ERRATA SHEET

The Following Corrections and Clarifications Apply to: STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION (SAFER) PLAN FOR CORRECTIVE ACTION UNIT 117, AREA 26 PLUTO DISASSEMBLY FACILITY, NEVADA TEST SITE, NEVADA

DOE Document Number: DOE/NV--1228

Revision: 0

Original Document Issuance Date: SEPTEMBER, 2007

This errata sheet was issued under cover letter from DOE on: November 6, 2007

Section 1.2, first paragraph, last sentence: this sentence incorrectly indicates "preliminary action levels (PALs)." Replace this occurrence with "final action levels (FALs)".

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Section 2.3.4, last sentence: this sentence incorrectly indicates "megaroentgen per hour." Replace with "millirem per hour."

Nevada
Environmental
Restoration
Project

DOE/NV--1228

National Nuclear Security Administration

Streamlined Approach for Environmental Restoration (SAFER) Plan for Corrective Action Unit 117: Area 26 Pluto Disassembly Facility Nevada Test Site, Nevada

Controlled Copy No.: ___
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September 2007

Environmental Restoration
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U.S. Department of Energy
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STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION (SAFER) PLAN FOR CORRECTIVE ACTION UNIT 117: AREA 26 PLUTO DISASSEMBLY FACILITY NEVADA TEST SITE, NEVADA

U.S. Department of Energy,
National Nuclear Security Administration
Nevada Site Office
Las Vegas, Nevada

Controlled Copy No.: ___

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September 2007

STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION (SAFER) PLAN FOR CORRECTIVE ACTION UNIT 117: AREA 26 PLUTO DISASSEMBLY FACILITY NEVADA TEST SITE, NEVADA

Approved by: /s/ Kevin J. Cabble Date: 09/17/2007

Kevin J. Cabble
Federal Sub-Project Director
Industrial Sites Sub-Project

Approved by: /s/ John B. Jones Date: 09/17/2007

John B. Jones
Acting Federal Project Director
Environmental Restoration Project

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List of Acronyms and Abbreviations

Ac	Actinium
ACM	Asbestos-containing material
Am	Americium
ASTM	American Society for Testing and Materials
Ba	Barium
bgs	Below ground surface
BMP	Best management practice
BN	Bechtel Nevada
CADD	Corrective Action Decision Document
CAI	Corrective Action Investigation
CAIP	Corrective Action Investigation Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
CFM	Cubic feet per minute
CFR	*Code of Federal Regulations*
cm^2	Square centimeter
Co	Cobalt
COC	Contaminant of concern
COPC	Contaminant of potential concern
CR	Closure Report
Cs	Cesium
CSM	Conceptual site model
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
dpm	Disintegrations per minute

List of Acronyms and Abbreviations *(Continued)*

dpm/100cm^2	Disintegrations per minute per 100 square centimeters
DQI	Data quality indicator
DQO	Data quality objective
E-MAD	Engine Maintenance, Assembly, and Disassembly
EPA	U.S. Environmental Protection Agency
Eu	Europium
FAL	Final action level
FFACO	*Federal Facility Agreement and Consent Order*
ft	Foot
ft^2	Square foot
HASL	Health and Safety Laboratories
HVAC	Heating, ventilation, and air conditioning
HWAA	Hazardous waste accumulation area
I	Iodine
IDW	Investigation-derived waste
in.	Inch
K	Potassium
LCS	Laboratory control sample
LLW	Low-level waste
LRL	Lawrence Radiation Laboratory
m^2	Square meter
MAD	Maintenance, Assembly, and Disassembly
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mrad/hr	Millirad per hour
mrem/yr	Millirem per year

List of Acronyms and Abbreviations *(Continued)*

MRL	Minimum reporting level
MS	Matrix spike
MSD	Matrix spike duplicate
N/A	Not applicable
NAC	*Nevada Administrative Code*
Nb	Niobium
NCRP	National Council on Radiation Protection and Measurement
ND	Normalized difference
NDEP	Nevada Division of Environmental Protection
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
NRS	*Nevada Revised Statutes*
NSTec	National Security Technologies, LLC
NTSWAC	*Nevada Test Site Waste Acceptance Criteria*
Pa	Protactinium
PAL	Preliminary action level
PCB	Polychlorinated biphenyl
pCi/g	Picocuries per gram
pCi/L	Picocuries per liter
pCi/s	Picocuries per sample
POC	Performance Objective for the Certification of Nonradioactive Hazardous Waste
PPE	Personal protective equipment
ppm	Parts per million
PRG	Preliminary remediation goal
Pu	Plutonium
QA	Quality assurance

List of Acronyms and Abbreviations (Continued)

QAPP	Quality Assurance Project Plan
QC	Quality control
R/hr	Roentgen per hour
R-MAD	Reactor Maintenance, Assembly, and Disassembly
Ra	Radium
RadCon	Radiation Control
RBCA	Risk-based corrective action
RCA	Radiologically controlled area
RCRA	*Resource Conservation and Recovery Act*
REECo	Reynolds Electrical & Engineering Co., Inc.
RL	Reporting limit
RMA	Radioactive material area
SAA	Satellite accumulation area
SAFER	Streamlined Approach for Environmental Restoration
SDWS	*Safe Drinking Water Standards*
SNJV	Stoller Navarro Joint Venture
SNL	Sandia National Laboratories
Sr	Strontium
SSTL	Site-specific target level
SVOC	Semivolatile organic compound
TCLP	Toxicity characteristic leaching procedure
Th	Thorium
TPH	Total petroleum hydrocarbons
TSCA	*Toxic Substances Control Act*
U	Uranium
UR	Use restriction
UST	Underground storage tank

List of Acronyms and Abbreviations *(Continued)*

UGTA	Underground test area
VOC	Volatile organic compound
Y	Yttrium
ß	Beta
%R	Percent recovery
$\mu g/100cm^2$	Micrograms per 100 square centimeters

Executive Summary

This Streamlined Approach for Environmental Restoration (SAFER) Plan addresses the actions needed to achieve closure for Corrective Action Unit (CAU) 117, Pluto Disassembly Facility, identified in the *Federal Facility Agreement and Consent Order.* Corrective Action Unit 117 consists of one Corrective Action Site (CAS), CAS 26-41-01, located in Area 26 of the Nevada Test Site.

This plan provides the methodology for field activities needed to gather the necessary information for closing CAS 26-41-01. There is sufficient information and process knowledge from historical documentation and investigations of similar sites regarding the expected nature and extent of potential contaminants to recommend closure of CAU 117 using the SAFER process. Additional information will be obtained by conducting a field investigation before finalizing the appropriate corrective action for this CAS. The results of the field investigation will support a defensible recommendation that no further corrective action is necessary following SAFER activities. This will be presented in a Closure Report that will be prepared and submitted to the Nevada Division of Environmental Protection (NDEP) for review and approval.

The site will be investigated to meet the data quality objectives (DQOs) developed on June 27, 2007, by representatives of NDEP; U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office; Stoller-Navarro Joint Venture; and National Security Technologies, LLC. The DQO process was used to identify and define the type, amount, and quality of data needed to determine and implement appropriate corrective actions for CAS 26-41-01 in CAU 117.

The DQO process developed for this CAU identified the following expected closure options: (1) investigation and confirmation that no contamination exists above the final action levels leading to a no further action declaration, or (2) investigation to determine the nature and extent of contamination leading to closure in place with use restrictions.

The end state for the Pluto Disassembly Facility is completion of SAFER activities that will result in closure of CAU 117 from the FFACO, and place the Pluto Disassembly Facility in a safe interim configuration for future demolition. The following text summarizes the SAFER activities that will support the closure of CAU 117.

- Perform site preparation activities (e.g., utilities clearances, preliminary investigation surveys, and sampling).

- Collect samples from potential source material within Building 2201 and environmental samples (as necessary) to confirm or disprove the presence of contaminants of concern (COCs) as necessary to supplement existing information.

- If no COCs are present, establish no further action as the corrective action.

- If COCs exist in environmental media, collect environmental samples from designated target populations (e.g., clean soil adjacent to contaminated soil) and submit for laboratory analysis to define the extent of COC contamination.

- If a COC is present, either:
  - Establish clean closure as the corrective action (based on the characterization of readily removable wastes and potential migration pathways to environmental media), or
  - Establish closure in place as the corrective action and implement appropriate use restrictions.

- Confirm the preferred closure option is sufficient to protect human health and the environment.

This SAFER plan has been developed in accordance with the *Federal Facility Agreement and Consent Order* that was agreed to by the State of Nevada; DOE, Environmental Management; U.S. Department of Defense; and DOE, Legacy Management. Under the *Federal Facility Agreement and Consent Order*, this SAFER plan will be submitted to NDEP for approval. Fieldwork will be conducted following approval of the plan.

1.0 Introduction

This Streamlined Approach for Environmental Restoration (SAFER) plan addresses the actions necessary for the closure of Corrective Action Unit (CAU) 117: Area 26 Pluto Disassembly Facility, Nevada Test Site (NTS), Nevada. It has been developed in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; U.S. Department of Energy (DOE), Environmental Management; U.S. Department of Defense (DoD); and DOE, Legacy Management (FFACO, 1996; as amended August 2006). In addition to the closure activities for CAU 117 under the FFACO, several of the best management practices (BMPs) to be conducted at CAU 117 are described in this document. The BMPs performed at CAU 117 are outside the FFACO process, and will enable safe transition to future demolition of Building 2201.

A SAFER may be performed when the following criteria are met:

- Conceptual corrective actions are clearly identified- (although some degree of investigation may be necessary to select a specific corrective action before completion of the corrective action investigation [CAI]).
- Uncertainty of the nature, extent, and corrective action must be limited to an acceptable level of risk.
- The SAFER plan includes decision points and criteria for making data quality objective (DQO) decisions.

The purpose of the investigation is to document and verify the adequacy of existing information; to affirm the decision for either clean closure, closure in place, or no further action; and to provide sufficient data to implement the corrective action. The actual corrective action selected will be based on site investigation activities implemented under this SAFER plan. This SAFER plan identifies decision points developed in cooperation with the Nevada Division of Environmental Protection (NDEP), where the DOE, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) will reach consensus with the NDEP before beginning the next phase of work.

Corrective Action Unit 117 is located in Area 26 of the NTS, which is approximately 65 miles northwest of Las Vegas, Nevada (Figure 1-1). Corrective Action Unit 117 is comprised of one Corrective Action Site (CAS), CAS 26-41-01, as shown on Figure 1-1. Corrective Action Site 26-41-01 is comprised of Building 2201, known as the Pluto Disassembly Facility, the facility water tower, and a nearby wooden shed (shown in Figure 1-2).

There is sufficient information and process knowledge from historical documentation and investigations of similar sites (i.e., the expected nature and extent of contaminants of potential concern [COPCs]) to recommend closure of CAU 117 using the SAFER process (FFACO, 1996; as amended August 2006).

1.1 SAFER Process Description

Corrective action units that may be closed using the SAFER process have conceptual corrective actions that are clearly identified. Consequently, corrective action alternatives can be chosen before completing a CAI, given anticipated investigation results.

The SAFER process combines elements of the DQO process and the observational approach to plan and conduct closure activities. The DQOs are used to identify the problem and define the type and quality of data needed to complete closure of the CAS. The purpose of the investigation phase is to verify the adequacy of existing information used to determine the chosen corrective action and to confirm that closure objectives were met.

Use of the SAFER process allows for technical decisions to be made based on incomplete but sufficient information, and the experience of the decision maker. Based on a detailed review of historical documentation, there is sufficient process knowledge to close CAU 117 using the SAFER process. Any uncertainties are addressed by documented assumptions that are verified by sampling and analysis, data evaluation, and onsite observations, as necessary. Closure activities may proceed simultaneously with site investigation as sufficient data are gathered to confirm or disprove the assumptions made during selection of the corrective action. If, at any time during the closure process, new information is discovered that indicates closure activities should be revised, closure activities will be re-evaluated as appropriate.

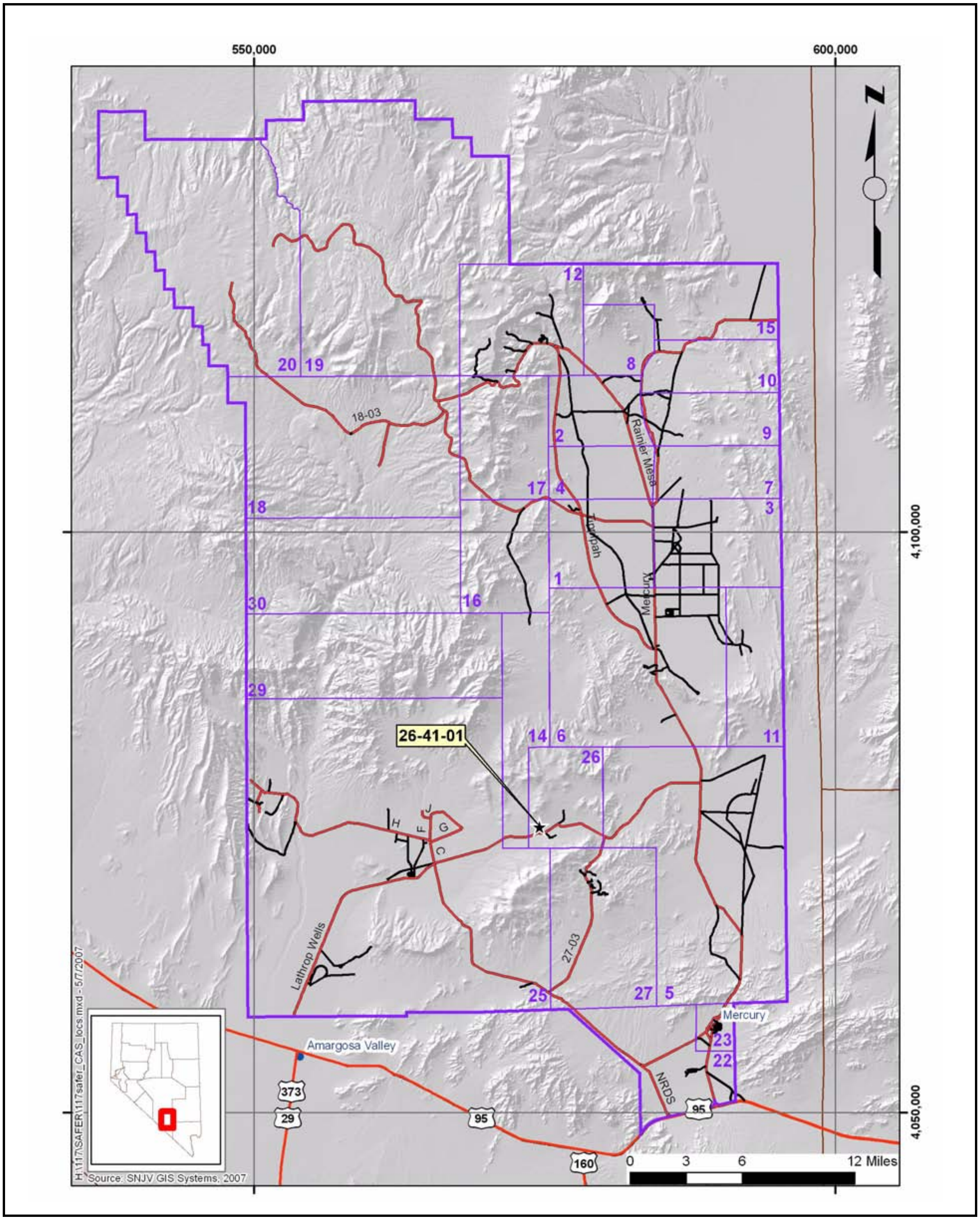

Figure 1-1
Nevada Test Site Map with CAU 117 CAS Location

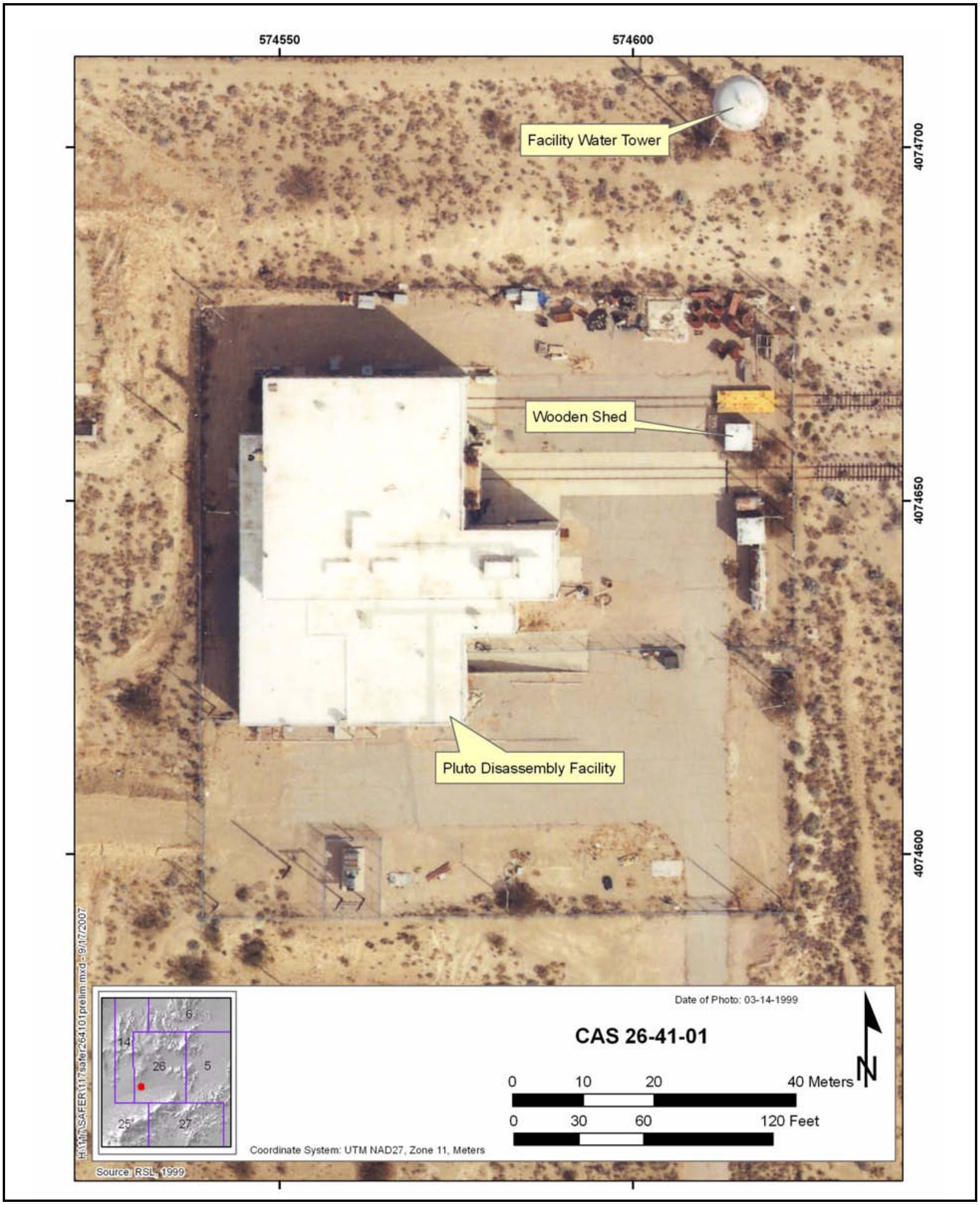

Figure 1-2
Corrective Action Site 26-41-01 Structures

1.2 Summary of Corrective Action and Closure

The decision process for closure of CAU 117 is summarized in Figure 1-3. This process starts with the initial investigation in which the appropriate target population(s) within the CAS (defined in the DQO process, Appendix B) is sampled. The objectives for the field activities are to determine whether contaminants of concern (COCs) exist in environmental media or potential source material. If remediation is determined to be feasible, then the extent of COCs will be determined so that a closure alternative may be implemented. However, contingencies are built into the process in the event new information is identified that indicates the selected closure option should be revised. The process ends with closure of the site based on laboratory analytical results of the environmental samples and the preparation of a Closure Report (CR). Corrective action alternatives of closure in place and clean closure will be evaluated for the CAS if contaminants are found above preliminary action levels (PALs).

Decision points that require a consensus be reached between NNSA/NSO and NDEP before continuing are indicated in Figure 1-3.

In addition to the previously discussed hold/decision points, work may be temporarily suspended until the issue can be satisfactorily resolved if any of the following unexpected conditions occur:

- Conditions outside the scope of work are encountered.
- Radiological screening yields results that require an upgrade in procedures to continue survey work in specific areas.
- Elevated levels of additional COCs are found that were not originally identified as being present at the sites.
- Unexpected conditions, including unexpected waste and/or contamination, are encountered.
- Out-of-scope work activities are required due to the detection of other COCs that would require re-evaluating a disposal pathway, such as with hazardous or low-level waste (LLW).
- Unsafe conditions or work practices are found.

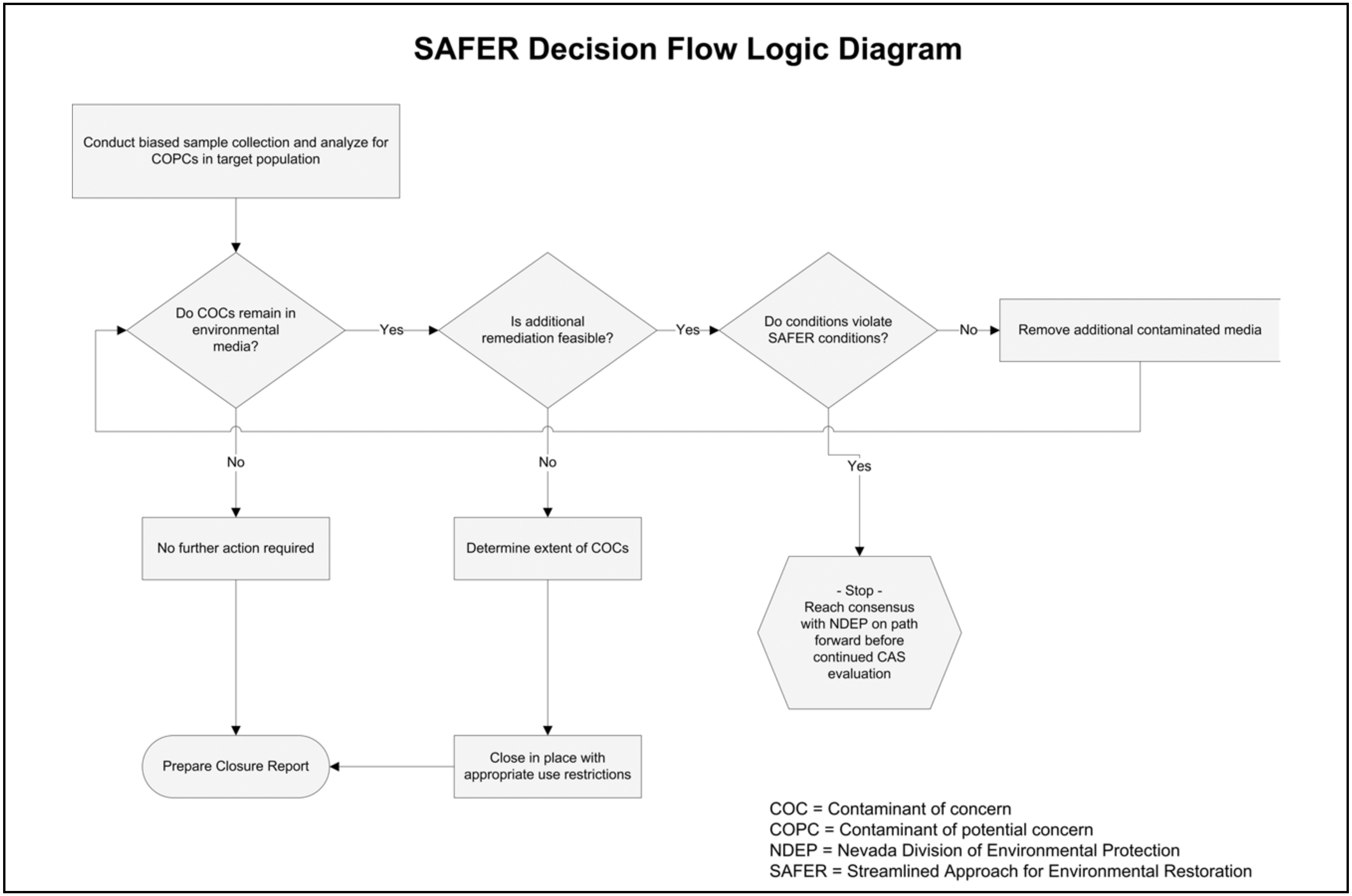

Figure 1-3
Corrective Action Unit 117 Closure Decision Process

1.3 Best Management Practices

The BMPs performed at CAU 117 will enable placement of Building 2201 in a safe interim configuration for future demolition. The BMPs associated with CAU 117 are conducted outside of the FFACO process. The BMPs presently planned for CAU 117 include:

- Removal of readily removed wastes (e.g., filters, equipment and material).
- Potential removal or decontamination of radiologically impacted surfaces such as floors, walls and ceilings.
- Potential stabilization of radiologically impacted inaccessible surfaces (e.g., ventilation ducting, piping).
- Potential removal of leaded glass windows

1.4 Building 2201 End State

The final end state for the Pluto Disassembly Facility is demolition. Because this work will span more than one fiscal year, deactivation and decommissioning activities will be conducted in stages. Completion of BMP activities will:

- Place the Pluto Disassembly Facility in a safe interim configuration for future demolition, and
- Minimize continued surveillance and maintenance costs for the facility.

The FFACO driven end state for CAU 117, Pluto Disassembly Facility is site closure using the SAFER process. Closure of CAU 117 under the FFACO will:

1. Identify potential existing soil contamination at the site.
2. Establish appropriate controls if soil contamination exists.
3. Identify any potential source materials remaining at the site with the potential to impact soils.
4. Establish a practical closure strategy for the site based upon risk to potential receptors (e.g., clean closure, close in place, or no further action).

2.0 Unit Description

2.1 Description of Unit

Corrective Action Unit 117 is located north of Cane Spring Road in the southwestern portion of Area 26 of the NTS (see Figure 1-1), approximately 600 feet (ft) west of the Rail Car Washdown area (CAS 26-07-01) (Holmes & Narver, Date Unknown). It is comprised of a single CAS, CAS 26-41-01, which consists of the Pluto Disassembly Facility (also known as Building 2201 or the Maintenance, Assembly, and Disassembly [MAD] Building), the facility water tower, and a nearby wooden shed. Current access to CAS 26-41-01 is limited by a surrounding chain-link fence, locked gates, and locked entryways to Building 2201. Figure 1-2 shows Building 2201 with respect to the facility water tower, wooden shed, and the surrounding chain-link fence. Figure 2-1 is a photograph of Building 2201 taken facing northwest.

2.1.1 Pluto Disassembly Facility

Building 2201 is three stories tall with a basement and consists of 23 rooms (four basement rooms, 17 first-floor rooms, one second-floor room, and one third-floor room). The rooms include, but are not limited to, equipment rooms, a cold assembly bay, a main disassembly bay, hot and warm cells, a control room, operating area, shower/change room, washroom, an electrical maintenance shop, and an office. Figure 2-2 shows the layout of the first floor of the facility (adapted from BN, 1996). Figure 2-3 shows the layout of the facility including the basement. Room 201 is located above Room 105, and Room 301 is located above Room 201. Total floor space in the building is approximately 19,500 square feet. Table 2-1 summarizes room dimensions and functions estimated from a review of engineering drawings and historical documentation. Wall thicknesses and heights are also summarized in Table 2-1. Walls surrounding the hot cells and main disassembly bay are constructed of either normal concrete or barite concrete. The depth of the barite concrete (4 ft) was chosen so that those walls would provide equivalent shielding as walls constructed of regular concrete (6 ft thick) (LRL, 1960). Walls in administrative area of the building are constructed of concrete block approximately 1 ft thick.

Figure 2-1
Pluto Facility Building 2201 (July 2007)

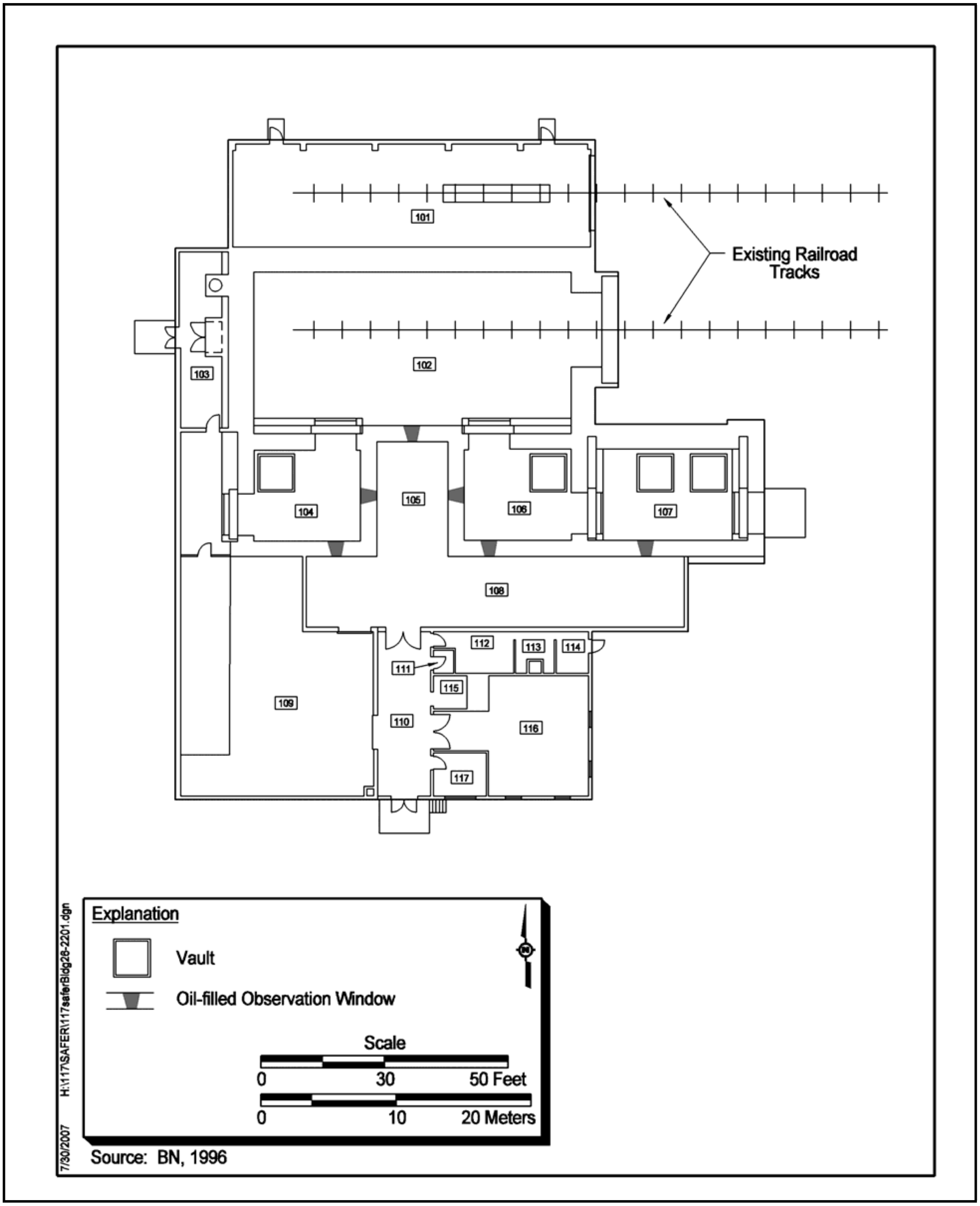

Figure 2-2
Building 2201 First-Floor Layout

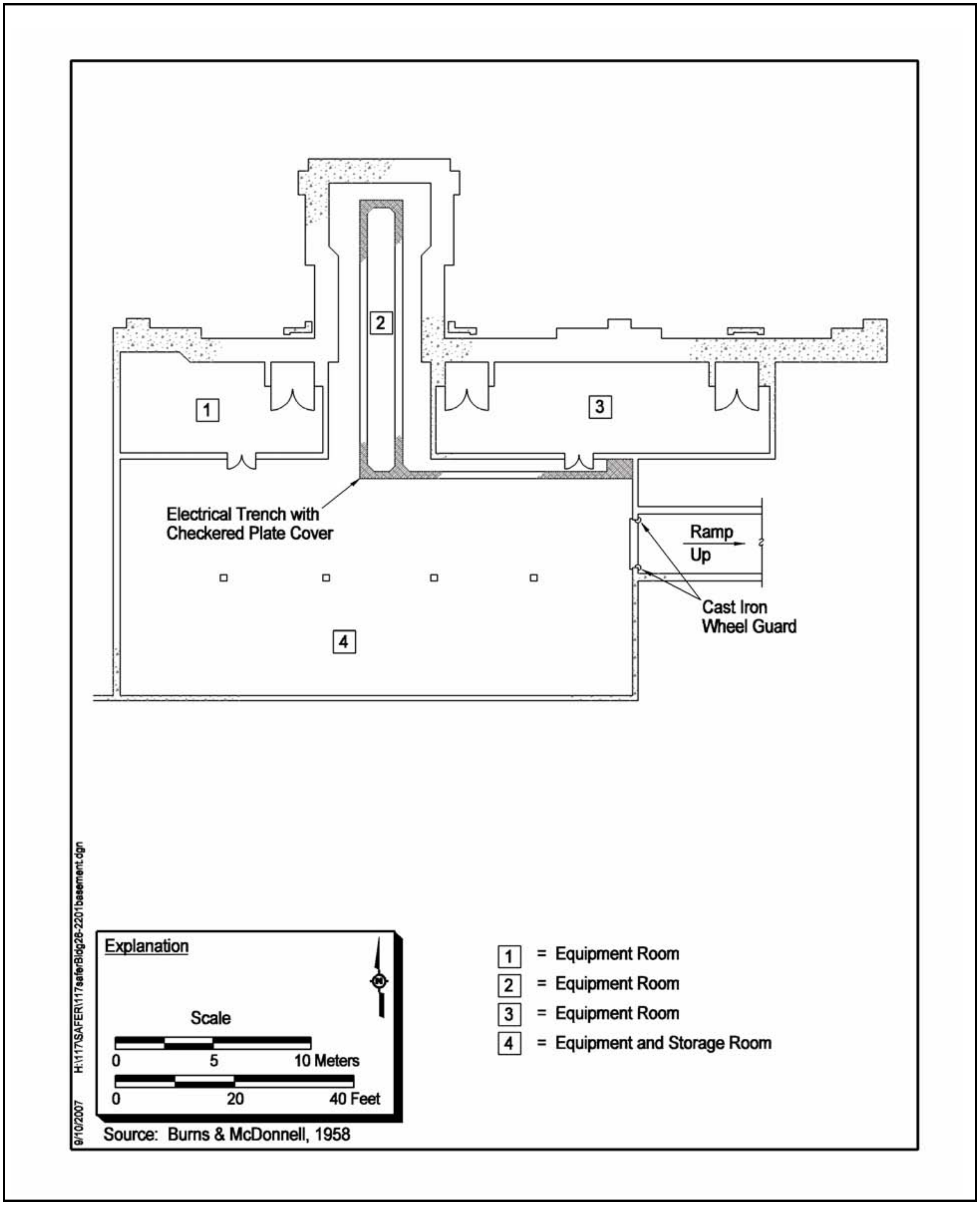

Figure 2-3
Building 2201 Basement Layout

Table 2-1
Building 2201 Room Dimensions

Room Number	Function[a]	Area (ft^2)	Wall Height (ft)	Wall Thickness[b]
1	Equipment Room	578	10.33	North: 4 ft[c] East/West/South: 1 ft[c]
2	Equipment Room	782	10.33	North/East/West: 4 ft[c]
3	Equipment Room	859	10.33	North: 4 ft[b] East/West/South: 1 ft[c]
4	Equipment & Storage Room	3,411	10.33	1 ft[c]
101	Cold Assembly Bay	2,175	36.83	North/East/West: 1 ft South: 6 ft
102	Main Disassembly Bay	3,006	35	North/East/West: 6 ft South: 4 ft
103	Equipment Room	497	22.5	North/West/South: 1 ft East: 6 ft
104	Hot & Warm Cell	572	35	4 ft
105	Control Room	476	10	North/East/West: 4 ft South: Open to Room 108
106	Kilo-Curie Hot Cell	572	35	4 ft
107	Hot Storage & Packaging Room	860	35	North: 6 ft East/West/South: 4 ft
108	Operating Area	1,539	12.17	North: 4 ft East/West/South: 1 ft
109	Warm & Cold Storage Room	1,735	13.25	East/West/South: 1 ft Northeast: 4 ft
110	Corridor	503	12	East/West/South: 1 ft
111	Janitor’s Closet	27	9	8 in.
112	Men’s Restroom	142	9	1 ft
113	Shower & Change Room	93	9	North: 1 ft East/West/South: 8 in.
114	Radiation Safety Room	78	9	North/East: 1 ft West/South: 8 in.
115	Women’s Restroom	67	9	8 in.
116	Cold Storage & Electrical Maintenance Shop	706	14	North/East/South: 1 ft West: 8 in.
117	Office	133	9	North/East/West: 8 in. South: 1 ft
201	Equipment Room	370	8.33	North/West/East: 4 ft South: 1 ft
301	Equipment Room	370	8.33	North/West/East: 4 ft South: 1 ft

[a]Source: LRL, 1960
[b]Wall thickness: 1 ft = concrete block, 4 ft = barite concrete, 6 ft = normal concrete (LRL, 1960)
[c]Source: Burns & McDonnell, 1958a

ft = Foot
ft^2 = Square foot
in. = Inch

Engineering drawings and documentation show that Building 2201 includes a heating, ventilation, and air conditioning (HVAC) system, a ventilation pre-filter system, electrical systems, and drains used to discharge radioactive and domestic sewage effluent (Burns & McDonnell, 1958b). Waste drainage systems were designed for both the "hot" and "cold" portions of Building 2201, which drained to a radioactive leachfield (CAS 26-05-01) and a septic leachfield (CAS 26-05-04), respectively.

According to the *Consolidated Chronic Beryllium Disease Prevention Program Plan,* the Pluto Disassembly Facility is classified as a "high potential beryllium area" with respect to the potential risk for exposure (NSTec, 2007). This ranking is derived from the use of reactor fuel comprised of 50 percent beryllium oxide in the building.

The facility was designed jointly by the Lawrence Radiation Laboratory (LRL), and the Burns and McDonnell Engineering Company (LRL, 1960).

2.1.1.1 Hot/Cold Cells

Rooms 102, 104, 106, and 107 comprise the Building 2201 hot cells, designed to handle experimental reactors and reactor fuel. The Main Disassembly Bay (Room 102) houses a bridge crane with a 15-ton hook and 5-ton auxiliary hook, and two mechanical arms. An oil-filled, leaded-glass window to Room 105 is located in the center of the south wall. This window was covered with a 0.5-inch (in.)-thick steel plate in the mid-1990s (BN, 1996). Room 102 may be accessed via Rooms 104 or 106, or through a large concrete-filled steel door at the east end, through which a reactor test vehicle could be transported. Room 102 also contains a mercury vapor lighting system. The ventilation system in Room 102 is of the down-draft type with a capacity of 1,000 cubic feet per minute (CFM) (LRL, 1960). Room 102 contains a total of 11 floor drains leading to the radioactive leachfield (Burns & McDonnell, 1958b). The west end of Room 102 presently houses two cylindrical tanks and several associated flanged vessels (see Figure 2-4). This equipment was presumably used for calibration of logging equipment to support Test Readiness Programs.

Figure 2-4
Cylindrical Tanks and Flanged Vessels West End of Room 102 (July 2007)

Rooms 104, 106, and 107 make up the postmortem hot cells. The walls and floors of these rooms are constructed of phenoline-painted concrete (phenoline is believed to be a chemically resistant epoxy coating for use on steel and concrete surfaces [Carboline, 2007]). The ventilation systems in Rooms 104, 106, and 107 are of the down-draft type, designed for minimum dead spots and eddy currents. The capacity of these systems is 1,000 CFM (LRL, 1960). The postmortem hot cells are equipped with hot waste gutters and drains for washdown. Each room also contains a mercury vapor lighting system. The five shielding doors for these rooms consist of two 1-ft-thick slabs of Meehite cast iron joined together. Each door weighs 80 tons and is suspended from an overhead trolley or monorail system actuated by hydraulic rams located at the top of the door (LRL, 1960). *The Design and Construction of the Site 401 Disassembly Facility* (LRL, 1960) also refers to a "boost pump and distilled water system for cell door operation." It is unknown how the hydraulic system for door operation coordinates with the boost pump and distilled water system. As of the date this SAFER was published, no oil reservoir for hydraulic equipment operated in Building 2201 had been found.

Rooms 104 and 106 share similar equipment and construction. Each room contains a 7.5-ton bridge-mounted, 270-degree rotating hoist crane; one pair of master slave manipulators; one floor vault; and six floor drains leading to the radioactive leachfield (LRL, 1960; Burns & McDonnell, 1958b). Optical periscopes originally installed in both rooms have since been removed. In both Rooms 104 and 106, two oil-filled, leaded-glass windows lead to Rooms 105 and 108. Shielded pits are provided for emergency use and storage in Room 106.

Room 107 contains a 7.5-ton bridge mounted, 270-degree rotating hoist crane (LRL, 1960); one oil-filled, leaded-glass window leading to Room 108; two floor vaults; and four floor drains leading to the radioactive leachfield (LRL, 1960; Burns & McDonnell, 1958b).

Descriptions of Rooms 101, 103, and 109 are included in this section due to their historical association with the hot cell rooms. The Cold Assembly Bay (101) is located north of Room 102. Room 101 contains a 15-ton overhead bridge crane (LRL, 1960). The walls of Room 101 are concrete painted with radiation-resistant paint (Burns & McDonnell, 1958a). Room 101 contains two floor drains leading to the radioactive leachfield (Burns & McDonnell, 1958b). Within Room 101 is also a series of rectangular metal canisters lined up against the walls (Figures 2-5 and 2-6). The origin and content of the canisters is unknown.

The Warm and Cold Storage Room (109) is located south of Room 104. Room 109 contains installed equipment, including a grinder, belt sander, band saw, and drill press. The walls and floors of Room 109 are concrete painted with phenoline (Burns & McDonnell, 1958a). Room 109 contains two floor drains leading to the radioactive leachfield (Burns & McDonnell, 1958b). Within Room 101 is also a series of rectangular metal canisters lined up against the wall (Figures 2-5 and 2-6). The origin and content of the canisters is unknown.

Room 103 is an equipment room located west of Room 102, and houses exhaust blowers for the main exhaust stack. Air from the hot cells was directed through Room 103 after passing through ventilation system filters (LRL, 1960). The main exhaust stack was equipped with a spray system that could be used to wash down the stack (LRL, 1960). Room 103 contains three floor drains leading from the stack sump to the radioactive leachfield (LRL, 1960; Burns & McDonnell, 1958b).

Figure 2-5
Rectangular Metal Canisters in Room 101 (July 2007)

Figure 2-6
Metal Canisters Against Opposite Walls in Room 101 (July 2007)

2.1.1.2 Control and Operating Areas

Rooms 105 and 108 were designed as the main control and operating areas for the facility (LRL, 1960). The Control Room (Room 105) is located between Rooms 104 and 106, and is connected to the Operating Area (Room 108) via a large entryway to the south. Oil-filled, leaded-glass windows on the west, north, and east walls connect Room 105 to Rooms 104, 102, and 106, respectively. Oil-filled, leaded-glass windows on the north wall of Room 108 connect that room to Rooms 105, 106, and 107. Walls in both rooms are covered with radiation-resistant paint. Each room has a suspended acoustical ceiling and asphalt tile floor (Burns & McDonnell, 1958a). Holes in the walls of Room 105 lead to the hot cell rooms for passing equipment or services to these rooms (LRL, 1960). Control panels located in Room 105 have previously been removed.

2.1.1.3 Equipment Rooms

Basement Rooms 1 through 4, and upper-level Rooms 201 and 301 are considered the Building 2201 equipment rooms. The floors of these rooms are constructed of concrete with hardener (Burns & McDonnell, 1958a). Room 2 is open to the south to Room 4. Rooms 1 and 3 each have doors leading to Room 4 (Burns & McDonnell, 1958a). Four floor drains in Room 1 and two floor drains in Room 3 lead to the radioactive leachfield (Burns & McDonnell, 1958b). Four floor drains in Room 2 and 13 floor drains in Room 4 lead to the sanitary leachfield (Burns & McDonnell, 1958b). The historical use of the equipment rooms is unknown.

Room 4 houses the Building 2201 air conditioning plant (DOE/NV, 1998). A direct-current welding generator, ventilation blowers, air sampling vacuum pump, high-capacity vacuum pump, carbon dioxide system for in-cell fire protection, house air compressor, boost pump and distilled water system for cell door operation, and main heating and electrical services are also located in Room 4 (LRL, 1960). A makeshift darkroom had also been set up in the basement.

2.1.1.4 Administrative Areas

The remaining rooms in Building 2201 comprise the administrative area used to support engineering operations in the assembly and disassembly sections of Building 2201.

The Shower Change Room and Rad Safety Room (Rooms 113 and 114, respectively) are constructed of concrete block walls painted with radiation-resistant paint, and concrete floors painted with phenoline (Burns & McDonnell, 1958a). Both rooms have a suspended acoustical tile ceiling (Burns & McDonnell, 1958a). A single drain in Room 113 and three drains in Room 114 lead to a nearby sanitary leachfield (Burns & McDonnell, 1958b).

According to historical references, Room 115 was originally designed as the facility darkroom and was used for quickly developing photograph negatives (Burns & McDonnell, 1958a; LRL, 1960). As the use of the facility changed over time, Room 115 was eventually converted into a women's restroom. The room contains an asphalt tile floor and suspended acoustical tile ceiling (Burns & McDonnell, 1958a). Walls are constructed of concrete block painted with radiation-resistant paint (Burns & McDonnell, 1958a). Room 115 contains one waste drain and trap leading to the sanitary leachfield (Burns & McDonnell, 1958b).

The floor of the Cold Storage and Electrical Maintenance Shop (Room 116) is constructed of concrete with hardener. The walls of Room 116 are constructed of concrete block painted with radiation-resistant paint. The ceiling of this room is painted, exposed, structural steel (Burns & McDonnell, 1958a).

Building 2201 also contains an administrative office (Room 117), corridor (Room 110), janitor's closet (Room 111), and toilets (Room 112). Walls in Rooms 117, 110, and 112 are constructed of concrete block and painted with radiation-resistant paint. Each of these rooms has a suspended acoustical tile ceiling. The floors in Rooms 117 and 110 are constructed of asphalt tile. The floors in Rooms 111 and 112 are constructed of concrete with hardener (Burns & McDonnell, 1958a). One waste drain in Room 111 and two waste drains in Room 112 lead to the sanitary leachfield (Burns & McDonnell, 1958b).

2.1.1.5 Roof

In the Decontamination & Decommissioning Program Surveillance & Maintenance Master Plan for the NTS, the DOE, Nevada Operations Office noted that the roofing system in Building 2201 is deteriorating, and that the lower and upper roofing systems should be repaired as soon as possible (DOE/NV, 1998). It is unknown if any roof repairs have been completed to date.

2.1.2 Water Tower

The facility water tower is located approximately 175 ft to the northeast of Building 2201 (IT, 1996). The water tower is 100 ft tall with a 35 pounds per square inch static head and a capacity of 30,000 gallons. The water tank and tower was constructed in 1959 by Hammond Iron Works. The tank provided a water source for facility operations (Figure 2-7). The water tower remains in good condition, with no indication that a breach has occurred. Soil beneath the water tower is not expected to be contaminated.

2.1.3 Wooden Shed

A wooden shed located approximately 100 ft to the east of Building 2201 is also included in the scope of this SAFER. The wooden shed contains several drums of unidentified material. The shed remains in good condition, and there is no indication that drum containment has been compromised.

Figure 2-7
Water Tower and Wooden Shed (July 2007)

2.2 History and Process Knowledge

Operational history and process knowledge for CAS 26-41-01 is summarized in this section. Process knowledge has been obtained through historical document reviews, engineering drawing and map reviews, and interviews with past and present NTS employees. Some uncertainty remains regarding general knowledge of past operations and site-specific historical documentation pertaining to CAS 26-41-01. Based on the process knowledge and information about operations at the CAS, assumptions were made to formulate a conceptual site model (CSM) that describes the most probable scenario for current conditions at the CAS. Sections 3.2.5 and B.2.2 provide additional information on the CSM developed for CAS 26-41-01.

2.2.1 Project Pluto

Construction of Building 2201 began in May 1959 for Project Pluto, approximately four years after the project's initiation by the DoD in 1955. After completion of the building in October 1960, the project was passed to LRL, who managed Project Pluto until its cancellation in 1964. The objective of Project Pluto was to design a nuclear reactor that could propel a missile through the atmosphere at altitudes ranging from sea level to several miles and at velocities up to three times the speed of sound (LLNL, Date Unknown). As a result, the earthbound Tory II-A reactor and its flyable counterpart, the Tory II-C, were developed. The cores of these reactors incorporated several hundred thousand fuel elements consisting of a homogenous mixture of highly enriched uranium dioxide and beryllium oxide (AEC, Date Unknown). The propulsion system operated on the ramjet principle, in which large quantities of air were ingested, heated by the reactor, and expelled at a high temperature and pressure to provide thrust. Between 1961 and 1964, LRL conducted several tests of the Tory reactors, including four successful power runs with the Tory II-A and two power runs with the Tory II-C (Holmes & Narver, 1986; DRI, 1998).

Project Pluto was also associated with "Hot Box" tests performed in Building 2201. These tests consisted of using stacks of graphite blocks interspersed with a few oralloy (uranium [U]-235) foils. Air was heated to high temperatures and circulated through the reactor to obtain initial test data. Results from these tests were used to design the Tory II-A reactor (LLNL, Date Unknown).

Only the Tory II-A was disassembled in Building 2201 (DOE/NV, 1993). The Tory II-C reactor was stored in Building 2201 until 1974, when it was moved to the Reactor Maintenance, Assembly, and Disassembly (R-MAD) building for storage (Author Unknown, Date Unknown). Actual disassembly of the Tory II-C was performed at the Engine Maintenance, Assembly, and Disassembly (E-MAD) building in 1976 (DOE/NV, 1993).

Building 2201 was designed specifically to perform remote adjustments, component replacement, and complete disassembly of the Tory II reactor systems. The Main Disassembly Bay (Room 102) housed the Tory II test vehicle when activities dictated that remote handling be used. Historical documentation indicates that the hydraulic hoist in Room 102 leaked oil (IT, 1996). Disassembly operations were viewed through 4-ft-thick leaded-glass observation windows immersed in oil (LRL, 1960). During disassembly, the reactor core was removed from the railcar (used to transport the reactor to the test pad) with remotely operated manipulators. The heavily shielded postmortem hot cells adjacent to the disassembly bay were used to monitor control rod actuators during Project Pluto. Vaults within each cell were operated with remote manipulators for "fuel elements and classified core parts" (Holmes & Narver, 1986). The Cold Assembly Bay (Room 101) was used for storage and assembly of modular components for the reactor test vehicle (LRL, 1960).
A maintenance service pit and battery charger for the locomotive were also located in Room 101 (LRL, 1960).

The disassembly bay was supported by a maintenance shop, darkroom, offices, and equipment storage rooms. All controls for Building 2201 operation were located in Room 105 (DOE/NV, 1998). The Warm & Cold Storage Room (109) was used for repair and maintenance of equipment contaminated with low-activity radiological contaminants and was also intended for low-activity glove-box work (LRL, 1960). Both the Shower/Change Room (113) and Rad Safety Room (114) were designed as change rooms and check stations for personnel needing access to the hot cell and assembly areas (LRL, 1960). Before it was converted into a restroom, Room 115 served as a darkroom for quickly developing photograph negatives (LRL, 1960). Chemicals typically used in the photograph development process were stored and used in this room. Room 116 was originally used to store the many spare parts required for the facility. A small electronics maintenance area was later set up in Room 116. It is suspected that hydrocarbons, mild detergents, degreasers, muriatic acid, and solvents associated with routine equipment repair shops and maintenance facilities were used in the

Building 2201 maintenance areas (IT, 1993-1998). Historical functions associated with Project Pluto for the remaining rooms in Building 2201 are briefly summarized in Table 2-1.

During operation, Rooms 105 and 108 were air conditioned and maintained at a positive pressure so that air flowed into the surrounding hot cells (Rooms 102, 104, 106, and 107) when equipment or services were passed through openings at each operating station (LRL, 1960). These openings were plugged with lead plates or bagged shot when not in use (DOE/NV, 1998). The ventilation system in Room 102 was exhausted at the west end of the room through roughing and absolute filters before being vented to the atmosphere via the main exhaust stack in Room 103 (LRL, 1960). An initial survey done inside the stack indicated no elevated radiological readings. Roughing and absolute filters for Rooms 104, 106, and 107 could be changed from a remote location (LRL, 1960). In 1998, a portable air conditioning system was installed by an unidentified "user." This user set up a portable system outside of the building with ducts running through external penetrations in the building that otherwise would have remained closed (DOE/NV, 1998).

The drainage system originating in the disassembly bay and postmortem cell area was designed to collect rinsate from gross decontamination efforts. Information from interviews with former personnel suggest that the septic drainage system was disconnected in 1964 (Barrow, 1998).

2.2.2 Fuel Repackaging Operations

Following the cancellation of Project Pluto, Building 2201 was used for the Fuel Repackaging Operations Project conducted between 1971 and 1972 (REECo, 1972). During this period, fuel elements from the Tory II reactors were removed from their original containers and placed in 6-liter containers that were then sealed, cleaned, and removed from the hot cell rooms (Rooms 104, 106, and 107) of Building 2201. The containers were temporarily stored in the machine shop area of Building 2201 until they were taken to the decontamination pad in Area 6 for storage or potential future use (REECo, 1972). The packaged fuel elements were eventually shipped to the Idaho National Engineering Laboratory (Holmes & Narver, 1986).

2.2.3 Classified Activities

Starting in 1972, Building 2201 was used for a series of classified experiments following the fuel repackaging operations (DOE/NV, 1993). As of 1986, Sandia National Laboratories (SNL) was using portions of Building 2201 to conduct weapons-related non-destructive testing of fast-acting closure systems (DOE/NV, 1998). Since 1996, SNL has performed activities in Building 2201 associated with non-nuclear rocket launching and other classified projects. Due to their sensitive nature, specific information on experiments conducted by SNL inside Building 2201 is not readily available (IT, 1996). In 1998, an unidentified "user" used Building 2201 for additional classified activities (DOE/NV, 1998).

2.2.4 Associated Corrective Action Units

The following CAUs and CASs associated with CAS 26-41-01 have been identified:

- Corrective Action Unit 127, CAS 26-01-01, Filter Tank (RAD) and Piping: This site is located within the fence for Building 2201 and is related to the building. A closure strategy of clean closure was applied to the site. According to the CAU 127 Corrective Action Decision Document (CADD), the only COC detected at CAS 26-01-01 was lead (NNSA/NSO, 2004b). This COC has been included as a COPC for CAS 26-41-01 because it is believed that contaminants found in CAS 26-01-01 originated from activities conducted within Building 2201.

- Corrective Action Unit 127, CAS 26-01-02, Filter Tank (RAD): This site is located within the fence for Building 2201 and is related to the building. A closure strategy of clean closure was applied to the site. Contaminants of concern at CAS 26-01-02 included americium (Am)-241 and plutonium (Pu)-239 (NNSA/NSO, 2004b). These COCs have been included as COPCs for CAS 26-41-01 because it is believed that these contaminants originated from activities conducted within Building 2201.

- Corrective Action Unit 127, CAS 26-99-01, Radioactively Contaminated Filters. This site is located within the fence for Building 2201 and is related to the building. According to the CAU 127 CADD, radiological contamination exceeding unrestricted release criteria is limited to the inside of the eight 30-gallon filter tanks and associated piping. A closure strategy of clean closure has been selected for the site.

- Corrective Action Unit 165, CAS 26-07-01, Vehicle Washdown Station: This site is located approximately 600 ft from Building 2201 and is connected to the building via railroad tracks. A closure strategy of no further action was applied to the site because no COCs were identified. Contaminants of potential concern identified in the Corrective Action Investigation Plan (CAIP) for CAS 26-07-01 include beryllium, cobalt (Co)-60, strontium

(Sr)-90, yttrium (Y)-90, niobium (Nb)-94, cesium (Cs)-137, barium (Ba)-137m, europium (Eu)-152, Eu-154, Eu-155, U-234, U-235, U-238, Pu-238, Pu-239/240, and Am-241 (NNSA/NV, 2002a). Because the washdown station was used to decontaminate the reactor test vehicle before its return to Building 2201, analyses for the contaminants listed above have been included in the list of COPCs for 26-41-01.

- Corrective Action Unit 168, CAS 26-19-02, Contaminated Waste Dump #2: This site is located approximately 6,600 ft to the northeast of Building 2201 and is connected to the building via railroad tracks. A closure strategy of clean closure was applied to the site. Potential contaminants identified in the CAIP for CAU 168 include beryllium, uranium, and fission products (NNSA/NV, 2001). According to a 1988 report from the Desert Research Institute, potassium (K)-40, radium (Ra)-226, thorium (Th)-228, Th-232, and Cs-137 are contaminants also associated with the waste dump (DRI, 1988). According to the CAU 168 CADD, arsenic was found at CAS 26-19-02 above the PAL (NNSA/NSO, 2006a). Uranium and Sr-90 were detected above minimum reporting levels (MRLs) at the site but were not above PALs (NNSA/NSO, 2006a). It is assumed that the site received waste from Project Pluto between 1961 and 1964 (NNSA/NV, 2001), so analyses for potential contaminants associated with CAS 26-19-02 have been included in the list of COPCs for CAS 26-41-01.

- Corrective Action Unit 271, CAS 26-05-01, Radioactive Leachfield: This leachfield was designed to receive radioactive effluent from Building 2201. It is located approximately 1,600 ft to the southeast of Building 2201 and is connected to the building via an 8-in. piping system (Holmes & Narver, Date Unknown). A closure strategy of clean closure was applied to the site. Potential contaminants at the site included beryllium, total petroleum hydrocarbons (TPH), Cs-137, Pu-239, U-234, and U-235. According to the CAU 271 CR, Pu-239 was found above action levels in two samples from the site (NNSA/NSO, 2004a). Because CAS 26-05-01 received effluent from Building 2201, COPCs from CAS 26-05-01 have been included as COPCs for CAS 26-41-01.

- Corrective Action Unit 271, CAS 26-05-04, Septic System: This leachfield was designed to receive sanitary effluent from Building 2201. It is located approximately 100 ft to the south of Building 2201 and is connected to the building via a 6-in. sanitary sewer piping system (Holmes & Narver, Date Unknown). A closure strategy of clean closure was applied to the site. Potential contaminants at the site included beryllium, TPH, Cs-137, Pu-239, U-234, and U-235. According to the CAU 271 CR, no contaminants were detected above action levels (NNSA/NSO, 2004a). Because CAS 26-05-04 received effluent from Building 2201, COPCs from CAS 26-05-04 have been included as COPCs for CAS 26-41-01.

- Corrective Action Unit 418, CAS 26-02-04, Underground Storage Tank 26-2201-2: In May 1996, an underground storage tank was removed from just outside of the southeast corner of Building 2201. It is unknown what the tank was used for and its relationship to Building 2201. At the time it was removed, the tank contained approximately 850 gallons of liquid. Elevated readings of lead, oil, Am-241 and Pu-239 were found (BN, 1997). It is unknown whether these contaminants are related to activities conducted in Building 2201, but they have been included as COPCs in Section 3.0 and Appendix B. A closure strategy of clean closure was applied to the site.

2.3 Available Site Information

Following the cancellation of Project Pluto, various radiological surveys and decontamination activities took place in Building 2201 between 1971 and 1999.

2.3.1 1971 and 1972 Surveys

The *Summary Report of Fuel Repackaging Operations Building 2201 - Area 401 January 10, 1971 through January 24, 1972* contains information from surveys conducted coinciding with fuel repackaging operations that took place in Building 2201. Surveys were taken before the work commenced and after the work was finished and decontamination efforts had been conducted. Following decontamination, surveys and swipe samples were taken from Rooms 102 and 104. These post-decontamination results indicated that no removable alpha contamination remained in Room 104, 24 disintegrations per minute per 100 square centimeters (dpm/100cm^2) of removable beta/gamma contamination remained just outside of Room 104, and 0.04 millirad per hour (mrad/hr) fixed beta/gamma contamination remained in Rooms 102 and 104. (REECo, 1972).

After decontamination efforts, several locations of elevated radioactivity with activities ranging from 0.1 to 4 roentgen per hour (R/hr) remained in Room 106 (REECo, 1972). Attempts were made to remove contamination on the floor using paint remover as well as chipping paint and concrete floor areas (REECo, 1972). Twelve locations of elevated radioactivity and three floor drains in Room 106 were marked using “Contaminated Material” tape (REECo, 1972). The report noted that this contamination appears fixed underneath a layer of epoxy paint. However, these marked locations were not observed in Room 106 during the 2007 preliminary site investigation.

Smear and airborne samples from Rooms 104, 106, and 107 analyzed for beryllium contamination showed no significant beryllium contamination on the walls, floors, or in the air. In each room, no airborne radioactivity was detected aside from natural radon/thoron. Floor vaults in Rooms 104 and 107 were marked “Internally Contaminated” after the surveys. Instructions were posted to contact “Rad/Safe” before opening the vaults in Rooms 104, 106, and 107. Banks of ventilation pre-filters marked with “Contaminated Material” tape and covered in plastic sheets were found in all three rooms. Maximum doses on contact for the filters in Rooms 104, 106, and 107 were recorded as 4.0 mrad/hr, 1.0 mrad/hr, and 0.4 mrad/hr, respectively. Smear surveys of the walls and floor in all three rooms indicated no significant removable contamination was present (i.e., less than 10 dpm/100cm^2 alpha and less than 200 dpm/100cm^2 beta plus gamma) (REECo, 1972).

2.3.2 1985 Survey

A *Building 2201 Survey* was conducted and summarized in a memo by this name from Reynolds Electrical & Engineering Co., Inc. (REECo) in March 1985 (Rosenberry, 1985). According to the memo, a room by room survey was performed to determine whether the building could be released for further use. The survey included all readily accessible areas and consisted of multiple swipe locations for removable alpha and beta contamination and surveys for beta/gamma contamination between the swipe locations. As a result, the walls were only checked to a height of approximately 7 ft. The storage vault in Room 104 was still labeled as "Internally Contaminated" at the time of the 1985 survey. The vault was not surveyed due to its inaccessibility (Rosenberry, 1985).

Results from the survey demonstrated that beta gamma readings were primarily at the area background level (0.04 mrad/hr). Most alpha and beta swipe readings were below 20 dpm. The maximum removable contamination values were recorded in Room 102 (51 dpm alpha) and Room 106 (51 dpm beta). Results from the 1985 survey are summarized in Table 2-2 (Rosenberry, 1985).

Table 2-2
1985 REECo Survey Results
(Page 1 of 2)

Room	Beta/Gamma Readings (mrad/hr)	High Swipe (dpm)	
		Alpha	Beta
101	0.04[a]	17	20
102	0.04	51	17
102 Add On	0.04	6	12
103	0.04	3	14
104	0.04	10	13
105	0.04	6	10
106	0.09	18	51
107	0.04	14	13
108	0.04	3	10

Table 2-2
1985 REECo Survey Results
(Page 2 of 2)

Room	Beta/Gamma Readings (mrad/hr)	High Swipe (dpm)	
		Alpha	Beta
109	0.04	7	13
110	0.04	3	13
111	0.04	7	3
112	0.04	3	6
113	0.04	3	6
114	0.04	3	6
115	0.04	3	16
116	0.04	7	11
117	0.04	3	6
Basement	0.04	7	21
Ramp	0.04	3	11

Source: Rosenberry, 1985
[a]0.04 mrad/hr is the area background

dpm = Disintegrations per minute
mrad/hr = Millirad per hour
REECO = Reynolds Electrical & Engineering Co., Inc.

2.3.3 1999 Bechtel Nevada Survey

In 1999, Bechtel Nevada (BN) performed surveys of Rooms 101, 102, and 107 for removable alpha and beta contamination and for fixed plus removable alpha and beta contamination (BN, 1999). Maximum values from the survey are summarized in Table 2-3. The entire *Bechtel Nevada Radiation Survey Report* is available in the CAU 117 project files.

2.3.4 2006 Bechtel Nevada Survey

An annual survey conducted by BN in 2006 (BN, 2006) did not find any removable alpha or beta contamination outside Building 2201. A radioactive material waste drum with contact reading of 0.05 megaroentgen per hour was found in Room 103.

Table 2-3
1999 Bechtel Nevada Survey Maximums

Room	Alpha removable (dpm/100cm^2)	Beta removable (dpm/100cm^2)	Alpha (fixed + removable) (dpm/100cm^2)	Beta (fixed + removable) (dpm/100cm^2)
101	10	20	325	275
102	10	20	65	23,000
107	7	12	450	3,250

Source: BN, 1999

dpm/100cm^2 = Disintegrations per minute per 100 square centimeters

2.3.5 2007 SNJV Preliminary Site Investigation

Stoller-Navarro Joint Venture (SNJV) conducted further field investigations in May and June 2007 to supplement existing historical data and determine the nature and extent of contamination. This effort involved the sampling of various media from Building 2201, including paint, oil, flooring material, and surface smears. Samples were collected from the basement, the facility water tower, and Rooms 101, 102, 103, 104, 105, 106, 107, and 108 in Building 2201. Data obtained from the preliminary site investigation will be used to support the selection of an appropriate corrective action as recommended in this SAFER document. Maximum detected concentrations of sampled media are presented in Table 2-4 by location and media type. Maximum detected concentrations from smear samples are presented in Table 2-5. The complete site investigation data reports are available in the CAU 117 project files.

Radiological swipes and surveys were also collected, analyzed, and documented. The survey data indicate surface contamination is localized, and locations of elevated radioactivity are relatively isolated. Values that exceeded free release criteria as outlined in the *NV/YMP Radiological Control* (RadCon) *Manual* (NNSA/NSO, 2004c) were found on top of removable conductive flooring on top of the existing floor in Rooms 102, 106, and 107. It is anticipated that aggregate wastes from Building 2201 media will not be classified as LLW, and decontamination of building surfaces will not be necessary. Maximum values for alpha and beta fixed and removable contamination surveys are summarized in Table 2-6.

Table 2-4
2007 Preliminary Site Investigation (Preliminary Data)[a]
Media Samples

Location	Sample	Actinium-228	Americium-241	Tritium	Potassium-40	Lead-212	Lead-214	Plutonium-238	Plutonium-239/240	Thallium-208	Uranium-234	Uranium-238	Gross Alpha	Gross Beta	Lead	Aroclor 1254	Aroclor 1260
Water tower	Paint chip (leg)	--	--	--	--	--	--	--	--	--	--	--	--	--	0.426 mg/L	--	--
Room 104	Paint chip (wall)	--	--	15.16 pCi/g	10.02 pCi/g	--	--	--	--	1.433 pCi/g	0.127 pCi/g	0.111 pCi/g	--	--	--	2,000 μg/kg	650 μg/kg
	Paint chip (wall)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,600 μg/kg	1,300 μg/kg
	Paint chip (wall)	--	--	--	--	0.937 pCi/g	0.702 pCi/g	--	--	--	--	--	--	--	--	--	--
Room 106	Paint chip (wall)	0.89 pCi/g	--	7.68 pCi/g	7.02 pCi/g	0.766 pCi/g	0.542 pCi/g	--	--	--	0.191 pCi/g	0.174 pCi/g	--	--	--	--	--
Room 107	Solid (linoleum flooring)	--	1.131 pCi/g	--	--	--	--	0.058 pCi/g	5.459 pCi/g	--	0.126 pCi/g	0.091 pCi/g	7.044 pCi/g	--	--	--	--
	Paint chip (wall)	1.193 pCi/g	--	12.05 pCi/g	3.755 pCi/g	1.324 pCi/g	0.626 pCi/g	--	--	1.183 pCi/g	0.241 pCi/g	0.165 pCi/g	3.736 pCi/g	--	0.51 mg/L	740 μg/kg	320 μg/kg
	Paint chip	--	--	--	--	--	--	--	--	--	--	--	--	--	--	930 μg/kg	360 μg/kg
Room 108	Window oil	--	--	--	--	--	--	--	--	--	--	--	--	12.76 pCi/g	12.8 mg/kg	--	--

[a] Laboratory detects only

mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
pCi/g = Picocuries per gram
μg/kg = Micrograms per kilogram

Table 2-5
2007 Preliminary Site Investigation (Preliminary Data)[a]
Smear Samples

Location	Sample	Cobalt-60	Cesium-137	Europium-155	Pu-239/240	Strontium-90	Uranium-234	Uranium-235	Uranium-238	Gross Alpha	Gross Beta	Aroclor 1248	Aroclor 1254	Aroclor 1260
Room 102	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	13 µg	7.7 µg	--
	Smear (floor)	--	--	--	--	--	--	--	--	--	--	12 µg	19 µg	--
Room 104	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	30 µg	55 µg	28 µg
	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	27 µg	20 µg	10 µg
	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	18 µg	13 µg	9.1 µg
Room 105	Smear (stain on window gasket)	--	--	--	--	--	--	--	--	--	--	--	9.4 µg	--
Room 106	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	5.2 µg	3.6 µg	1.7 µg
	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	120 µg	54 µg	21 µg
	Smear (filter plenum)	30.78 pCi/s	259.1 pCi/s	17.75 pCi/s	1.939 pCi/s	25.55 pCi/s	846.1 pCi/s	97.48 pCi/s	9.401 pCi/s	782.1 pCi/s	303.5 pCi/s	--	--	--
	Smear (filter plenum)	22.53 pCi/s	139.3 pCi/s	--	0.675 pCi/s	7.617 pCi/s	264.3 pCi/s	9.098 pCi/s	3.454 pCi/s	268.4 pCi/s	142.8 pCi/s	--	--	--
Room 107	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	9.7 µg	5.8 µg	2 µg
	Smear (floor stain)	--	--	--	--	--	--	--	--	--	--	13 µg	8.8 µg	4 µg

[a] Laboratory detects only

pCi/s = Picocuries per sample

µg = Micrograms

Table 2-6
2007 Preliminary Site Investigation
Radiological Surveys, Maximum Values

Room	Alpha removable (dpm/100cm^2)	Beta removable (dpm/100cm^2)	Alpha (fixed + removable) (dpm/100cm^2)	Beta (fixed + removable) (dpm/100cm^2)
Room 102	4	9	39	33,200
Room 104	11	9	85	409
Room 106	925	1,914	69	65,800
Room 107	25	15	831	143
Shop/Admin Area	7	4	23	341
Room 103 (Air duct)	4	11	39	878
Room 201 (Pre-filter housing)	4	11	15	335
Basement	11	9	58	1,049

dpm/100cm^2 = Disintegrations per minute per 100 square centimeters

A total of 36 swipe samples were taken to determine beryllium and lead contamination throughout Building 2201. The highest beryllium result, 0.13 micrograms per 100 square centimeters (μg/100cm^2), came from a sample collected in the basement. This is below the public release level of 0.20 μg/100cm^2 for beryllium. Traces of lead dust were found on surfaces throughout Building 2201, at levels comparable to similar sites at the NTS. The highest value for lead surface contamination was found in Room 116 (540 μg/100cm^2). Additional lead and beryllium monitoring may be required during decontamination and demolition activities for worker health and safety.

The 1971/1972 and 1985 surveys indicated the storage vaults in Rooms 104, 106, and 107 were labeled as "Internally-Contaminated." The vaults were not surveyed during the 2007 investigation due to inaccessibility. The filter plenum in Room 106 was covered with plastic and labeled "Contaminated Material."

3.0 Data Quality Objectives

3.1 Summary of DQO Analysis

This section contains a summary of the DQO process (Appendix B). This process is a strategic planning approach based on the scientific method designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend the recommendation of viable corrective actions (e.g., no further action, clean closure, or closure in place).

The DQO strategy for CAU 117 was developed at a meeting on June 27, 2007. The DQOs were developed to identify data needs, clearly define the intended use of the environmental data, and design a data collection program that will satisfy these purposes. During the DQO discussions for this CAU, the informational inputs or data needs to resolve problem statements and decision statements were documented.

The problem statement for CAU 117 is: "Existing information on the nature and extent of potential contamination is insufficient to evaluate and confirm closure of CAS 26-41-01 in CAU 117." To address this question, the resolution of two decision statements is required:

- Decision I: "Is any COC present in environmental media within the CAS, or does potential source material exist that, if released, could cause a COC in environmental media?" Any analytical result for a COPC above the final action level (FAL) will result in that COPC being designated as a COC.
- Decision II: "Is sufficient information available to meet the closure objectives?" Sufficient information is defined to include:
    - Identifying the volume of COC impacted media bounded by analytical sample results in lateral and vertical directions, if a COC is present.
    - The information needed to characterize investigation-derived waste (IDW) for disposal.
    - The information needed to determine potential remediation waste types.
    - Identifying actions taken to eliminate exposure pathways.

The presence of a COC would require a corrective action. A corrective action may also be necessary if there is a potential for wastes that are present at a site to impose COCs into site environmental media if the wastes were to be released. To evaluate the potential for site wastes to result in the introduction of a COC to the surrounding environmental media, the following assumptions were made:

- Building 2201 containment would fail at some point, and the contents would be released to the surrounding media.
- The resulting concentration of contaminants in the surrounding media would be equal to the concentration of contaminants within Building 2201.
- Any liquid contaminant within Building 2201 exceeding the *Resource Conservation and Recovery Act* (RCRA) toxicity characteristic concentration would result in COCs in the surrounding media.

Waste solids containing a contaminant exceeding an equivalent FAL concentration would be considered to be potential source material and would require a corrective action. Liquids will be removed as part of the corrective action. Any remaining liquids with contaminant concentrations exceeding an equivalent toxicity characteristic action level would be considered to be potential source material and would require a corrective action.

Decision I samples will be submitted to analytical laboratories for the analyses listed in Table 3-1. The constituents reported for each analytical method are listed in Table 3-2.

Table 3-1
CAS 26-41-01 Analytical Program[a]

Analyses	Soil (if pathway exists)	Materials in containers/vaults[b]	Oil in leaded-glass windows	Hydraulic equipment oil	Filter material	Piping/tank insulation	Floor/ceiling tile	Roofing material
Organic Contaminants of Potential Concern (COPCs)								
Total Petroleum Hydrocarbons-Diesel-Range Organics	X	X						
Polychlorinated Biphenyls	X	X	X	X				
Semivolatile Organic Compounds	X	X	X	X				
Volatile Organic Compounds	X	X	X	X				
Inorganic COPCs								
Resource Conservation and Recovery Act Metals	X	X				X		
Total Beryllium	X	X			X			
Radionuclide COPCs								
Gamma Spectroscopy[c]	X	X	X	X	X	X	X	X
Isotopic Uranium	X	X	X	X	X	X	X	X
Isotopic Plutonium	X	X	X	X	X	X	X	X
Cesium-137 from Gamma	X	X	X	X	X	X	X	X
Niobium-94 from Gamma	X	X	X	X	X	X	X	X
Strontium-90	X	X	X	X	X	X	X	X

X = Required analytical method

[a]The contaminants of potential concern are the constituents reported from the analytical methods listed.
[b]Dependent on site conditions.
[c]Results of gamma analysis will be used to determine whether further radioanalytical analysis is warranted.

Table 3-2
Analytes Reported by Analytical Methods

VOCs		SVOCs	TPH	PCBs	Metals	Radionuclides
1,1,1-Trichloroethane 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethene cis-1,2-Dichloroethene 1,2-Dichloroethane 1,2-Dichloropropane 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,2-Dibromo-3-chloropropane 1,3,5-Trimethylbenzene 1,4-Dioxane 2-Butanone 2-Chlorotoluene 2-Hexanone 4-Methyl-2-pentanone Acetone Acetonitrile Allyl chloride Benzene Bromodichloromethane Bromoform Bromomethane Carbon disulfide Carbon tetrachloride Chlorobenzene Chloroethane Chloroform Chloromethane Chloroprene Dibromochloromethane Dichlorodifluoromethane Ethyl methacrylate Ethylbenzene Isobutyl alcohol Isopropylbenzene m-Dichlorobenzene (1,3) Methacrylonitrile Methyl methacrylate	Methylene chloride N-Butylbenzene N-Propylbenzene o-Dichlorobenzene (1,2) p-Dichlorobenzene (1,4) p-isopropyltoluene sec-Butylbenzene Styrene tert-Butylbenzene Tetrachloroethene Toluene Total Xylenes Trichloroethene Trichlorofluoromethane Vinyl acetate Vinyl chloride	2,3,4,6-Tetrachlorophenol 2,4-Dimethylphenol 2,4-Dinitrotoluene 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol 2-Chlorophenol 2-Methylnaphthalene 2-Methylphenol 2-Nitrophenol 3-Methylphenol[a] 4-Chloroaniline 4-Methylphenol[a] 4-Nitrophenol Acenaphthene Acenaphthylene Aniline Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Benzoic Acid Benzyl Alcohol Bis(2-ethylhexyl) phthalate Butyl benzyl phthalate Carbazole Chrysene Dibenzo(a,h)anthracene Dibenzofuran Diethyl Phthalate Dimethyl phthalate Di-n-butyl phthalate Di-n-octyl phthalate Fluoranthene Fluorene Hexachlorobenzene Hexachlorobutadiene[b] Hexachloroethane Indeno(1,2,3-cd)pyrene Naphthalene[b] Nitrobenzene N-Nitroso-di-n-propylamine Pentachlorophenol Phenanthrene Phenol Pyrene Pyridine	TPH (Diesel-Range Organics)	Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 Aroclor 1268	Arsenic Barium Beryllium Cadmium Chromium Lead Mercury Selenium Silver	Plutonium-238 Plutonium-239/240 Strontium-90 Uranium-234 Uranium-235 Uranium-238 **Gamma-emitting radionuclides** Actinium-228 Americium-241 Cobalt-60 Cesium-137 Europium-152 Europium-154 Europium-155 Lead-212 Lead-214 Niobium-94 Potassium-40 Thallium-208 Thorium-234 Uranium-235

[a]May be reported as 3,4-methylpenol
[b]May be reported with VOCs

PCB = Polychlorinated biphenyl
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound

The list of COPCs is intended to encompass all of the contaminants that could potentially be present at CAS 26-41-01. These COPCs were identified during the planning process through the review of site history, process knowledge, personal interviews, past investigation efforts (where available), inferred activities associated with the CAS, and preliminary site investigation sampling. Contaminants detected at other similar NTS sites were also included in the COPC list to reduce the uncertainty about potential contamination at CAS 26-41-01 because complete information regarding activities performed at CAU 117 is not available. A complete description of the COPCs for CAS 26-41-01 is given in Section 4.1.

During the review of site history documentation, process knowledge information, personal interviews, past investigation efforts, and inferred activities associated with the CAS, some of the COPCs were identified as targeted contaminants. Targeted contaminants are those COPCs for which evidence in the available site and process information suggests that they may be reasonably suspected to be present at a given CAS. The targeted contaminants are required to meet a more stringent completeness criteria than other COPCs, thus providing greater protection against a decision error. Targeted contaminants will be considered only for environmental samples (i.e., if a pathway to soil exists). If it is determined that a pathway to soil exists, targeted contaminants for CAS 26-41-01 soil samples will include polychlorinated biphenyls (PCBs) and radionuclides.

Decision II samples will be submitted for the analysis of all unbounded COCs. In addition, samples will be submitted for analyses as needed to support waste management or health and safety decisions.

The data quality indicators (DQIs) of precision, accuracy, representativeness, completeness, comparability, and sensitivity needed to satisfy DQO requirements are discussed in Section 7.2. Laboratory data will be assessed in the CR to confirm or refute the CSM and determine whether the DQO data needs were met.

To satisfy the DQI of sensitivity (presented in Section 7.2.6), the analytical methods must be sufficient to detect contamination that is present in the samples at concentrations equal to the corresponding FALs. Analytical methods for each CAU 117 COPC are provided in Tables 3-3 and 3-4. The minimum detectable concentration (MDC) is the lowest concentration of a chemical or radionuclide parameter that can be detected in a sample within an acceptable level of error. Due to changes in analytical methodology and changes in analytical laboratory contracts, information in Tables 3-3 and 3-4 that varies from corresponding information in the Quality Assurance Project Plan (QAPP) will supersede that information in the QAPP (NNSA/NV, 2002b).

3.2 Results of the DQO Analysis

3.2.1 Action Level Determination and Basis

The PALs presented in this section are to be used for site screening purposes. They are not necessarily intended to be used as cleanup action levels or FALs. However, they are useful in screening out contaminants that are not present in sufficient concentrations to warrant further evaluation, therefore streamlining the consideration of remedial alternatives. The risk-based corrective action (RBCA) process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006b). This process conforms with *Nevada Administrative Code* (NAC) Section 445A.227, which lists the requirements for sites with soil contamination (NAC, 2006c). For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006d) requires the use of the American Society for Testing and Materials (ASTM) Method E 1739-95 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

Table 3-3
Analytical Requirements for Radionuclides for CAU 117

Analysis[a]	Matrix	Analytical Method	Minimum Detectable Concentration (MDC)[b]	Laboratory Precision	Laboratory Accuracy (%R)
Gamma-Emitting Radionuclides					
Gamma Spectroscopy	Aqueous	EPA 901.1[c]	< Preliminary Action Levels	RPD 35%[d] ND[e] -2<ND[e]<2	Laboratory Control Sample 80-120%R
	Non-aqueous	HASL-300[f]			
Other Radionuclides					
Plutonium-238	All	HASL-300[f]	< Preliminary Action Levels	RPD 35%[d] ND[e] -2<ND[e]<2	Laboratory Control Sample 80-120%R Chemical Yield 30-105%R (not applicable for tritium and gross-alpha/beta) Matrix Spike Sample 61-140%R (tritium and gross alpha/beta only)
Plutonium-239/240	All	HASL-300[f]			
Strontium-90	All	HASL-300[f]			
Uranium-234	All	HASL-300[f]			
Uranium-235	All	HASL-300[f]			
Uranium-238	All	HASL-300[f]			

[a]Applicable constituents are listed in Table 3-2.
[b]The MDC is the lowest concentration of a radionuclide present in a sample and can be detected with a 95% confidence level.
[c]*Prescribed Procedures for Measurement of Radioactivity in Drinking Water (*EPA, 1980)
[d]*Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) with Guidance* (EPA, 2000)
[e]ND is not RPD; rather, it is another measure of precision used to evaluate duplicate analyses. The ND is calculated as the difference between two results divided by the square root of the sum of the squares of their total propagated uncertainties. *Evaluation of Radiochemical Data Usability* (Paar and Porterfield, 1997)
[f]*The Procedures Manual of the Environmental Measurements Laboratory*, HASL-300 (DOE, 1997)

EPA = U.S. Environmental Protection Agency
HASL = Health and Safety Laboratory
ND = Normalized difference
RPD = Relative percent difference
%R = Percent recovery

Table 3-4
Analytical Requirements for Chemical COPCs for CAU 117

Analysis[a]	Matrix	Analytical Method (SW-846)[b]	Minimum Detectable Concentration (MDC)[c]	Laboratory Precision	Laboratory Accuracy (%R)
ORGANICS					
Total Volatile Organic Compounds	All	8260B	< Preliminary Action Levels	Lab-specific[d]	Lab-specific[d]
Total Semivolatile Organic Compounds	All	8270C	< Preliminary Action Levels	Lab-specific[d]	Lab-specific[d]
Polychlorinated Biphenyls	All	8082	< Preliminary Action Levels	Lab-specific[d]	Lab-specific[d]
Total Petroleum Hydrocarbons-Diesel-Range Organics	All	8015B (modified)		Lab-specific[d]	Lab-specific[d]
INORGANICS					
Metals	All	6010B	< Preliminary Action Levels	RPD 35% (non-aqueous)[e] 20% (aqueous)[e] Absolute Difference[f] ±2x RL (non-aqueous)[f] ±1x RL (aqueous)[f]	Matrix Spike Sample 75-125%R[b] Laboratory Control Sample 80-120%R[f]
Mercury	Aqueous	7470A			
	Non-aqueous	7471A			

[a]Applicable constituents are listed in Table 3-2.
[b]*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) (EPA, 1996)
[c]The MDC is the lowest concentration that can be reliably achieved within specified limits of accuracy and precision.
[d]RPD and %R performance criteria are developed by the analytical laboratory according to approved procedures.
[e]*Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) with Guidance* (EPA, 2000)
[f]*USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b)

RL = Reporting limit
RPD = Relative percent difference
%R = Percent recovery

This RBCA process, summarized in Figure 3-1, defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- Tier 1 evaluation - sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., the PALs established in the SAFER). The FALs may then be established as the Tier 1 action levels, or the FALs may be calculated using a Tier 2 evaluation.

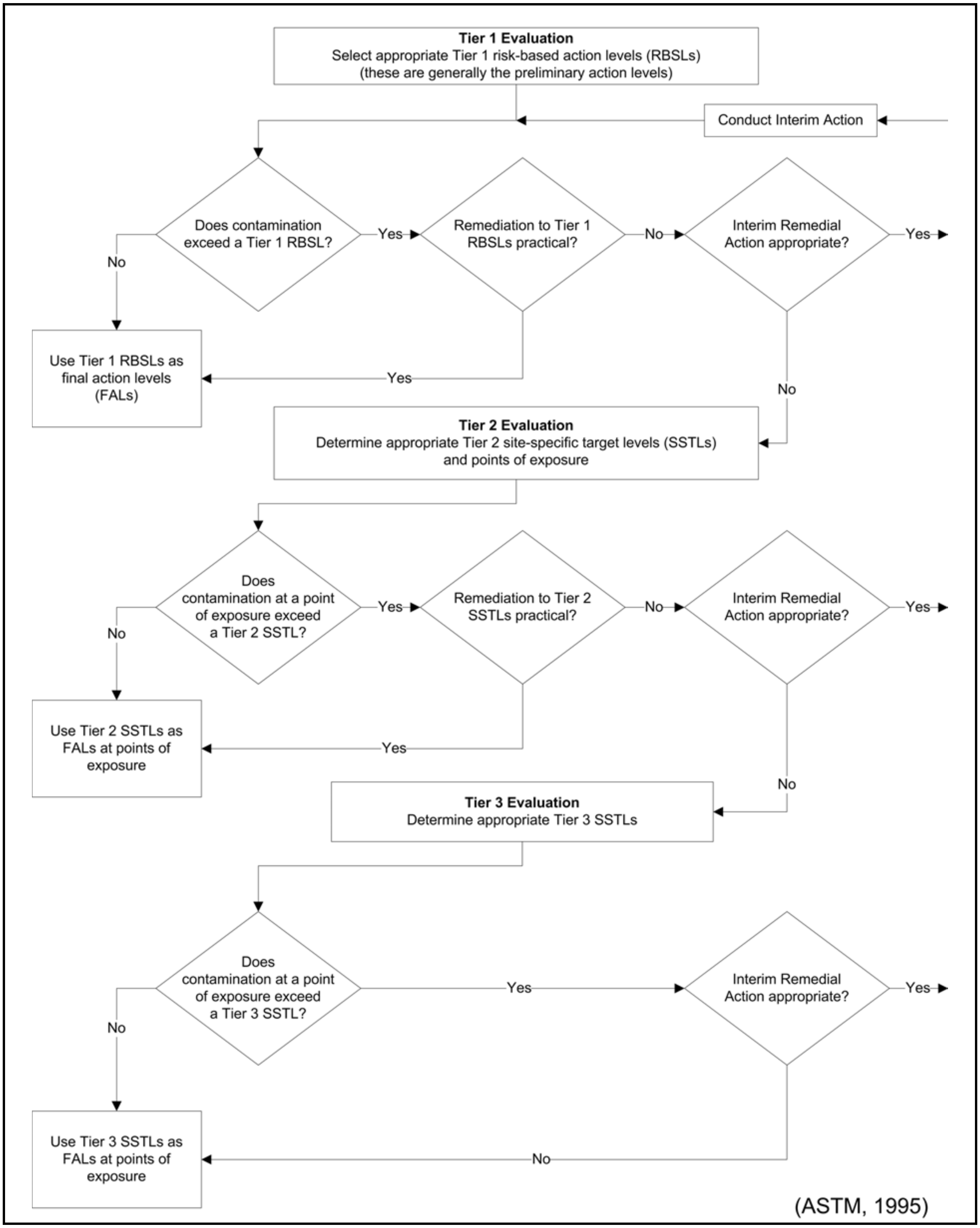

Figure 3-1
Risk-Based Corrective Action Decision Process

- Tier 2 evaluation - conducted by calculating Tier 2 site-specific target levels (SSTLs) using site-specific information as inputs to the same or similar methodology used to calculate Tier 1 action levels. The Tier 2 SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual chemicals of concern will be compared to the SSTLs.

- Tier 3 evaluation - conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E 1739-95 that consider site-, pathway-, and receptor-specific parameters.

Evaluation of DQO decisions will be based on conditions at the site following completion of any corrective actions. Any corrective actions conducted will be reported in the CR. The FALs (along with the basis for their selection) will be defined in the CR, where they will be compared to laboratory results in the evaluation of site closure.

3.2.1.1 Chemical PALs

Except as noted herein, the chemical PALs are defined as the U.S. Environmental Protection Agency (EPA) *Region 9 Risk-Based Preliminary Remediation Goals* (PRGs) for chemical contaminants in industrial soils (EPA, 2004a). Background concentrations for RCRA metals will be used instead of PRGs when natural background concentrations exceed the PRG, as is often the case with arsenic at the NTS. Background is considered the mean plus two standard deviations of the mean for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (formerly the Nellis Air Force Range) (NBMG, 1998; Moore, 1999). For detected chemical COPCs without established PRGs, the protocol used by the EPA Region 9 in establishing PRGs (or similar) will be used to establish PALs. If used, this process will be documented in the CR.

3.2.1.2 Total Petroleum Hydrocarbon PALs

The PAL for TPH is 100 parts per million (ppm) as listed in NAC 445A.2272 (NAC, 2006e).

3.2.1.3 Radionuclide PALs

The PALs for radiological contaminants (other than tritium) are based on the National Council on Radiation Protection and Measurement (NCRP) Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) using a 25 millirem per year (mrem/yr) dose constraint (Murphy, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993). These PALs are based on the construction, commercial, and industrial land-use scenario provided in the guidance and are appropriate for the NTS based on future land uses presented in Section B.2.2.6.

The PAL for tritium is based on the Underground Test Area (UGTA) Project limit of 400,000 picocuries per liter (pCi/L) for discharge of water containing tritium (NNSA/NV, 2002c). The activity of tritium in the soil moisture of soil samples will be reported in units of pCi/L for comparison to this PAL.

3.2.2 Hypothesis Test

The baseline condition (i.e., null hypothesis) and alternative condition are:

- Baseline condition – closure objectives have not been met
- Alternative condition – closure objectives have been met

Sufficient evidence to reject the null hypothesis is:

- The identification of the lateral and vertical extent of COC contamination (if present) in environmental media.
- Sufficient information to properly dispose of IDW and remediation waste.
- Sufficient information to properly identify and dispose of potential source material.

3.2.3 Statistical Model

A judgmental sampling design will be implemented to select sample locations and evaluate DQO decisions for CAS 26-41-01. This sampling design will assume the data are not normally distributed and the statistical test will be to compare results to fixed threshold values (i.e., FALs).

3.2.4 Design Description/Option

Because individual sample results, rather than an average concentration, will be used to compare to FALs at the CAS, statistical methods to generate site characteristics will not be used. Adequate representativeness of the entire target population may not be a requirement to developing a sampling design. If good prior information is available on the target site of interest, then the sampling may be designed to collect samples only from areas known to have the highest concentration levels on the target site. If the observed concentrations from these samples are below the action level, then a decision can be made that the site contains safe levels of the contaminant without the samples being truly representative of the entire area (EPA, 2006).

All sample locations will be selected to satisfy the DQI of representativeness in that samples collected from selected locations will best represent the populations of interest as defined in Section B.5.1. To meet this criterion for judgmentally sampled sites, a biased sampling strategy will be used for Decision I samples to target areas with the highest potential for contamination, if it is present anywhere in the CAS. Sample locations will be determined based on process knowledge, previously acquired data, or the field-screening and biasing factors listed in Section B.4.2.1. The Site Supervisor has the discretion to modify the judgmental sample locations, but only if the modified locations meet the decision needs and criteria stipulated in this DQO.

3.2.5 Conceptual Site Model and Drawing

The CSM describes the most probable scenario for current conditions at the site and defines the assumptions that are the basis for identifying the future land use, contaminant sources, release mechanisms, migration pathways, exposure points, and exposure routes. The CSM is also used to support appropriate sampling strategies and data collection methods. The CSM has been developed for CAU 117 using information from the physical setting, potential contaminant sources, release information, historical background information, knowledge from similar sites, and physical and chemical properties of the potentially affected media and COPCs. Figure 3-2 depicts a tabular representation of the conceptual pathways to receptors from CAU 117 sources. Figure 3-3 depicts a graphical representation of the CSM. If evidence of contamination that is not consistent with the presented CSM is identified during investigation activities, the situation will be reviewed, the CSM will be revised, the DQOs will be reassessed, and a recommendation will be made as to how best to proceed. In such cases, participants in the DQO process will be notified and given the opportunity to comment on and/or concur with the recommendation. A detailed discussion of the CSM is presented in Appendix B.

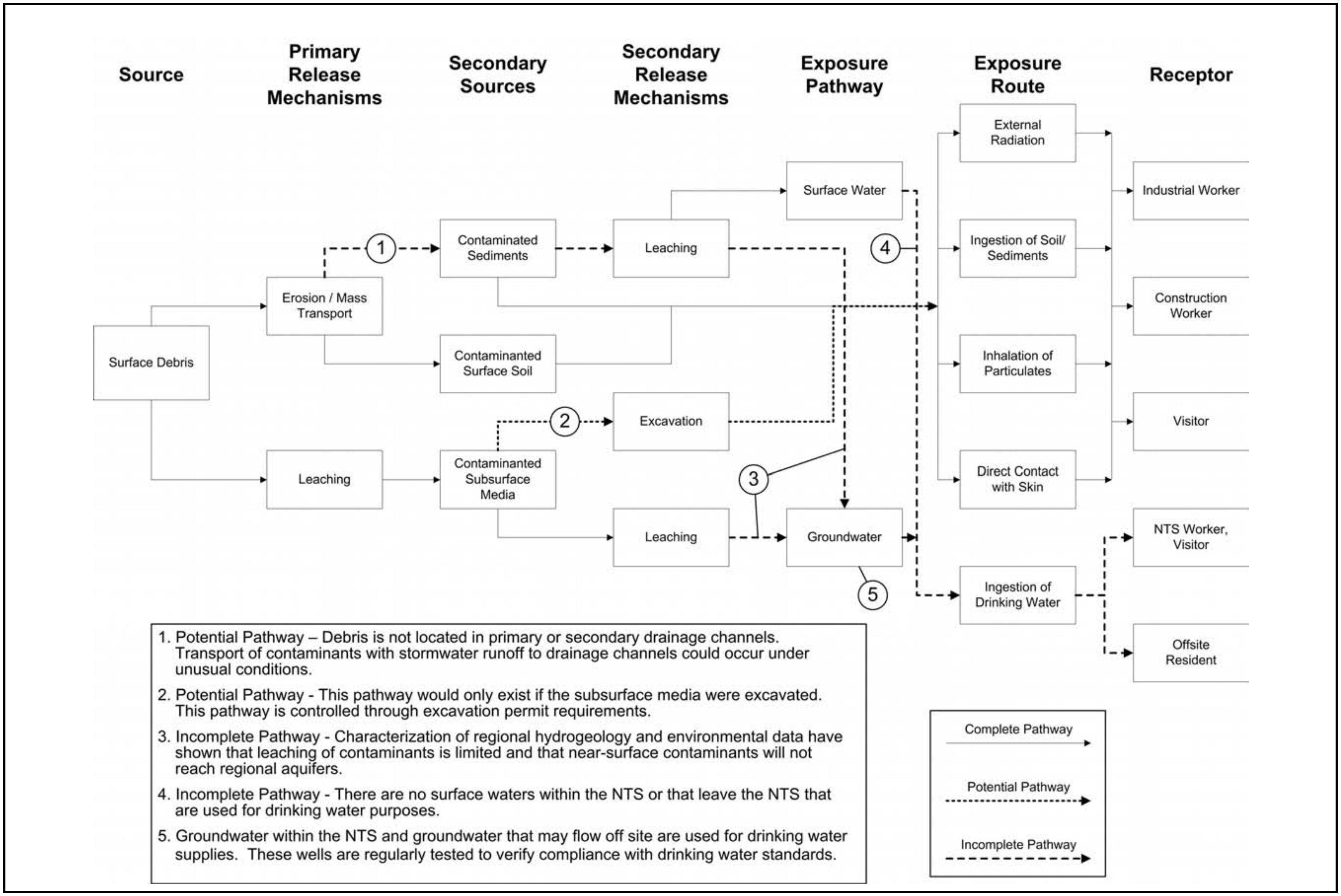

Figure 3-2
Conceptual Site Model Diagram

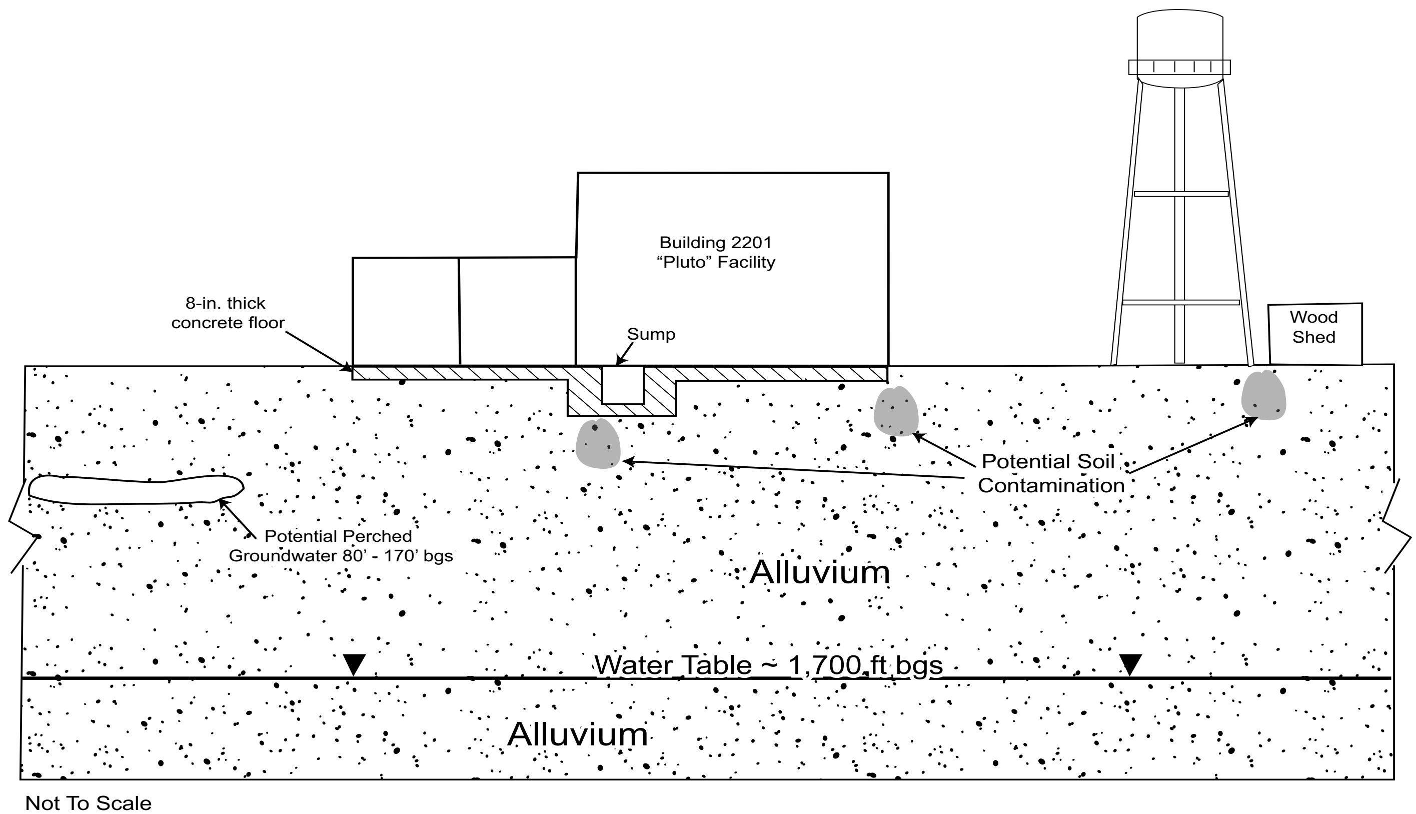

Figure 3-3
Corrective Action Unit 117 Conceptual Site Model

4.0 Field Activities and Closure Objectives

This section of the SAFER plan provides a description of the field activities and closure objectives for CAU 117. The objectives for the field activities are to determine whether COCs exist in environmental media or potential source material. If remediation is determined to be feasible, then the extent of COCs will be determined so that a closure alternative may be implemented. All sampling activities will be conducted in compliance with the Industrial Sites QAPP (NNSA/NV, 2002b) and other applicable, approved procedures and instructions.

4.1 Contaminants of Potential Concern

The COPCs for CAU 117 are defined as the list of constituents represented by the analytical methods identified in Table 3-1 for Decision I samples taken at CAS 26-41-01. The constituents reported for each analytical method are listed in Table 3-2.

The list of COPCs is intended to encompass all of the contaminants that could potentially be present at CAS 26-41-01. These COPCs were identified during the planning process through the review of site history, process knowledge, personal interviews, past investigation efforts, preliminary site investigation sampling, and inferred activities associated with the CAS. Because complete information regarding activities performed at CAU 117 is not available, contaminants detected at similar NTS sites were included in the COPC list to reduce the uncertainty about potential contamination at CAS 26-41-01. The list of COPCs includes:

- Radionuclides
- Polychlorinated biphenyls
- RCRA metals
- Beryllium
- Total petroleum hydrocarbons
- Volatile and semivolatile organic compounds

During the review of site history documentation, process knowledge information, personal interviews, past investigation efforts, and inferred activities associated with the CAS, some of the COPCs were identified as targeted contaminants at CAS 26-41-01. Targeted contaminants are those COPCs for which evidence in the available site and process information suggests that they may be reasonably suspected to be present at a given CAS. The targeted contaminants are required to meet a more stringent completeness criteria than other COPCs thus providing greater protection against a decision error. Targeted contaminants for CAS 26-41-01 are discussed in Section 3.1.

4.1.1 Radionuclides

Samples taken during the preliminary site investigation were analyzed for the radionuclides identified in Table 3-1. Detected radionuclide contaminants from media and smear samples from Building 2201 are summarized in Tables 2-4 and 2-5. Results from radiological surveys (shown in Table 2-6) indicate radiological contamination may be primarily found in isolated spots on the walls and floors of the hot cell rooms where reactor disassembly and fuel repackaging operations took place.

4.1.2 Polychlorinated Biphenyls

Based on results from smear samples taken during the preliminary site investigation, it is anticipated that oils from hydraulic equipment in Building 2201 may contain PCBs (see Table 2-5). If present, it is expected that oils from a building hydraulic equipment reservoir would also contain PCBs. As of the date this SAFER was published, a Building 2201 hydraulic equipment reservoir had not yet been identified. Based upon historical knowledge from similar facilities, it is also possible that many of the paints and coatings in Building 2201 contain PCBs. Paints, coatings, plastics, etc., will be evaluated for PCBs as being a potential source material.

4.1.3 RCRA Metals

Resource Conservation and Recovery Act metals exist in Building 2201 as potential source material. Lead components identified within the building include lead shielding bricks, bagged shot, and the leaded observation windows. Lead was also identified in "radiation-resistant" paint used on the walls and floors of Building 2201 and in oil samples taken during the preliminary site investigation. Mercury can be found throughout Building 2201 in mercury vapor light bulbs, thermostats, and switches. Based upon historical knowledge from similar facilities, pipe systems will be evaluated for cadmium foil wrapping as being a potential source material.

Surveys taken during the preliminary site investigation also showed elevated levels of lead on surfaces throughout Building 2201. If it becomes airborne, this lead may present an inhalation hazard for workers during remediation activities, though it is not expected to impact the characterization of demolition wastes from Building 2201.

4.1.4 Beryllium

Fuel elements containing a mixture of highly enriched uranium dioxide and beryllium oxide were handled in Building 2201 as part of Project Pluto and the subsequent fuel repackaging operations. However, surface surveys taken during the preliminary site investigation indicate beryllium levels within Building 2201 are below the public release level of 0.2 $\mu g/100cm^2$. Beryllium surface contamination is not expected to impact waste characterization during remediation or demolition of Building 2201. Because CAU 117 is listed as a beryllium legacy site, workers will be required to wear appropriate personal protective equipment (PPE) during remediation activities.

4.1.5 Total Petroleum Hydrocarbons

Total petroleum hydrocarbons are primarily associated with oils and greases required to operate equipment such as that found in Building 2201.

4.1.6 Volatile and Semivolatile Organic Compounds

Freon gas/liquids may be found in the Building 2201 HVAC system.

4.2 Remediation

The DQOs developed for CAU 117 identified data gaps that require additional data collection before identifying and implementing the preferred closure alternative for the CAS. A decision point approach, based on the DQOs, for making remediation decisions is summarized in Figure 1-3. The presence of contamination, if any, is assumed to be confined to the spatial boundaries of the sites as defined in the DQO process and CSM.

The CAU 117 site investigation strategy consists of characterizing wastes that will be removed during SAFER activities and future demolition waste. To determine whether COCs are present at the site, samples will be taken from the soil, if it is determined that a pathway to soil exists, and potential source material within Building 2201 and/or the wooden shed will be investigated to define the nature and extent of potential contaminants as they are identified. Future demolition waste will also be characterized for waste disposal purposes, as it is identified.

If COCs or potential source materials that could cause COCs in environmental media are identified within the CAS based on the initial investigation results, they will be further assessed before implementing closure activities. If upon completion of removal activities COPCs are not found to be present at concentrations exceeding FALs, the CAS will be recommended for no further action. The objective of the initial investigation strategy is to determine whether COCs or potential source materials are present. Laboratory analytical results will be used to confirm the presence or absence of COCs and to identify potential contaminants from potential source material.

If COCs are present within environmental media, or it is decided that COCs may be present based on the presence of biasing factors, a corrective action of removal for disposal may be implemented and additional verification samples taken from biased locations within the excavation. If potential source material is determined to be present within the CAS, that material must be removed from the site before closure.

The judgmental sampling strategy is presented in Appendix B. Predetermined biased sample locations may be justified by the Site Supervisor, based on the criteria for satisfying DQO data needs listed in Appendix B. Additional samples may be collected for waste management characterization and disposal purposes.

The closure strategy for CAU 117 under this SAFER process consists of the following stages, discussed in further detail in the sections below:

- Preparing the site
- Sampling for potential COCs and potential source material
- Characterizing and removing readily removable wastes
- Estimating and characterizing future demolition wastes, and documenting conditions within Building 2201

Concurrent with these activities, an appropriate final closure strategy (i.e., clean closure versus closure in place with appropriate use restrictions) will be determined.

4.2.1 Site Preparation

Site preparation activities will take place before remedial activities to mitigate existing hazardous conditions and provide a safe and efficient work environment within Building 2201. As of the date this SAFER was published, most site preparation activities have been completed. Samples of various media, surface swipes, and radiological and beryllium survey data were collected in May and June 2007 as part of the CAU 117 preliminary site investigation. A description of general preliminary investigation activities is given in Section 2.3.5. Tables 2-4, 2-5, and 2-6 present sample and survey results. A detailed inventory of material and debris stored in Building 2201 was also completed during the preliminary site investigation phase. Hantavirus cleanup was completed before preliminary investigation sampling and will be performed as necessary during planned remediation activities.

4.2.2 Sampling for COCs

Potential pathways to environmental media will be determined by reviewing engineering drawings, performing a visual inspection and examining any cracks in the Building 2201 foundation, and verifying that the Building 2201 drainage systems were covered under previous CASs. Containment within the wooden shed will be similarly evaluated. Soil samples will be collected from areas adjacent to or beneath Building 2201 and/or the wooden shed if it is determined that a pathway to the surrounding soil exists. No past contaminant releases to the environment are expected.

Potential source material within Building 2201 and the wooden shed will also be investigated during this phase to determine the potential for a future release of a COC to environmental media (Decision I). Data from the preliminary site investigation may be used in part to define the nature and extent of potential contamination from potential source material. Detailed information on the sampling plan is outlined in Section B.8.3.

4.2.3 Removal of Readily Removable Wastes

Readily removable wastes are defined as those wastes for which removal is practical, beneficial, and can be removed from the site without the need for special equipment. The purpose of this phase is to remove waste that cannot be included with demolition waste from Building 2201 (i.e., it cannot be disposed of at a sanitary landfill). During this phase, identified potential source material and readily removable material will be removed from Building 2201 and the wooden shed. Materials removed from Building 2201 during SAFER activities will be surveyed for radiological contamination as necessary for waste characterization purposes.

4.2.3.1 Oils and Fluids

Before building demolition, all equipment (e.g., hydraulic cranes, robotic arms), a building hydraulic oil reservoir (if present), and the building HVAC system will be drained of lubricants/fluids to the extent practical. The six 6-ft-thick leaded-glass windows between the hot cells and operating/control room areas in Building 2201 will be drained of mineral oil (see also Section 4.2.3.5). Drain lines exiting Building 2201 will be tapped and drained. The pipe section ends will be separated, plugged, and sealed (i.e., crimped, grouted) to prevent a potential future release of contamination. Oils and fluids/sludges removed from the site will be characterized as necessary for waste characterization purposes. Fluids found to contain PCBs will be disposed of as described in Section 6.2.

4.2.3.2 Unidentified Materials in Containers

Several waste drums, containers, and fuel canisters stored in Building 2201 and drums stored in the wooden shed contain unknown contents. The contents of these drums and containers will be investigated appropriately to identify the contents and determine proper disposal options.

4.2.3.3 Potential Source Material in Vaults

Building 2201 contains four floor vaults located in Rooms 104, 106, and 107. Following decontamination activities in 1972, the vaults were marked as “Internally Contaminated” and instructions were given to contact “Rad/Safe” upon opening. As of the date of this SAFER, the vaults could not be opened and consequently were not sampled during the 2007 preliminary site investigation.

During SAFER activities, historical documentation will continue to be researched for additional information regarding the identity of vault contents. Any information found will be evaluated along with site conditions to aid in determining whether the vaults can be safely accessed for investigation. If a determination is made that the vaults cannot be accessed, they will be assumed to be contaminated (i.e., that radionuclides are present above FALs) and they will be closed in place.

Should this pathway for closure be selected (with concurrence from NNSA/NSO and NDEP), risk assessment information will be provided in the CR.

4.2.3.4 RCRA Hazardous Waste

Several items and components containing lead and/or mercury have been identified within Building 2201. Items and components that can be identified as RCRA hazardous waste when generated and can be readily removed will be radiologically surveyed, removed, managed, or disposed of as described in Section 6.2. Items found to contain RCRA metals are described in Section 4.1.3.

4.2.3.5 Observation Windows

A total of five leaded-glass windows between the hot cells and operating/control room areas in Building 2201 were used to view operations in the hot cells. These windows are 4 ft thick and contain layers of leaded glass immersed in mineral oil. Lead shot used as shielding was placed between the frame and walls (Figure 4-1).

Significant process knowledge from remediation activities at similar CAUs is available regarding removal of oil-filled shielding windows (e.g., CAU 113, the R-MAD building, in which 18 oil-filled, leaded-glass observation windows similar to those in Building 2201 were removed). Such process knowledge will be applied in determining the need to remove the windows in Building 2201.

4.2.3.6 Filters

Pre-filters and plenum filters for the Building 2201 HVAC and intake systems will be removed with other readily removable wastes. The filters are enclosed in frame assemblies. Intake filters were used to circulate air into Building 2201 rooms. Exhaust filters were used to filter air before it was exhausted through the main stack in Room 103 (Figure 4-2).

Figure 4-1
Observation Window (Leaded Glass) in Room 105 (July 2007)

Figure 4-2
Filter Plenum in Room 107 (July 2007)

4.2.3.7 Equipment

Readily removable equipment in Building 2201 used during facility operations (i.e, floor-mounted, wall-mounted, or loose equipment) may be removed during this phase of SAFER activities. Mounted equipment will be unbolted or cut from mountings, as appropriate. Removed equipment will be moved to a staging area and surveyed for radiological contamination before release. Removed equipment that can be free-released will be sent to the NTS 10c Industrial Waste Landfill for disposal. Radiologically impacted equipment will either be decontaminated and disposed of in the NTS 10c landfill or disposed of as LLW as described in Section 6.2. Criteria for release will follow Table 4-2 of the NV/YMP RadCon Manual (NNSA/NSO, 2004c), which is reproduced as Table 4-1 in this document.

Table 4-1
Allowable Total Residual Surface Contamination Values in dpm/100 cm^2 (Note 1)
(from DOE 5400.05)
(Page 1 of 2)

Radionuclide (See Note 2)	**Removable (See Note 3)**	**Average (Fixed and Removable) (See Note 4)**	**Maximum Allowable (Fixed and Removable) (See Note 5)**
Transuranics, ^{125}I, ^{129}I, ^{226}Ra, ^{227}Ac, ^{228}Ra, ^{228}Th, ^{230}Th, ^{231}Pa,	20	100	300
Th-nat, ^{90}Sr, ^{126}I, ^{131}I, ^{133}I, ^{223}Ra, ^{224}Ra, ^{232}U, ^{232}Th,	200	1,000	3,000
U-natural, ^{235}U, ^{238}U and associated decay products, alpha emitters	1,000 a	5,000 a	15,000 a
ß+? emitters (radionuclides with decay modes other than a-emission or spontaneous fission) except ^{90}Sr and others noted above. **(See Note 6)**	1,000 ß+?	5,000 ß+?	15,000 ß+?

Table 4-1
Allowable Total Residual Surface Contamination Values in dpm/100 cm² (Note 1)
(from DOE 5400.05)
(Page 2 of 2)

Radionuclide (See Note 2)	Removable (See Note 3)	Average (Fixed and Removable) (See Note 4)	Maximum Allowable (Fixed and Removable) (See Note 5)

Source: NNSA/NSO, 2004c

Table 4-1 Notes:
1. Disintegrations per minute means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
2. Where surface contamination by both alpha- and beta/gamma-emitting radionuclides exist, the limits established for alpha- and beta/gamma-emitting radionuclides apply independently.
3. The amount of removable material per 100 cm^2 of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency.

   When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.
4. Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.
5. The maximum contamination level applies to an area of not more than 100 cm^2.
6. This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

Ac = Actinium
cm^2 = Square centimeter
dpm/100cm^2 = Disintegrations per minute per square 100 centimeters
I = Iodine
m^2 = Square meter
Pa = Protactinium
Ra = Radium
Sr = Strontium
Th = Thorium
U = Uranium
ß = Beta

4.2.4 Estimate Future Demolition Waste

Following activities outlined in this SAFER, sufficient information should be available to estimate whether debris from the demolition of Building 2201 may be disposed of as sanitary waste, the volume of waste that will be produced by demolition, and costs for disposing of the debris. If necessary, further investigation of Building 2201 media to determine the nature and extent of contamination, or radiological surveys/smears will be collected before completion of SAFER activities.

4.3 Verification

The information necessary to satisfy the closure criteria will be generated for CAS 26-41-01 by collecting and analyzing samples generated during a field investigation. If a COC is present in environmental media and removal of the COC is feasible, verification sampling of remaining environmental media will be required. The verification samples will be collected from the approximate center of the bottom of the excavation below the stained area and at lateral boundaries. The final locations and numbers of verification samples to be collected will be determined in the field based on the presence of any biasing factors as listed in Section B.4.2.1, the size of the excavation, site conditions, and the professional judgment of the Site Supervisor. All verification sample locations must meet the DQO decision needs and criteria stipulated in Appendix B. The number and location of verification samples will be justified in the CR.

If a COC is present in environmental media and removal of the COC is not feasible, information on the extent of COC contamination will be obtained by collecting step-out (Decision II) samples. Decision II sampling will consist of further defining the extent of contamination where COCs have been confirmed. Step-out (Decision II) sampling locations at the CAS will be selected based on the CSM, biasing factors, field-screening results, existing data, and the outer boundary sample locations where COCs were detected. In general, step-out sample locations will be arranged in a triangular pattern around areas containing a COC at distances based on site conditions, COC concentrations, process knowledge, and other biasing factors. If COCs extend beyond step-out locations, additional Decision II samples will be collected from locations further from the source. If a spatial boundary is reached, the CSM is shown to be inadequate, or the Site Supervisor determines that extent sampling needs to be re-evaluated, work will be temporarily suspended, NDEP will be notified, and the investigation strategy will be re-evaluated.

The closure objectives will have been met and the CAS will be proposed for closure if the following conditions are true:

- A COC is not present at the CAS, or a COC is present and the extent of each COC has been defined.
- Information is sufficient to characterize remediation waste and IDW for disposal.

Because this SAFER plan only addresses contamination originating from the CAU, it may be necessary to distinguish overlapping contamination originating from other sources. For example, widespread surface radiological contamination originating from atmospheric tests will not be addressed in the CAU 117 investigation. If necessary, soil samples may be collected from background locations at the CAS to determine whether contamination is from the CAU or other sources.

Modifications to the investigation strategy may be required should unexpected field conditions be encountered at the CAS. Significant modifications shall be justified and documented in a Record of Technical Change before implementation. If an unexpected condition indicates conditions are significantly different than the corresponding CSM, the activity will be rescoped and the decision makers will be notified. Field activities at CAU 117 include site preparation, sample location selection, sample collection activities, waste characterization, photodocumentation, and collection of geo-coordinates.

4.4 Actions To Achieve Closure

The following activities, at a minimum, have been identified for closure of this CAS. The decision logic behind the activities is provided in Figure 1-3:

- If no COCs or potential source material remain after SAFER activities, a corrective action alternative of no further action will be selected.
- If potential source material is present on site, a corrective action is required.
- If COCs or potential source material is present and removal is not feasible, closure in place will be the preferred corrective action alternative. The appropriate use restrictions will be implemented and documented in the SAFER CR.
- If COCs or potential source material is present and removal is feasible, clean closure will be the preferred corrective action alternative. The material to be remediated will be removed and disposed as waste, and verification samples will be collected from environmental and building media, as necessary. Verification analytical results will be documented in the SAFER CR.

Following completion of remediation and waste management activities, the following actions will be implemented before site closure:

- Removal of all equipment, wastes, debris, materials, signage and fencing associated with the CAI.
- Grading of site to pre-investigation condition, as necessary (unless changed condition is necessary under a corrective action).
- Inspection of site and certification that restoration activities have been completed.

Decommissioning activities may conclude with demolition of Building 2201. Demolition is completed outside the FFACO process. Performance of BMPs will result in safe interim configuration for the facility. The project schedule is based upon the assumption that the funding required to complete the scope of work is available for the project.

4.5 Duration

The following is a tentative duration (in calendar days) for SAFER field activities (Table 4-2):

Table 4-2
SAFER Field Activities

Duration (days)	Activity
14	Site Preparation
60	Sampling for Potential Contaminants of Concern and Potential Source Material
120	Characterization and Removal of Readily Removable Wastes
20	Estimate Future Demolition Wastes

5.0 Reports and Records Availability

Reports generated during ongoing field activities will be provided to NDEP upon request. Historic information and documents referenced in this plan are retained in the NNSA/NSO project files in Las Vegas, Nevada, and can be obtained through written request to the NNSA/NSO Federal Sub-Project Director. This document is available in the DOE public reading rooms located in Las Vegas and Carson City, Nevada, or by contacting the appropriate DOE manager. The NDEP maintains the official Administrative Record for all activities conducted under the auspices of the FFACO.

6.0 Investigation/Remediation Waste Management

Management of IDW will be based on regulatory requirements, field observations, process knowledge, and laboratory results from CAU 117 investigation samples.

Disposable sampling equipment, PPE, and rinsate are considered potentially contaminated waste only by virtue of contact with potentially contaminated media (e.g., soil) or potentially contaminated debris (e.g., construction materials). Therefore, sampling and analysis of IDW, separate from analyses of site investigation samples, may not be necessary for all IDW. However, if associated investigation samples are found to contain contaminants above regulatory levels, conservative estimates of total waste contaminant concentrations may be made based on the mass of the waste, the amount of contaminated media contained in the waste, and the maximum concentration of contamination found in the media. Direct samples of IDW may also be taken to support waste characterization.

Sanitary, hazardous, radioactive, and/or mixed waste, if generated, will be managed and disposed of in accordance with applicable DOE orders, U.S. Department of Transportation (DOT) regulations, state and federal waste regulations, and agreements and permits between DOE and NDEP. Materials left in place are not considered to be generated and are not subject to RCRA or the requirements of the sections below.

6.1 Waste Minimization

Investigation activities are planned to minimize IDW generation. This will be accomplished by incorporating the use of process knowledge, visual examination, and/or radiological survey and swipe results. When possible, disturbed media (such as soil removed during trenching) or debris will be returned to its original location. Contained media (e.g., soil managed as waste) as well as other IDW will be segregated to the greatest extent possible to minimize generation of hazardous, radioactive, or mixed waste. Hazardous material used at the sites will be controlled in order to limit unnecessary generation of hazardous or mixed waste. Administrative controls, including decontamination procedures and waste characterization strategies, will minimize waste generated during investigations.

6.2 Potential Waste Streams

Waste generated during the corrective action activities may include the following potential waste streams:

- Sanitary waste
- Low-level waste
- Hazardous waste
- Hydrocarbon waste
- Mixed low-level waste
- *Toxic Substances Control Act* (TSCA) waste: PCBs, asbestos

For commonly disposed items such as fluorescent and incandescent light bulbs, process knowledge may be used for waste designation/disposal. No sampling for hazardous waste constituents (such as RCRA constituents) is required, although radiological surveys may be required to determine whether the waste meets the regulatory requirements for LLW.

The onsite management and ultimate disposition of wastes will be established based on a determination of the waste type (e.g., sanitary, low-level, hazardous, hydrocarbon, mixed), or the combination of waste types. A determination of the waste type will be guided by several factors, including, but not limited to: the analytical results of samples either directly or indirectly associated with the waste, historical site knowledge, knowledge of the waste generation process, field observations, field-monitoring/screening results, and/or radiological survey/swipe results.

Table 4-2 of the NV/YMP RadCon Manual (NNSA/NSO, 2004c) shall be used to determine whether such materials may be free-released. Onsite IDW management requirements by waste type are detailed in the following sections. Applicable waste management regulations and requirements are listed in Table 6-1.

6.2.1 Sanitary Waste

Sanitary IDW generated at the CAS will be collected, managed, and disposed of in accordance with the sanitary waste management regulations and the permits for operation of the NTS 10c Industrial Waste Landfill.

Table 6-1
Waste Management Regulations and Requirements

Waste Type	Federal Regulation	Additional Requirements
Solid (nonhazardous)	N/A	NRS[a] 444.440 - 444.620 NAC[b] 444.570 - 444.7499 NTS Landfill Permit SW13.097.04[c] NTS Landfill Permit SW13.097.03[d]
Liquid/Rinsate (nonhazardous)	N/A	Water Pollution Control General Permit GNEV93001, Rev. 3iii[e]
Hazardous	RCRA[f], 40 CFR 260-282	NRS[a] 459.400 - 459.600 NAC[b] 444.850 - 444.8746 POC[g]
Low-Level Radioactive	N/A	DOE Orders and NTSWAC[h]
Mixed	RCRA[f], 40 CFR 260-282	NTSWAC[h] POC[g]
Hydrocarbon	N/A	NTS Landfill Permit SW13.097.02[i] NAC 445A.2272
Polychlorinated Biphenyls	TSCA[j], 40 CFR 761	NRS[a] 459.400 - 459.600 NAC[b] 444.940 - 444.9555
Asbestos	TSCA[j], 40 CFR 763	NRS[a] 618.750-618.840 NAC[b] 444.965-444.976

[a]*Nevada Revised Statutes* (NRS, 2005a, b, c)
[b]*Nevada Administrative Code* (NAC, 2006a and e)
[c]Area 23 Class II Solid Waste Disposal Site (NDEP, 2006a)
[d]Area 9 Class III Solid Waste Disposal Site (NDEP, 2006c)
[e]Nevada Test Site Sewage Lagoons (NDEP, 2005)
[f]*Resource Conservation and Recovery Act* (CFR, 2006a)
[g]*Nevada Test Site Performance Objective for the Certification of Nonradioactive Hazardous Waste* (BN, 1995)
[h]*Nevada Test Site Waste Acceptance Criteria,* Rev. 6-02 (NNSA/NSO, 2006c)
[i]Area 6 Class III Solid Waste Disposal Site for hydrocarbon waste (NDEP, 2006b)
[j]*Toxic Substance Control Act* (CFR, 2006b and c)

CFR = *Code of Federal Regulations*
DOE = U.S. Department of Energy
N/A = Not applicable
NAC = *Nevada Administrative Code*
NDEP = Nevada Division of Environmental Protection
NRS = *Nevada Revised Statutes*
NTS = Nevada Test Site
NTSWAC = *Nevada Test Site Waste Acceptance Criteria*
POC = Performance Objective for the Certification of Nonradioactive Hazardous Waste
RCRA = *Resource Conservation and Recovery Act*
TSCA = *Toxic Substance Control Act*

6.2.2 Low-Level Radioactive Waste

Low-level waste generated at CAU 117 will be packaged and managed in accordance with all applicable federal, state, and NTS requirements. Low-level waste may be generated as a result of operations in areas where radioactive materials are or were formerly managed. Low-level waste forms expected at CAU 117 include debris, tools, and equipment.

Non-hazardous solid waste that exceeds the permissible radiological surface and mass concentration for the NTS 10c Industrial Waste Landfill Permit will be managed as LLW. Radiological swipe surveys and/or direct-scan surveys may be conducted on reusable sampling equipment and the PPE and disposable sampling equipment waste streams exiting a radiologically controlled area (RCA). This allows for the immediate segregation of radioactive waste from waste that may be unrestricted regarding radiological release. Removable contamination limits, as defined in Table 4-2 of the current version of the NV/YMP RadCon Manual (NNSA/NSO, 2004c), will be used to determine whether such waste may be declared unrestricted regarding radiological release versus being declared radioactive waste. Direct sampling of the waste may be conducted to aid in determining whether a particular waste unit (e.g., drum of soil) contains LLW, as necessary. Waste that is determined to be below the values of Table 4-2, by either direct radiological survey/swipe results or through process knowledge, will not be managed as potential radioactive waste but will be managed in accordance with the appropriate section of this document. Wastes in excess of Table 4-2 values will be managed as potential radioactive waste and will be managed in accordance with this section and any other applicable sections of this document. Refer to Table 4-2 from NV/YMP RadCon Manual (in Section 4.2.3.7)

Low-level radioactive waste, if generated, will be managed in accordance with the contractor-specific waste certification program plan, DOE orders, and the requirements of the current version of the *Nevada Test Site Waste Acceptance Criteria* (NTSWAC) (NNSA/NSO, 2006c). Potential radioactive waste drums containing soil, PPE, disposable sampling equipment, and/or rinsate may be staged at a designated radioactive material area (RMA) when full or at the end of an investigation phase. The waste drums will remain at the RMA pending certification and disposal under NTSWAC requirements (NNSA/NSO, 2006c).

6.2.3 Hazardous Waste

Resource Conservation and Recovery Act waste contains hazardous constituents or exhibits hazardous characteristics as defined by RCRA and the State of Nevada Hazardous Waste Regulations (Table 6-1). Items with the potential of being RCRA-regulated hazardous waste were identified during the site confirmation phase in May and June 2007. These items include mercury-vapor lamps, mercury switches, lead bricks, cadmium-foil-wrapped piping, and similar items. The RCRA waste is routinely shipped to offsite commercial facilities for treatment and/or disposal. Hazardous materials will be removed from Building 2201 before future demolition.

The CAU will have waste accumulation areas established according to the needs of the project. Satellite accumulation areas (SAAs) and hazardous waste accumulation areas (HWAAs) will be managed consistent with the requirements of federal and state regulations (CFR, 2006a; NAC, 2006b). The HWAAs will be properly controlled for access, and will be equipped with spill kits and appropriate spill containment. Suspected hazardous wastes will be placed in DOT-compliant containers. All containerized hazardous waste will be handled, inspected, and managed in accordance with Title 40 *Code of Federal Regulations* (CFR) 265 Subpart I (CFR, 2006a). The HWAAs will be covered under a site-specific emergency response and contingency action plan until such time that the waste is determined to be nonhazardous or all containers of hazardous waste have been removed from the storage area. Hazardous waste will be characterized in accordance with the requirement of Title 40 CFR 261. *Resource Conservation and Recovery Act*-listed waste has not been identified. Any waste determined to be hazardous will be managed and transported in accordance with RCRA and DOT requirements to a permitted treatment, storage, and disposal facility (CFR, 2006a).

6.2.4 Hydrocarbon Waste

Hydrocarbon soil waste containing more than 100 milligrams per kilogram of TPH will be managed on site in a drum or other appropriate container until fully characterized. Hydrocarbon waste may be disposed of at a designated hydrocarbon landfill (NDEP, 2006b), an appropriate hydrocarbon waste management facility (e.g., recycling facility), or other method in accordance with Nevada regulations.

6.2.5 Mixed Low-Level Waste

Mixed waste, if generated, shall be managed and dispositioned according to the requirements of RCRA (CFR, 2006a) or subject to agreements between NNSA/NSO and the State of Nevada, as well as DOE requirements for radioactive waste.

6.2.6 TSCA Waste

Wastes governed by TSCA (USC, 1976) include PCB waste (solid or liquid) and asbestos.

6.2.6.1 Polychlorinated Biphenyls

The management of PCBs is governed by TSCA and its implementing regulations at 40 CFR 761 (CFR, 2006b). Polychlorinated biphenyl contamination may be found as a sole contaminant or in combination with any of the types of waste discussed in this document. For example, PCBs may be a co-contaminant in soil that contains a RCRA “characteristic” waste (PCB/hazardous waste), or in soil that contains radioactive wastes (PCB/radioactive waste), or even in mixed waste (PCB/radioactive/hazardous waste). The IDW will initially be evaluated using analytical results for media samples from the investigation. If any type of PCB waste is generated, it will be managed according to 40 CFR 761 (CFR, 2006b) as well as State of Nevada requirements, (NAC, 2006a) guidance, and agreements with NNSA/NSO. Polychlorinated biphenyls are suspected to be found in equipment oils at the CAS. Hydraulic oils containing PCBs will be managed as PCB liquids.

6.2.6.2 Asbestos-Containing Material

Asbestos-containing material (ACM) has been identified in Building 2201. Piping insulation on the exterior north and east walls are marked “Asbestos,” and it is suspected that insulation surrounding a tank in Room 4 is also asbestos. In addition, floor and ceiling tile used in several rooms may also contain asbestos. Asbestos-containing material will be removed by trained asbestos workers. Disposal options for ACM may vary depending on other contaminants present in the waste. All asbestos will be disposed of in accordance with the NTSWAC (NNSA/NSO, 2006c). Friable asbestos will be disposed of at the Mercury Sanitary Landfill. Non-friable asbestos will be disposed of at the 10c Industrial Waste Landfill. Radiologically contaminated asbestos waste will be disposed of at the LLW Waste Facility.

6.3 Management of Specific Waste Streams

6.3.1 Personal Protective Equipment

Personal protective equipment and disposable sampling equipment will be visually inspected for stains, discoloration, and gross contamination as the waste is generated, and also evaluated for radiological contamination. Staining and/discoloration will be assumed to be the result of contact with potentially contaminated media such as soil, sludge, or liquid. Gross contamination is the visible contamination of an item (e.g., clumps of soil/sludge on a sampling spoon or free liquid smeared on a glove). While gross contamination can often be removed through decontamination methods, removal of gross contamination from small items, such as gloves or booties, is not typically conducted. Any IDW that meets this description will be segregated and managed as potentially “characteristic” hazardous waste. This segregated population of waste will either: (1) be assigned the characterization of the soil/sludge that was sampled, (2) be sampled directly, or (3) undergo further evaluation using the soil/sludge sample results to determine how much soil/sludge would need to be present in the waste to exceed regulatory levels. Waste that is determined to be hazardous will be entered into an approved waste management system, where it will be managed and dispositioned according to RCRA requirements or subject to agreements between NNSA/NSO and the State of Nevada. The PPE and equipment that is not visibly stained, discolored, or grossly contaminated and that is within the radiological free-release criteria will be managed as nonhazardous sanitary waste.

6.3.2 Management of Decontamination Rinsate

Rinsate at CAU 117 will not be considered hazardous waste unless there is evidence that the rinsate may display a RCRA characteristic. Evidence may include such things as the presence of a visible sheen, pH, or association with equipment/materials used to respond to a release/spill of a hazardous waste/substance. Decontamination rinsate that is potentially hazardous (using associated sample results and/or process knowledge) will be managed as characteristic hazardous waste (CFR, 2006a). The regulatory status of the potentially hazardous rinsate will be determined through the application of associated sample results or through direct sampling. If the associated samples do not indicate the presence of hazardous constituents, then the rinsate will be considered to be nonhazardous.

The disposal of nonhazardous rinsate will be consistent with guidance established in current NNSA/NSO Fluid Management Plans for the NTS as follows:

- Rinsate that is determined to be nonhazardous and contaminated to less than 5x *Safe Drinking Water Standards* (SDWS) is not restricted as to disposal.
- Nonhazardous rinsate that is contaminated at 5x to 10x SDWS will be disposed of in an established infiltration basin or solidified and disposed of as sanitary waste or LLW in accordance with the respective sections of this document.
- Nonhazardous rinsate that is contaminated at greater than 10x SDWS will be disposed of in a lined basin or solidified and disposed of as sanitary waste or LLW in accordance with the respective sections of this document.

6.3.3 Management of Soil

This waste stream consists of soil removed for disposal during soil sampling and/or excavation. This waste stream will be characterized based on laboratory analytical results from representative locations. If the soil is determined to potentially contain COCs, the material will either be managed on site or containerized for transportation to an appropriate disposal site.

Onsite management of the waste soil will be allowed only if it is managed within an area of concern and it is appropriate to defer the management of the waste until the final remediation of the site. If this option is chosen, the waste soil shall be protected from run-on and runoff using appropriate protective measures based on the type of contaminant(s) (e.g., covered with plastic and bermed).

Management of soil waste for disposal consists of placing the waste in containers, labeling the containers, temporarily storing the containers until shipped, and shipping the waste to a treatment/disposal site. The containers, labels, management of stored waste, transport to the disposal site, and disposal shall be appropriate for the type of waste (e.g., hazardous, hydrocarbon, mixed).

Note that soils placed back into a borehole or excavation in the same approximate location from which it originated is not considered to be a waste.

6.3.4 Management of Debris

This waste stream can vary depending on site conditions. Debris that requires removal for the investigation activities (soil sampling, excavation, and/or drilling) must be characterized for proper management and disposition. Historical site knowledge, knowledge of the waste generation process, field observations, field-monitoring/screening results, radiological survey/swipe results and/or the analytical results of samples either directly or indirectly associated with the waste may be used to characterize the debris. Debris will be visually inspected for stains, discoloration, and gross contamination. Debris may be deemed reusable, recyclable, sanitary waste, hazardous waste, PCB waste, or LLW. Waste that is not sanitary will be entered into an approved waste management system, where it will be managed and dispositioned according to federal, state requirements, and agreements between NNSA/NSO and the State of Nevada.

6.3.5 Field-Screening Waste

The use of field test kits and/or instruments may result in the generation of small quantities of hazardous wastes. If hazardous waste is produced by field screening, it will be segregated from other IDW and managed in accordance with the hazardous waste regulations (CFR, 2006a). For sites where field-screening samples contain radioactivity above background levels, field-screening methods that have the potential to generate hazardous waste will not be used, thus avoiding the potential to generate mixed waste. In the event a mixed waste is generated, the waste will be managed in accordance with Section 6.2.5 of this document.

6.3.6 Freon

Freon from the Building 2201 HVAC system will be evacuated. Fluids will be drained, containerized, managed, and will be recycled or disposed of according to the appropriate regulations.

7.0 Quality Assurance/Quality Control

The overall objective of the site investigation activities described in this SAFER plan is to collect accurate and defensible data to support the selection and implementation of a closure alternative for CAS 26-41-01 in CAU 117. Sections 7.1 and 7.2 discuss the collection of required quality control (QC) samples in the field and quality assurance (QA) requirements for laboratory/analytical data to achieve closure. Unless otherwise stated in this SAFER plan or required by the results of the DQO process (Appendix B), this investigation will adhere to the Industrial Sites QAPP (NNSA/NV, 2002b).

7.1 Sample Collection Activities

Field QC samples will be collected in accordance with established procedures. Field QC samples are collected and analyzed to aid in determining the validity of environmental sample results. The number of required QC samples depends on the types and number of environmental samples collected. The minimum frequency of collecting and analyzing QC samples for this investigation, as determined in the DQO process, include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment rinsate blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per uncharacterized lot of source material that contacts sampled media)
- Field duplicates (1 per 20 environmental samples or 1 per CAS per matrix, if less than 20 collected)
- Field blanks (1 per 20 environmental samples)
- Laboratory QC samples (1 per 20 environmental samples or 1 per CAS per matrix, if less than 20 collected)

Additional QC samples may be submitted based on site conditions at the discretion of the Task Manager or Site Supervisor. Field QC samples shall be analyzed using the same analytical procedures implemented for associated environmental samples. Additional details regarding field QC samples are available in the Industrial Sites QAPP (NNSA/NV, 2002b).

7.2 Applicable Laboratory/Analytical Data Quality Indicators

The DQIs are qualitative and quantitative descriptors used in interpreting the degree of acceptability or utility of data. Data quality indicators are used to evaluate the entire measurement system and laboratory measurement processes (i.e., analytical method performance) as well as to evaluate individual analytical results (i.e., parameter performance). The quality and usability of data used to make DQO decisions will be assessed based on the following DQIs:

- Precision
- Accuracy/bias
- Representativeness
- Comparability
- Completeness
- Sensitivity

Table 7-1 provides the established analytical method/measurement system performance criteria for each of the DQIs and the potential impacts to the decision if the criteria are not met. The following subsections discuss each of the DQIs that will be used to assess the quality of laboratory data. Due to changes in analytical methodology and changes in analytical laboratory contracts, criteria for precision and accuracy in Tables 3-3 and 3-4 that vary from corresponding information in the QAPP will supersede that information in the QAPP (NNSA/NV, 2002b).

7.2.1 Precision

Precision is a measure of the repeatability of the analysis process from sample collection through analysis results. It is used to assess the variability between two equal samples.

Table 7-1
Laboratory and Analytical Performance Criteria for CAU 117 Data Quality Indicators

Data Quality Indicator	Performance Metric	Potential Impact on Decision If Performance Metric Not Met
Precision	At least 80% of the sample results for each measured contaminant are not qualified for precision based on the criteria for each analytical method-specific and laboratory-specific criteria presented in Tables 3-3 and 3-4.	If the performance metric is not met, the affected analytical results from each affected CAS will be assessed to determine whether there is sufficient confidence in analytical results to use the data in making DQO decisions.
Accuracy	At least 80% of the sample results for each measured contaminant are not qualified for accuracy based on the method-specific and laboratory-specific criteria presented in Tables 3-3 and 3-4.	If the performance metric is not met, the affected analytical results from each affected CAS will be assessed to determine whether there is sufficient confidence in analytical results to use the data in making DQO decisions.
Sensitivity	Minimum detectable concentrations are less than or equal to respective FALs.	Cannot determine whether COCs are present or migrating at levels of concern.
Comparability	Sampling, handling, preparation, analysis, reporting, and data validation are performed using standard methods and procedures.	Inability to combine data with data obtained from other sources and/or inability to compare data to regulatory action levels.
Representativeness	Samples contain contaminants at concentrations present in the environmental media from which they were collected.	Analytical results will not represent true site conditions. Inability to make appropriate DQO decisions.
Completeness	80% of the CAS-specific COPCs have valid results. 100% of CAS-specific targeted contaminants have valid results.	Cannot support/defend decision on whether COCs are present.
Extent Completeness	100% of COCs used to define extent have valid results.	Extent of contamination cannot be accurately determined.
Clean Closure Completeness	100% of targeted contaminants have valid results.	Cannot determine whether COCs remain in soil.

COC = Contaminant of concern
COPC = Contaminant of potential concern
DQO = Data quality objective
FAL = Final action level

Determinations of precision will be made for field duplicate samples and laboratory duplicate samples. Field duplicate samples will be collected simultaneously with samples from the same source under similar conditions in separate containers. The duplicate sample will be treated independently of the original sample in order to assess field impacts and laboratory performance on precision through a comparison of results. Laboratory precision is evaluated as part of the required laboratory internal QC program to assess performance of analytical procedures. The laboratory sample duplicates are an aliquot, or subset, of a field sample generated in the laboratory. They are not a separate sample but a split, or portion, of an existing sample. Typically, laboratory duplicate QC samples may include matrix spike duplicate (MSD) and laboratory control sample (LCS) duplicate samples for organic, inorganic, and radiological analyses.

Precision is a quantitative measure used to assess overall analytical method and field-sampling performance as well as to assess the need to “flag” (qualify) individual parameter results when corresponding QC sample results are not within established control limits.

The criteria used for the assessment of inorganic chemical precision when both results are greater than or equal to 5x reporting limit (RL) is 20 percent and 35 percent for aqueous and soil samples, respectively. When either result is less than 5x RL, a control limit of ±1x RL and ±2x RL for aqueous and soil samples, respectively, is applied to the absolute difference.

The criteria used for the assessment of organic chemical precision is based on professional judgment using laboratory derived control limits and gas chromatography column comparison when appropriate.

The criteria used for the assessment of radiological precision when both results are greater than or equal to 5x MDC is 20 percent and 35 percent for aqueous and soil samples, respectively. When either result is less than 5x MDC, the normalized difference should be between -2 and +2 for aqueous and soil samples. The parameters to be used for assessment of precision for duplicates are listed in Table 3-3.

Any values outside the specified criteria do not necessarily result in the qualification of analytical data. It is only one factor in making an overall judgment about the quality of the reported analytical results. The performance metric for assessing the DQI of precision on DQO decisions (see Table 7-1) is that at least 80 percent of sample results for each measured contaminant are not qualified due to duplicates exceeding the criteria. If this performance is not met, an assessment will be conducted in the CR on the impacts to DQO decisions specific to affected contaminants and the CAS.

7.2.2 Accuracy/Bias

Accuracy is a measure of the closeness of an individual measurement to the true value. It is used to assess the performance of laboratory measurement processes.

Accuracy is determined by analyzing a reference material of known parameter concentration or by reanalyzing a sample to which a material of known concentration or amount of parameter has been added (spiked). Accuracy will be evaluated based on results from three types of spiked samples: matrix spike (MS), LCS, and surrogates (organics). The LCS sample is analyzed with the field samples using the same sample preparation, reagents, and analytical methods employed for the samples. One LCS will be prepared with each batch of samples for analysis by a specific measurement.

The criteria used for the assessment of inorganic chemical accuracy are 75 to 125 percent for MS recoveries and 80 to 120 percent for LCS recoveries. For organic chemical accuracy, laboratory-specific percent recovery criteria developed and generated in-house by the laboratory according to approved laboratory procedures are applied to MS and LCS surrogates. The criteria used for the assessment of radiochemical accuracy are 80 to 120 percent for LCS and MS recoveries.

Any values outside the specified criteria do not necessarily result in the qualification of analytical data. It is only one factor in making an overall judgment about the quality of the reported analytical results. Factors beyond laboratory control, such as sample matrix effects, can cause the measured values to be outside of the established criteria. Therefore, the entire sampling and analytical process may be evaluated when determining the usability of the affected data.

The performance metric for assessing the DQI of accuracy on DQO decisions (see Table 7-1) is that at least 80 percent of the sample results for each measured contaminant are not qualified for accuracy. If this performance is not met, an assessment will be conducted in the CR on the impacts to DQO decisions specific to affected contaminants and the CAS.

7.2.3 Representativeness

Representativeness is the degree to which sample characteristics accurately and precisely represent a characteristics of a population or an environmental condition (EPA, 2002). Representativeness is assured by carefully developing the sampling strategy during the DQO process such that false negative and false positive decision errors are minimized. The criteria listed in DQO Step 6 – Specify the Tolerable Limits on Decision Errors are:

- For Decision I judgmental sampling, having a high degree of confidence that the sample locations selected will identify COCs if present anywhere within the CAS.
- Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
- For Decision II, having a high degree of confidence that the sample locations selected will identify the extent of COCs.

These are qualitative measures that will be used to assess measurement system performance for representativeness. The assessment of this qualitative criterion will be presented in the CR.

7.2.4 Completeness

Completeness is defined as generating sufficient data of the appropriate quality to satisfy the data needs identified in the DQOs. For judgmental sampling, completeness will be evaluated using both a quantitative measure and a qualitative assessment. The quantitative measurement to be used to evaluate completeness is presented in Table 7-1 and is based on the percentage of measurements made that are judged to be valid. For the judgmental sampling approach, the completeness goal for targeted contaminants and the remaining COPCs is 100 and 80 percent, respectively. If this goal is not achieved, the dataset will be assessed for potential impacts on making DQO decisions.

The qualitative assessment of completeness is an evaluation of the sufficiency of information available to make DQO decisions. This assessment will be based on meeting the data needs identified in the DQOs and will be presented in the CR. Additional samples will be collected if it is determined that the number of samples do not meet completeness criteria.

7.2.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another (EPA, 2002). The criteria for the evaluation of comparability will be that all sampling, handling, preparation, analysis, reporting, and data validation were performed using approved standard methods and procedures. This will ensure that data from this project can be compared to regulatory action levels that were developed based on data generated using the same or comparable methods and procedures. An evaluation of comparability will be presented in the CR.

7.2.6 Sensitivity

Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest (EPA, 2002). The evaluation criteria for this parameter will be that measurement sensitivity (detection limits) will be less than or equal to the corresponding FALs. If this criterion is not achieved, the affected data will be assessed for usability and potential impacts on meeting site investigation objectives. This assessment will be presented in the CR.

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Appendix A

Project Organization

A.1.0 Project Organization

The NNSA/NSO Federal Sub-Project Director is Kevin Cabble, who can be reached at (702) 295-5000. The NNSA/NSO Task Manager is Peter Sanders, who can be reached at (702) 295-1037.

The identification of the project Health and Safety Officer and the Quality Assurance Officer can be found in the appropriate plan. However, personnel are subject to change and it is suggested that the DOE Director be contacted for further information. The Task Manager will be identified in the FFACO Monthly Activity Report before the start of field activities.

Appendix B

Data Quality Objective Process

B.1.0 Introduction

The DQO process described in this appendix is a seven-step strategic systematic planning method used to plan data collection activities and define performance criteria for the CAU 117, Pluto Disassembly Facility, field investigation. The DQOs are designed to ensure that the data collected will provide sufficient and reliable information to determine the appropriate corrective actions, verify the adequacy of existing information, provide sufficient data to implement the corrective actions, and verify that closure was achieved.

The CAU 117 investigation will be based on the DQOs presented in this appendix as developed by representatives of the NDEP and the NNSA/NSO. The seven steps of the DQO process presented in Sections B.2.0 through B.8.0 were developed in accordance with *EPA Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006) and the CAS-specific information presented in Section B.2.0.

The DQO process presents a judgmental sampling approach. In general, the procedures used in the DQO process provide:

- A method to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study.
- Criteria that will be used to establish the final data collection design such as:
  - the nature of the problem that has initiated the study and a conceptual model of the hazards to be investigated
  - the decisions or estimates that need to be made and the order of priority for resolving them
  - the type of data needed
  - an analytic approach or decision rule that defines the logic for how the data will be used to draw conclusions from the study findings
- Acceptable quantitative criteria on the quality and quantity of the data to be collected, relative to the ultimate use of the data.
- A data collection design that will generate data meeting the quantitative and qualitative criteria specified. A data collection design specifies the type, number, location, and physical quantity of samples and data, as well as the QA and QC activities that will ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in the DQOs.

B.2.0 Step 1 - State the Problem

Step 1 of the DQO process defines the problem that requires study, identifies the planning team, and develops a conceptual model of the environmental hazard to be investigated.

The problem statement for the CAU 117 CAS is: "Existing information on the nature and extent of potential contamination is insufficient to evaluate and confirm closure of CAS 26-41-01 in CAU 117."

B.2.1 Planning Team Members

The DQO planning team consists of representatives from NDEP, NNSA/NSO, SNJV, and National Security Technologies, LLC (NSTec). The DQO planning team met on June 27, 2007, for the DQO meeting. The primary decision-makers are the NDEP and NNSA/NSO representatives.

B.2.2 Conceptual Site Model

The CSM is used to organize and communicate information about site characteristics. It reflects the best interpretation of available information at any point in time. The CSM is a primary vehicle for communicating assumptions about release mechanisms, potential migration pathways, or specific constraints. It provides a summary of how and where contaminants are expected to move and what impacts such movement may have. It is the basis for assessing how contaminants could reach receptors both in the present and future. The CSM describes the most probable scenario for current conditions at the site and defines the assumptions that are the basis for identifying appropriate sampling strategy and data collection methods. Accurate CSMs are important as they serve as the basis for all subsequent inputs and decisions throughout the DQO process.

The CSM was developed for CAU 117 using information from the physical setting, potential contaminant sources, release information, historical background information, knowledge from similar sites, site walk-downs, site investigation data, and physical and chemical properties of the potentially affected media and COPCs.

The CSM consists of:

- Potential contaminant releases including media subsequently affected.
- Release mechanisms (the conditions associated with the release).
- Potential contaminant source characteristics including contaminants suspected to be present and contaminant-specific properties.
- Site characteristics including physical, topographical, and meteorological information.
- Migration pathways and transport mechanisms that describe the potential for migration and where the contamination may be transported.
- The locations of points of exposure where individuals or populations may come in contact with a COC associated with a CAS.
- Routes of exposure where contaminants may enter the receptor.

If additional elements are identified during the investigation that are outside the scope of the CSM, the situation will be reviewed and a recommendation will be made as to how to proceed. In such cases, NDEP and NNSA/NSO will be notified and given the opportunity to comment on, and concur with, the recommendation.

The applicability of the CSM to CAS 26-41-01 is summarized in Table B.2-1 and discussed below. Table B.2-1 provides information on CSM elements that will be used throughout the remaining steps of the DQO process. Figure B.2-1 represents site conditions applicable to the CSM.

B.2.2.1 Contaminant Release

The most likely location for potential contaminant releases to the environment are the soils directly below or adjacent to the CSM's surface and subsurface components (i.e., Building 2201, the Building 2201 basement, drains/piping stemming from Building 2201, and the wooden shed). The CSM accounts for potential releases resulting from overflow or leaking of system components present at the ground surface (e.g., drains and piping) and surface spills. If present, contaminant concentrations in soil are expected to decrease with horizontal and vertical distance from the source. Sources for potential contamination include hazardous and radiological contaminants related to Project Pluto, fuel repackaging operations, and classified experiments conducted at Building 2201.

Table B.2-1
Conceptual Site Model Description of Elements for CAU 117, CAS 26-41-01

CAS Identifier	**26-41-01**
CAS Description	**Pluto Disassembly Facility**
Site Status	Site is inactive and/or abandoned
Exposure Scenario	Occasional Use
Sources of Potential Soil Contamination	Releases from activities conducted within Building 2201, releases from hazardous/radioactive materials stored in Building 2201, potential future releases from hazardous/radioactive waste currently in Building 2201, potential future releases from wastes currently stored in the wooden shed
Location of Contamination/ Release Point	Exterior of Building 2201, facility water tower, and/or the wooden shed
Amount Released	Unknown
Affected Media	Surface and shallow subsurface soil
Potential Contaminants	Polychlorinated biphenyls, hydrocarbons, RCRA metals, beryllium, radionuclides, volatile organic compounds, semivolatile organic compounds
Transport Mechanisms	Percolation of precipitation through subsurface media serves as the major driving force for migration of contaminants. Surface water runoff may provide for the transportation of some contaminants within or outside of the footprint of the CAS.
Migration Pathways	Vertical transport expected to dominate over lateral transport due to small surface gradients.
Lateral and Vertical Extent of Contamination	Contamination, if present, is expected to be contiguous to the release points. Concentrations are expected to decrease with distance and depth from the source. Groundwater contamination is not expected. Lateral and vertical extent of COC contamination is assumed to be within the spatial boundaries.
Exposure Pathways	The potential for contamination exposure is limited to industrial and construction workers, and military personnel conducting training. These human receptors may be exposed to COPCs through oral ingestion, inhalation, dermal contact (absorption) of soil and/or debris due to inadvertent disturbance of these materials or irradiation by radioactive materials.

COC = Contaminant of concern
COPC = Contaminant of potential concern
RCRA = *Resource Conservation and Recovery Act*

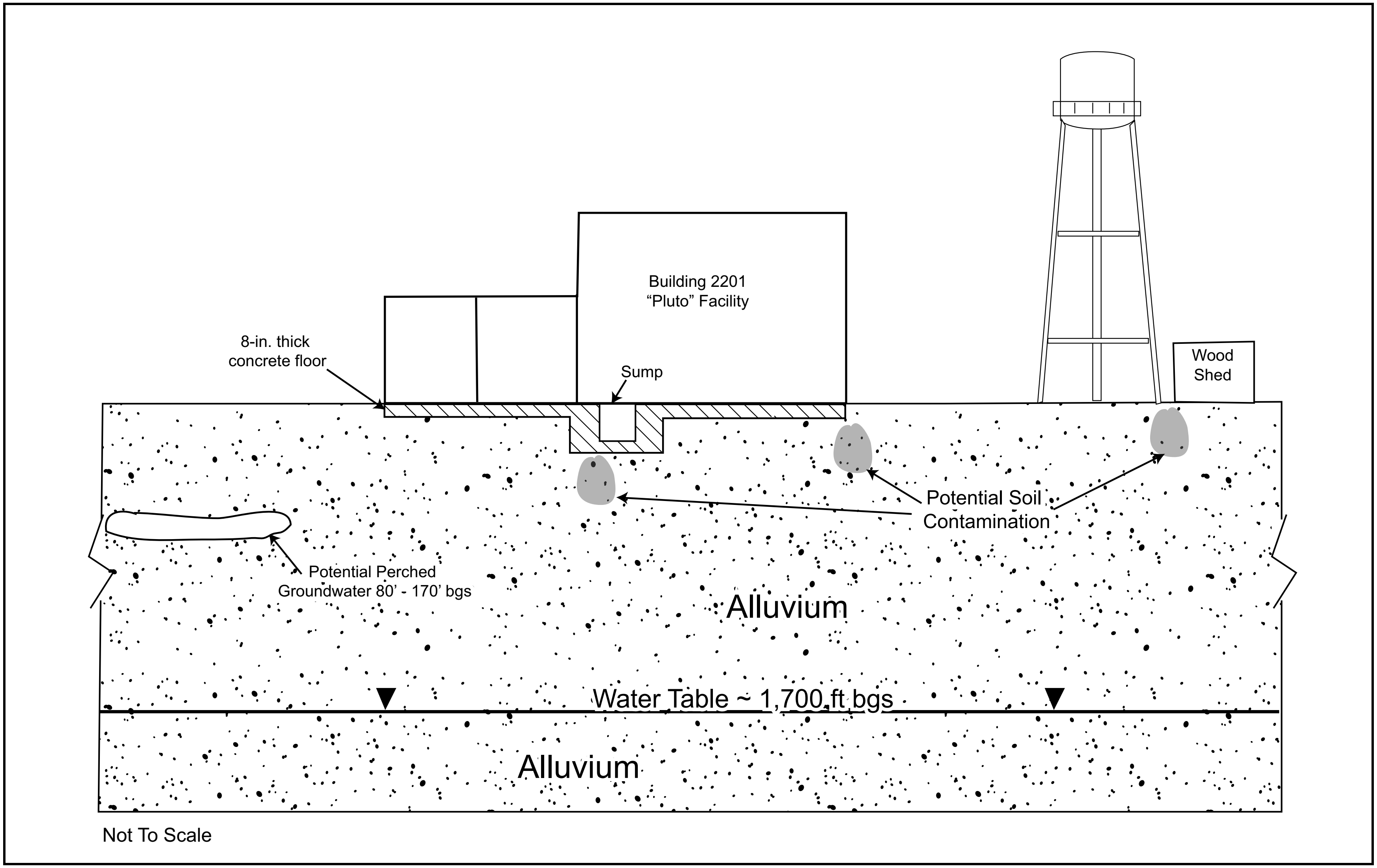

Figure B.2-1
Conceptual Site Model for CAS 26-41-01

Two release scenarios are considered for this CSM:

- Potential past releases from activities conducted in Building 2201, hazardous/radioactive materials stored in Building 2201 and/or used as building materials, and hazardous/radioactive materials stored in the wooden shed.
- Potential future releases from hazardous and/or radioactive materials currently stored in Building 2201 or the wooden shed.

The primary source for potential radionuclide contamination to soil is suspected to be from radioactively contaminated liquid effluent that was washed down Building 2201 drains. Any releases from underground piping extending from Building 2201 to nearby radioactive and sanitary leachfields were covered in previous CASs (CAS 26-05-01 and 26-05-04, respectively). It is presumed that soil contamination from this source is negligible.

The primary potential source for a chemical contaminant release is suspected to be from hydraulic equipment fluids containing PCBs. However, no evidence of a past release from the building has been identified, and the thickness of the Building 2201 concrete floors and walls suggest excellent containment. Further investigation is needed to determine the presence of potential contamination from past spills, identified by the presence of floor stains. Soils will be sampled for potential contamination where it is determined that a pathway from Building 2201 to the soil exists.

Future environmental contamination could occur if hazardous or radioactive wastes currently contained within Building 2201 or the wooden shed are released. Potential source material within Building 2201 and the wooden shed will be investigated to define the nature and extent of potential contaminants as they are identified.

B.2.2.2 Potential Contaminants

The COPCs were identified during the planning process through the review of site history, process knowledge, personal interviews, past investigation efforts, and inferred activities associated with the CAS. The list of COPCs (presented in Table B.2-2) is intended to encompass all of the contaminants that could potentially be present at the CAS. The COPCs applicable to Decision I environmental samples for CAS 26-41-01 are defined as the constituents reported from the analytical methods stipulated in Table B.2-3.

Table B.2-2
CAS 26-41-01 Analytical Program[a]

Analyses	Soil (if pathway exists)	Materials in containers/vaults[b]	Oil in leaded-glass windows	Hydraulic equipment oil	Filter material	Piping/tank insulation	Floor/ceiling tile	Roofing material
Organic Contaminants of Potential Concern (COPCs)								
Total Petroleum Hydrocarbons-Diesel-Range Organics	X	X						
Polychlorinated Biphenyls	X	X	X	X				
Semivolatile Organic Compounds	X	X	X	X				
Volatile Organic Compounds	X	X	X	X				
Inorganic COPCs								
Resource Conservation and Recovery Act Metals	X	X				X		
Total Beryllium	X	X			X			
Radionuclide COPCs								
Gamma Spectroscopy[c]	X	X	X	X	X	X	X	X
Isotopic Uranium	X	X	X	X	X	X	X	X
Isotopic Plutonium	X	X	X	X	X	X	X	X
Cesium-137 from Gamma	X	X	X	X	X	X	X	X
Niobium-94 from Gamma	X	X	X	X	X	X	X	X
Strontium-90	X	X	X	X	X	X	X	X

X = Required analytical method

[a]The contaminants of potential concern are the constituents reported from the analytical methods listed.
[b]Dependent on site conditions.
[c]Results of gamma analysis will be used to determine whether further radioanalytical analysis is warranted.

Table B.2-3
Analytes Reported by Analytical Methods

VOCs		SVOCs	TPH	PCBs	Metals	Radionuclides
1,1,1-Trichloroethane	Methylene chloride	2,3,4,6-Tetrachlorophenol	TPH (Diesel-Range Organics)	Aroclor 1016	Arsenic	Plutonium-238
1,1,1,2-Tetrachloroethane	N-Butylbenzene	2,4-Dimethylphenol		Aroclor 1221	Barium	Plutonium-239/240
1,1,2,2-Tetrachloroethane	N-Propylbenzene	2,4-Dinitrotoluene		Aroclor 1232	Beryllium	Strontium-90
1,1,2-Trichloroethane	o-Dichlorobenzene (1,2)	2,4,5-Trichlorophenol		Aroclor 1242	Cadmium	Uranium-234
1,1-Dichloroethane	p-Dichlorobenzene (1,4)	2,4,6-Trichlorophenol		Aroclor 1248	Chromium	Uranium-235
1,1-Dichloroethene	p-isopropyltoluene	2-Chlorophenol		Aroclor 1254	Lead	Uranium-238
cis-1,2-Dichloroethene	sec-Butylbenzene	2-Methylnaphthalene		Aroclor 1260	Mercury	
1,2-Dichloroethane	Styrene	2-Methylphenol		Aroclor 1268	Selenium	**Gamma-emitting radionuclides**
1,2-Dichloropropane	tert-Butylbenzene	2-Nitrophenol			Silver	
1,2,4-Trichlorobenzene	Tetrachloroethene	3-Methylphenol[a]				
1,2,4-Trimethylbenzene	Toluene	4-Chloroaniline				
1,2-Dibromo-3-chloropropane	Total Xylenes	4-Methylphenol[a]				
1,3,5-Trimethylbenzene	Trichloroethene	4-Nitrophenol				Actinium-228
1,4-Dioxane	Trichlorofluoromethane	Acenaphthene				Americium-241
2-Butanone	Vinyl acetate	Acenaphthylene				Cobalt-60
2-Chlorotoluene	Vinyl chloride	Aniline				Cesium-137
2-Hexanone		Anthracene				Europium-152
4-Methyl-2-pentanone		Benzo(a)anthracene				Europium-154
Acetone		Benzo(a)pyrene				Europium-155
Acetonitrile		Benzo(b)fluoranthene				Lead-212
Allyl chloride		Benzo(g,h,i)perylene				Lead-214
Benzene		Benzo(k)fluoranthene				Niobium-94
Bromodichloromethane		Benzoic Acid				Potassium-40
Bromoform		Benzyl Alcohol				Thallium-208
Bromomethane		Bis(2-ethylhexyl) phthalate				Thorium-234
Carbon disulfide		Butyl benzyl phthalate				Uranium-235
Carbon tetrachloride		Carbazole				
Chlorobenzene		Chrysene				
Chloroethane		Dibenzo(a,h)anthracene				
Chloroform		Dibenzofuran				
Chloromethane		Diethyl Phthalate				
Chloroprene		Dimethyl phthalate				
Dibromochloromethane		Di-n-butyl phthalate				
Dichlorodifluoromethane		Di-n-octyl phthalate				
Ethyl methacrylate		Fluoranthene				
Ethylbenzene		Fluorene				
Isobutyl alcohol		Hexachlorobenzene				
Isopropylbenzene		Hexachlorobutadiene[b]				
m-Dichlorobenzene (1,3)		Hexachloroethane				
Methacrylonitrile		Indeno(1,2,3-cd)pyrene				
Methyl methacrylate		Naphthalene[b]				
		Nitrobenzene				
		N-Nitroso-di-n-propylamine				
		Pentachlorophenol				
		Phenanthrene				
		Phenol				
		Pyrene				
		Pyridine				

[a]May be reported as 3,4-methylpenol
[b]May be reported with VOCs

PCB = Polychlorinated biphenyl
SVOC = Semivolatile organic compound

TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound

During a review of site history documentation, process knowledge information, personal interviews, past investigation efforts (where available), and inferred activities associated with the CAS, some of the COPCs were identified as targeted contaminants for the CAS. Targeted contaminants are those COPCs for which evidence in the available site and process information suggests that they may be reasonably suspected to be present at a given CAS. The targeted contaminants are required to meet a more stringent completeness criteria than other COPCs, thus providing greater protection against a decision error (see Section B.7.0). Targeted contaminants will be considered only for environmental samples (i.e., if a pathway to soil exists). If it is determined that a pathway to soil exists, targeted contaminants for CAS 26-41-01 soil samples will include PCBs and radionuclides.

Analytical methods for each CAU 117 COPC are provided in Tables B.2-4 and B.2-5. Due to changes in analytical methodology and changes in analytical laboratory contracts, information in Tables B.2-4 and B.2-5 that varies from corresponding information in the QAPP will supersede that information in the QAPP (NNSA/NV, 2002a).

Table B.2-4
Analytical Requirements for Radionuclides for CAU 117
(Page 1 of 2)

Analysis[a]	**Matrix**	**Analytical Method**	**Minimum Detectable Concentration (MDC)[b]**	**Laboratory Precision**	**Laboratory Accuracy (%R)**
Gamma-Emitting Radionuclides					
Gamma Spectroscopy	Aqueous	EPA 901.1[c]	< Preliminary Action Levels	RPD 35%[d]	Laboratory Control Sample 80-120%R
	Non-aqueous	HASL-300[f]		ND[e] -2<ND[e]<2	
Other Radionuclides					

Table B.2-4
Analytical Requirements for Radionuclides for CAU 117
(Page 2 of 2)

Analysis[a]	**Matrix**	**Analytical Method**	**Minimum Detectable Concentration (MDC)**[b]	**Laboratory Precision**	**Laboratory Accuracy (%R)**
Plutonium-238	All	HASL-300[f]	< Preliminary Action Levels	RPD 35%[d] ND[e] -2<ND[e]<2	Laboratory Control Sample 80-120%R Chemical Yield 30-105%R (not applicable for tritium and gross-alpha/beta) Matrix Spike Sample 61-140%R (tritium and gross alpha/beta only)
Plutonium-239/240	All	HASL-300[f]			
Strontium-90	All	HASL-300[f]			
Uranium-234	All	HASL-300[f]			
Uranium-235	All	HASL-300[f]			
Uranium-238	All	HASL-300[f]			

[a]Applicable constituents are listed in Table B.2-3.
[b]The MDC is the lowest concentration of a radionuclide present in a sample and can be detected with a 95% confidence level.
[c]*Prescribed Procedures for Measurement of Radioactivity in Drinking Water (*EPA, 1980)
[d]*Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) with Guidance* (EPA, 2000)
[e]ND is not RPD; rather, it is another measure of precision used to evaluate duplicate analyses. The ND is calculated as the difference between two results divided by the square root of the sum of the squares of their total propagated uncertainties. *Evaluation of Radiochemical Data Usability* (Paar and Porterfield, 1997)
[f]*The Procedures Manual of the Environmental Measurements Laboratory*, HASL-300 (DOE, 1997)

EPA = U.S. Environmental Protection Agency
HASL = Health and Safety Laboratory
ND = Normalized difference
RPD = Relative percent difference
%R = Percent recovery

Table B.2-5
Analytical Requirements for Chemical COPCs for CAU 117

Analysis[a]	Matrix	Analytical Method (SW-846)[b]	Minimum Detectable Concentration (MDC)[c]	Laboratory Precision	Laboratory Accuracy (%R)
ORGANICS					
Total Volatile Organic Compounds	All	8260B	< Preliminary Action Levels	Lab-specific[d]	Lab-specific[d]
Total Semivolatile Organic Compounds	All	8270C	< Preliminary Action Levels	Lab-specific[d]	Lab-specific[d]
Polychlorinated Biphenyls	All	8082	< Preliminary Action Levels	Lab-specific[d]	Lab-specific[d]
Total Petroleum Hydrocarbons-Diesel-Range Organics	All	8015B (modified)		Lab-specific[d]	Lab-specific[d]
INORGANICS					
Metals	All	6010B	< Preliminary Action Levels	RPD 35% (non-aqueous)[e] 20% (aqueous)[e]	Matrix Spike Sample 75-125%R[b]
Mercury	Aqueous	7470A		Absolute Difference[f] ±2x RL (non-aqueous)[f] ±1x RL (aqueous)[f]	Laboratory Control Sample 80-120%R[f]
	Non-aqueous	7471A			

[a]Applicable constituents are listed in Table B.2-3.
[b]*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) (EPA, 1996)
[c]The MDC is the lowest concentration that can be reliably achieved within specified limits of accuracy and precision.
[d]RPD and %R performance criteria are developed by the analytical laboratory according to approved procedures.
[e]*Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) with Guidance* (EPA, 2000)
[f]*USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b)

RL = Reporting limit
RPD = Relative percent difference
%R = Percent recovery

B.2.2.3 Contaminant Characteristics

Contaminant characteristics include, but are not limited to: solubility, density, and adsorption potential. In general, contaminants with large particle size, low solubility, high affinity for media, and/or high density can be expected to be found relatively close to release points. Contaminants with small particle size, high solubility, low affinity for media, and/or low density are found further from release points or in low areas where evaporation of ponding will concentrate dissolved constituents.

B.2.2.4 Site Characteristics

Site characteristics are defined by the interaction of physical, topographical, and meteorological attributes and properties. Physical properties include permeability, porosity, hydraulic conductivity, degree of saturation, sorting, chemical composition, and organic content. Topographical and meteorological properties and attributes include slope stability, precipitation frequency and amounts, precipitation runoff pathways, drainage channels and ephemeral streams, and evapotranspiration potential.

Corrective Action Site 26-41-01 is located in the southwestern corner of Area 26 at approximately 4,396 ft elevation (BN, 1996). A perched water table occurs throughout most of Area 26, with static water levels ranging from 81 to 167 ft below ground surface (bgs). The perched water occurs in highly fractured and altered rock, and may extend to a depth of 261 ft or more before reaching a low-permeable confining layer. Electrical resistivity vertical profiles indicate zones of saturation between 24 and 136 ft, 460 and 900 ft, and 1,050 and 1,800 ft. These zones may represent several perched aquifers present in permeable zones between the known perched aquifer and the regional water table located approximately 1,700 ft bgs (DRI, 1988; Johnson and Ege, 1964).

A large portion of Area 26 consists of thin gravel alluvium capping a pediment which dips 3 to 6 degrees to the southeast and merges with the valley alluvium along Cane Spring Wash to the south. Lateral migration may occur as a result of overland flow or erosion, though the permeability of the alluvium is low (ranging from roughly 10^{-3} to 10^{-5} centimeters per second) (DRI, 1988).

B.2.2.5 Migration Pathways and Transport Mechanisms

Migration pathways include the lateral migration of potential contaminants across surface soils/sediments and vertical migration of potential contaminants through subsurface soils. Environmental contamination is expected to be limited due to the physical barrier posed by Building 2201 between potential contaminants and potentially affected soil.

Infiltration and percolation of precipitation serves as a driving force for downward migration of contaminants. However, due to the low permeability of the alluvium throughout Area 26, high potential evapotranspiration rates, and low precipitation rates (approximately 7.8 in. per year at nearby Cane Spring [ARL, 2007]), percolation of infiltrated precipitation at the NTS does not provide a significant mechanism for vertical migration of contaminants to groundwater (DOE/NV, 1992).

Because of the expected limited mobility of contaminants, the affected media is typically the surface and shallow subsurface soil. The native soil interfaces below and adjacent to the identified release points are the most likely locations for potential soil contamination.

B.2.2.6 Exposure Scenarios

Human receptors may be exposed to COPCs through oral ingestion, inhalation, or dermal contact with contaminated materials due to inadvertent disturbance of these materials or irradiation by radioactive materials. The land-use and exposure scenario for CAS 26-41-01 is listed in Table B.2-6. According to the *Nevada Test Site Resource Management Plan* (DOE/NV, 1998), the area in which CAU 117 is located is restricted to use as a Research, Test, and Experiment Zone. Following closure activities outlined in this SAFER, Building 2201 would not be available for use by site personnel. Corrective Action Site 26-41-01 is therefore considered an Occasional Use area.

Table B.2-6
Land Use and Exposure Scenarios

Corrective Action Site	Record of Decision Land Use Zone	Exposure Scenario
26-41-01	Research, Test, and Experiment Zone This area is designated for small-scale research and development projects and demonstrations; pilot projects; outdoor tests; and experiments for the development, quality assurance, or reliability of material and equipment under controlled conditions. This zone includes compatible defense and nondefense research, development, and testing projects and activities	Occasional Use Area Worker will be exposed to the site occasionally (up to 80 hours per year for 5 years). Site structures are not present for shelter and comfort of the worker.

B.3.0 Step 2 - Identify the Goal of the Study

Step 2 of the DQO process states how environmental data will be used in meeting objectives and solving the problem, identifies study questions or decision statement(s), and considers alternative outcomes or actions that can occur upon answering the question(s). Figure B.3-1 depicts the sequential flow of questions, answers, and action alternatives required to fulfill the objectives of the SAFER process.

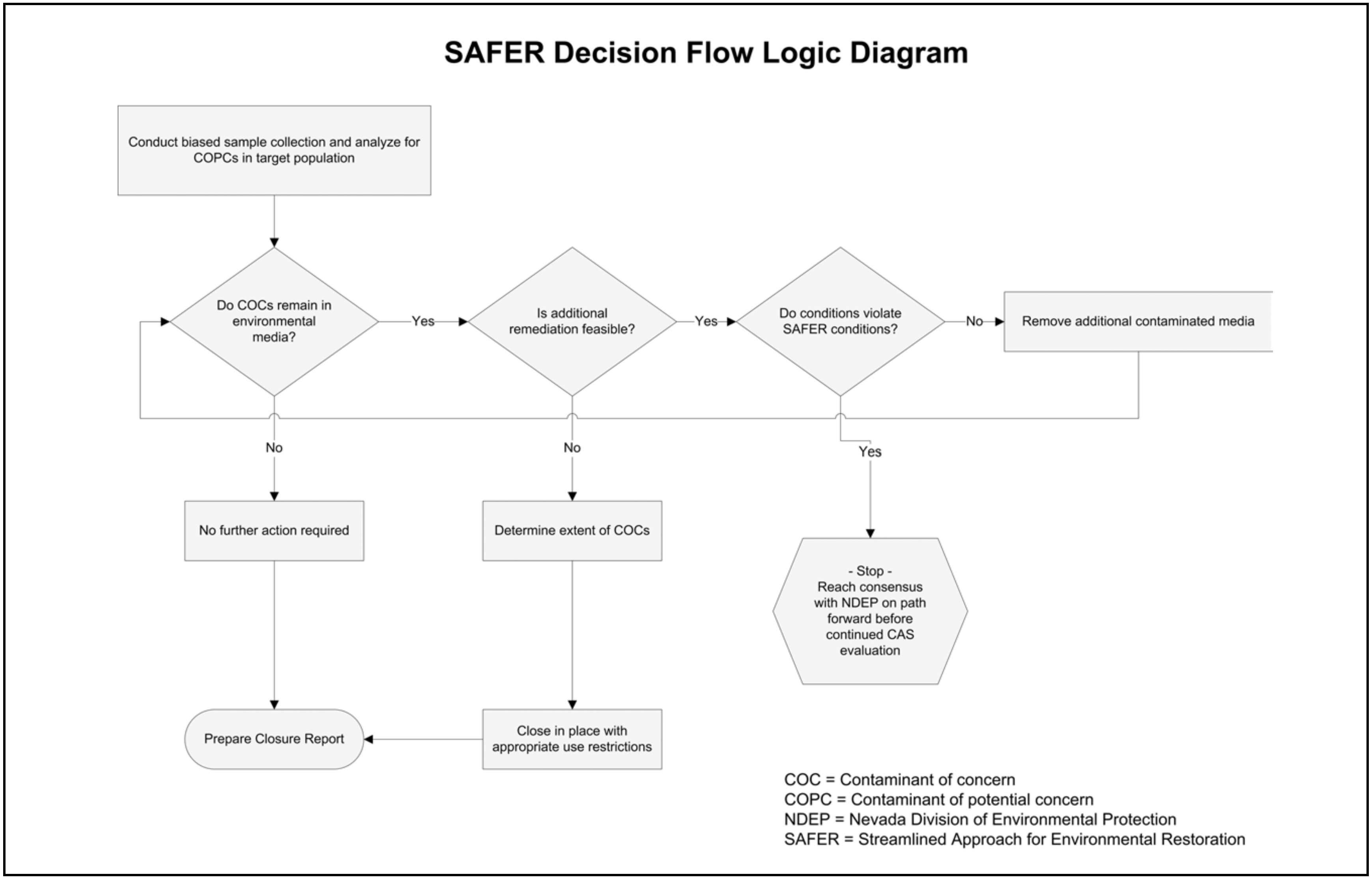

Figure B.3-1
SAFER Decision Flow Logic Diagram

After completion of SAFER activities, the following closure objectives should be met for CAU 117:

- The chosen corrective action has been verified to be appropriate and effective.
- The nature and extent of any remaining contamination has been defined.
- Sufficient information is available to estimate decontamination and decommissioning waste types, volumes, and disposal costs.
- RCRA hazardous wastes have been removed.

Decision I and II statements intended to direct SAFER activities toward completion of these objectives are presented in the following sections.

B.3.1 Decision Statements

The Decision I statement is: "Is any COC present in environmental media within the CAS, or does potential source material exist that, if released, could cause a COC in environmental media?" For a judgmental sampling design, any analytical result for a COPC above the FAL will result in that COPC being designated as a COC. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple constituent analysis (NNSA/NSO, 2006). If a COC is detected, then Decision II must be resolved.

The Decision II statement is: "Is sufficient information available to meet the closure objectives?" Sufficient information to meet these closure objectives is defined to include:

- Identifying the volume of media containing any COC bounded by analytical sample results in lateral and vertical directions.
- The information needed to characterize IDW for disposal.
- The information needed to determine potential remediation waste types.

A corrective action will be determined for any site containing a COC. The evaluation of the need for corrective action will include the potential for wastes that are present at a site to cause the future contamination of site environmental media if the wastes were to be released. The following conservative assumptions were made to evaluate the potential for Building 2201 material or contents to result in the introduction of a COC to surrounding environmental media:

- Building 2201 containment would fail at some point, and the contents would be released to the surrounding media.
- The resulting concentration of contaminants in the surrounding media would be equal to the concentration of contaminants within Building 2201.
- Any liquid contaminants within Building 2201 will be removed.

If sufficient information is not available to meet the closure objectives, then site conditions will be re-evaluated and additional samples will be collected (as long as the scope of the investigation is not exceeded and CSM assumptions have not been shown to be incorrect).

B.3.2 Alternative Actions to the Decisions

In this section the actions that may be taken to solve the problem are identified depending on the possible outcomes of the investigation.

B.3.2.1 Alternative Actions to Decision I

If no COC associated with a release from the CAS is detected, then further assessment of the CAS is not required and the corrective action alternative of no further action will be selected. If a COC associated with a release from the CAS is detected, then additional sampling will be conducted to determine the extent of COC contamination. If the extent of the contamination is defined and additional remediation is feasible, contaminated media will be removed until all the contamination has been removed. If the extent of contamination has been determined and additional remediation is not feasible, then the extent of contamination will be defined and the contaminated area will be closed in place with appropriate use restrictions.

If the collection of verification samples confirm that all the contaminated media has been removed, then the clean closure objectives will have been met. If contamination still exists and additional remediation would violate the conditions of the SAFER, then work will stop and a consensus reached with NDEP on the path forward before continuing the investigation of the CAS.

B.3.2.2 Alternative Actions to Decision II

If sufficient information is available to define the extent of COC contamination and confirm that closure objectives were met, then further assessment of the CAS is not required. If sufficient information is not available to define the extent of contamination or confirm that closure objectives were met, then additional samples will be collected until the extent is defined.

B.4.0 Step 3 - Identify Information Inputs

Step 3 of the DQO process identifies the information needed, determines sources for information, and identifies sampling and analysis methods that will allow reliable comparisons with FALs.

B.4.1 Information Needs

To resolve Decision I (determine whether a COC is present at the CAS), samples need to be collected and analyzed following two criteria:

- Samples must be collected in areas most likely to contain a COC (judgmental sampling).
- The analytical suite selected must be sufficient to identify any COCs present in the samples.

To resolve Decision II (determine whether sufficient information is available to confirm that closure objectives were met at the CAS), samples must be collected and analyzed to meet the following criteria:

- Samples must be collected in areas contiguous to the contamination but where contaminant concentrations are below FALs.
- Samples of the waste or environmental media must provide sufficient information to characterize the IDW for disposal.
- Samples of the waste or environmental media must provide sufficient information to determine potential remediation waste types.
- Samples of material from Building 2201 must provide sufficient information to determine concentrations of potential source material.
- Samples and surveys of material remaining in Building 2201 must be sufficient to estimate future demolition wastes.
- The analytical suites selected must be sufficient to detect contaminants at concentrations equal to or less than their corresponding FALs.

B.4.2 Sources of Information

Information to satisfy Decision I and Decision II will be generated by sampling for COCs and sampling to characterize future demolition wastes. In all cases, sample collection and handling activities will follow standard procedures. Only validated data from analytical laboratories will be used to make DQO decisions.

Sampling for COCs will be done in areas most likely to contain a COC (judgmental sampling), and will include samples of environmental media, if necessary, and potential source material that could cause future contamination of the CAS. These areas include soils adjacent to or directly below contaminant pathways (if it is determined that a pathway from Building 2201 to environmental media exists), soils beneath the water tower, and material within Building 2201 and the wooden shed. Samples of potential source material includes materials in containers in Building 2201 and the wooden shed. Data generated from the sampling of potential source material must be sufficient to meet the quality requirements of the designated waste acceptance criteria.

Media samples and survey data will be used to characterize future demolition wastes from Building 2201. Samples from piping and tank insulation, floor and ceiling tile, and roofing material will be analyzed to determine the appropriate disposal strategy for these materials. Surveys of Building 2201 surfaces will be used to determine the extent of any remaining surface contamination and its potential impact on demolition wastes. All waste characterization data must be sufficient to meet the quality requirements of the designated waste acceptance criteria.

Waste disposal documentation, field surveys, and other appropriate information may also be used to ensure corrective actions were completed as planned.

B.4.2.1 Sample Locations

Design of the sampling approaches for the CAU 117 CAS must ensure that the data collected are sufficient for selection of the corrective action alternatives (EPA, 2002). To meet this objective, samples collected from the site should be from locations most likely to contain a COC, if present (judgmental sampling). These sample locations, therefore, can be selected using biasing factors for judgmental sampling (e.g., a stain, likely containing a spilled substance). Because sufficient data are available to develop a judgmental sampling plan, this approach was used to develop plans for sampling environmental media and potential source material at the CAS. Analytical suites for Decision I samples will include all COPCs identified in Table B.2-2.

Environmental media (soil) will be sampled in the event that a pathway from Building 2201 or the wooden shed to soil is confirmed. To determine whether such a pathway exists, historical documentation, surveys, interviews, and applied process knowledge will be used to determine the most likely locations for a contaminant release or barrier breach. Engineering drawings, visual inspections, examination of the Building 2201 foundation, and a review of Building 2201 drains covered in previous CASs, will be used to determine potential pathways from the building to environmental media. Environmental soil samples will be submitted to analytical laboratories meeting the quality criteria stipulated in the Industrial Sites QAPP (NNSA/NV, 2002a).

A judgmental sampling approach will also be used to select locations for samples taken from Building 2201 to determine potential source material. Sampled locations will depend on field-screening criteria and site history and process knowledge. Potential source material from Building 2201 and the wooden shed will be characterized as it is identified.

Samples of potential source material will include samples of unknown materials in containers and vaults.

Field-screening techniques may be used to select appropriate sampling locations by providing semiquantitative data that can be used to comparatively select samples to be submitted for laboratory analyses from several screening locations. The following field-screening methods and biasing factors may be applied at CAU 117:

- Walkover surface area radiological surveys: A radiological survey instrument will be used to detect locations of elevated radioactivity. Field-screening levels will be determined by RadCon personnel.

- Documented process knowledge on source and location of release (e.g., volume of release).

- Stains: Any spot or area on the soil surface or floor of Building 2201. Typically stains indicate an organic liquid such as oil has reached the soil (or the potential exists for the liquid to have reached the soil if found inside a structure at the CAS).

- Drums, containers, equipment or debris: Materials that may have been used at, or added to, a location, and that may have contained or come in contact with hazardous or radioactive substances at some point during their use.

- Preselected areas based on process knowledge of the site: Locations for which evidence such as historical photographs, experience from previous investigations, or interviewee's input, exists that a release of hazardous or radioactive substances may have occurred.
- Experience and data from investigations of similar sites.
- Other biasing factors: Factors not previously defined for the CAI but become evident once the investigation of the site is under way.

Decision II sample step-out locations will be selected based on the CSM, biasing factors, and existing data. Analytical suites will include those parameters that exceeded FALs (i.e., COCs) in prior samples. Biasing factors to support Decision II sample locations include Decision I biasing factors plus available analytical results.

B.4.2.2 Analytical Methods

Analytical methods are available to provide the data needed to resolve the decision statements. The analytical methods and laboratory requirements (e.g., detection limits, precision, and accuracy) are provided in Tables B.2-4 and B.2-5.

B.5.0 Step 4 - Define the Boundaries of the Study

Step 4 of the DQO process defines the target population of interest and its relevant spatial boundaries, specifies temporal and other practical constraints associated with sample/data collection, and defines the sampling units on which decisions or estimates will be made.

B.5.1 Target Populations of Interest

The population of interest to resolve Decision I ("Is any COC present in environmental media within the CAS, or does potential source material exist that, if released, could cause a COC in environmental media?") is any location within the site that is contaminated with any contaminant above a FAL. The populations of interest to resolve Decision II ("Is sufficient information available meet the closure objectives?") are:

- Each one of a set of locations bounding contamination in lateral and vertical directions.
- Investigation-derived waste or environmental media that must be characterized for disposal.
- Potential remediation waste.
- Environmental media where natural attenuation or biodegradation or construction/evaluation of barriers is considered.

B.5.2 Spatial Boundaries

Spatial boundaries are the maximum lateral and vertical extent of expected contamination at the CAS, including all media likely to come in contact with the environment. Contamination found beyond these boundaries may indicate a flaw in the CSM and may require re-evaluation of the CSM before the investigation can continue. The CAS is considered geographically independent and intrusive activities are not intended to extend into the boundaries of neighboring CASs. The lateral boundary for Building 2201 will be the exisiting building footprint (walls). The lateral boundary for the wooden shed will be the existing shed footprint (walls). The lateral boundary for the water tower will include the soil directly beneath the tower and in a 25-ft radius around the tower. The vertical boundary for all structures in scope at the CAS will be 15 ft bgs, approxmiately the extent of reach of a backhoe.

B.5.3 Practical Constraints

Practical constraints such as military activities at the NTS, weather (i.e., high winds, rain, lightning, extreme heat), underground utilities, and/or access restrictions may affect the ability to investigate this site.

B.5.4 Define the Sampling Units

The scale of decision making in Decision I is defined as the CAS. Any COC detected at any location within the CAS will cause the determination that the CAS is contaminated and needs further evaluation. The scale of decision making for Decision II is defined as a contiguous area contaminated with any COC originating from the CAS. Resolution of Decision II requires this contiguous area to be bounded laterally and vertically.

B.6.0 Step 5 - Develop the Analytic Approach

Step 5 of the DQO process specifies appropriate population parameters for making decisions, defines action levels and generates an "If … then … else" decision rule that defines the conditions under which possible alternative actions will be chosen. This step also specifies the parameters that characterize the population of interest, specifies the FALs, and confirms that the analytical detection limits are capable of detecting FALs.

B.6.1 Population Parameters

For judgmental sampling results, the population parameter is the observed concentration of each contaminant from each individual analytical sample. Each sample result will be compared to the FALs to determine the appropriate resolution to Decision I and Decision II. For Decision I, a single sample result for any contaminant exceeding a FAL would cause a determination that a COC is present within the CAS.

The Decision II population parameter is an individual analytical result from a bounding sample. For Decision II, a single bounding sample result for any contaminant exceeding a FAL would cause a determination that the contamination is not bounded.

B.6.2 Action Levels

The PALs presented in this section are to be used for site screening purposes. They are not necessarily intended to be used as cleanup action levels or FALs. However, they are useful in screening out contaminants that are not present in sufficient concentrations to warrant further evaluation and, therefore, streamline the consideration of remedial alternatives. The RBCA process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227, which lists the requirements for sites with soil contamination (NAC, 2006a). For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006b) requires the use of ASTM Method E 1739-95 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

This RBCA process defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- Tier 1 evaluation - sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., the PALs established in the SAFER plan). The FALs may then be established as the Tier 1 action levels, or the FALs may be calculated using a Tier 2 evaluation.

- Tier 2 evaluation - conducted by calculating Tier 2 SSTLs using site-specific information as inputs to the same or similar methodology used to calculate Tier 1 action levels. The Tier 2 SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual chemicals of concern will be compared to the SSTLs.

- Tier 3 evaluation - conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E 1739-95 that consider site-, pathway-, and receptor-specific parameters.

The comparison of laboratory results to FALs and the evaluation of potential corrective actions will be included in the investigation report. The FALs will be defined (along with the basis for their definition) in the investigation report.

B.6.2.1 Chemical PALs

Except as noted herein, the chemical PALs are defined as the EPA Region 9 PRGs for chemical contaminants in industrial soils (EPA, 2004a). Background concentrations for RCRA metals and zinc will be used instead of PRGs when natural background concentrations exceed the PRG, as is often the case with arsenic on the NTS. Background is considered the average concentration plus two standard deviations of the average concentration for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (formerly the Nellis Air Force Range) (NBMG, 1998; Moore, 1999). For detected chemical COPCs without established PRGs, the protocol used by the EPA Region 9 in establishing PRGs (or similar) will be used to establish PALs. If used, this process will be documented in the investigation report.

B.6.2.2 Total Petroleum Hydrocarbon PALs

The PAL for TPH is 100 ppm as listed in NAC 445A.2272 (NAC, 2006c).

B.6.2.3 Radionuclide PALs

The PALs for radiological contaminants (other than tritium) are based on the NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) scaled to 25 mrem/yr dose constraint (Murphy, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993). These PALs are based on the construction, commercial, and industrial land-use scenario provided in the guidance and are appropriate for the NTS based on future land use scenarios as presented in Section B.2.2.6. The PAL for tritium is based on the UGTA Project limit of 400,000 pCi/L for discharge of water containing tritium (NNSA/NV, 2002b).

Solid media such as concrete and/or structures may pose a potential radiological exposure risk to site workers if contaminated. The radiological PAL for solid media will be defined as the unrestricted-release criteria defined in the NV/YMP RadCon Manual (NNSA/NSO, 2004).

B.6.3 Decision Rules

The decision rules applicable to both Decision I and Decision II are:

- If COC contamination is inconsistent with the CSM or extends beyond the spatial boundaries identified in Section B.5.2, then work will be suspended and the investigation strategy will be reconsidered, else the decision will be to continue sampling to define the extent.

The decision rules for Decision I are:

- If contaminant concentrations in remaining environmental media exceed FALs, that contaminant is identified as a COC.
- If source material is present that, if released, has the potential to cause future contamination of site environmental media, then a corrective action is required.
- If no COCs or potential source material remain after SAFER activities, a corrective action alternative of no further action will be selected (pending demolition of Building 2201).
- If COCs or potential source material remain at the CAS after SAFER activities, a corrective action alternative of closure in place with use restrictions will be implemented, and Decision II will be resolved.

The decision rules for Decision II are:

- If a COC is detected through Decision I sampling, additional samples will be collected to determine the extent of contamination.
- If sufficient information is available to define the extent of COC contamination and confirm that closure objectives were met, no further assessment of the CAS is required.
- If sufficient information is not available to define the extent of contamination or confirm that closure objectives were met, then additional samples will be collected until the extent is defined.
- If the waste types, volumes, or costs of remaining demolition waste streams cannot be estimated, additional sampling and/or surveys will be performed.

If a COC is detected in environmental media or potential source material, additional sampling will be conducted to determine the extent of COC contamination. If the extent of the contamination is defined and additional remediation is feasible, then the contaminated media will be removed and a closure strategy of clean closure will be selected. If the extent of contamination has been determined and additional remediation is not feasible, then a closure strategy of close in place will be chosen and appropriate use restrictions will be applied.

B.7.0 Step 6 - Specify Performance or Acceptance Criteria

Step 6 of the DQO process defines the decision hypotheses, specifies controls against false rejection and false acceptance decision errors, examines consequences of making incorrect decisions from the test, and places acceptable limits on the likelihood of making decision errors.

B.7.1 Decision Hypotheses

The baseline condition (i.e., null hypothesis) and alternative condition for Decision I are:

- Baseline condition – A COC is present.
- Alternative condition – A COC is not present.

The baseline condition (i.e., null hypothesis) and alternative condition for Decision II are as follows:

- Baseline condition – The extent of a COC has not been defined.
- Alternative condition – The extent of a COC has been defined.

Decisions and/or criteria have false negative or false positive errors associated with their determination. The impact of these decision errors and the methods that will be used to control these errors are discussed in the following subsections. In general terms, confidence in DQO decisions based on judgmental sampling results will be established qualitatively by:

- The development of and concurrence of a CSM (based on process knowledge) by stakeholder participants during the DQO process,
- Testing the validity of CSMs based on investigation results, and
- Evaluating the quality of the data based on DQI parameters.

B.7.2 False Negative Decision Error

The false negative decision error would mean deciding that a COC is not present when it actually is (Decision I), or deciding that the extent of a COC has been defined when it has not (Decision II). In both cases, the potential consequence is an increased risk to human health and environment.

In judgmental sampling, the selection of the number and location of samples is based on knowledge of the feature or condition under investigation and on professional judgment (EPA, 2002). Judgmental sampling conclusions about the target population depend upon the validity and accuracy of professional judgment.

The false negative decision error (where consequences are more severe) for judgmental sampling designs is controlled by meeting these criteria:

- For Decision I, having a high degree of confidence that the sample locations selected will identify COCs if present anywhere within the CAS. For Decision II, having a high degree of confidence that the sample locations selected will identify the extent of COCs.
- Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
- Having a high degree of confidence that the dataset is of sufficient quality and completeness.

To satisfy the first criterion, Decision I samples must be collected in areas most likely to be contaminated by COCs (supplemented by random samples where appropriate). Decision II samples must be collected in areas that represent the lateral and vertical extent of contamination (above FALs). The following characteristics must be considered to control decision errors for the first criterion:

- Source and location of release
- Chemical nature and fate properties
- Physical transport pathways and properties
- Hydrologic drivers

These characteristics were considered during the development of the CSM and selection of sampling locations. The field-screening methods and biasing factors listed in Section B.4.2.1 will be used to further ensure that appropriate sampling locations are selected to meet these criteria. Radiological survey instruments and field-screening equipment will be calibrated and checked in accordance with the manufacturer's instructions and approved procedures. The investigation report will present an assessment on the DQI of representativeness that samples were collected from those locations that best represent the populations of interest as defined in Section B.5.1.

To satisfy the second criterion, Decision I samples will be analyzed for the chemical and radiological parameters listed in Sections 3.1 and B.2.0 of this document. Decision II samples will be analyzed for those chemical and radiological parameters that identified unbounded COCs. The DQI of sensitivity will be assessed for all analytical results to ensure that all sample analyses had measurement sensitivities (detection limits) that were less than or equal to the corresponding FALs. If this criterion is not achieved, the affected data will be assessed (for usability and potential impacts on meeting site investigation objectives) in the investigation report.

To satisfy the third criterion, the entire dataset, as well as individual sample results, will be assessed against the DQIs of precision, accuracy, comparability, and completeness as defined in the Industrial Sites QAPP (NNSA/NV, 2002a) and in Section 7.2 of this document. The DQIs of precision and accuracy will be used to assess overall analytical method performance as well as to assess the need to potentially "flag" (qualify) individual contaminant results when corresponding QC sample results are not within the established control limits for precision and accuracy. Data qualified as estimated for reasons of precision or accuracy may be considered to meet the constituent performance criteria based on an assessment of the data. The DQI for completeness will be assessed to ensure that all data needs identified in the DQO have been met. The DQI of comparability will be assessed to ensure that all analytical methods used are equivalent to standard EPA methods so that results will be comparable to regulatory action levels that have been established using those procedures. Strict adherence to established procedures and QA/QC protocol protects against false negatives. Site-specific DQIs are discussed in more detail in Section 7.2 of this document.

To provide information for the assessment of the DQIs of precision and accuracy, the following QC samples will be collected as required by the Industrial Sites QAPP (NNSA/NV, 2002a):

- Field duplicates (minimum of 1 per matrix per 20 environmental samples)
- Laboratory QC samples (minimum of 1 per matrix per 20 environmental samples or 1 per CAS per matrix, if less than 20 collected)

B.7.3 False Positive Decision Error

The false positive decision error would mean deciding that a COC is present when it is not, or a COC is unbounded when it is not, resulting in increased costs for unnecessary sampling and analysis.

False positive results are typically attributed to laboratory and/or sampling/handling errors that could cause cross contamination. To control against cross contamination, decontamination of sampling equipment will be conducted according to established and approved procedures and only clean sample containers will be used. To determine whether a false positive analytical result may have occurred, the following QC samples will be collected as required by the Industrial Sites QAPP (NNSA/NV, 2002a):

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per source lot per sampling event)
- Field blanks (minimum of 1 per 20 environmental samples)

B.8.0 Step 7 - Develop the Plan for Obtaining Data

Step 7 of the DQO process selects and documents a design that will yield data that will best achieve performance or acceptance criteria. A judgmental sampling scheme will be implemented to select sample locations and evaluate analytical results for CAU 117. Sections B.8.1 and B.8.2 contain general information about collecting Decision I and Decision II samples under a judgmental sampling design, while the subsequent sections provide sampling activities, including proposed sample locations.

B.8.1 Decision I Sampling

A judgmental sampling design will be implemented for CAS 26-41-01. Because individual sample results, rather than an average concentration, will be used to compare to FALs at the CAS, statistical methods to generate site characteristics will not be used. Adequate representativeness of the entire target population may not be a requirement to developing a sampling design. If good prior information is available on the target site of interest, then the sampling may be designed to collect samples only from areas known to have the highest concentration levels on the target site. If the observed concentrations from these samples are below the action level, then a decision can be made that the site contains safe levels of the contaminant without the samples being truly representative of the entire area (EPA, 2006).

All sample locations will be selected to satisfy the DQI of representativeness in that samples collected from selected locations will best represent the populations of interest as defined in Section B.5.1. To meet this criterion for judgmentally sampled sites, a biased sampling strategy will be used for Decision I samples to target areas with the highest potential for contamination, if it is present anywhere in the CAS. Sample locations will be determined based on process knowledge, previously acquired data, or the field-screening and biasing factors listed in Section B.4.2. If biasing factors are present in soils below locations where Decision I samples were removed, additional Decision I soil samples will be collected at depth intervals selected by the Site Supervisor based on biasing factors to a depth where the biasing factors are no longer present. The Site Supervisor has the discretion to modify the judgmental sample locations, but only if the modified locations meet the decision needs and criteria stipulated in this DQO.

B.8.2 Decision II Sampling

To meet the DQI of representativeness for Decision II samples (that Decision II sample locations represent the population of interest as defined in Section B.5.1), judgmental sampling locations at the CAS will be selected based on the outer boundary sample locations where COCs were detected, the CSM, and other field-screening and biasing factors listed in Section B.4.2. In general, sample locations will be arranged in a triangular pattern around the Decision I location or area at distances based on site conditions, process knowledge, and biasing factors. If COCs extend beyond the initial step-outs, Decision II samples will be collected from incremental step-outs. Initial step-outs will be at least as deep as the vertical extent of contamination defined at the Decision I location and the depth of the incremental step-outs will be based on the deepest contamination observed at all locations. A clean sample (i.e., COCs less than FALs) collected from each step-out direction (lateral or vertical) will define extent of contamination in that direction. The number, location, and spacing of step-outs may be modified by the Site Supervisor, as warranted by site conditions.

B.8.3 Sampling Design

This section discusses the specific sampling design for CAS 26-41-01, Pluto Disassembly Facility. The sampling plan will focus on the following:

- Identifying and sampling any releases to environmental media.
- Identifying and removing potential source material from Building 2201 and the wooden shed.
- Characterizing SAFER wastes such as IDW and readily removable wastes from Building 2201.
- Collecting information for estimating demolition waste types, volumes, and costs.

Actual sampling locations will be selected based on biasing factors (i.e., cracks or staining of the Building 2201 foundation) and site conditions as documented during the initial visual inspection.

During Decision I sampling, soil samples will be collected from locations based on biasing factors (i.e., cracks or staining of the Building 2201 foundation), if it is determined likely that a breach in the Building 2201 barrier has occurred. If it is determined that soil sampling is necessary, the concrete floor of the Building 2201 basement will be penetrated to reach soil most likely to be contaminated.

Soil samples will also be collected adjacent to Building 2201 if it is determined that a pathway to soil exists from a spill originating in Building 2201. Based on preliminary site investigations it is considered unlikely that such a breach in the Building 2201 containment has occurred.

Decision I samples will also be taken to assess potential source material within Building 2201 and the wooden shed. Samples of material removed during SAFER activities will be taken for waste characterization purposes, as such material is identified. The actual locations of these Decision I samples will be selected based on biasing factors (i.e., process knowledge and results from historical surveys) and site conditions as documented during the initial visual inspection.

After completion of SAFER activities, building media samples and radiological smears/surveys will be taken to collect information for estimating demolition waste types, volumes and costs. These samples will include:

- Surveys (fixed and removable) of Building 2201 surfaces for radiological contamination and beryllium.
- Roofing material, acoustical ceiling tiles, asphalt floor tiles, piping and tank insulation, and other suspected material will be sampled for asbestos.

B.9.0 References

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NAC, see *Nevada Administrative Code*.

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Appendix C

Nevada Division of Environmental Protection Comments

(1 Pages)

NEVADA ENVIRONMENTAL RESTORATION PROJECT
DOCUMENT REVIEW SHEET

1. Document Title/Number Draft Streamlined Approach for Environmental Restoration (SAFER) Plan for Corrective Action Unit 117: Area 26 Pluto Disassembly Facility, Nevada Test Site, Nevada
2. Document Date August 2007
3. Revision Number 0
4. Originator/Organization Stoller-Navarro
5. Responsible DOE/NV ERP Project Mgr. Kevin J. Cabble
6. Date Comments Due September 3, 2007
7. Review Criteria Full
8. Reviewer/Organization/Phone No. Donne Elle and Dennis Nicodemus, NDEP, 486-2850
9. Reviewer's Signature

10. Comment Number/ Location	11. Type[a]	12. Comment	13. Comment Response	14. Accept
1) General Comment	M	The septic/drainage lines from Building 2201 to drainage fields associated with CAU 271 were sealed before the septic tanks. These same lines should be sealed at or near Building 2201 and the SAFER document should reflect that this is going to be a future task to be completed before closure to limit any pathway for possible contamination release.	Section 4.2.3.1 has been revised to include a statement indicating that, "drain lines exiting Building 2201 will be tapped and drained, and the pipe section ends will be plugged and sealed to prevent a potential release of contamination".	
2) Section 2.3.6, Page 25	M	Please include the release level for lead surface contamination as done with beryllium.	There presently is no release level for lead surface contamination. All action levels associated with lead are for airborne lead exposure (for worker health and safety).	
3) Section 2.3.6, Page 25 and Section 4.1.4, Page 42	M	It is not accurate to say the beryllium swipe samples are 'well below' the release levels considering the highest sample came back at .13 ug/100cm2. Suggest using 'below'.	Text has been revised as suggested.	
4) Section 3.2.1.3, 3rd Paragraph, Page 35	M	Please include the radiological PAL for solid media definition as referred to in the RadCon Manual.	The NV/YMP RadCon Manual was incorrectly referenced in this section, and the 3rd paragraph of this section has been deleted. The radiological PALs applicable to solid media and debris are described in the 1st paragraph of section 3.2.1.2. NV/YMP unrestricted release criteria applies to the release of equipment and material for public use.	
5) Section 6.2.2, 2nd Paragraph, Page 54	M	Include Table 4-2 from the RadCon Manual.	Table 4-2 from the NV/YMP RadCon Manual has been included in the SAFER document.	

[a]Comment Types: M = Mandatory, S = Suggested.

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