DETERMINATION OF SITE BACKGROUND VALUES

FOR RADIOLOGICAL MEASUREMENTS

JULY 17, 2000

WESTINGHOUSE ELECTRIC CORPORATION

BLAIRSVILLE, PA

REPORT #005

DETERMINATION OF SITE BACKGROUND VALUES

FOR RADIOLOGICAL MEASUREMENTS

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DETERMINATION OF SITE BACKGROUND VALUES

FOR RADIOLOGICAL MEASUREMENTS

Purpose

The Westinghouse Blairsville Site utilized nuclear materials during the period of the mid to late 1950's to the early part of the 1960's. Work was performed both under licenses with the atomic Energy Commission and for the Bettis Atomic Power Laboratory. Although all work ceased during the 1960's, subsequent radiological surveys and investigations, starting in 1993, established that some residual radioactivity, primarily in underground piping and subsurface soil contamination, existed on the site. During the period of 1993 through the present, additional remediation work and radiological surveys have been conducted to establish that the site can be released for unrestricted use. This series of reports documents the results of the final status radiological surveys subsequent to the various remediation efforts.

Scope

This report presents the results of measurements made to determine appropriate values for the background radiation levels using the various radiation detection instrumentation that will be used for the building release surveys. Analytical information is also presented for soil samples taken. Radiation measurements were made on various surfaces both on and off the site. A statistical analysis is presented to evaluate the differences in the background measurements

Discussion

The procedure used to obtain the necessary background radiation data is included as Appendix A. Measurement points were selected to provide a representation of the various measurements that will be required as part of the surveys. The instruments used are those types that will be used for the surveys. Soil samples were collected and analyzed.

The locations where the appropriate measurements and soil samples were taken were chosen on the basis of areas which were considered to be unaffected by past radiological operations. Both on-site and off-site locations were selected. Different surfaces were selected in order to establish if such differences would be significant.

Instrumentation used to measure the presence of radioactive material on smear papers was not included in this study. However, typical background radiation levels for these instruments are presented in this report for completeness. The locations where each of the measurements or samples were taken is documented in Appendix G.

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Results for Instrumentation

Appendix B presents all of the information obtained during the taking of background radiation measurements for the various instruments. The location for each measurement point is identified as appropriate on building layout or site plot plans. Appendix C presents a summary of the information obtained.

Although the Reuter-Stokes instrument is considered to be the standard for the measurement of gamma dose rate, it is not a convenient instrument to use for routine measurements. The Eberline Model PRM-7 instrument will normally be used for the surveys. Information is presented in Appendix B showing the ratio of the results obtained for each of these instruments at the same locations. The Eberline Model PRM-7 survey meter was found, on the average, to provide adequate data. For interior locations, the PRM-7 is about 12% lower than the Reuter-Stokes. For exterior locations, the PRM-7 is about 26% higher than the Reuter-Stokes. These differences are small enough to justify the use of the more convenient Model PRM-7 instrument for the majority of the survey measurements of the gamma dose rate at one meter above the surface.

Results for Soil Sample Analysis

Twenty-three soil samples were taken at nearby locations including both on-site and off-site locations. Care was taken to not include locations that would be expected to have possibly been affected by site operations such as water drainage areas. The analytical report sheets are included as Appendix E and the statistical analysis of the results is presented in Appendix F.

APPENDIX A

PROCEDURE FOR TAKING

BACKGROUND RADIATION MEASUREMENTS

AND SOIL SAMPLES

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Enviromental Clean-Up Procedure 40-03-93 Rev 1. 3/29/95

Background Surveys

Purpose:

To establish background levels of direct radiation and radionuclide concentrations in soil to enable a comparison of site radiological conditions with the acceptable guideline values.

Policy and Scope:

To be applied to any survey performed for the purpose of establishing background radiological levels.

Definitions:

None.

Responsibilities:

A historical review, predetermined survey points, perform all required instrument checks prior to performing surveys.

References:

Nureg CR-5849, ORAU/57 June 1992, section 2.3.1, 6.3, 6.5.5, 4.2.3
Environmental Clean-Up Procedures and Guidelines.

General Procedure

I. Interior surveys.

A. Concrete.
   1. Alpha.
   2 Beta.
   3. Beta-gamma.
   4. Gamma

B. Brick.
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma

C. Block.
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma

D. Other.
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma

E. TLD surveys.
   1. Gamma.

II. Exterior surveys.

A. Concrete.
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma

B. Brick. (walls)
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma

C. Block. (walls)
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma

D. Other.
   1. Alpha.
   2. Beta.
   3. Beta-gamma.
   4. Gamma
   5. Soil.

E. TLD.
   1. Gamma.

III. Performing the Survey.

A Interior Surveys.
   1. Alpha , beta, beta-gamma, gamma.
      a. Obtain relevent survey form(s).
      b. Locate survey point and place the alpha and beta instruments on the point.
      c. Set instruments to the following count times:
         1) ESP-2 with gas proportional probe or equivilent,10 min. (alpha).
         2) ESP-2 with HP 270 probe or equivilent, 5 min. avg. (beta-gamma)
         3) ESP-2 with gas proportional probe or equivilent, 10 min. (beta).
         4) E-520 with HP 270 probe or equivilent (beta-gamma).
         5) PRS-1 with NaI probe or equivilent 5 min (low energy gamma).
         6) Reuter-Stokes or equivilent 10 min. avg. (PIC gamma)
         7) PRM-7 or equivilent (gamma).
      d. On survey form, locate survey point and start the count for the applicable instrument.
      e. Log the reading in the appropriate block.
      f. Continue through the form until all of the survey points have been completed.

B. Exterior Surveys.
   1. Proceed as in Part A 1 a,b,c, d,e,f above as applicable.
   2. Soil samples.
      a. At survey point excavate a sample of at least 1.5 kg's.
      b. Remove grass and twigs unless there is some reason to believe they are contaminated.
      c. Place sample into container (bag or other container).
      d. Identify sample.
      e. Dry sample.
      f. Maintain chain of custody.
      g. Make sure that sampling tools are cleaned and monitored after each sample to avoid any cross contamination of subsequent samples.

C. TLD Surveys.
   1. Place TLD's at predetermined points.
   2. Allow to remain for a period of 90 days.
   3. After period of exposure remove TLD's.
   4. Have TLD's read.
   5. Collate results to be included as part of background study.

IV. Choosing the Survey Points.

A. Survey Point Selection
   1. A random selection that is repeatable.

B. Mapping the Survey Points.
   1. Using the topograghical maps:
      a. Draw two concentric circles around the site (center) at 1.5 and 2.5 kilometers.
      b. Divide the circles in eight (8) quadrants of 45 degrees.
      c. Mark a soil sample point in each guadrant and one (1) other point in concrete or asphalt near it.
      d. Mark additional points down wind and up wind from the site outside the 2.5 kilometer circle for soil samples.
      e. If wind has more than one direction for an appreciable period then soil samples of this type must be completed.

APPENDIX B

INSTRUMENT BACKGROUND DATA SHEETS

IH and S Form #008-A Instrument Background Data for Concrete Surfaces

		ALPHA ACTIVITY RESULTS		BETA ACTIVITY RESULTS		BETA / GAMMA EXPOSURE RATE	
		(10 minute gross Counts)	(5 Minute gross Counts)	(10 minute gross Counts)	(Average CPM)	(5 min. Average - mRad/hr)	(Average mRad/hr)
Ref.	Location	ESP-2	ESP-2	ESP-2	E-520	ESP-2	E-520
Point	code	#1510	#1522	#1593	#5242	#1522	#5242
1	1-17	27	8	2790	45	0.009	0.015
2	1-16	23	5	3080	35	0.012	0.025
3	1-13	12	2	3270	45	0.012	0.015
4	1-9	19	4	3260	35	0.012	0.015
5	1-9	24	1	2670	60	0.013	0.025
6	1-10	24	5	2660	35	0.012	0.01
7	1-13	14	1	2940	45	0.015	0.012
8	1-32	20	8	2830	60	0.012	0.045
9	1-24B	21	7	3020	60	0.012	0.02
10	1-23	52	4	2670	40	0.009	0.015
11	1-21	16	5	2720	50	0.013	0.015
12	1-25	28	1	2970	50	0.011	0.01
13	1-27	35	9	2980	40	0.012	0.02
14	1-30	24	5	3340	40	0.009	0.01
15	1-33	16	1	2700	40	0.01	0.01
16	1-43	8	8	3120	50	0.011	0.015
17	1-36	27	8	3040	70	0.012	0.02
18	1-35B	36	5	2500	70	0.01	0.015
19	1-40A	13	3	2810	35	0.01	0.015
20	4-1	27	6	2500	40	0.009	0.02
21	4-1	22	4	2900	50	0.013	0.02
22	3-1-1	20	5	2520	35	0.012	0.015
23	3-1-1	35	2	2620	45	0.011	0.015
24	3-1-1	26	7	3000	40	0.011	0.01
25	2-9-1	20	4	2840	35	0.013	0.015
26	2-9-1	29	7	2750	35	0.011	0.01
27	2-5-1	39	7	2880	50	0.01	0.01
28	2-3-1	23	2	2570	50	0.01	0.01
29	2-3-1	24	7	2860	45	0.012	0.015
30	2-1-1	25	7	2970	50	0.012	0.02
31	2-2-1	29	8	3030	50	0.009	0.01
32	2-4-1	27	6	3130	50	0.009	0.01
33	2-6-1	24	9	2830	45	0.008	0.02
34	2-8-1	24	6	2700	50	0.011	0.01
Stastical Analysis							
Number of Samples		34	34	34	34	34	34
Minimum		8	1	2500	35	0.008	0.010
Maximum		52	9	3340	70	0.015	0.045
Average		24.50	5.21	2866.76	46.32	0.011	0.016
Standard Deviation		8.40	2.47	221.60	9.48	0.002	0.007

IH and S Form #008-B Instrument Background Data for Block Surfaces

		ALPHA ACTIVITY RESULTS		BETA ACTIVITY RESULTS		BETA / GAMMA EXPOSURE RATE	
		(10 minute gross Counts)	(5 Minute gross Counts)	(10 minute gross Counts)	(Average CPM)	(5 min. Average - mRad/hr)	(Average mRad/hr)
Ref. Point	Location code	ESP-2 #1510	ESP-2 #1522	ESP-2 #1593	E-520 #5245	ESP-2 #1522	E-520 #5245
35	2-1-1	29	9	3040	35	0.014	0.02
36	2-1-1	24	14	2150	50	0.009	0.01
37	2-2-1	31	10	2430	30	0.01	0.015
38	2-4-1	26	9	2290	40	0.012	0.01
39	2-6-1	15	9	2240	35	0.01	0.015
40	2-8-1	25	9	2510	40	0.011	0.015
41	2-9-1	28	8	2300	30	0.01	0.015
42	2-7-1	19	8	2500	30	0.012	0.01
43	2-5-1	18	10	2870	35	0.01	0.01
44	2-3-1	20	33	2770	40	0.012	0.015
45	3-1-1	12	4	3000	30	0.012	0.01
46	3-1-1	15	10	2570	30	0.012	0.02
47	3-3-1	23	5	2510	40	0.013	0.02
48	3-3-1	23	11	2690	40	0.012	0.015
49	4-1-1	19	12	2730	30	0.011	0.02
50	4-1-1	11	10	2890	40	0.011	0.015
51	1-40A-1	24	10	2230	40	0.011	0.015
52	1-37-1	16	13	2330	30	0.011	0.01
53	1-43-1	13	12	1790	35	0.008	0.01
54	1-33-1	34	11	2800	40	0.01	0.015
55	1-33-1	11	8	2960	40	0.011	0.01
56	1-24B-1	13	5	2030	40	0.008	0.01
57	1-22-1	31	7	3200	30	0.007	0.01
58	1-6-1	12	4	2000	40	0.009	0.01
59	1-13-1	16	3	2030	40	0.007	0.01
60	1-16-1	10	9	3900	40	0.01	0.01
Stastical Analysis							
Number of Samples		26	26	26	26	26	26
Minimum		10	3	1790	30	0.007	0.010
Maximum		34	33	3900	50	0.014	0.020
Average		19.92	9.73	2567.69	36.54	0.011	0.013
Standard Deviation		7.13	5.51	456.37	5.25	0.002	0.004

IH and S Form #008-C Instrument Background Data - Interior Locations

Reference Point	Location Code	LOW ENERGY GAMMA - CONTACT (5 minute gross counts) Ludlum 44-2	LOW ENERGY GAMMA - CONTACT (5 minute gross counts) PRS-1	GAMMA @ 1 METER (uR/hr) (Avg. exposure rate) PRM-7	GAMMA @ 1 METER (uR/hr) (10 minute Average) Reuter-Stokes
61	1-17	5662	24303	5	6.2
62	1-13	7125	29657	6	6.8
63	1-9	6648	28379	6	6.4
64	1-25	5743	24178	6	6
65	1-27	5943	24806	6	6.1
66	1-30	5522	23636	4	5.5
67	1-36	6215	26582	5	6
68	1-40A	5373	23060	5	6.1
69	4-1	5115	22024	5	5.5
70	3-1-1	4995	21448	6	5.8
71	3-1-1	4739	20450	5	5.7
72	3-1-1	4735	20338	4	5.4
73	2-9-1	5479	22679	5	5.6
74	2-5-1	4908	21253	4.5	6
75	2-3-1	5493	24308	5	6.1
76	2-1-1	5703	24651	6	6
77	2-4-1	5076	21552	5	5.5
78	2-4-1	5189	21758	5	5.3
79	2-6-1	4715	20556	5	5.3
80	2-8-1	5012	21658	4.5	5.6
Stastical Analysis					
Number of Samples		20	20	20	20
Minimum		4715	20338	4	5.3
Maximum		7125	29657	6	6.8
Average		5469.50	23363.80	5.15	5.85
Standard Deviation		642.36	2576.65	0.65	0.39

IH and S Form #008-D Instrument Background Data Exterior Locations

		LOW ENERGY GAMMA ON CONTACT		GAMMA EXPOSURE @ 1 METER (uR/hr)		BETA SURFACE ACTIVITY			
		(5 minute gross count)	(5 minute gross count)	(Average exposure rate)	(10 minute Average)	(10 minute count)	(Average CPM)	Soil Sample	
	Ref. Point	Ludlum 44-2	PRS-1	PRM-7	Reuter-Stokes	ESP-2 #1593	E-520 #5242	Ref. # (if applic.)	Comments
On	81	6213	26363	6.5	6.3	7050	90		At Rust deposite (See map)
Site	82	7002	26880	6.5	6.7	3830	80		See map
Concrete	83	6353	26302	5.5	5.4	3440	80		See map
	84	5663	23932	5	5	3570	60		See map
	85	5510	23002	5	5.8	3600	70		See map
	86	5777	24582	4.5	6.1	3450	70		See map
On	87	6644	27436	4.5	5.6	3340	70		See map
Site	88	7198	30103	5.5	6.5	3480	70		See map
Asphalt	89	5797	22751	4.5	5	3330	60		See map
	90	8546	34535	7	5.3	3810	50		See map
	91	5824	24224	5	4.8	3200	60		See map
	92	8554	30727	8	5.7	3500	60		See map
On	93	17506	74033	14	9.8	5260	70	2	See map
Site	94	9918	40508	6.5	5.7	3770	60	3	See map
Unpaved	95	9299	34521	6	4.8	3020	40	4	See map
	96	9776	40822	8	6.3	3920	70	5	See map
	97	9354	37583	8.5	6.8	3600	70	6	See map
	98	11763	47359	10	8.5	4110	70	7	See map
Off	99	8092	34963	7	5	3440	40		At Gas Line #14
Site	100	7828	30187	6	5.8	2880	60		Westinghouse access road
Asphalt	101	8405	33229	7	6	2640	50		Stony Run Road
	102	5384	23584	7	5.4	2620	40		Industrial Park Blvd.
	103	10237	42821	11	4.9	1950	45		
	104	7671	31729	7.5	4.8	2630	45		
Off	105	12293	49804	9.5	5.4	3430	50	8	Near Pole #48574 ; P.O. Box 354
Site	106	8047	35483	7.5	4.6	2510	35	9	Stake in ground
Unpaved	107	12245	48828	10	6.2	3520	60	10	At hill top; Stake in ground
	108	14168	54626	10	7.4	4020	60	11	In field at rear of IPS Company
	109	17969	77600	15	10.8	4770	90	12	Off Deep Hollow Rd. on left side
	110	10564	40570	7	6.7	3210	50	13	In Field off Bummy Rd. on left side
	111	12279	49231	8	6.6	2990	40	14	Off Old Rt. 22 on north side
	112	8586	33803	6.5	5.3	2650	45	15	Across from sewage plant
	113	12195	46931	8	5	3440	50	16	
	114	10117	39454	7	4.5	2830	50	17	
	115	11418	46863	6.5	7.8	3050	50	18	Near Pole #5/97
	116	13151	53433	11	8.7	3360	50	19	Across from Pole #122
	117	12730	52164	11	6.2	3490	50	20	At gas well just off road
	118	7690	32155	7.5	4.9	2890	50	21	Across from House Box #363
	119	12199	47492	9.5	7.5	3930	60	22	At pipeline off Rt. 217 North
	120	14323	56121	12	8.3	4460	60	23	At pipeline off Lear Rd.
Stastical Analysis									
Number of Samples		40	40	40	40	40	40		
Minimum		5384	22751	5	5	1950	35		
Maximum		17969	77600	15	11	7050	90		
Average		9607.20	38918.35	7.80	6.20	3499.75	58.25		
Standard Deviation		3200.05	13118.67	2.51	1.45	848.57	13.57		

APPENDIX C

SUMMARY OF

BACKGROUND MEASUREMENT RESULTS

REPORT #005

SUMMARY OF BACKGROUND MEASUREMENT RESULTS

	ALPHA ACTIVITY RESULTS		BETA ACTIVITY RESULTS		BETA / GAMMA EXPOSURE RATE		LOW ENERGY GAMMA ON CONTACT		GAMMA @ 1 METER	
	(10 minute gross Counts)	(5 Minute gross Counts)	(10 minute gross Counts)	(Average CPM)	(5 min. Average - mRad/hr)	(Average mRad/hr)	(5 minute gross counts)		(uR/hr)	
	ESP-2 #1510	ESP-2 #1522	ESP-2 #1593	E-520 #5242	ESP-2 #1522	E-520 #5242	Ludlum 44-2	PRS-1	(Avg. exposure rate) PRM-7	(10 minute Average) Reuter-Stokes
CONCRETE SURFACES										
COUNT	34	34	34	34	34	34				
MINIMUM	8	1	2500	35	0.008	0.010				
MAXIMUM	52	9	3340	70	0.015	0.045				
AVERAGE	24.50	5.21	2866.76	46.32	0.011	0.016				
STANDARD DEVIATION	8.40	2.47	221.60	9.48	0.002	0.007				
BLOCK SURFACES				#5245		#5245				
COUNT	26	26	26	26	26	26				
MINIMUM	10	3	1790	30	0.007	0.010				
MAXIMUM	34	33	3900	50	0.014	0.020				
AVERAGE	19.92	9.73	2567.69	36.54	0.011	0.013				
STANDARD DEVIATION	7.13	5.51	456.37	5.25	0.002	0.004				
INTERIOR LOCATIONS										
COUNT							20	20	20	20
MINIMUM							4715	20338	4	5.3
MAXIMUM							7125	29657	6	6.8
AVERAGE							5469.50	23363.80	5.15	5.85
STANDARD DEVIATION							642.36	2576.65	0.65	0.39
EXTERIOR LOCATIONS										
COUNT			40	40			40	40	40	40
MINIMUM			1950	35			5384	22751	5	5
MAXIMUM			7050	90			17969	77600	15	11
AVERAGE			3499.75	58.25			9607.20	38918.35	7.80	6.20
STANDARD DEVIATION			848.57	13.57			3200.05	13118.67	2.51	1.45

APPENDIX D

BACKGROUND INSTRUMENTS USED

Background Instruments

Instruments Used in Background Measurements				Detector Model/ Type	Detection Type	Efficiency	Correction Factor	Area Factor	MDA
Code Number	Manufacturer	Model	Serial Number						
6	Eberline	ESP-2	1510	Gas Proportional	Alpha	24.0	4.17	1	63
11	Eberline	ESP-2	1593	Gas Proportional	Beta	37.7	2.65	1	286
15	Eberline	E-520	5242	GM Pancake	Beta	23.7	4.22	0.15	1758
16	Eberline	E-520	5242	GM HP-270	Beta/ Gamma	N/A	N/A	N/A	0.02
17	Eberline	E-520	5245	GM Pancake	Beta	22.1	4.52	0.15	1758
18	Eberline	E-520	5245	GM HP-270	Beta/ Gamma	N/A	N/A	N/A	0.02
22	Eberline	ESP-2	1522	GM HP-270	Beta/ Gamma	N/A	N/A	N/A	0.02
23	Eberline	PRM-7	234	Internal	Gamma	N/A	N/A	N/A	15
24	Eberline	PRS-1	346	SPA-3 LEG	Gamma	N/A	N/A	N/A	N/A
25	Reuter Stokes	ERM	L-2088	Ion Chamber	Gamma	N/A	N/A	N/A	14
32	Eberline	2221	125429	Ludlum 44-2	Gamma	N/A	N/A	N/A	N/A
33	Ludlum	2221	91943	Ludlum 44-2	Gamma	N/A	N/A	N/A	2300

APPENDIX E

SOIL SAMPLE ANALYTICAL

LABORATORY REPORT SHEETS

REPORT #005

Nuclear Services Division
COTA - Analytical Laboratory
Waltz Mill Site
(412) 722-5219

ANALYSIS REPORT 15569

Originator: A. J. Nardi

Company/Div. W ESBU Environmental & Regulatory Services

RESULTS OF ANALYSIS

pCi/gram ±2 sigma (@ sample date: 12-13-94)

Analytical Service #	Sample Identification	CS137	TL208	PB212	Pb214	Pb212	Pb214	Ra226	Ra226/ Ac228	Th228	U235		Other
94-2383	B-001	0.465 ± 0.2	.274 ± 0.1	-	0.671 ± 0.3	0.577	0.673 ± 0.3	0.671 ± 0.3	-	0.787 ± 0.4	-		-
94-2384	B-002	0.399 ± 0.1	0.312 ± 0.2	-	-	0.615 ± 0.3	1.46 ± 0.4	1.46 ± 0.4	1.85 ± 0.8	0.896 ± 0.6	0.352 ± 0.2		CE-144 0.622 ± 0.5
94-2385	B-003	-	-	-	-	0.703 ± 0.2	1.05 ± 0.4	0.716 ± 0.3	-	<0.7	0.274 ± 0.15		-
94-2386	B-004	-	0.233 ± 0.2	-	-	0.677 ± 0.2	1.00 ± 0.4	0.596 ± 0.3	-	0.668 ± 0.6	-		-
94-2387	B-005	-	0.309 ± 0.2	-	-	1.01 ± 0.2	0.896 ± 0.4	0.754 ± 0.3	1.72 ± 1.0	0.888 ± 0.6	-		-
94-2388	B-006	-	0.290 ± 0.2	-	-	0.741 ± 0.3	0.858 ± 0.4	0.435 ± 0.3	2.30 ± 2	0.832 ± 0.5	-		-

Remarks: Blairsville, COC-001

Procedures: A-524
Analyst: WTF, MRK, FRC
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WPF0749-13:49/011795

Nuclear Services Division
COTA - Analytical Laboratory
Waltz Mill Site
(412) 722-5219

ANALYSIS REPORT 15569

Originator: A. J. Nardi Company/Div. W ESBU Environmental & Regulatory Services

RESULTS OF ANALYSIS

pCi/gram ±2 sigma (@ sample date: 12-13-94)

Analytical Service #	Sample Identification	CS137	TL208	PB212	Pb214	Pb212	Pb214	Ra226	Ra226/ Ac228	Th228	U235		Other
94-2388	B-007	-	.290 ± 0.1	-	-	0.741 ± 0.3	0.858 ± 0.4	0.435 ± 0.3	2.30 ± 2	0.832 ± 0.5	-		-
94-2389	B-008	-	0.388 ± 0.1	1.87 ± 1.6	0.772 ± 0.3	0.661 ± 0.3	0.981 ± 0.4	0.772 ± 0.3	-	1.11 ± 0.4	0.224 ± 0.2		-
94-2390	B-009	-	0.212 ± 0.2	-	-	0.897 ± 0.2	0.931 ± 0.4	0.721 ± 0.4	3.34 ± 2	0.610 ± 0.6	-		-
94-2391	B-010	0.702 ± 0.3	0.286 ± 0.2	-	-	0.634 ± 0.3	0.629 ± 0.4	0.840 ± 0.4	-	0.822 ± 0.5	-		-
94-2392	B-011	0.197 ± 0.16	0.266 ± 0.2	-	-	0.952 ± 0.3	0.804 ± 0.3	0.670 ± 0.4	-	0.763 ± 0.5	-		-
94-2393	B-012	0.317 ± 0.2	0.376 ± 0.2	-	-	1.21 ± 0.3	0.549 ± 0.4	0.458 ± 0.4	-	1.08 ± 0.5	-		-

Remarks: Blairsville, COC-001

Procedures: A-524
Analyst: WTF, MRK, FRC
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ANALYSIS REPORT 15569

Originator: A. J. Nardi

Company/Div.: W ESBU Environmental & Regulatory Services

RESULTS OF ANALYSIS

pCi/gram ±2 sigma (@ sample date: 12-13-94)

Analytical Service #	Sample Identification	CS137	TL208	PB212	Pb214	Pb212	Pb214	Ra226	Ra226/ Ac228	Th228	U235		Other
94-2394	B-013	-	0.702 ± 0.2	-	0.898 ± 0.4	1.24 ± 0.2	1.35 ± 0.4	0.898 ± 0.4	3.80 ± 2	2.02 ± 0.7	-		-
94-2395	B-014	0.284 ± 0.2	-	-	0.600 ± 0.4	0.798 ± 0.2	1.13 ± 0.4	0.600 ± 0.4	-	<0.8	-		-
94-2396	B-015	0.526 ± 0.2	0.303 ± 0.2	-	-	0.951 ± 0.4	1.10 ± 0.4	0.824 ± 0.5	2.44 ± 2	0.869 ± 0.6	0.371 ± 0.2		-
94-2397	B-016	0.273 ± 0.2	0.337 ± 0.1	-	-	0.779 ± 0.3	0.433 ± 0.4	0.790 ± 0.3	-	0.969 ± 0.3	-		-
94-2398	B-017	0.367 ± 0.3	0.344 ± 0.2	-	-	0.773 ± 0.3	0.785 ± 0.4	0.803 ± 0.4	3.55 ± 1	0.988 ± 0.5	-		-
94-2399	B-018	-	-	-	-	-	-	0.435 ± 0.4	-	0.709 ± 0.5	-		-

Remarks: Blairsville, COC-001

Procedures: A-524
Analyst: WTF, MRK, FRC
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ANALYSIS REPORT 15569

Originator: A. J. Nardi Company/Div. W ESBU Environmental & Regulatory Services

RESULTS OF ANALYSIS

pCi/gram ±2 sigma (@ sample date: 12-13-94)

Analytical Service #	Sample Identification	CS137	TL208	PB212	Pb214	Pb212	Pb214	Ra226	Ra226/ Ac228	Th228	U235		Other
94-2400	B-019	0.503 ± 0.3	0.288 ± 0.2	-	-	0.851 ± 0.3	-	-	-	0.826 ± 0.5	-		-
94-2401	B-020	0.300 ± 0.2	0.481 ± 0.2	-	-	1.18 ± 0.2	0.600 ± 0.3	0.614 ± 0.3	-	1.38 ± 0.6	0.179 ± 0.17		-
94-2402	B-021	-	0.530 ± 0.2	-	-	1.17 ± 0.2	0.898 ± 0.3	1.07 ± 0.4	-	1.52 ± 0.6	0.210 ± 0.2		-
94-2403	B-022	0.674 ± 0.2	0.244 ± 0.1	-	0.586 ± 0.3	0.659 ± 0.3	-	-	-	0.700 ± 0.4	-		-
94-2404	B-023	0.223 ± 0.2	0.285 ± 0.2	-	0.434 ± 0.3	0.674 ± 0.3	1.19 ± 0.4	0.434 ± 0.3	2.85 ± 2	0.818 ± 0.6	-		-
~~94-2405~~	~~B-024~~	~~0.318 ± 0.2~~	~~0.670 ± 0.2~~	VOID		~~1.43 ± 0.3~~	~~1.04 ± 0.4~~	~~0.706 ± 0.4~~	~~4.80 ± 2~~	~~1.93 ± 0.6~~	-		-

Remarks: Blairsville, COC-001

Procedures: A-524
Analyst: WTF, MRK, FRC
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APPENDIX F

SOIL SAMPLE

LABORATORY RESULTS ANALYSIS

REPORT #005

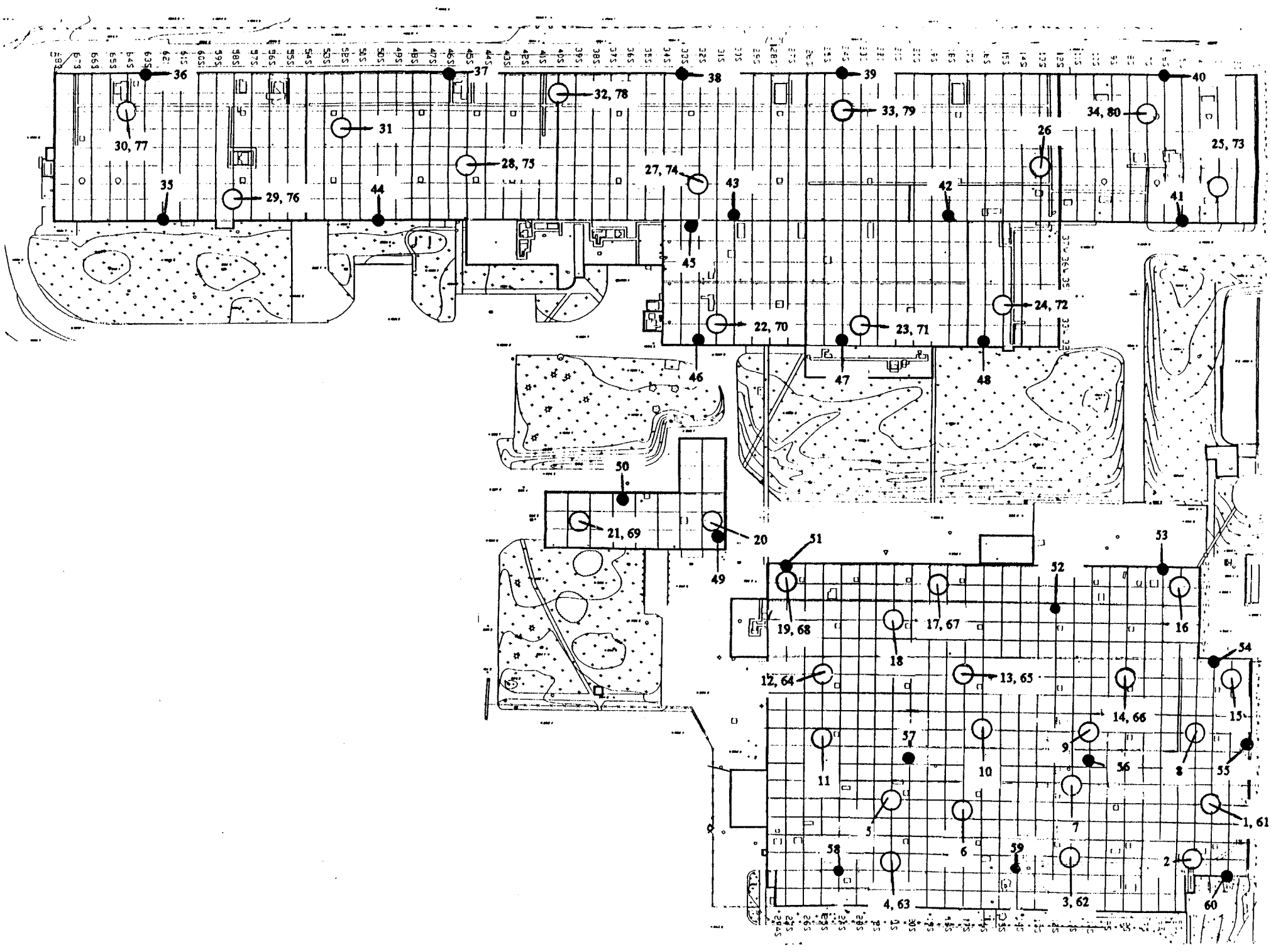
Background Soil Analysis

Analytical Service #	Sample Identification	CS 137	TL 208	RA 226	RA226/ AC 228	TH 228	U 235
		pCI/gram (@ sample date: 12-13-94)					
94-2383	B-001	0.465	0.274	0.671		0.787	
94-2384	B-002	0.399	0.312	1.460	1.650	0.896	0.352
94-2385	B-003					0.700	0.274
94-2386	B-004		0.233	0.596		0.668	
94-2387	B-005		0.309	0.754	1.720	0.888	
94-2388	B-006		0.290	0.453	2.300	0.832	
94-2388	B-007		0.290	0.435	2.300	0.832	
94-2389	B-008		0.388	0.772		1.110	0.224
94-2390	B-009		0.212	0.721	3.340	0.610	
94-2391	B-010	0.702	0.286	0.840		0.822	
94-2392	B-011	0.197	0.266	0.670		0.763	
94-2393	B-012	0.317	0.376	0.458		1.080	
94-2394	B-013		0.702	0.898	3.800	2.020	
94-2395	B-014	0.284		0.600		0.800	
94-2396	B-015	0.526	0.303	0.824	2.440	0.869	0.371
94-2397	B-016	0.273	0.337	0.790		0.969	
94-2398	B-017	0.367	0.344	0.803	3.550	0.988	
94-2399	B-018			0.435		0.709	
94-2400	B-019	0.503	0.288			0.826	
94-2401	B-020	0.300	0.481	0.614		1.380	0.179
94-2402	B-021		0.530	1.070		1.520	0.210
94-2403	B-022	0.674	0.244			0.700	
94-2404	B-023	0.223	0.285	0.434	0.285	0.818	
Minimum		0.197	0.212	0.434	0.285	0.610	0.179
Maximum		0.702	0.702	1.460	3.800	2.020	0.371
Average		0.402	0.338	0.715	2.376	0.939	0.268
Standard Deviation		0.163	0.116	0.248	1.100	0.320	0.079
		NOTE: Empty Spaces Not Counted					

APPENDIX G

BACKGROUND SURVEY POINT LOCATION MAPS

REPORT #005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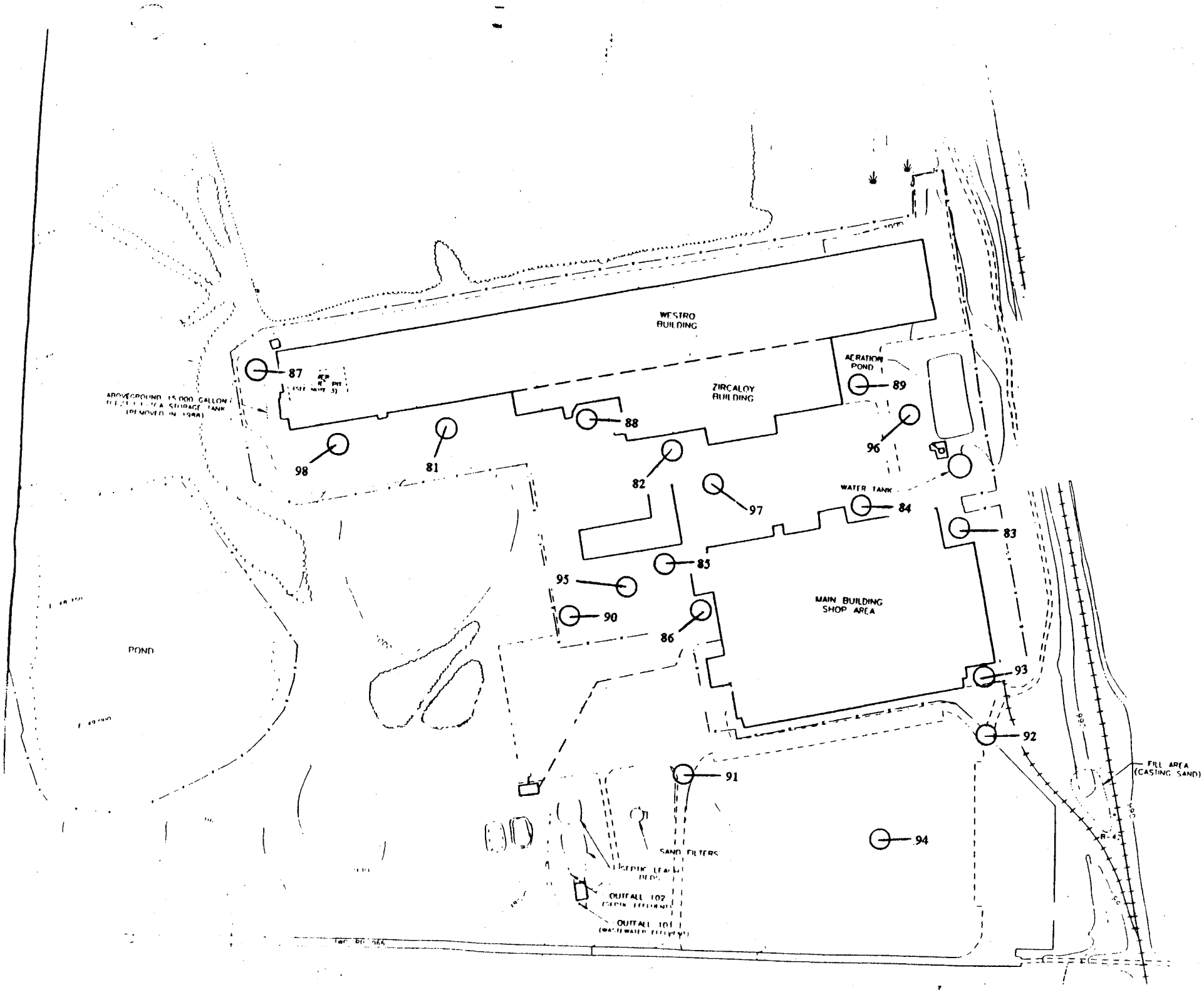
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WATER TANK
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POND
SAND FILTERS
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OUTFALL 101
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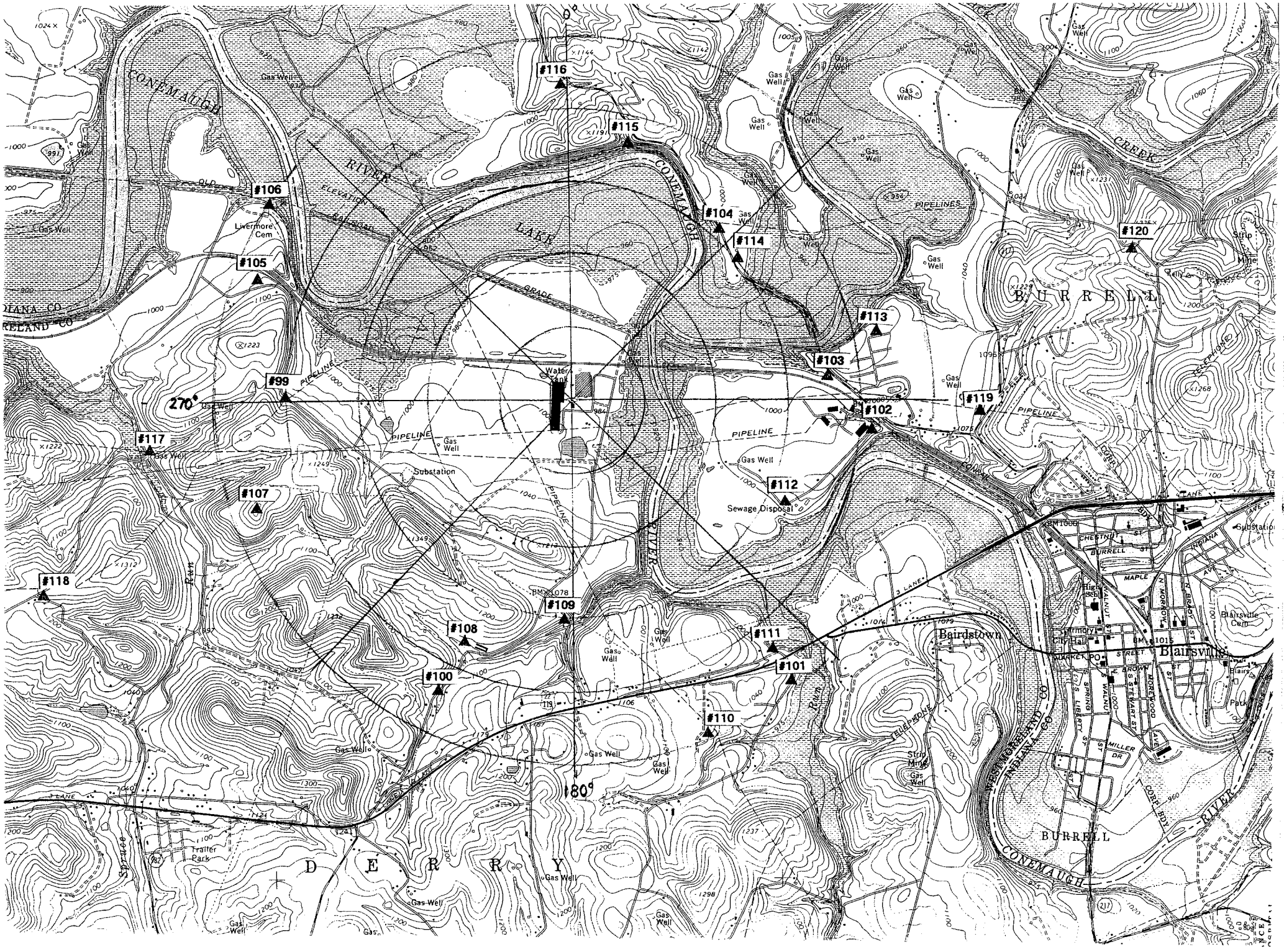

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180°
CONEMAUGH
RIVER
LAKE
CREEK
BURRELL
Livermore Cem
Substation
Sewage Disposal
Water Tank
PIPELINE
PIPELINES
Gas Well
Strip Mine
Bairdstown
Blairsville
Blairsville Cem
Trailer Park
D E R R Y
Spruce
Run
WESTMORELAND CO
INDIANA CO
CHESTNUT ST
BURRELL ST
MAPLE
MILLER DR