DEPARTMENT OF ENERGY
National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

DEC 16 2004

Mr. John E. Kieling
Manager, Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of Revised Closure Plans for Interim Status Container Storage Units-Technical Area (TA) 50, Building 1, Room 59 and TA-50, Building 37, Rooms 115 and 118; and TA-55, Room B38, Los Alamos National Laboratory (LANL)

Dear Mr. Kieling:

This letter submits revised closure plans for the units referenced above. A letter dated November 16, 2004 from your office approved the closure plans for these units and required changes to be made to the plans. The attached closure plans incorporate the changes required.

- LANL TA-50 Closure Plan for Interim Status Container Storage Units TA-50-1, Room 59 and TA-50-37, Revision 1.1, December 2004 (LA-UR-04-8494)
- LANL TA-55 Closure Plan for the B38 Container Storage Unit, Revision 0.1, December 2004 (LA-UR-04-8493).

Revisions to the closure plans were made as described in the approval letter's attachment, with one additional modification. One of the required changes to the closure plan for the TA-55 B38 container storage unit was edited. At the request of your office, LANL clarified the type and preparation of the blank sample to be used. This change was to be made within Section 8.0, "Verification of Decontamination." Instead, Section 8 was modified to contain the following sentence, "Sample blanks (field blanks and trip blanks) will be prepared as described in Section 11.3.1 of this closure plan." Then, Section 11.3.1 was modified to contain the statement, "The sample wash water blank (trip blank) will be prepared by the analytical laboratory. It will consist of deionized water. The blank container will remain closed on site." These changes clarify the type of blank to be used; and how it will be prepared and handled as required by the November 16, 2004 letter.

Included with this letter is a version of each closure plan containing editing marks as well as a clean version of each plan. Should you have any comments or questions, please contact either Gene Turner of my staff at (505) 667-5794 or Jack Ellvinger, UC, at (505) 667-0633.

Sincerely,

Edwin L. Wilmot
Manager

EM:5GT-019

Enclosure

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CERTIFICATION
Los Alamos National Laboratory
TA-55-4, B38 Closure Plan

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 possibility of fine and imprisonment for knowing violations.

Kenneth M. Hargis

12/10/04

Kenneth M. Hargis
Division Director
Environmental Stewardship Division
Los Alamos National Laboratory

Date Signed

12/16/04

Edwin L. Wilmot
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

Date Signed .

LA-UR-~~02-545~~04-8493
~~August 2002~~December 2004

Los Alamos National Laboratory
Technical Area 55

Closure Plan for the
B38 Container Storage Unit

Prepared by:

Los Alamos National Laboratory
Solid Waste Regulatory Compliance (SWRC)
Los Alamos, New Mexico 87545

Document: TA-55-4, B38 CSU Closure Plan
Revision No.: 0.10
Date: ~~August 2002~~December 2004

Los Alamos National Laboratory
Technical Area 55

Closure Plan for the B38 Container Storage Unit

~~August 2002~~December 2004

Prepared by:

Los Alamos National Laboratory
Solid Waste Regulatory Compliance (SWRC)
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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
BUS-4	Materials Management Group
°C	degrees Celsius
CFR	Code of Federal Regulations
CSU	container storage unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Group
ft.	feet/foot
HSR-1	Health Physics Operations Group
HSR-5	Industrial Hygiene and Safety Group
in.	inch(es)
LANL	Los Alamos National Laboratory
MADAM	Multiple Assay Duel Analysis Measurement
NMED	New Mexico Environment Department
OLASO	Office of Los Alamos Site Operation
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SOP	standard operating procedure
SW-846	*"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"*
SWRC	Solid Waste Regulatory Compliance Group
TA	technical area

CLOSURE PLAN FOR THE B38 CONTAINER STORAGE UNIT

The information provided in this closure plan is submitted to address the applicable closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart VI, Part 265, Subparts G and I, revised June 14, 2000 [6-14-00]. This closure plan describes the activities necessary to clean close the B38 container storage unit (CSU) at the Los Alamos National Laboratory (LANL) Technical Area (TA) 55. Closure activities will minimize the need for further maintenance, preclude the release of hazardous constituents to environmental media, and be protective of human health, in accordance with the closure performance standards specified in 20.4.1 NMAC, Subpart V, 265.111 [6-14-00].

Until closure is complete and has been certified in accordance with 20.4.1 NMAC, Subpart VI, 265.115 [6-14-00], as discussed in Section 1.6, a copy of the approved closure plan and any approved revisions will be on file at LANL's Solid Waste Regulatory Compliance Group (SWRC) and at the U.S. Department of Energy (DOE) Office of Los Alamos Site Operations (OLASO).

1.0 GENERAL CLOSURE INFORMATION

1.1 Closure Performance Standard [20.4.1 NMAC, Subpart VI, 265.111]

The B38 CSU will be closed to meet the following performance standards:

- Minimize the need for further maintenance,
- Controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, or surface waters, or to the atmosphere, and
- Complies with the closure requirements of 20.4.1 NMAC, Subpart VI, Part 265, Subparts G and I [6-14-00], including, but not limited to the requirements of 20.4.1 NMAC, Subpart VI, 265.178, 265.197, 265.228, 265.258, 265.280, 265.310, 265.351, 265.601, through 265.603, and 265.1102.

This will be accomplished by removal of waste from the CSU and decontamination, if necessary, of the surfaces and equipment that may have come into contact with the wastes. Decontamination activities will ensure the removal of hazardous waste residues from the B38 CSU to established cleanup levels.

1.2 Partial and Final Closure Activities [20.4.1 NMAC, Subpart VI, 265.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial closure will consist of clean closing the B38 CSU, while leaving the other regulated hazardous/mixed waste units at LANL in service. Partial closure (hereinafter referred to as closure) will be deemed complete when clean closure has been verified; all surfaces and equipment have been decontaminated, or otherwise properly disposed, if necessary; and closure certification has been submitted to and approved by the New Mexico Environment Department (NMED). Final closure will occur when the remaining hazardous/mixed waste management units at LANL are closed. Final closure will consist of assembling documentation on the closure status of each unit, including all previous partial clean closures as well as land-based units that have been or are being addressed via alternative closure requirements. Final closure will be deemed complete when the closure certification has been submitted to the NMED and the NMED has approved the final closure.

1.3 Closure Schedule [20.4.1 NMAC, Subpart VI, 265.112(b)(6), 265.112(e), and 265.113]

Written notification will be provided to the NMED 45 days before the start of closure activities for the B38 CSU. However, pursuant to 20.4.1 NMAC, Subpart VI, 265.112(e) [6-14-00], removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin according to the requirements of 20.4.1 NMAC, Subpart VI, 265.112(d)(2) [6-14-00]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20.4.1 NMAC, Subpart VI, 265.113(a) [6-14-00], within 90 days after final receipt of waste at the B38 CSU. This timeframe will be met as long as facilities are available for storage, treatment, or disposal of these wastes. In the event that closure activities cannot begin within 90 days, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC, Subpart VI, 265.113(a) [6-14-00]. Closure activities and reporting requirements will be completed within 180 days of receipt of the final volume of waste at the CSU. Closure will be conducted in accordance with the schedule presented in Table 1.

Table 1
Closure Schedule for the B38 Container Storage Unit at Technical Area 55

Activity	Maximum Time Required [a]
Submit Closure Plan.	-90 Days
Notify the NMED of intent to close.	-45 Days
Final receipt of waste.	Day 0
Remove waste.	Day 5
Decontaminate surfaces and equipment.	Day 20
Sample excess used decontamination water for disposal.	Day 20
Perform verification sampling.	Day 30
Evaluate analytical data from verification sampling.	Day 50
Perform additional decontamination, if necessary.	Day 55
Perform additional verification sampling, if necessary.	Day 60
Evaluate additional analytical data.	Day 75
Perform final clean up and disposal (i.e., removal of decontaminated equipment and decontamination waste).	Day 140
Prepare closure report.	Day 150
Certify closure.	Day 175
Submit final report to NMED.	Day 180

a The schedule above indicates calendar days from the beginning by which activities will be completed. Some activities may be conducted simultaneously and/or may not require the maximum time listed. Extensions to this schedule may be requested, as needed.

NMED = New Mexico Environment Department

In the event that closure of the B38 CSU cannot proceed according to schedule, LANL will notify the Secretary of the NMED in accordance with extension request requirements in 20.4.1 NMAC, Subpart VI, 265.113(b) [6-14-00]. In addition, the demonstrations in 20.4.1 NMAC, Subpart VI, 265.113(a)(1) and (b)(1) [6-14-00], will be made in accordance with 20.4.1 NMAC, Subpart VI, 265.113(c) [6-14-00].

1.4 Amendment of the Closure Plan [20.4.1 NMAC, Subpart VI, 265.112(c)]

In accordance with 20.4.1 NMAC, Subpart VI, 265.112(c) [6-14-00], LANL will submit a written change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the closure plan.
- There is a change in the expected date of closure.
- Unexpected events occur during closure that requires modification of the approved closure plan.

The written notification or request will include a copy of the amended closure plan for approval by the NMED.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions presented in the bulleted items above. LANL will submit the modified plan in accordance with the request within 60 days of notification or within 30 days of notification if a change in facility condition occurs during the closure process.

1.5 Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC, Subpart VI, 265.140(c)]

In accordance with 20.4.1 NMAC, Subpart VI, 265.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart VI, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

1.6 Closure Certification [20.4.1 NMAC, Subpart VI, 265.115]

Within 60 days after completion of closure activities for the B38 CSU, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit has been closed in accordance with the approved closure plan. The certification will be signed by the appropriate DOE and LANL officials and by an independent, registered professional engineer and will be, in accordance with 20.4.1 NMAC, Subpart VI, 265.115 [6-14-00]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED upon request, as specified in 20.4.1 NMAC, Subpart VI, 265.115 [6-14-00]. Both DOE/OLASO and SWRC will maintain a copy of the certification and supporting documentation.

1.7 Security

Because of the ongoing nature of operations at LANL TA-55, site security at the B38 CSU will be maintained by the DOE or another authorized federal agency for as long as necessary to prohibit public access. The security fence at TA-55 will be maintained to ensure that public access is prevented.

1.8 Closure Report

Upon completion of the closure activities at the B38 CSU, a closure report will be prepared and submitted to the Secretary of the NMED. The report will document the closure and contain the following:

- A copy of the certification described in Section 1.6 of this closure plan.
- Any significant variance from the approved activities and the reason for the variance.
- A summary of all sampling results, showing:

  - Sample identification
  - Sampling location
  - Datum reported
  - Detection limit for each datum
  - A measure of analytical precision (e.g., uncertainty, range, variance)
  - Identification of analytical procedure
  - Identification of analytical laboratory

- A quality assurance/quality control (QA/QC) statement on analytical data validation and decontamination verification.
- The location of the file of supporting documentation, including:

  - Field logbooks
  - Laboratory sample analysis reports
  - QA/QC documentation
  - Chain-of-custody forms

- Storage or disposal location of regulated hazardous/mixed waste resulting from closure activities.
- A certification of accuracy of the report.

2.0 DESCRIPTION OF UNIT TO BE CLOSED

TA-55 is located on a finger mesa between a branch of Mortandad Canyon to the North and Two Mile Canyon to the South. Figure 1 shows the location of TA-55 at LANL. The B38 CSU is located in the southeast section of the basement floor of TA-55, Building 4 as shown on Figure 2 and has been identified as Area 2 in previous permitting documents. The B38 CSU consists of an area approximately 26.5 feet (ft) long by 11 ft wide as indicated in Figure 3. The CSU was used for solid and liquid mixed waste storage of 55-gallon drums in support of waste operations at TA-55. A photograph of the CSU is provided as Figure 4.

3.0 ESTIMATE OF MAXIMUM WASTE IN STORAGE

The maximum total inventory of waste in storage at any time in the TA-55-4, B38 CSU is estimated at 3,000 gallons.

4.0 DESCRIPTION OF WASTE

The B38 CSU was used to store 55-gallon drums of solid mixed waste generated during research and development activities, processing and recovery operations, decontamination and

decommissioning projects, and general facility operations at TA-55. These wastes included solidified evaporator salt solutions and solidified analytical solutions. A majority of the analytical solutions were only corrosive; however, a small portion of these analytical solutions contained organics. Envirostone® cement, which is a calcium sulfate dehydrate, was used to solidify these solutions. Over time it was discovered that a small percentage of the solutions migrated out of the cement matrix on to the surface of the cement. Collectively, the solidified evaporator salt solutions and the analytical solutions were assigned the U.S. Environmental Protection Agency (EPA) hazardous waste numbers for toxic metals, volatile organic compounds, and semi-volatile organic compounds. It should be noted that only the analytical solutions contain organic compounds. Table 2 provides a list of applicable compounds and associated EPA hazardous waste numbers based on analytical data.

Table 2

Hazardous Waste Constituents Stored at the B38 Container Storage Unit[a]

Category	EPA Hazardous Waste Numbers	Specific Constituents
Toxic Metals	D004, D005, D006, D007, D008, D009, D010, D011	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Volatile Organic Compounds	F002, F003, F005	Acetone, MEK, Bromomethane, Methylene, Chloride, Toluene, MIBK, DBCP
Semi-Volatile Organic Compounds		N-Nitrosodimethylamine, Phenol, Benzyol Alcohol, 2-Nitrophenol, 4-Nitrophenol, Benzoic Acid, Diethylphthalate, Di-n-Butylphthalate, Bis-2-Ethylhexlphthalate, Di-n-Octylphthalate, Butylbenzylphthalate

[a] Based on the operating record of the unit

MEK = methyl ethyl ketone
MIBK = 4-methyl-2-pentanone
DBCP = 1,2-dibromo-3-chloropropane

LANL will verify that the constituents listed in Table 2 are not present on the surfaces of the B38 CSU for a clean closure certification.

5.0 REMOVAL OF WASTE

The operating record of the B38 CSU indicates that the unit has not received any waste for storage since 1994, however, it has remained active in order to remain compatible with TA-55 operations and to allow flexibility for additional storage.

6.0 PRELIMINARY CLOSURE PROCEDURES

6.1 Safety Precautions

Job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted, in accordance with LANL safety procedures. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE), specified by Health Physics Operations Group (HSR-1) and Industrial Hygiene and Safety Group (HSR-5), and will follow good hygiene practices to protect themselves from exposure to hazardous and/or mixed waste. The level of PPE that will be required will depend upon the levels of radiological and/or chemical contamination detected, if any. If HSR-1 and HSR-5 surveys indicate no detectable contamination levels, minimum PPE requirements will consist of coveralls, booties, gloves, ear plugs, steel-toed/composite toed shoes, and safety glasses or face shields. If an overhead danger is present, hard hats will be worn. All workers involved in closure activities will be required to have appropriate training including Hazardous Waste Operations and Emergency Response Training for general site workers (24 hour and refresher) and TA-55 site-specific training, as appropriate. Personnel may also be required to have Radiation Worker, Level II training based on the radiological survey conducted prior to the commencement of closure. Contaminated PPE will either be decontaminated or managed in compliance with appropriate waste management regulations.

6.2 Structural Assessment

Preventive maintenance inspections were conducted weekly at the B38 CSU while waste was in storage. If any defects, deterioration, damage, or hazards affecting containment developed, appropriate remedial actions (including sampling, repairs, maintenance, or replacement) were completed immediately. Prior to beginning any decontamination activities at the B38 CSU, the base or secondary containment will be inspected for any cracks or conditions that could potentially lead to loss of decontamination water and/or verification wash water during closure. If a crack or gap is present, a swipe sample or a representative sample of the media (i.e., concrete, metal) will be taken to determine the presence of contamination. The sample will be analyzed for the hazardous contaminants identified in Table 2 of this closure plan. If contamination is present, the surface flaw will be decontaminated prior to repairing the crack/gap. Complete or partial removal (e.g., scabbling) of the material may be performed until contamination is no longer detected. If partial removal is successful in eliminating the contamination, it will be assumed that the remaining material, including underlying soil, is clean.

6.3 Waste Management

After each decontamination wash down process, the used wash water will be collected, transferred

to containers, sampled, and analyzed for the hazardous constituents listed in Table 2 as appropriate. The results of this analysis will be used to determine if the used wash water can be managed as hazardous or non-hazardous wastewater. The wastewater, PPE, and any other waste generated as a result of closure will be managed as discussed in Section 12.0.

7.0 DECONTAMINATION PROCEDURES

To the extent possible, all contaminated surfaces and equipment (if present) will be decontaminated. Surfaces and equipment that cannot be decontaminated will be containerized and managed in compliance with applicable regulations. All sampling conducted during closure and decontamination will be done in accordance with QA/QC procedures defined by "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846)* (EPA, 1986). Closure will be conducted in accordance with the schedule presented in Table 1. Monitoring for contamination will occur throughout closure activities, as appropriate.

7.1 Equipment Located in the B38 CSU

All portable equipment (if present) will be wiped down with a solution consisting of Alconox® and water. A portable berm will be used to collect excess wash water and provide containment during the decontamination process. The Multiple Assay Duel Analysis Measurement (MADAM) and its associated ancillary equipment are located along the southeast wall of the B38 CSU and are shown in Figure 4. MADAM (43 inches (in.) wide by 47 in. long) and its associated electrical equipment (25 in. wide by 28 in. long) are not portable and will remain in place during the decontamination of the main surfaces of the B38 CSU.

7.2 Decontamination of the B38 Surfaces

Decontamination of the B38 CSU surfaces will commence in two phases. The first phase will consist of the decontamination of the walls and floor of the CSU with the exception of the areas immediately underneath and adjacent to MADAM and its ancillary equipment. Decontamination will be conducted using mops, cloths, and/or other absorbent materials to remove any potential hazardous constituents. These materials will be rinsed in a wash water solution consisting of Alconox® and water and used to wipe down the walls and floor. Containers in the TA-55, B-38 CSU were not stacked beyond the height of a 55-gallon drum on a secondary containment pallet. The containers were not opened or closed within the unit and there is no record of any spills. For these reasons, decontamination will begin with the wash down of the walls to a height of 5-ft (i.e., just above the height of a 55-gallon drum on a secondary containment pallet).

The second phase will consist of decontamination of the walls and floor, as in the first phase, only immediately adjacent and underneath MADAM and its ancillary equipment. There is approximately 30 in. of space between MADAM, its ancillary equipment, and the walls of the CSU. This should allow for sufficient space to wipe down the walls using mops, cloths, and/or other absorbent materials to remove hazardous constituents. There is approximately 4 in. of space between the bottom of MADAM and the floor underneath. This space may allow for the use of a mop, cloth, and/or other absorbent materials to remove hazardous constituents. If this space is insufficient, the equipment may be raised by a hydraulic lift or other means to a position which allows for appropriate access to the floor for decontamination.

The B38 CSU does not have recess areas (i.e., sumps) so excess used wash water during both phases will collect within temporary berms located on the floor of the unit. After the walls have been decontaminated, the floor and the secondary containment berms located in the room will be wiped down and excess used wash water removed from the area and transferred to an appropriate container for analysis and waste disposal.

When decontamination of the CSU is complete, verification will be conducted as indicated in Section 8.0. If sampling and analysis indicate that hazardous constituents are present, the wash cycles and analyses will continue until the walls and floor have been decontaminated or the decision is made to proceed with an alternate demonstration of decontamination as described in Section 9.0.

7.3 Equipment Used During Closure

Reusable protective clothing, tools, and equipment used during decontamination activities will be cleaned with a wash water solution. Residue, disposable equipment, and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

8.0 VERIFICATION OF DECONTAMINATION

LANL proposes analysis of wash water samples for decontamination verification at the B38 CSU utilizing the following methodology:

1. Minimize dilution of potential hazardous constituents by limiting the verification solution to an amount that is sufficient to wipe down the surface to be verified and collect the required number of samples.

2. Limit the sampling area to a specific discrete location (e.g., a wall or portion thereof

depending on the size of the unit).

3. Verify decontamination by comparing the discrete sample results to a baseline result obtained from the verification solution prior to its use for the verification wipe down.

4. If the result is at or below that of the blank, the decontamination is verified for the discrete area sampled. Sample blanks (field blanks and trip blanks) will be prepared as described in Section 11.3.1 of this closure plan.

5. If the result is above the blank, repeat the decontamination and verification of the discrete location in accordance with Sections 7.0 and 8.0 of this closure plan.

This proposed method minimizes dilution and establishes criteria by which successful decontamination is verified. Analytical procedures will conform to methods found in the most current version *SW-846* (EPA, 1986).

8.1 Verification Criteria

Successful decontamination of the B38 CSU will meet a minimum of one of the following criteria:

- No detectable Resource Conservation and Recovery Act (RCRA)-regulated constituent residues from the management of stored authorized RCRA-regulated wastes are identified in samples collected during closure activities.

- Analytical results of samples collected during decontamination verification activities identify no statistically significant concentrations of RCRA-regulated constituents above baseline data.

- Detectable concentrations of RCRA-regulated constituents in samples collected during verification activities are at or below levels agreed upon with the NMED to be protective of human health and the environment based on the results of risk assessment methods.

- Detectable concentrations of RCRA-regulated constituents that cannot be removed or decontaminated to acceptable levels as described above will be allowed to remain provided that these RCRA-regulated constituents do not pose an unacceptable risk when combined with technical or administrative control measures agreed upon with the NMED.

The following sections provide a detailed description of how decontamination verification will be conducted at the B38 CSU.

8.2 Verification Procedures

Verification sampling at theTA-55, B38 CSU will be conducted at 8 discrete locations as described below:

1. Divide the northwest wall (26.5-ft long, 5-ft high) of the CSU into two equal sections. Wipe each down with sufficient wash water solution to collect one set of verification samples per

section. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove the excess water.

2. Wipe down the northeast wall (11-ft long, 5-ft high) of the CSU with sufficient wash water solution to collect one set of verification samples. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove the excess water.

3. Divide the southeast wall (26.5-ft long, 5-ft high) of the CSU into two equal sections. Wipe each down with sufficient wash water solution to collect one set of verification samples per section. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove excess water.

4. Wipe down the southwest wall (11-ft long, 5-ft high) of the CSU with sufficient wash water solution to collect one set of verification samples. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove the excess water.

5. Divide the floor (26.5-ft long, 11-ft wide) of the CSU into two equal sections. Wipe each down with sufficient wash water solution to collect one set of verification samples per section. Collect the wash water solution in a bermed area. Sample and remove excess water.

9.0 ALTERNATE DEMONSTRATION OF CLOSURE

An alternate demonstration of decontamination may be justified at the B38 CSU if decontamination methods described in Section 7.0 are not feasible. LANL proposes the following alternate demonstration for the B38 CSU:

- Comparison of the verification analytical results to the EPA Region 9 Human Health Risk Based levels for drinking water. If the result is below the human health risk based level, decontamination at the CSU will be considered complete.

10.0 SAMPLING ACTIVITIES [20.4.1 NMAC, Subpart VI, 265.112(b)(4)]

The following sections describe procedures and methods for sampling, analysis, and documentation applicable to closure activities. Sampling will be conducted in accordance with procedures given in *SW-846* (EPA, 1986) or other approved procedures or methods.

10.1 Sampling Strategy/Approach

Sampling activities will be conducted to verify that the decontamination efforts described in Section 7.0 were effective at removing hazardous constituents, if any, from the surfaces of the CSU. Samples will be collected according to the methods and procedures provided in this section from discrete locations and analyzed for the appropriate hazardous constituents identified in Table 2 of this closure plan. Table 3 identifies the sample locations, types, and quantities applicable to the closure of the TA-55, B38 CSU. Each discrete location will be wiped down with a clean Alconox® and de-ionized water solution that will be allowed to collect in a bermed area. To minimize dilution

of the samples, the solution used for the wipe down will be limited to a quantity sufficient to collect the appropriate number of samples. Verification sampling for this CSU will be conducted for each of the walls and finally for the floor to prevent cross contamination of the samples and allow for the identification of contaminated areas.

Table 3
Sample Types and Quantities for the TA-55, B38 Container Storage Unit Closure

Discrete Sample Location	Verification Sample Sets [a]	Blank Comparison Samples
Northwest Wall (26.5-ft x 5-ft)	2	2
Northeast Wall (11-ft x 5-ft)	1	1
Southeast Wall (26.5-ft x 5-ft)	2	2
Southwest Wall (11-ft x 5-ft)	1	1
Floor (26.5-ft x 11-ft)	2	2

[a] Analysis for Metals, VOCs, and SVOC as identified in Table 2.

ft = feet

10.2 Sample Collection Procedure

10.2.1 Soil and Sediment Sampling

The B38 CSU is located inside TA-55-4 and is provided with secondary containment and run-on protection. The TA-55-4 basement floor is constructed of 10-in. thick concrete and is coated with a chemical-resistant epoxy primer and paint, which effectively prevents the migration of any liquids through the concrete and into the environment. Inspections were conducted at the unit while waste was in storage to ensure that defects, deterioration, damage, or hazards affecting this containment were discovered and repaired. These features, inspections, and maintenance were effective at preventing the migration of waste to the environment. In addition, the operating record indicates that there are no recorded spills of liquids at the B38 CSU. For these reasons, soil sampling is not applicable for the B38 CSU closure and will not be conducted.

10.2.2 Liquid Sampling

Sampling of the clean/used wash water solution will be performed in accordance with Environmental Restoration Group (ER) standard operating procedures (SOP) ER-SOP-6.13, "Surface Water Sampling" (LANL, 2001).

10.2.3 Cleaning of Samplers

Disposable sampling equipment will be used for the B38 CSU closure. This equipment may be presumed clean if still in a factory-sealed wrapper.

10.3 Sample Management Procedures

Samples will be collected and transported using documented chain-of-custody and sample management procedures to ensure the integrity of the sample and provide an accurate and defensible written record of the possession and handling of a sample from the time of collection, through laboratory analysis. An EPA approved laboratory will provide coolers, containers, preservative, labels, chain-of-custody forms, analysis request forms, and custody seals prior to sampling. The following provides a description of chain-of-custody; sample documentation; sample handling, preservation, and storage; and sample transportation requirements that will be followed during the sampling activities associated with the closure.

10.3.1 Chain-of-Custody

Sample chain-of-custody form will be maintained by sampling personnel until the samples are relinquished to the analytical laboratory. The sample collector will be responsible for the integrity of the samples collected until properly transferred to another person. The EPA considers a sample to be in a person's custody if it is:

- In a person's physical possession,
- In view of the person in possession, or
- Secured by that person in restricted access area to prevent tampering.

The sample collector will document all pertinent sample collection data. Individuals relinquishing or receiving custody of the samples will sign, date, and note the time on the analysis request/chain-of-custody form. A chain-of-custody form shall accompany the sample containers or coolers, including transport to the analytical laboratory.

10.3.2 Sample Documentation

Sampling personnel will complete and maintain records to document sampling and analysis activities. Sample documentation will include, at a minimum, sample identification numbers, sample container labels and custody seals, chain-of-custody forms, analysis request forms, sample logbooks detailing sample collection activities, and shipping forms (if necessary).

10.3.2.1 Sample Labels and Custody Seals

A sample label will be affixed to each sample container. The sample label will include, at a minimum the following information:

- A unique sample identification number.
- Name of the sample collector.
- Date and time of collection.

- Type of preservatives used, if any.
- Location from which the sample was collected.

A custody seal will be placed on each sample container to ensure detection of unauthorized tampering with the samples. These labels must be initialed, dated, and affixed, by the sample collector, to the container in such a manner that it is necessary to break the seal to open the container.

10.3.2.2 Chain-of-Custody Form

A chain-of-custody form must accompany all samples from collection through laboratory analysis. The completed original chain-of-custody form will be returned by the laboratory and will become a part of the permanent record documenting the sampling effort. One chain-of-custody form may be used to document all of the samples collected from a single sampling event.

10.3.2.3 Analysis Request Form

An analysis request form must accompany all samples to the analytical laboratory. The completed original analysis request form will be returned by the laboratory and will become a part of the permanent record documenting the sampling effort. A separate analysis request form must be completed for each sample from a given sampling event. All samples for laboratory analysis will be submitted to an accredited off-site contract laboratory.

10.3.2.4 Sample Logbook

All pertinent information on the sampling effort must be recorded in a logbook. The sample logbook will include, at a minimum, the following information:

- The sample location.
- Suspected waste composition.
- Sample identification number.
- Volume/mass of waste taken.
- Purpose of sampling.
- Description of sample point and sampling methodology.
- Date and time of collection.
- Name of the sample collector.
- Sample destination and how it will be transported.
- Observations.
- Signatures of personnel responsible for the observations.

10.3.3 Sample Handling, Preservation, and Storage

Samples will be collected and containerized in appropriate pre-cleaned sample containers. Table 4 presents the requirements specified in *SW-846* (EPA, 1986), for sample containers, preservation techniques, and holding times. Samples that require cooling to 4 degrees Celsius (°C) will be placed in a cooler with ice or ice gel or in a refrigerator immediately upon collection.

Table 4
Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container Type and Materials	Preservation	Holding Time
Metals			
TCLP Metals: Arsenic Barium Cadmium Chromium Lead Selenium Silver	500-mL Wide Mouth-Polyethylene or Glass with Teflon Liner	Cool to 4°C	180 Days
TCLP/Total Mercury	500-mL Wide Mouth-Polyethylene or Glass with Teflon Liner	Cool to 4 °C	28 Days
Volatile Organic Compounds			
Target Compound VOCs	Two 40 mL Amber Glass Vials with Teflon-Lined Septa	HCl to pH<2 Cool to 4 °C	14 days
Semi-Volatile Organic Compounds			
Target Compound SVOCs	Four 1 L Amber Glass with Teflon-Lined Lid	Cool to 4 °C	Seven days from field collection to preparative extraction. 40 days from preparative extraction to determinative analysis.

[a] Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.

[b] Information obtained from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, U.S. Environmental Protection Agency, 1986 and all approved updates.

°C = degrees Celsius
HCl = hydrochloric acid
L = Liter
mL = milliter
SVOC = semi-volatile organic compounds
TCLP = Toxicity Characteristic Leaching Procedure
VOC = volatile organic compounds

10.3.4 Packaging and Transportation of Samples

All packaging and transportation activities will meet safety expectations, QA requirements, DOE Orders, and relevant local, state, and federal laws, (including 10 Code of Federal Regulation [CFR] and 49 CFR). The LANL document Laboratory Implementation Requirement (LIR) 405-10-01.1, "Packaging and Transportation" (LANL, 1999) establishes requirements that will be implemented for packaging design, testing, acquisition, acceptance, use, maintenance, and decommissioning and for on-site, intra-site, and off-site shipment preparation and transportation of general commodities, hazardous materials, substances, wastes, and defense program materials. Samples that require cooling to 4 °C will be transported in a cooler with ice or ice gel.

Off-site transportation of samples will occur via private, contract, or common motor carrier; air carrier; or freight. All off-site transportation will be processed through Materials Management Group (BUS-4) shipping office (667-4174) unless the shipper is specifically authorized through formal documentation by BUS-4 to independently tender shipments to common motor or air carriers.

11.0 ANALYTICAL REQUIREMENTS

11.1 Proposed Analytical Methods

Analytical methods to be used for verification during the TA-55, B38 CSU closure are summarized in Table 5.

Table 5
Summary of Proposed Analytical Methods

Parameter	Method Numbers	Test Methods	Rationale
Metals			
TCLP Metals: Arsenic Barium Cadmium Chromium Lead Selenium Silver Mercury	(7060A[c], 7061A)[a] (7080A[d], 7081[c])[a] (7130[d], 7131A[c])[a] (7190[d], 7191[c])[a] (7420[d], 7421[c])[a] (7740 [d], 7741 [c]) (7760A [d], 7761) (7471A[e], 7470A)[a] or equivalent methods [b]	Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Furnace technique Gaseous hydride Direct aspiration Borohydride reduction Manual cold vapor technique	Determine the metalconcent ration in the samples.
Volatile Organic Compounds (VOCs)			
VOCs	8260B[a] or equivalent methods	Gas chromatography /mass spectometry (GC/MS)	Determine the VOCs in the samples.
Semi-Volatile Organic Compounds (SVOCs)			
SVOCs	8270C[f a]	GC/MS	Determine the SVOCs in the samples.

[a] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
[b] Equivalent methods subject to EPA approval may be substituted.
[c] Method being integrated into Method 7010, per the May 1998 SW-846 Draft Update IVA.
[d] Method being integrated into Method 7000B, per the May 1998 SW-846 Draft Update IVA.
[e] Method being revised to 7471B per the May 1998 SW-846 Draft Update IVA.
[f] Method being revised per the May 1998 SW-846 Draft Update IVA.

Each sample will be analyzed for the constituents identified in Table 2 as appropriate. Target detection limits and instrumentation for metals and organic analyses are presented in Tables 6 and 7, respectively.

Table 6
Target Detection Limits, Analytical Methods, and Instrumentation for Metals Analysis

Analyte	Target Detection [a] Limit (ug/L)	EPA SW-846 [b] Analytical Method	Instrumentation
Arsenic	10	7060A [c], 7061A	ICP, GFAA
Barium	200	7080A [d], 7081 [c]	ICP, FLAA, GFAA
Cadmium	2	7130 [d], 7131A [c]	ICP, FLAA, GFAA
Chromium	10	7190 [d], 7191 [c]	ICP, FLAA, GFAA
Lead	5	7420 [d], 7421 [c]	ICP, FLAA, GFAA
Mercury	0.2	7470A, 7471A [e]	CVAA
Selenium	5	7740[e], 7741A	ICP, FLAA, GFAA
Silver	10	7760A[d], 7761 [c]	ICP, FLAA, GFAA

a Detection limits listed are for clean water. Actual detection limits may be higher depending on sample composition and matrix type.
b U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
c Method being integrated into Method 7010, per the May 1998 SW-846 Draft Update IVA.
d Method being integrated into Method 7000B, per the May 1998 SW-846 Draft Update IVA.
e Method being revised to 7471B per the May 1998 SW-846 Draft Update IVA.

CVAA = Cold-vapor atomic absorption spectroscopy
FLAA = Flame atomic absorption spectroscopy
GFAA = Graphite furnace atomic absorption spectroscopy
ICP = Inductively coupled plasma emission spectroscopy
ug/L = micrograms per liter.

Table 7
Target Detection Limits, Analytical Methods, and Instrumentation for Organic Analysis

Analyte	Target Detection Limit [a]	EPA SW-846 [c] Analytical Method	Instrumentation
Target compound list VOCs plus ten tentatively identified compounds (TIC)	10 mg/L[d] water	8260B	GC/MS [c]
Target compound list SVOCs plus 20 TICs	10 mg/L water	8270C [c]	GC/MS

a Detection limits expressed as practical quantitation limits.
b U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
c Method being revised per the May 1998 SW-846 Draft Update IVA.

GC/MS = Gas chromatography/mass spectrometry
mg/L = milligrams per liter
SVOC = semi volatile organic compounds
VOC = volatile organic compounds

11.2 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Table 5. This analytical laboratory will include at a minimum:

- A documented comprehensive QA/QC program
- Technical analytical expertise
- A document control/records management plan
- The capability to perform data reduction, validation, and reporting.

The selection of the analytical testing methods identified in Table 5 was based on the following considerations:

- The physical form of the waste
- Constituents of interest
- Required detection limits (e.g., regulatory thresholds)
- Information requirements (e.g., waste classification)

11.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. QC samples used to evaluate precision, accuracy, and potential sample contamination associated with the sampling/analysis process are described in the following sections for field and laboratory activities. The recommended frequency of collection or analysis and acceptance criteria also are presented, along with information on calculations necessary to evaluate the QC results.

11.3.1 Field Quality Control

The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. For each CSU sampled during decontamination verification, at least one field duplicate will be collected. The sample wash water blank (trip blank) will be prepared by the analytical laboratory. It will consist of deionized water. The blank container will remain closed on site. Table 8 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples. QC samples will be identified on the applicable forms so that the results can be applied to the associated sample. The frequency of field blank QC sampling will be 1 per day or one per 20 samples, whichever is more frequent.

Table 8
Recommended Quality Control Samples, Frequency, and Acceptance Criteria

QC Sample Type	Applicable Analysis[a]	Frequency	Acceptance Criteria
Trip Blank	VOC	One set per shipping cooler containing samples to be analyzed for VOCs	Not Applicable
Field Blank	VOC/SVOC, metals,	One sample daily per analysis	Not Applicable
Field Duplicate	Chemical	1 for each sampling sequence	Relative percent difference less than or equal to 20 percent

a For VOC and SVOC analysis, if blank shows detectable levels of any common laboratory contaminant (e.g., methylene chloride, acetone, 2-butanone, toluene, and/or any phthalate ester), sample must exhibit that contaminant at a level 10 times the quantitation limit to be considered detectable. For all other contaminants, sample must exhibit the contaminant at a level 5 times the quantitation level to be considered detectable.

VOC = volatile organic compound
SVOC = semi-volatile organic compound

11.3.2 Analytical Laboratory QC Samples

QA/QC considerations are an integral part of analytical laboratory operations. Laboratory QA is undertaken to ensure that analytical methods generate data that are technically sound, statistically valid, and can be documented. Individual QC procedures are the tools employed to measure the degree to which these QA objectives are met. At a minimum,the laboratory shall analyze laboratory blanks, Matrix Spike/Matrix Spike Duplicate, Blank Spike/Blank Spike Duplicate, and laboratory duplicates at a frequency of one in twenty for all batch runs requiring EPA test methods and at a frequency of one in ten for non-EPA test methods.

11.4 Data Reduction, Verification, Validation, and Reporting

Analytical data generated as a result of the activities described in this closure plan will be verified and validated. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests.

11.5 Data Reporting Requirements

Analytical results will include all pertinent information about the condition and appearance of the sample-as-received. At a minimum, analytical reports will include:

- A summary of analytical results for each sample
- Results from QC samples such as blanks, spikes, calibrations
- Reference to standard methods or a detailed description of analytical procedures
- Raw data printouts for comparison with summaries

The laboratory will describe the sample preparation procedure used in the analysis in sufficient

detail so that the data user can understand how the sample was manipulated during analysis.

12.0 WASTE MANAGEMENT FROM SAMPLING AND ANALYSIS ACTIVITIES

All sample collection activities will be conducted with waste minimization goals in mind. All waste material generated will be controlled, handled, characterized, and disposed in accordance with LANL waste management procedures. The inspection record for this unit discussed in this plan indicates that there have not been any spills, which would cause contamination of the surfaces and equipment with hazardous constituents. For this reason it is anticipated that the waste generated during decontamination and verification of the B38 CSU closure will be non-regulated waste with respect for hazardous constituents. However, should contamination be present the closure has the potential to generate several different types of waste materials. Table 9 provides a list of the full spectrum of waste materials that could be generated during closure and potential disposal options.

Table 9
Potential Waste Materials, Waste Types, and Disposal Options

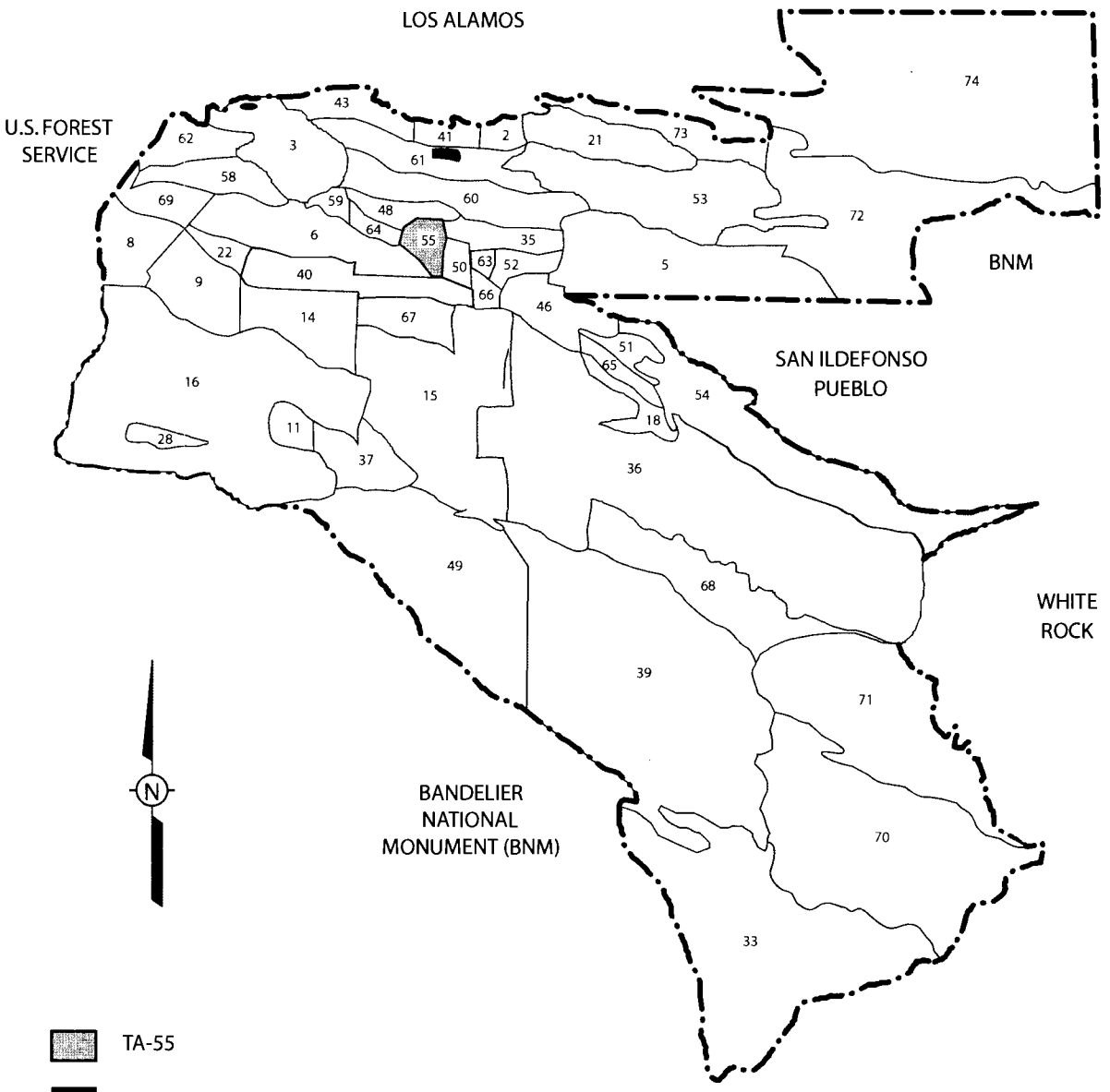
Potential Waste Materials	Potential Waste Type (s)	Disposal Options
PPE	Non-regulated solid waste Low-level solid	SWSC – non-regulated waste TA-54 – solid low-level waste (LLW)
Decontamination wash water	Non-regulated liquid waste Low-level liquid and solid	RLWTF – radioactive liquid waste (RLW) SWSC – non-regulated waste
Verification wash water	Non-regulated liquid waste Low-level liquid and solid	RLWTF – radioactive liquid waste (RLW) SWSC – non-regulated waste

13.0 REFERENCE

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *(SW-846)* Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

LANL, 1999, "Packaging and Transportation," LIR 405-10-01.1, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2001, "Surface Water Sampling," ER-SOR-6.13, Los Alamos National Laboratory, Los Alamos, New Mexico.



Note: Technical Area 57, the Fenton Hill Geothermal Site, is not shown on this figure.

Modified from Los Alamos National Laboratory, 1994, "Environmental Surveillance at Los Alamos During 1992," LA-12764-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

Figure 1
Location of Technical Area (TA) 55 at Los Alamos National Laboratory

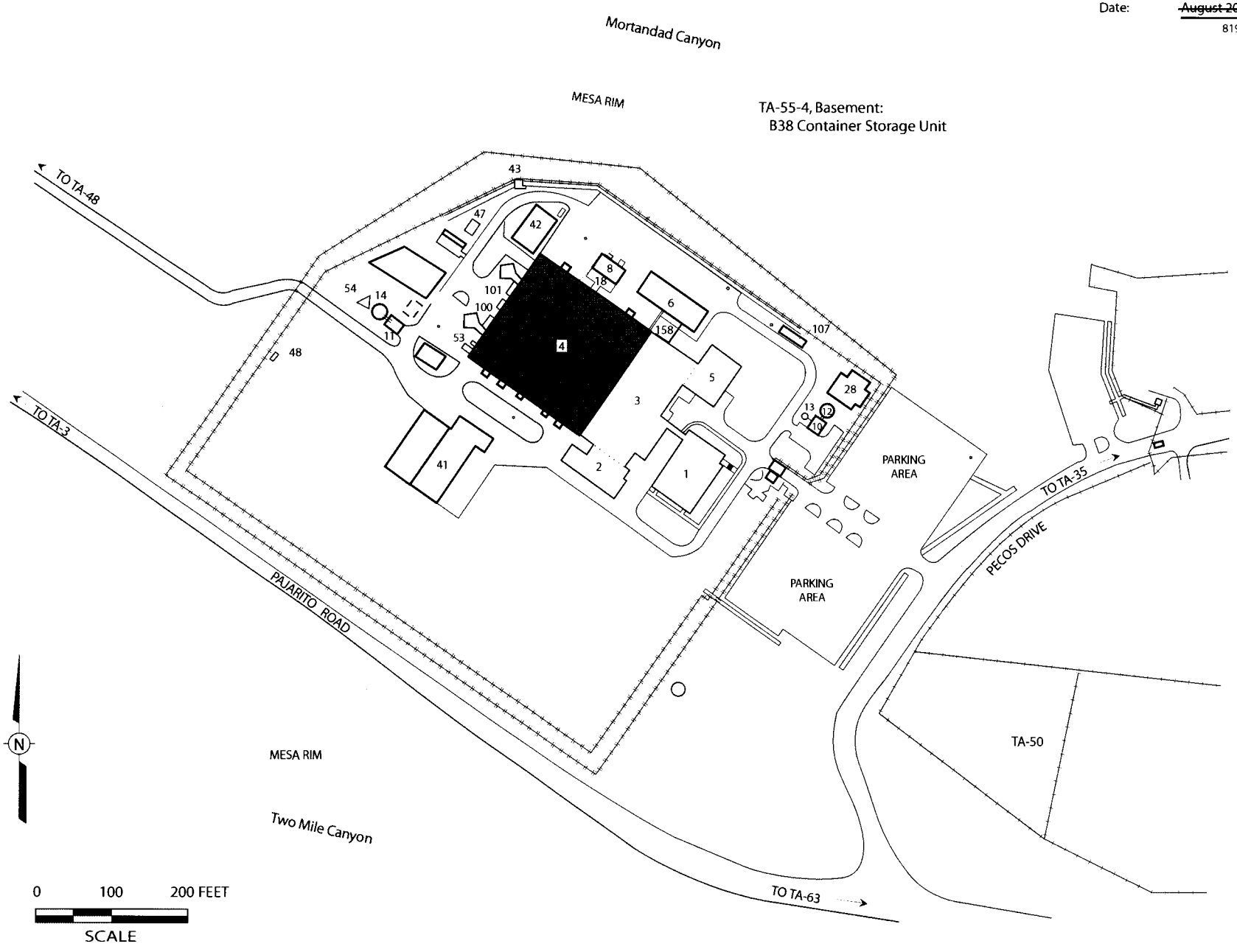
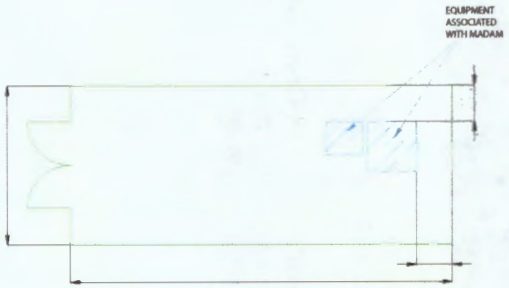


Figure 2
Technical Area (TA) 55, Building 4 - Site Location Map

GENERAL NOTES:

1. SEE THE TABLE BELOW FOR A LIST OF WASTE AND CONTAINER TYPES THAT ARE STORED IN THE CONTAINER STORAGE UNIT.
2. THE MAXIMUM CAPACITY WAS CALCULATED BASED ON FULL 55-GALLON DRUMS, DOUBLE STACKED, WITH A MINIMUM 2' AISLE SPACE.



TA-55-4, CONTAINER STORAGE UNIT, B38
(TO BE CLOSED)

CONTAINER STORAGE UNIT (CSU) DETAILS

	MAX CAPACITY (GALLONS)	WASTE TYPES	CONTAINER TYPES
	3,000	LIQUID AND SOLID MIXED WASTE	30-, 55-, AND 85-GALLON DRUMS

LEGEND

INDICATES EQUIPMENT ASSOCIATED WITH MADAM

LOS ALAMOS

LOS ALAMOS NATIONAL LABORATORY
TA-55-4, B38 CLOSURE PLAN

819592 | FIGURE 3 | M1 | 1 OF 1 | 0

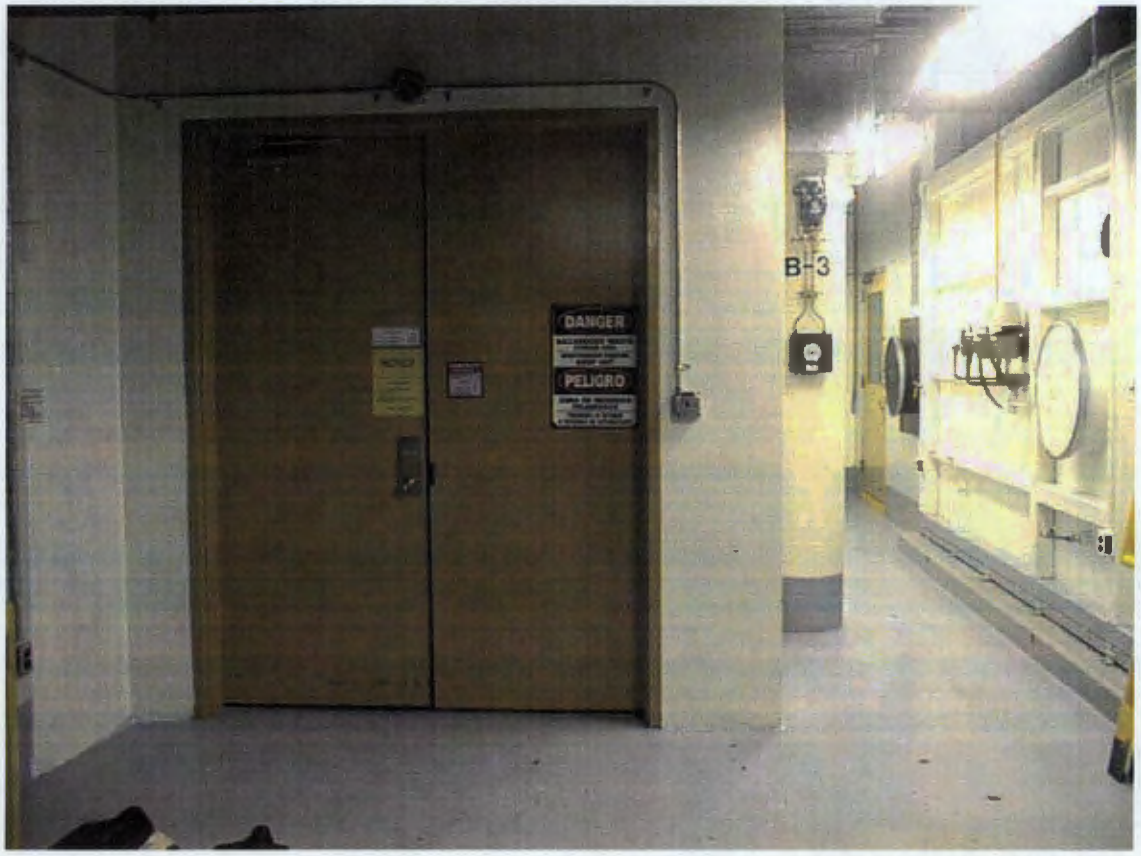


Figure 4

Photograph – Technical Area 55, Building 4, B38 Container Storage Unit
(Container storage area is located within the room pictured)
(Photograph taken 3/17/98)

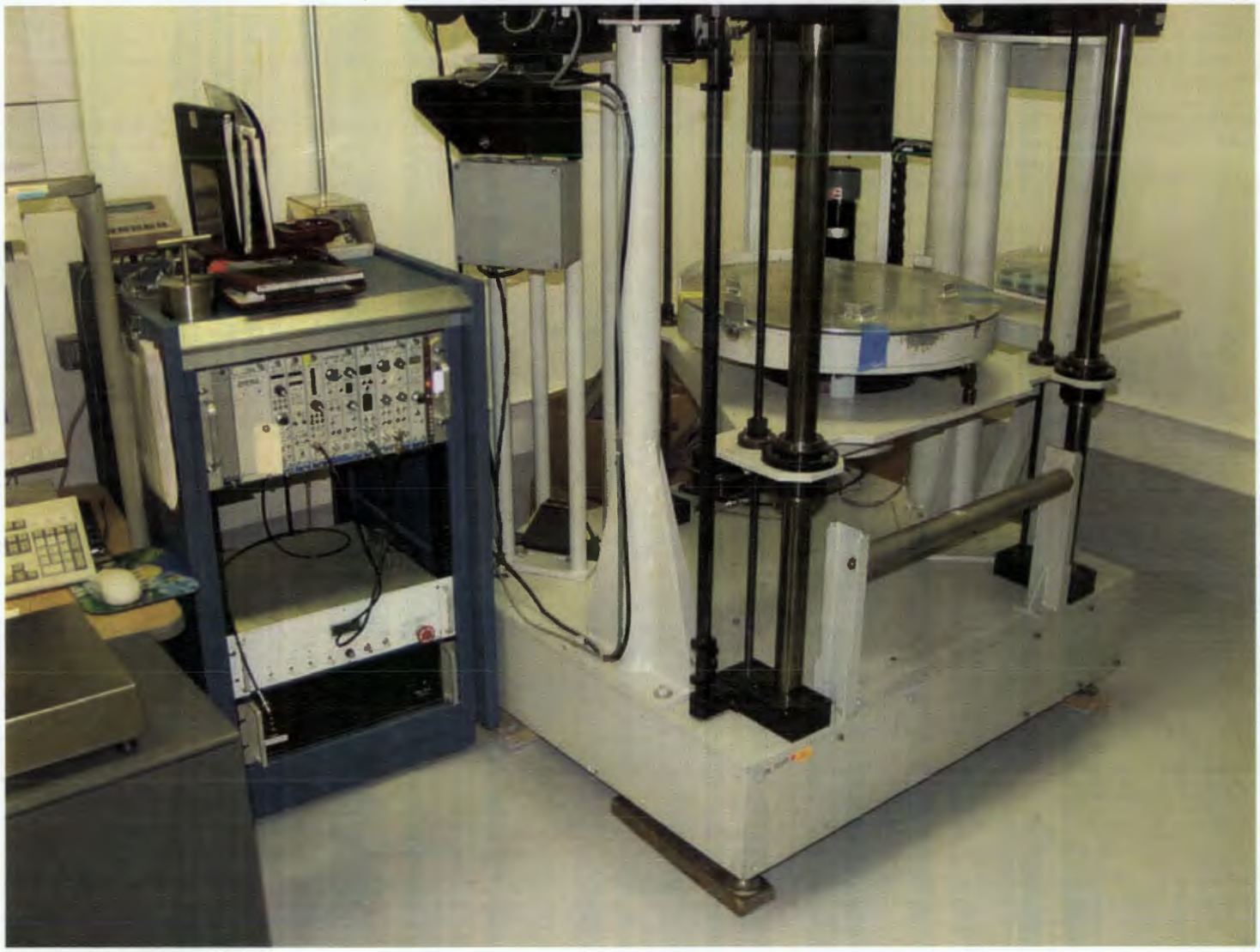


Figure 5
Multiple Assay Duel Analysis Measurement (MADAM) Equipment
(November 2001)

TA 55

LA-UR-04-8493
December 2004

Los Alamos National Laboratory
Technical Area 55

Closure Plan for the
B38 Container Storage Unit

Prepared by:

Los Alamos National Laboratory
Solid Waste Regulatory Compliance (SWRC)
Los Alamos, New Mexico 87545

Redline-Strikeout Revised Closure Plan

LA-UR-04-8493
December 2004

Los Alamos National Laboratory
Technical Area 55

Closure Plan for the
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Los Alamos National Laboratory
Technical Area 55

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6	Target Detection Limits, Analytical Methods, and Instrumentation for Metals Analysis
7	Target Detection Limits, Analytical Methods, and Instrumentation for Organic Analysis
8	Recommended Quality Control Samples, Frequency and Acceptance Criteria
9	Potential Waste Materials, Waste Types, and Disposal Options

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5	Multiple Assay Dual Analysis Measurement (MADAM) Equipment (November 2001)

LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
BUS-4	Materials Management Group
°C	degrees Celsius
CFR	Code of Federal Regulations
CSU	container storage unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Group
ft.	feet/foot
HSR-1	Health Physics Operations Group
HSR-5	Industrial Hygiene and Safety Group
in.	inch(es)
LANL	Los Alamos National Laboratory
MADAM	Multiple Assay Duel Analysis Measurement
NMED	New Mexico Environment Department
OLASO	Office of Los Alamos Site Operation
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SOP	standard operating procedure
SW-846	*"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"*
SWRC	Solid Waste Regulatory Compliance Group
TA	technical area

CLOSURE PLAN FOR THE B38 CONTAINER STORAGE UNIT

The information provided in this closure plan is submitted to address the applicable closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart VI, Part 265, Subparts G and I, revised June 14, 2000 [6-14-00]. This closure plan describes the activities necessary to clean close the B38 container storage unit (CSU) at the Los Alamos National Laboratory (LANL) Technical Area (TA) 55. Closure activities will minimize the need for further maintenance, preclude the release of hazardous constituents to environmental media, and be protective of human health, in accordance with the closure performance standards specified in 20.4.1 NMAC, Subpart V, 265.111 [6-14-00].

Until closure is complete and has been certified in accordance with 20.4.1 NMAC, Subpart VI, 265.115 [6-14-00], as discussed in Section 1.6, a copy of the approved closure plan and any approved revisions will be on file at LANL's Solid Waste Regulatory Compliance Group (SWRC) and at the U.S. Department of Energy (DOE) Office of Los Alamos Site Operations (OLASO).

1.0 GENERAL CLOSURE INFORMATION

1.1 Closure Performance Standard [20.4.1 NMAC, Subpart VI, 265.111]

The B38 CSU will be closed to meet the following performance standards:

- Minimize the need for further maintenance,
- Controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, or surface waters, or to the atmosphere, and
- Complies with the closure requirements of 20.4.1 NMAC, Subpart VI, Part 265, Subparts G and I [6-14-00], including, but not limited to the requirements of 20.4.1 NMAC, Subpart VI, 265.178, 265.197, 265.228, 265.258, 265.280, 265.310, 265.351, 265.601, through 265.603, and 265.1102.

This will be accomplished by removal of waste from the CSU and decontamination, if necessary, of the surfaces and equipment that may have come into contact with the wastes. Decontamination activities will ensure the removal of hazardous waste residues from the B38 CSU to established cleanup levels.

1.2 Partial and Final Closure Activities [20.4.1 NMAC, Subpart VI, 265.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial closure will consist of clean closing the B38 CSU, while leaving the other regulated hazardous/mixed waste units at LANL in service. Partial closure (hereinafter referred to as closure) will be deemed complete when clean closure has been verified; all surfaces and equipment have been decontaminated, or otherwise properly disposed, if necessary; and closure certification has been submitted to and approved by the New Mexico Environment Department (NMED). Final closure will occur when the remaining hazardous/mixed waste management units at LANL are closed. Final closure will consist of assembling documentation on the closure status of each unit, including all previous partial clean closures as well as land-based units that have been or are being addressed via alternative closure requirements. Final closure will be deemed complete when the closure certification has been submitted to the NMED and the NMED has approved the final closure.

1.3 Closure Schedule [20.4.1 NMAC, Subpart VI, 265.112(b)(6), 265.112(e), and 265.113]

Written notification will be provided to the NMED 45 days before the start of closure activities for the B38 CSU. However, pursuant to 20.4.1 NMAC, Subpart VI, 265.112(e) [6-14-00], removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin according to the requirements of 20.4.1 NMAC, Subpart VI, 265.112(d)(2) [6-14-00]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20.4.1 NMAC, Subpart VI, 265.113(a) [6-14-00], within 90 days after final receipt of waste at the B38 CSU. This timeframe will be met as long as facilities are available for storage, treatment, or disposal of these wastes. In the event that closure activities cannot begin within 90 days, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC, Subpart VI, 265.113(a) [6-14-00]. Closure activities and reporting requirements will be completed within 180 days of receipt of the final volume of waste at the CSU. Closure will be conducted in accordance with the schedule presented in Table 1.

Table 1
Closure Schedule for the B38 Container Storage Unit at Technical Area 55

Activity	Maximum Time Required [a]
Submit Closure Plan.	-90 Days
Notify the NMED of intent to close.	-45 Days
Final receipt of waste.	Day 0
Remove waste.	Day 5
Decontaminate surfaces and equipment.	Day 20
Sample excess used decontamination water for disposal.	Day 20
Perform verification sampling.	Day 30
Evaluate analytical data from verification sampling.	Day 50
Perform additional decontamination, if necessary.	Day 55
Perform additional verification sampling, if necessary.	Day 60
Evaluate additional analytical data.	Day 75
Perform final clean up and disposal (i.e., removal of decontaminated equipment and decontamination waste).	Day 140
Prepare closure report.	Day 150
Certify closure.	Day 175
Submit final report to NMED.	Day 180

a The schedule above indicates calendar days from the beginning by which activities will be completed. Some activities may be conducted simultaneously and/or may not require the maximum time listed. Extensions to this schedule may be requested, as needed.

NMED = New Mexico Environment Department

In the event that closure of the B38 CSU cannot proceed according to schedule, LANL will notify the Secretary of the NMED in accordance with extension request requirements in 20.4.1 NMAC, Subpart VI, 265.113(b) [6-14-00]. In addition, the demonstrations in 20.4.1 NMAC, Subpart VI, 265.113(a)(1) and (b)(1) [6-14-00], will be made in accordance with 20.4.1 NMAC, Subpart VI, 265.113(c) [6-14-00].

1.4 Amendment of the Closure Plan [20.4.1 NMAC, Subpart VI, 265.112(c)]

In accordance with 20.4.1 NMAC, Subpart VI, 265.112(c) [6-14-00], LANL will submit a written change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the closure plan.
- There is a change in the expected date of closure.
- Unexpected events occur during closure that requires modification of the approved closure plan.

The written notification or request will include a copy of the amended closure plan for approval by the NMED.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions presented in the bulleted items above. LANL will submit the modified plan in accordance with the request within 60 days of notification or within 30 days of notification if a change in facility condition occurs during the closure process.

1.5 Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC, Subpart VI, 265.140(c)]

In accordance with 20.4.1 NMAC, Subpart VI, 265.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart VI, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

1.6 Closure Certification [20.4.1 NMAC, Subpart VI, 265.115]

Within 60 days after completion of closure activities for the B38 CSU, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit has been closed in accordance with the approved closure plan. The certification will be signed by the appropriate DOE and LANL officials and by an independent, registered professional engineer and will be, in accordance with 20.4.1 NMAC, Subpart VI, 265.115 [6-14-00]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED upon request, as specified in 20.4.1 NMAC, Subpart VI, 265.115 [6-14-00]. Both DOE/OLASO and SWRC will maintain a copy of the certification and supporting documentation.

1.7 Security

Because of the ongoing nature of operations at LANL TA-55, site security at the B38 CSU will be maintained by the DOE or another authorized federal agency for as long as necessary to prohibit public access. The security fence at TA-55 will be maintained to ensure that public access is prevented.

1.8 Closure Report

Upon completion of the closure activities at the B38 CSU, a closure report will be prepared and submitted to the Secretary of the NMED. The report will document the closure and contain the following:

- A copy of the certification described in Section 1.6 of this closure plan.
- Any significant variance from the approved activities and the reason for the variance.
- A summary of all sampling results, showing:

  - Sample identification
  - Sampling location
  - Datum reported
  - Detection limit for each datum
  - A measure of analytical precision (e.g., uncertainty, range, variance)
  - Identification of analytical procedure
  - Identification of analytical laboratory

- A quality assurance/quality control (QA/QC) statement on analytical data validation and decontamination verification.
- The location of the file of supporting documentation, including:

  - Field logbooks
  - Laboratory sample analysis reports
  - QA/QC documentation
  - Chain-of-custody forms

- Storage or disposal location of regulated hazardous/mixed waste resulting from closure activities.
- A certification of accuracy of the report.

2.0 DESCRIPTION OF UNIT TO BE CLOSED

TA-55 is located on a finger mesa between a branch of Mortandad Canyon to the North and Two Mile Canyon to the South. Figure 1 shows the location of TA-55 at LANL. The B38 CSU is located in the southeast section of the basement floor of TA-55, Building 4 as shown on Figure 2 and has been identified as Area 2 in previous permitting documents. The B38 CSU consists of an area approximately 26.5 feet (ft) long by 11 ft wide as indicated in Figure 3. The CSU was used for solid and liquid mixed waste storage of 55-gallon drums in support of waste operations at TA-55. A photograph of the CSU is provided as Figure 4.

3.0 ESTIMATE OF MAXIMUM WASTE IN STORAGE

The maximum total inventory of waste in storage at any time in the TA-55-4, B38 CSU is estimated at 3,000 gallons.

4.0 DESCRIPTION OF WASTE

The B38 CSU was used to store 55-gallon drums of solid mixed waste generated during research and development activities, processing and recovery operations, decontamination and

decommissioning projects, and general facility operations at TA-55. These wastes included solidified evaporator salt solutions and solidified analytical solutions. A majority of the analytical solutions were only corrosive; however, a small portion of these analytical solutions contained organics. Envirostone® cement, which is a calcium sulfate dehydrate, was used to solidify these solutions. Over time it was discovered that a small percentage of the solutions migrated out of the cement matrix on to the surface of the cement. Collectively, the solidified evaporator salt solutions and the analytical solutions were assigned the U.S. Environmental Protection Agency (EPA) hazardous waste numbers for toxic metals, volatile organic compounds, and semi-volatile organic compounds. It should be noted that only the analytical solutions contain organic compounds. Table 2 provides a list of applicable compounds and associated EPA hazardous waste numbers based on analytical data.

Table 2

Hazardous Waste Constituents Stored at the B38 Container Storage Unit[a]

Category	EPA Hazardous Waste Numbers	Specific Constituents
Toxic Metals	D004, D005, D006, D007, D008, D009, D010, D011	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Volatile Organic Compounds	F002, F003, F005	Acetone, MEK, Bromomethane, Methylene, Chloride, Toluene, MIBK, DBCP
Semi-Volatile Organic Compounds		N-Nitrosodimethylamine, Phenol, Benzyol Alcohol, 2-Nitrophenol, 4-Nitrophenol, Benzoic Acid, Diethylphthalate, Di-n-Butylphthalate, Bis-2-Ethylhexlphthalate, Di-n-Octylphthalate, Butylbenzylphthalate

[a] Based on the operating record of the unit

MEK = methyl ethyl ketone
MIBK = 4-methyl-2-pentanone
DBCP = 1,2-dibromo-3-chloropropane

LANL will verify that the constituents listed in Table 2 are not present on the surfaces of the B38 CSU for a clean closure certification.

5.0 REMOVAL OF WASTE

The operating record of the B38 CSU indicates that the unit has not received any waste for storage since 1994, however, it has remained active in order to remain compatible with TA-55 operations and to allow flexibility for additional storage.

6.0 PRELIMINARY CLOSURE PROCEDURES

6.1 Safety Precautions

Job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted, in accordance with LANL safety procedures. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE), specified by Health Physics Operations Group (HSR-1) and Industrial Hygiene and Safety Group (HSR-5), and will follow good hygiene practices to protect themselves from exposure to hazardous and/or mixed waste. The level of PPE that will be required will depend upon the levels of radiological and/or chemical contamination detected, if any. If HSR-1 and HSR-5 surveys indicate no detectable contamination levels, minimum PPE requirements will consist of coveralls, booties, gloves, ear plugs, steel-toed/composite toed shoes, and safety glasses or face shields. If an overhead danger is present, hard hats will be worn. All workers involved in closure activities will be required to have appropriate training including Hazardous Waste Operations and Emergency Response Training for general site workers (24 hour and refresher) and TA-55 site-specific training, as appropriate. Personnel may also be required to have Radiation Worker, Level II training based on the radiological survey conducted prior to the commencement of closure. Contaminated PPE will either be decontaminated or managed in compliance with appropriate waste management regulations.

6.2 Structural Assessment

Preventive maintenance inspections were conducted weekly at the B38 CSU while waste was in storage. If any defects, deterioration, damage, or hazards affecting containment developed, appropriate remedial actions (including sampling, repairs, maintenance, or replacement) were completed immediately. Prior to beginning any decontamination activities at the B38 CSU, the base or secondary containment will be inspected for any cracks or conditions that could potentially lead to loss of decontamination water and/or verification wash water during closure. If a crack or gap is present, a swipe sample or a representative sample of the media (i.e., concrete, metal) will be taken to determine the presence of contamination. The sample will be analyzed for the hazardous contaminants identified in Table 2 of this closure plan. If contamination is present, the surface flaw will be decontaminated prior to repairing the crack/gap. Complete or partial removal (e.g., scabbling) of the material may be performed until contamination is no longer detected. If partial removal is successful in eliminating the contamination, it will be assumed that the remaining material, including underlying soil, is clean.

6.3 Waste Management

After each decontamination wash down process, the used wash water will be collected, transferred

to containers, sampled, and analyzed for the hazardous constituents listed in Table 2 as appropriate. The results of this analysis will be used to determine if the used wash water can be managed as hazardous or non-hazardous wastewater. The wastewater, PPE, and any other waste generated as a result of closure will be managed as discussed in Section 12.0.

7.0 DECONTAMINATION PROCEDURES

To the extent possible, all contaminated surfaces and equipment (if present) will be decontaminated. Surfaces and equipment that cannot be decontaminated will be containerized and managed in compliance with applicable regulations. All sampling conducted during closure and decontamination will be done in accordance with QA/QC procedures defined by "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846)* (EPA, 1986). Closure will be conducted in accordance with the schedule presented in Table 1. Monitoring for contamination will occur throughout closure activities, as appropriate.

7.1 Equipment Located in the B38 CSU

All portable equipment (if present) will be wiped down with a solution consisting of Alconox® and water. A portable berm will be used to collect excess wash water and provide containment during the decontamination process. The Multiple Assay Duel Analysis Measurement (MADAM) and its associated ancillary equipment are located along the southeast wall of the B38 CSU and are shown in Figure 4. MADAM (43 inches (in.) wide by 47 in. long) and its associated electrical equipment (25 in. wide by 28 in. long) are not portable and will remain in place during the decontamination of the main surfaces of the B38 CSU.

7.2 Decontamination of the B38 Surfaces

Decontamination of the B38 CSU surfaces will commence in two phases. The first phase will consist of the decontamination of the walls and floor of the CSU with the exception of the areas immediately underneath and adjacent to MADAM and its ancillary equipment. Decontamination will be conducted using mops, cloths, and/or other absorbent materials to remove any potential hazardous constituents. These materials will be rinsed in a wash water solution consisting of Alconox® and water and used to wipe down the walls and floor. Containers in the TA-55, B-38 CSU were not stacked beyond the height of a 55-gallon drum on a secondary containment pallet. The containers were not opened or closed within the unit and there is no record of any spills. For these reasons, decontamination will begin with the wash down of the walls to a height of 5-ft (i.e., just above the height of a 55-gallon drum on a secondary containment pallet).

The second phase will consist of decontamination of the walls and floor, as in the first phase, only immediately adjacent and underneath MADAM and its ancillary equipment. There is approximately 30 in. of space between MADAM, its ancillary equipment, and the walls of the CSU. This should allow for sufficient space to wipe down the walls using mops, cloths, and/or other absorbent materials to remove hazardous constituents. There is approximately 4 in. of space between the bottom of MADAM and the floor underneath. This space may allow for the use of a mop, cloth, and/or other absorbent materials to remove hazardous constituents. If this space is insufficient, the equipment may be raised by a hydraulic lift or other means to a position which allows for appropriate access to the floor for decontamination.

The B38 CSU does not have recess areas (i.e., sumps) so excess used wash water during both phases will collect within temporary berms located on the floor of the unit. After the walls have been decontaminated, the floor and the secondary containment berms located in the room will be wiped down and excess used wash water removed from the area and transferred to an appropriate container for analysis and waste disposal.

When decontamination of the CSU is complete, verification will be conducted as indicated in Section 8.0. If sampling and analysis indicate that hazardous constituents are present, the wash cycles and analyses will continue until the walls and floor have been decontaminated or the decision is made to proceed with an alternate demonstration of decontamination as described in Section 9.0.

7.3 Equipment Used During Closure

Reusable protective clothing, tools, and equipment used during decontamination activities will be cleaned with a wash water solution. Residue, disposable equipment, and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

8.0 VERIFICATION OF DECONTAMINATION

LANL proposes analysis of wash water samples for decontamination verification at the B38 CSU utilizing the following methodology:

1. Minimize dilution of potential hazardous constituents by limiting the verification solution to an amount that is sufficient to wipe down the surface to be verified and collect the required number of samples.

2. Limit the sampling area to a specific discrete location (e.g., a wall or portion thereof

depending on the size of the unit).

3. Verify decontamination by comparing the discrete sample results to a baseline result obtained from the verification solution prior to its use for the verification wipe down.

4. If the result is at or below that of the blank, the decontamination is verified for the discrete area sampled. Sample blanks (field blanks and trip blanks) will be prepared as described in Section 11.3.1 of this closure plan.

5. If the result is above the blank, repeat the decontamination and verification of the discrete location in accordance with Sections 7.0 and 8.0 of this closure plan.

This proposed method minimizes dilution and establishes criteria by which successful decontamination is verified. Analytical procedures will conform to methods found in the most current version *SW-846* (EPA, 1986).

8.1 Verification Criteria

Successful decontamination of the B38 CSU will meet a minimum of one of the following criteria:

- No detectable Resource Conservation and Recovery Act (RCRA)-regulated constituent residues from the management of stored authorized RCRA-regulated wastes are identified in samples collected during closure activities.

- Analytical results of samples collected during decontamination verification activities identify no statistically significant concentrations of RCRA-regulated constituents above baseline data.

- Detectable concentrations of RCRA-regulated constituents in samples collected during verification activities are at or below levels agreed upon with the NMED to be protective of human health and the environment based on the results of risk assessment methods.

- Detectable concentrations of RCRA-regulated constituents that cannot be removed or decontaminated to acceptable levels as described above will be allowed to remain provided that these RCRA-regulated constituents do not pose an unacceptable risk when combined with technical or administrative control measures agreed upon with the NMED.

The following sections provide a detailed description of how decontamination verification will be conducted at the B38 CSU.

8.2 Verification Procedures

Verification sampling at theTA-55, B38 CSU will be conducted at 8 discrete locations as described below:

1. Divide the northwest wall (26.5-ft long, 5-ft high) of the CSU into two equal sections. Wipe each down with sufficient wash water solution to collect one set of verification samples per

section. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove the excess water.

2. Wipe down the northeast wall (11-ft long, 5-ft high) of the CSU with sufficient wash water solution to collect one set of verification samples. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove the excess water.

3. Divide the southeast wall (26.5-ft long, 5-ft high) of the CSU into two equal sections. Wipe each down with sufficient wash water solution to collect one set of verification samples per section. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove excess water.

4. Wipe down the southwest wall (11-ft long, 5-ft high) of the CSU with sufficient wash water solution to collect one set of verification samples. Collect the wash water solution in a bermed area at the base of the wall. Sample and remove the excess water.

5. Divide the floor (26.5-ft long, 11-ft wide) of the CSU into two equal sections. Wipe each down with sufficient wash water solution to collect one set of verification samples per section. Collect the wash water solution in a bermed area. Sample and remove excess water.

9.0 ALTERNATE DEMONSTRATION OF CLOSURE

An alternate demonstration of decontamination may be justified at the B38 CSU if decontamination methods described in Section 7.0 are not feasible. LANL proposes the following alternate demonstration for the B38 CSU:

- Comparison of the verification analytical results to the EPA Region 9 Human Health Risk Based levels for drinking water. If the result is below the human health risk based level, decontamination at the CSU will be considered complete.

10.0 SAMPLING ACTIVITIES [20.4.1 NMAC, Subpart VI, 265.112(b)(4)]

The following sections describe procedures and methods for sampling, analysis, and documentation applicable to closure activities. Sampling will be conducted in accordance with procedures given in *SW-846* (EPA, 1986) or other approved procedures or methods.

10.1 Sampling Strategy/Approach

Sampling activities will be conducted to verify that the decontamination efforts described in Section 7.0 were effective at removing hazardous constituents, if any, from the surfaces of the CSU. Samples will be collected according to the methods and procedures provided in this section from discrete locations and analyzed for the appropriate hazardous constituents identified in Table 2 of this closure plan. Table 3 identifies the sample locations, types, and quantities applicable to the closure of the TA-55, B38 CSU. Each discrete location will be wiped down with a clean Alconox® and de-ionized water solution that will be allowed to collect in a bermed area. To minimize dilution

of the samples, the solution used for the wipe down will be limited to a quantity sufficient to collect the appropriate number of samples. Verification sampling for this CSU will be conducted for each of the walls and finally for the floor to prevent cross contamination of the samples and allow for the identification of contaminated areas.

Table 3
Sample Types and Quantities for the TA-55, B38 Container Storage Unit Closure

Discrete Sample Location	Verification Sample Sets [a]	Blank Comparison Samples
Northwest Wall (26.5-ft x 5-ft)	2	2
Northeast Wall (11-ft x 5-ft)	1	1
Southeast Wall (26.5-ft x 5-ft)	2	2
Southwest Wall (11-ft x 5-ft)	1	1
Floor (26.5-ft x 11-ft)	2	2

[a] Analysis for Metals, VOCs, and SVOC as identified in Table 2.

ft = feet

10.2 Sample Collection Procedure

10.2.1 Soil and Sediment Sampling

The B38 CSU is located inside TA-55-4 and is provided with secondary containment and run-on protection. The TA-55-4 basement floor is constructed of 10-in. thick concrete and is coated with a chemical-resistant epoxy primer and paint, which effectively prevents the migration of any liquids through the concrete and into the environment. Inspections were conducted at the unit while waste was in storage to ensure that defects, deterioration, damage, or hazards affecting this containment were discovered and repaired. These features, inspections, and maintenance were effective at preventing the migration of waste to the environment. In addition, the operating record indicates that there are no recorded spills of liquids at the B38 CSU. For these reasons, soil sampling is not applicable for the B38 CSU closure and will not be conducted.

10.2.2 Liquid Sampling

Sampling of the clean/used wash water solution will be performed in accordance with Environmental Restoration Group (ER) standard operating procedures (SOP) ER-SOP-6.13, "Surface Water Sampling" (LANL, 2001).

10.2.3 Cleaning of Samplers

Disposable sampling equipment will be used for the B38 CSU closure. This equipment may be presumed clean if still in a factory-sealed wrapper.

10.3 Sample Management Procedures

Samples will be collected and transported using documented chain-of-custody and sample management procedures to ensure the integrity of the sample and provide an accurate and defensible written record of the possession and handling of a sample from the time of collection, through laboratory analysis. An EPA approved laboratory will provide coolers, containers, preservative, labels, chain-of-custody forms, analysis request forms, and custody seals prior to sampling. The following provides a description of chain-of-custody; sample documentation; sample handling, preservation, and storage; and sample transportation requirements that will be followed during the sampling activities associated with the closure.

10.3.1 Chain-of-Custody

Sample chain-of-custody form will be maintained by sampling personnel until the samples are relinquished to the analytical laboratory. The sample collector will be responsible for the integrity of the samples collected until properly transferred to another person. The EPA considers a sample to be in a person's custody if it is:

- In a person's physical possession,
- In view of the person in possession, or
- Secured by that person in restricted access area to prevent tampering.

The sample collector will document all pertinent sample collection data. Individuals relinquishing or receiving custody of the samples will sign, date, and note the time on the analysis request/chain-of-custody form. A chain-of-custody form shall accompany the sample containers or coolers, including transport to the analytical laboratory.

10.3.2 Sample Documentation

Sampling personnel will complete and maintain records to document sampling and analysis activities. Sample documentation will include, at a minimum, sample identification numbers, sample container labels and custody seals, chain-of-custody forms, analysis request forms, sample logbooks detailing sample collection activities, and shipping forms (if necessary).

10.3.2.1 Sample Labels and Custody Seals

A sample label will be affixed to each sample container. The sample label will include, at a minimum the following information:

- A unique sample identification number.
- Name of the sample collector.
- Date and time of collection.

- Type of preservatives used, if any.
- Location from which the sample was collected.

A custody seal will be placed on each sample container to ensure detection of unauthorized tampering with the samples. These labels must be initialed, dated, and affixed, by the sample collector, to the container in such a manner that it is necessary to break the seal to open the container.

10.3.2.2 Chain-of-Custody Form

A chain-of-custody form must accompany all samples from collection through laboratory analysis. The completed original chain-of-custody form will be returned by the laboratory and will become a part of the permanent record documenting the sampling effort. One chain-of-custody form may be used to document all of the samples collected from a single sampling event.

10.3.2.3 Analysis Request Form

An analysis request form must accompany all samples to the analytical laboratory. The completed original analysis request form will be returned by the laboratory and will become a part of the permanent record documenting the sampling effort. A separate analysis request form must be completed for each sample from a given sampling event. All samples for laboratory analysis will be submitted to an accredited off-site contract laboratory.

10.3.2.4 Sample Logbook

All pertinent information on the sampling effort must be recorded in a logbook. The sample logbook will include, at a minimum, the following information:

- The sample location.
- Suspected waste composition.
- Sample identification number.
- Volume/mass of waste taken.
- Purpose of sampling.
- Description of sample point and sampling methodology.
- Date and time of collection.
- Name of the sample collector.
- Sample destination and how it will be transported.
- Observations.
- Signatures of personnel responsible for the observations.

10.3.3 Sample Handling, Preservation, and Storage

Samples will be collected and containerized in appropriate pre-cleaned sample containers. Table 4 presents the requirements specified in *SW-846* (EPA, 1986), for sample containers, preservation techniques, and holding times. Samples that require cooling to 4 degrees Celsius (°C) will be placed in a cooler with ice or ice gel or in a refrigerator immediately upon collection.

Table 4
Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container Type and Materials	Preservation	Holding Time
Metals			
TCLP Metals: Arsenic Barium Cadmium Chromium Lead Selenium Silver	500-mL Wide Mouth-Polyethylene or Glass with Teflon Liner	Cool to 4°C	180 Days
TCLP/Total Mercury	500-mL Wide Mouth-Polyethylene or Glass with Teflon Liner	Cool to 4 °C	28 Days
Volatile Organic Compounds			
Target Compound VOCs	Two 40 mL Amber Glass Vials with Teflon-Lined Septa	HCl to pH<2 Cool to 4 °C	14 days
Semi-Volatile Organic Compounds			
Target Compound SVOCs	Four 1 L Amber Glass with Teflon-Lined Lid	Cool to 4 °C	Seven days from field collection to preparative extraction. 40 days from preparative extraction to determinative analysis.

[a] Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.

[b] Information obtained from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, U.S. Environmental Protection Agency, 1986 and all approved updates.

°C = degrees Celsius
HCl = hydrochloric acid
L = Liter
mL = milliter
SVOC = semi-volatile organic compounds
TCLP = Toxicity Characteristic Leaching Procedure
VOC = volatile organic compounds

10.3.4 Packaging and Transportation of Samples

All packaging and transportation activities will meet safety expectations, QA requirements, DOE Orders, and relevant local, state, and federal laws, (including 10 Code of Federal Regulation [CFR] and 49 CFR). The LANL document Laboratory Implementation Requirement (LIR) 405-10-01.1, "Packaging and Transportation" (LANL, 1999) establishes requirements that will be implemented for packaging design, testing, acquisition, acceptance, use, maintenance, and decommissioning and for on-site, intra-site, and off-site shipment preparation and transportation of general commodities, hazardous materials, substances, wastes, and defense program materials. Samples that require cooling to 4 °C will be transported in a cooler with ice or ice gel.

Off-site transportation of samples will occur via private, contract, or common motor carrier; air carrier; or freight. All off-site transportation will be processed through Materials Management Group (BUS-4) shipping office (667-4174) unless the shipper is specifically authorized through formal documentation by BUS-4 to independently tender shipments to common motor or air carriers.

11.0 ANALYTICAL REQUIREMENTS

11.1 Proposed Analytical Methods

Analytical methods to be used for verification during the TA-55, B38 CSU closure are summarized in Table 5.

Table 5
Summary of Proposed Analytical Methods

Parameter	Method Numbers	Test Methods	Rationale
Metals			
TCLP Metals: Arsenic Barium Cadmium Chromium Lead Selenium Silver Mercury	(7060A[c], 7061A)[a] (7080A[d], 7081[c])[a] (7130[d], 7131A[c])[a] (7190[d], 7191[c])[a] (7420[d], 7421[c])[a] (7740[d], 7741[c]) (7760A[d], 7761) (7471A[e], 7470A)[a] or equivalent methods [b]	Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Furnace technique Gaseous hydride Direct aspiration Borohydride reduction Manual cold vapor technique	Determine the metalconcentration in the samples.
Volatile Organic Compounds (VOCs)			
VOCs	8260B[a] or equivalent methods	Gas chromatography /mass spectometry (GC/MS)	Determine the VOCs in the samples.
Semi-Volatile Organic Compounds (SVOCs)			
SVOCs	8270C[f a]	GC/MS	Determine the SVOCs in the samples.

[a] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
[b] Equivalent methods subject to EPA approval may be substituted.
[c] Method being integrated into Method 7010, per the May 1998 SW-846 Draft Update IVA.
[d] Method being integrated into Method 7000B, per the May 1998 SW-846 Draft Update IVA.
[e] Method being revised to 7471B per the May 1998 SW-846 Draft Update IVA.
[f] Method being revised per the May 1998 SW-846 Draft Update IVA.

Each sample will be analyzed for the constituents identified in Table 2 as appropriate. Target detection limits and instrumentation for metals and organic analyses are presented in Tables 6 and 7, respectively.

Table 6
Target Detection Limits, Analytical Methods, and Instrumentation for Metals Analysis

Analyte	Target Detection [a] Limit (ug/L)	EPA SW-846 [b] Analytical Method	Instrumentation
Arsenic	10	7060A [c], 7061A	ICP, GFAA
Barium	200	7080A [d], 7081 [c]	ICP, FLAA, GFAA
Cadmium	2	7130 [d], 7131A [c]	ICP, FLAA, GFAA
Chromium	10	7190 [d], 7191 [c]	ICP, FLAA, GFAA
Lead	5	7420 [d], 7421 [c]	ICP, FLAA, GFAA
Mercury	0.2	7470A, 7471A [e]	CVAA
Selenium	5	7740[e], 7741A	ICP, FLAA, GFAA
Silver	10	7760A[d], 7761 [c]	ICP, FLAA, GFAA

a Detection limits listed are for clean water. Actual detection limits may be higher depending on sample composition and matrix type.
b U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
c Method being integrated into Method 7010, per the May 1998 SW-846 Draft Update IVA.
d Method being integrated into Method 7000B, per the May 1998 SW-846 Draft Update IVA.
e Method being revised to 7471B per the May 1998 SW-846 Draft Update IVA.

CVAA = Cold-vapor atomic absorption spectroscopy
FLAA = Flame atomic absorption spectroscopy
GFAA = Graphite furnace atomic absorption spectroscopy
ICP = Inductively coupled plasma emission spectroscopy
ug/L = micrograms per liter.

Table 7
Target Detection Limits, Analytical Methods, and Instrumentation for Organic Analysis

Analyte	Target Detection Limit [a]	EPA SW-846 [c] Analytical Method	Instrumentation
Target compound list VOCs plus ten tentatively identified compounds (TIC)	10 mg/L[d] water	8260B	GC/MS [c]
Target compound list SVOCs plus 20 TICs	10 mg/L water	8270C [c]	GC/MS

a Detection limits expressed as practical quantitation limits.
b U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
c Method being revised per the May 1998 SW-846 Draft Update IVA.

GC/MS = Gas chromatography/mass spectrometry
mg/L = milligrams per liter
SVOC = semi volatile organic compounds
VOC = volatile organic compounds

11.2 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Table 5. This analytical laboratory will include at a minimum:

- A documented comprehensive QA/QC program
- Technical analytical expertise
- A document control/records management plan
- The capability to perform data reduction, validation, and reporting.

The selection of the analytical testing methods identified in Table 5 was based on the following considerations:

- The physical form of the waste
- Constituents of interest
- Required detection limits (e.g., regulatory thresholds)
- Information requirements (e.g., waste classification)

11.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. QC samples used to evaluate precision, accuracy, and potential sample contamination associated with the sampling/analysis process are described in the following sections for field and laboratory activities. The recommended frequency of collection or analysis and acceptance criteria also are presented, along with information on calculations necessary to evaluate the QC results.

11.3.1 Field Quality Control

The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. For each CSU sampled during decontamination verification, at least one field duplicate will be collected. The sample wash water blank (trip blank) will be prepared by the analytical laboratory. It will consist of deionized water. The blank container will remain closed on site. Table 8 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples. QC samples will be identified on the applicable forms so that the results can be applied to the associated sample. The frequency of field blank QC sampling will be 1 per day or one per 20 samples, whichever is more frequent.

Table 8
Recommended Quality Control Samples, Frequency, and Acceptance Criteria

QC Sample Type	Applicable Analysis[a]	Frequency	Acceptance Criteria
Trip Blank	VOC	One set per shipping cooler containing samples to be analyzed for VOCs	Not Applicable
Field Blank	VOC/SVOC, metals,	One sample daily per analysis	Not Applicable
Field Duplicate	Chemical	1 for each sampling sequence	Relative percent difference less than or equal to 20 percent

a For VOC and SVOC analysis, if blank shows detectable levels of any common laboratory contaminant (e.g., methylene chloride, acetone, 2-butanone, toluene, and/or any phthalate ester), sample must exhibit that contaminant at a level 10 times the quantitation limit to be considered detectable. For all other contaminants, sample must exhibit the contaminant at a level 5 times the quantitation level to be considered detectable.

VOC = volatile organic compound
SVOC = semi-volatile organic compound

11.3.2 Analytical Laboratory QC Samples

QA/QC considerations are an integral part of analytical laboratory operations. Laboratory QA is undertaken to ensure that analytical methods generate data that are technically sound, statistically valid, and can be documented. Individual QC procedures are the tools employed to measure the degree to which these QA objectives are met. At a minimum,the laboratory shall analyze laboratory blanks, Matrix Spike/Matrix Spike Duplicate, Blank Spike/Blank Spike Duplicate, and laboratory duplicates at a frequency of one in twenty for all batch runs requiring EPA test methods and at a frequency of one in ten for non-EPA test methods.

11.4 Data Reduction, Verification, Validation, and Reporting

Analytical data generated as a result of the activities described in this closure plan will be verified and validated. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests.

11.5 Data Reporting Requirements

Analytical results will include all pertinent information about the condition and appearance of the sample-as-received. At a minimum, analytical reports will include:

- A summary of analytical results for each sample
- Results from QC samples such as blanks, spikes, calibrations
- Reference to standard methods or a detailed description of analytical procedures
- Raw data printouts for comparison with summaries

The laboratory will describe the sample preparation procedure used in the analysis in sufficient

detail so that the data user can understand how the sample was manipulated during analysis.

12.0 WASTE MANAGEMENT FROM SAMPLING AND ANALYSIS ACTIVITIES

All sample collection activities will be conducted with waste minimization goals in mind. All waste material generated will be controlled, handled, characterized, and disposed in accordance with LANL waste management procedures. The inspection record for this unit discussed in this plan indicates that there have not been any spills, which would cause contamination of the surfaces and equipment with hazardous constituents. For this reason it is anticipated that the waste generated during decontamination and verification of the B38 CSU closure will be non-regulated waste with respect for hazardous constituents. However, should contamination be present the closure has the potential to generate several different types of waste materials. Table 9 provides a list of the full spectrum of waste materials that could be generated during closure and potential disposal options.

Table 9
Potential Waste Materials, Waste Types, and Disposal Options

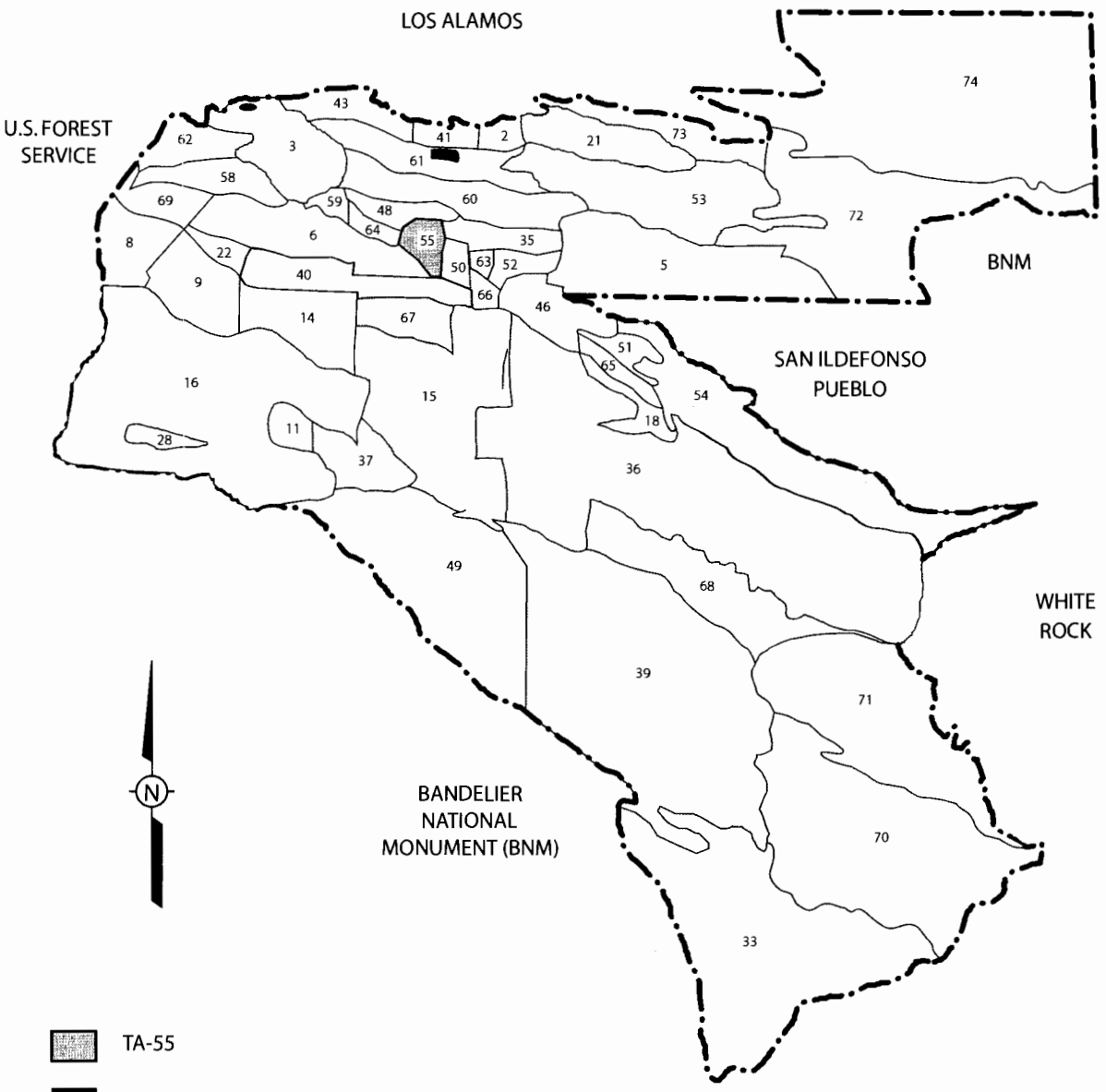
Potential Waste Materials	Potential Waste Type (s)	Disposal Options
PPE	Non-regulated solid waste Low-level solid	 SWSC – non-regulated waste TA-54 – solid low-level waste (LLW)
Decontamination wash water	Non-regulated liquid waste Low-level liquid and solid	RLWTF – radioactive liquid waste (RLW) SWSC – non-regulated waste
Verification wash water	Non-regulated liquid waste Low-level liquid and solid	RLWTF – radioactive liquid waste (RLW) SWSC – non-regulated waste

13.0 REFERENCE

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *(SW-846)* Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

LANL, 1999, "Packaging and Transportation," LIR 405-10-01.1, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2001, "Surface Water Sampling," ER-SOR-6.13, Los Alamos National Laboratory, Los Alamos, New Mexico.



Note: Technical Area 57, the Fenton Hill Geothermal Site, is not shown on this figure.

Modified from Los Alamos National Laboratory, 1994, "Environmental Surveillance at Los Alamos During 1992," LA-12764-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

Figure 1
Location of Technical Area (TA) 55 at Los Alamos National Laboratory

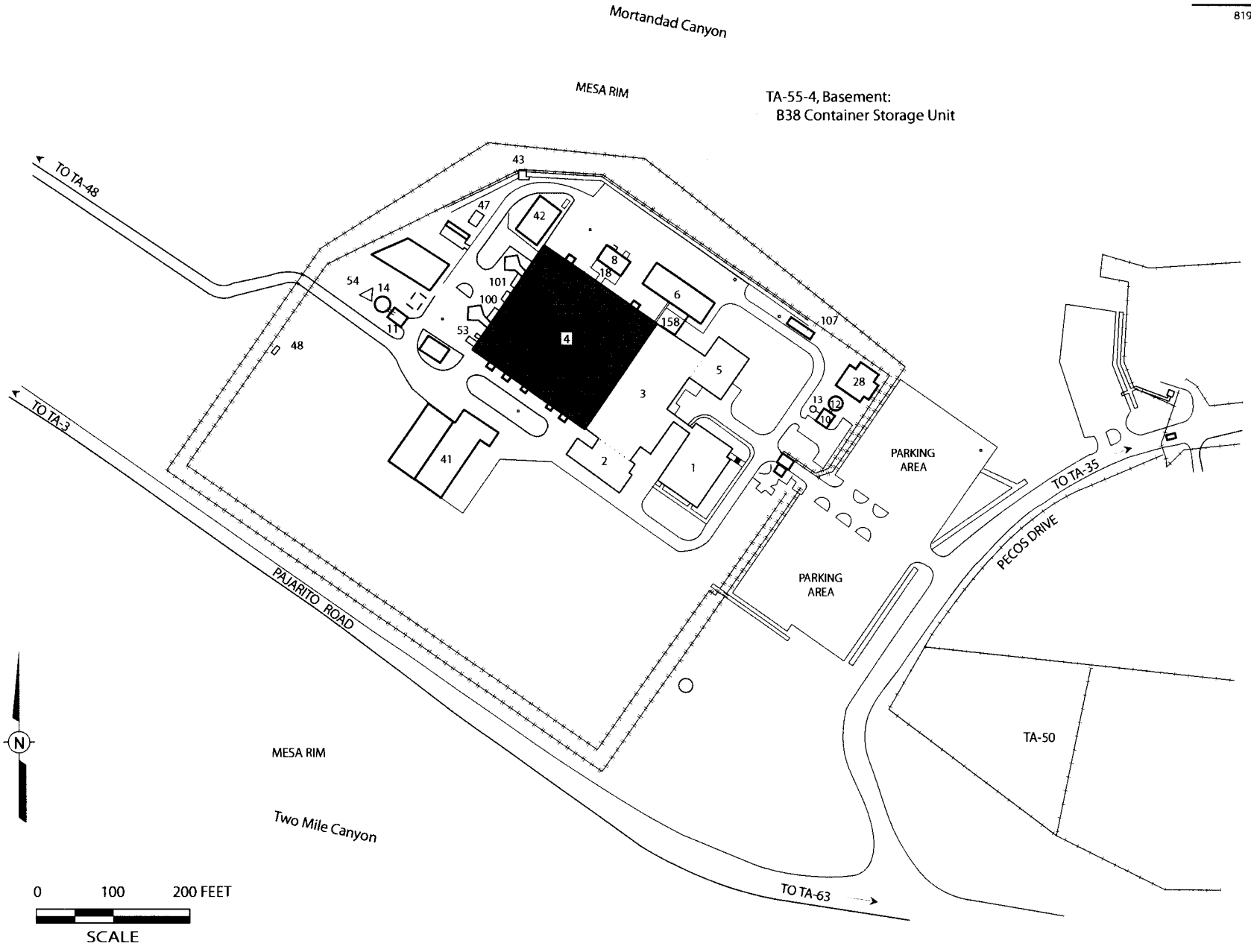
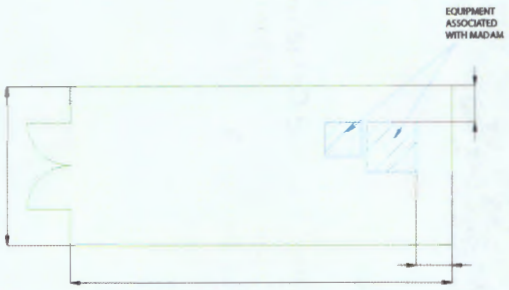


Figure 2
Technical Area (TA) 55, Building 4 - Site Location Map



TA-55-4, CONTAINER STORAGE UNIT, B38
(TO BE CLOSED)

GENERAL NOTES:

1. SEE THE TABLE BELOW FOR A LIST OF WASTE AND CONTAINER TYPES THAT ARE STORED IN THE CONTAINER STORAGE UNIT.
2. THE MAXIMUM CAPACITY WAS CALCULATED BASED ON FULL 55-GALLON DRUMS, DOUBLE STACKED, WITH A MINIMUM 2' AISLE SPACE.

CONTAINER STORAGE UNIT (CSU) DETAILS

	MAX CAPACITY (GALLONS)	WASTE TYPES	CONTAINER TYPES
	3,000	LIQUID AND SOLID MIXED WASTE	30-, 55-, AND 85-GALLON DRUMS

LEGEND

INDICATES EQUIPMENT ASSOCIATED WITH MADAM

LOS ALAMOS

LOS ALAMOS NATIONAL LABORATORY
TA-55-4, B38 CLOSURE PLAN

819592 FIGURE 3 M1 1 0

Figure 4

Photograph – Technical Area 55, Building 4, B38 Container Storage Unit
(Container storage area is located within the room pictured)
(Photograph taken 3/17/98)

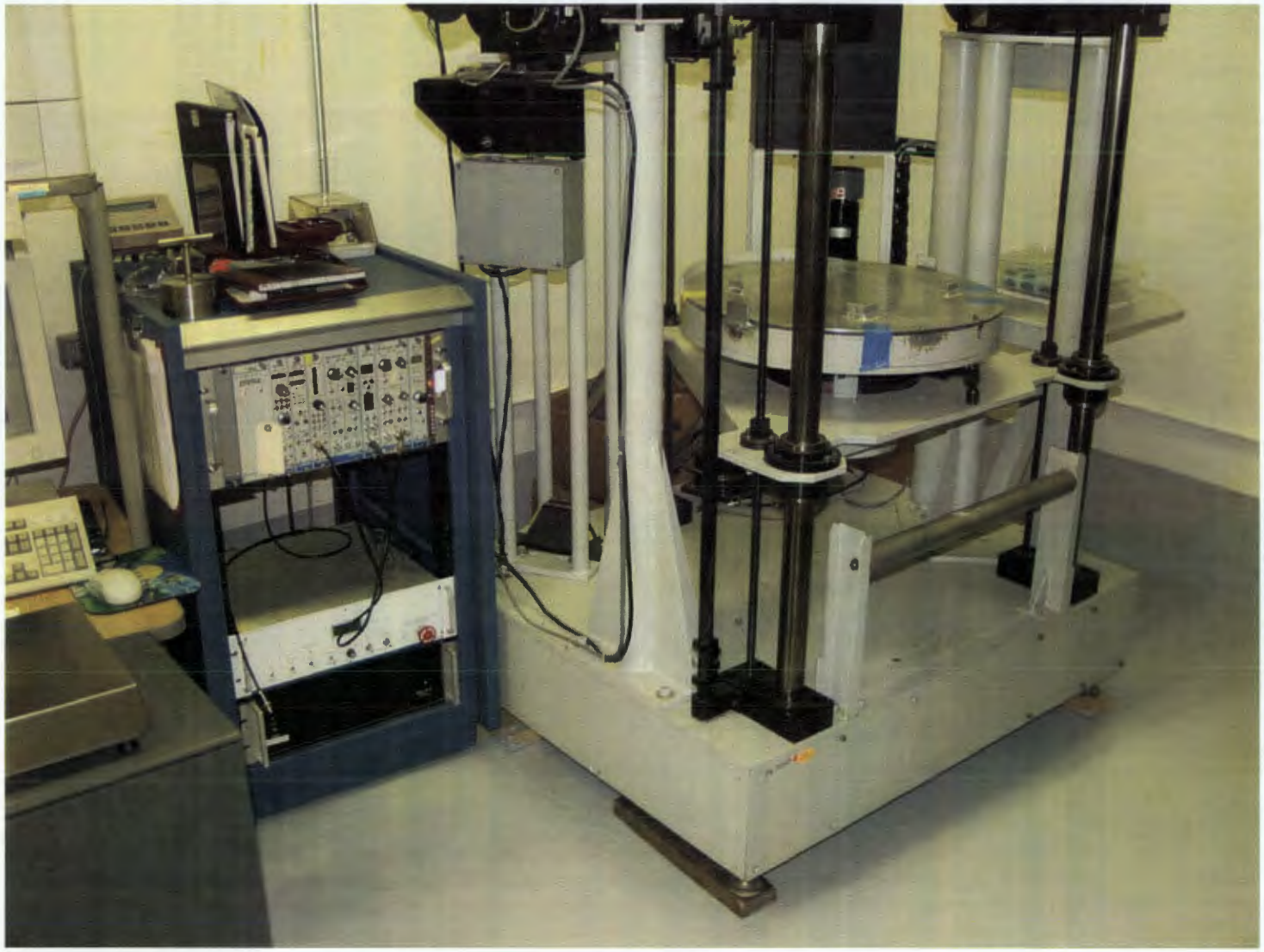


Figure 5
Multiple Assay Duel Analysis Measurement (MADAM) Equipment
(November 2001)

Clean Revised Closure Plan