Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

AUG 1 1 1994

Barbara Driscoll
RCRA Permits Branch
Hazardous Waste Management Division
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Ms. Driscoll:

Enclosed are two draft Corrective Action Management Unit (CAMU) proposals. ~~The proposals~~ conform to the U.S. Environmental Protection Agency's (EPA) procedure for reviewing initial CAMU applications.

During your visit on August 15-19, 1994, we have scheduled a meeting on CAMUs for August 18, 1994 at 2:30 p.m. I look forward to discussing these draft proposals then.

If you have questions, please call me at 505-665-7203.

Sincerely,

T.J.T

Theodore J. Taylor
Program Manager
Environmental Restoration Program

Enclosure

cc w/ enclosure:
B. Hoditschek, New Mexico Environment Department
B. Swanton, NMED/AIP, MS J993
T. Taylor, ESH, LAAO
C. Fesmire, Scientech/LAAO
J. Levings, ERPO, AL, MS A906
D. Garvey, ESH-8, UC-LANL, MS K490
cc w/o enclosure:
K. Boardman, ERPO, AL, MS A906
W. Spurgeon, EM-452, HQ
T. Baca, EM-DO, UC-LANL, MS-J591
J. Jansen, EM/ER, UC-LANL, MS M992
RFP, MS M707

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PROPOSAL FOR A CORRECTIVE ACTION MANAGEMENT UNIT AT LOS ALAMOS NATIONAL LABORATORY'S TECHNICAL AREA 15, E-F FIRING SITE

August 10, 1994

The following information is provided in support of an application to the Environmental Protection Agency's (EPA's) Region 6 Administrator for a corrective action management unit (CAMU) at the E-F Firing Site in Los Alamos National Laboratory's Technical Area (TA) 15. This information is organized as specified by the EPA Region 6 Standard Operating Procedure for CAMU Requests.

1st site

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1.0 IMPLEMENTATION

The TA-15 E-F Firing Site is a location where large (up to 5,500 pounds) explosive charges have scattered approximately 340 kg beryllium; 97 kg lead; 20,000 kg depleted uranium; and 43,000 kg natural uranium over some 30 acres of soil and tuff. There are three obvious remediation activities that could be performed:

(1) Remove the 30 acres of top soil containing the contaminants and transport the material to a permitted landfill.

(2) Process the 30 acres of top soil through a soil washing apparatus. Remove the separated contaminants to a permitted landfill.

(3) Cap the contaminated area.

(4) Implementation of a CAMU-permitted landfill at this location is a fourth option.

1.1 Reliability, Effectiveness, Protectiveness, and Cost-Effectiveness

1.1.1 Reliability

The reliability of the CAMU-permitted landfill is expected to be the same as that of any permitted landfill to which the material from the E-F Firing Site might be taken

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for disposal. The landfill design will meet or exceed all minimum technology requirements. Construction of the CAMU-permitted landfill and emplacement of liners and monitoring alarm systems will be done according to a quality construction plan, with all phases of construction monitored for compliance with the construction plan.

1.1.2 Effectiveness

Disposal of wastes from inactive firing sites in this CAMU-permitted landfill is effective, because the contaminated soils will be remediated by placing them in a landfill that meets or exceeds minimum technology requirements. There are currently no treatment facilities known to Laboratory personnel that can receive and treat mixed waste comprised of soil and debris. One disposal facility that can receive mixed waste is not licensed for some of the radioactive materials that may be present and does not treat any mixed waste.

1.1.3 Protectiveness

Placing remediation waste in this proposed CAMU-permitted landfill will be more protective than allowing the materials to remain in the environment, exposed to the elements. Such placement in a structure with liners and an engineered cover will provide greater protection against migration than capping the waste in place.

1.1.4 Cost-Effectiveness

Management of wastes from inactive firing sites through use of a centrally located land fill will be cost effective in comparison to the costs associated with transporting the materials to other locations and possible payment of commercial disposal fees.

1.2 Waste Management Within the CAMU and Timelines

The waste at the E-F Firing Site consists of geologic materials contaminated with beryllium, lead, uranium, and possibly other materials that might be hazardous. The potentially hazardous materials are expected to be dispersed over approximately 30 acres as a result of explosive tests. The top soil at this location averages about 2 feet in depth, and all potentially hazardous material is expected to be either in the

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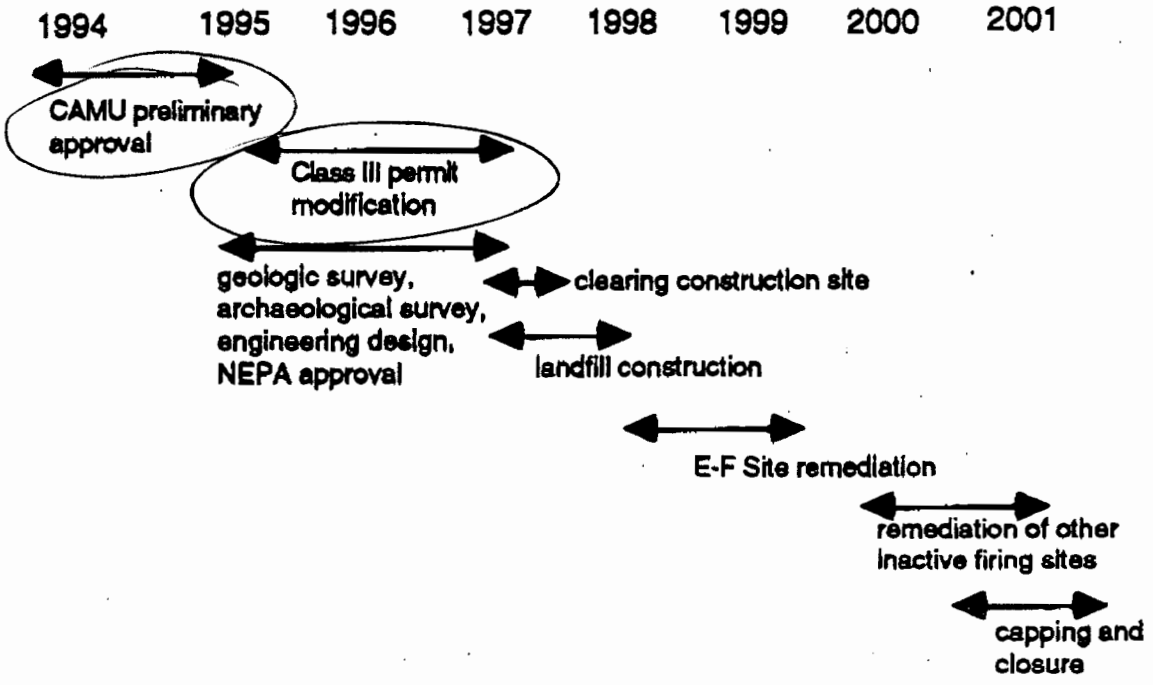
topsoil or at shallow depths in the underlying tuff.

The movement of wastes at this CAMU will not commence until the design of the landfill is complete and all necessary approvals to begin construction have been obtained. The first step in the construction process will be to clear the construction area of contaminated media by bulldozing aside the minimum area needed for construction activities. The resulting piles will be stabilized only to the extent necessary to prevent aeolian and pluvial redistribution until this material can be placed in the CAMU-permitted landfill for disposal. Construction of the landfill, including installation of the double-liner system and installation of the leachate monitoring and alarm system, will require approximately one year. When construction is complete, all the contaminated media at E-F Site will be placed in the landfill. Completion of the E-F Site remediation is expected to take about one year. The landfill will be used for disposal of similar waste from other firing sites at the Laboratory. When these similar sites are remediated, the landfill will be closed and capped with an engineered barrier to prevent the infiltration of water and snow melt.

Timeline



1.3 Types of Media

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The media to be placed in the CAMU-permitted landfill will consist entirely of geologic materials contaminated with hazardous wastes, such as lead, and other materials from past Laboratory activities that are potentially deleterious to the environment or human health, such as uranium and other radioactive materials, beryllium, residues from high explosives, and mercury.

Only wastes from remediation activities will be placed in this landfill, in accord with the CAMU regulation.

life of CAMU?

1.4 Remediation Expediency

Establishing this CAMU at Los Alamos National Laboratory will facilitate environmental cleanup by providing a location where geologic media contaminated with hazardous and radioactive constituents can be disposed in a safe and effective manner with minimal transportation of these materials. The Laboratory recognizes that offsite shipment of waste does not enhance remediation. The large volumes expected would have to be transported through portions of three states at a minimum, and liability for any problems at the selected disposal facility would remain with Los Alamos National Laboratory. Onsite disposal of these large volumes is a problem, too, because of insufficient permitted capacity. A landfill has been designed and proposed at TA-67, but approval for start of construction appears at present to be further in the future than the one year required for CAMU approval. Disposal of wastes at this other proposed facility would have to comply with all land disposal restrictions. The two principal advantages of the CAMU-approved landfill are

(1) an approval process specified in the EPA's standard operating procedure that can be less than one year long (but followed by a Class III permit modification process) and this may mean 2 yrs.

(2) exemption from land disposal restrictions.

The latter is particularly important, because the wastes proposed for this CAMU-permitted landfill are types where treatment within 90 days really does not help in providing a cleaner and safer environment. These wastes are mainly geologic

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media contaminated almost entirely with inorganic—rather than organic—wastes. This proposed use of the CAMU regulation truly is the fastest, cheapest, and most protective way to remediate the inactive firing sites at the Laboratory.

The current baseline schedule estimates completion of remediation at the E-F Site by December 7, 2001. Note that the timeline shown above results in completing the E-F Site remediation by 1999. Remediation of additional sites will start as soon as the E-F Site remediation is complete. Thus the value of this CAMU for remediation at the Laboratory is greater than that of remediating the E-F Site alone.

2.0 CAMU DESCRIPTION

2.1 Configuration and Construction Design

? see page 2 concerning top soil

The CAMU-permitted landfill is expected to be a rectangular pit that is excavated to a depth of approximately 20 feet. The sides will be sloped to meet the 1:2 minimum technology requirement. The landfill will be located at least 100 feet away from the edge of the mesa, at the closest point. The size of the pit will have to be optimized on the basis of the likely volumes of contaminated material to be placed there. A pit approximately 1,000 feet long by 300 feet wide has been taken as a starting point. The useful volume of such a pit is ~200,000 cubic yards, with the volume of the sloping sides and the 3-foot thick liner excluded.

The landfill design will include a leachate collection and removal system that meets the following minimum technology requirements:

ok space

- minimum bottom slope of 1%;
- either -

  12 inches or more of granular drainage material having a hydraulic conductivity of 1×10^{-2} cm/s,

  or

  Geonet with transmissivity of at least 3×10^{-5} m^2/s;
- chemically resistant to the waste or waste leachate being managed; and
- the liner drainage and leachate collection systems must be operated to minimize clogging of these systems.

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The bottom liner will be designed as a composite of two layers. The upper layer will be designed and constructed to prevent the migration of hazardous constituents into the liner through the post-closure care period of the facility (30 years). The lower layer of the bottom liner will be constructed of at least 3 feet of compacted soil material having a conductivity less than or equal to 1×10^{-7} cm/s. The strength of the leachate collection and removal system and liner construction materials must exceed the pressure of the cover and waste overburden.

The reported tendency of clay to crack in the Los Alamos environment might make the installation of a different liner more protective, but such a change in design would be undertaken only after agreement between the regulators and the permittees that a different design would be preferable.

The cover system requirements for closure under 40 CFR 264.310 are based on performance and include the following:

- provide long-term minimization of migration of liquids through the closed landfill;
- function with minimum maintenance;
- promote drainage and minimize erosion or abrasion of the cover;
- accommodate settlement and subsidence so that the cover's integrity is maintained; and
- have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils.

In the Los Alamos environment, the proposed cover system for this CAMU could feature:

- all natural materials allowing for more certain long-term performance over synthetic materials;
- a vegetative layer to provide evapotranspiration and reduce erosion and soil loss;
- a top soil layer to serve as a rooting medium and a zone of moisture retention and storage; and
- either a low-permeability layer or a fine-sand layer to serve as a capillary break above the underlying gravel layer, which provides for lateral

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drainage within the cover thereby minimizing infiltration into the wastes.

The landfill could be constructed with individual cells that are excavated as needed or as a single pit. The first option has the advantages of a shorter time to operation and flexibility concerning ultimate capacity. The second option would permit emplacement of the liner all at once, which might offer less likelihood of questions concerning the integrity of the liner seal. The preferable option will be chosen on the basis of overall protection to the environment. A monitoring and alarm system will be installed to detect the presence of any moisture that accumulates between liners.

Figure 1 shows the location of E-F Site within the Laboratory boundaries. The central position is obvious. However, explosive experiments currently conducted in the vicinity of E-F Site periodically limit access to this area. Figure 2 shows the outline of the proposed CAMU boundary plus the location of the landfill within the CAMU boundary. Figure 3 is a cross-section of the landfill.

2.2 Uncontaminated Areas

The entire CAMU is likely to be situated on contaminated land. Field work is underway now to define the maximum areal extent of contamination. Topographic constraints at the site may cause the CAMU to protrude slightly onto uncontaminated land immediately adjacent to the E-F Site.

2.3 Regulated Units

No regulated units will be included in this CAMU.

2.4 Temporary Units

Temporary units will not be used at this CAMU, as far as known at present.

3.0 WASTE DESCRIPTION

3.1 Types and Quantities of Wastes

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The types of wastes to be disposed in this CAMU are expected to include no listed wastes. The primary characteristic waste likely to be encountered is lead. The large quantities of uranium with both natural isotopic concentrations and isotopic concentrations depleted in ^{235}U technically are low-level radioactive materials that are not regulated under RCRA. The other constituent of concern is beryllium, but it is also unlikely to be regulated under the provisions of the Act just cited.

The total quantity of waste to be deposited in this CAMU-permitted landfill will be ~200,00 cubic yards.

3.2 Source of Waste

The source of this waste is explosively-driven experiments conducted over the years at the Laboratory. About half the total volume is expected to come from the E-F Site, which is the proposed location of this CAMU. The remainder is expected to come from other inactive firing sites in the vicinity, such as A, B, and G. Firing Site R-44 is known to have had large quantities of materials similar to those at E-F Site dispersed by explosions (about 343 kg beryllium; 15 kg lead; and 7,054 kg depleted uranium), but R-44 has not yet been listed as an inactive site. Firing Sites A and B are located ~1,000 feet to the southwest of E-F Site. Firing Site G is located ~1,000 feet south of E-F Site. R-44 is located ~2,000 feet northeast of E-F Site.

3.3 Treatment

No treatment of this waste is proposed, other than that which may be necessary to stabilize the waste piles that will be generated prior to construction of the landfill.

3.4 Ultimate Disposition Of Wastes

The ultimate disposition of these wastes is burial in this CAMU-permitted landfill, which will be capped with an engineered barrier to prevent aqueous infiltration.

4.0 MONITORING

Groundwater monitoring at Los Alamos National Laboratory began around 1949. The results in recent years, which now include an air monitoring program, are

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presented in annual reports of environmental surveillance activities.

4.1 Groundwater

Monitoring of any facility constructed to receive waste is necessary to determine if leakage is occurring. The monitoring system selected for this CAMU will be constructed on the exterior of the landfill. The system is designed to provide the earliest detection of a vapor or liquid leak. The migration of vapors or liquids would be detected in a system of tunnels constructed in the tuff. The tunnels will be open, allowing the insertion of monitoring instrumentation. If a vapor or liquid is detected in these tunnels, it can be pumped out to prevent liquid from migrating into the tuff below the landfill.

The depth to groundwater at the location of this proposed CAMU exceeds 900 feet. The Laboratory does not propose a groundwater monitoring program specifically for this CAMU. Note, however, that the Laboratory's periodic groundwater surveillance program is expected to continue indefinitely.

4.2 Air Releases

Air releases are not considered probable at the CAMU. Waste will be stabilized to prevent airborne particulates escaping the unit, if necessary.

The Laboratory maintains a system of air monitors. These monitors are for health monitoring purposes, but may be used to detect airborne releases. Anomalous results will result in the use of portable air monitors in the vicinity of the landfill, if there is reason to suspect it to be the source of the anomalous readings.

5.0 CLOSURE AND POST-CLOSURE REQUIREMENTS

5.1 Types of Requirements

The CAMU-permitted landfill is similar to a RCRA landfill. Therefore, closure will be performed according to RCRA requirements for a land-based unit. Post-closure monitoring and inspection will meet those standards, too.

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5.2 Long-Term Reliability and Effectiveness

The CAMU design is based on the minimum technology requirements for a RCRA land-based unit. These requirements have been established by the EPA after years of research to determine the most reliable, performance-based designs and materials. The liners will be placed in accord with the quality control requirements for a land-based unit. The CAMU-permitted landfill will be lined. It will have a monitoring system and an engineered cover, which will provide long-term reliability for the unit.

The effectiveness of the CAMU-permitted landfill is based on its ability to prevent migration of waste. Placement of remediation waste in the landfill is more effective than leaving it in the original location, because the unit will be lined and covered to prevent agents of migration from contacting the waste.

what is the risk assessment of leaving it in place?

5.3 Wastes which Remain in Place

All wastes placed in the CAMU-permitted landfill are intended to remain in place. No waste will be put in the unit for later retrieval. The only scenario where waste may be removed is if leakage occurs and no other remedial action such as drainage or pumping will stop the migration of constituents and the only option left is physically removing the waste from the landfill.

The concentrations of wastes in the landfill will be those of the current concentrations in the geologic material to be emplaced there. As noted above, the major contaminant is some 63,000 kg natural and depleted uranium in about 100,000 cubic yards of soil and tuff. The distributions of the contaminants are not homogenous. The uranium is known to have concentrations as high as one per cent by weight in some of the locations at E-F Site. Concentrations of contaminants at other inactive firing sites also will be inhomogeneous, but with similar high values for uranium, beryllium, and lead in certain batches of soil.

6.0 PERMITS

6.1 Federal or State Permits

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Although no additional permits are anticipated, other permits which may be required include: a National Pollutant Discharge Elimination System permit for the construction phase, discharge of surface water runoff for the operational phase, and a Pollution Prevention Plan for point source discharges of stormwater; a National Emission Standard for Hazardous Air Pollutant review; a National Environmental Policy Act determination of the need for an Environmental Assessment or an Environmental Impact Statement; and a New Mexico Environment Department construction/operations permit as a landfill for the CAMU.

6.2 Institutional Controls

The proposed CAMU location is not open to public access, and current Laboratory operations are expected to continue into the future indefinitely, according to the Department of Energy's 20-year site plan. Strict access controls to the site are maintained, because the area is in an explosives exclusion zone. A fence around the CAMU could be installed, if it were needed.

7.0 LAND USE

7.1 Surrounding Land Use and Receptors

The proposed CAMU-permitted landfill is located on land completely within Laboratory boundaries where explosively driven tests still are being conducted. There are no endangered species or sensitive habitats at this location.

7.2 Risk Assessments

Risk assessments are an integral part of the investigation and remediation process at the Laboratory. Detailed risk assessments will be performed for the operational phase of the CAMU-permitted landfill and for the long-term impacts of the closed facility.

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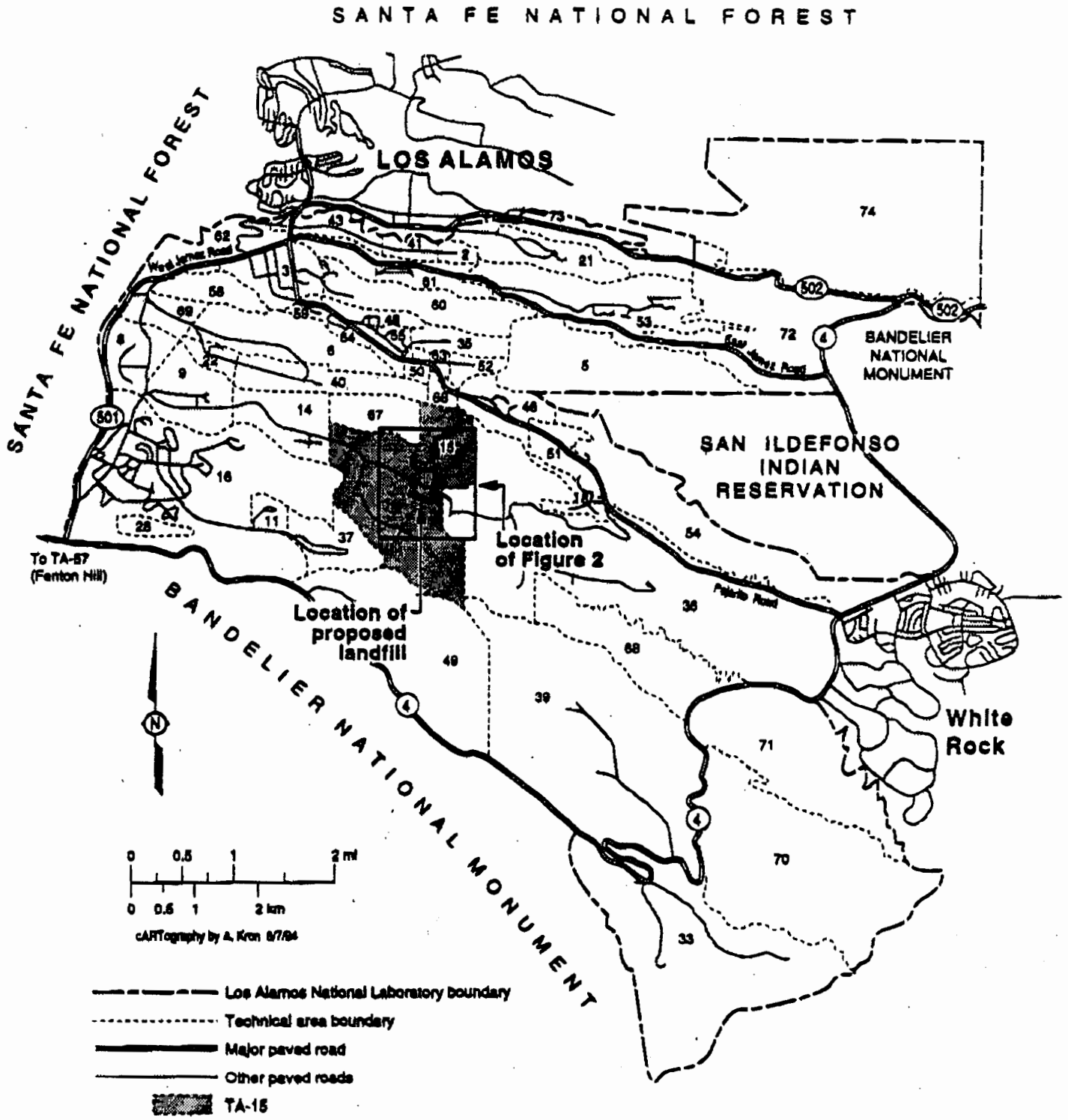

Figure 1. Location map of Los Alamos National Laboratory.

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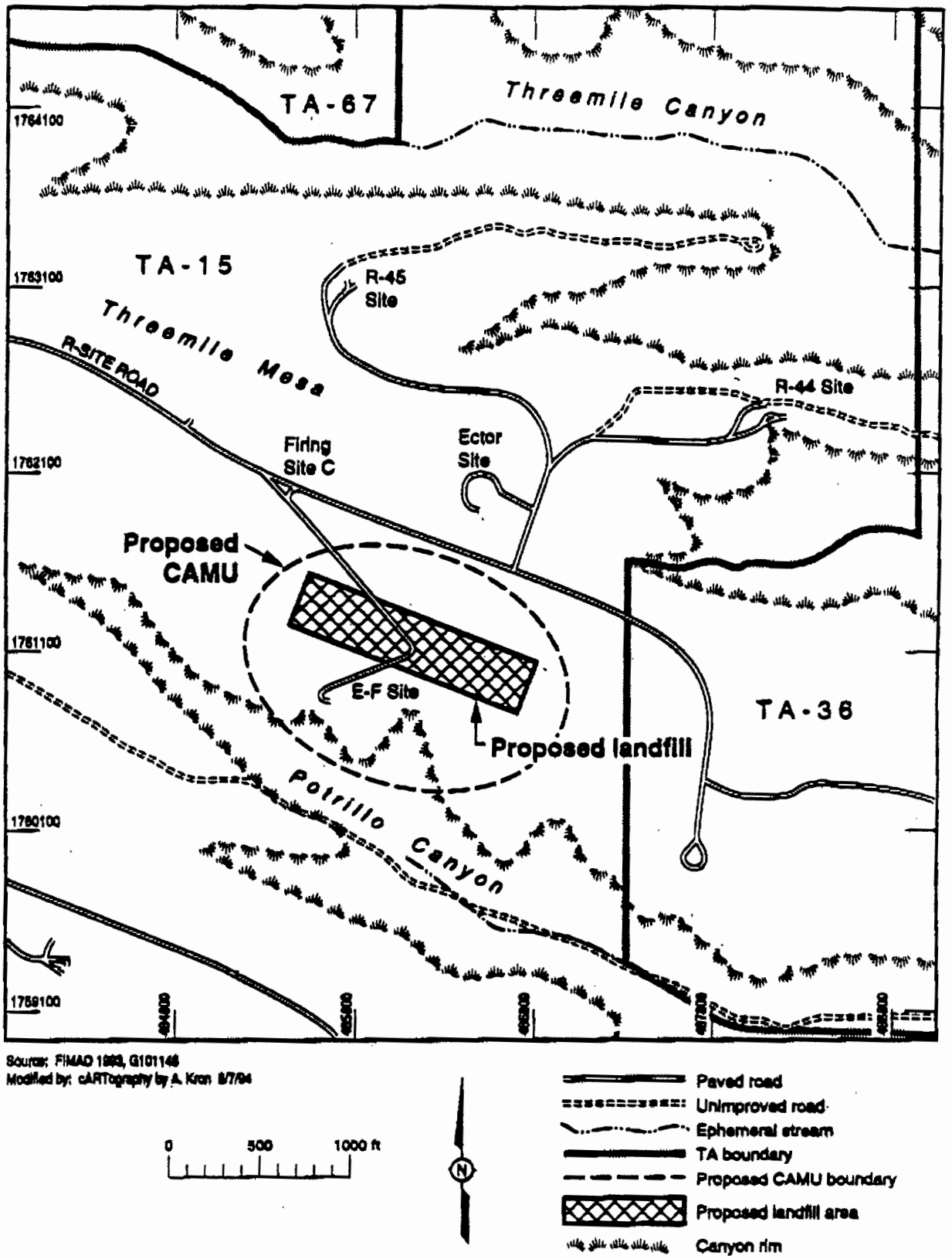

Figure 2. Locations of proposed CAMU and landfill at TA-15.

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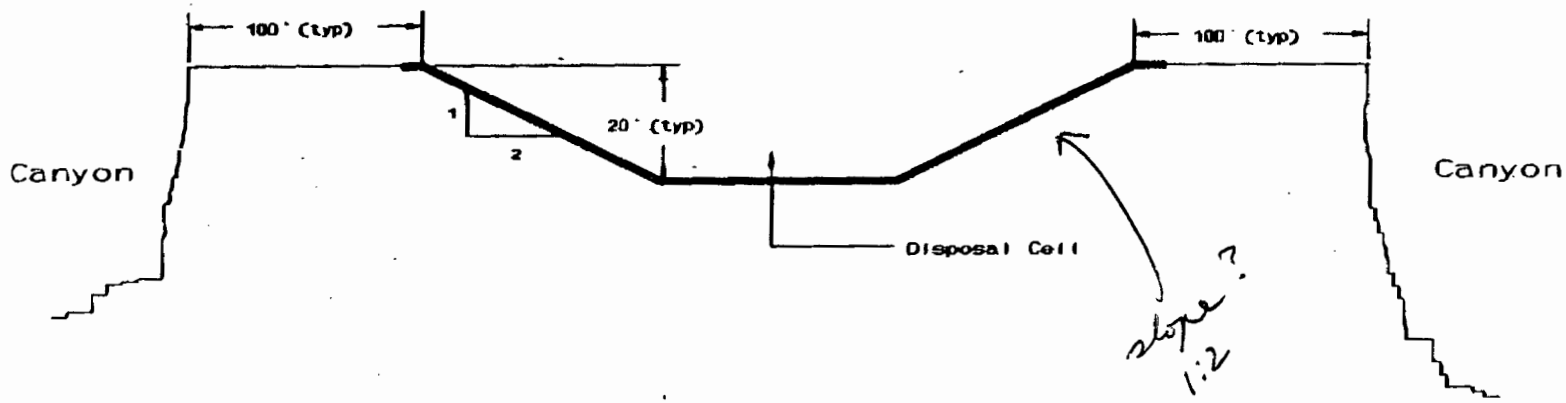
Typical Cross Section
CAM Disposal Cell TA-15
Firing Sites. (NTS)



Notes:
Disposal cell depth is for proposal purposes only.
Distance to cliff face to be kept to a minimum of 100 feet.
Disposal cell sidewall slope to be maintained at 1:2.

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PROPOSAL FOR A CORRECTIVE ACTION MANAGEMENT UNIT AT LOS ALAMOS NATIONAL LABORATORY'S TA-16 WASTE WATER PONDS AGGREGATE AREA

August 9, 1994

The following information is provided in support of an application to the Environmental Protection Agency's (EPA) Region 6 Administrator for a corrective action management unit (CAMU) at the Wastewater Ponds Aggregate Area in Los Alamos National Laboratory's Technical Area (TA) 16. This information is organized as specified by the EPA Region 6 Standard Operating Procedure for CAMU Requests.

1.0 IMPLEMENTATION

The proposed CAMU site is located within TA-16 in the area known as the GMX-3 high explosives machining area. This area was used from the mid 1940s until the late 1960s for the development and production of shaped high explosive charges. A landfill is proposed at the site of four backfilled discharge ponds and five abandoned buildings to consolidate and dispose of potentially hazardous remediation wastes.

1.1 Reliability, Effectiveness, Protectiveness, and Cost-Effectiveness

1.1.1 Reliability

The reliability of the CAMU-permitted landfill is expected to be the same as that of any permitted landfill to which the material from TA-16 might be taken for disposal. The landfill design will meet or exceed all minimum technology requirements. Construction of the CAMU-permitted landfill and emplacement of liners and monitoring alarm systems will be done according to a quality construction plan, with all phases of construction monitored for compliance with the construction plan.

1.1.2 Effectiveness

UNCLASSIFIED

FACSIMILE TRANSMITTAL SHEET

call
* ~~send letter to~~
Barbara to Discuss
this Next week

United States Department of Energy
LAAO
ES&H
Los Alamos Area Office

U. S. DEPARTMENT OF ENERGY

LOS ALAMOS AREA OFFICE

ENVIRONMENT, SAFETY AND HEALTH BRANCH

FAX Number: (505) 665-4504 (Unclassified), Voice Confirm Number: (505) 667-5288

DATE : 8-11-94 **# PAGES TO FOLLOW:** 28

TO: BARBARA HEDITSCHEK **FAX NO.** 827 4361

ORGANIZATION: NMED **DEPT. / ROUTE:**

FROM: KEN SCHLEWICK SCIENTECH DOE/LAAO

REMARKS:

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This proposed CAMU is an effective way to remediate the potentially contaminated soils, discharge piping, and debris from contaminated building demolition activities into a consolidated area that minimizes the transportation of these materials. Some of these materials are potentially mixed wastes, and there are currently no treatment facilities known to Laboratory personnel that can receive and treat mixed waste comprised of this type of soil and debris. One disposal facility that can receive mixed waste does not perform any treatment. Permanent disposal in a landfill is a very effective way to manage these wastes.

1.1.3 Protective

The engineered structures proposed for the landfill will be substantially more protective of human health and environment than allowing any potential hazardous constituents of TA-16 Solid Waste Management Units (SWMUs) to continue to be exposed to the elements and remain in the environment. The backfilled discharge ponds [SWMU 16-007(a)] presently have no known liner or engineered cap. The proposed CAMU will have a both a double liner combined with an engineered cap over the remediation waste, which will serve to prevent migration of the hazardous constituents to the environment.

1.1.4 Cost Effective

Management of wastes from inactive firing sites through use of a centrally located landfill will be cost effective in comparison to the costs associated with transporting the materials to other locations and possible payment of commercial disposal fees. Approval of this CAMU is expected to permit completion of remediation activities by the year 1999, rather than the currently scheduled September 30, 2009, without a CAMU. The shortened time to completion results in an estimated dollar saving of at least $500,000 just from the escalated cost of money.

1.2 Waste Management Within the CAMU and Timelines

Remediation wastes will not be placed into this proposed CAMU-permitted landfill until all necessary approvals are received. Construction of the landfill will require demolition of the buildings. Then the remaining debris and any potentially contaminated geologic media in the CAMU will be bulldozed aside. The debris may

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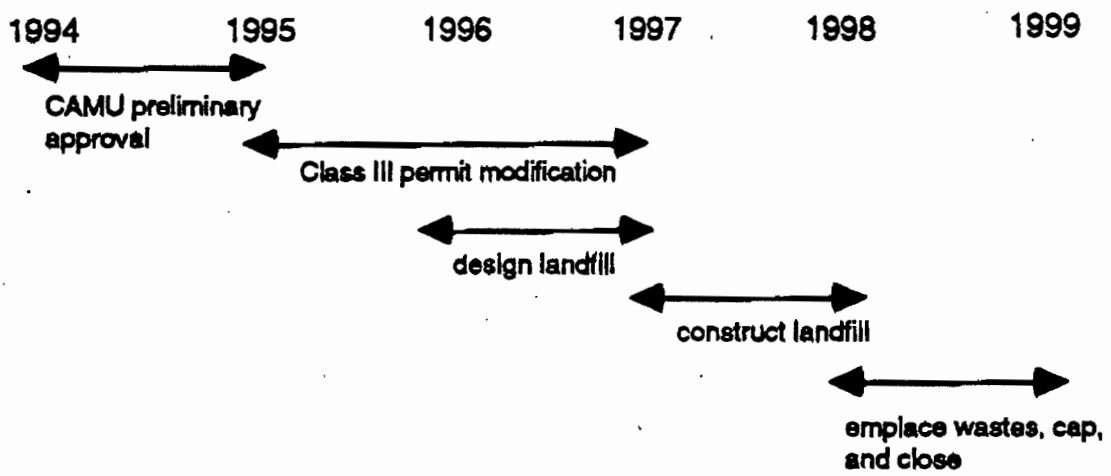
require minimal stabilization to prevent aeolian and pluvial redistribution until the contaminated materials are placed into the landfill. The landfill construction is expected to be complete within approximately one year.

Timeline



1.3 Types of Media

The media that will be emplaced in this CAMU-permitted landfill will be remediation wastes consisting of contaminated soils and debris from demolished buildings such as wood, glass, metal, wiring, and piping. These wastes will be placed into the landfill in bulk form.

1.4 Remediation Expediency

Immediately available options for remediation waste treatment, storage, and disposal are extremely limited with high associated costs. Offsite disposal for hazardous or mixed waste requires transport across state lines. Implementation of this proposed CAMU will expedite remediation for many wastes at TA-16 by some ten years.

2.0 CAMU DESCRIPTION

The location of the proposed CAMU within the boundaries of Los Alamos National Laboratory is shown in Figure 1.

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2.1 Configuration and Construction Design

The CAMU proposed for this site is comprised of SWMU 16-007(a), the surrounding abandoned buildings identified as SWMU 16-017, asssociated discharge piping called SWMU 16-026 (m-p) and 16-029 (k, l, s, t, u), and small amounts of potentially uncontaminated land between the buildings. The boundary of the proposed CAMU is shown in Figure 2.

A landfill will be constructed and operated as a land-based unit. The surface area of the unit will be approximately 5.5 acres, with approximate dimensions of 900 ft X 270 ft. Depth will be approximately 15 to 25 feet. Operation with multiple cells might be possible, to allow segregation by waste type and characteristic. Separate cells would also allow better control by reducing the area to be managed until actually needed. Minimum technology requirements for Resource Conservation and Recovery (RCRA) land-based units will be met.

The landfill design will include a leachate collection and removal system that meets the following minimum technology requirements :

- minimum bottom slope of 1%;
- either
  - 12 inches or more of granular drainage material having a hydraulic conductivity of 1×10^{-2} cm/s, or
  - Geonet with transmissivity of at least 3×10^{-5} m^2/s
- chemically resistant to the waste or waste leachate being managed; and
- the liner drainage and leachate collection systems will be operated to minimize clogging of these systems.

The bottom liner will be designed as a composite of two layers. The upper layer will be designed and constructed to prevent the migration of hazardous constituents into the liner through the post-closure care period of the facility (30 years). The lower layer of the bottom liner will be constructed of at least 3 feet of compacted soil material having a conductivity less than or equal to 1×10^{-7} cm/s. The strength of the leachate collection and removal system and liner construction materials will exceed the pressure of the cover and waste overburden.

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The reported tendency of clay to crack in the Los Alamos environment might make the installation of a different liner more protective, but such a change in design would be undertaken only after agreement between the regulators and the permittees that a different design would be preferable.

In the Los Alamos environment, the proposed cover system for this CAMU could feature:

- all natural materials allowing for more certain long-term performance over synthetic materials;
- a vegetative layer to provide evapotranspiration and reduce erosion and soil loss;
- a topsoil layer to serve as a rooting medium and a zone of moisture retention and storage;
- either a low permeability layer or a fine sand layer to serve as a capillary break above the underlying gravel layer which provides for lateral drainage within the cover thereby minimizing infiltration into the wastes.

Figure 2 shows the location of the proposed landfill at TA-16.

2.2 Uncontaminated Areas

The proposed CAMU encompasses five abandoned buildings that are listed as SWMUs and an additional SWMU encompassing a wastewate aggregate unit. The areas around and between and around these six SWMUs are scheduled for field investigation in 1995 and 1996. It is not possible to say in a reliable manner until that work is complete which areas within this proposed CAMU are contaminated and which are not.

2.3 Regulated Units

No regulated units will be included in this proposed CAMU.

2.4 Temporary Units

No temporary units are anticipated at this time for use at TA-16.

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3.0 WASTE DESCRIPTION

3.1 Types and Quantities of Wastes

The types of remediation wastes which may be placed into this proposed CAMU-permitted landfill are listed, characteristic, mixed, and non-EPA regulated hazardous constituents. The constituents may include any or all of the following in combination: undetonated high explosives, high explosive degradation products, and high explosive burn products; uranium-238, thorium-232, cesium-137; barium, beryllium, cadmium, chromium, copper, lead, and zinc; and cyanide.

The total quantity of remediation wastes to be deposited in this proposed CAMU will be limited by its projected total capacity. Surface area of the CAMU is estimated at 5.5 acres with a depth between 15 - 24 feet. An approximate total volume of the landfill with cap in place is between 130,000 and 215,000 cubic yards. The total volume of remediation wastes at TA-16 is estimated to be 275,000 cubic yards. The capacity of this landfill will be sufficient to accommodate much, but not all, of the remediation wastes at this technical area.

3.2 Source of Waste

The experimental activities at TA-16 have involved the production and detonation of high explosives. The wastes at this site generally derive from these activities.
The SWMUs in and around the proposed CAMU site primarily are drainage ponds, abandoned buildings, and the drainage lines between them. Within the proposed CAMU are four backfilled ponds about 100 feet southwest of TA-16-90 and five abandoned buildings. The four ponds were used to evaporate liquids associated with the machining of explosives in buildings that have already been razed. The ponds are believed to have received high explosive-contaminated liquid containing barium, organics, and potentially some natural uranium. Personal interviews with former employees indicate that the four ponds were excavated and filled with clean soil in 1967 as part of the "S-site" demolition and restoration activities. These ponds are now level with the mesa and covered with natural grasses. They are being investigated to determine how thorough the past remediation efforts were.

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3.3 Treatment

No treatment of this waste is proposed, other than that which may be necessary to stabilize the waste piles that will be generated prior to construction of the landfill.

3.4 Ultimate Disposition of Wastes

The ultimate disposition of these wastes is burial in this CAMU-permitted landfill, which will be capped with an engineered barrier to prevent aqueous infiltration.

4.0 MONITORING

Groundwater monitoring at Los Alamos National Laboratory began around 1949. The results in recent years, which now include an air monitoring program, are presented in annual reports of environmental surveillance activities.

4.1 Groundwater

Monitoring of any facility constructed to receive waste is necessary to determine if leakage is occurring. The monitoring system selected for this CAMU will be constructed on the exterior of the landfill. The system is designed to provide the earliest detection of a vapor or liquid leak. The migration of vapors or liquids would be detected in a system of tunnels constructed in the tuff. The tunnels will be open, allowing the insertion of monitoring instrumentation. If a vapor or liquid is detected in these tunnels, it can be pumped out to prevent liquid from migrating into the tuff below the landfill.

The depth to groundwater at the location of this proposed CAMU is about 900 feet. The Laboratory does not propose a groundwater monitoring program specifically for this CAMU. Note, however, that the Laboratory's periodic groundwater surveillance program is expected to continue indefinitely.

4.2 Air Releases

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Demolition of the abandoned buildings within the proposed CAMU boundary will be the most likely source of airborne contaminants. The primary contaminants would be airborne particulates which may be controlled through dust suppression. Air releases beyond the proposed CAMU boundary are considered to be of low probability. An air monitoring system will be utilized primarily to detect health risks at the CAMU, but the system may also be used to detect air releases.

5.0 CLOSURE AND POST-CLOSURE REQUIREMENTS

5.1 Types of Requirements

The CAMU-permitted landfill is similar to a RCRA landfill. Therefore, closure will be performed according to RCRA requirements for a land-based unit. Post-closure monitoring and inspection will meet those standards, too.

5.2 Long-Term Reliability and Effectiveness

The CAMU design is based on the minimum technology requirements for a RCRA land-based unit. These requirements have been established by the EPA after years of research to determine the most reliable, performance-based designs and materials. The liners will be placed in accord with the quality control requirements for a land-based unit. The CAMU-permitted landfill will be lined. It will have a monitoring system and an engineered cover, which will provide long-term reliability for the unit.

The effectiveness of the CAMU-permitted landfill is based on its ability to prevent migration of waste. Placement of remediation waste in the landfill is more effective than leaving it in the original location, because the unit will be lined and covered to prevent agents of migration from contacting the waste.

5.3 Wastes which Remain In Place

All wastes placed in the CAMU-permitted landfill are intended to remain in place. No waste will be put in the unit for later retrieval. The only scenario where waste may be removed is if leakage occurs and no other remedial action such as drainage or pumping will stop the migration of constituents and the only option left is physically removing the waste from the landfill.

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The concentration ranges of potential contaminants of concern are shown in the table that follows the two figures.

6.0 PERMITS

6.1 Federal or State Permits

Although no additional permits are anticipated, other permits which may be required include: a National Pollutant Discharge Elimination System permit for the construction phase, discharge of surface water runoff for the operational phase, and a Pollution Prevention Plan for point source discharges of stormwater; a National Emission Standard for Hazardous Air Pollutant review; a National Environmental Policy Act determination of the need for an Environmental Assessment or an Environmental Impact Statement; and a New Mexico Environment Department construction/operations permit as a landfill for the CAMU.

6.2 Institutional Controls

TA-16 is ideally suited for siting a CAMU because it will be located within a secured area of the Laboratory with limited access through a series of two gated checkpoints. Current Laboratory operations are expected to continue into the future indefinitely, according to the Department of Energy's 20-year site plan.

7.0 LAND USE

7.1 Surrounding Land Use and Receptors

This proposed CAMU is located wholly within the secured perimeter of TA-16 on land completely within the Laboratory boundaries. At the proposed site there are not known to be either endangered species or sensitive habitats.

TA-16 operations presently take place only four days a week, with little to no activity existing within 600-800 feet of the proposed CAMU. Any potential exposures to humans would be limited to site workers, who will be required to meet the Laboratory's health, safety, and training requirements prior to access to the site.

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7.2 Risk Assessments

Risk assessments are an integral part of the investigation and remediation process at the Laboratory. Detailed risk assessments will be performed for the operational phase of the CAMU-permitted landfill and for the long-term impacts of the closed facility.

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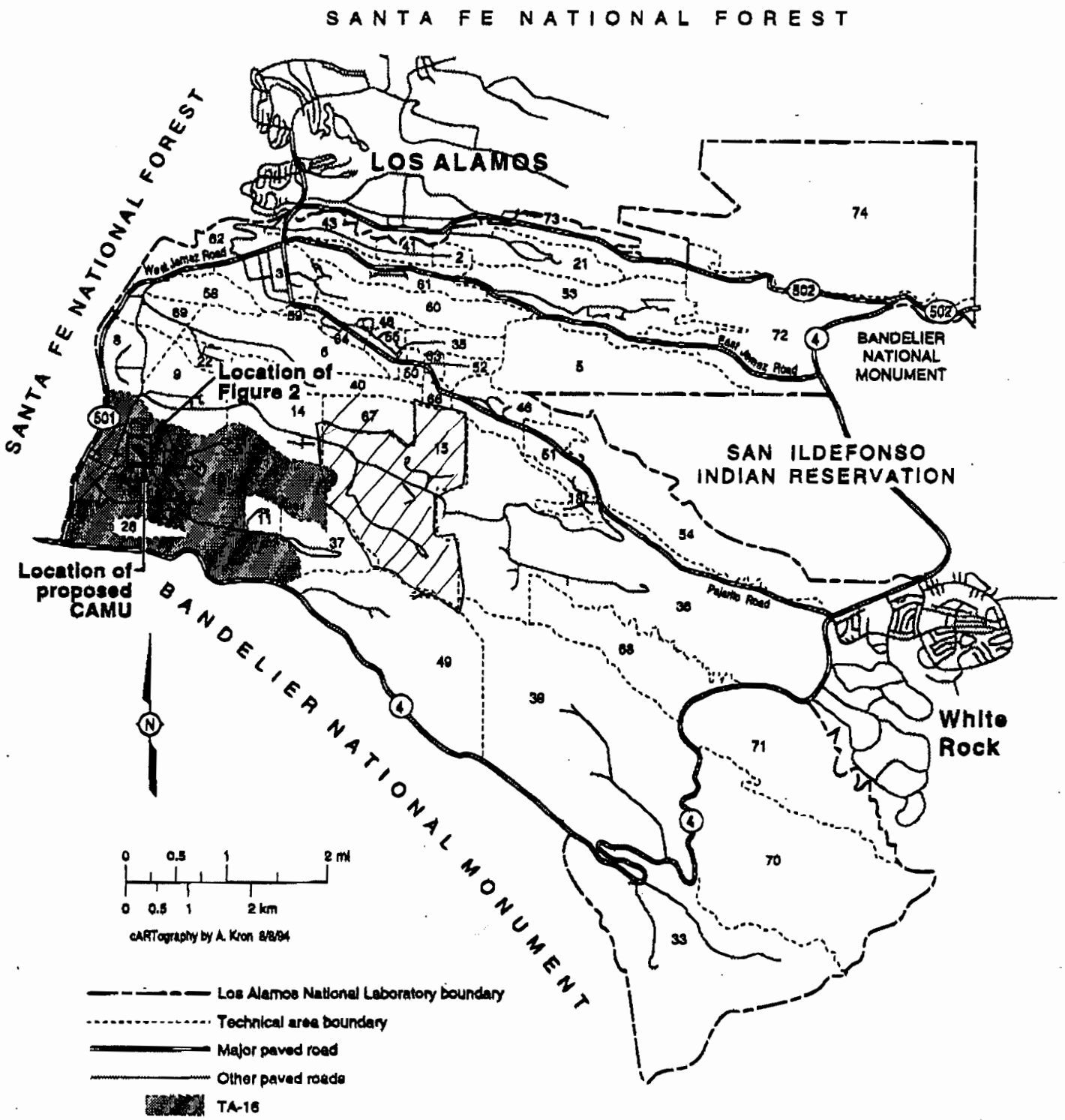

Figure 1. Location map of Los Alamos National Laboratory.

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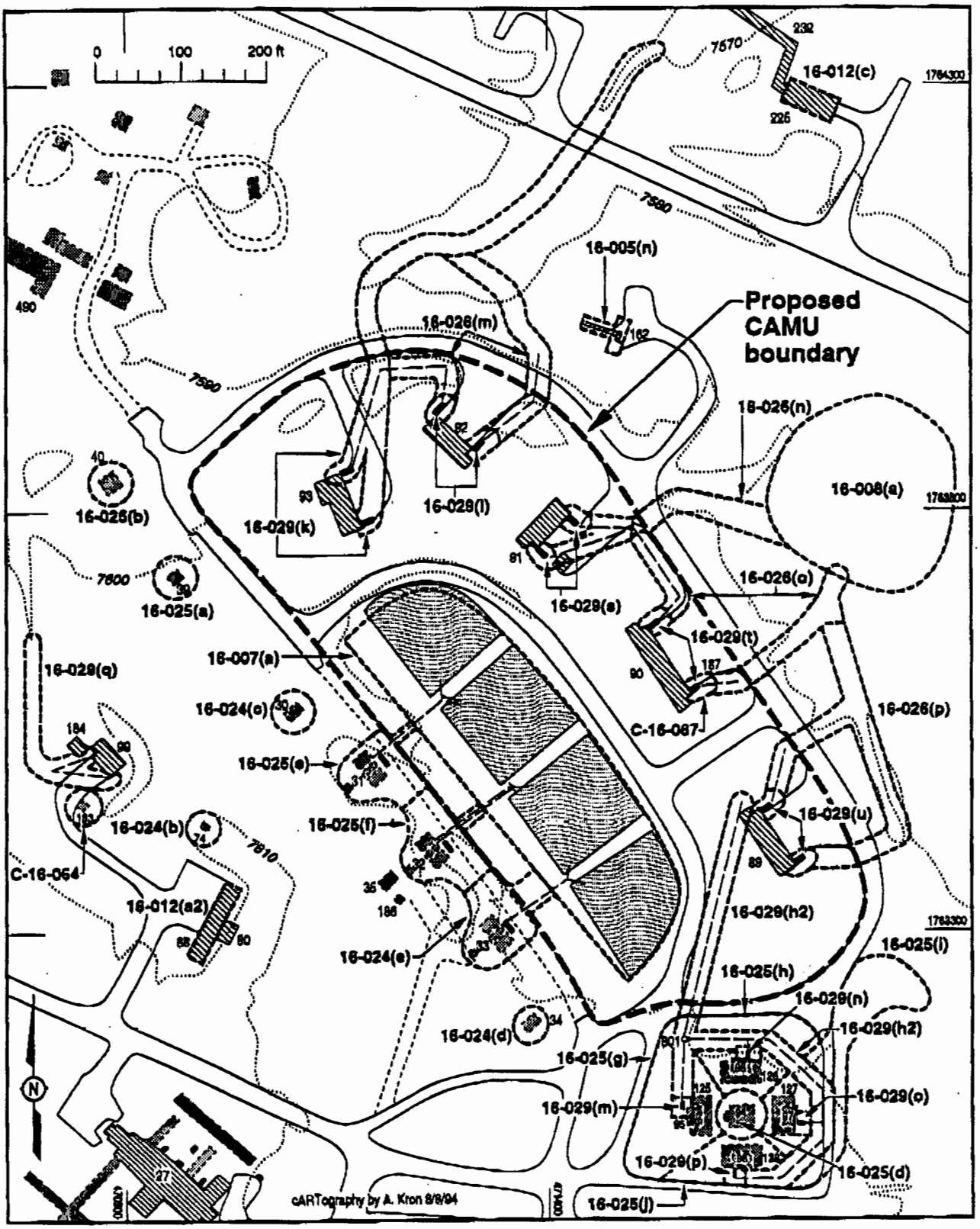

Figure 2. Location of proposed CAMU at TA-16.

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TABLE

CONTAMINATION DETECTED AT SWMU 16-007(a)
ENVIRONMENTAL PROBLEM #24 (DOE 1989, 15-16-345)

POND NUMBER	PCOC	CONCENTRATION RANGE	LOCAL BACKGROUND [a]	SOIL SCREENING ACTION LEVEL [a]
1,2,3,4	Barium	160-230 ppm	120-810 ppm	5 600 ppm
1,2,3,4	Beryllium	1-2 ppm	0.42-4.4 ppm	0.16 ppm
1,2,3,4	Chromium	11-31 ppm	1.17-136 ppm	400 ppm
1,2	Nickel	14, 19 ppm	2-19 ppm	1 600 ppm
3,4	Cadmium	3 ppm	0.03-1.7 ppm	80 ppm
2	Lead	19 ppm	8-98 ppm	500 ppm
1,2	Acetone	.081-.310 ppm	0 ppm	8 000 ppm
4	TCE	.002-.005 ppm	0	3.2 ppm
4	Benzene	.004 ppm	0	0.67 ppm
4	Toluene	.005 ppm	0	890 ppm
4	Chlorobenzene	.004 ppm	0	67 ppm
4	Cesium-137	0.250 pCi/g	0.01-0.82 pCi/g	4.0 pCi/g
1	Uranium-235	.065,.072 pCi/g		1.8×10^1 pC/g

TABLE

ANALYSES OF TA-16-93 EFFLUENT,
ENVIRONMENTAL PROBLEM #24 (LANL 1989, 0425)

SAMPLE	824-1	824-2	824-3	SALs
Medium	Soil	Soil	Soil	
Units (ppm)	mg/kg	mg/kg	mg/kg	mg/kg
Metals				
Barium	420	1 120	1 590	5 600
Beryllium(a)	1.8	1.7	1.8	0.16
Cadmium(a)	1.6	1.7	5.6	80
Chromium(b)	9.2	9.2	8.6	400 (VI)
Copper(b)	10.2	11.1	14.5	3 000
Lead		332		500
Zinc	130	206	234	24 000
Other				
Thorium-232	< 12 500 pCi/kg	< 13 600 pCi/kg	< 17 000 pCi/kg	880 pCi/kg
Uranium-238	< 11 100 pCi/kg	< 6 600 pCi/kg	< 16 100 pCi/kg	59 000 pCi/kg
Cesium-137	250 pCi/kg	380 pCi/kg	1 220 pCi/kg	4 000 pCi/kg
Cyanide(c)	0.39		0.40	1 600

A blank cell indicates the analyte was not detected
NA indicates that the sample was not analyzed for the analyte
[a] Analyte found in blank result may be biased high.
[b] Copper and chromium outside of QA/QC control limits.
[c] Cyanide analyses likely to be biased low up to 250%; holding times exceeded.