Department of Energy

Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402

July 19, 1990

Mr. Michael Gearheard, Chief
Waste Management Branch
U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

SUBJECT: Closure Plan for CPP-64 (Hexone Spill West of CPP-660)

Dear Mr. Gearheard:

Enclosed for your review and approval are two copies of the referenced Closure Plan, submitted per the requirements of the Consent Order and Compliance Agreement and the schedule for submittal of COCA closure plans.

If you have any questions, please contact W. N. Sato at 526-0193 or Lisa Green at 526-0417.

Sincerely,

J. E. Solecki
Acting Assistant Manager
Environmental Restoration and
Waste Management

Enclosure

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JULY 1990

CLOSURE PLAN FOR LAND DISPOSAL UNIT CPP-64
HEXONE SPILL WEST OF CPP-660

IDAHO NATIONAL ENGINEERING LABORATORY

Managed by the U.S. Department of Energy

Prepared for the
U.S. Nuclear Regulatory Commission
Under Department of Energy
Idaho Operations Office
Contract No. DE-AC07-84ID12435

Westinghouse Idaho Nuclear Company. Inc.
Idaho Falls, Idaho 83403

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HEXONE SPILL WEST OF CPP-660

Prepared by:

7/18/90
Date

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EXECUTIVE SUMMARY

A 55-gallon spill of methyl iso-butyl ketone (Hexone) occurred at the ICPP February 14, 1984, when a forklift tine punctured a drum of new material during a routine storage operation. The material leaked from the drum onto an asphalt pad covered with ice and snow. Vermiculite was applied to absorb the solvent. On-site inspection indicated the solvent did not come in contact with the asphalt due to ice and snow cover.

The vermiculite was pushed off of the asphalt pad onto bare soil, then barreled for disposal. Although the earth was frozen, precluding substantial penetration, the vermiculite covered an area approximately five feet long and two feet wide which is now suspect of potential contamination.

Hexone is a listed commercial chemical product (U161) because of its ignitiblity. Due to the age and limited extent of the spill, and the containment actions taken at the time of the incident, no significant risk is believed to exist for human health and safety or the environment. Due to the inclusion of the spill site in the list of Land Disposal Units at the ICPP, however, compulsory site characterization sampling has been conducted. The proposed action will be to clean-close the site by removing any soil contaminated to above the alternate contamination limit (ACL) which will be developed based on ignitiblity. Evaluation of the extent of soil removal, if necessary, will be based on the validated and verified analytical results due in September 1990.

CLOSURE PLAN FOR LDU CPP-64
HEXONE SPILL WEST OF CPP-660

EPA Facility ID No.:	ID 4890008952
Owner: Address:	Dept. of Energy, Idaho Operations Office 785 DOE Place Idaho Falls, Idaho 83402 (208) 526-1505
Contractor for the DOE: Address:	Westinghouse Idaho Nuclear Co. P.O. Box 4000 Idaho Falls, Idaho 83403 (208) 526-0998
Facility Address:	Idaho Chemical Processing Plant Scoville, Idaho

1. FACILITY CONDITIONS

1.1 General Description

The Idaho Chemical Processing Plant (ICPP) is located in the southeastern, central part of the Idaho National Engineering Laboratory (INEL) site. The ICPP is a fenced security area of over 100 acres. The facilities at the ICPP, some of which have been operating since 1951, are designed to recover uranium from irradiated nuclear fuels. The fuel is dissolved and the uranium is separated from the fission products and cladding material by an extraction process. The uranium is further purified and eventually reused. Methyl isobutyl ketone (hexone) is used in the uranium extraction process.

The hexone spill area, referred to as Land Disposal Unit (LDU) CPP-64, is located inside the ICPP security fence west of building CPP-660 (Figures 1 and 2). Building CPP-660 is a chemical storage warehouse. In the past, 55 gallon drums containing supply chemicals were stored outside and adjacent to the west wall of CPP-660 on pallets.

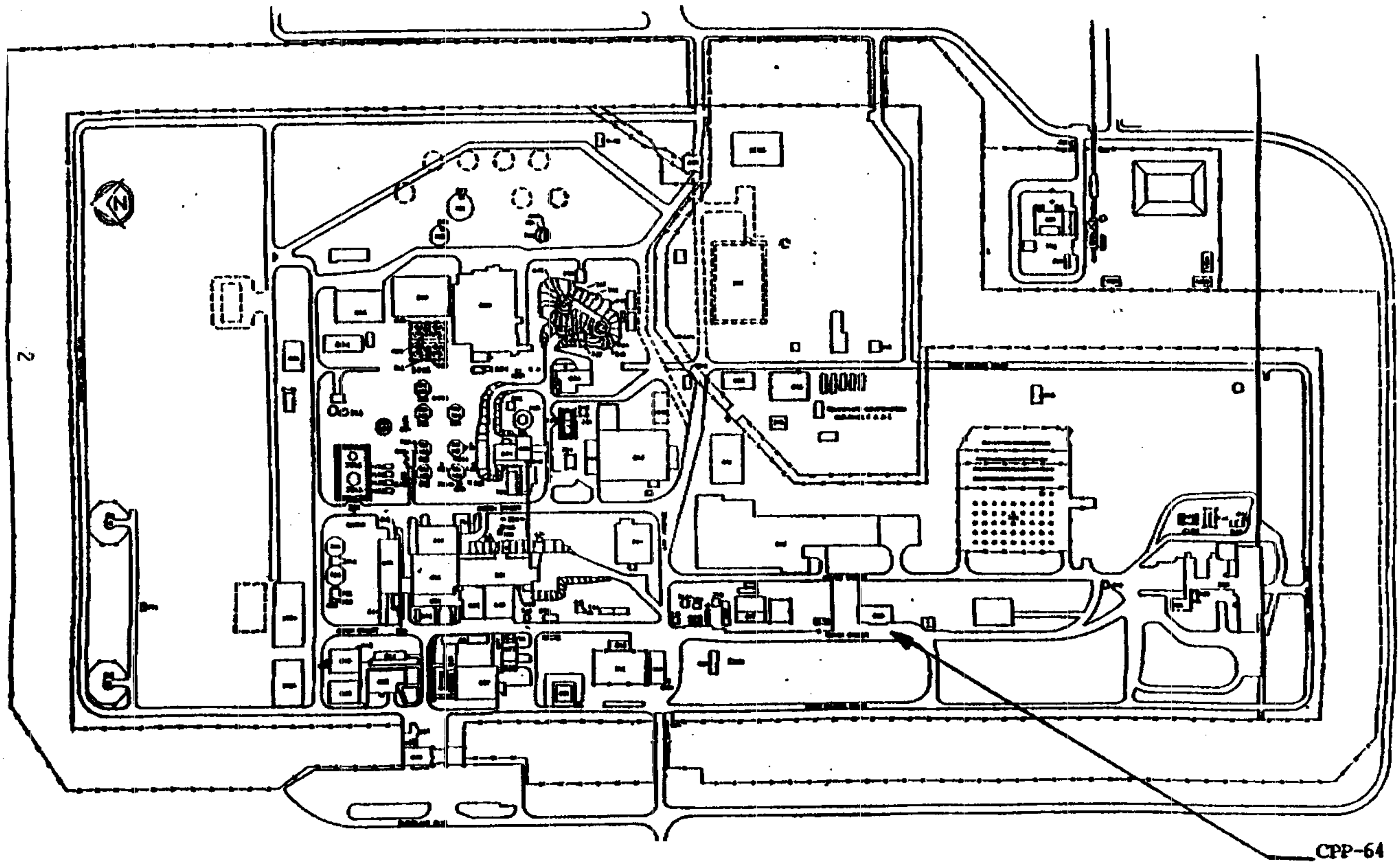

Figure 1. ICPP Plot Plan

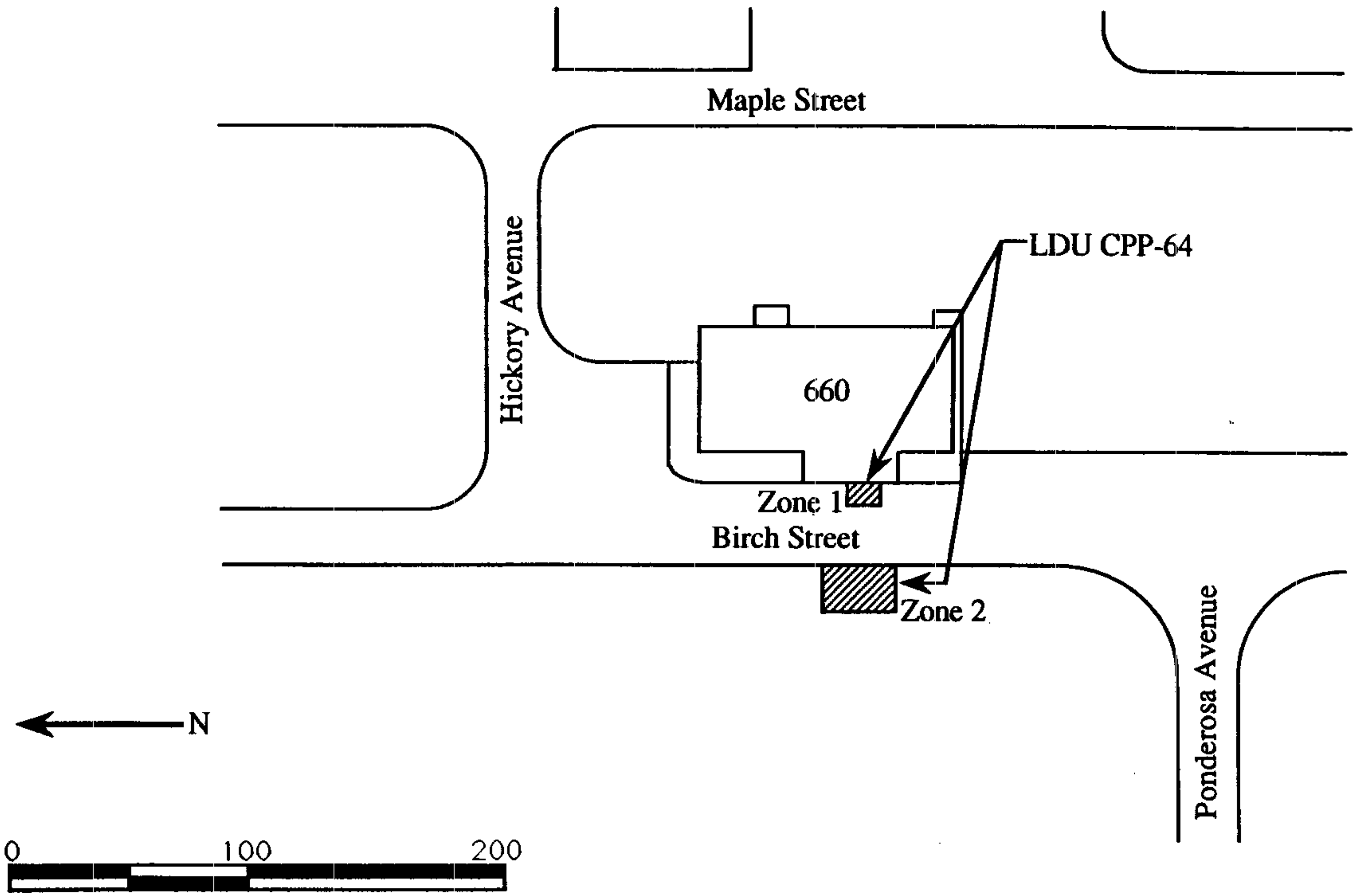

Figure 2. Site Plan Land Disposal Unit CPP-64

On February 14, 1984 a spill of approximately 55 gallons of methyl isobutyl ketone (hexone) occurred when a tine on a forklift punctured a 55 gallon drum on a pallet stored outside the warehouse building, CPP-660. The puncture was through the side of the drum, near the bottom and all 55 gallons leaked onto the asphalt. At the time of the release, the asphalt was covered with snow and ice.

It is doubtful that the hexoné infiltrated the asphalt or the soil below the asphalt in the spill area as the asphalt was covered with ice and the temperature was below freezing for most of the day (35°F maximum and 20° minimum). WINCO personnel inspected the asphalt and saw no evidence that the hexone came in contact with the asphalt (i.e., the hexone did not penetrate the ice/snow) prior to vermiculite being placed on the spill. Twenty-five (3 ft^3/bag) bags of vermiculite, an absorbent, were used to absorb the hexone. The vermiculite was spread on the area within one hour of the spill. The vermiculite and snow were then pushed across Birch street, which is paved with asphalt, onto the soil West of the street. The vermiculite remained on the soil for several days prior to being drummed and disposed of to an Environmental Protection Agency (EPA) approved disposal facility.

Three weeks later, after the snow adjacent to the warehouse melted and water evaporated, a small amount of vermiculite (approximately 3 ft^3) was discovered at the location of the spill. This material was also pushed across Birch Street, onto the soil West of Birch Street. The vermiculite covered an area on the gravel about 5 feet long and 2 feet wide adjacent to the pavement. The vermiculite was left in place.

Potential migration pathways from LDU CPP-64 to the environment include: physical contact with the biota (i.e., plants, animals, or humans), evaporation to the atmosphere, and migration over the ground surface to the Big Lost River, or through the soil to the Snake River Plain Aquifer.

Because the ICPP is a fenced facility, domestic animals, large wildlife and unauthorized personnel are excluded from access to the unit. Some smaller species of wildlife (e.g., birds and rabbits) are occasionally found within the ICPP fence. Unauthorized disturbance of the unit is controlled by administrative procedures. Most areas inside the ICPP security fence are covered with gravel and maintained free of vegetation for security and monitoring purposes. No vegetation is in the area of the spill.

Presently, there is little probability of hazardous wastes/constituents evaporating from the unit to the atmosphere because the majority of the hexone should have been absorbed to the vermiculite, or evaporated to the atmosphere soon after being spilled. Any remaining hexone should not evaporate from the soil unless the unit is disturbed.

The only body of natural surface water in the vicinity of the unit is the Big Lost River which is located approximately 2,875 feet north of the unit. The average surface slope between the unit and the river is 0.07% (WINCO Initial Assessment, 1986). Therefore, there is little probability of hazardous constituents migrating to the river. Also, the river flow is intermittent and controlled by irrigation diversion dams which are located upstream of the ICPP. The diversion system, assuming it remains intact, could contain up to a 300 year flood.

The probability of hazardous wastes migrating from the unit to the Snake River Plain Aquifer is limited because of the depth to the aquifer (approximately 450 feet below the unit) and the small quantity of solvent spilled to the soil (55 gallons). Due to the depth to the aquifer, even if some migration occurred, there is little probability of the hazardous wastes reaching the aquifer.

1.2 Unit Characterization Objectives

Land Disposal Unit CPP-64 is being characterized in accordance with the Idaho National Engineering Laboratory (INEL) Consent Order and Compliance

Agreement (COCA). Although CPP-64 is classified as a LDU, it is not known if hexone is present in the soil and no significant risk to man or the environment is believed to exist. The unit characterization is being conducted to determine if hexone is present and if present, to determine the extent of the contamination and the potential risk to human health and safety or the environment. In addition, to ensure comprehensive examination of the site, all samples are being analyzed for EP-toxic metals, volitile organic compounds (VOCs) and semi-VOCs and one sample taken from the most heavily VOC contaminated location will be analyzed for 40 CFR 261, Appendix VIII contaminants. This information is being used to determine the closure requirements for the unit.

The primary objectives for characterization of LDU CPP-64 are to:

- o Determine the amount of hexone present in the soils;
- o Determine the location and quantify the amount of hexone contaminated soil present at LDU CPP-64.
- o Determine if the hexone or any other RCRA hazardous wastes pose an unacceptable risk to human health and safety or the environment.

The action limit for requiring RCRA closure of LDU CPP-64 will be based on the presence of hexone in the soil at ignitable levels and background levels for naturally occuring compounds. The basis for the hexone action limit is that a hazardous waste that is listed only for a characteristic identified in Subpart C ceases to be hazardous if it no longer exibits the characteristic for which it was listed (40 CFR 261.3(a)(2)(iii)). Ignitiblity will be determined by calculating the theoretical quantity of hexone required to make the soil ignitable and comparing this value to the quantity of hexone found in the soil during unit characterization. If the hexone found in the soil during unit characterization exceeds the theoretical limit, the soil contamination will be considered to have exceeded the action limit, and remedial actions will be proposed. If RCRA hazardous wastes, known to be naturally occurring at the ICPP, are found to exceed the upper confidince limit for background soil at the ICPP they will be considered to exceed the action limit and remediation will be proposed.

1.3 Closure Goals

Unit closure will be based on quantity of hexone present at LDU CPP-64. If hexone is not present, or is present in quantities that do not pose an unacceptable risk to human health and safety or the environment (is nonignitable), a proposal will be submitted to EPA and the State of Idaho requesting administrative closure. If hexone is found to pose an unacceptable risk to human health and safety or the environment (the soil is ignitable), all contaminated soils exceeding the alternate contamination limit (ACL) will be excavated and the unit will be clean closed in accordance with the applicable requirements of 40 CFR 265, Subpart G (Closure and Post-Closure).

In addition, if other RCRA hazardous wastes are discovered during unit characterization all contaminated soils will be excavated to the method detection limit or background limits, as appropriate.

2. GEOLOGY

The following geological information is condensed from hydrogeological information compiled by Hull (1986).

The ICPP is located on alluvial materials deposited by the Big Lost River (wells used for a fence diagram are shown in Figure 3 and a cross section of the geology beneath the ICPP is given in Figure 4). The upper 35 to 40 feet of alluvium generally consists of well graded gravels, gravelly sands, and sands with few fine grained materials. The upper layer is underlaid by 0 to 10 feet of clayey sands and sand-clay mixtures which directly overlie the basalt. Immediately overlying the first basalt

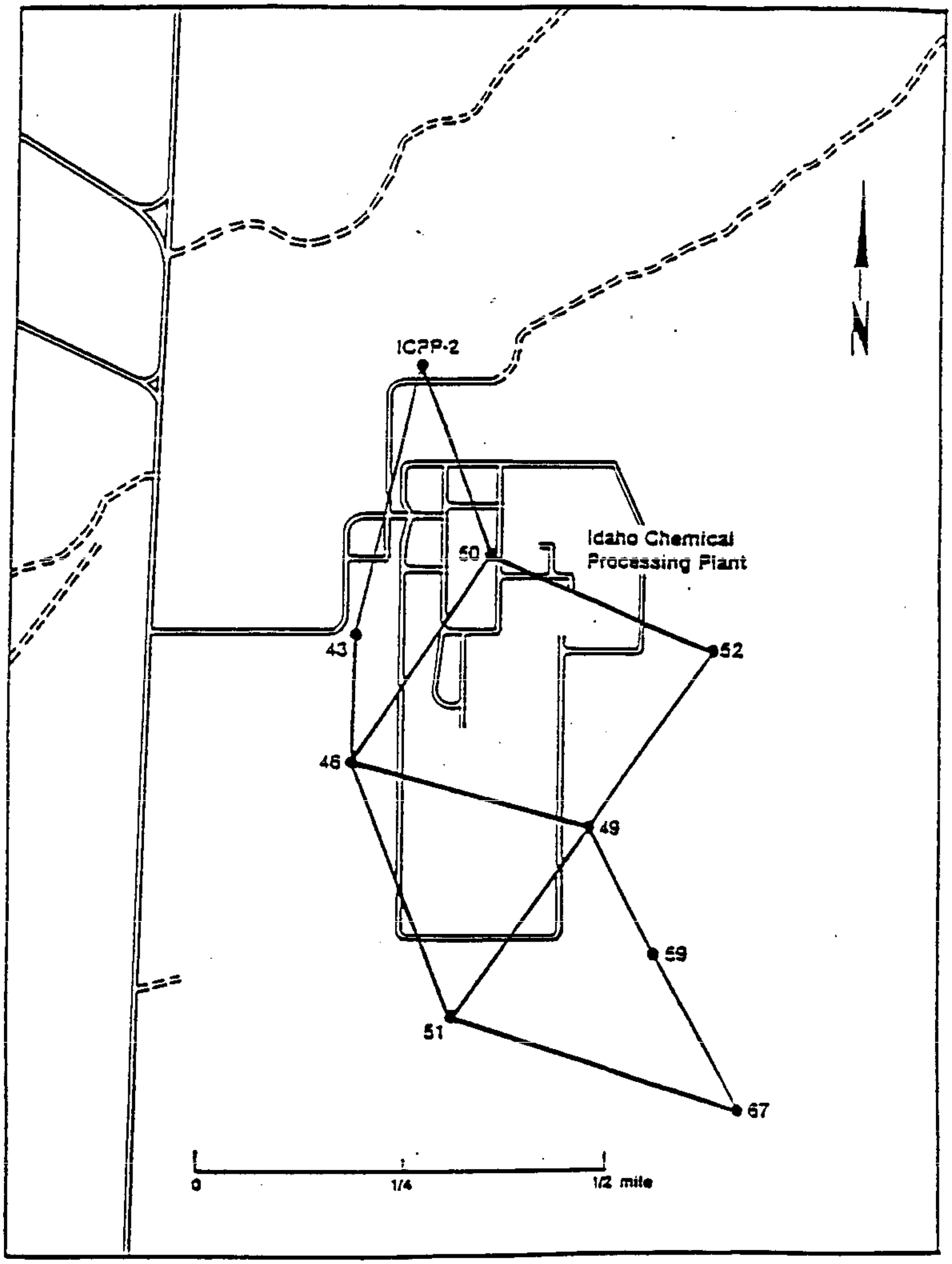

Figure 3. Location Map of Wells Used for Fence Diagram, Wells Which Surround ICPP

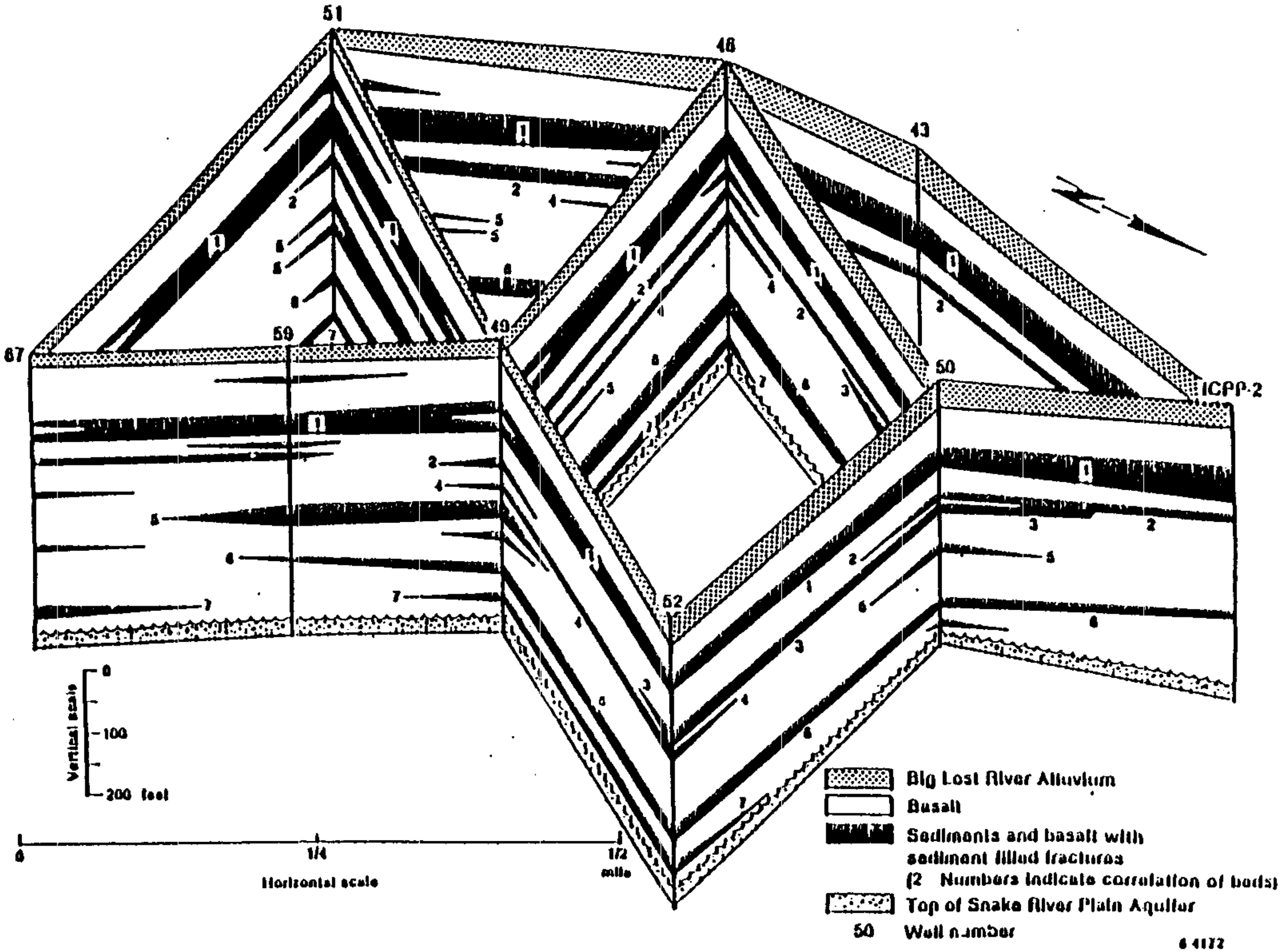

Figure 4. Geologic Cross Section Fence Diagram, Circular Line of Wells Which Surround the ICPP

layer is a layer of finer grained windblown materials. This layer is discontinuous and is not found in all borings taken at the ICPP. The interface between surficial sediments and underlying basalt probably occurs at a depth of 40-50 feet under the original land surface.

Underlying the surficial sediments are 2000-3000 feet of basalt flows with interbedded sedimentary materials. The most important of these sedimentary interbeds is a clayey layer which occurs at a depth of about 110 feet below land surface and is 30 to 40 feet thick. This interbedded sedimentary material is continuous over a large area of the INEL site, and can be expected to be continuous under the ICPP. The sequence of interbedded basalt and sediments continues to well below the water table. There is some evidence of a sedimentary bed at a depth of 750 feet below land surface, this may be the effective bottom of the aquifer below the ICPP.

Cation exchange and sorption capacity of sediments at the ICPP are likely to be low due to the generally small percentage of clay in the surficial sediments. The clay minerals present are montmorillonite, illite, and kaolinite. Carbonate materials are present both as detrital dolomite and as calcite cement. Therefore, buffering capacity of the sedimentary materials should be fairly high.

Surficial sediments at the ICPP can be divided into two distinct layers. The surface layer is a gravel to gravelly sand which averages about 60% gravel and 40% sand. This coarse surface layer is underlain in many places with a layer of finer grained materials. The fine-grained layer has an average sand content of 33% and an average silt plus clay content of 64%.

Fractures in the basalts commonly have silt and clay filling material where the basalt has been exposed on the surface. There are also cinder layers within the basalts which are composed primarily of sand and gravel sized material. Sedimentary interbeds are likely to be composed of sand, silt, and clay sized materials.

3. HYDROGEOLOGICAL CHARACTERIZATION/GROUNDWATER MONITORING

The following hydrological information is adapted from hydrogeological information compiled by Hull (1986).

3.1 Surface Water

The channel for the dry Big Lost River is located about 2,875 feet north of LDU CPP-64 (Figure 5). Water flow in the river is intermittent and flows on to the ICPP only during years with high spring snow melt run off from the mountains. In 1972, a diversion system was constructed to control the maximum flood with a 300 year recurrence interval. The average slope of the terrain from the unit to the river channel is 0.07%.

3.2 Groundwater

Based on 1985 water level measurements supplied by the U. S. Geological Survey (USGS), the depth to the water table at the ICPP is 450 feet below land surface. The direction and rate of groundwater movement in the vicinity of the ICPP are well documented from monitored plumes in the Snake River Plain Aquifer (Figure 6). The injection of high specific conductance fluid at ICPP (Lewis and Goldstein, 1982) caused the groundwater to show elevated values of specific conductance. The direction of flow is clearly indicated by the migration of this plume. The rate of groundwater flow based on the time required for the plume to reach certain wells downgradient from the injection point ranges from 5 to 15 feet/day.

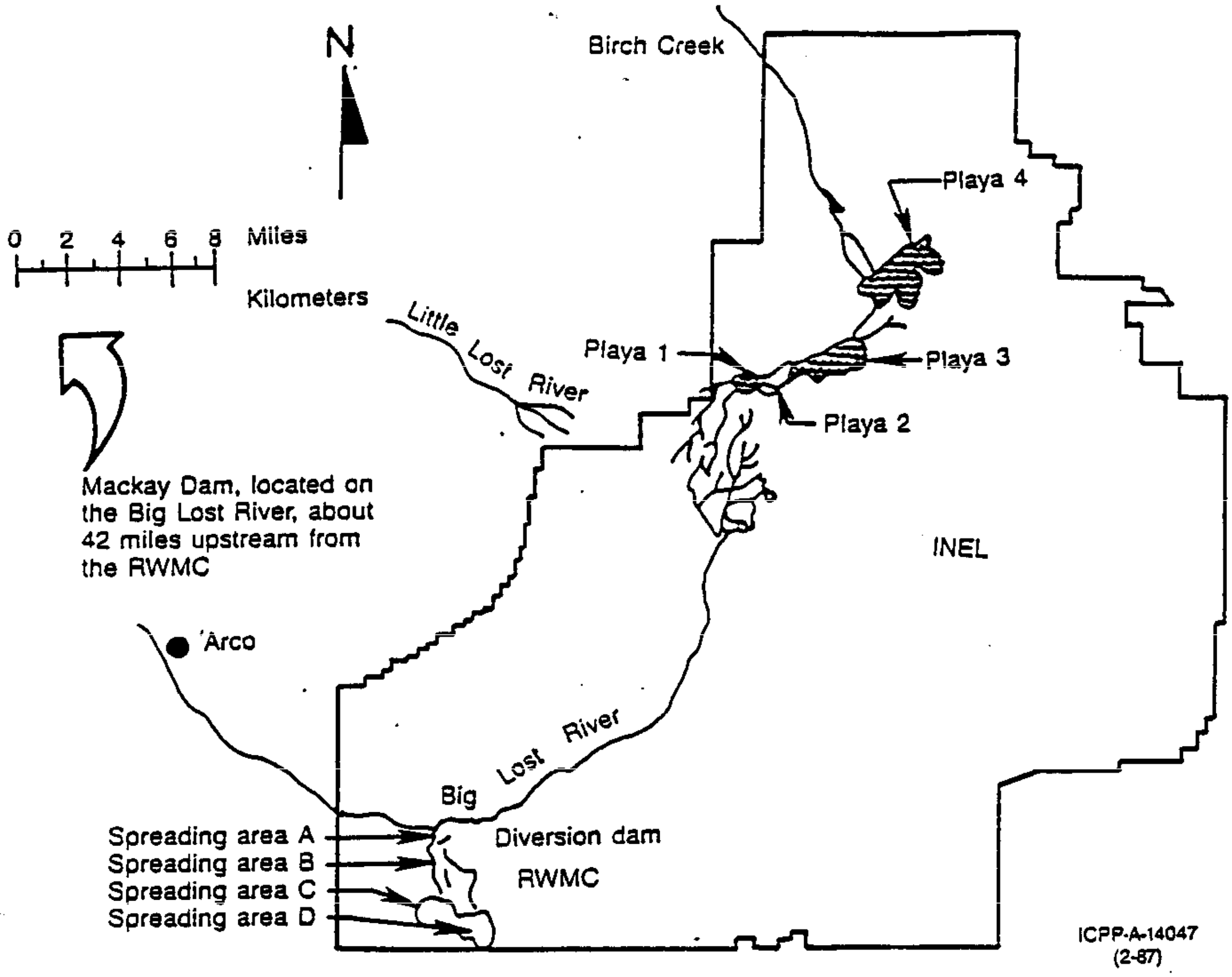

Figure 5. Surface water features at or near the INEL (Robertson, et al., 1974)

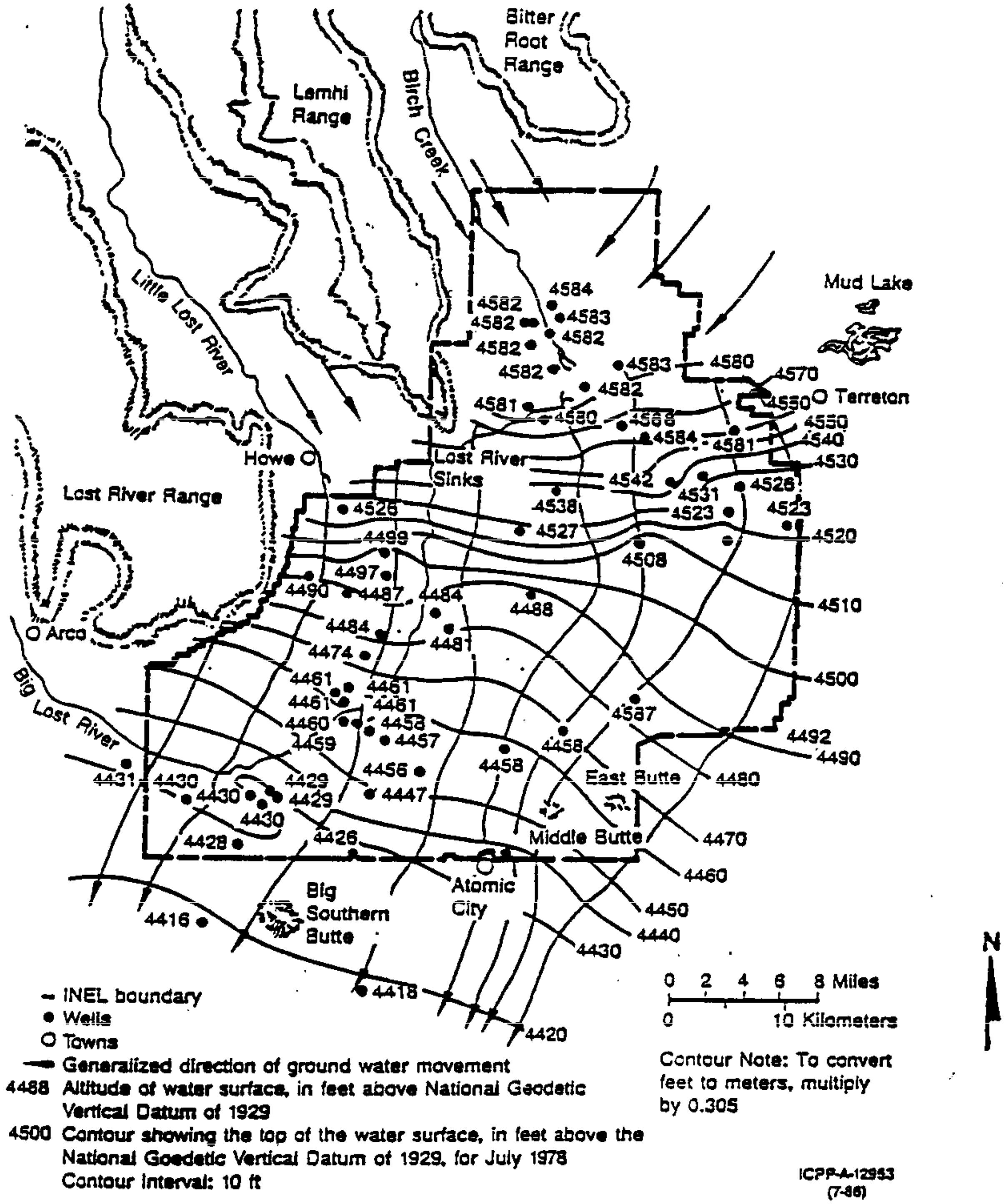

Figure 6. Groundwater Contour Directions - INEL

3.3 Unsaturated Zone

There are two geologic layers responsible for creating perched water tables at the ICPP. They are found at the interface between the surficial sediments and the top of the uppermost basalt layer at about 40 feet beneath the surface and the interface between the 110 foot interbedded and the overlying basalts. In the first case, the perching occurs because of fracture filling by the clayey layer which overlies the basalt. The second perched layer occurs because the 110 foot interbedded is much less permeable than the overlying basalt. A perched water zone exists under the Big Lost River as shown in Figure 7. In the absence of a surface-water impoundment, it is not anticipated that there will be any zone of saturation in the surficial sediments directly beneath the unit.

Table I summarizes the best estimates of hydrologic properties of materials in the unsaturated zone based on Robertson's (1977) modeling study. There have been no direct measurements of hydrologic properties of materials made at the ICPP. Measurements of hydrologic properties made throughout the INEL are summarized in Table II. The average moisture content increases with depth as does the average percent saturation. The average permeability decreases with depth. The geometric mean of the vertical hydraulic conductivity decreases from 0.59 feet/day for surficial sediments to 0.019 feet/day for shallow interbeds to 0.008 feet/day for deep interbeds.

4. METEOROLOGY

4.1 Data Source

The National Oceanic and Atmospheric Administration (NOAA) and its predecessor, the U. S. Weather Bureau, have operated a meteorological observation program at the INEL since 1949. The weather station at

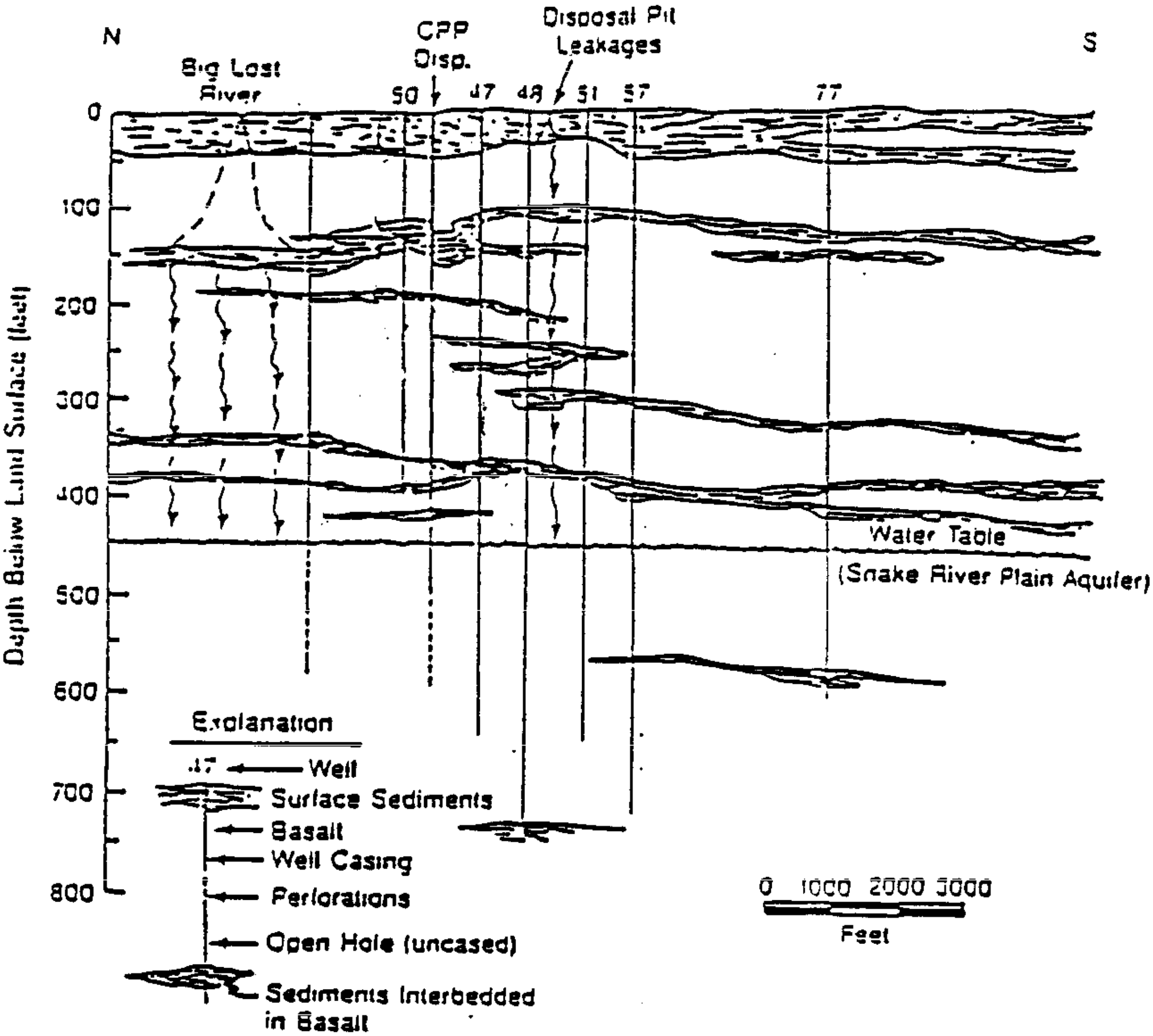

Figure 7. Geologic cross section through the ICPP area showing generalized stratigraphy, perched water, wells, and regional water table. (Robertson, et al., 1974).

Table I. Hydraulic and Physical Parameters of the Unsaturated Zone at the Test Reactor Area, INEL (Robertson, 1977).

Layer	Permeability (feet/day)	Thickness (feet)	Dispersion (feet)	Porosity (%)	Velocity[1] (feet/day)
Surface Sediment	1.0	50	3-30 10	25-45 30	2
Shallow Basalt	K_v=10 K_h= 7	100	a_l=150 a_t= 75	5-15 10	
Sediment Interbed	10^{-5}-10^{-1} 2 X 10^{-2}	60	10	30-45 30	
Deep Basalt	5-50 10	240	10	10	2-6
Aquifer	-------------- Not Studied -----------------				

[1]Vertical velocity. Velocity in the shallow basalt is horizontal.

K_v = Vertical conductivity

K_h = Horizontal conductivity

a_l = Longitudinal coefficient

a_t = Transverse coefficient

Table II. Summary of Hydraulic Properties of Sedimentary Materials from the INEL (Morris et al., 1963; Morris et al., 1965; Barraclough et al., 1976).

	Density (g/cc)	Porosity (%)	Moisture (%)	Saturation (%)	K_v (ft/day)
			Surficial Sediments		
Mean	1.54	0.44	0.13	29.06	51.58
Std. Dev.	0.24	0.09	0.07	15.72	234.63
Maximum	2.02	0.59	0.30	73.68	1.3E+03
Minimum	1.13	0.21	0.03	6.98	3.1E-05
Coef.Var.	15.39	20.08	51.89	54.11	454.92
			Shallow Interbeds[1]		
Mean	2.04	0.34	0.21	65.48	2.56
Std. Dev.	0.28	0.08	0.07	20.69	3.75
Maximum	2.41	0.45	0.37	86.05	9.8E+00
Minimum	1.62	0.21	0.15	33.33	1.0E-05
Coef.Var.	13.80	22.98	32.89	31.60	146.31
			Deep Interbeds[2]		
Mean	1.89	0.41	0.29	74.86	0.76
Std. Dev.	0.22	0.06	0.10	28.56	1.83
Maximum	2.33	0.53	0.46	100.00	8.5E+00
Minimum	1.34	0.28	0.09	16.98	5.2E-07
Coef.Var.	11.65	15.54	36.25	38.16	239.73

[1] Depth less than 200 feet below land surface.
[2] Depth greater than 200 feet below land surface.

K_v = Vertical conductivity

Central Facilities Area (CFA), located approximately two miles South of the ICPP, was the first on-site station and appears on National Climatic Center records as "Idaho Falls 46 W".

4.2 Temperature

Average monthly maximum temperatures range from 87°F in July to 28°F in January. Average monthly minimum temperatures range from 49°F in July to 4°F in January. The warmest temperature recorded was 101°F, and the coldest temperature through January 1982 has been -40°F.

4.3 Wind

Wind directions at the INEL are mostly from the southwest or northeast quadrants due to air flow channeling by the bordering mountains. During the summer months, a very sharp diurnal reversal in wind directions occurs. Winds blowing from the southwest (up slope) predominate during daylight hours, and northeasterly winds persist at night. Winter winds are controlled almost exclusively by either large scale weather systems or by stagnation. These show no significant diurnal characteristics.

The average wind speed is about 5 miles per hour in December and maximum of 9 miles per hour in April and May. The highest maximum hourly average speed was 51 miles per hour, measured at the 20 foot level at CFA from the west-southwest. Peak gusts of 78 and 87 miles per hour have been observed. Calm conditions prevail 11% of the time.

4.4 Precipitation

The average annual precipitation is 9.07 inches of water. The yearly totals range from 4.50 to 14.40 inches. Individual months have had as little as no precipitation to as much as 4.42 inches. Maximum observed 24 hour precipitation amounts are less than 2.0 inches and maximum 1 hour amounts are just over 1.0 inches.

About 26.0 inches of snow falls each year. The maximum yearly total was 40.9 inches and the smallest total was 11.3 inches. The greatest 24 hour total snowfall was 8.6 inches. The greatest snow depth observed on the ground was 27 inches. January and February average about 7.0 inches for a monthly maximum snow depth on the ground. The ground is usually free of snow from mid-April to mid-November.

4.5 Evaporation

While extensive evaporation data have not been collected on the INEL, evaporation information is available from Aberdeen and Kimberly in southeastern Idaho. The data, which should be representative of the INEL region, indicates that the average annual evaporation rate is about 36 inches. About 80% of the evaporation, 29 inches/year, occurs from May through October.

4.6 Severe Weather Conditions

Five funnel clouds (vortex clouds which do not reach the ground) and two tornadoes (which caused no damage) have been documented in the 23 year period of observation at the INEL.

5. WASTE TYPES KNOWN OR SUSPECTED

5.1 Radioactivity

A radiological survey was conducted prior to initiating unit characterization. No radiological contamination was found above background at the unit.

5.2 Chemically Hazardous Waste

Methyl isobutyl ketone (hexone) is the only chemical involved in the spill. The solvent released was not used in a process and is, therefore, a commercial chemical product (U161). The methyl isobutyl ketone is classified as a hazardous waste due solely to ignitiblity. It has a vapor pressure of 15 mm Hg at 20^{o}C (NIOSH/OSHA Pocket Guide to Chemical Hazards).

Other process chemicals and chemical wastes have been stored in the CPP-660 area, however, no spills are known to have occurred. Chemicals stored in the area may have included acid organic liquids and possibly wastes containing EP-toxicity metals.

5.3 Soil

It is estimated that no more than 3 cubic yards of soil may have been contaminated with hexone.

6. PRE-CLOSURE SAMPLING AND ANALYTICAL RESULTS

6.1 Unit Sampling Unit CPP-64

6.1.1 Sample Locations - Land Disposal Unit (LDU) CPP-64 contains two zones as shown in Figure 2. Zone 1 has recently been resurfaced with asphalt, while Zone 2 is a gravel surfaced area. There is currently no visible evidence of any spills or leaks in the area and hexone is the only material known to have leaked. However, as a conservative measure, the sampling efforts at LDU CPP-64 will determine whether any organic solvents or miscellaneous chemicals have been released to the soil.

6.1.2 Soil Gas Survey - A soil gas survey was conducted at LDU CPP-64 at the ten initial locations shown on Figure 8 which gave positive indications of the presence of VOCs. VOC concentrations measured in the survey are also shown on Figure 8.

6.1.3 Soil Sampling - Due to the indications from the soil gas survey, 2 boreholes were drilled in Zones 1, and 3 boreholes in Zone 2 at locations with the highest concentrations of VOCs. All boreholes were drilled to a depth of about six feet, (Figure 9).

All soil samples from LDU CPP-64 are being analyzed for EP-toxic metals, and volatile and semi-volatile organic compounds by GC/MS methods. One sample will be selected for analysis of the 40 CFR Part 261 Appendix VIII hazardous constituents, for which acceptable EPA approved analytical

methods exist. This sample will be selected from soils with high levels of VOCs based on field screening results using an organic volatile analyzes (OVA).

6.1.4 Drilling and Sampling - Details on Test Plan (TP) procedures are given in the Golder Technical Work Plan (Attached). Surface soil sampling was conducted in accordance with technical procedure TP-1.2-18, "Technical Procedure for Sampling Surface Soil for Chemical Analysis" by drilling subcontractor, Halwey Brothers, Blackfoot, Idaho. The soil gas surveys were conducted in accordance with TP-2.3-1, "Technical Procedure for Conducting Soil Atmosphere Surveys for Volatile Organics." All drilling conducted in the surficial sediments at the ICPP were conducted using an 8-inch OD hollow stem auger. Continuous sampling was conducted ahead of the auger by driving a 4-inch standard split spoon sampler using a rig mounted cathead operated air hammer (140-lb minimum thrust). Split spoon sampling was conducted with 2-foot clear lexan inner liners. The DPE and PG logged the soils and provided field records as described below. Drilling, sampling, and logging of soils was conducted in accordance with technical procedure TP-1.2-5, "Drilling, Sampling, and

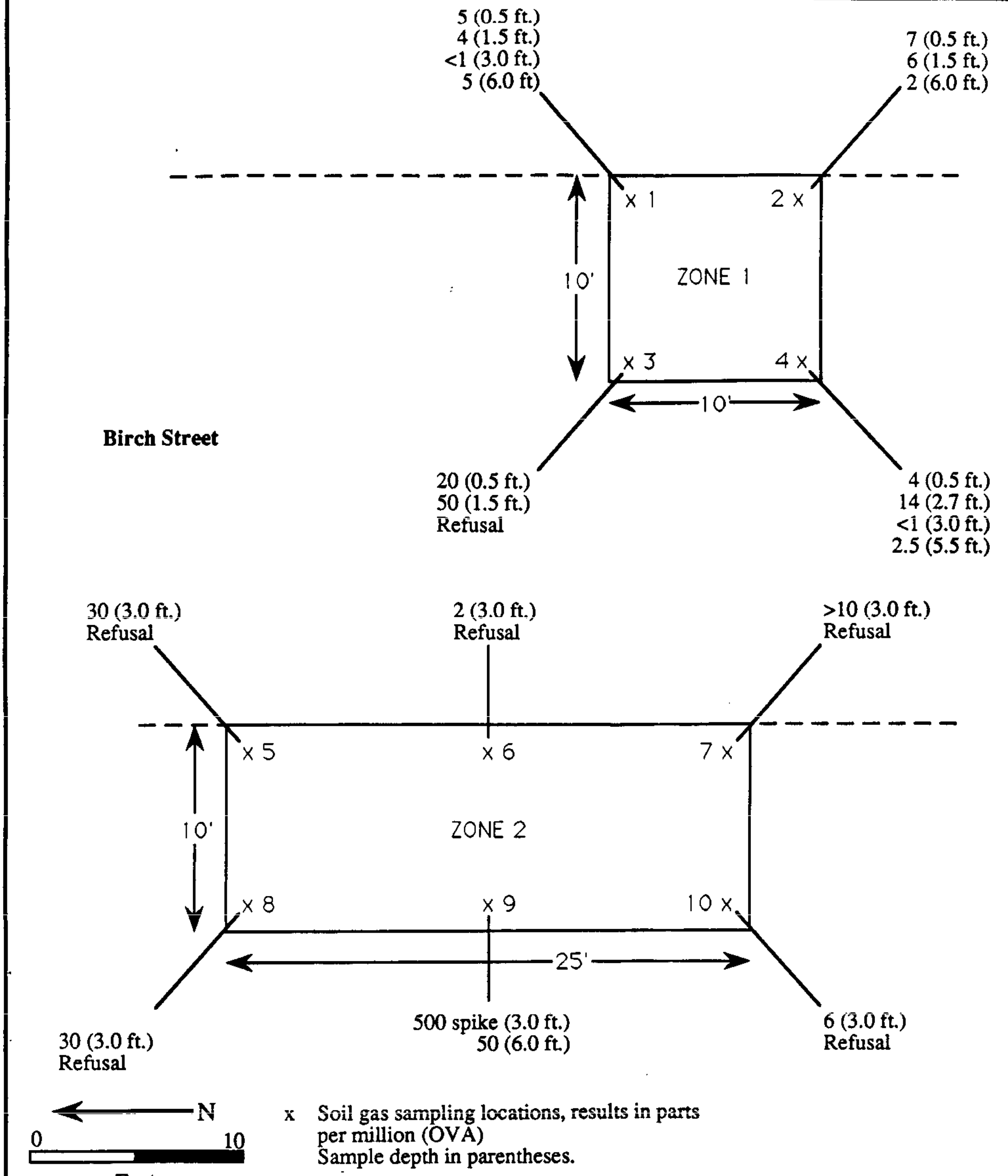

Figure 8. Soil Gas Survey Locations At Land Disposal Unit CPP-64

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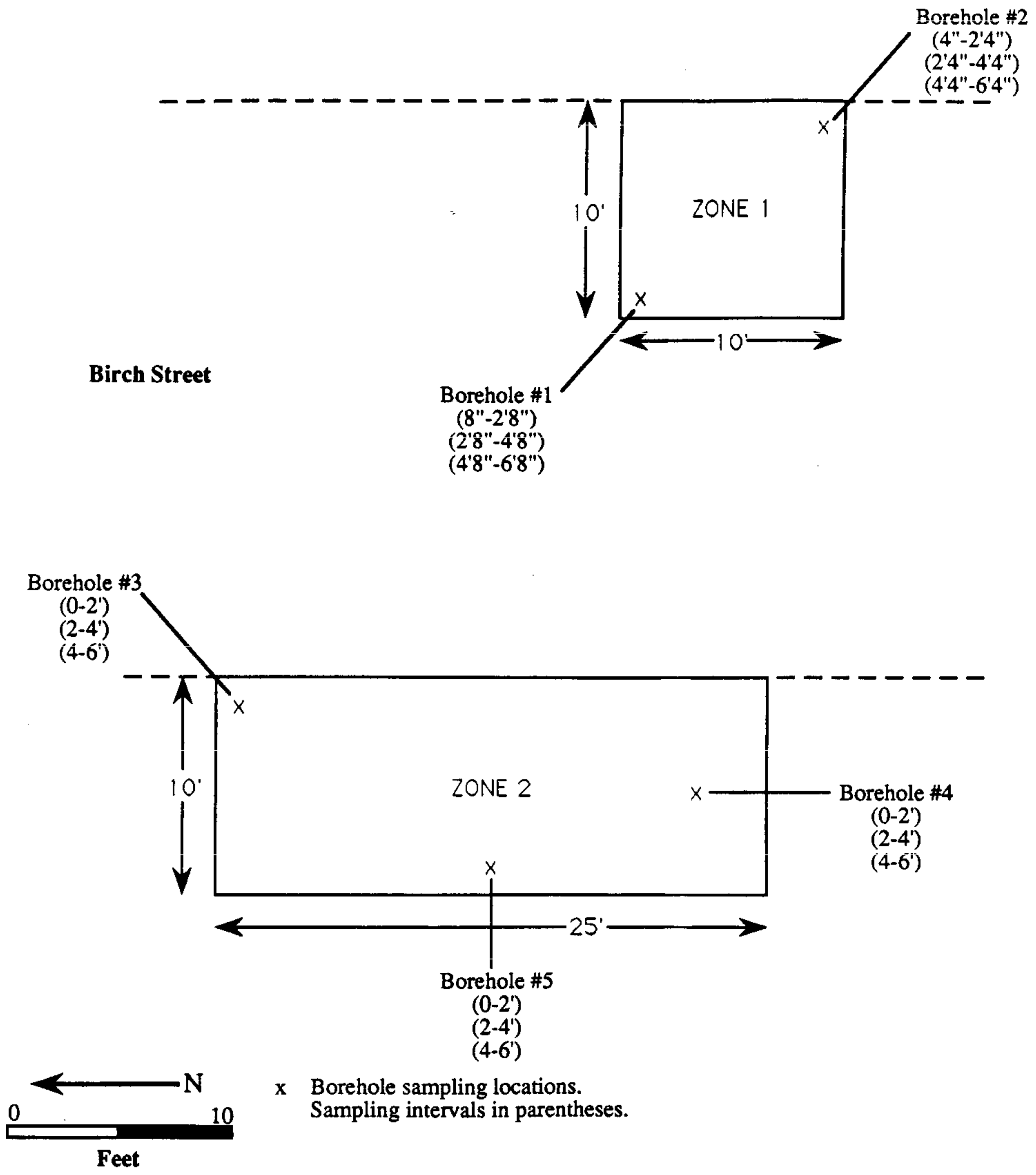

Figure 9. Borehole Locations At Land Disposal Unit CPP-64

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Logging of Soils." Soils were identified by the DPE and PG as specified in technical procedure TP-1.2-6, "Field Identification of Soils" as modified by USDA soil classification procedures.

6.2 Background Sampling

Data from background samples collected in 1986 and 1987 by the University of Utah Research Institute (UURI), Salt Lake City, UT, were utilized. The background samples were collected at the surface and at 6, 18, and 24 inches depth from seven sample locations outside of the ICPP security fence (Figure 10). The sampling locations were selected authoritatively by a WINCO representative based on knowledge of past plant activities which could have disturbed or contaminated the soils. The locations were chosen to exclude areas where prior construction/excavation activities or releases of hazardous wastes/radiological contamination were known to have occurred.

The background samples (Bkg 1-4) collected by UURI for the Fuel Processing Restoration (FPR) Warehouse Site (associated with LDU CPP-48) were analyzed for heavy metals. Background samples (258-265) collected for the Chemical Storage (associated with SWMU CPP-45) and Zirconium Feed Tank Storage (associated with SWMU CPP-46) areas were analyzed for pH, nitrates, aluminum, zirconium and heavy metals. The background samples were analyzed for hazardous constituents suspected to be present in the three units. The results of the background sample analyses are shown in Table III.

All background samples were collected and analyzed using EPA methods. The UURI report stated that the soils taken from the background locations were geologically identical to the soils in the sampling areas on the ICPP. Since all background samples were collected adjacent to the ICPP

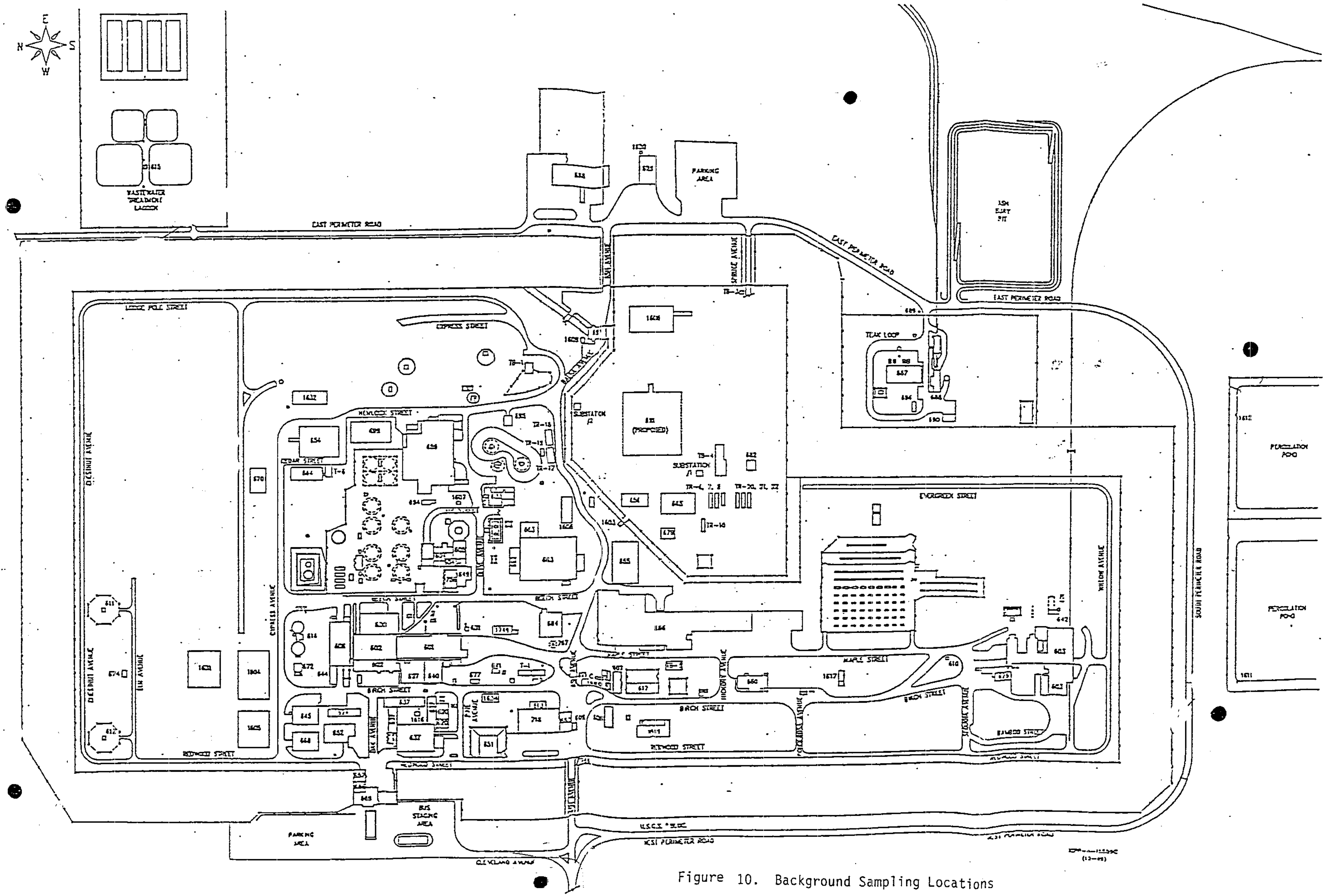

Figure 10. Background Sampling Locations

and all sampling and analyses were conducted using EPA methods, the results were used for comparison with shallow alluvial soils at the ICPP.

6.3 Analytical Procedures

Analytical procedures used on this project are based on reference methods from the most recent editions of the following documents:

- "Test Methods for Evaluation Solid Waste (SW-846)," Third Edition, (EPA 1986);
- "USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis," (EPA 1988);
- "USEPA Contract Laboratory Program Statement of Work for Organics Analysis," (EPA 1988);
- "EML Procedures Manual," 25th Edition, Environmental Measurement Laboratory, U.S. Department of Energy (DOE 1982).

A list of the specific reference methods to be used for analysis at each site and the analytes of interest and laboratory procedures based on the reference methods are presented in the Golder Work Plan.

Volatiles (method 8260) and semivolatiles (method 8270) and Ep-tox metals are being analyzed by Pacific Northwest Laboratories (PNL) Inc. of Redmond, WA. Appendix VIII analyses (minus dioxins and furans) are being conducted by Gulf South Environmental Laboratories, Inc., New Orleans, LA. Dionin and furan analyses are being conducted by Southwest Laboratories of Oklahoma, Broken Arrow OK.

6.4 Quality Assurance Samples

QA samples were collected to ensure sampling precision in accordance with the requirements of the Technical Work Plan for the Idaho Chemical Processing Plant Drilling and Sampling Program at Land Disposal Units

Table III. Background concentrations of Hg, Ba, Cr, Pb, Cd, Ag, As, and Se in soil sampled from locations outside of the ICPP facility*

Sample #	Hg (ppb)	Ba (ppm)	Cr (ppm)	Pb (ppm)	Cd (ppm)	Ag (ppm)	As (ppm)	Se (ppb)
Bkg 1	43	200	25	12	<5	<2	5.6	484
Bkg 2	19	270	32	16	<5	<2	5.1	405
Bkg 3	27	270	33	17	<5	<2	6.5	467
Bkg 4	28	250	34	12	<5	<2	7.0	341
258	25	280	28	<10	<5	<2	5.6	113
259	57	380	26	<10	<5	<2	7.6	252
260	23	240	28	<10	<5	<2	6.4	695
261	30	220	18	<10	<5	<2	6.2	236
264	21	230	28	<10	<5	<2	6.0	102
265	46	210	20	<10	<5	<2	7.6	227
Average (X)	32	255	27	12	<5	<2	6.4	332
St.Dev.(s.d.)	13	51	5	3	--	--	0.8	184
X + 2(s.d.)	57	358	38	17	--	--	8.0	701

* Note: All samples were collected by the University of Utah Research Institute, Salt Lake City, UT using EPA methods. Samples Bkg 1-4 were collected for the FPR Warehouse Site, and 258-265 were collected for the Chemical Storage and Zirconium Feed Tank Storage Areas. All analyses are total constituent analyses and are reported on weight per dry basis.

CPP-39, CPP-55, and CPP-64, and Solid Waste Management Units CPP-51 and CPP-54 (Golder Assoc., 1990).

6.5 Radiation Survey

Radiation surveys were conducted by a WINCO Occupational Health Physicist (OHP) in accordance with WINCO's Standard Operating Procedures (SOPs). Prior to all sampling activities, radiation surveys were conducted in the immediate area surrounding each drilling area to ensure the safety of field and sampling personnel at the unit. Also, all samples were measured for direct radiation prior to removal from the unit to determine the radiological control requirements for shipping and handling. Direct radiation was measured using Geiger-Mueller detection tubes, which were calibrated by the WINCO instrument laboratory prior to field use. Measurement results were logged in the Field Log Book.

6.6 Sample Preservation Methods and Holding Times

Samples collected for analysis were placed in appropriate containers and preserved as required for the types of analysis to be conducted, labeled, sealed, and placed in coolers at $4^{o}C$ for shipping to the analytical laboratories. Information on container types, volumes, container preparation requirements, special handling requirements, preservatives, and holding times is detailed in the Golder Work Plan for this project.

6.7 Sample Packing and Shipping

All sample containers were surveyed for radiation prior to packaging. The samples were then placed into coolers which contained inert packing materials to protect the containers during transport, a cooling agent ("blue ice"), chain-of-custody documentation and a trip blank. The containers were then sealed with a tamper-proof seal and transferred under chain-of-custody to the WINCO Hazardous Materials Shipping group for shipment to the contract laboratory. The sample containers, shipping containers and labeling were checked by WINCO's Hazardous Materials and Shipping group to ensure that applicable DOT shipping requirements were met.

6.8 DATA VALIDATION AND EVALUATION

6.8.1 Data Validation - Validation of all contract inorganic and organic laboratory data will be performed by Golder in accordance with guidelines based on Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (EPA 1988a) and Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (EPA 1988b).

6.8.2 Data Evaluation - Validated analytical data will be evaluated based on the sampling objectives discussed above. Analytical results for metals will be compared to background data for the ICPP collected by UURI in 1986 (WINCO 1989a and WINCO 1989b) and EP-Toxicity criteria. The background data collected by the Utah Research Institute will be evaluated to determine whether it is adequate. Additional background data may be required if the existing data does not adequately represent the soils sampled in this investigation. Other constituents such as PCBs will be compared to promulgated policy or appropriate regulatory action levels. Evidence of contamination will be statistically determined using tolerance intervals as described in "Statistical Analysis of Groundwater Data at RCRA Facilities - Interim Final Guidance" (EPA 1989). Tolerance intervals establish a concentration range that is constructed to contain a specified proportion or coverage (P%) of the population with a specified confidence coefficient, Y. One-Sided tolerance intervals for the background data assuming a normal distribution with 95% coverage of the samples at a 95% confidence coefficient are shown in Table 8-1. Results of sampling exceeding the tolerance intervals shown in Table 8-1, will be considered statistical evidence of contamination. For non-naturally occurring constituents with no promulgated action levels, concentrations in excess of the method detection limit will be considered evidence of contamination. An ACL based on ingitiblity will be developed, if possible, for hexone. The contamination, if any, will be evaluated versus the ACL to develop the plan for remediation activities to be proposed. Additional characterization may be required if statistical evidence of contamination or presence of hazardous constituent above detection limits is determined to exist.

6.8.3 Data Reporting - A final report will be prepared by Golder that summarizes all field activities, presents results of all validated raw data, and presents a summary and evaluation of the results. The report will provide an evaluation of the evidence of contamination at each of the units based on the statistical comparisons to background tolerance intervals, or presence of hazardous constituents above detection limits. The chemical laboratory data will be supplied in electronic format for subsequent statistical analysis by WINCO personnel. This report will provide a basis for evaluating the necessity of remedial actions.

7. CLOSURE PROCEDURES

The sampling procedures and analyses discussed in Section 6 and the Golder Technical Work Plan should delineate the extent of hexone contamination at the unit. If hexone is found to be present at ignitable levels, all contaminated soils will be excavated to the alternate contamination limit for hexone (to be proposed by WINCO), collected, packaged and disposed of at an EPA-approved treatment or disposal facility, and the unit will then be closed in accordance with the applicable requirements of 40 CFR 265, Subpart G (Closure and Post-Closure).

All contaminated soils will be excavated by either backhoe or shovel, depending on the depth of contamination and volume of contaminated soil. Excavation will be to the lowest depth at which contamination was found during unit characterization (e.g., if the surface is found to be contaminated, the surface soil will be removed, if the three foot level shows contamination, the top three feet of soil will be removed). Excavation will continue until all contamination is removed below the method detection limit for hexone or it is not feasible to remove all of the soil.

The contaminated soil will be place either directly into DOT-approved drums or boxes, depending on volume of contaminated soil excavated, or piled on a plastic sheet and covered to prevent contamination from spreading to the environment until the soil can be put into containers for shipment. Contaminated soils will be shipped by truck to an EPA-approved disposal facility. Presently, WINCO is sending hazardous wastes to United States Pollution Control, Inc. (USPCI) in Murray, Utah. If USPCI is unable to accept the contaminated soil an alternate EPA-approved treatment or disposal facility will be contracted for disposal of the waste. If an alternate facility is used WINCO will notify EPA Region X and the State of Idaho.

8. GROUNDWATER MONITORING

Presently, there are no groundwater monitoring wells in the immediate vicinity of LDU CPP-64. However, a detailed hydrogeological assessment report of the Snake River Plain Aquifer and perched water zones has been prepared for the ICPP by Hull (1986). Information from Hull's report will be used, in conjunction with the groundwater monitoring requirements review being conducted for the INEL Mixed Waste Implementation Program (this program is being conducted as part of the INEL RCRA Part B process), ICPP unit characterization data and information collected during the RI/FS scoping process, under the upcoming INEL Federal Facilities Agreement, to determine the number of wells needed and their placement.

Numerous wells are already in place around ICPP for sampling the regional aquifer (see Figure 11). Until a determination is made that additional wells are needed, existing ICPP groundwater monitoring wells will be used for monitoring LDU CPP-64.

9. DECONTAMINATION PROCEDURES

9.1 Sampling Equipment Decontamination

The drill rig was decontaminated by the drilling contractor prior to entry to LDU CPP-64 using high-pressure steam at a designated decontamination area near the ICPP. Sampling personnel visually inspected the rig and downhole tools before they were brought on site for grease, hydraulic fluids, or other visible materials that might potentially contaminate the boreholes.

After each use, sampling equipment was surveyed with a beta-gamma survey instrument to ensure there was no residual radioactivity. Samples that showed radiation were sent to a radioactive materials decontamination facility inside the ICPP prior to chemical decontamination by sampling personal. All split-spoon samplers, lexan liners, and associated sampling equipment, not contaminated with radiation, were decontaminated by the sampling subcontractor. Decontamination consisted of the following:

- o steam clean with deionized water and wiped dry;

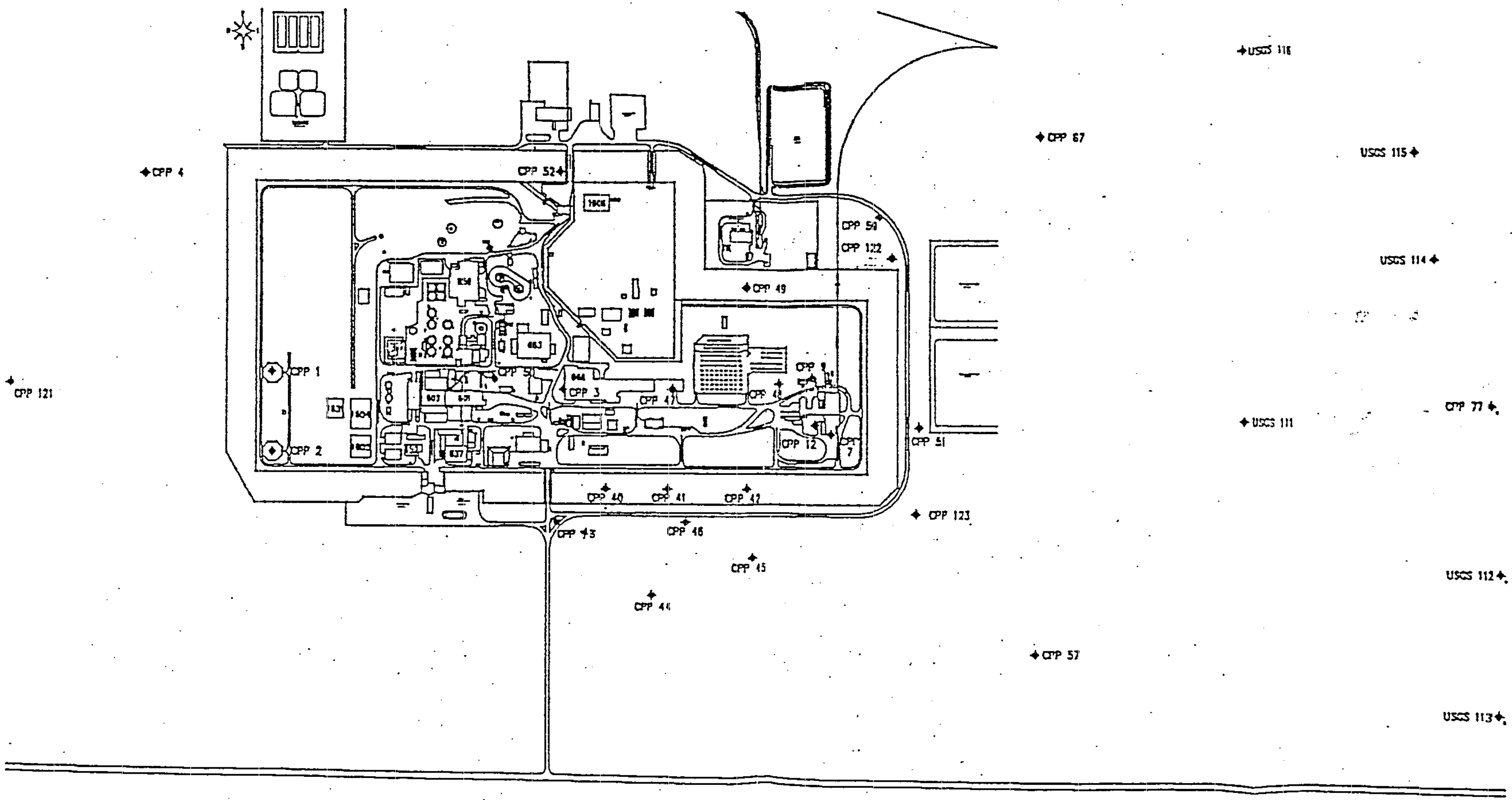

Figure 11. Location of ICPP Groundwater Monitoring Wells

- o rinse with a towel or rag soaked lightly with methanol and allowed to air dry;
- o rinse with deionized water and wiped dry, then sealed in plastic until the next period of use.

All drilling and sampling equipment was decontaminated at completion of the work as outlined above, and surveyed by a WINCO Health Physicist prior to leaving the site.

9.2 Facility Decontamination

It is not anticipated that any facility decontamination activities will be required.

10. POST-REMOVAL SAMPLING AND ANALYTICAL PROCEDURES

If soil remediation is required, verification sampling will be performed to ensure that no further contamination (above the ACL for hexone) is present at the unit. Verification sampling locations will be selected by random sampling unless the analytical results for unit characterization indicates that judgemental sampling is warranted. If random sampling is used, the potential sampling locations will be determined by placing grids on a map of the unit. Each grid intersection will be assigned a unique number. The actual sampling locations will be determined by selecting numbers at random and then sampling the corresponding location. The actual number of samples collected will dependent on the results of unit characterization. If contamination is found, the soil will be resampled and additional layers of soil will be removed until no contamination is found. All samples will be collect and analyzed using the same methods outlined in Section 6. All analyses will be conducted for hexone.

11. CLOSURE QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

All administrative, sampling, and analysis activities were performed in accordance with sound QA/QC procedures. These procedures are outlined in the Quality Assurance Program Plan: INEL/ICPP Land Disposal Unit Characterization Support (Golder Assoc., 1990c) and the Quality Assurance Project Plan for Drilling and Sampling Activities at Land Disposal Units CPP-34 (Golder Assoc., 1990a) (see Attachment I). These plans establish appropriate QA program controls for conducting unit characterizations at ICPP Land Disposal Units and Solid Waste Management Units. The plans incorporate all applicable requirements of ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, which is defined as the preferred standard for all projects conducted at nuclear facilities by U.S. Department of Energy (DOE) Order 5700.6B, Quality Assurance. In addition, the QA Project Plan was written in compliance with the guidelines provided by Interim Guidelines for Preparation of Quality Assurance Project Plans (QAMS/005). Interpretations of QAMS/005 and expanded guidance provided by other applicable EPA guidance documents were considered during the preparation of the QA Project Plan.

12. CLOSURE CERTIFICATION

If LDU CPP-64 is administratively closed a closure certification will not be required. If remediation is required, this Closure Plan and all associated activities will be reviewed by a registered engineer. Upon completion, a certification will be obtained stating that all work was performed in accordance with this closure plan.

13. AREA RESTORATION

If the unit is administratively closed, area restoration will not be required. All excavations will be filled to grade with native soils excavated during previous projects at the ICPP. These soils are stock piled south of the ICPP Percolation Ponds. The original spill area will then be resurfaced with asphalt. Since the area West of Birch Street is a gravel one located within the ICPP perimeter, where the soils are chemically controlled to prevent growth, vegetation will not be reestablished in this area.

14. OTHER TOPICS OF CONCERN

Since sample analyses for LDU CPP-64 have not been completed to date, additional investigations/evaluations of the potential risk may be required. It is assumed that additional finances and resources will be available for additional sampling and/or remediation if necessary. However, until the analytical results are evaluated, the additional activities required to obtain closure cannot be determined and the financial and resource needs cannot be accurately predicted.

Every effort will be made to meet the established timetable; however, extensions may be required due to circumstances beyond control of the DOE or its contractor. The weather conditions can be very harsh in the central Idaho desert, potentially causing delays in closure-related activities. Also, since the INEL is a government-funded facility, the closure schedule will depend upon the availability of adequate funding.

15. COST SCHEDULE

Since the final disposition of LDU CPP-64 cannot be ascertained until the sample analyses are completed, the analytical results are validated, verified and the data are interpreted, the costs associated with future activities cannot be projected. It is assumed that unit characterization is complete and that future activities will be associate with remedial activities. If contamination is identified, a budget for future activities will be established.

16. SCHEDULE OF ACTIVITIES

The DOE has previously requested an extension of this closure plan deadline (reference letter J. E. Solecki to M. Gearheard, USEPA, dated July 6, 1990). However, this plan is being submitted to EPA Region X and the State of Idaho for approval on or before the original scheduled date of July 19, 1990, as required by the COCA. It is anticipated that sample analyses will be completed and the analytical results will be validated and verified by September 30, 1990. A final report reflecting results of sample analyses will be written and submitted to the EPA and the State of Idaho by December 14, 1990. The report will contain all pertinent unit characterization information and either a request for administrative closure or a detailed outline and schedule for closure activities.

17. POST CLOSURE

Since LDU CPP-64 will either be administratively closed or clean closed, post-closure requirements under RCRA (40 CFR 265.117-120) and the COCA will probably not be required for LDU CPP-64. However, if post-closure care becomes necessary, this Closure Plan will be amended in accordance with 40 CFR 265.112 and a Post-Closure Plan will be developed and submitted within 30 days of that determination to EPA Region X and the State of Idaho for review and approval.

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APPENDIX A

ACRONYMS

ACRONYMS

BEHP	Bis(2-ethyl-hexyl)phthalate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CPP	Chemical Processing Plant
CLP	Contract Laboratory Program
COCA	Consent Order and Compliance Agreement
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	Department of Transportation
DPE	Drilling Project Engineer
EPA	Environmental Protection Agency
EP-toxicity	Extraction procedure toxicity
FPR	Fuel Processing Restoration
GC/MS	Gas Chromatography/Mass Spectrometry
HEA	Health and Environmental Assessment
INEL	Idaho National Engineering Laboratory
LDU	Land Disposal Unit
mph	Miles per hour
MRem/HR	Millerem per hour
NRTS	National Reactor Testing Station
NOAA	National Oceanic and Atmospheric Administration
OD	Outside diameter
OHP	Occupational Health Physicist
PG	Project Geologist
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative percent difference
RWMC	Radioactive Waste Management Complex
SOP	Standard Operating Procedure
SWMU	Solid Waste Management Unit
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
UTL	Upper tolerance intervals
UURI	University of Utah Research Institution
WINCO	Westinghouse Idaho Nuclear Company