

**FINAL INDUSTRIAL AREA  
SAMPLING AND ANALYSIS PLAN  
FY04 ADDENDUM #IA-04-04  
IHSS GROUP 100-1  
UBC 122 (MEDICAL FACILITY)  
AND IHSS 000-121 TANK T-1 (OPWL)**

**NOVEMBER 2003**

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Approval received from the Colorado Department of Public Health and Environment  
November 20, 2003.  
Approval letter contained in the Administrative Record.

**NOVEMBER 2003**

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## ACRONYMS

AL	action level
CDPHE	Colorado Department of Public Health and Environment
DOE	U.S. Department of Energy
FY	Fiscal Year
HPGe	high purity germanium
HRR	Historical Release Report
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
MDL	method detection limit
mg/kg	milligrams per kilogram
N/A	not applicable
NPWL	New Process Waste Lines
OPWL	Original Process Waste Lines
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PCOC	potential contaminant of concern
RFCA	Rocky Flats Cleanup Agreement
SAP	Sampling and Analysis Plan
UBC	under building contamination
VOC	volatile organic compound

## **1.0 INTRODUCTION**

This Industrial Area (IA) Sampling and Analysis Plan (SAP) (IASAP) Addendum #IA-04-04 includes Individual Hazardous Substance Site (IHSS)-specific information, sampling locations, and potential contaminants of concern (PCOCs) for IHSS Group 100-1, which is proposed for characterization during Fiscal Year (FY) 04. This IASAP Addendum is a supplement to the IASAP (DOE 2001). IHSS Group 100-1 is located in the west-central portion of the IA, beneath and around Building 122 (Figure 1). IHSS Group 100-1 consists of the following Under Building Contamination (UBC) sites and IHSSs:

- UBC 122 – Building 122 Medical Facility; and
- IHSS 000-121 – Tank T-1 Original Process Waste Lines (OPWL).

Building 122 housed (until September 2003) the on-site medical facilities of the Plant and the occupational health and internal dosimetry organizations. Emergency medical services, diagnosis, decontamination, first aid, x-ray, minor surgical treatment, and ambulatory activities were carried out in this building. The building also contained clinical facilities to support routine employee and subcontractor physical examinations. Body counting, to measure radioactive material in the body, was also conducted. The facility contains three general areas: administration, internal dosimetry, and medical/health.

Building 122 went into service in 1953. Major additions were made in approximately 1967, 1969, and 1989. Other smaller additions and internal modifications were also made during the building's service life.

Very few chemicals were used in Building 122, and only small volumes of chemical wastes were generated. Chemicals used in Building 122 were principally related to development of x-ray film (e.g., fixers and developers) and decontamination of workers (e.g., water, Clorox, soap, and hydrogen peroxide). Fixers and developers consisted of inorganic chemicals, with silver being the long-term contaminant of concern. Most of the film development work and related chemical storage occurred in Room 109. Starting in the mid-1980s, spent fixers were stored in a satellite accumulation area in Room 109. Developers and associated water were discharged into the sanitary system. Decontamination fluids originally drained to Tank T-1. After the tank was removed, the building was connected to the new process waste line (NPWL) system. No records were found indicating that x-ray chemicals or decontamination fluids either spilled or leaked within the building.

The Historical Release Report discusses research studies related to beryllium, plutonium, americium, and uranium (DOE 1992-2002). No records have been found indicating the exact location of these studies within Building 122, nor is there indication that spills or releases to the environment occurred. The presumption is that only small quantities of these elements were involved in the studies and that they were contained within the building.

Tank T-1 was an 800-gallon stainless steel storage tank used to collect wastewater streams from Building 122, the Medical Facility. The Historical Site Assessment (DOE 2003) states that the tank was located above ground. Other reports and available diagrams indicate it was located below ground (DOE 1992, 1994, DOW 1959). Waste drained from the building to the tank. When the tank was full, waste was pumped out to a tank truck and then discharged to the original process waste line (OPWL) system. Waste included trace radionuclides, bleach, soap, blood, and hydrogen peroxide. The tank was removed in January 1984.

**2.0 EXISTING CHARACTERIZATION INFORMATION**

Limited characterization information exists for the UBC Site and IHSS. The list of PCOCs was derived from historical process knowledge, interviews with building personnel and a building walkdown, and limited characterization data. Existing information and data for the UBC Site and IHSS are available in Appendix C of the IASAP (DOE 2001), the Historical Release Reports (HRRs) (DOE 1992-2003), and the IA Data Summary Report (DOE 2000). Table 1 presents the PCOCs.

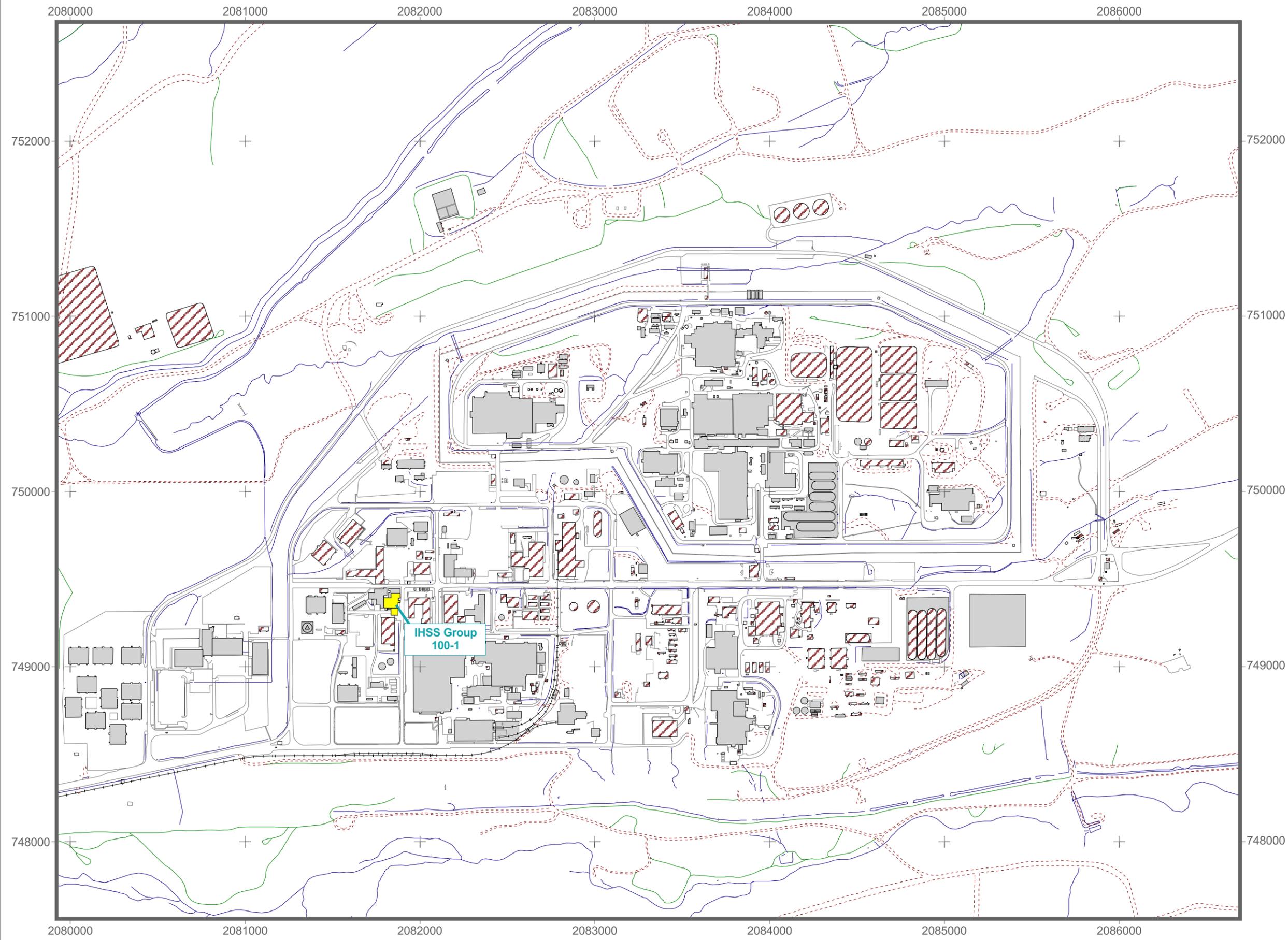
**Table 1  
IHSS Group 100-1 PCOCs**

<b>IHSS Group</b>	<b>IHSS/PAC/UBC Site</b>	<b>Media</b>	<b>PCOCs</b>	<b>Data Source</b>	<b>Sampling Method</b>
100-1	UBC 122 Building 122 Medical Facility	Surface and subsurface soil	Radionuclides Metals	HRRs (DOE 1992-2003) Process knowledge (DOE 2001)	Biased
	IHSS 000-121 Tank T-1 OPWL	Surface and subsurface soil	Radionuclides Metals	HRRs (DOE 1992-2003) Process knowledge (DOE 2001) Sampling results	Biased

Existing analyte concentrations and activities above the background means plus two standard deviations (BM+2SD) or method detection limits (MDLs) (DOE 2001) are presented on Figure 2. Three existing subsurface soil-sampling locations (01095, 01195, and 01295) lie south of UBC 122 and were intended to investigate the Tank T-1 site. Soil at all three locations was analyzed for metals and radionuclides. Only borehole 01295 was analyzed for VOCs. Data indicate that plutonium-239/240 and americium-241 results were less than the Wildlife Refuge Worker (WRW) and Ecological Receptor (“ECO”) Action Levels (AL) (Figure 2). Metals were less than BM+2SD, and VOCs were less than MDLs.

The existing soil sampling locations that were intended to overlie the IHSS 000-121 Tank T-1 site do not coincide with the tank as plotted on the map. This is probably because of a discrepancy in determining the exact location of the tank because it had been removed before the IHSS was identified. Building drawings were evaluated to determine where the tank was located; however, no information exists as to the exact location.

**Figure 1**  
**IHSS Group 100-1**  
**Location Map**



**KEY**

-  IHSS Group 100-1
-  Paved Road
-  Dirt Road
-  Trail
-  Railroad
-  Stream
- Buildings**
-  Demolished
-  Standing

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 9/18/2003

  
  
 Scale = 1:6500  
 State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum: NAD 27

U.S. Department of Energy  
 Rocky Flats Environmental Technology Site

Prepared for:



Prepared by:



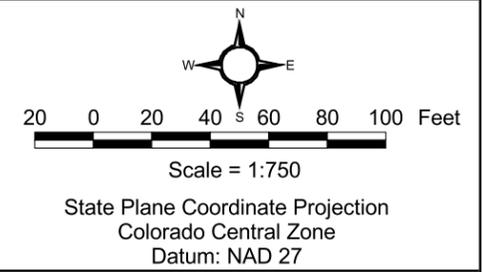
**Figure 2**  
**IHSS Group 100-1**  
**Existing Subsurface Soil Sampling**  
**Results Above Background Means**  
**Plus Two Standard Deviations**  
**Or Method Detection Limits**

**KEY**

-  UBC-122
-  IHSS 000-121, Tank T-1
-  Floorplan Buildings 121 & 122
-  Paved Road
-  Dirt Road
-  NPWL
-  Buildings Demolished
-  Buildings Standing

Existing Soil Sampling Location (50 ft. buffer)  
 Subsurface Detection Greater than  
 Background Mean + 2 Standard Deviations  
 but Less than Wildlife Refuge Worker  
 or Ecological Receptor Action Levels

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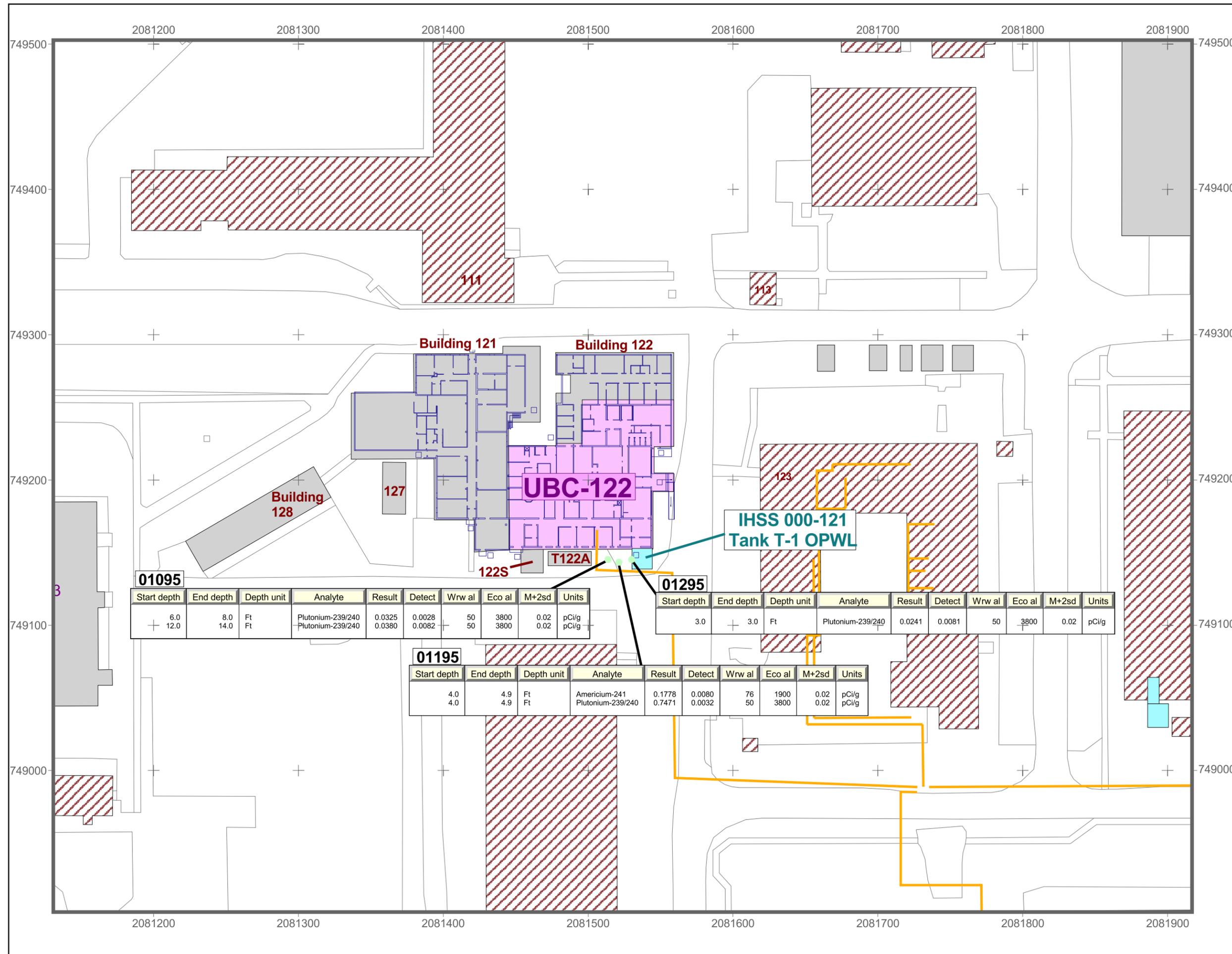


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**01095**

Start depth	End depth	Depth unit	Analyte	Result	Detect	Wrw al	Eco al	M+2sd	Units
6.0	8.0	Ft	Plutonium-239/240	0.0325	0.0028	50	3800	0.02	pCi/g
12.0	14.0	Ft	Plutonium-239/240	0.0380	0.0082	50	3800	0.02	pCi/g

**01295**

Start depth	End depth	Depth unit	Analyte	Result	Detect	Wrw al	Eco al	M+2sd	Units
3.0	3.0	Ft	Plutonium-239/240	0.0241	0.0081	50	3800	0.02	pCi/g

**01195**

Start depth	End depth	Depth unit	Analyte	Result	Detect	Wrw al	Eco al	M+2sd	Units
4.0	4.9	Ft	Americium-241	0.1778	0.0080	76	1900	0.02	pCi/g
4.0	4.9	Ft	Plutonium-239/240	0.7471	0.0032	50	3800	0.02	pCi/g

The location of IHSS 000-121, as shown on the figures herein, is the best estimate for the area that contained the tank. If field activities find indications of the former tank, such as staining or backfill, sampling locations and/or intervals will be modified to take them into consideration.

Sinks and showers are present in several parts of the building, and their historical use was evaluated in terms of sampling locations and PCOCs. The building was also evaluated in terms of surface radioactive contamination. Historical information indicates that two areas were significantly contaminated by removable radioactive particulates. These areas were decontaminated to the standard of the time.

The body counting rooms have steel walls with lead, tin, and zinc plating. It is highly unlikely that these metals leached in any significant quantities and migrated into the soil. However, metals are PCOCs at all locations being sampled.

Polychlorinated biphenyls (PCBs) were in oils used in the x-ray equipment. However, because only a small amount of PCBs was present, no PCB spills were documented, and no migration pathway is evident, PCBs are not PCOCs.

### **3.0 SAMPLING**

The proposed number and types of samples for IHSS Group 100-1 are summarized in Table 2 and shown on Figure 3. Specific sampling requirements are listed in Table 3. Only biased sampling locations will be used, and they are based on existing information.

**Table 2  
Sampling Summary**

<b>Category</b>	<b>Total</b>
Number of Sampling Locations	8
Number of Samples	32
Number of Radionuclide Analyses	32
Number of Metal Analyses	32

Figure 3

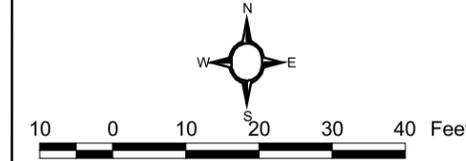
Proposed Sampling Locations for IHSS Group 100-1

KEY

- Bias Sampling Locations
- UBC-122
- IHSS 000-121, Tank T-1
- ~ Floorplan Buildings 121 & 122
- ~ Paved Road
- ~ NPWL
- ~ Sewer
- Building Demolished
- Standing

Existing Soil Sampling Location (50 ft. buffer) Subsurface Detection Greater than Background Mean + 2 Standard Deviations but Less than Wildlife Refuge Worker or Ecological Receptor Action Levels

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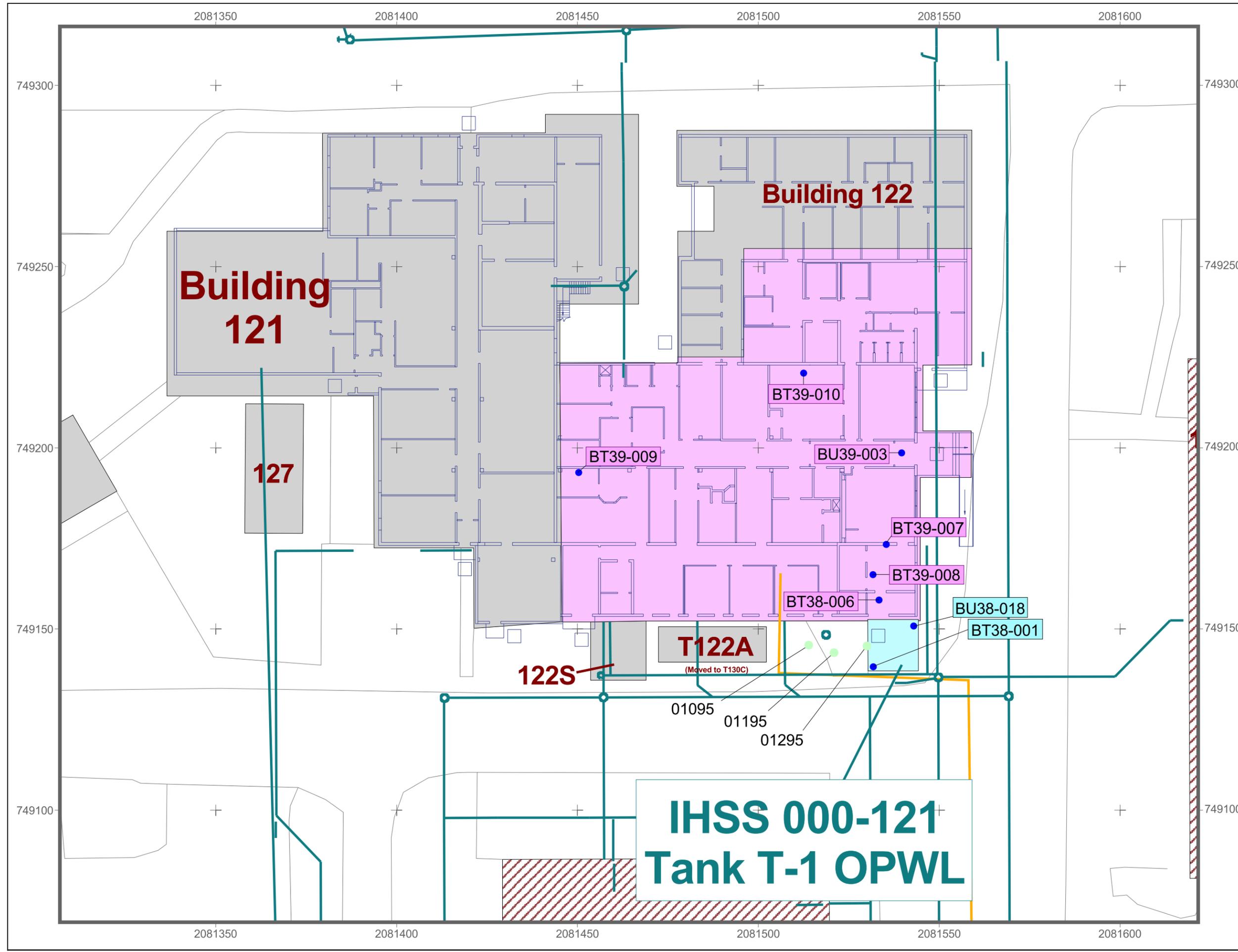


Scale = 1:300  
State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD 27

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Because of the uncertainty associated with the tank location, two sampling locations (BT38-001 and BU38-018) were selected to assess potential contamination in the area of the former Tank T-1. Samples will be collected from seven intervals, extending from the surface to 12.5 feet to adequately characterize potential pathways whether the tank was above or below ground.

Sampling Locations BT38-006, BT39-007, and BT39-008 were selected to determine if any radioactive contamination has reached soil underneath Building 122 from decontamination activities in adjacent rooms. Location BT39-007 is positioned where the drain from a cadaver table in Room 119 entered the wall. Location BT39-008 is positioned under Room 127 to assess the co-mingled drain from four grouted showers in Room 127A. Patches in the floor of Room 127 (containing BT39-008) are the result of repairs to the drain system after contamination of the cadaver table and shower room (personal communication R. Bistline). Results from Sampling Location BT38-006 will supplement data from the two adjacent locations because it is also located along the drain line. Samples in this area will be collected from 4 intervals to a depth of 6.5 feet in order to ensure that potential contamination from the drain line is identified.

Sampling Locations BT39-010 and BU39-003 are positioned to assess radioactive surface contamination. Sampling Location BT39-010 is in a ward area where the floor was contaminated by particulate radionuclides beneath a bed. The area was decontaminated at the time. Because of carpeting in the area, it is difficult to assess obvious pathways to the soil. Location BT39-010 will be sampled for radionuclides and metals in one interval from 0.0 to 0.5 feet below the slab to check for contamination. Similarly, Location BU39-003 had particulate radioactive contamination. The location is in the Building 122 entryway, which was contaminated by a worker disrobing. The area was decontaminated, and floor tiles were removed and replaced. There are no obvious pathways to the soil. One interval at Location BU39-003 will be sampled from 0.0 to 0.5 feet in depth to assess conditions below the slab.

Sampling Location BT39-009 is located in Room 109 where x-ray film was developed and related chemicals were stored. Samples at Location BT39-003 will be collected from 4 intervals to a depth of 6.5 feet to look for potential contamination originating from two sinks in the room. The location was selected because it is half way between the sinks (one sanitary and one process waste) along the northern wall of the room.

Proposed new sampling locations are the starting point for IHSS Group characterization. After characterization starts, the number and type of samples may change based on sampling results. If contaminant concentrations are found to be above ALs near and under the Building 122 slab, additional samples will be collected in consultation with the regulatory agencies, and a contact record will be issued. Sampling locations will be field-checked and adjusted if necessary through the consultative process. In addition, after the slab is removed, additional sampling will be conducted if staining is observed. Details will be developed in consultation with the regulatory agencies.

**Table 3**  
**Sampling Specifications for IHSS Group 100-1**

IHSS Group	IHSS/PAC/UBC	Location Code	Easting	Northing	Media	Depth Interval	Analyte	On-site Laboratory Method	Off-site Laboratory Method
100-1	IHSS 000-121 Tank T-1 at Medical Facility Building (Biased Samples)	BT38-001A	2081531.718	749139.535	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001A	2081531.718	749139.535	Surface Soil	0-0.5'	Metal	6200	6010
		BT38-001B	2081531.718	749139.535	Subsurface Soil	0.5-2.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001B	2081531.718	749139.535	Subsurface Soil	0.5-2.5'	Metal	6200	6010
		BT38-001C	2081531.718	749139.535	Subsurface Soil	2.5-4.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001C	2081531.718	749139.535	Subsurface Soil	2.5-4.5'	Metal	6200	6010
		BT38-001D	2081531.718	749139.535	Subsurface Soil	4.5-6.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001D	2081531.718	749139.535	Subsurface Soil	4.5-6.5'	Metal	6200	6010
		BT38-001E	2081531.718	749139.535	Subsurface Soil	6.5-8.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001E	2081531.718	749139.535	Subsurface Soil	6.5-8.5'	Metal	6200	6010
		BT38-001F	2081531.718	749139.535	Subsurface Soil	8.5-10.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001F	2081531.718	749139.535	Subsurface Soil	8.5-10.5'	Metal	6200	6010
		BT38-001G	2081531.718	749139.535	Subsurface Soil	10.5-12.5'	Radionuclides	HPGe	Alpha Spec
		BT38-001G	2081531.718	749139.535	Subsurface Soil	10.5-12.5'	Metal	6200	6010
100-1	UBC 122 Medical Facility Building (Biased Samples)	BT38-006A	2081533.367	749157.934	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BT38-006A	2081533.367	749157.934	Surface Soil	0-0.5'	Metal	6200	6010
		BT38-006B	2081533.367	749157.934	Subsurface Soil	0.5-2.5'	Radionuclides	HPGe	Alpha Spec
		BT38-006B	2081533.367	749157.934	Subsurface Soil	0.5-2.5'	Metal	6200	6010
		BT38-006C	2081533.367	749157.934	Subsurface Soil	2.5-4.5'	Radionuclides	HPGe	Alpha Spec
		BT38-006C	2081533.367	749157.934	Subsurface Soil	2.5-4.5'	Metal	6200	6010
		BT38-006D	2081533.367	749157.934	Subsurface Soil	4.5-6.5'	Radionuclides	HPGe	Alpha Spec
		BT38-006D	2081533.367	749157.934	Subsurface Soil	4.5-6.5'	Metal	6200	6010
		BT39-007A	2081535.299	749173.299	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BT39-007A	2081535.299	749173.299	Surface Soil	0-0.5'	Metal	6200	6010
		BT39-007B	2081535.299	749173.299	Subsurface Soil	0.5-2.5'	Radionuclides	HPGe	Alpha Spec
		BT39-007B	2081535.299	749173.299	Subsurface Soil	0.5-2.5'	Metal	6200	6010
		BT39-007C	2081535.299	749173.299	Subsurface Soil	2.5-4.5'	Radionuclides	HPGe	Alpha Spec
		BT39-007C	2081535.299	749173.299	Subsurface Soil	2.5-4.5'	Metal	6200	6010
		BT39-007D	2081535.299	749173.299	Subsurface Soil	4.5-6.5'	Radionuclides	HPGe	Alpha Spec
		BT39-007D	2081535.299	749173.299	Subsurface Soil	4.5-6.5'	Metal	6200	6010
		BT39-008A	2081531.653	749164.965	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BT39-008A	2081531.653	749164.965	Surface Soil	0-0.5'	Metal (including Be)	N/A	6010
BT39-008B	2081531.653	749164.965	Subsurface Soil	0.5-2.5'	Radionuclides	HPGe	Alpha Spec		

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IHSS Group	IHSS/PAC/UBC	Location Code	Easting	Northing	Media	Depth Interval	Analyte	On-site Laboratory Method	Off-site Laboratory Method
100-1	UBC 122 Medical Facility Building (Biased Samples)	BT39-008B	2081531.653	749164.965	Subsurface Soil	0.5-2.5'	Metal (including Be)	N/A	6010
		BT39-008C	2081531.653	749164.965	Subsurface Soil	2.5-4.5'	Radionuclides	HPGe	Alpha Spec
		BT39-008C	2081531.653	749164.965	Subsurface Soil	2.5-4.5'	Metal (including Be)	N/A	6010
		BT39-008D	2081531.653	749164.965	Subsurface Soil	4.5-6.5'	Radionuclides	HPGe	Alpha Spec
		BT39-008D	2081531.653	749164.965	Subsurface Soil	4.5-6.5'	Metal (including Be)	N/A	6010
		BT39-009A	2081450.294	749193.090	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BT39-009A	2081450.294	749193.090	Surface Soil	0-0.5'	Metal	6200	6010
		BT39-009B	2081450.294	749193.090	Subsurface Soil	0.5-2.5'	Radionuclides	HPGe	Alpha Spec
		BT39-009B	2081450.294	749193.090	Subsurface Soil	0.5-2.5'	Metal	6200	6010
		BT39-009C	2081450.294	749193.090	Subsurface Soil	2.5-4.5'	Radionuclides	HPGe	Alpha Spec
		BT39-009C	2081450.294	749193.090	Subsurface Soil	2.5-4.5'	Metal	6200	6010
		BT39-009D	2081450.294	749193.090	Subsurface Soil	4.5-6.5'	Radionuclides	HPGe	Alpha Spec
		BT39-009D	2081450.294	749193.090	Subsurface Soil	4.5-6.5'	Metal	6200	6010
		BT39-010A	2081512.534	74220.564	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
BT39-010A	2081512.534	74220.564	Surface Soil	0-0.5'	Metal	6200	6010		
100-1	IHSS 000-121 Tank T-1 at Medical Facility Building (Biased Samples)	BU38-018A	2081542.916	749150.733	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018A	2081542.916	749150.733	Surface Soil	0-0.5'	Metal	6200	6010
		BU38-018B	2081542.916	749150.733	Subsurface Soil	0.5-2.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018B	2081542.916	749150.733	Subsurface Soil	0.5-2.5'	Metal	6200	6010
		BU38-018C	2081542.916	749150.733	Subsurface Soil	2.5-4.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018C	2081542.916	749150.733	Subsurface Soil	2.5-4.5'	Metal	6200	6010
		BU38-018D	2081542.916	749150.733	Subsurface Soil	4.5-6.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018D	2081542.916	749150.733	Subsurface Soil	4.5-6.5'	Metal	6200	6010
		BU38-018E	2081542.916	749150.733	Subsurface Soil	6.5-8.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018E	2081542.916	749150.733	Subsurface Soil	6.5-8.5'	Metal	6200	6010
		BU38-018F	2081542.916	749150.733	Subsurface Soil	8.5-10.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018F	2081542.916	749150.733	Subsurface Soil	8.5-10.5'	Metal	6200	6010
		BU38-018G	2081542.916	749150.733	Subsurface Soil	10.5-12.5'	Radionuclides	HPGe	Alpha Spec
		BU38-018G	2081542.916	749150.733	Subsurface Soil	10.5-12.5'	Metal	6200	6010
100-1	UBC 122 Medical Facility Building (Biased Samples)	BU39-003A	2081539.617	749198.559	Surface Soil	0-0.5'	Radionuclides	HPGe	Alpha Spec
		BU39-003A	2081539.617	749198.559	Surface Soil	0-0.5'	Metal	6200	6010

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