrations can be averaged. The previous guidelines did not fix the area size but left this as a decision for the on-site health physics management.

Survey results reported here have been evaluated to determine if radionuclide concentrations in soil, after decontamination, conform to these FUSRAP guidelines. In these surveys, the soil was not sampled in the 100- by 100-m area specified in the FUSRAP guidelines but was done only in the zones designated for decontamination and in the immediately surrounding areas. The reason for this difference in the sizes of the areas sampled is that, as previously indicated, sampling was performed several months before the final FUSRAP guidelines were available. In addition, the previous FUSRAP survey showed that above-background radionuclide soil concentrations were minimal outside the areas designated for cleanup (ESG 1981). Radionuclide soil concentrations averaged over the designated areas are higher than those averaged over a larger 100- by 100-m area, so application of the FUSRAP guidelines to these smaller areas is conservative.

III. SURFACE SOIL REMEDIAL ACTION GUIDELINES AND CONDITIONS BEFORE DECONTAMINATION

The guidelines for cleaning up residual contamination at FUSRAP sites are in two DOE reports [(ORO 1983) and (Gilbert 1983)]. Table II gives these FUSRAP guidelines for surface soil contamination, which apply to soil samples averaged over a 100- by 100-m area. The guideline in Table II for each radionuclide applies if that radionuclide is the only one at above-background concentratrations. If more than one radionuclide is present, the guideline requires that the sum of the ratios of the soil concentration (C_i) of each radionuclide (i) to the radionuclide soil guideline (RSG_i) must be less than 1, that is,

$$\Sigma \left[(C_i)/(RSG_i)\right] .$$

The predominant radionuclides that were released in the effluent from TA-45 were ^{3}H, ^{89}Sr, ^{90}Sr, ^{137}Cs, ^{238}Pu, $^{239,240}Pu$ (ESG 1981) and trace amounts of ^{241}Pu (a beta-emitting radionuclide that is important because it decays into ^{241}Am). Radionuclide soil concentrations before cleanup have been reported previously (ESG 1981). When the procedure for applying the FUSRAP guidelines to several radionuclides was used, we found that the FUSRAP guidelines were exceeded by these reported concentrations. The most contaminated area (Area 3, see Fig. 3) was approximately 325 times the FUSRAP ratio guideline. [This number is probably an overestimate, because the sampling program described in ESG 1981 was not specifically designed for application of the FUSRAP guidelines, which were published several years after the original sampling took place. Also, inclusion of uncontaminated areas in the Area 3 sampling to cover a 100- by 100-m area would lower the overall average concentrations. However, almost certainly, the FUSRAP guideline would still have been exceeded in this area.]

IV. SURVEY RESULTS AND COMPARISON WITH SOIL CLEANUP GUIDELINES

Group H-6 conducted a radiological surface soil survey on 16 August 1982 of the untreated radioactive waste-line discharge area (Fig. 4). This first survey was conducted after the initial decontamination by Bechtel and Eberline Corporations. Surface soil samples were collected from three areas (Fig. 4) where Bechtel and Eberline had removed contaminated soil. The soil samples were counted for gross-alpha and gross-beta activities, which were used in screening high-level samples. Because of their relatively long half-lives and their dosimetric importance, analyses for ^{90}Sr, ^{137}Cs, ^{238}Pu, $^{239,240}Pu$, and ^{241}Am were done on selected soil samples using radiochemistry techniques (ESG 1982).

Results of this first survey after cleanup are shown in Table III. Radionuclide concentrations were greatly reduced as a result of the decontamination program. Several samples with high gross-alpha readings also had elevated $^{239,240}Pu$ and ^{241}Am concentrations. Samples with no detectable above-background gross-alpha activity also had relatively low levels of ^{238}Pu, $^{239,240}Pu$, and ^{241}Am. This correlation confirmed the usefulness of the gross-alpha procedure in screening soil samples to determine which samples had relatively higher levels of radioactivity; it also agreed with past experience at Los Alamos National Laboratory (ESG 1981). Four of the $^{239,240}Pu$ samples exceeded the 100-pCi/g FUSRAP guideline; however, the average $^{239,240}Pu$ concentration was determined by averaging soil concentrations separately, over Areas 1, 2, and 3, to approximate the 100- by 100-m areal average procedure, and this concentration was below the FUSRAP guideline.

Summing the ratios of each radionuclide soil concentration to the respective RSG checked for compliance with the FUSRAP ratio guideline of 1. Soil concentrations of ^{241}Pu, ^{234}U, and ^{235}U (which were not measured in this

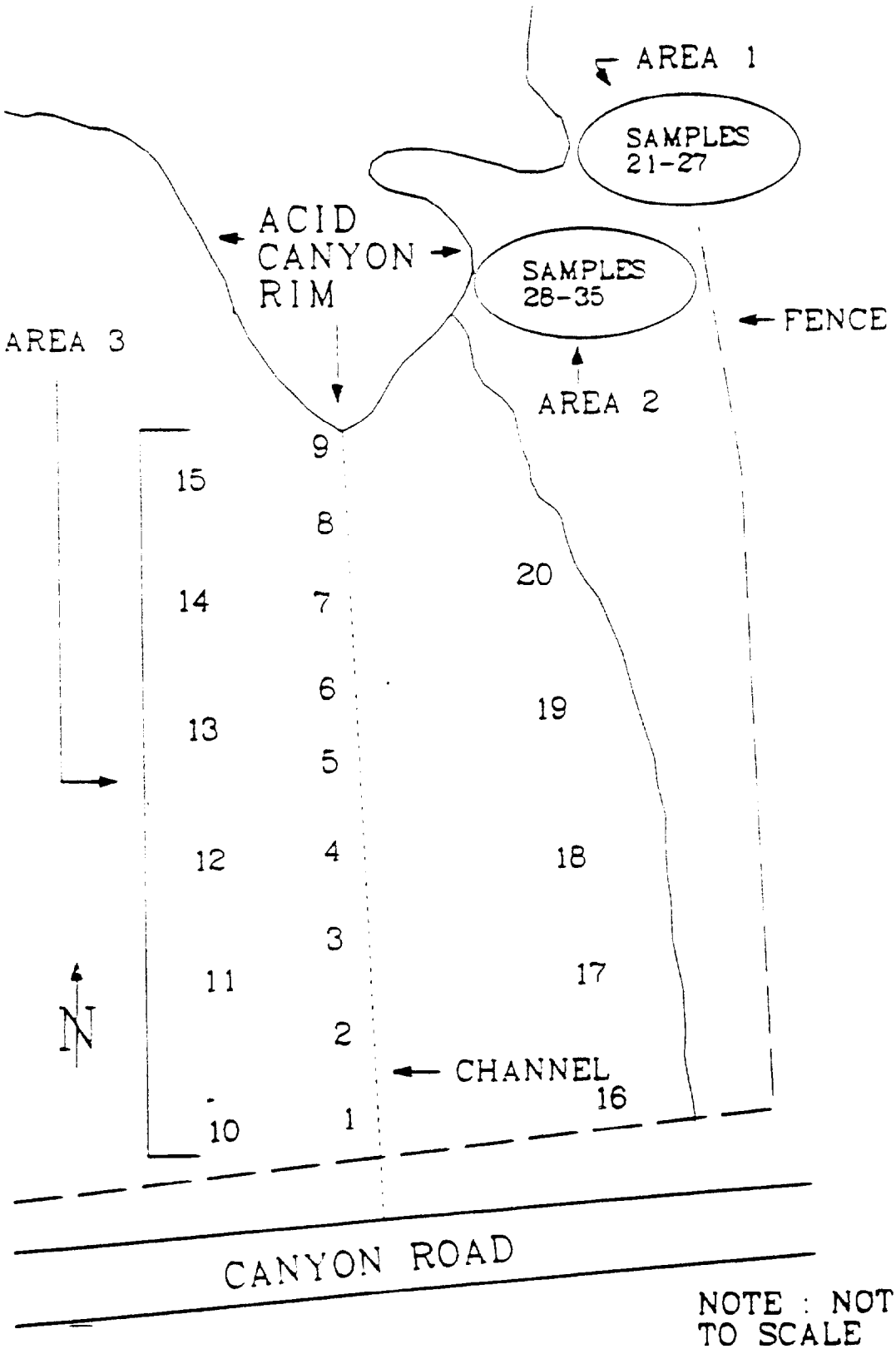

Fig. 4. Locations where surface soil samples were taken on 16 August 1982 radiological survey.

TABLE III

RESULTS OF RADIOLOGICAL SURFACE SOIL SURVEY DONE ON AUGUST 16, 1982

Sample Number (Fig. 4)	Gross Alpha (pCi/g)	Gross Beta (pCi/g)	^{238}Pu (pCi/g)	$^{239,240}Pu$ (pCi/g)	^{241}Am (pCi/g)	^{90}Sr (pCi/g)	^{137}Cs (pCi/g)
Minimum Detectable Limit	25	8	0.002	0.002	0.01	0.01	0.01
			AREA 3				
Typical Background[4]	10 ± 13		0.003 ± 0.007	0.026 ± 0.056	-	0.29 ± 0.33	0.44 ± 0.85
1	-	-					
2	-	-	0.001 ± 0.002	0.23 ± 0.02	0.6 ± 0.2		0.003 ± 0.001
3	-	-	0.004 ± 0.004	0.48 ± 0.04	0.7 ± 0.2		0.003 ± 0.001
4	-	-					
5	-	-					
6	-	-					
7	230 ± 40	-	0.51 ± 0.06	130 ± 12	8.2 ± 0.4		0.04 ± 0.009
8	270 ± 60	-	0.47 ± 0.04	130 ± 6	4.5 ± 0.3		0.004 ± 0.001
9	230 ± 60	-	0.52 ± 0.04	120 ± 6	2.8 ± 0.2		0.002 ± 0.001
10	-	-					
11	-	-					
12	-	-					
13	-	-					
14	400 ± 70	-	0.32 ± 0.03	77 ± 4	2.2 ± 0.2		0.004 ± 0.001
15	-	-					
16	-	-					
17	-	-					
18	-	-					
19	-	-					
20	-	-					
			AREA 1				
21	-	-					
22	-	-					
23	-	-					
24	-	-					
25	-	-					
26	-	-					
27	-	-					
			AREA 2				
28	-	212 ± 12				86 ± 6	17 ± 1
29	-	258 ± 14				101 ± 8	5.3 ± 0.6
30	-	106 ± 10				46 ± 4	5.6 ± 0.4
31	-	106 ± 10				59 ± 4	3.5 ± 0.3
32	-	60 ± 10				26 ± 1	2.0 ± 0.3
33	-	212 ± 12					
34	-	-					
35	-	-					

[4]Reference ESG 1982, p. 135. Typical background radionuclide concentrations in soils are averages of samples taken at six regional sampling locations in northern and central New Mexico during 1981.

Notes (1) Gross-beta counting system was only calibrated for ^{90}Sr.
(2) Results reported with ± two standard deviations.
(3) - Means sample activity was less than the minimum detectable limit.
No entry means no analysis was made on the sample.
(4) The ^{238}Pu, $^{239,240}Pu$, ^{241}Am, ^{90}Sr, and ^{137}Cs analyses were done using chemical dissolution and instrumental counting techniques. The gross-alpha and gross-beta analyses were counted with ZnS and plastic scintillator counting systems, respectively, on dried soil samples.

survey) were estimated from radionuclide activity ratios based on other soil sampling results (ESG 1981). The sum of the ratios for Area 3 was 0.4 ± 0.2. No above-background radioactivity was detected in Area 1. The sum of the ratios for Area 2 was 0.6 ± 0.1. However, this area had a relatively small size.

To further clean up isolated hot spots in Area 3, Bechtel and Eberline conducted a second decontamination effort during October 1982. On 1 November 1982, Group H-8 did a second radiological survey of the untreated radioactive waste-line discharge area (Fig. 5).

Results of the resurvey in Table IV and Fig. 5 show that of 34 surface soil samples taken in the untreated radioactive waste-line discharge area, 5 samples (410-, 120-, 410-, 100-, and 120-pCi/g gross alpha) were above the 100-pCi/g FUSRAP guideline for $^{239,240}Pu$ (assuming that the majority of the alpha activity came from $^{239,240}Pu$). Again, this 100-pCi/g FUSRAP guideline refers to the average $^{239,240}Pu$ concentration in surface soil from a 100- by 100-m area. The average of all 34 samples was 60-pCi/g gross alpha, which is less than the 100-pCi/g FUSRAP guideline. (The gross-alpha measurement, which is a crude field-screening technique, overestimates alpha activity. From Table III, we see that the gross-alpha measurement tends to be approximately double the total alpha activity in the sample.)

The ratio $\Sigma(C_i)/(RSG_i)$ was calculated again and compared with the FUSRAP ratio guidelines of 1. Radionuclide soil concentrations were calculated from the measured gross-alpha results and the previously measured radionuclide concentrations. The ratios were summed at 0.3 ± 0.2, indicating that the second cleanup reduced the radionuclide concentrations in soil. Because of the uncertainties involved in the analyses, this reduction was not significant statistically. Nevertheless, the radionuclide concentrations were still below the FUSRAP guidelines.

V. SUMMARY

Three areas at the site of a former radioactive liquid waste treatment plant (TA-45) were decontaminated during 1982 by Bechtel Corporation, with health physics support provided by Eberline Instrument Corporation, under the DOE's FUSRAP activity. Before decontamination, there were above-background concentrations of gross alpha, gross beta, ^{238}Pu, $^{239,240}Pu$, ^{241}Am, ^{90}Sr, and ^{137}Cs in the surface soils. The combination of these concentrations was above the FUSRAP guidelines for surface soil contamination. After cleanup operations, radionuclide concentrations in surface soils at all three sites were within the FUSRAP decontamination guidelines.

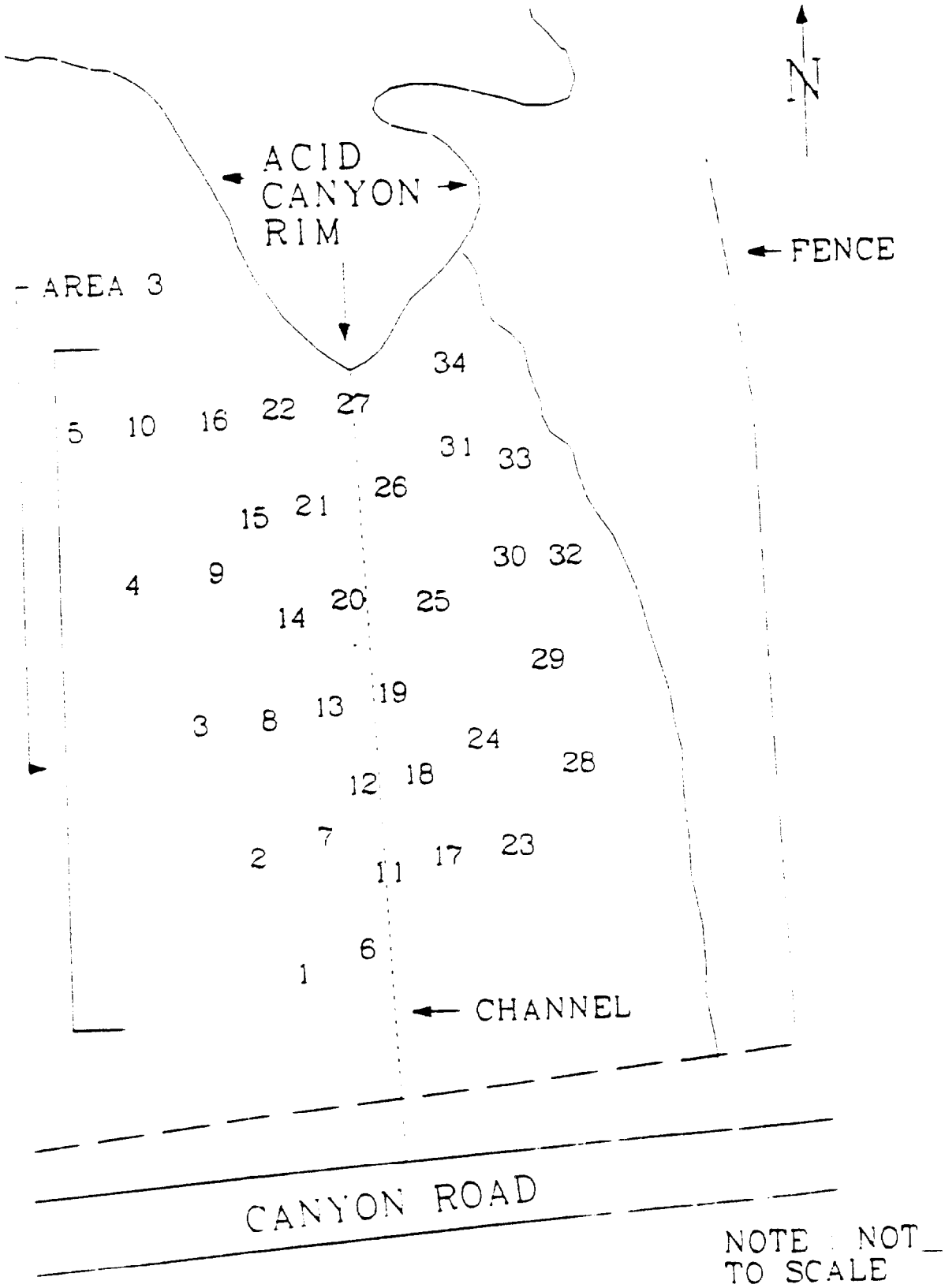

Fig. 5. Locations where surface soil samples were taken on 1 November 1982 radiological survey.

TABLE IV

RESULTS OF RADIOLOGICAL SURFACE SOIL SURVEY DONE ON NOVEMBER 1, 1982

Untreated Waste Line Discharge Area

Sample Number	Gross Alpha (pCi/g)
1	a
2	a
3	120 ± 40[b]
4	a
5	--
6	70 ± 50
7	a
8	a
9	a
10	a
11	100 ± 50
12	a
13	a
14	a
15	a
16	a
17	65 ± 38
18	a
19	a
20	a
21	46 ± 48
22	a
23	a
24	a
25	65 ± 38
26	a
27	a
28	a
29	410 ± 60
30	120 ± 60
31	a
32	a
33	410 ± 60
34	53 ± 49
35	a

[a]Sample activity is less than the minimum detectable limit of about 25 pCi/g.

[b]All results reported as X ± 2s.

NOTE: All samples analyzed for gross-beta activity were less than minimum detectable limit, except for Sample Number 33, which had a gross beta concentration of 23 ± 2 pCi/g.

REFERENCES

ESG 1981: Environmental Surveillance Group, "Formerly Utilized MED/AEC Sites Remedial Action Program, Radiological Survey of the Site of a Former Radioactive Liquid Waste Treatment Plant (TA-45) and the Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico," Los Alamos National Laboratory report LA-8890-ENV (U.S. Department of Energy report DOE/EV-0005/30) (May 1981).

ESG 1982: Environmental Surveillance Group, "Environmental Surveillance at Los Alamos During 1981," Los Alamos National Laboratory report LA-9349-ENV (April 1982).

Ferenbaugh 1982: R. W. Ferenbaugh, T. E. Buhl, A. K. Stoker, and W. R. Hansen, "Environmental Analysis of Acid/Middle Pueblo Canyon, Los Alamos, New Mexico," Los Alamos National Laboratory report LA-9409-MS (1982).

FBD 1981: Fore, Bacon, and Davis, Utah, Inc., "Engineering Evaluation of the Acid/Pueblo Canyon Site, Los Alamos, New Mexico," Bechtel report 10-05-01A-001 (October 1981).

Gilbert 1983: T. L. Gilbert, P. C. Chee, M. J. Knight, J. M. Peterson, C. J. Roberts, J. E. Robinson, S. Y. H. Tsai, and Y. Yuan, "Pathways Analysis and Radiation Dose Estimates for Radioactive Residues at Formerly Utilized MED/AEC Sites," U.S. Department of Energy, Oak Ridge Operations, ORO-832 (March 1983).

Healy 1979: J. W. Healy, J. C. Rodgers, and C. L. Wienke, "Interim Soil Limits for D&D Projects," Los Alamos Scientific Laboratory document LA-UR-79-1865-Rev. (1979).

ORO 1983: "Radiological Guidelines for Application to DOE's Formerly Utilized Sites Remedial Action Program," U.S. Department of Energy, Oak Ridge Operations, ORO-831 (March 1983).

U.S. DEPARTMENT OF ENERGY

memorandum

DATE JUN 30 1982

REPLY TO ATTN OF EP-1

SUBJECT National Environmental Policy Act (NEPA) Determination for the Proposed Remedial Action, Acid/Middle Pueblo Canyon FUSRAP Site, Los Alamos, New Mexico

TO Robert W. Ramsey, Jr., NE-30.1
Program Manager, Remedial Action Program

We have reviewed the Action Description Memorandum for the proposed remedial action at the Acid/Middle Pueblo Canyon site, Los Alamos, New Mexico, as requested, as well as the supporting draft environmental analysis. Based on our review of the information provided, and after consultation with the Office of the General Counsel, we have determined that an environmental assessment (EA) should be prepared to assure compliance with NEPA.

In this regard, the draft environmental analysis provides an adequate assessment of the proposed action, pursuant to the Department's responsibilities under NEPA, and can be adopted as an EA. Accordingly, the document is approved for publication as an EA, subject to incorporation of the minor changes noted on the attached copy. The EA has been assigned control number DOE/EA-0184, which should appear on the document cover.

Based on our review of the EA, and after consultation with the Office of the General Counsel, we find that the proposed remedial action for the Acid/Middle Pueblo Canyon site does not constitute a major Federal action significantly affecting the quality of the human environment, within the meaning of NEPA. Therefore, an environmental impact statement is not required for this action. A Finding of No Significant Impact, prepared in accordance with the requirements of the Council on Environmental Quality NEPA regulations (40 CFR Parts 1500-1508), and the Department of Energy implementing guidelines (Federal Register, March 28, 1980), is attached.

We expect minimal effect to result from the proposed action. Should any other information become available that might alter the conclusion of no significant environmental impact, this office should be notified.

In our view the proposed action does not meet the criteria set forth in Sections 1506.6 and 1501.4 of the Council on Environmental Quality NEPA regulations for publication of the finding in the Federal Register or a 30-day comment period on the EA. However, the assessment and finding must be made available to persons and agencies interested in or affected by the proposed action. Please provide the Office of Environmental Compliance with five copies of the EA and a copy of the distribution list for our record of the public involvement efforts in this proposal.

William A. Vaughan
Assistant Secretary
Environmental Protection, Safety,
and Emergency Preparedness

Attachments

Office of the General Counsel

Concur _____ Date 6-28-82

Nonconcur _____ Date _____

U.S. Department of Energy

FINDING OF NO SIGNIFICANT IMPACT

Remedial Action at the Acid/Middle Pueblo Canyon Site,
Los Alamos, New Mexico

The Department of Energy has prepared an environmental assessment (EA) on the proposed remedial action at the former radioactive waste treatment plant site (TA-45), Acid/Middle Pueblo Canyon, Los Alamos, New Mexico. Based on the findings of the EA, which is available to the public on request, the Department of Energy has determined that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq. Therefore, no environmental impact statement is required.

The proposed action is to excavate and remove the contaminated soils at the site of the former vehicle decontamination facility and around the former untreated waste effluent outfall. The soils would be removed to a depth of 30 to 45 centimeters (total excavated volume of about 230 cubic meters of contaminated soil) and transported by truck to the Los Alamos National Laboratory radioactive solid waste disposal site.

There are no significant environmental impacts associated with the proposed action. About 0.2 hectares of surface area would be directly affected by the clean-up operation. However, because the area is barren to sparsely vegetated, impacts to the biota would be minimal. No endangered or threatened species, historic stuctures or archeological resources are known to exist in the affected area. Environmental impacts, e.g., dust created by the excavation of soils, noise associated with heavy equipment used in the clean-up

operation, and interruption of traffic near the site, are anticipated to be temporary and typical of construction type activity.

As discussed in the EA, during normal work conditions or as the result of an accident, exposures to members of the clean-up crew, to truck drivers transporting the contaminated materials to the disposal site, and to members of the general public during the clean-up and transportation phases of the action, would be well within the radiation protection standards specified in Chapter XI of Department of Energy Order 5480.1A.

Alternatives to the proposed action considered in the EA include: 1) no action and 2) minimal action (i.e., fencing).

Single copies of the EA are available from:

Mary G. Wiltz
Mr. ~~Ed Delaney~~
U.S. Department of Energy
Nuclear Waste Management and Fuel Cycle Programs
Office of Nuclear Energy
Washington, D.C. 20545
301-353-4716

For further information contact:

Robert H. Strickler
U.S. Department of Energy
Office of Environmental Compliance
1000 Independence Avenue
Washington, D.C. 20585
202-252-4610.

Date Issued June 30 1982.

William A. Vaughan
Assistant Secretary
Environmental Protection, Safety,
and Emergency Preparedness

JUL 14 1982

Neil G. Seeley
County Administrator
Incorporated County of Los Alamos, NM
P.O. Box 30
Los Alamos, NM 87544

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP) ACID/PUEBLO CANYON AND BAYO CANYON

Dear Mr. Seeley:

This letter is to bring you up to date concerning the FUSRAP with respect to the two sites belonging to the County, Acid/Pueblo Canyon and Bayo Canyon, and to seek the County's consent to commence additional activities to bring the FUSRAP regarding these two properties to a successful conclusion.

The proposed remedial action at the Bayo Canyon site is to restrict the 1.25 acres of land where the former radiochemistry laboratory and the former solid and liquid waste disposal sites were located. These areas have subsurface strontium 90 contamination above the proposed 100 picocuries per gram of soil criterion that will require that the subsurface material not be disturbed for approximately 160 years, at which time the strontium 90 will have decayed to below the 100 picocuries per gram of soil level. This is in line with the County's statement that it would be no problem for the County to retain ownership, or require the private developer to return ownership to the County, of the relatively small area affected for development into a park or playground which would not require excavation at a depth greater than that necessary for utility line installation (no more than six feet). Accordingly, we need the County's consent so that Bechtel National, Inc., may send a survey team to the site so that metes and bounds for the 1.25 acres may be properly determined for inclusion in real estate documents, plats, etc. The survey will need to be accomplished within the next two months.

The proposed remedial action at the Acid/Pueblo Canyon site is to clean the area in upper Acid Canyon at the outfall of the former waste treatment plant. This work was to commence after the beginning of FY 83 (Oct. 1, 1982), but we have heard that the DOE at Oak Ridge wants the work to start around mid-August 1982. The clean-up work required is described in the enclosed letter from E. L. Keller, Oak Ridge Operations Office, to Harold E. Valencia, LAAO,

CONCURRENCES

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INITIALS/SIG	Crismon
DATE	7-9-82
RTG SYMBOL	CF&S
INITIALS/SIG	Warren
DATE	7-9-82
RTG SYMBOL	Dep. Mgr
INITIALS/SIG	Granere
DATE	7- -82
RTG SYMBOL	Area Mgr
INITIALS/SIG	Valencia
DATE	7-14-82
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dated May 27, 1982. On June 23, 1982, we supplied the Zia estimate and the Los Alamos National Laboratory estimate to Oak Ridge. Accordingly, we need the County's consent so that the clean-up work as described may commence around Mid-August 1982 as planned. Of course, after the work is completed, a report will be completed and furnished to the County for the record.

Please let me hear from you as soon as possible so that I may pass the words to Oak Ridge so that work may proceed regarding the FUSRAP sites.

Thank you for your cooperation.

Original signed by
Harold E. Valencia

Harold E. Valencia
Area Manager

1 Attachment

Fik

INCORPORATED COUNTY OF LOS ALAMOS, NEW MEXICO

July 28, 1982

Mr. Harold E. Valencia, Area Manager
Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP)
ACID/PUEBLO CANYON AND BAYO CANYON

Dear Mr. Valencia:

This is in response to your letter of July 14, 1982, requesting Los Alamos County's consent to commence additional activities in Bayo Canyon and Acid/Pueblo Canyon to bring the FUSRAP regarding these two properties to a successful conclusion.

At its meeting on July 26, 1982, the Los Alamos County Council adopted a motion granting consent to the Department of Energy and/or its agents to survey the 1.25 acres in Bayo Canyon and to perform the cleanup work in Acid/Pueblo Canyon.

If I can be of further assistance, please let me know.

Sincerely,

Neil G. Seeley

Neil G. Seeley
County Administrator

NGS:mam

2300 Trinity Drive • P.O. Box 30 • Los Alamos, New Mexico 87544 • (505) 662-8000

August 20, 1981

Robert W. Ramsey, Jr., NE-301, MS B107, GTN

REMEDIAL ACTION CRITERIA FOR NEW MEXICO FUSRAP SITES

Preliminary engineering and environmental analyses are being conducted at the Bayo Canyon and Acid/Pueblo Canyon sites in New Mexico. These sites are contaminated with transuranics and fission products, for which remedial action criteria levels have not been established. This office has discussed the need for appropriate remedial action criteria for these sites with you and members of your staff in the past and it was informally agreed that the criteria found in LA-UR-79-1865-Rev., Interim Soil Limits for D&D Projects, by J. W. Healy, J. C. Rodgers, and C. L. Hjenke (Los Alamos National Laboratory, September 12, 1979) would be used. These criteria have formed the basis of the engineering analysis being performed by Ford, Bacon and Davis Utah, Inc., and the environmental analysis being performed by Los Alamos Laboratory at the sites.

Remedial action at the sites is tentatively scheduled for the first quarter of FY 1983. We believe that a formal decision regarding criteria needs to be made as soon as possible so that we can continue on that schedule. For this reason, OR is formally requesting HQ approval of the use of the following soil limits for the radionuclides present at the New Mexico sites:

Radionuclides	Soil Limit (pCi/g)
Sr-90	100
Cs-137	80
Th-228	50
Th-230	280
Th-232	20
U-234	40
U-238	40
Pu-241	800
Am-241	200

Your prompt consideration of these criteria would be appreciated.

ORIGINAL SIGNED BY
E. L. KELLER

E. L. Keller, Director
Technical Services Division

SE-35:KFH

cc: William E. Mott, DOE-HQ
Wayne Hansen, LANL
R. L. Rudolph, Bechtel-OR, w/d
D. W. Connor, ANL
V. J. D'Amico, AMSE-OR

CONCURRENCE

RTG. SYMBOL	INITIALS/SIG.	DATE
SE-35	KFHarer	8/20/81
SE-35	ELKeller	8/20/81

MAR 17 1982

Bechtel National, Inc.
ATTN: Mr. R. L. Rudolph
PO Box 350
Oak Ridge, TN 37830

Gentlemen:

CRITERIA FOR REMEDIAL ACTION AT ACID/PUEBLO AND BAYO CANYONS; REQUEST FOR COST/BENEFIT ANALYSES OF REMEDIAL ACTION OPTIONS AT THE CANYONS

Enclosed are several pieces of correspondence related to Acid/Pueblo and Bayo Canyons. First, EP has concurred with the remedial action criteria for the New Mexico sites that were proposed to them on August 20, 1981 (with the addition of a criterion for Pu-239 added October 20, 1981). In summary, the criteria will be:

Radionuclide	Soil Limit (pCi/g)
Sr-90	100
Cs-137	80
Th-228	50
Th-230	280
Th-232	20
U-234	40
U-238	40
Pu-239	100
Pu-240	100
Pu-241	800
Am-241	20

The memorandum from RAPO to TSD that transmitted the EP and LANL correspondence includes a request that cost/benefit analyses be performed on the various proposed options being considered for the two New Mexico sites. Particular attention should be given to how previous estimated costs for Acid/Pueblo will be affected by EP's recent designation of only one relatively small section of the Canyon for remedial action.

As discussed with you on March 11, you are requested to develop an approach for the analyses that can be used for other FUSRAP sites as necessary. Please

CONCURRENCE
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INITIALS/SIG. KF Harper
DATE 3/12/82
RTG SYMBOL KFF SE-35
INITIALS/SIG. EL Keller
DATE 3/17/82
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OFFICIAL FILE COPY

coordinate this work with Kathleen Harer of my staff. RAPO anticipates that these analyses should each be only a few pages in length. However, they should adequately summarize all relevant costs and benefits associated with each option.

Sincerely,

Harer

for E. L. Keller, Director
Technical Services Division

SE-35:KFH

2 Enclosures:
Memo fm. Mary White dtd. 3/3/82
Memo fm. Mott dtd. 2/23/82

cc w/o encls:
W. Hansen, LANL
R. Vocke, ANL
M. White, DOE-HQ
V. D'Amico, AMSE

SE-35:KFHarer:tw:64450:3-12-82

CONCURRENCES
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U.S. DEPARTMENT OF ENERGY

memorandum

DATE MAR 3 1982

EP ATTN NE-30.1

SUBJECT New Mexico FUSRAP Sites

TO E. L. Keller
Oak Ridge Operations Office

Attached is a copy of a memorandum from W. E. Mott, EP-32, subject: Bayo Canyon and Acid/Pueblo Canyon Sites, Los Alamos, New Mexico, concurring with criteria suggested by FUSRAP for remedial action activities at the sites. The memorandum attachment (letter, Healy to Mott, dated October 9, 1981) concerns discussion of implementation of criteria at the New Mexico sites.

It is requested that cost/benefit analysis be prepared for the alternative extents of proposed remedial action, and submitted to this office for concurrence prior to proceeding with remedial action.

Mary G. White

Mary G. White
Acting FUSRAP Program Manager
Remedial Action Program
Nuclear Waste Management
and Fuel Cycle Programs
Office of Nuclear Energy

Attachment

U.S. DEPARTMENT OF ENERGY

memorandum

DATE FEB 2 3 1982

REPLY TO ATTN OF: EP-32

SUBJECT: Bayo Canyon and Acid/Pueblo Canyon Sites, Los Alamos, New Mexico

TO: Robert W. Ramsey, Jr., NE-30.1

In response to your January 25, 1982, memorandum regarding decontamination of the Bayo Canyon and Acid/Pueblo Canyon sites, we concur with the criteria you stated for the sites. In addition, I have attached a letter from Dr. Healy which outlines several cautions that should be considered in applying the criteria. Based on the minimum health effects involved, the criteria should be applied in conjunction with cost-benefit analyses of the proposed remedial actions.

William E. Mott

William E. Mott
Office of Operational
Safety (EP-32)

Attachment

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L. Lin
PH → J

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Health Division
HH 134
MS 400

October 9, 1981

Dr. William E. Mott, Director
Environmental and Safety
Engineering Division (EP-32)
Department of Energy
Washington, D.C. 20545

Dear Bill:

This is in reply to your letter asking my opinion about the application of the criteria in report LA-UR-39-1895-Rev. to the engineering and environmental analyses being conducted at Bayo Canyon and the Acid-Pueblo Canyon sites.

Let me say first that I feel very strongly about using limits derived for the specific radionuclide rather than picking a number derived for another radionuclide, such as the 5 pCi/g for radium. From this standpoint, I believe that the values are appropriate because they are the only ones that I know of that exist.

There are, however, several cautions that should be borne in mind when using these values.

1. The limits are nominally based on a dose rate to the most exposed organ of 500 mrem/yr in the year of highest exposure over a 70 year lifetime. The parameters were chosen to represent a most exposed individual so that this basis approximately corresponds to the present guidance put out by the FRC. However, the trend in Federal Agencies now seems to be push limits lower than the general standards.

2. For this reason, I would recommend that the standards be applied with a vigorous ALARA program to reduce levels as far below the standards as is reasonable. This should not be done by using an arbitrary fraction of the limit. Instead, judgements as to what is reasonable should be made for each site.

3. Note, also, that the report recommends averaging over 100 m^2 for the limits given. This is a somewhat arbitrary area but one that is reasonable in view of the parameters given.

4. The numerical values are based upon the surface layer of soil that can be disturbed by man or can contribute to plant uptake. For contamination below this layer, the individual situation should be appraised taking into account the possibility of man contacting it and the consequent dose.

I am certain that you are aware of the difficulty posed by the fact that these limits are individual recommendations that have not been adopted by any group. However, they are based upon the presently accepted dose limits for the public.

Sincerely yours,

J. W. Healy

JWH:eap

DOE F 1325.8
(5-83)

United States Government **Department of Energy**

memorandum

DATE: AUG 17 1984

REPLY TO ATTN OF: NE-24

SUBJECT: Recommendation for Certification of Decontamination for the Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico

TO: Franklin E. Coffman, Director
Office of Terminal Waste Disposal
and Remedial Action

I am attaching for your signature the post-decontamination Statement of Certification (attachment 1) and the Federal Register Notice of Certification (attachment 2) for the TA-45 treatment plant site and associated canyons at Los Alamos, New Mexico.

Acid Canyon served as the discharge area for radioactive liquid wastes resulting from research and processing operations conducted at Los Alamos National Laboratory under contract to the Manhattan Engineer District and the Atomic Energy Commission. Beginning in 1943 or early 1944, untreated wastes were discharged to Acid Canyon. The natural drainage system carries radionuclides into Pueblo and Los Alamos Canyons. From June 1951 until May 1964, a treatment plant known as TA-45 processed varying fractions of the liquid waste being produced before discharge to the canyons, removing plutonium and other radionuclides. Discharges to Acid Canyon were discontinued in June 1964. TA-45 was dismantled in late 1966 and decontamination work in Acid Canyon continued until 1967, when these areas were deemed sufficiently free of contamination for unrestricted use.

Soil samples taken by Los Alamos National Laboratory during a survey in 1976 and 1977 indicated that two small areas were still contaminated with plutonium above acceptable levels. On February 8, 1982, the Office of Environmental Protection, Safety, and Emergency Preparedness designated these areas as requiring remedial action. Excavation and disposal of contaminated material was completed in September 1982. Results of in situ gamma measurements and laboratory soil analyses indicated that the remedial action was successful.

Based on a review of all documents related to the former TA-45 plant site and associated canyons, we have concluded that, in accordance with the certification procedures defined in the Formerly Utilized Sites Remedial Action Program protocol, they should be certified for unrestricted use. I am providing the attached docket to support this certification (attachment 3).

Following your concurrence in the certification, we will notify interested State and local agencies, the public, local land records offices, and the specific property owners of the certification actions

by correspondence and local newspaper announcements, as appropriate. The documents transmitted with the Statement of Certification and the Federal Register Notice will be compiled in final docket from the Remedial Action Projects Division for retention in accordance with DOE Order 1324.2 (Disposal Schedule 25).

John E. Baublitz, Director
Division of Remedial Action Projects
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

3 Attachments

STATEMENT OF CERTIFICATION: THE FORMER SITE OF THE RADIOACTIVE LIQUID WASTE TREATMENT PLANT (TA-45) AND THE EFFLUENT RECEIVING AREAS OF ACID, PUEBLO, AND LOS ALAMOS CANYONS

The Office of Terminal Waste Disposal and Remedial Action has reviewed and analyzed the radiological data obtained following remedial action at the former site of the TA-45 treatment plant, Los Alamos, New Mexico. Based on this analysis, the Department of Energy certifies that the TA-45 plant site and associated areas of Acid, Pueblo, and Los Alamos Canyons are in compliance with all applicable decontamination criteria and standards. This certification of compliance provides assurance that unrestricted use of any of these areas will result in no radiological exposure above applicable criteria and standards to members of the general public or to site occupants.

By: F E Coffman Date: 8/28/84

F.E. Coffman, Director
Office of Terminal Waste Disposal
and Remedial Action

DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR ENERGY

Certification of the Radiological Condition
of the Former Site of the Radioactive Liquid Waste
Treatment Plant (TA-45) and Effluent Receiving Areas of Acid,
Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico

AGENCY: Office of Terminal Waste Disposal and Remedial Action, Department of Energy

ACTION: Notice of Certification

SUMMARY: The Department of Energy has completed radiological surveys of and taken remedial actions to decontaminate the former site of the radioactive liquid waste treatment plant (TA-45), Los Alamos National Laboratory, Los Alamos, New Mexico. The site contained low levels of radioactive material deposited during the period when the Laboratory was operated under contract to the Manhattan Engineer District and the Atomic Energy Commission. The Department, through the Office of Terminal Waste Disposal and Remedial Action, has issued the following statement:

STATEMENT OF CERTIFICATION: FORMER SITE OF THE RADIOACTIVE LIQUID WASTE TREATMENT PLANT (TA-45) AND EFFLUENT RECEIVING AREAS OF ACID, PUEBLO, AND LOS ALAMOS CANYONS

The Office of Terminal Waste Disposal and Remedial Action has reviewed the radiological data obtained following remedial action at the former site of the TA-45 treatment plant and effluent receiving areas, Los Alamos, New Mexico. Based on this review and earlier radiological surveys, the Department of Energy has certified that the former TA-45 plant site and associated areas of Acid, Pueblo, and Los Alamos Canyons are in compliance with all applicable decontamination criteria and standards. This certification of compliance provides assurance that unrestricted use of any of these areas will result in no

radiological exposure above applicable criteria and standards to members of the general public or to site occupants. Accordingly, the site is released from the Formerly Utilized Sites Remedial Action Program.

FOR FURTHER INFORMATION CONTACT:

J.E. Baublitz, Director
Division of Remedial Action Projects
Office of Terminal Waste Disposal and
Remedial Action
U.S. Department of Energy
Washington, D.C. 20545
(301) 353-5272

SUPPLEMENTARY INFORMATION: The Department of Energy has established a program to characterize and, where necessary, correct the radiological conditions at sites formerly used by the Army Corps of Engineers' Manhattan Engineer District and the Atomic Energy Commission during the early years of nuclear research, development, and production. The ultimate objective of the program is to ensure that formerly utilized sites, and any associated properties in their vicinity, can be certified within current radiological guidelines and applicable standards established to protect the general public. The former site of the radioactive liquid waste treatment plant (TA-45) and the natural drainage areas of Acid, Pueblo, and Los Alamos Canyons that received radioactive liquid effluents are two of these sites.

Acid Canyon served as the discharge area for radioactive liquid wastes resulting from research and processing operations associated with nuclear weapons development at the Los Alamos National Laboratory. Beginning in late 1943 or early 1944, untreated wastes were discharged to Acid Canyon, which drains into Pueblo Canyon, then into Los Alamos Canyon, and finally to the Rio Grande. From June 1951 until May 1964, a treatment plant known as TA-45 processed varying fractions of the liquid waste being produced before discharge to the canyons, removing plutonium and other radionuclides. Discharges to Acid Canyon were discontinued in June 1964. TA-45 was dismantled in late 1966 and

decontamination work in Acid Canyon continued until June 1967, when these areas were deemed sufficiently free of contamination for unrestricted use.

In 1976, the Energy Research and Development Administration identified the Acid/Pueblo Canyon site as one of the locations to be re-evaluated under the Formerly Utilized Sites Remedial Action Program. Soil samples taken by Los Alamos National Laboratory during a survey in 1976-1977 indicated that two small areas were contaminated with plutonium to unacceptable levels: near the former site of a vehicle decontamination facility and at the outfall of the untreated waste lines. Excavation and disposal of contaminated material was completed in September 1982. Based on the results of soil samples taken at the completion of the remedial action, the Director of the Office of Terminal Waste Disposal and Remedial Action certified that radiological conditions at the site are now consistent with the criteria established for the remedial action and that unrestricted use presents no radiological hazards to the general public or to site occupants. Accordingly, the site is released from the Formerly Utilized Sites Remedial Action Program.

These findings are supported by the Department of Energy "Certification Docket for the Former Site of the Radioactive Liquid Waste Treatment Plant (TA-45) and the Effluent Receiving Areas of Acid, Pueblo, and Los Alamos Canyons, Los Alamos, New Mexico." The dockets will be available for review between 8:00 a.m. and 4:00 p.m., Monday through Friday (except Federal holidays), in the Department of Energy Public Document Room located in Room 1E-190 of the Forrestal Building, 1000 Independence Avenue, SW., Washington, D.C.

F E Coffman

Dated: 8/28/84

F.E. Coffman, Director
Office of Terminal Waste Disposal
and Remedial Action