Addendum 1 to the Industrial Area Sampling and Analysis Plan Preliminary Building 771 Under Building Contamination

March 15, 2001

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LIST OF ACRONYMS

ASD	Analytical Services Division
CA	Contamination Area
CDPHE	Colorado Department of Public Health and Environment
COOP	Conduct of Operations
D&D	Decontamination and Decommissioning
DOE	Department of Energy
DQO	Data Quality Objective
HASP	Health and Safety Plan
HRR	Historical Release Report
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
IWCP	Integrated Work Control Program
JHA	Job Hazard Analysis
LOQI	List of Qualified Individuals
OPWL	Original Process Waste Lines
OU	Operable Unit
PAC	Potential Area of Concern
PCB	Polychlorinated biphenyl
QA	Quality Assurance
QC	Quality Control
RBA	Radiological Buffer Area
RLC	Reconnaissance Level Characterization
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RWP	Radiological Work Permit
SVOC	semivolatile organic compound
UBC	Under Building Contamination
VOC	volatile organic compound

1.0 INTRODUCTION

This document is an addendum to the Industrial Area Sampling and Analysis Plan (IASAP) for the Rocky Flats Environmental Technology Site (RFETS). As described in Section 1.3 of the IASAP, this document describes the sampling locations, potential contaminants, and any additional data quality objectives (DQOs), sampling and analysis approaches or health and safety concerns unique to a specific Individual Hazardous Substance Site (IHSS), Potential Area of Concern (PAC) and/or Under Building Contamination (UBC) site scheduled for evaluation.

This addendum describes the preliminary characterization of Building 771 UBC to assist the Decontamination and Decommissioning (D&D) group in developing a strategy for building demolition. For this project no additional DQOs or sampling approaches from those in the IASAP were identified. The project-specific health and safety requirements will be addressed in the project Health and Safety Plan (HASP).

Samples will be collected near the inside perimeter of Building 771 to support the development of the demolition strategy. Current D&D plans include leaving the outside walls and as much of the building foundation as possible in place. For this approach to be successful, the 771 Closure Project personnel have determined that the building footings and concrete slab within 10 feet of the inside-building perimeter must be left in place to maintain structural integrity of the building's shell. This characterization will evaluate whether the soil beneath the foundation footing requires removal. Based on the characterization results, a decision will be made (by D&D) as to whether the building shell can be retained.

At a later date, additional characterization sampling for determining remedial actions will address the remainder of the Building 771 UBC, the Building 774 UBC and all associated IHSSs and PACs in the 700-4 Group.

2.0 BUILDING 771 SITE DESCRIPTION

Building 771 is located in the north-central portion of the Industrial Area, approximately 500 feet south of North Walnut Creek (Figure 1). Building 771 is a two-story, structural-frame building of reinforced concrete construction. The first-floor footprint encompasses an area of approximately 78,000 square feet. Building 771 was constructed into a north-facing hill slope along the southern bank of the North Walnut Creek drainage.

Building 771 became operational in 1953. Building 771 functions consisted of plutonium foundry and machining operations; coating inspection, radiography, parts, and shipping; residue and metal recovery for metal recycle; chemistry and metallurgy research and development; and, analytical laboratory for the building operations.

Suspected UBC is based on documented releases that are discussed in the *Historical Release Report* (HRR) (DOE 1992). Additionally, releases from original process waste lines (OPWL) that are located beneath or within the foundation of Building 771 and below grade tanks within or adjacent to the facility may have resulted in UBC.

3.0 EXISTING INFORMATION

Several sources of information, including process knowledge, historical spill or release chronologies, OPWL investigations, environmental samples from foundation drains, boreholes, and groundwater wells, were used to optimize the sampling design. The chemical processes applied in Building 771 are described in several reports:

- Facility History for Building 771 at the Rocky Flats Plant, compiled for EM-30 by M.H. Chew & Associates, 1992;
- A History of the Rocky Flats Plutonium/Actinide Recovery Plant – 1952 to 1991. EG&G Rocky Flats, Production Technology Development Report, RT92-003, February, 1992; and,
- Historical Release Report Building Histories (Draft), Department of Energy (DOE) Rocky Flats, June 1994.

4.0 APPROACH

The sampling design is biased in areas of known or suspected releases around the inside perimeter structural supports and along expansion joints and footings within the interior of Building 771.

4.1 Potential Contaminants

The process-related chemicals handled in Building 771 and transferred via the OPWL system are summarized in Chew (1992) and DOE (1994). Release histories are provided in Chew (1992), the HRR (DOE 1992), and the HRR Annual Update (DOE 2000). The Building 771/774 Cluster Closure Project Reconnaissance Level Characterization Report includes data on the RLC (DOE 1998). These data sources were used to identify potential contaminants that are listed in Table 1.

Table 1. Potential Contaminants.

Contaminant Group	Potential Contaminants
Radionuclides	americium, plutonium, uranium
Metals	chromium, cadmium, beryllium, silver, lead, nickel, copper, mercury
Cations/Anions[1]	potassium (KOH), sodium (NaOH), chloride (HCl), nitrate (HNO_3), sulfate (H_2SO_4), phosphate (H_3PO_4), fluoride (HF), sulfide, cyanide
Volatile Organic Compounds (VOCs)	1,1,1-trichloroethane, trichloroethene, carbon tetrachloride, tetrachloroethene, xylene
Semivolatile Organic Compounds (SVOCs) /Petroleum Hydrocarbons	Hydraulic oil, fuel oil
Polychlorinated biphenyls (PCBs)	Hydraulic oil

[1] Cations/Anions include indicators for the potential acidic and caustic solutions referenced in parentheses.

4.2 Field Sampling Activities

The sampling strategy presented in this addendum follows the IASAP DQOs (Section 3.0 of the IASAP). Quality Control (QC) sampling requirements are provided in Section 8.0 of the IASAP and the QA Project Plan, Appendix G. A cross-reference to the IASAP sections and relevant standard operating procedures is presented in Table 2.

Figure 2 illustrates proposed sampling locations selected in areas of known or suspected contaminant releases in Building 771. Table 3 summarizes the UBC-771 sampling specifications and rationale for the biased sampling locations. The target analytes and corresponding analytical methods are presented in Table 4. An overview of the field preparation and sampling activities is presented in the following subsections.

4.2.1 Field Preparation

Preliminary characterization and preparation will include the following protocol:

- Sampling stations will be located and clearly marked with the appropriate designations prior to data acquisition activities.
- A drawing search and non-intrusive survey will be performed by a RFETS Excavation Specialist to detect utilities or debris beneath the concrete slab. All sampling locations will be cleared in accordance with SOPs.
- In preparation of sampling activities, a contamination area (CA), radiological buffer area (RBA), support zones, and relevant radiological postings will be established at each sampling station.

Table 2. Standard Operating Procedures and IASAP Cross Reference.

Field Activity	IASAP Section	Supporting Procedure Number(s)	Supporting Procedure Title(s)
Preliminary Characterization and Preparation	4.10.1	RMRS/OPS-PRO.124 5-21000-OPS-FO.16 2-S47-ER-ADM-05.14	*Push Subsurface Soil Sampling* *Field Radiological Measurements* *Use of Field Documents and Forms*
Soil sampling	4.10.2	4-E42-ER-OPS-GT.08 OPS-PRO.117	*Soil Sampling* *Plugging and Abandonment of Boreholes.*
Location Survey and Sample Designation	6.1.12	OPS-PRO.947	*Location Code and Surveying Control*
Decontamination and Waste Handling Procedures	4.10.6	OPS-FO.03 1-PRO-573-SWODP OPS-PRO.128 1-PRO-079-WGI-001 OPS-FO.23 OPS-FO.03	*Field Decontamination Operations* *Sanitary Waste Offsite Disposal Procedure* *Handling and Containerizing Drilling Fluids and Cuttings* *Waste Characterization, Generation, and Packaging* *Management of Soil and Sediment Investigative Derived Materials* *Disposition of Soil and Sediment Investigative Derived Materials*
Sample Handling	6.1.11	OPS-PRO.069	*Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples*
Data Management	6.1	PRO-1058-ASD-005	*Data Management Procedure*
Field Documentation	NA	2-S47-ER-ADM-05.14	*Use of Field Logbooks and Forms*
Chain-of-Custody	6.1.11	OPS-PRO.069	*Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples*
On-Site Material Transfer and Off-Site Shipment	6.1.11	PRO-908-ASD-004	*On-Site Material Transfer and Off-site Shipment of Samples*

NA – Not Applicable

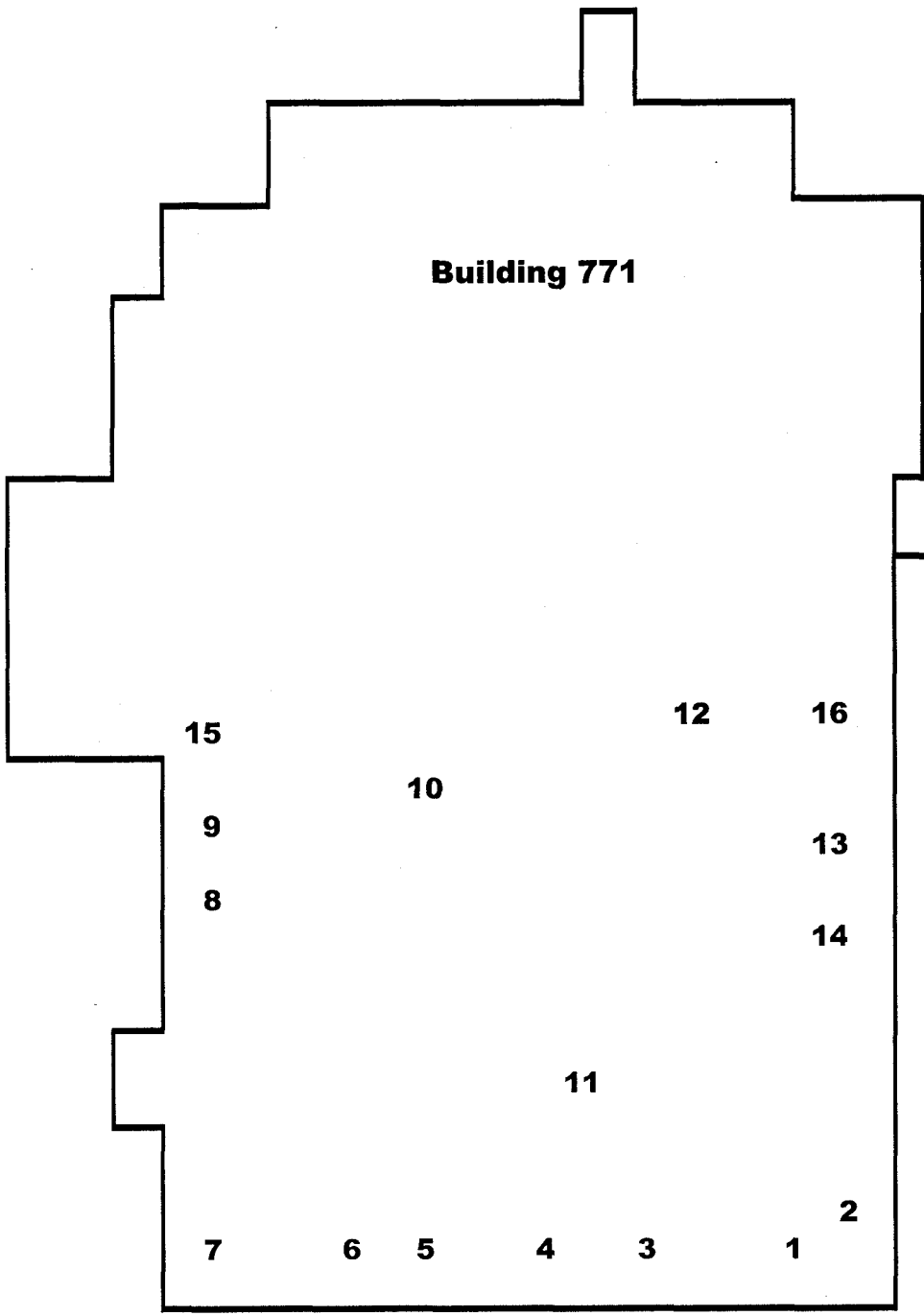

Figure 2.
Building 771 UBC Phase I
Sampling Locations

1 – ER Biased location: Fire/spill related releases

2 – ER Biased location: Area flooded during 776 fire and water line break

3 – ER Biased location: Fire/spill related releases

4 - ER Biased location: Fire/spill related releases

5 – ER Biased optional location: Flood area from 776 fire and water line break

6 – ER Biased location: Conduit for 776 fire and water line break; hallway leading to 776 tunnel

7 – ER Biased location: Former storage vault; groundwater flow path

8 – ER Biased optional location: former storage vault

9 – ER Biased location: former SNM storage vault; early releases

10 – D&D Internal location: Rm 180K wall and foundation contaminated by 1957 fire

11 – D&D Internal location: Void space investigation

12 – D&D Internal location: Multiple spills of Pu and Pu/Be

13 – ER Biased location: Multiple HNO3 releases

14 - ER Biased location: Multiple HNO3 releases

15 – ER Biased location: West building perimeter

16 – ER Biased location: Across from elevator shaft and Infinity Room

North

Not to Scale

Table 3. Sampling Specifications and Rationale.

Location[1]	Sampling Purpose	Sampling Technique	Sample Depth Intervals (Each Location)	Comments
1	Inside Perimeter Characterization	Slide Hammer/Core or Soil Auger[2]	1) 0 to 2.0 ft. 2) 2.0 to 4.0 ft.	Fire/Spill related releases
2				Area flooded during 776 fire and water line break, located near building sump
3				Fire/Spill related releases
4				Fire/Spill related releases
5				Flood area from 776 fire and water line break
6				Conduit for 776 fire and water line break; hallway leading to 776 tunnel
7				Former storage vault; groundwater flow path
8				Rm 187; former storage vault
9				Rm 187; former SNM storage vault; early releases
10	Interior Building Characterization			Rm 165; wall and foundation contaminated by 1957 fire
11				Rm 149; void space beneath building slab
12				West side of infinity room; multiple spills of Pu and Pu/Be
13	Inside Perimeter Characterization			Rm 146; Multiple nitric acid spills
14				Multiple nitric acid spills
15				Plenum Deluge Catch Tank; West building perimeter
16				Rm 129; West building perimeter

[1] Sampling locations are presented in Figure 2.

[2] The preferred sampling technique is a Slide Hammer/Core apparatus.
However, sampling may be augmented with a soil auger or appropriate equipment in the event of refusal.

	ASD Line Item Code[1]	Analytical Method	Sample Container Type	Preservation	Holding Time
U^{235}, U^{238})	RC01B03	Alpha Spectroscopy	1-250 ml glass jar	4°C	90 Days
	SS05C026	SW-846 Method 6010A	1-250 ml wide-mouth amber glass teflon-lined jar	4°C	180 Days
	SS05C052	SW-847OA	1-125 ml wide-mouth glass teflon-lined jar	4°C	28 Days
	SS01B006	SW-846 Method 8260B	2-125 ml wide-mouth glass teflon lined jars	4°C Zero-head space	14 Days
	SS02B002	SW-846 Method 8270C	1-250 ml wide-mouth amber glass teflon-lined jar	4°C	14 Days until extraction 40 Days after extraction
	SS03B006	SW-846 Method 8082	1-250 ml wide-mouth amber glass teflon-lined jar	4°C	14 Days until extraction 40 Days after extraction
I)	SS08CO38/ SS08CO39	SW3450B/3550A, 8015	1-125 ml wide-mouth glass teflon-lined jar	4°C	28 Days
	SS08C021	SW-846 Method 9010B or 9012A	1-250 ml wide-mouth amber glass teflon-lined jar	4°C	14 Days
	SS08C031	SW 846 Method 9056	1-250 ml wide-mouth amber glass teflon-lined jar	4°C	48 hours
	R6048003	Gas Flow Proportional Counting	1 -125 ml plasic container	4°C	90 Days

- A containment structure will be used, as needed around each sampling location to prevent the potential spread of contamination.
- Each sampling location will first be characterized by a pre-work surface radiological survey in accordance with SOPs.
- Initial preparation will require removal of paint from concrete prior to coring.
- All observations will be documented in a field logbook.

4.2.2 Soil Sampling

A total of 32 soil samples from 16 locations will be collected. As shown in Figure 2, samples will be collected from 13 locations along the inside perimeter of the building and from 3 locations within the interior of the building.

The soil substrate beneath the concrete slab will be accessed using a concrete corer. Wet coring techniques will be used to minimize the dispersal of airborne contamination. Care will be taken to prevent the potential downward migration of contaminants from the concrete slab into the soil substrate. Assuming that contamination is likely to occur near the surface of the concrete slab, the concrete cores will be collected in two-inch lifts until field screening for radioactivity and VOCs indicate the absence of contamination. Loose concrete debris will be carefully exhumed from the concrete boring after each two-inch lift to minimize the potential for cross contamination. The concrete cores will be collected and submitted to the 771 Closure Project for radionuclide analyses.

A total of 2 soil samples will be collected from the subsurface soils beneath the concrete pad at each location. Samples will be collected from 0 to 2.0 feet and 2.0 to 4.0 feet using a slide-hammer coring apparatus or soil-auger. The slide-hammer coring apparatus is the preferred method because it allows for the collection of relatively undisturbed soil samples. However, the field team has the discretion to use a hand/power-auger, or other appropriate sampling equipment, as field conditions may dictate. In order to maintain sample integrity, VOC grab or core samples will be collected first and care will be taken to minimize the amount of headspace in the sample container. The remaining sample will be composited and homogenized in a stainless steel bowl. In the event of poor core recovery, the borehole may be advanced to collect additional soil. Deviations in actual sample depths will be clearly documented in the field notebook. If sample refusal is encountered prior to reaching the desired sample depth, the boring will be abandoned and one offset boring will be attempted within three feet of the original location. In the event of sample refusal in the offset location, the field team will plug the boring and abandon the location. Another sample location may be added at the discretion of the *Project Manager.*

During all soil disturbance activities, excavated soil will be periodically surveyed for radiation. Prior to the initiation of sampling activities for each hole, background ranges will be recorded in the area surrounding the exclusion zones. Cores/samples will be monitored real-time for VOCs and radionuclides for health and safety purposes.

Building diagrams indicate the presence of a 6-inch thick gravel layer beneath the concrete slab. Care will be taken to segregate the gravel from the samples. Sampling locations will be plugged and sealed immediately following sampling at each location and painted as required.

In addition to the 32 soil samples, 2 duplicate and 2 equipment rinsate samples will be obtained (Table 4). Trip blank samples will accompany all batches of VOC samples transported to the laboratory. Samples will be analyzed in order of priority for isotopics by alpha spectroscopy, VOCs, metals, SVOCs, PCBs, cyanide, TPH, and nitrate (Table 4).

4.2.3 Water Sampling

Water sampling may be performed if shallow groundwater is encountered beneath the concrete foundation following coring. If collected, water from beneath the foundation will be sampled in accordance with the RFETS procedure 1-C91-EPR-SW.01, *Control and Disposition of Incidental Water*. In addition to the water quality parameters and requirements referenced in the above procedure, the water samples will be analyzed for actinides, VOCs, metals, nitrates as N, inorganics, pH, and conductivity provided enough water is available for these analyses.

5.0 PROJECT ORGANIZATION AND TRAINING REQUIREMENTS

The project organization is shown in Figure 3. The *Project Manager* will provide overall project direction and will ensure that the project milestones and objectives are achieved. The *Evolution Supervisor* will oversee daily project activities and will ensure that all activities associated with the characterization sampling are consistent with the guidelines presented in the IASAP. The *Evolution Supervisor* is also responsible for coordinating relevant RFETS support groups such as Waste Management, Quality Assurance, ASD, Radiological Engineering, Radiological Operations, Health and Safety, and the 771 Closure Project. The *Sampling Coordinator* will be responsible for data acquisition, documentation, sample handling, shipping, verifying chain-of-custody records, coordinating offsite sample shipments with Analytical Services Division (ASD), and sample tracking.

The following is a list of training and medical approvals that may be required. A job-specific List of Qualified Individuals (LOQI) and training will be developed as part of the readiness assessment and will specify required training for the project.

Asbestos Awareness
Beryllium Operations/Beryllium Awareness
Building 771 Specific Training
Confined Space Entry Safety Awareness
Lead Awareness
Lock Out/Tag Out Training
Radiation Worker II
Respirator Fit Test/Medical Approval

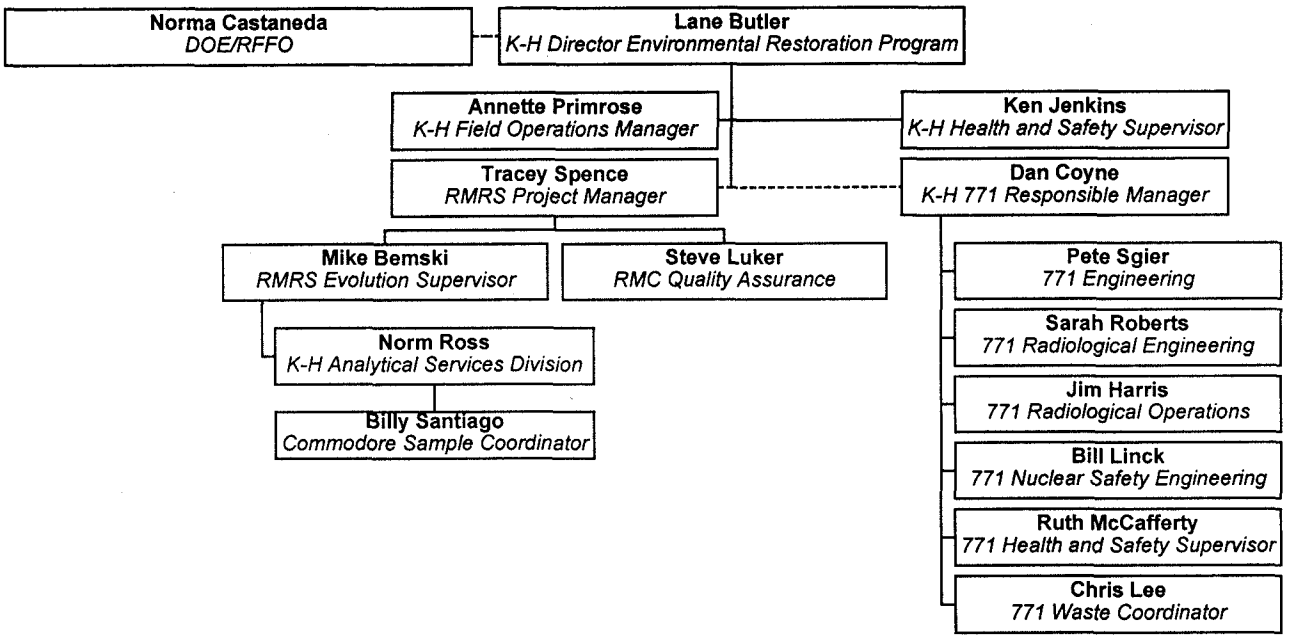

Figure 3. Building 771 Characterization Sampling Organization Structure

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6.0 SPECIFIC HEALTH AND SAFETY REQUIREMENTS

Worker health and safety will be addressed in a project-specific Health and Safety Plan (HASP). The Integrated Work Control Program (IWCP) process will be used to identify hazards, and the controls for those hazards. A Job Hazard Analysis (JHA) will be developed as part of the IWCP process to address hazards associated with sampling activities. The JHA will include hazards for each task step, controls to be used, special equipment needs, training, and any necessary monitoring. No tasks will be performed until the JHA has been written and approved, except for walkdowns, general work tasks performed within skill of the task, surveillance accomplished by procedure, inspections required by IWCP and/or plans and specifications, and other tasks specified by the project Health and Safety Supervisor. The project Health and Safety Supervisor, with radiological personnel, will assess the need for personnel and area monitoring. A pre-job briefing in accordance with Conduct of Operations (COOP) will be conducted prior to all work activities. Specific radiological and chemical hazards include the potential contaminants listed in Table 1 and will be addressed accordingly in the project documents.

7.0 SCHEDULE

Sampling activities are planned to begin in March 2001 and are scheduled for completion by May 2001. Data analysis and preparation of the Characterization Sampling Summary Report will begin after receipt of laboratory analytical data.

8.0 REFERENCES

Chew and Associates (1992). *Facility History for Building 771 at the Rocky Flats Plant*, compiled for EM-30 by M.H. Chew and Associates.

DOE, 1992. *Historical Release Report for the Rocky Flats Plant*, DOE Rocky Flats, June.

DOE, 1994. *Historical Release Report Building Histories* (Draft), DOE Rocky Flats, June 1994.

DOE, 1998. *Building 771/774 Cluster Closure Project Reconnaissance Level Characterization Report, Revision 2.* Safe Sites of Colorado, L.L.C., August 8, 1998.

DOE, 2000. *Historical Release Report Annual Update*, DOE Rocky Flats, September 2000.

EG&G, 1992. *A History of the Rocky Flats Plutonium/Actinide Recovery Plant – 1952 to 1991*. EG&G Rocky Flats, Production Technology Development Report, RT92-003.

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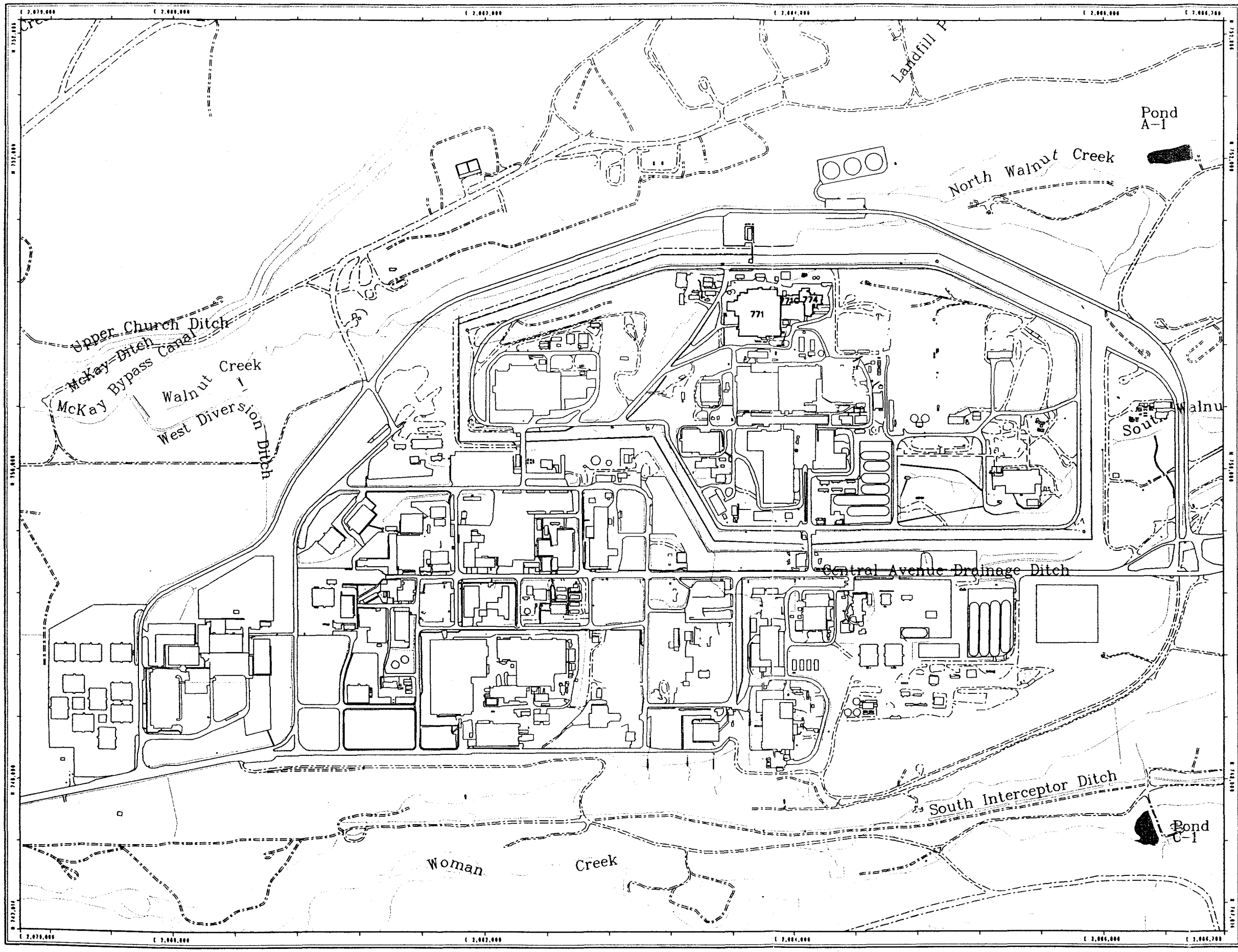
Figure 1

Location of Building 771/774 Cluster



EXPLANATION

- Buildings 771 & 774

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Contour (20-Foot)
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:

Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSI, Las Vegas. Digitized from the orthophotographs. 1/95

Topology (contours) were derived from digital elevation model (DEM) data by Morrison Knudson (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~ 10 meter resolution. DEM post-processing performed by MK, Winter 1997.

Subject Matter Expert:
Tracey Spence (303) 966-4322
Building # 115 Room # 72

Scale = 1 : 7580
1 inch represents approximately 632 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: DynCorp — THE ART OF TECHNOLOGY

Prepared for: KAISER-HILL COMPANY

MAP ID: 01-0092/b771-774.aml

November 30, 2000

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