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

Sheila A. Please coordinate w/ Bruce Gentry

OCT 28 1993

NOV 1 - 1993

William K. Honker, Chief
RCRA Permits Branch
Hazardous Waste Management Division
U. S. EPA, Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Honker:

Enclosed is the Western Sanitary Waste Line Sampling Plan for Solid Waste Management Units (SWMUs) 1-001(s) and 1-001(u), OU-1078, Los Alamos National Laboratory. This sanitary waste line served several buildings located south of Trinity Drive in Technical Area 1. This sampling plan prescribes subsurface sampling procedures to locate and to investigate the more suspect portions of this line that are accessible. The plan was assembled to specifically address concerns generated by the recent discovery of process-related wastes at a septic tank, SWMU 0-030(g) in OU-1071, located downstream of the Western Sanitary Waste Line.

Soon to follow will be the No Further Action (NFA) proposals for 24 SWMUs at OU-1078. These NFA proposals will include five trial proposals previously approved by your staff.

If you have questions about the enclosed sampling plan, please call Ted Taylor of my staff at (505) 665-7203.

Sincerely,

Joseph C. Vozella

Joseph C. Vozella, Chief
Environment, Safety and Health
Branch

LESH:9TT-003

Enclosures

cc:
See Page 2

3184

OCT 28 1993

cc w/enclosures:
Benito Garcia, Bureau Chief,
Hazardous & Radioactive
Materials Bureau
New Mexico Environment Dept.
525 Camino de los Marquez
Santa Fe, New Mexico 87502

S. Slaten, ES&H, LAAO

B. Enz, Scientech, LAAO

cc w/o enclosures:
T. Taylor, ES&H, LAAO

R. Vocke, EM-13, LANL,
MS-M992

D. McInroy, EM-13, LANL,
MS-K490

C. Newton, EES-3, LANL,
MS-C335

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possiblility of fine and imprisonment for knowing violation.

Document Titles:

Waste Line Sampling Plan for Operable Unit (OU) 1078

Name: _____ Date: 10/21/93

James Jackson
Deputy Director
Los Alamos National Laboratory

Name: _____ Date: 10/20/93

Joseph Vozella
Chief
Environmental Safety & Health Branch
Los Alamos Area Office

ENVIRONMENTAL RESTORATION PROGRAM

RCRA FACILITY INVESTIGATION
OPERABLE UNIT 1078 (TA-1)

WESTERN SANITARY WASTE LINE SAMPLING PLAN FOR FY93

LOS ALAMOS NATIONAL LABORATORY

LOS ALAMOS, NEW MEXICO

August 1993

ENVIRONMENTAL RESTORATION PROGRAM

LOS ALAMOS NATIONAL LABORATORY

DRAFT FINAL

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 DATA QUALITY OBJECTIVES 3

2.1 Problem Statement 3
2.2 Decision Domain 4
2.3 Decision Inputs 4
2.4 Decision Logic 5
2.5 Design Criteria 5

3.0 SAMPLING AND ANALYSIS PLAN 6

3.1 Physical Description of Sampling Locations 6
3.1.1 Selection of Sampling Locations 7
3.2 Sampling Program Design 10
3.2.1 Selection of Investigation Methods 11
3.2.2 Pre-Characterization Field Operations 11
3.2.2.1 Pre-Characterization Constituent Analyses 12
3.2.2.2 Pre-Characterization Sampling Methods 13
3.3 Excavation Sampling Procedures 15
3.3.1 Number of Samples 17
3.3.2 Suite of Constituents to be Analyzed 17

4.0 FIELD METHODS FOR TA-1 SANITARY SEWER LINE INVESTIGATION 19

4.1 Plans 19
4.2 Procedures 19
4.2.1 Methods of Field Screening for Radioactivity and VOCs 19
4.2.2 Methods for Homogenization of Samples 20
4.2.3 Methods for Preparing Replicate Samples 20
4.2.4 Methods for Managing Waste Material 21
4.2.5 Decontamination 21
4.2.6 Restoration of Excavation and Surrounding Areas 22

TABLE OF CONTENTS (cont')

REFERENCES 23

TABLES

Table 3-1 - Analytical Methods for Soil Samples at the Western Sanitary Waste Line 24

Table 4-1 - SOPs Applicable to OU 1078 Field Operations 25

FIGURES

Figure 1 - Sample Location Numbers 1, 2, 3, and 4

Figure 2 - Sample Location Numbers 5, 6, and 7

Figure 3 - Sample Location Numbers 8, 9, 10, 11, and 12

Figure 4 - Sample Location Number 13

Figure 5 - Sample Locations 1 - 13

SAMPLING AND ANALYSIS PLAN

OU 1078 PHASE I, WESTERN SANITARY WASTE LINE, SWMU AGGREGATE N

SWMUs 1-001(s) and 1-001(u)

1.0 INTRODUCTION

The RCRA Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1078 (LANL 1992), submitted to the U.S. Environmental Protection Agency (EPA) Region VI in May 1992, was judged to be deficient, and a Notice of Deficiency (NOD) was issued. After the NOD Response was submitted, the Work Plan was accepted with two modifications on January 8, 1993. One requirement for final approval of the OU 1078 RFI Work Plan was the addition of subsurface sampling and analysis plans (SAPs) for Phase I investigation of the Solid Waste Management Units (SWMUs) not adequately justified for no further action (NFA) or originally planned for Phase II investigation. This SAP is one of several planned for the mesa top for fulfilling that requirement.

SWMUs 1-001(s) and 1-001(u) together comprise the Western Sanitary Waste Line (SWMU Aggregate N, as described in the RFI Work Plan for OU 1078), which served several buildings located south of Trinity Drive in TA-1. SWMU 1-001(u) is the sanitary waste line that served J-2 Building; it was proposed for no further action (NFA) in the May 1992 RFI Work Plan for OU 1078. SWMU 1-001(s) served the balance of the buildings in TA-1 west of (and including) D Building, and was proposed for Opportunity-Available sampling in the 1992 Work Plan. These two units are now proposed for sampling in the FY93 sampling program, and will be referred to collectively as the "Western Sanitary Waste Line." The majority of wastes handled in the sanitary waste lines were non-process-related, however, several buildings connected to the sanitary waste line handled hazardous and radioactive materials. Process-related wastes were routinely disposed in the acid sewer line (i.e., the industrial waste line). However, recent sampling results from a septic tank in OU 1071, SWMU 0-030(g), located downstream of the Western Sanitary Waste Line,

have suggested that possibly such constituents, including mercury, lead, and plutonium, entered the line.

Most of the sanitary waste lines in TA-1 were left in place following the decommissioning of the Technical Area. Portions of the sewers were apparently used by Los Alamos County as sanitary sewers for a period of time; however, Los Alamos County personnel have stated that none of the Western Sanitary Waste Line has been used by the County. The following sampling plan is designed with the assumption that the sanitary sewer line can be located in the field. Although it will not be the object of investigations proposed in this plan, it should be kept in mind that the acid sewer line (SWMU 1-002, which was totally removed), not the Western Sanitary Waste Line, was designed to handle the most harmful waste streams from TA-1. The volume of hazardous waste which may have passed through the Western Sanitary Waste Line is thought to be small by comparison with that released into the acid sewer line.

The general approach in this sampling plan will be to locate and investigate accessible portions of the sanitary waste line, given the constraints of legal access to private property and physical constraints in the field. Virtually all of the land traversed by the sanitary waste line is now in private hands, and much has been developed. Private dwellings, office buildings, commercial establishments, parking lots, and roads have been built atop the route of the former line. The sampling will be based on and directed by engineering judgment as described in the Work Plan.

2.0 DATA QUALITY OBJECTIVES

The Data Quality Objectives described in the May 1992 Work Plan for OU 1078, and updated in this Phase I Addendum, are as follows for the planned sampling of the Western Sanitary Waste Line. The sampling program will form the basis for a screening assessment of the Western Sanitary Waste Line to evaluate the overall condition of the system and the contaminant levels from releases that may have occurred. The objectives of this work plan are to (1) determine, initially, the nature of the soil contamination, if any; (2) provide information on waste characterization and possible impacts to residents and properties from more invasive sample collection techniques; and (3) remove portions of the line during the excavation phase.

2.1 Problem Statement

The objectives of this sampling plan are (1) to provide additional information for evaluating whether hazardous materials remain in the line; (2) to determine if hazardous wastes have been released to surrounding soils; and (3) to classify these potential wastes. Knowledge of the operations performed in TA-1 buildings, and recent analysis of the downstream septic tank's (SWMU 0-030(g)) contents, have shown that hazardous and radioactive constituents were discharged into at least a portion of the sanitary waste line. There is no evidence that these constituents were released from the sanitary waste line in any other way than to the septic tank, but it is possible that fugitive releases might have occurred due to failure of the structural containment. Specifically, leaks may have occurred at pipe joints, at joints between pipes and manholes, at connections between building sewers and sewer mains, or from breaks in the sewer pipe. Damage could have occurred from faulty installation, settlement of portions of the line, or disruption due to subsequent construction of roads or structures above the line. Manholes could have had obstructions which resulted in release of waste from overflows. If leaks or losses of liquid occurred, and if they occurred in areas where

future excavation could expose the contamination, then there is a possibility for future human exposure. In addition, migration of constituents could occur, most likely within the excavation backfill. Since the proposed activities will support a screening assessment, LANL ER Program screening action levels (SALs) will be used as the basis for comparisons.

2.2 Decision Domain

The scope of the investigation will include the soil within the original excavation, and soil adjacent to the sanitary waste line and manholes. Since the investigation will include evaluation of the presence and distribution of contaminants in the sanitary waste system, these are also included in the domain. Surface soils, backfill associated with the sanitary waste system excavation, and tuff beneath the previous excavation are outside the domain of this decision, except when they are in immediate proximity to the line or show visible evidence of a release. The investigation will be focused on and biased towards the locations where contamination is most likely to exist: the immediate vicinity of the sanitary waste line, including the sewer pipe and manholes.

2.3 Decision Inputs

The data requirements for the decision include the thickness of clean fill (from borehole logs) and concentrations in soil of contaminants of concern (COCs). These concentrations will be determined using field and laboratory analytical testing techniques. COCs include radioactivity (specific radionuclides, if gross alpha, beta, or gamma are detected in the field), RCRA metals, PCBs, pesticides, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). Analytical methods for these analyses are provided in Table 3-1.

2.4 Decision Logic

Individual observations will be compared with SALs for soil. Observations that exceed SALs will identify COCs and locations along the Western Sanitary Waste Line system that require further evaluation. Further evaluation may include a preliminary baseline risk assessment or development of risk-based target cleanup levels for the identified contaminants, either of which will provide a basis for determining whether corrective action is needed. If no observations exceed SALs, no further action (NFA) will be proposed for the Western Sanitary Waste Line.

2.5 Design Criteria

Portions of the Western Sanitary Waste Line which may be sampled are constrained by limited physical and legal access. However, the areas that are potentially available for sampling are reasonably representative of the elements of the sanitary system, including straight runs, lateral connections, and manholes. Selection of target areas, and of samples within these areas, will be biased by professional judgment, visual indicators, and field measurements to increase the probability of detecting contaminants if present in the line or the surrounding soil.

3.0 SAMPLING AND ANALYSIS PLAN

3.1 Physical Description of the Sampling Locations

The Western Sanitary Waste Line is composed of both gravity and force main sections. The sanitary line segment from the J-2 Building (Figure 1) is the only force main, and is believed to be cast iron, 4 to 6 inches in diameter (nominal pipe size). Connections of pipe sections (four to eight feet in length) may be flanged or have a similar connection system, or may be leaded in place. The force main was laid in a northerly direction from the building, and follows the generally rising topography at a more-or-less uniform depth of 3 to 4 feet. The total length of this line is 275 feet. No manholes are expected on this line until the point where it discharged into a manhole of the former gravity sanitary waste line near Trinity Drive. The line would have operated under low pressure, and would have been at atmospheric conditions at the discharge point at the gravity sewer manhole. A sump and pumping system would have been located within or adjacent to J-2 Building, and would have included one or more pumps and check valves. The check valves would serve to check the backflow of sewage when the pumps had emptied the sump and shut down.

A gravity sanitary waste line comprises the balance of the Western Sanitary Waste Line system (Figures 2 through 4). This includes over 1300 feet of vitrified clay pipe (VCP), 4 and 8 inches in diameter, and most likely in four-foot sections. The sanitary waste line operated under atmospheric conditions, and is shown on drawings as having manholes every 200 to 300 feet. Six manholes are shown on the drawings, although not all are expected to still be in place. Gravity sewer lines must be designed with adequate capacity to carry expected flows. Pipe size (diameter) and slope are the most important design variables. The sanitary line is shown on design drawings as having a slope of less than one percent (vertical feet per 100 horizontal feet) to over 7 percent. A minimum depth of four to five feet is usually specified to provide crush resistance to applied

loads, such as heavy equipment. It is not known at what depth the sanitary line was installed, but it may have been anywhere from 4 to 15 feet below the original land surface. Modifications to the ground surface since abandonment of TA-1 may have increased or decreased this depth.

The manholes may be of concrete or brick construction, but would likely have had a cast-iron riser collar at the top with a cast-iron lid. Remaining manholes on the Eastern Sanitary Waste Line that have been in service since the Manhattan Project are of this construction.

In most locations, it is be expected that excavations for the sanitary waste line were made into the tuff. It is possible to identify such excavations by removing fill material down to the tuff surface. Most of the properties through which the line passed have been developed, which restricts physical access.

3.1.1 Selection of Sampling Locations

In general, it was determined that buildings and related structures, retaining walls, concrete drives and walks, buried utilities, and plantings on private property should be considered restraints on physical access. Asphalt is judged to be repairable, and as such is not considered a restraint. At least 20 feet of continuous access, in directions both parallel and perpendicular to the sanitary waste line, is judged to be necessary to use the selected equipment. Also, a location on an active roadway or drive is not preferred, if at least one-way access could not be maintained during excavation. Manholes are of particular interest, since they may be more prone to leaks than pipes, for the following reasons. Connections are necessary between pipes and manhole bodies, and sophisticated joining methods and materials were not available in the 1940's. Also, manholes were used at changes in grade or line direction, so sediments may collect in manholes and potentially result in flow constrictions. Constrictions may, in turn, result in manhole "surcharge," creating a greater likelihood of a release.

The following locations along the sanitary waste line were selected for further review and ranking. Locations of manholes and connections are noted and are provided on the attached maps (Figures 1 through 4). Figure 5 shows the entire Western Sanitary Waste Line with proposed sampling locations and current structures.

1. Timber Ridge along Trinity Drive. A 20-foot section is available between the Timber Ridge fence and Trinity Drive. The ground surface is covered with cobbles, which can easily be restored (Figure 1).

2. J-2 Building Sewer Line. A 40-foot section of this line is available where it crosses a playlot and the asphalt-surfaced Trinity Village drive (Figure 1).

3. J-2 Building Sanitary Sewer Sump. A tentative location for the sump serving the sanitary wastes from this building has been established. The location is in a condominium village, but physical access is possible (Figure 1).

4. Timber Ridge Road. Over 50 feet of access is available in this asphalt drive (Figure 1).

5. West of 555 Oppenheimer. Approximately 40 feet of access in asphalt is possible (Figure 2).

6. East of 557 Oppenheimer. Over 50 feet of access is possible, including a possible manhole and lateral connection location (Figure 2).

7. Oppenheimer Drive Right-of-Way. About 50 feet of access is available, but subsurface utilities are present that will likely reduce the extent of possible access (Figure 2).

8. West of Shell Station. About 60 feet of access is possible between the Shell station and the plantings/landscaping along Oppenheimer Drive. A manhole is shown on the FIMAD maps within this access (Figure 3).

9. East of Shell Station. About 20 feet of access is possible, but stored equipment will have to be moved to facilitate access (Figure 3).

10. Behind Hot Shots Restaurant. Nearly 100 feet of access is available across the parking lot. A manhole is mapped in the approximate center of the parking lot (Figure 3).

11. Vacant Lot Between Hot Shots and Exxon Station. Although the lot is vacant (used for Hot Shots parking), the sewer line is thought to be located at the rear of the property beyond (and below) the extent of fill. Although over 100 feet of length is available, physical access will likely be restricted due to fill and overgrowth (Figure 3).

12. West of Exxon Station. About 20 feet of access is available west of the former car wash structure, including a manhole location. A concrete retaining wall will limit exploration to the west and a fence to the south would have to be restored if disturbed (Figure 3).

13. Western Portion of the Los Alamos Inn Property. This location was investigated last winter by drill rig during a geotechnical investigation for the construction of new office buildings. Field screening results showed no elevated levels of radioactivity or VOCs. Up to 200 feet of access is available, with the most promising location being at the west edge of the property. This area would be excavated to locate the sanitary sewer line from D Building (Figure 4).

In terms of ranking, the following locations are recommended for investigation: Numbers 3, 6, 8, 10, and 12 due to the expected location of former manholes, number 2 provides the best access to SWMU 1-001(u), and number 13 due to its proximity to D Building. However, each of the 13 locations listed above will be investigated as long as physical or legal access is obtained.

3.2 Sampling Program Design

The general sampling program design is as follows: the sanitary waste line will be traced using historic engineering drawings and presently identifiable features (such as manholes), in the field. Areas where physical access is possible will be noted. Particular attention (ranking) will be paid to locations where manholes or other connections are expected, based on professional and engineering judgment. Legal access will be pursued for the properties that contain both extensive physical access and high-ranking features, such as manholes or branch line connections. Geophysical methods will be used to provide more precise locations of the line, manholes and other features.

A pre-characterization field operation will be performed using a drill rig to help determine the type of waste materials that will require handling and disposal during the full implementation of the sampling plan. The results of the pre-characterization field operation will not be used for any RFI-related decisions. This pre-characterization step was added after hazardous and radioactive wastes were discovered in Septic Tank 030(g) at OU 1078, which was fed by the Western Sanitary Waste Line. Pre-characterization of waste materials associated with the Western Sanitary Waste Line will ensure that necessary procedures are in place to handle the waste before sections of the line are excavated. Upon completion of the pre-characterization field operation, a backhoe or similar excavator will be used to locate the former sanitary waste line and manholes, and to obtain soil samples from as many of the locations listed in Section 3.1.1 as possible based on legal and physical access.

3.2.1 Selection of Investigation Methods

Prior to initiation of any field operations, subsurface utilities will be located and marked. The most likely locations of the sanitary waste line (and manholes) will then be located and marked based on engineering and/or geophysical surveys. The geophysical methods may include one or more of the following techniques: magnetometer, electromagnetic conductivity surveys (EM), ground penetrating radar, and/or probing with short rods to locate the former sanitary waste line excavation/backfill locations and, ultimately, the sanitary waste line and manholes. The LANL ER Standard Operating Procedure (LANL-ER-SOP-03.02, General Surface Geophysics) will be implemented for performing these surveys.

3.2.2 Pre-Characterization Field Operations

The pre-characterization field work will be performed to help determine the potential contaminants that may be encountered during the excavation of portions of the line, and how those materials should be handled if temporary storage and disposal are required. However, excavation of locations identified in Section 3.1 will be implemented even if pre-characterization results show no contamination. If mixed waste is determined to be present during pre-characterization activities, excavation of the line may be delayed until an approved mixed waste disposal site is identified.

This process, termed initial waste classification, is intended to provide an indication as to whether excavated materials will need to be treated as one of four waste types: 1) municipal-type waste - suitable for disposal in the Los Alamos County Landfill; 2) radioactive waste materials - requiring disposal at TA-54; 3) hazardous waste materials - requiring packaging and manifesting at TA-54 for off-site treatment and disposal; or 4) mixed waste materials - requiring storage at TA-54 until a suitable disposal facility is available. Alternatively, the soil or

tuff may not be contaminated and therefore suitable for replacement into the excavation at the conclusion of the removal process.

The initial sampling for waste classification will use two primary criteria for the selection of sample sites. The first criteria is the probability that the surface geophysical investigations have located the western sanitation line. The second criteria is accessibility to those portions of the line that are well-defined during the geophysical surveys.

The locations chosen for the waste classification phase will be sampled using a hollow-stem auger drilling rig and continuous split-barrel or split spoon sampler for acquisition of sample materials from immediately above, adjacent, and below the sanitary waste line and associated manholes. The specifics associated with the waste classification sampling techniques are described in Section 3.2.2.2. This approach will minimize the generation of materials that will need to be treated as a suspect waste, pending the results of radioisotopic and chemical constituent analyses. A minimum of three of the locations identified in Section 3.1.1 will be sampled. The number and frequency of the locations will be dependent on the established criterion and the variability, if any, in the results obtained from field monitoring. Additional locations may be sampled if initial locations do not provide any or inadequate waste characterization results. Physical and/or legal access may restrict additional pre-characterization activities.

3.2.2.1 Pre-Characterization Constituent Analyses

Field screening and laboratory analyses will be performed on the pre-characterization samples collected. The potential COCs to be measured are RCRA metals, PCBs, pesticides, VOCs, SVOCs, and gross alpha and beta/gamma analyses. Specific isotopes are to be determined in the event that gross radioactivities exceed background levels (20 pCi/g gross alpha and/or 30 pCi/g gross beta).

Those samples with metals that exhibit total concentrations equal to or exceeding 20 times the TCLP threshold value for hazardous waste classification will be subjected to the TCLP analysis to determine if the sample materials will require classification as a RCRA hazardous waste or in the event of elevated radioactivity, as a mixed waste.

3.2.2.2 Pre-Characterization Sampling Methods

The following procedure will be used for minimizing potential wastes during the initial pre-characterization sampling. It may also be the preferred procedure for some of the subsequent sampling.

1. A hollow-stem auger fitted with 5-foot continuous barrel samplers or split spoon samplers will be used to collect the samples. The hollow-stem auger method consists of advancing continuous auger flights into the ground. The core barrel samplers fit inside the hollow-stem auger flights, and advance with the augers as the subsurface is penetrated. When VOCs are to be collected, either a stainless steel core barrel will be used or stainless steel sleeves, 6 inches long by 2.5 inches in diameter, which are pressure-fitted end-to-end inside the core barrel. As the auger flights move into the subsurface, soil and sediments are pushed up into the (non-rotating) core barrel, or stainless steel sleeves, and relatively undisturbed soil samples are collected. In the event the core-barrel recovery is insufficient for specific sample collection purposes, either another portion of the recovered core will be used in the sample or the borehole will be relocated as close as possible to the original borehole. Any such change will be documented in Daily Activity Logs and field logs, and any new borehole location will be surveyed. Only selected intervals will be analyzed for VOCs, allowing cuttings and materials from above and below any stainless steel sleeves to be used for geologic descriptions. Additionally, clear liners may also be used for some borings to ensure adequate geologic descriptions.

2. When the core barrel is brought to the surface, it is separated from the auger and placed on a table fitted with tools for opening the core barrel into its two halves. At the same time, a decontaminated core barrel (with accompanying sleeves, if used) is placed in the auger to accompany the next flight down. If used, the stainless steel sleeves are numbered consecutively; the first one is the sleeve that represents the 6-inch segment nearest the ground surface, and the highest-numbered sleeve is the sleeve that samples the deepest segment of the boring. The core barrel is split into its two parts, using two pipe wrenches, to reveal the stainless steel sleeves or the core. At this point the HS-1 and HS-5 monitors will screen each core to measure levels of VOCs and the number of beta/gamma counts emanating from the core in a one-minute interval in accordance with HS-5 procedures. This information will be recorded in the sample collection log. This information is gathered primarily for health and safety purposes; however, the beta/gamma counts are also useful in determining whether there are any radioactive contaminant trends over the profile of the borehole. Each subsurface soil sample will be screened and a geologic description of the sample materials prepared.

3. Each boring will extend to approximately 24 inches below the level of the sanitary waste line as determined from geophysical surveying and probes/rods as discussed in Section 3.2.1. At least three core samples will be collected from each boring, immediately above the line, adjacent to the line, and immediately below the line. If field screening or visual observation suggest the presence of potential contaminants, additional samples may be collected at those locations.

4. Cuttings from each borehole will initially be containerized until expedited analytical results are received indicating that the material is clean and can be placed back into the borehole.

3.3 Excavation Sampling Procedures

The following general steps will be followed for excavations at all locations. Field instruments will be used continuously for personnel protection and field screening of excavated materials and samples for radioactivity (alpha and beta/gamma) and VOCs.

1. A preliminary excavation will be made perpendicular to the line to locate any previous excavation.

2. If the previous excavation is located, the excavator will move 90 degrees and proceed to remove backfill from the trench.

3. When a line or manhole is encountered, the line will be carefully exposed (still using the backhoe if necessary) and conditions observed. Photographs will be taken and notations made. Sample locations will be selected based on field screening (radiological and VOCs) and/or visual observation of contamination. The most contaminated areas within an excavation will be sampled.

4. The line will then be broken, using the backhoe bucket, and the pieces removed until at least four feet of pipe bedding is clearly exposed. For a manhole, samples will be collected at a minimum of two locations using hand-operated augers advanced to the base of the manhole.

5. The pipe segments will be screened for radioactivity in the field and inspected. Any residue will be collected for analysis. If radioactivity is detected, swipe samples will be collected for laboratory analysis. Similar procedures will be followed to sample any residue from manholes for analysis.

6. Samples will be collected from materials directly beneath the pipe using the backhoe bucket. The samples collected will be from the surface of the bedding material to a depth of 6 to 12

inches. If tuff is encountered at depths of less than 6 inches below the pipe, an attempt will be made to collect tuff to crush and homogenize with the bedding material in accordance with the procedure described in Section 4.2.2. Samples will be collected from the backhoe bucket with a stainless steel scoop in a representative manner (from the left-side, center and right-side and then homogenized in a stainless-steel bowl), and the bucket will be decontaminated before moving to a new location. Decontamination procedures to be followed are described in Section 4.2.5. Sampling personnel may enter the excavation only if it is less than four feet deep. In most locations, it will not be possible to lay back the excavation sides to facilitate safe access because of space restrictions.

7. If access allows, each excavation will be lengthened along the pipe to provide for a second sampling location. A location five to ten feet away from the first location will be selected so that, in a gravity sewer, at least one intact pipe joint will be selected as a sampling point.

8. Soil samples will be analyzed in on-site mobile chemistry and radioactivity laboratories for rapid turnaround to support field decisions.

9. Backfill and natural soils that do not exhibit any signs of contamination when measured with field instruments and mobile screening labs will be returned to the excavation. Sections of pipe determined not to be contaminated will be removed for disposal as non-hazardous solid waste. Materials determined to be contaminated will be handled according to the Waste Management Plan applicable to this sampling effort. As much remediation (removal of contaminated soil and pipe) as is practical will be accomplished during the investigation, consistent with ER Program guidance, and in a fashion that minimizes inconvenience to the property owner(s). Additional

remediation, if necessary, (i.e., beneath property structures) will be addressed during a Corrective Measures Study (CMS).

10. Backfill will be placed and compacted in lifts to achieve maximum compaction. Surface materials will be replaced to closely approximate the pre-excavation land surface (Section 4.2.7).

Field conditions may dictate modification of the above steps.

3.3.1 Number of Samples

If physical and legal access is obtained for all 13 proposed locations listed in Section 3.1.1, and 2 soil samples are collected below the sanitary waste line from each excavation, a total of 26 soil samples will be taken. Up to 4 pipe residue samples are estimated. The 4 manholes will yield an additional 8 soil samples and 4 residue samples. Six swipe samples may also be collected from the manholes. Therefore, a total of 48 samples is expected, in addition to samples for quality assurance purposes (such as field replicates, etc.).

3.3.2 Suite of Constituents to be Analyzed

For the samples collected from the Western Sanitary Waste Line, the full suite of analyses will include:

- Isotopic plutonium and uranium;
- Cesium-137 by gamma spectrometry;
- Radionuclides by gamma and alpha spectrometry;
- 12 RCRA metals (total analysis);
- Manhole soils for SVOCs; and
- Manhole and pipe residues for VOCs, SVOCs, PCBs, and pesticides.

In addition, soil samples will be submitted for VOC analyses only if VOCs are detected with field instruments, or a total of four samples will be submitted based on evidence of fugitive releases. These samples will be collected from the center of the backhoe bucket in accordance with ER-SOP 06.09 "Spade and Scoop Method for Collecting Soil Samples." The soil samples will be collected in glass jars and immediately placed in a cooler maintained at 4 degrees centigrade. Specified analytical methods are provided in Table 3-1.

4.0 FIELD METHODS FOR TA-1 SANITARY SEWER LINE INVESTIGATION

4.1 Plans

Numerous plans and procedures are incorporated into this sampling plan. Some will be developed specifically to support this activity, while others will be referenced. Plans and procedures that have been identified are noted below:

Health and Safety Plan. This plan will be developed specifically to address activities covered in this sampling plan, and will be based on previous investigations in OU 1078 and waste removal activities in OU 1071.

Waste Management Plan. This plan will also be site-specific to the planned sampling, and will include requirements for contaminated media that may be found in the excavations: soil, backfill, sewer pipe, manholes, debris, etc. These materials may need to be moved off-site while the excavation is open to minimize inconveniences to the property owner(s) or traffic. Appropriate permits and/or authorization will be obtained, if necessary.

4.2 Procedures

A list of applicable SOPs to OU 1078 field activities is provided in Table 4-1. The following subsections provide further guidance for focussing attention on various aspects of quality assurance and waste minimization practices.

4.2.1 Methods of Field Screening For Radioactivity and VOCs

The principal radiological field screening instruments that will be used during the OU 1078 sanitary waste line sampling is the Eberline ESP-1 beta/gamma meter with a "pancake" detector and the Eberline ESP-1 alpha meter. The principal field instrument that will be used to screen for volatile organic compounds while sampling the sanitary waste line

is an HNu meter. Subsurface soils collected in the backhoe bucket will be screened with each instrument prior to the collection of any samples. The detectors/meters will be moved along the surface of the soil and a one minute reading will be taken at a minimum of three locations in the bucket.

4.2.2 Methods for Homogenization of Samples

The sample collected from the backhoe bucket will be placed in a stainless steel bowl. A stainless steel hammer is used to pulverize the material. Since the excavated material may range from clay-like mud to large tuff fragments, the homogenized sample may consist of a mixture of these entities. For example, any moist clay-like material will be broken up to the greatest extent possible and mixed with any drier soil and tuff that is separately pulverized. The end product will approach a visual particle size distribution that approximates the surrounding soils. Foreign particles such as pieces of asphalt, wood, or non-tuff derived pebbles will be discarded from the homogenate and not included in the sample although they may be submitted for discrete analysis if field screening indicates the materials are contaminated. The time required to homogenize each sample will depend on the hardness of any tuff included in the sample and the consistency of any clay-like materials that require diminution. The same field personnel will be used to homogenize each sample to help ensure consistency and professional judgement to the process.

4.2.3 Methods for Preparing Replicate Samples

At least one replicate sample will be collected for each Western Sanitary Line location sampled and submitted for a full suite of analyses. Additionally, the EPA and/or NMED may collect replicates of specific samples. In those instances when replicates are to be made, the replicate sample containers will be filled by alternately placing a subsample in the OU 1078 sample container followed by an equivalent subsample into the replicate sample container. This process will continue until all the required containers are filled.

4.2.4 Methods for Managing Waste Material

Cuttings brought to the surface during the pre-characterization field operations will be continuously monitored for radioactivity and VOCs. Cuttings designated as clean will be stockpiled for backfilling. Upon completion of sampling, all soil brought to the surface will be replaced in the excavation until analytical results are received from the laboratory and a decision made whether to proceed with a voluntary corrective action (VCA) or interim measures. If results indicate that a VCA is feasible or interim measures are necessary, the site-specific Waste Management Plan will be implemented. Soil brought to the surface and not used as samples will also be returned to the excavation. Some soil samples may be held in a controlled repository for delayed submission to the sample coordination facility if analytical results from the expedited samples indicate that additional analyses would improve the conclusions of the investigation.

4.2.5 Decontamination

Equipment decontamination will primarily be conducted offsite at LANL decontamination facility located at the Waste Management Site (TA-50). Equipment will be screened for contamination prior to removal from the site in accordance with threshold values established by the draft SOP. Should some equipment decontamination be required in the field, the decontamination will be performed in accordance with the draft ER-SOP entitled "Field Decontamination and Sampling Equipment." Personnel will be decontaminated according to the draft ER-SOP entitled "Personnel Decontamination."

4.2.6 Restoration of Excavation and Surrounding Areas

Every attempt will be made to return the excavation and area adjacent to each excavation to the condition it was in before the field operations began. Excavated soils (or clean fill in the event a voluntary corrective action or interim measure has taken place) and unused samples will be replaced in the excavation and the ground surface returned to its original condition. In some cases, grass sod will be placed where patches of grass have been damaged, or asphalt/concrete patching will be required where excavations are made through asphalt or concrete surfaces.

REFERENCES

Ahlquist, A.J., A.K. Stoker, and L.K. Trocki, December 1977. "Radiological Survey and Decontamination of the Former Main Technical Area (TA-1) at Los Alamos New Mexico," Los Alamos Scientific Laboratory Report LA-6887, Los Alamos, New Mexico.
(LANL 1977, 09-0016)

LANL (Los Alamos National Laboratory), August 1993. "Environmental Restoration Program Standard Operating Procedures," Los Alamos National Laboratory Report, Los Alamos, New Mexico.
(LANL 1993, 0875)

LANL (Los Alamos National Laboratory), November 1992. "Installation Work Plan for Environmental Restoration," Revision 2, Los Alamos National Laboratory Report LA-UR-92-3795, Los Alamos, New Mexico.
(LANL 1992, 0768)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1078," Los Alamos National Laboratory Report LA-UR-92-838, Los Alamos, New Mexico.
(LANL 1992, 0782)

Table 3-1
Analytical Methods for Soil Samples at the Western Sanitary Waste Line

Method #	Analysis	Holding Time
EPA SW-846 Method 8270	Semivolatile Organic Compounds	14 days until extraction 40 days therafter
EPA SW-846 Method 6010	Metals by Inductively Coupled Plasma Atomic Emission Spectroscopy	6 months
EPA SW-846 Method 7000	Metals by Atomic Absorption	6 months
EPA SW-846 Method 7470	Mercury	28 days
EPA Method 418.1	Total Petroleum Hydrocarbons	
EPA SW-846 Method 8260	Volatile Organic Compounds	14 days
EPA SW-846 Method 8080	PCBs and Pesticides	7 days until extraction 30 days therafter
LANL or DOE Method	Radionuclides Gross Alpha Gross Beta Gamma Spectrometry Isotopic Plutonium (Pu-238, -239) Isotopic Uranium (U-234, -235) Cesium 137 Americium 241 Cobalt 60 Strontium 90 Beryllium 90	6 months

TABLE 4-1
SOPS APPLICABLE TO OU 1078 FIELD OPERATIONS

General

ER-SOP-01.01	General Instructions for Field Investigations
ER-SOP-01.02	Sample Containers and Preservation
ER-SOP-01.03	Handling, Packaging, and Shipping of Samples
ER-SOP-01.04	Sample Control and Field Documentation
ER-SOP-01.05	Field Quality Control Samples
ER-SOP-01.06	Management of RFI-Generated Waste

Health and Safety in the Field

ER-SOP-draft	Personal Protective Equipment
ER-SOP-draft	Respirators
ER-SOP-draft	Pre-Entry Briefings for Site Personnel
ER-SOP-draft	Pre-Entry Briefings for Site Visitors
ER-SOP-draft	Safety Meetings and Inspections
ER-SOP-draft	Heat and Cold Stress and Natural Hazards
ER-SOP-draft	General Equipment Decontamination
ER-SOP-draft	Accident/Incident Reporting
ER-SOP-draft	Radiation Protection
ER-SOP-draft	Training and Medical Surveillance

Reconnaissance/Field Survey

ER-SOP-3.02	General Surface Geophysics
ER-SOP-3.08	Geomorphic Characterization
ER-SOP-draft	PHOSWICH Determination of Low-Energy Gamma Radiation
ER-SOP-draft	FIDLER Determination of Low-Energy Gamma Radiation

Drilling, Excavating, Sampling, and Logging

ER-SOP-04.01	Drilling Methods and Drill Site Management
ER-SOP-draft	Excavating Methods
ER-SOP-draft	General Borehole Logging
ER-SOP-planned	Methods for Sample Collection from Backhoe Bucket
ER-SOP-planned	Methods for Sample Collection from Sewer Pipe and Debris

Field Screening Techniques

ER-SOP-draft	Portable GC/MC for Field Screening of VOCs
ER-SOP-draft	X-Ray Fluorescence for Field Screening of Metals
ER-SOP-14.01	Berthold Low Alpha and Beta Activity Counter Calibration, Quality Control, Detection Limit, and Use
ER-SOP-draft	Gross Gamma Activity on Soil

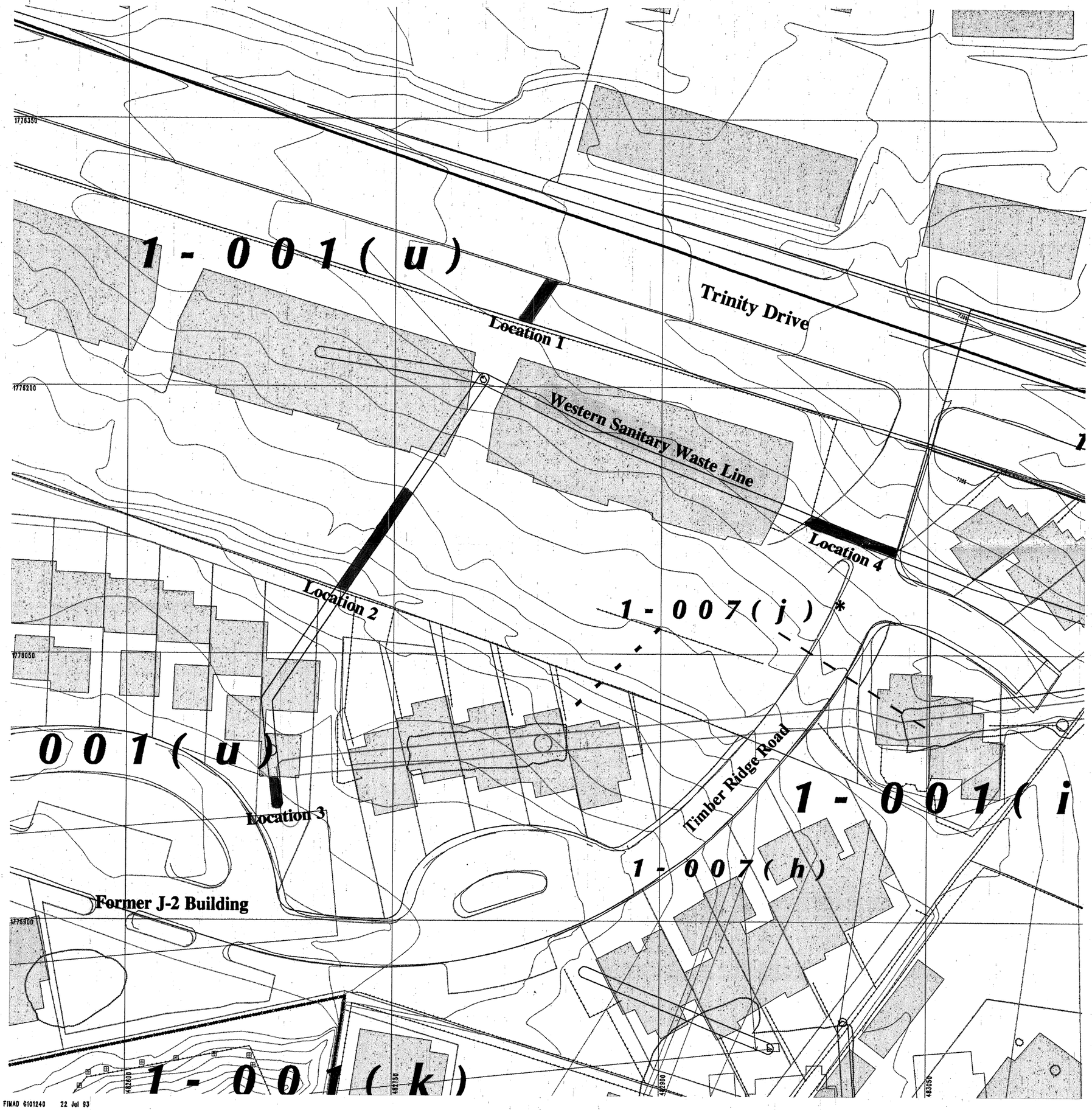
Sampling Techniques

ER-SOP-06.09	Spade and Scoop Method for Collecting Soil Samples
ER-SOP-06.10	Hand-Auger and Thin-Wall Tube Sampler
ER-SOP-06.11	Stainless Steel Surface Soil Sampler
ER-SOP-06.13	Surface Water Sampling
ER-SOP-06.14	Sediment Material Collection
ER-SOP-06.15	Coliwasa Sampler for Liquids and Slurries
ER-SOP-06.17	Trier Sampler for Sludges and Moist Powders or Granules
ER-SOP-06.19	Weighted Bottle Samples for Liquids and Slurries in Tanks
ER-SOP-draft	Draeger Tubes
ER-SOP-draft	Replicate Spoon Sampling for Auger Drilling

Decontamination

ER-SOP-draft	Field Decontamination and Sampling Equipment
ER-SOP-draft	Personnel Decontamination

OU-1078: PRS's 1-001, 1-002, & 1-007 (Subset 1)



LEGEND

- Boundary, LANL
- Boundary, OU
- Boundary, TA
- Contour, 100 foot
- Contour, 20 foot
- Contour, 10 foot
- Contour, 2 foot
- Fence, Industrial
- Fence, Security
- Gate
- Retaining Wall
- Road, Dirt
- Road, Paved
- Road/Trail
- PRS, 1-001
- PRS, 1-002
- PRS, 1-007
- Permanent Structure
- Temporary Structure
- Former Structure
- Underground Structure
- Sample Sites

3184-B

NORTH, NM State Plane

Grid provides NMSP coordinates, in feet

Grid interval, in feet: 150

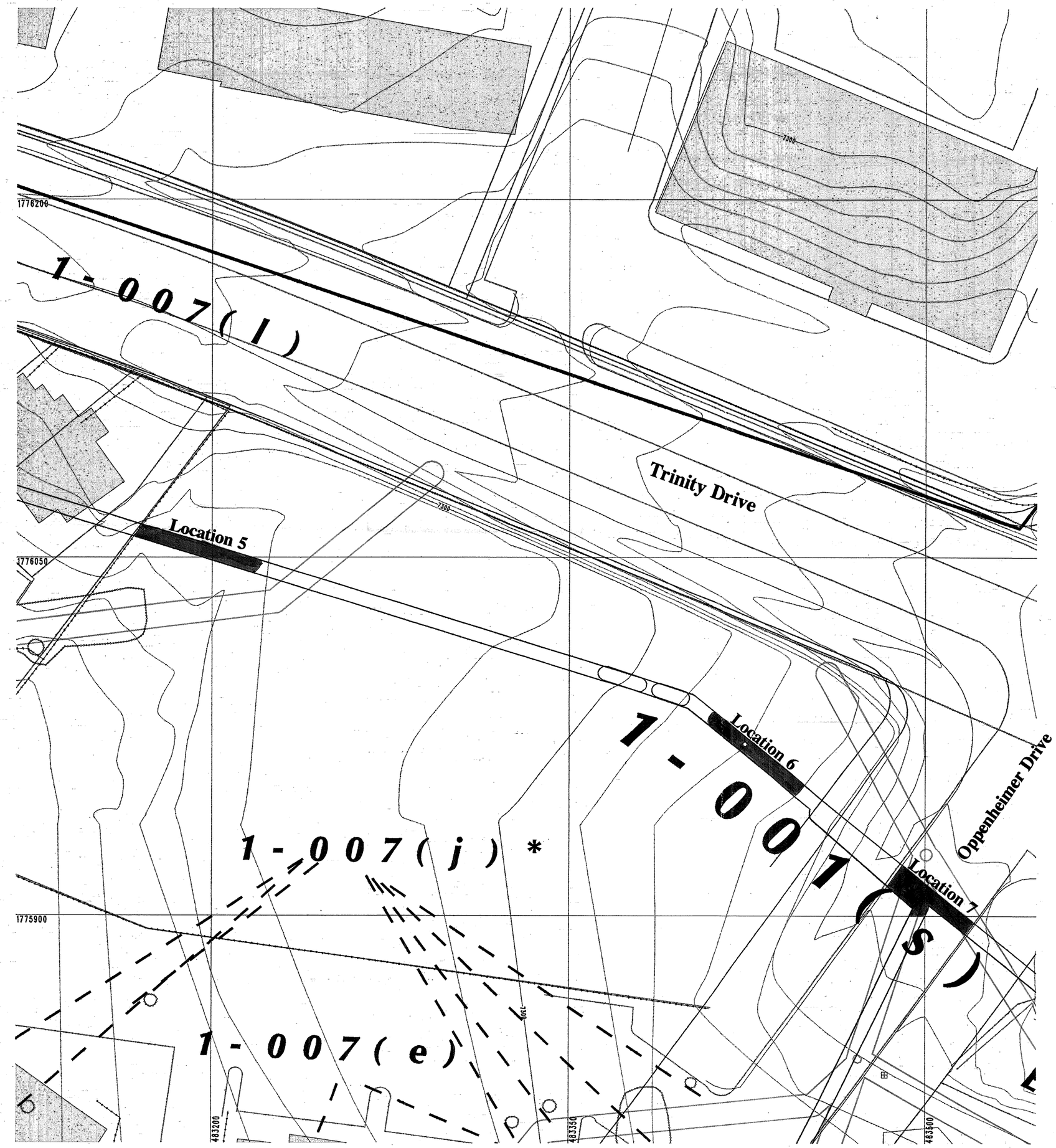
0 25 50 75 ft

NOTICE: Information on this map is provisional and has not been checked for accuracy

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display
Produced by: Jan Benson
Date: 93-07-22

Figure 1

OU-1078: PRS's 1-001, 1-002, & 1-007 (Subset 2)



FIMAD G101247 22 Jul 93

LEGEND

- Boundary, LANL
- Boundary, OU
- Boundary, TA
- Contour, 100 foot
- Contour, 20 foot
- Contour, 10 foot
- Contour, 2 foot
- Fence, Industrial
- Fence, Security
- Gate
- Retaining Wall
- Road, Dirt
- Road, Paved
- Road/Trail
- PRS, 1-001
- PRS, 1-002
- PRS, 1-007
- Permanent Structure
- Temporary Structure
- Former Structure
- Underground Structure
- Sample Sites

3184-C

NORTH, NM State Plane

Grid provides NMSP coordinates, in feet

Grid interval, in feet: 150

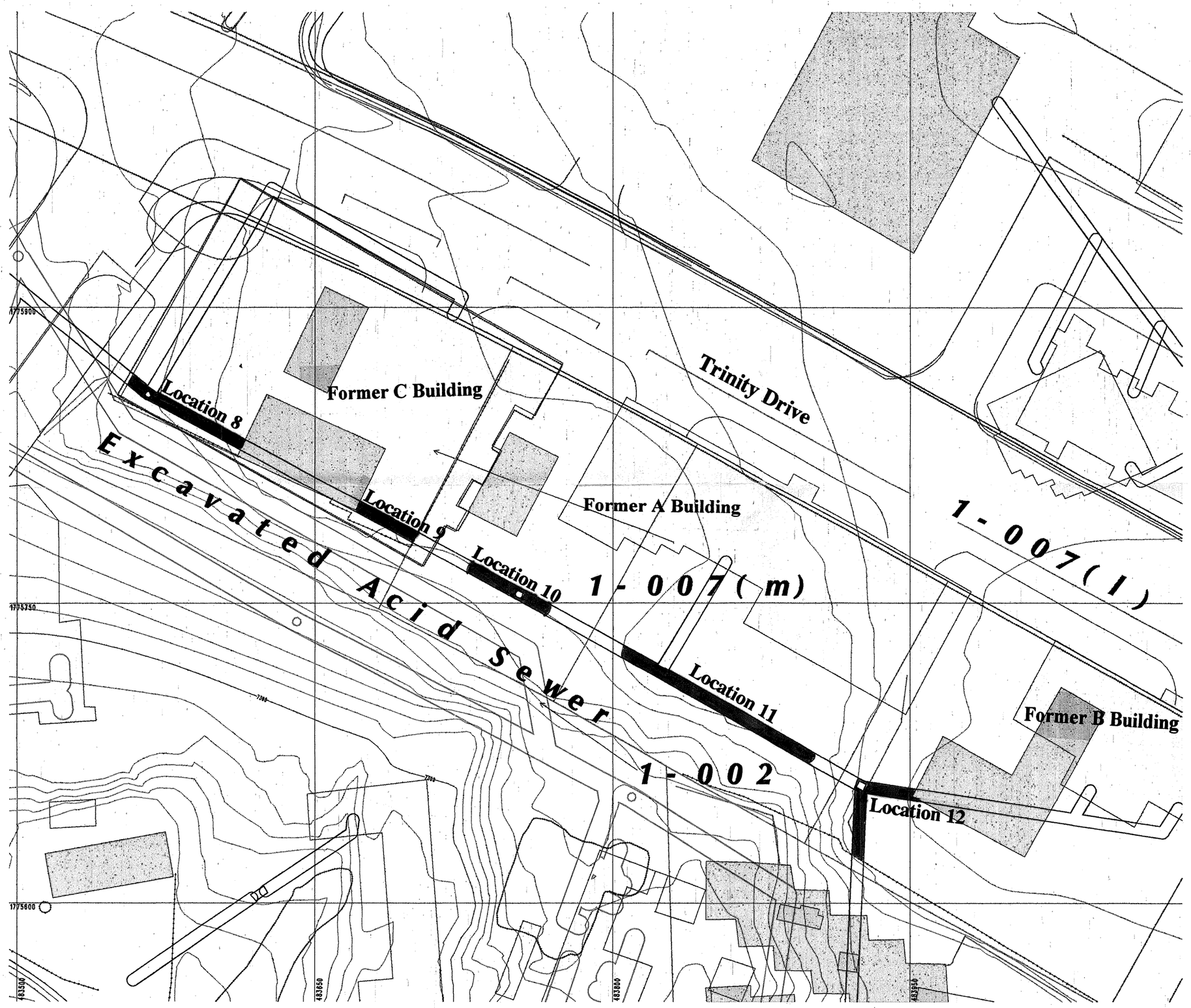
0 25 50 75 ft

NOTICE: Information on this map is provisional and has not been checked for accuracy

Figure 2

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display
Produced by: Jan Benson
Date: 93-07-22

OU-1078: PRS's 1-001, 1-002, & 1-007 (Subset 3)



LEGEND

- Boundary, LANL
- Boundary, OU
- Boundary, TA
- Contour, 100 foot
- Contour, 20 foot
- Contour, 10 foot
- Contour, 2 foot
- Fence, Industrial
- Fence, Security
- Gate
- Retaining Wall
- Road, Dirt
- Road, Paved
- Road/Trail
- PRS, 1-001
- PRS, 1-002
- PRS, 1-007
- Permanent Structure
- Temporary Structure
- Former Structure
- Underground Structure
- Sample Sites

3184-D

NORTH, NM State Plane
Grid provides NMSP coordinates, in feet
Grid interval, in feet: 150

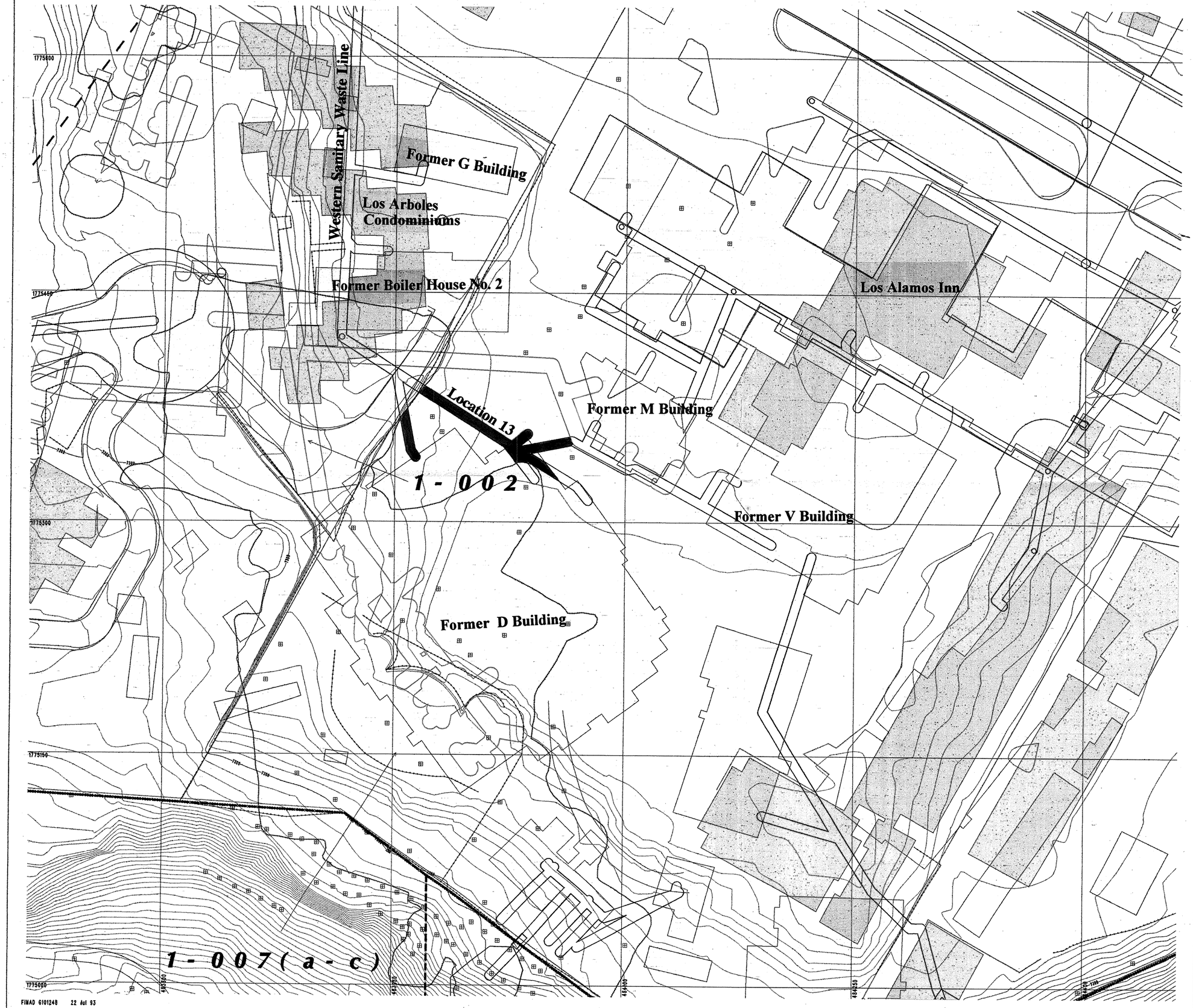
0 25 50 75 ft

NOTICE: Information on this map is provisional and has not been checked for accuracy

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display
Produced by: Jan Benson
Date: 93-07-22

Figure 3

OU-1078: PRS's 1-001, 1-002, & 1-007 (Subset 4)



LEGEND

- Boundary, LANL
- Boundary, OU
- Boundary, TA
- Contour, 100 foot
- Contour, 20 foot
- Contour, 10 foot
- Contour, 2 foot
- Fence, Industrial
- Fence, Security
- Gate
- Retaining Wall
- Road, Dirt
- Road, Paved
- Road/Trail
- PRS, 1-001
- PRS, 1-002
- PRS, 1-007
- Permanent Structure
- Temporary Structure
- Former Structure
- Underground Structure
- Sample Sites

3184-E

NORTH, NM State Plane

Grid provides NMSP coordinates, in feet

Grid interval, in feet: 150

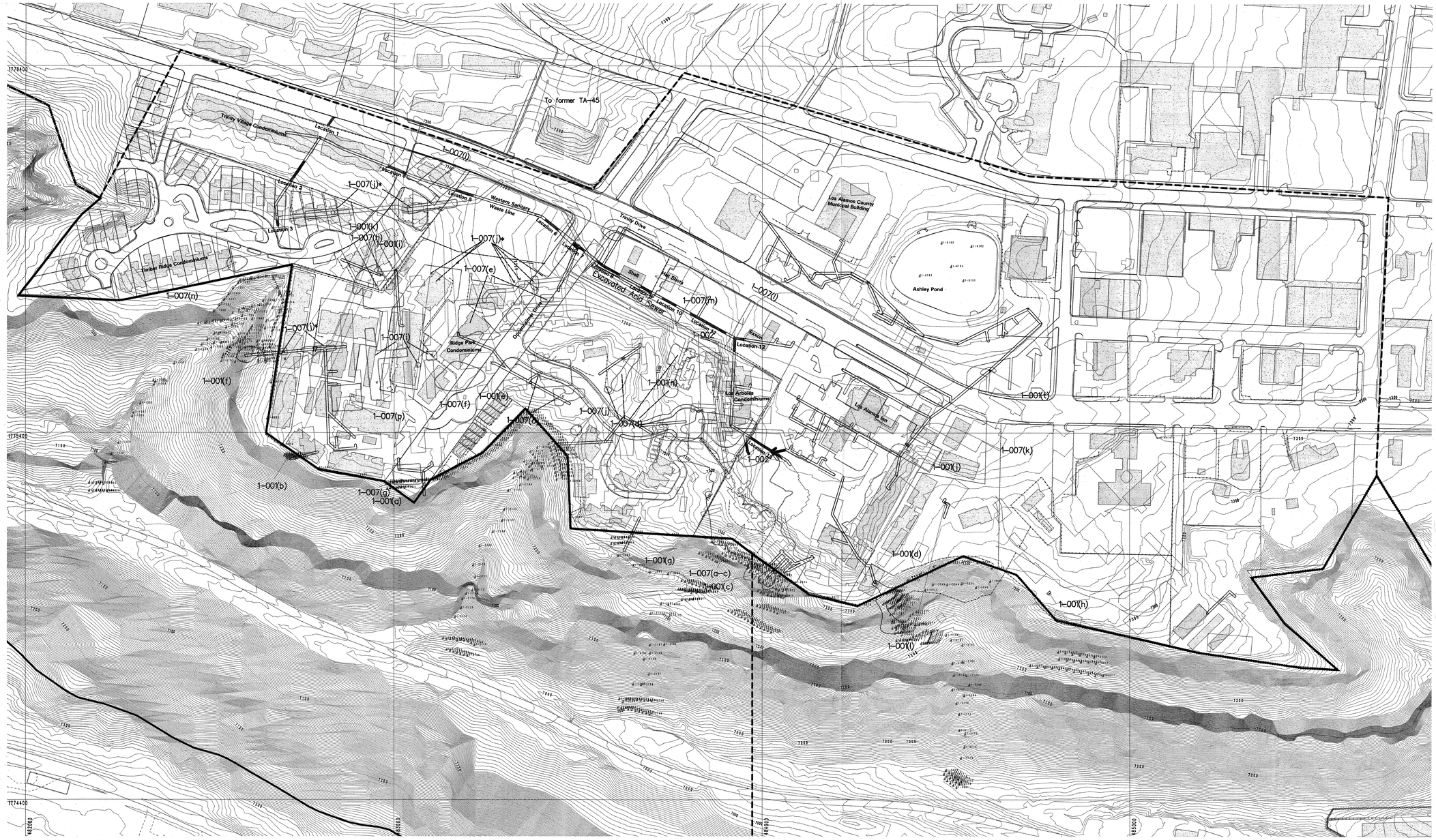
0 25 50 75 ft

NOTICE: Information on this map is provisional and has not been checked for accuracy

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display
Produced by: Jan Benson
Date: 93-07-22

Figure 4

OU-1078: PRS's 1-001, 1-002, and 1-007



LEGEND

- Boundary, LANL
- Boundary, OU
- Boundary, TA
- Contour, 100 foot
- Contour, 10 foot
- Contour, 2 foot
- Fence, Industrial
- Fence, Security
- Gate
- Retaining Wall
- Road, Dirt
- Road, Paved
- Road/Trail
- PRS, 1-001
- PRS, 1-002
- PRS, 1-007
- Permanent Structure
- Temporary Structure
- Former Structure
- Underground Structure
- Sample Sites

NORTH, NM State Plane

WESTERN SANITARY WASTE LINE, TA-1

Grid provides NMSP coordinates, in feet

Grid interval, in feet: 1000

0 100 200 300 ft

NOTICE: Information on this map is provisional and has not been checked for accuracy

3184-A

FIGURE 5

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display

Produced by: Tom Garrison
Date: 93-04-13

FIMAD G100818 13 Apr 93