

Transport and deposition of plutonium contaminated sediments by fluvial processes, Los Alamos Canyon, New Mexico

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Supplementary Data

The following pages contain four components: three tables and one set of maps of supplementary data to accompany the paper, and to be made available through the office of the Documents Secretary, Geological Society of American.

Supplementary Table 1. Active Sediment Inventory for the Los Alamos Canyon System

Supplementary Table 2. Plutonium Inventory and Distribution

Supplementary Table 3. Plutonium Concentration Data

Supplementary Maps. Distribution of Deposits in the Los Alamos Canyon System.

Supplementary Table 1. Active Sediment Inventory for the Los Alamos Canyon System

This table contains the serial numbers and identification information as well as field observations for all the active sedimentary deposits identified and mapped in the field for the present project. Active is defined as responsive to the present hydrologic regime and deposited since 1945. The information in this Table was current as of September 1, 1994. Subsequent runoff events may have altered their dimensions, eliminated some features, or added new ones.

SEDIMENT INVENTORY, ACID AND PUEBLO CANYONS

#	Landform and Sediment	Surface Vegetation	Depth (m)	Area (sq m)	Volume (cu m)	Downstream
						Distance (m)
1	Recent flood deposit, sand, gravel	None	0.65	2934	1907	11689
2	Recent flood deposit, sand, gravel	None	0.75	1080	810	11506
3	Recent attachment bar, sand	None	2.1	2251	4727	11104
4A	Active channel, sand to gravel	Ponderosa pine	0.5	17959	8979	11381
4B	Active channel, sand to gravel	Ponderosa pine	0.5	8926	4463	10891
5	Recent attachment bar, sand	None	1.3	635	825	11079
6	Recent attachment bar, sand	None	1.3	523	680	10933
7	Active channel, sand, cobbles	None	0.3	1785	535	10750
8	Pre-recent attachment bar, sand	Chamisa, driftwood	1.1	1312	1443	10580
9	Older flood plain, sand, gravel	Juniper	1.8	2033	3660	10458
10	Recent inset deposit, sand, pebbles	Chamisa, driftwood	1.2	1221	1465	10385
11	Recent inset deposit, sand, pebbles	Chamisa	1.2	345	414	10263
12	Recent inset deposit, sand	None	1.8	177	319	10226
13	Flood bar, boulders, sand, cobbles	Chamisa	1.1	440	484	10116
14	Inset deposit, sand	Buried driftwood, tire	1.5	955	1432	10110
15	Inset flood-plain deposit	Chamisa	1.5	1198	1798	9994
16	Attachment bar	Chamisa, juniper, driftwood	3.1	7974	24719	9751
17	Attachment bar	Chamisa, juniper, driftwood	3.1	5593	17338	9616
18	Channel fill	Chamisa, willow	1.8	2534	4561	9568
19	Arroyo fill, sand, cobbles, gravel	Grass, annuals, trees	1.1	3127	3440	9433
20	Active inset fill,	Chamisa	1.1	427	470	9409
21	Arroyo fill, sand, cobbles, gravel	Grass, thistles, driftwood	0.9	8937	8044	9116
22	Overflow splay, sand	Juniper, ponderosa, snags	0.2	655	131	8982
23	Arroyo fill, pebbles	Grass, snags, willow, cottonwood	0.9	4953	4458	8427
24	Overflow area, sand	Grass, snags	0.1	223	22	8458
25	Active bedload deposit, sand, pebbles	Grass, driftwood	0.5	5736	2868	8068
26	Attachment bar, sand, boulders	Grass, baby's breath	0.5	1144	572	7909
27	Attachment bar, sand, gravel	Baby's breath, thistle	0.3	315	95	7982
28	Point bar, sand	Baby's breath	0.4	228	91	7787
29	Flood plain, silt, clay, boulders	Grass, juniper, snags	1.1	1687	1855	7739
30	Point bar, flood plain, cobbles, sand	Grass, juniper, driftwood	1.2	1108	1329	7641
31	Flood bar, boulders, sand	None	1.3	704	915	7629
32	Active bedload deposit, sand, pebbles	None	0.3	15428	4628	6858
33	Point bar deposit, sand, cobbles	None	0.4	321	129	7592
34	Attachment bar, sand	Willow	0.25	147	37	7531
35	Side attachment bar, sand	None	0.3	151	45	7528
36	Pocket flood plain, sand, pebbles	Grass, ponderosa	0.6	786	472	7394
37	Point bar and flood plain, sand, pebbles	Grass, ponderosa	0.6	595	357	7321
38	Side attachment bar, sand, pebbles	Grass	0.65	220	143	7272
39	Point bar, sand, silt	Grass, snags, driftwood	1.2	970	1164	6577
40	Point bar, sand, pebbles	Ponderosa	1.2	449	539	6468
41	Attachment bar, sand	Grass, driftwood	0.3	1060	318	6260
42	High flow bedload deposit, sand, gravel	Thistles, driftwood	0.3	1203	361	6175
43	Point bar, sand, silt, pebbles	Grass	0.5	549	274	6041
44	Point bar, sand	Grass	0.3	570	171	5834
45	Channel fill, sand, silt	Grass	0.4	824	330	5858
46	Active bedload, sand, gravel	None	0.6	5197	3118	5827
47	Mid-channel bar, sand, gravel	Grass, ponderosa	0.2	1702	340	5736
48	Highflow meander, sand, silt	Grass	0.9	1180	1062	5638
49	Channel fill, silt, sand, pebbles	Grass, juniper, snags	1.1	11855	13041	5370
49	Active bedload, 0.5 cu m/m	Grass, juniper, snags			644	5370
50	Alluvium, silt, sand	Grass	1.1	766	842	4286
51	Alluvium, silt, sand	Grass	0.9	379	341	4140
52	Alluvium, silt, sand	Grass	1	537	537	4109
53	Alluvium, silt, sand	Grass	1.1	402	443	4048
54	Alluvium, silt, sand	Grass	0.5	281	140	3926
55	Alluvium, silt, sand	Grass	1.1	497	547	3805
56	Reach E alluvium, sand, 1.1 cu m/m	None			2737	2524
57	Reach E active bedload, sand, 0.5 cu m/m	None			1244	2524
58	Reach F active bedload, sand, 0.25 cu m/m	None			153	975
59	Reach G pocket flood plains, sand, 0.5 cu/m	Grass			299	360
60	Reach G active bedload, sand, 1.0 cu m/m	None			599	360
61	Reach H active bedload, sand, 0.5 cu m/m	None			320	

SEDIMENT INVENTORY, DP and UPPER LOS ALAMOS CANYON

# Landform and Sediment	Surface Vegetation	Depth (m)	Area (sq m)	Volume (cu m)	Downstream	
					Distance (m)	
1 Active bedload, sand to boulders	Barren			396		5606
2 Active bedload, boulder bar	Barren	1.1	1486	1635		4180
3 Point bar, sand, cobbles	Grass, willow	0.8	613	490		4156
4 Overbank flood deposit	Buried juniper	0.7	521	365		4070
5 Active bedload, sand and boulders	Barren			28		4021
6 Active bedload, sand and boulders	Barren			69		3929
7 Active bedload, sand and boulders	Barren			34		3831
8 Active bedload, sand and boulders	Barren			719		3782
9 Flood bar, boulders in sand matrix	Grass, cottonwood	0.5	424	212		3756
10 Side bars associated with #8, sand	Grass			360		3782
11 Overflow zone, highflow channel, sand, cobbles	Grass	0.5	53	27		3695
12 Point bar, sand	Grass, pinyon pine	1.1	260	286		3463
13 Point bar, sand and cobbles	Grass	0.9	520	468		3205
14 Slack water bar, sand	Buried trees	1.3	1003	1304		3120
15 Active bedload	Barren			37		3063
16 Side bars associated with #15, sand	Grass			15		3063
17 Active bedload, sand, cobble riffles	Barren			157		2917
18 Side bars associated with #17, sand	Grass			105		2917
19 Flood plain, sand	Grass, willow	1.1	446	491		2360
20 Active bedload, sand, boulders	Barren			677		2393
21 Side bars associated with #20	Grass			1354		2393
22 Flood plain, fine sand	Grass	1.2	520	624		2170
23 Flood plain, sand	Grass, oak	0.4	316	126		2109
24 Flood plain, sand, compound strata	Grass, juniper	1.3	502	653		2050
25 Flood plain, fine sand	Grass, shrubs, ponderosa	0.8	836	669		1952
26 Flood plain, sand	Grass	0.9	223	201		1878
27 Flood plain, fine sand	Grass	0.6	669	401		1029
28 Active bedload, sand and boulders	Barren			376		1039
29 Side bars associated with part of #28, sand	Grass			573		1039
30 Side bars associated with part of #28, sand	Grass			732		466
31 Flood plain, fine sand	Grass	1.1	279	307		625
32 Acid Canyon, active bedload	Barren			622		0

SEDIMENT INVENTORY, LOWER LOS ALAMOS CANYON

# Landform and Sediment	Surface Vegetation	Depth (m)	Area (sq m)	Volume (cu m)	Downstream	
					Distance (m)	
1 Flood bars, sand	Grass, some barren			3951	13067	1
2 Active bedload, sand, gravel	Barren			527	13067	2
3 Active bedload, sand	Barren			46	13530	3
4 Pocket flood plains, with #3, fine sand	Grass, cottonwood			463	13530	4
5 Active bedload, sand, gravel	Barren			106	14591	5
6 Pocket flood plains, with #5, fine sand	Grass, cottonwood			1061	14591	6
7 Flood plain, pebbles	Juniper	1.5	836	1255	13737	7
8 Flood bar, sand	Sagebrush	0.3	613	184	13835	8
9 Abandoned channel, sand, gravel	Sagebrush	0.25	11659	2915	14078	9
10 Active bedload, sand, cobbles, boulders	Grass	0.4	40898	16359	15945	10
11 Flood bar, sand	Sagebrush	0.7	1785	1249	14664	11
12 Flood bar, sand	Sagebrush, brittle bush	0.7	4462	3123	14957	12
13 Flood bar, sand	Barren	0.7	1236	865	15018	13
14 Flood bar, sand	Sagebrush	0.7	1249	874	15140	14
15 Active Channel, sand, gravel, cobbles	Barren, tamarisk	1	5E+05	465674	19762	15

Supplementary Table 2. Plutonium Inventory and Distribution

This Appendix contains the data and calculations used in the present study to define the first approximation to the plutonium inventory for the Los Alamos Canyon system. Supplementary Table 1 contains individual field descriptions of the each deposit.

PLUTONIUM INVENTORY CALCULATIONS FOR LOS ALAMOS CANYON SYSTEM

Sources of Data:

Sediment volume and mass data from field surveys and mapping
 Pu Conc. data for channels from LANL Surveillance Reports
 Pu Conc. data for inactive channels and overbank
 in Acid, Pueblo, and Lower Los Alamos Canyons from Stoker et al., 1981, p. 49
 Pu Conc. data for inactive channels and overbank in Upper Los Alamos Canyon
 from Lane et al., 1985, p. 43 (estimated from simulations by Lane)

Acid and Pueblo Canyons

#	Reach and Deposit	Dist. Down (M)	Volume (cu m)	Mass (g)	Pu Conc. (fCu/g)	Pu Total Cu
Segment 8, Lowest Part of Pueblo Canyon						
----- CHANNEL						
1	Recent flood deposit, sand, gravel	11689	1907	2860914479	609	0.001742
4A	Active channel, sand to gravel	11381	8979	13468912500	609	0.008203
7	Active channel, sand, cobbles	10750	535	803210558	609	0.000489
----- INACTIVE CHANNEL						
2	Recent flood deposit, sand, gravel	11506	810	1215251381	5100	0.006198
3	Recent attachment bar, sand	11104	4727	7090754549	5100	0.036163
5	Recent attachment bar, sand	11079	825	1237916063	5100	0.006313
6	Recent attachment bar, sand	10933	680	1020574171	5100	0.005205
----- OVER-BANK						
8	Pre-recent attachment bar, sand	10580	1443	2164287758	6400	0.013851
9	Older flood plain, sand, gravel	10458	3660	5490007740	6400	0.035136
10	Recent inset deposit, sand, pebbles	10385	1465	2197985850	6400	0.014067
11	Recent inset deposit, sand, pebbles	10263	414	621436464	6400	0.003977
Segment 7, Lower Part of Lower Pueblo Canyon						
----- CHANNEL						
4B	Active channel, sand to gravel	10891	4463	6694500000	609	0.004077
13	Flood bar, boulders, sand, cobbles	10116	484	725574465	609	0.000442
----- INACTIVE CHANNEL						
16	Attachment bar	9751	24719	37078695171	5100	0.189101
17	Attachment bar	9616	17338	26007519750	5100	0.132638
18	Channel fill	9568	4561	6842061900	5100	0.034895
----- OVER-BANK						
12	Recent inset deposit, sand	10226	319	478991313	6400	0.003066
14	Inset deposit, sand	10110	1432	2148417023	6400	0.01375
15	Inset flood-plain deposit	9994	1798	2696282933	6400	0.017256
Segment 6, Middle Part of Lower Pueblo Canyon						
----- CHANNEL						
20	Active inset fill,	9409	470	705246911	1941	0.001369
21	Arroyo fill, sand, cobbles, gravel	9116	8044	12065572674	1941	0.023419
----- OVER-BANK						
19	Arroyo fill, sand, cobbles, gravel	9433	3440	5159375018	6400	0.03302
22	Overflow splay, sand	8982	131	196536024	6400	0.001258

Segment 5, Upper Part of Lower Pueblo Canyon

————— CHANNEL			43136013347		0.020619
23	Arroyo fill, pebbles	8427	4458	6686899097	478 0.003196
25	Active bedload deposit, sand, pebbles	8068	2868	4302269250	478 0.002056
32	Active bedload deposit, sand, pebbles	6858	4628	6942568500	478 0.003319
46	Active bedload, sand, gravel	5827	3118	4676949000	478 0.002236
49	Channel fill, silt, sand, pebbles	5370	13041	19561327500	478 0.00935
49	Active bedload, 0.5 cu m/m	5370	644	966000000	478 0.000462
————— INACTIVE CHANNEL			9268869058		0.047271
26	Attachment bar, sand, boulders	7909	572	857670750	5100 0.004374
27	Attachment bar, sand, gravel	7982	95	141923358	5100 0.000724
28	Point bar, sand	7787	91	136705584	5100 0.000697
31	Flood bar, boulders, sand	7629	915	1372730210	5100 0.007001
33	Point bar deposit, sand, cobbles	7592	129	192883584	5100 0.000984
30	Point bar, flood plain, cobbles, sand	7641	1329	1993710132	5100 0.010168
34	Attachment bar, sand	7531	37	55058348	5100 0.000281
35	Side attachment bar, sand	7528	45	67896239	5100 0.000346
37	Point bar and flood plain, sand, pebbles	7321	357	535212810	5100 0.00273
38	Side attachment bar, sand, pebbles	7272	143	214656907	5100 0.001095
39	Point bar, sand, silt	6577	1164	1746387810	5100 0.008907
40	Point bar, sand, pebbles	6468	539	808754436	5100 0.004125
41	Attachment bar, sand	6260	318	477034673	5100 0.002433
43	Point bar, sand, silt, pebbles	6041	274	411660353	5100 0.002099
44	Point bar, sand	5834	171	256583867	5100 0.001309
————— OVERBANK			10939490775		0.070013
24	Overflow area, sand	8458	22	33415472	6400 0.000214
29	Flood plain, silt, clay, boulders	7739	1855	2783202312	6400 0.017812
36	Pocket flood plain, sand, pebbles	7394	472	707268798	6400 0.004527
42	High flow bedload deposit, sand, gravel	6175	361	541343696	6400 0.003465
45	Channel fill, sand, silt	5858	330	494557686	6400 0.003165
47	Mid-channel bar, sand, gravel	5736	340	510645813	6400 0.003268
48	Highflow meander, sand, silt	5638	1062	1593311472	6400 0.010197
50	Alluvium, silt, sand	4286	842	1263417920	6400 0.008086
51	Alluvium, silt, sand	4140	341	512058956	6400 0.003277
52	Alluvium, silt, sand	4109	537	806145540	6400 0.005159
53	Alluvium, silt, sand	4048	443	663874332	6400 0.004249
54	Alluvium, silt, sand	3926	140	210450075	6400 0.001347
55	Alluvium, silt, sand	3805	547	819798705	6400 0.005247

Segment 4, Lower Part of Middle Pueblo Canyon

————— CHANNEL			1866375000		0.003246
57	Segment 4 active bedload, sand, 0.5 cu m/m	2524	1244	1866375000	1739 0.003246
————— OVER-BANK			4106025000		0.014371
56	Segment 4 alluvium, sand, 1.1 cu m/m	2524	2737	4106025000	3500 0.014371

Segment 3, Middle Part of Middle Pueblo Canyon

————— CHANNEL			229500000		0.000399
58	Segment 3 active bedload, sand, 0.25 cu m/	975	153	229500000	1739 0.000399

Segment 2, Upper Part of Middle Pueblo Canyon

————— CHANNEL			897750000		0.001561
60	Segment 2 active bedload, sand, 1.0 cu m/m	360	599	897750000	1739 0.001561
————— OVER-BANK			448875000		0.001571
59	Segment 2 pocket flood plains, sand, 0.5 cu/	360	299	448875000	3500 0.001571

Acid Canyon

	————— CHANNEL			480000000	0.005171
61	Acid Canyon active bedload, sand, 0.5 cu m/m	320		480000000	10772 0.005171
	————— OVER-BANK			240000000	0.0264
62	Acid Canyon overbank areas, sand, 0.25 cu m/m	160		240000000	110000 0.0264
Sum of Pu, Pueblo Canyon (Cu) —————>					0.776257

Upper Los Alamos Canyon

#	Reach and Deposit	Dist. Down (M)	Volume (cu m)	Mass (g)	Pu Conc. (fCu/g)	Pu Total Cu
Segment 15						0.000396
1	Active bedload, sand to boulders	5606	396	594000000	384	0.000228
2	Active bedload, boulder bar	4180	1635	2451900000	30	0.000074
3	Point bar, sand, cobbles	4156	490	735600000	30	0.000022
4	Overbank flood deposit	4070	365	547050000	30	0.000016
5	Active bedload, sand and boulders	4021	28	42000000	384	0.000016
6	Active bedload, sand and boulders	3929	69	103500000	384	0.00004
Segment 14						0.000756
7	Active bedload, sand and boulders	3831	34	51000000	384	0.00002
8	Active bedload, sand and boulders	3782	719	1078500000	384	0.000414
9	Flood bar, boulders in sand matrix	3756	212	318000000	30	9.5E-06
10	Side bars associated with #8, sand	3782	360	540000000	30	0.000016
11	Overflow zone, highflow channel, sand, cob	3695	27	39750000	30	1.2E-06
12	Point bar, sand	3463	286	429000000	30	0.000013
13	Point bar, sand and cobbles	3205	468	702000000	30	0.000021
14	Slack water bar, sand	3120	1304	1955850000	30	0.000059
15	Active bedload	3063	37	55500000	384	0.000021
16	Side bars associated with #15, sand	3063	15	22500000	384	8.6E-06
17	Active bedload, sand, cobble riffles	2917	157	235500000	384	0.00009
18	Side bars associatd with #17, sand	2917	105	157500000	384	0.00006
19	Flood plain, sand	2360	491	735900000	30	0.000022
Segment 13						0.00129
20	Active bedload, sand, boulders	2393	677	1015500000	384	0.00039
21	Side bars associated with #20	2393	1354	2031000000	384	0.00078
22	Flood plain, fine sand	2170	624	936000000	30	0.000028
23	Flood plain, sand	2109	126	189600000	30	5.7E-06
24	Flood plain, sand, compound strata	2050	653	978900000	30	0.000029
25	Flood plain, fine sand	1952	669	1003200000	30	0.00003
26	Flood plain, sand	1878	201	301050000	30	9.0E-06
27	Flood plain, fine sand	1029	401	602100000	30	0.000018
Segment 12						
28	Active bedload, sand and boulders	1039	376	564000000	291	0.000164
29	Side bars associated with part of #28, sand	1039	573	859500000	291	0.00025
30	Side bars associated with part of #28, sand	466	732	1098000000	30	0.000033
31	Flood plain, fine sand	625	307	460350000	30	0.000014

DP Canyon					0.001762
32 Active bedload, DP Canyon	0	622	933000000	1888	0.001762
Sum of Pu, DP & Upper Los Alamos Canyon (Cu)	—————>				0.004434

Lower Los Alamos Canyon

# Reach and Deposit	Dist. Down (M)	Volume (cu m)	Mass (g)	Pu Conc. (fCu/g)	Pu Total Cu
Segment 9					0.013844
1 Flood bars, sand	13067	3951	5926500000	2300	0.013631
2 Active bedload, sand, gravel	13067	527	790500000	269	0.000213
3 Active bedload, sand	13530	46	69000000	269	0.000019
4 Pocket flood plains, with #3, fine sand	13530	463	694500000	2300	0.001597
5 Active bedload, sand, gravel	14591	106	159000000	210	0.000033
6 Pocket flood plains, with #5, fine sand	14591	1061	1591500000	2300	0.00366
7 Flood plain, pebbles	13737	1255	1882500000	2300	0.00433
8 Flood bar, sand	13835	184	276000000	2300	0.000635
9 Abandoned channel, sand, gravel	14078	2915	4372500000	2300	0.010057
10 Active bedload, sand, cobbles, boulders	15945	16359	24538500000	210	0.005153
11 Flood bar, sand	14664	1249	1873500000	2300	0.004309
12 Flood bar, sand	14957	3123	4684500000	2300	0.010774
13 Flood bar, sand	15018	865	1297500000	2300	0.002984
Segment 10					0.11827
14 Flood bar, sand	15140	874	1311000000	2300	0.003015
15 Active Channel, sand, gravel, cobbles	19762	465674	698511000000	165	0.115254
Sum of Pu, Lower Los Alamos Canyon (Cu)	—————>				0.153889
Grand Sum of all Pu in Sediment, Los Alamos Canyon System (Cu)	—————>				0.9566

Supplementary Table 3. Plutonium Concentration Data

This Table contains plutonium concentration data collected by Los Alamos National Laboratory and published in annual monitoring and surveillance reports. The distance scale used for these data is slightly different from the one used for locating the deposits in the present research. The distance values were adjusted to reflect improved distance measures in the present research.

LOS ALAMOS CANYON RADIOCHEMICAL DATA
Version 950526

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Radionuclide Concentrations in Sediment Samples
Los Alamos, Pueblo, Guaye, Bayo, Acid, and DP Canyons

458 entries with 1 to 3 radionuclide measurements each

Canyon = canyon of sample location
Site = location of sample
Dist Down = downstream distance from outfall (m)
Dist Up = upstream distance from Rio Grande (m)
Depth = maximum depth of sample below surface (cm)
Date = year sample collected
TotPu = total ²³⁸Pu + ²³⁹240Pu concentration (fCi/g)
²³⁸Pu = ²³⁸Pu concentration (fCi/g)
²³⁹240Pu = ²³⁹Pu and ²⁴⁰Pu concentration (fCi/g)
¹³⁷Cs = ¹³⁷Cs concentration (fCi/g)

Canyon	Site	Dist Down	Dist Up	Depth	Date	Pu Total	Pu 238	Pu 239240	Cs 137
Acid	AC-4			16400	1970	29019	19	29000	
Acid	Acid Wier			16400	1970	25021	21	25000	
Acid	Acid Wier			16400	1981	14985	85	14900	1000
Acid	Acid Wier			16400	1982	7640	40	7600	990
Acid	Acid Wier			16400	1982	18580	80	18500	1260
Acid	Acid Wier			16400	1983	7395	5	7390	990
Acid	Acid Wier			16400	1984	7569	59	7510	90
Acid	Acid Wier			16400	1985	13387	87	13300	780
Acid	Acid Wier			16400	1986	10163	63	10100	830
Acid	Acid Wier			16400	1987	5	1	4	180
Acid	Acid Wier			16400	1988	12920	520	12400	350
Acid	Acid Wier			16400	1989	9850	530	9320	410
Acid	Acid Wier			16400	1990	5213	43	5170	250
Acid	Acid Wier			16400	1991	7316	36	7280	500
Acid	Acid Wier			16400	1992	6790	40	6750	300
Acid/Pueblo		640	16400	2.5	1972	11080	80	11000	1100
Acid/Pueblo		320	16720	2.5	1972	12080	80	12000	1500
Acid/Pueblo		-100	17140	2.5	1972	209	9	200	360
Acid/Pueblo		0	17040	2.5	1972	2320	20	2300	20
Acid/Pueblo		10240	6800	2.5	1972	760	20	740	33
Acid/Pueblo		80	16960	2.5	1972	55000	1000	54000	14000
Acid/Pueblo		2560	14460	2.5	1972	1520	20	1500	310
Acid/Pueblo		5120	11920	2.5	1972	360	10	350	20
Acid/Pueblo		160	16880	2.5	1972	8580	80	8500	1100
Acid/Pueblo		40	17000	2.5	1972	6930	30	6900	740
Acid/Pueblo		20	17020	2.5	1972	2290	90	2200	1500
Acid/Pueblo		40	17000	7.5	1973	8130			
Acid/Pueblo		40	17000	17.5	1973	28700			
Acid/Pueblo		-100	17140	7.5	1973	137			
Acid/Pueblo		20	17020	2.5	1973	16800			
Acid/Pueblo		0	17040	2.5	1973	16600			
Acid/Pueblo		320	16720	12.5	1973	10800			
Acid/Pueblo		40	17000	12.5	1973	11400			
Acid/Pueblo		160	16880	17.5	1973	20400			
Acid/Pueblo		80	16960	2.5	1973	6210			
Acid/Pueblo		160	16880	2.5	1973	8610			
Acid/Pueblo		320	16720	17.5	1973	12300			
Acid/Pueblo		160	16880	7.5	1973	10100			
Acid/Pueblo		80	16960	12.5	1973	21100			
Acid/Pueblo		80	16960	7.5	1973	660			
Acid/Pueblo		-100	17140	2.5	1973	122			
Acid/Pueblo		0	17040	7.5	1973	8520			
Acid/Pueblo		40	17000	2.5	1973	5780			
Acid/Pueblo		320	16720	7.5	1973	7900			
Acid/Pueblo		5120	11920	17.5	1973	1650			
Acid/Pueblo		640	16400	2.5	1973	7860			
Acid/Pueblo		2560	14460	2.5	1973	36600			

Acid/Pueblo		640	16400	17.5	1973	19100					
Acid/Pueblo		10240	6800	12.5	1973	435					
Acid/Pueblo		80	16960	17.5	1973	505000					
Acid/Pueblo		2560	14460	7.5	1973	36900					
Acid/Pueblo		2560	14460	12.5	1973	2250000					
Acid/Pueblo		5120	11920	12.5	1973	617					
Acid/Pueblo		640	16400	12.5	1973	10400					
Acid/Pueblo		5120	11920	2.5	1973	1390					
Acid/Pueblo		640	16400	7.5	1973	12400					
Acid/Pueblo		10240	6800	7.5	1973	518					
Acid/Pueblo		320	16720	2.5	1973	8280					
Acid/Pueblo		10240	6800	2.5	1973	400					
Bayo	SR 4		3900		1978	3	2	1	100		
Bayo	SR 4		3900		1979	0	0	0	60		
Bayo	SR 4		3900		1980	3	2	1	110		
Bayo	SR 4		3900		1981	1	1	0	40		
Bayo	SR 4		3900		1982	0	0	0	90		
Bayo	SR 4		3900		1983	3	0	3	100		
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Bayo	SR 4		3900		1985	2	0	2	190		
Bayo	SR 4		3900		1986	8	5	3	200		
Bayo	SR 4		3900		1987	1	0	1	340		
Bayo	SR 4		3900		1988	3	1	2	0		
Bayo	SR 4		3900		1989	2	1	1	110		
Bayo	SR 4		3900		1990	5	2	3	80		
Bayo	SR 4		3900		1991	7	2	5	0		
Bayo	SR4		3900		1992	18	11	7	0		
DP	DPS-1		13980		1968	8300	620	7680			
DP	DPS-1		13980		1970	2848	158	2690			
DP	DPS-1		13980		1977	1901	401	1500	19000		
DP	DPS-1		13980		1978	8430	6710	1720	20000		
DP	DPS-1		13980		1979	1606	536	1070	8700		
DP	DPS-1		13980		1980	7620	2320	5300	1480		
DP	DPS-1		13980		1980	299	65	234			
DP	DPS-1		13980		1981	6510	2110	4400	18000		
DP	DPS-1		13980		1982	3340	670	2670	23900		
DP	DPS-1		13980		1982	238	35	203	20		
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DP	DPS-1		13980		1990	25	5	20	160		
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DP	DPS-1		13980		1991	15	8	7	100		
DP	DPS-2		13880		1968	1440	120	1320			
DP	DPS-3		13780		1968	910	120	790			
DP	DPS-4		13680		1968	760	70	690			
DP	DPS-4		13680		1970	1619	219	1400			
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DP	DPS-4		13680		1982	555	115	440	19000		
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DP	DPS-4		13680		1985	491	118	373	11000		
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DP	DPS-4		13680		1987	805	196	609	20700		
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DP	DPS-4		13680		1990	107	28	79	1430		
DP	DPS-4		13680		1991	25	3	22	0		
DP	DPS-4		13980		1992	181	37	144	4000		
DP/LA		-100	14180	17.5	1973	51					
DP/LA		-100	14180	12.5	1973	44					
DP/LA		-100	14180	2.5	1973	36					
DP/LA		-100	14180	7.5	1973	36					
DP/LA		0	14080	2.5	1973	957000					
DP/LA		0	14080	7.5	1973	1640000					
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Guaye	SR 4		2400		1986	5	0	5	40	
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Guaye	SR 4		2400		1990	1	0	1	700	
Guaye	SR 4		2400		1991	3	2	1	0	
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LA	Bridge		16600		1978	0	0	0	70	
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LA	Bridge		16600		1988	1	1	0	230	
LA	Bridge		16600		1989	3	0	3	160	
LA	Bridge		16600		1990	4	2	2	188	
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LA	Bridge		16600		1992	6	3	3	100	
LA	GS-1		11000		1977	475	9	466	2300	
LA	GS-1		11000		1978	237	0	237	22	
LA	GS-1		11000		1979	217	0	217	90	
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LA	GS-1		11000		1980	378	97	281	470	
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LA	GS-1		11000		1982	220	0	220	150	
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LA	LAS-1		1968	15	3	12		
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LA	Otowi	400	1977	40	1	39	210	
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LA	Reservoir	19800	1978	11	0	11	800	
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LA	SR 4	7250	1977	22	0	22	700	
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LA	SR 4	7250	1992	59	6	53	1400	
LA	Totavi	209.5	3800	1977	62	0	62	350
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LA	Totavi	3800	1979	276	6	270	1390	

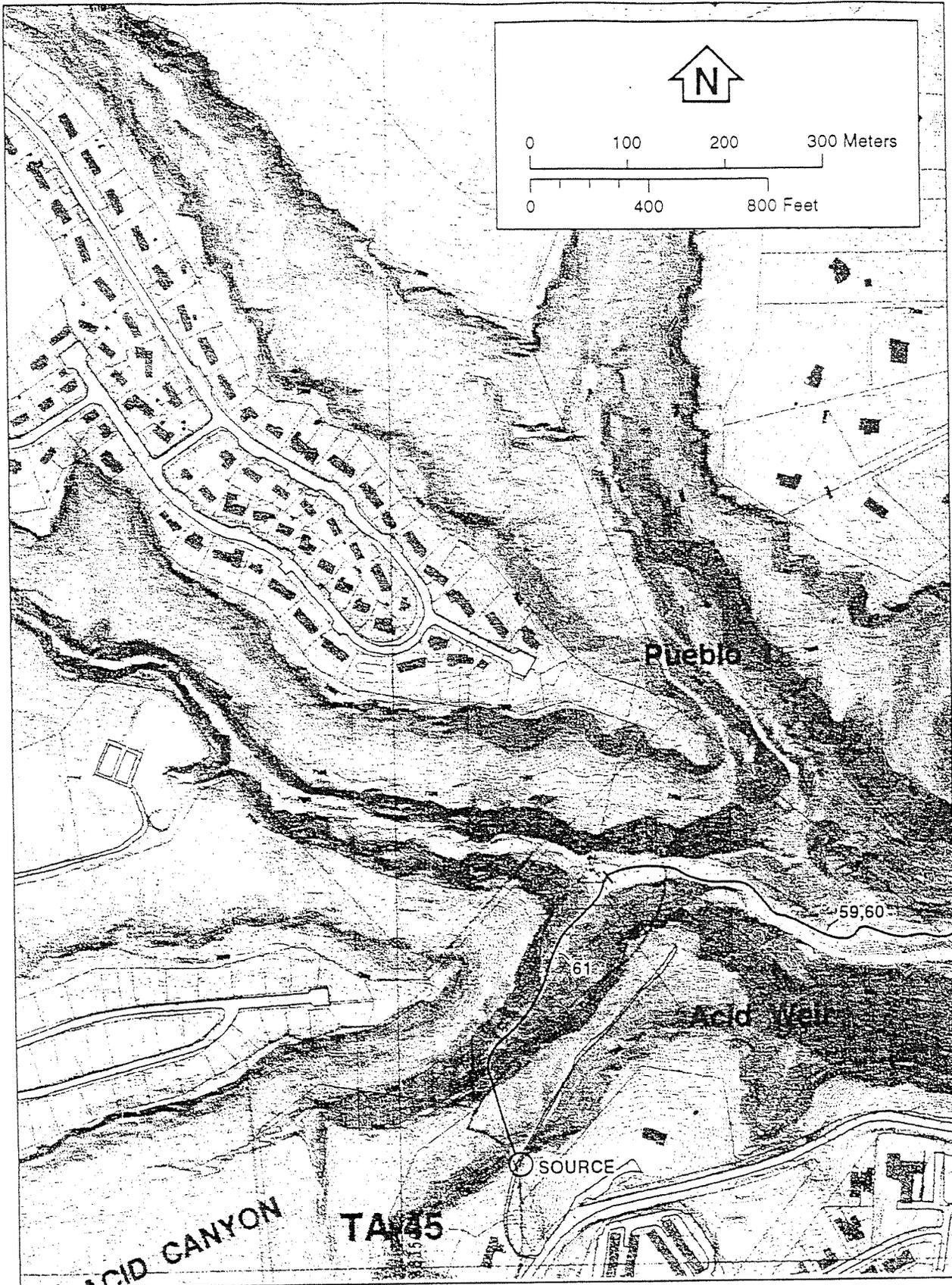
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LA	Totavi	3800	1982	61	1	60	420
LA	Totavi	3800	1984	400	11	389	760
LA	Totavi	3800	1985	737	44	693	3600
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Pueblo	APSC (SR 4)	7650	1970	1106	6	1100	
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Pueblo	At Pueblo	10050	1978	441	1	440	140
Pueblo	Hamilton Bend Spring	12850	1978	433	1	432	120
Pueblo	Hamilton Bend Spring	12850	1979	472	2	470	50
Pueblo	Hamilton Bend Spring	12850	1980	295	4	291	
Pueblo	Hamilton Bend Spring	12850	1980	196	0	196	120
Pueblo	Hamilton Bend Spring	12850	1981	713	13	700	120
Pueblo	Hamilton Bend Spring	12850	1982	642	2	640	120
Pueblo	Hamilton Bend Spring	12850	1982	492	4	488	130
Pueblo	Hamilton Bend Spring	12850	1983	748	8	740	50
Pueblo	Hamilton Bend Spring	12850	1985	1756	6	1750	110
Pueblo	Hamilton Bend Spring	12850	1986	299	2	297	230
Pueblo	Hamilton Bend Spring	12850	1987	168	1	167	270
Pueblo	Hamilton Bend Spring	12850	1988	463	4	459	60
Pueblo	Hamilton Bend Spring	12850	1989	152	0	152	150
Pueblo	Hamilton Bend Spring	12850	1990	212	2	210	680
Pueblo	Hamilton Bend Spring	12850	1991	141	3	138	0
Pueblo	Hamilton Bend Spring	12850	1992	424	8	416	200
Pueblo	PC-1	17000	1970	51	11	40	
Pueblo	PC-1	17000	1981	42	5	37	100
Pueblo	PC-2	14150	1970	4980	80	4900	
Pueblo	PC-5	11850	1970	4511	11	4500	
Pueblo	PC-6	10650	1971	2946	16	2930	
Pueblo	PC-6	10650	1971	2207	7	2200	1500
Pueblo	PC-6	10650	1972	2562	12	2550	3400
Pueblo	PC-6	10650	1973	10	5	5	900
Pueblo	PC-7	8150	1970	1201	1	1200	
Pueblo	PC-9	7950	1970	5	1	4	
Pueblo	Pueblo 1	15900	1981	3960	30	3930	500
Pueblo	Pueblo 1	15900	1982	2	0	2	20
Pueblo	Pueblo 1	15900	1982	11	2	9	200
Pueblo	Pueblo 1	15900	1983	8	2	6	250
Pueblo	Pueblo 1	15900	1984	12	2	10	0
Pueblo	Pueblo 1	15900	1985	28	1	27	110
Pueblo	Pueblo 1	15900	1986	6	2	4	160
Pueblo	Pueblo 1	15900	1987	9	0	9	200
Pueblo	Pueblo 1	15900	1988	3	1	2	140
Pueblo	Pueblo 1	15900	1989	9	2	7	200
Pueblo	Pueblo 1	15900	1990	617	54	563	190
Pueblo	Pueblo 1	15900	1991	57	2	55	100
Pueblo	Pueblo 2	14150	1981	2781	11	2770	290
Pueblo	Pueblo 2	14150	1982	4324	24	4300	190
Pueblo	Pueblo 2	14150	1982	4416	26	4390	130
Pueblo	Pueblo 2	14150	1983	4406	16	4390	160
Pueblo	Pueblo 2	14150	1985	1776	16	1760	90
Pueblo	Pueblo 2	14150	1986	177	0	177	40
Pueblo	Pueblo 2	14150	1987	638	26	612	0
Pueblo	Pueblo 2	14150	1988	908	4	904	50

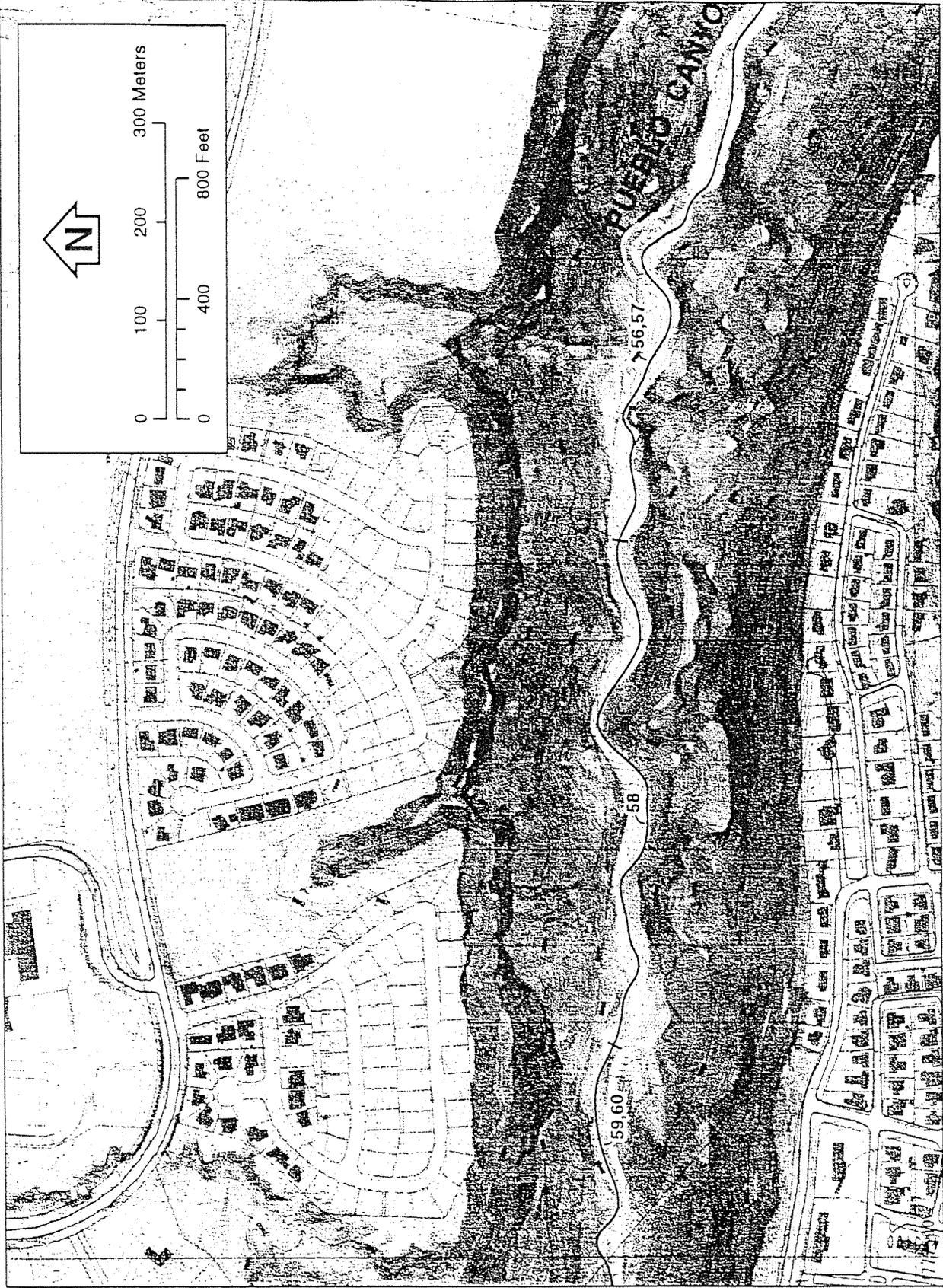
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Pueblo	Pueblo 2 (TW-2)	14150	1977	309	5	304	180
Pueblo	Pueblo 3	10050	1979	216	1	215	20
Pueblo	Pueblo 3	10050	1980	2742	12	2730	
Pueblo	Pueblo 3	10050	1980	201	0	201	100
Pueblo	Pueblo 3	10050	1982	2	0	2	150
Pueblo	Pueblo 3	10050	1982	15560	60	15500	440
Pueblo	Pueblo 3	10050	1983	10	4	6	130
Pueblo	Pueblo 3	10050	1985	6355	25	6330	500
Pueblo	Pueblo 3	10050	1986	6	1	5	140
Pueblo	Pueblo 3	10050	1987	4	0	4	20
Pueblo	Pueblo 3	10050	1988	4	0	4	90
Pueblo	Pueblo 3	10050	1989	3	0	3	150
Pueblo	Pueblo 3	10050	1990	4	0	4	120
Pueblo	Pueblo 3	10050	1991	136	4	132	0
Pueblo	Pueblo 3	10050	1992	11	4	7	200
Pueblo	SR 4	7650	1977	2	2		90
Pueblo	SR 4	7650	1978	522	1	521	160
Pueblo	SR 4	7650	1979	494	1	493	14
Pueblo	SR 4	7650	1980	456	3	453	
Pueblo	SR 4	7650	1980	559	2	557	220
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Pueblo	SR 4	7650	1982	704	4	700	130
Pueblo	SR 4	7650	1982	644	4	640	60
Pueblo	SR 4	7650	1983	67	2	65	100
Pueblo	SR 4	7650	1984	3186	16	3170	0
Pueblo	SR 4	7650	1985	612	2	610	10
Pueblo	SR 4	7650	1986	435	2	433	10
Pueblo	SR 4	7650	1987	401	2	399	0
Pueblo	SR 4	7650	1988	421	2	419	50
Pueblo	SR 4	7650	1989	2	0	2	250
Pueblo	SR 4	7650	1990	825	15	810	440
Pueblo	SR 4	7650	1991	427	3	424	200
Pueblo	SR 4	10050	1992	1083	13	1070	100

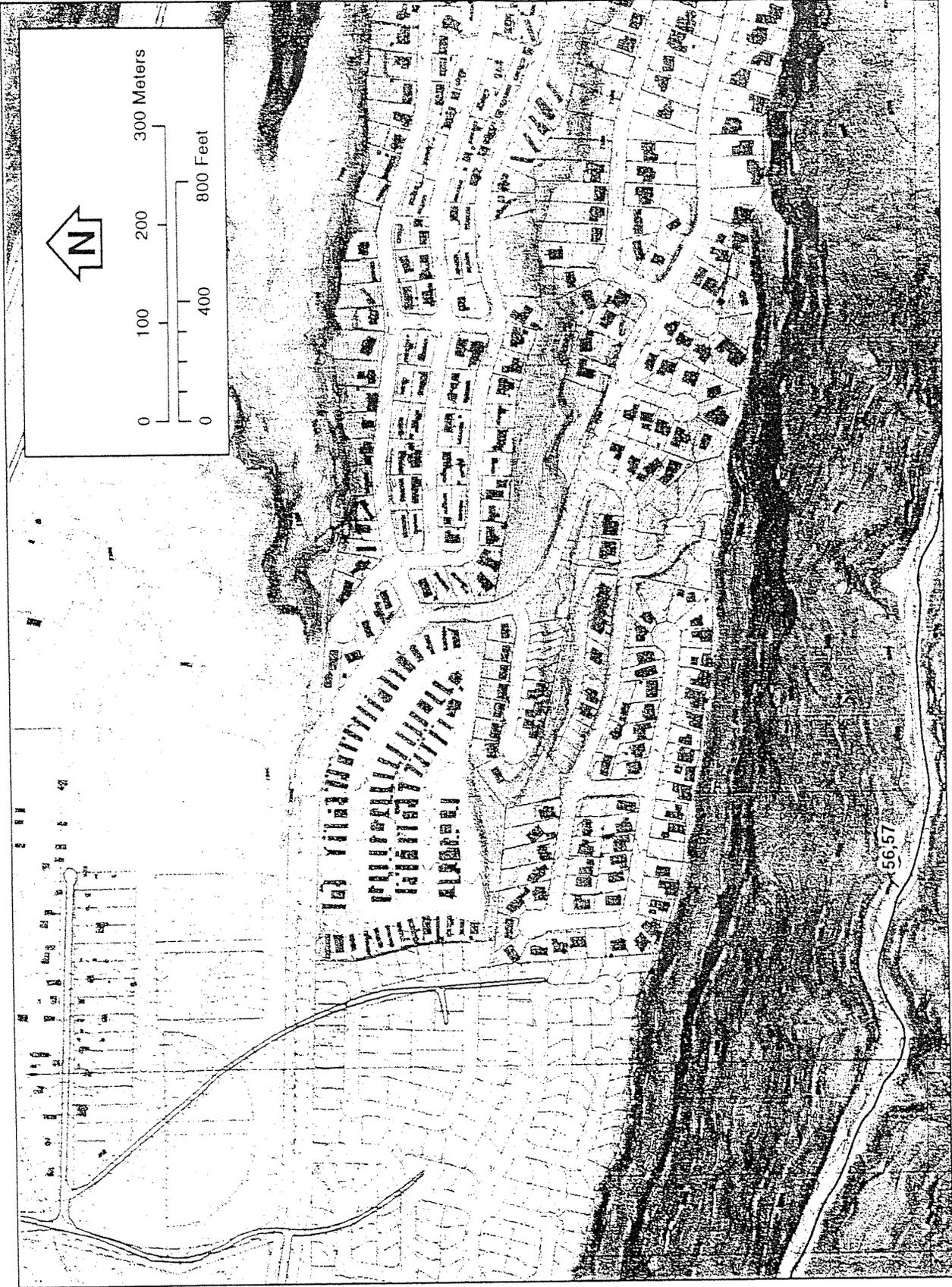
Supplementary Maps. Distribution of Deposits in the Los Alamos Canyon System.

The following pages contain maps showing the distribution of all the sedimentary deposits identified and mapped in the field for this paper. Numbers correspond to identification numbers in Supplementary Tables 1 and 2. The information on these maps was current as of September 1, 1994, when the field mapping was completed. Subsequent runoff events may have altered their dimensions, eliminated some features, or added new ones.

Elizabeth Zeiler of the Facility for Information, Management, Analysis, and Display of the Earth and Environmental Sciences Division, Los Alamos National Laboratory, created the base maps. She generated the 1:4,800 scale maps with a 0.6 contour interval using an ArcInfo geographic information system. Barbara Trapido-Lurie of the Cartographic Laboratory of the Department of Geography, Arizona State University, further processed the sections of the original maps using a Hewlett-Packard ScanJet IIp scanner to create the half-tone density image. See added black-line overlay drawings made from digitized versions of field maps made by William L. Graf who used copies of the original base maps as guides.



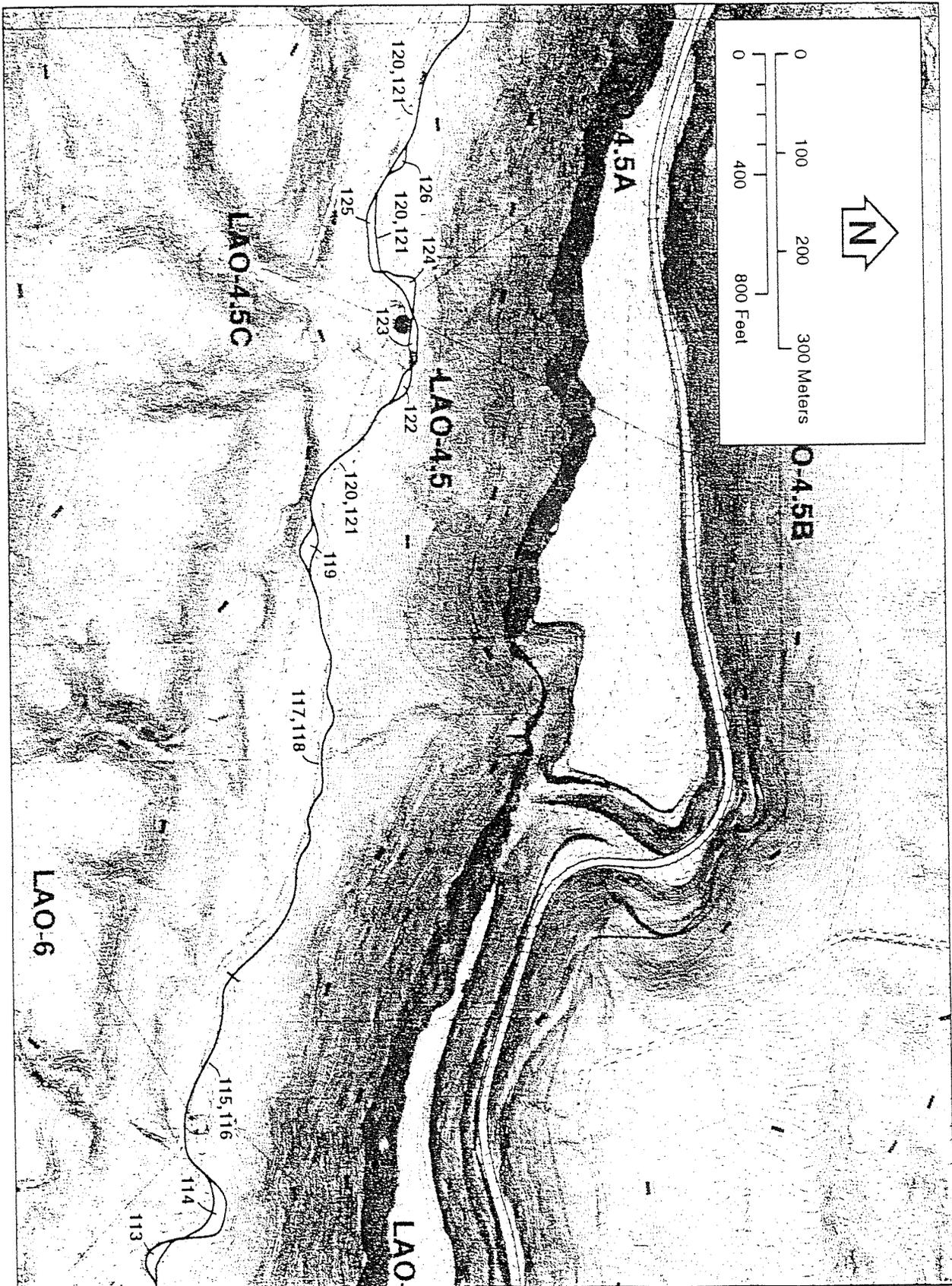


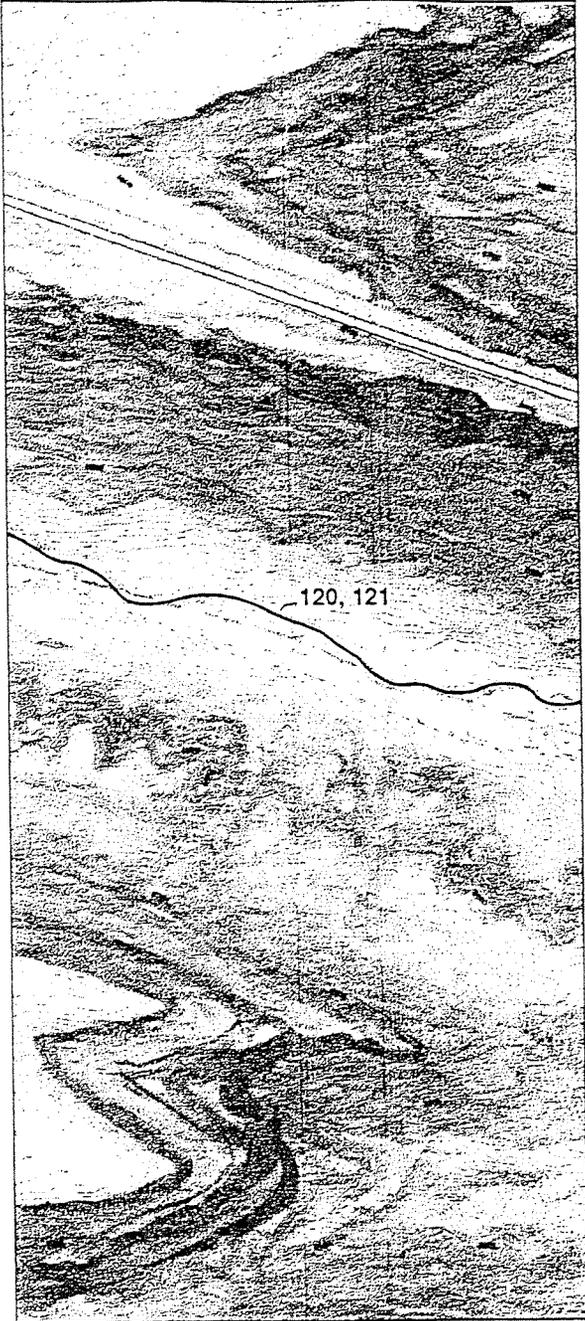


0 100 200 300 Meters
0 400 800 Feet

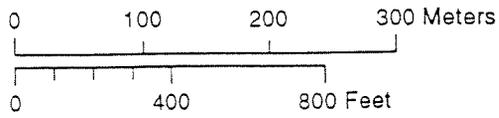
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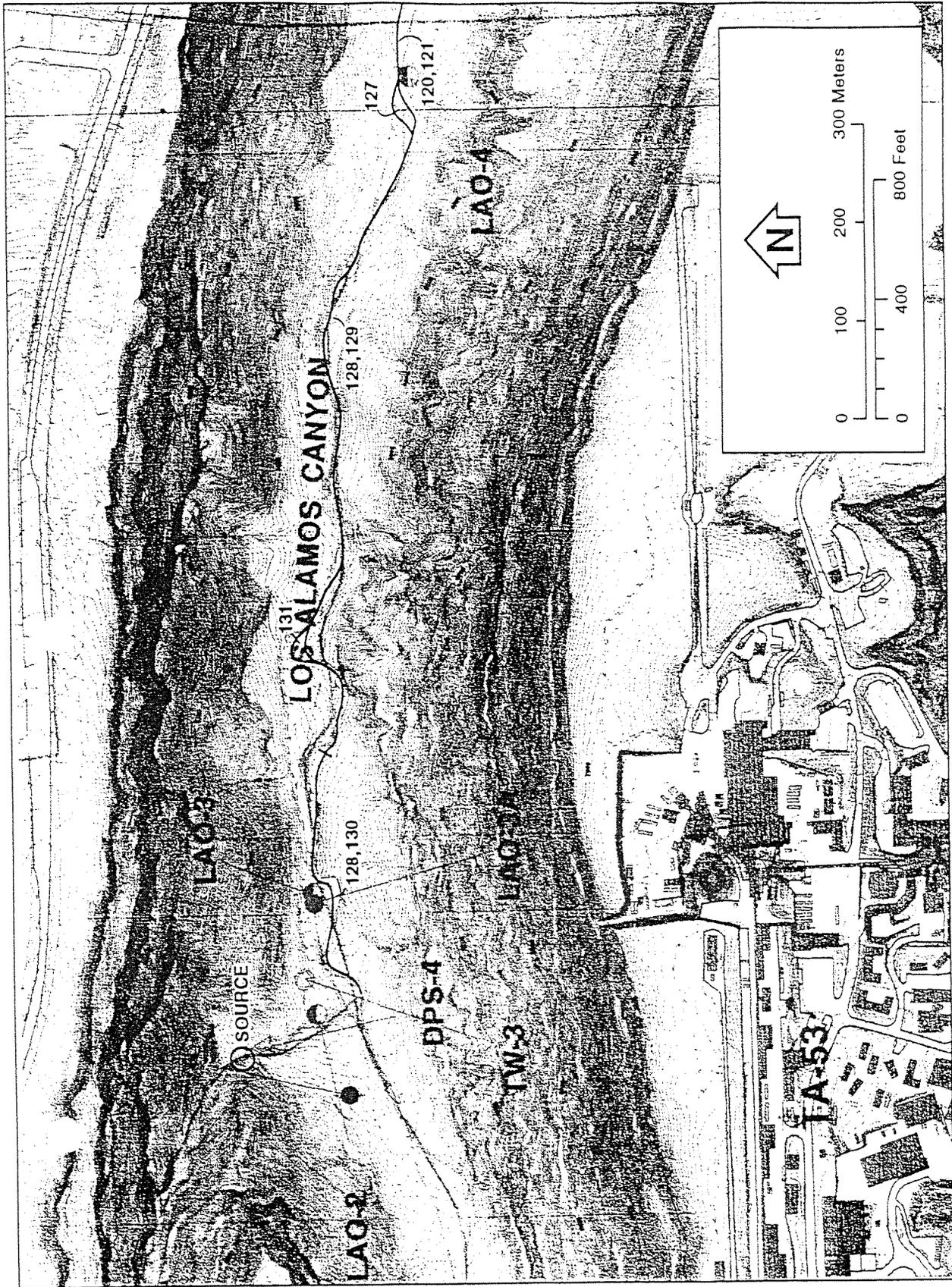
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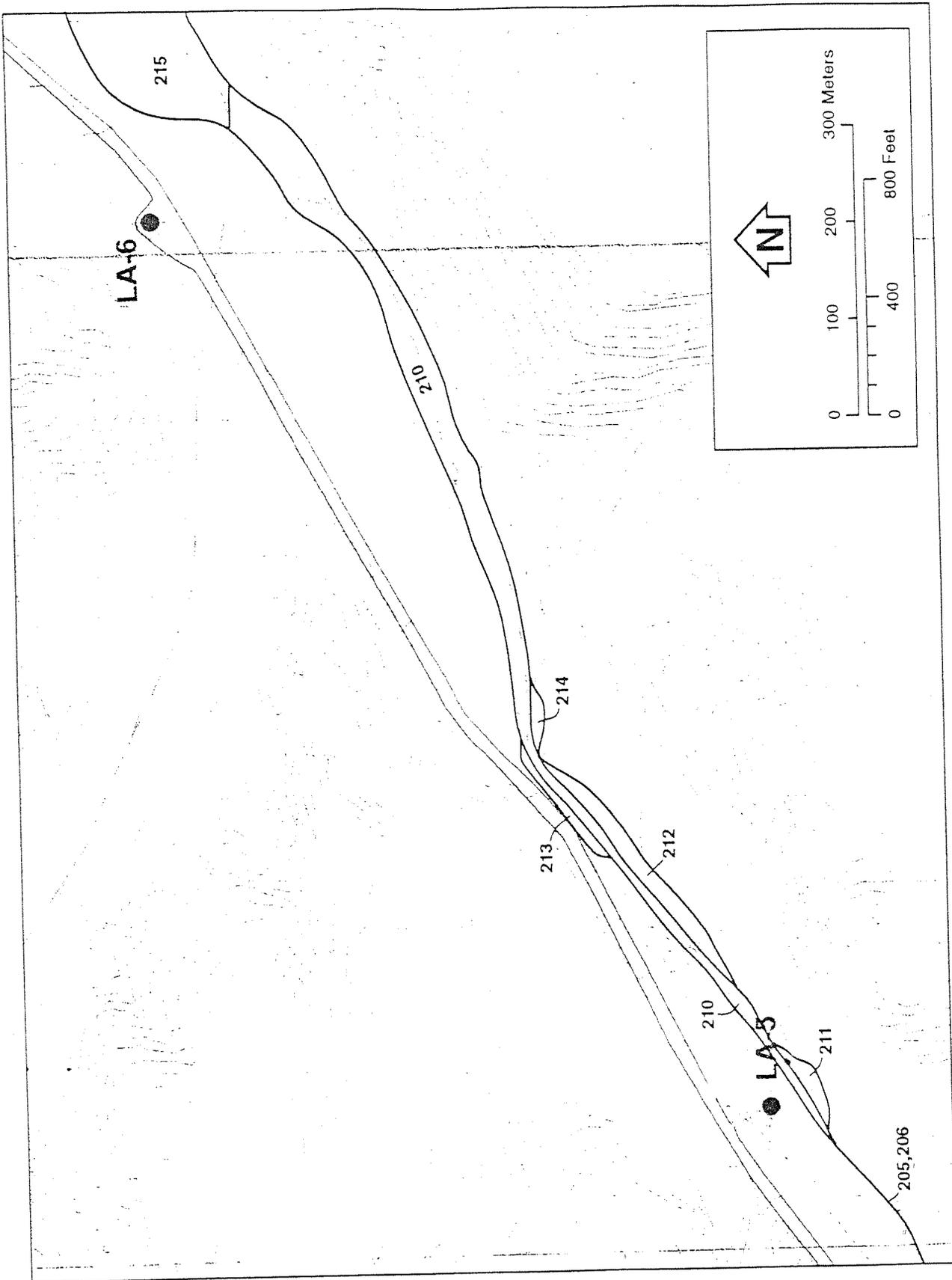


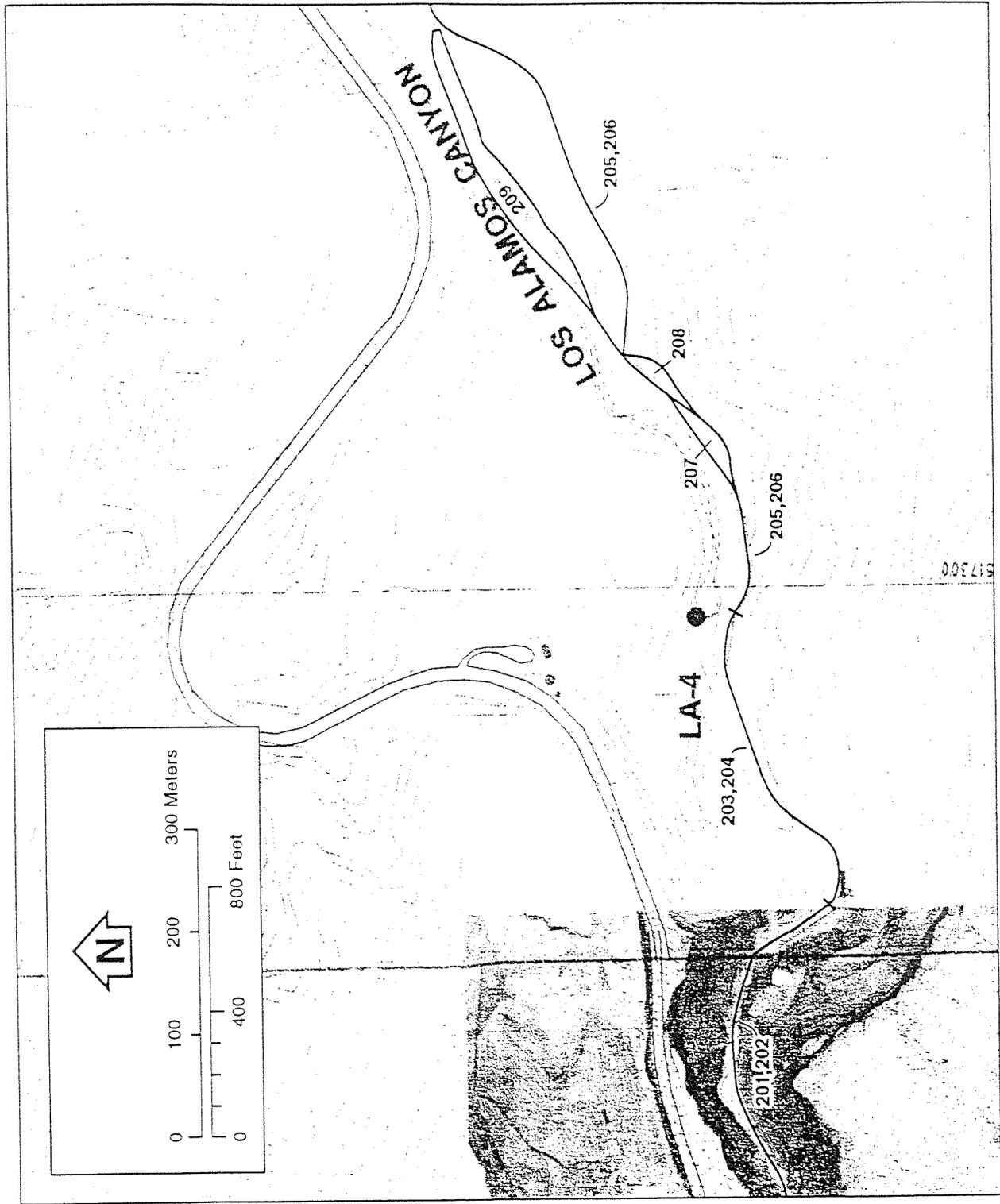


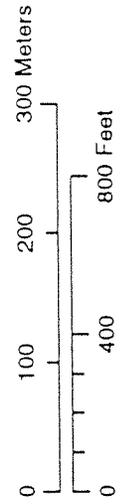
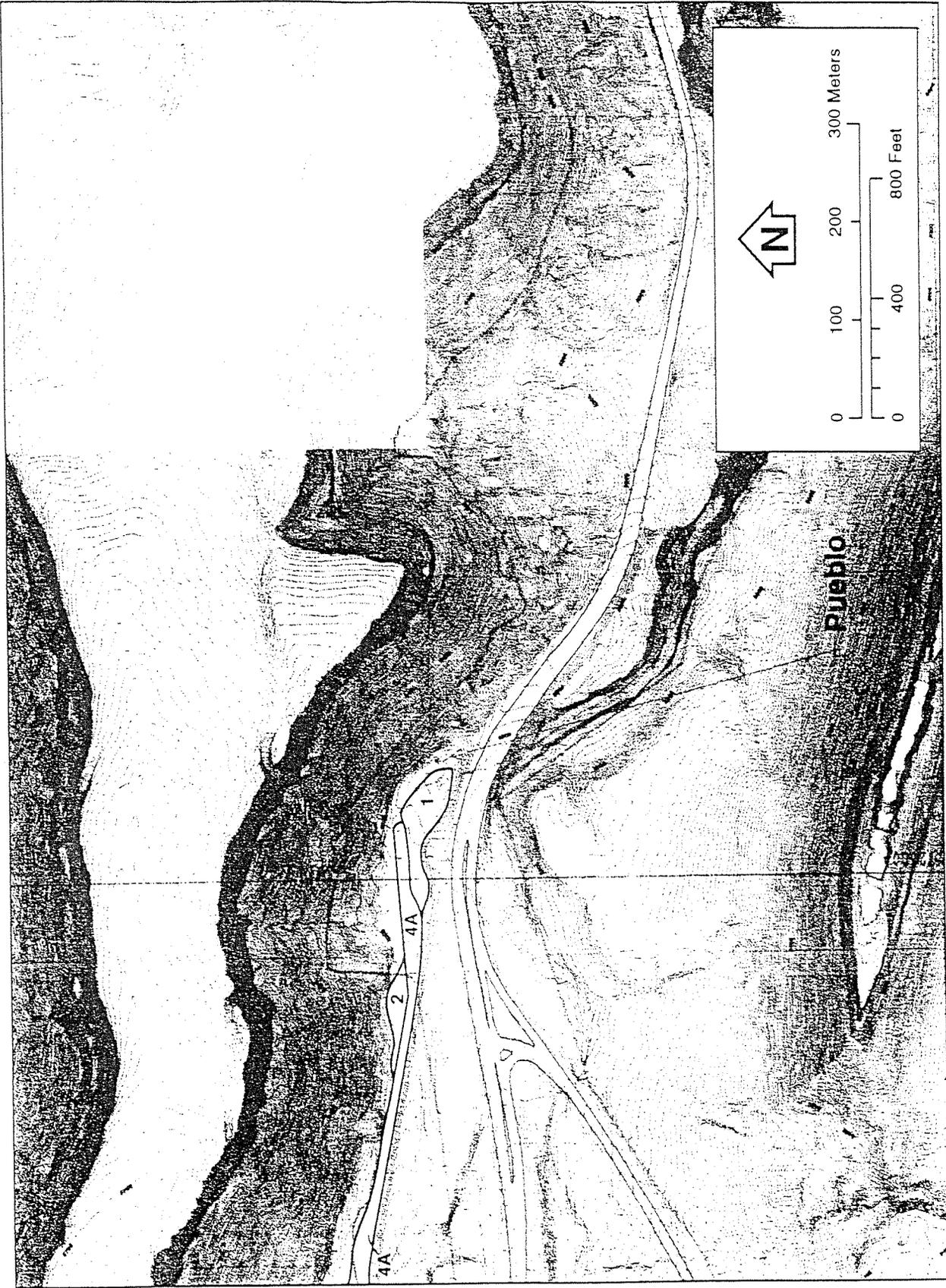
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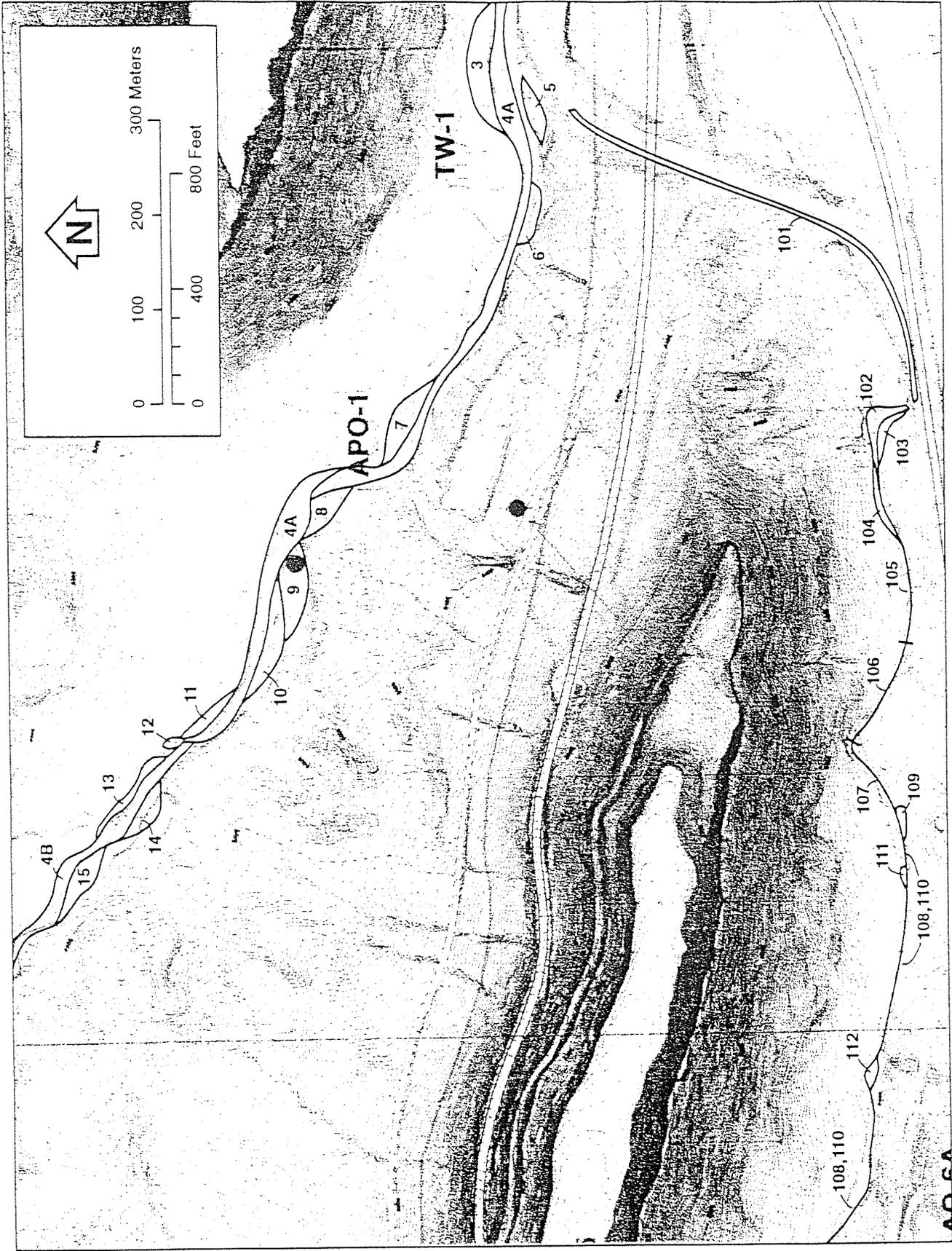
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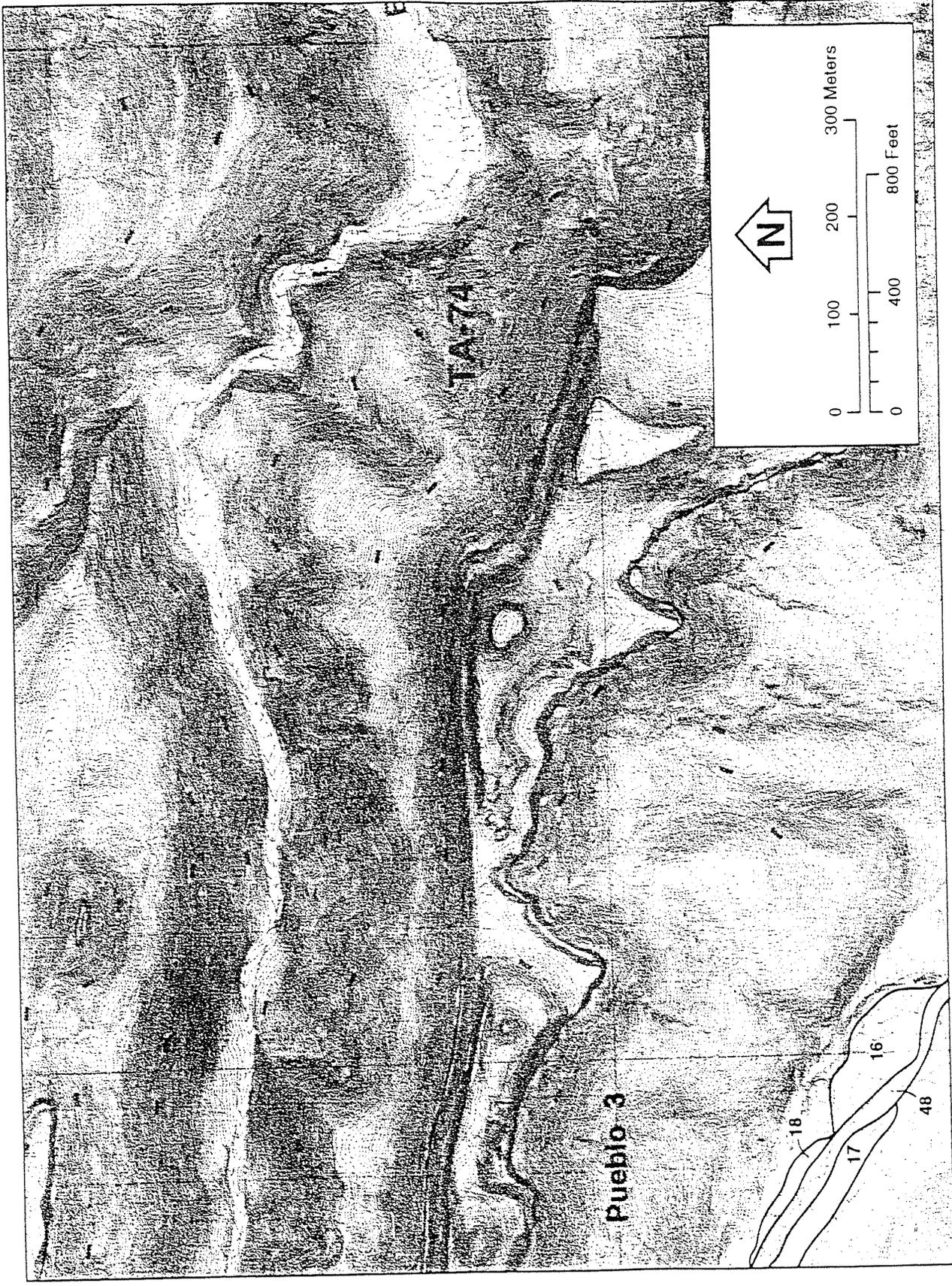
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4A

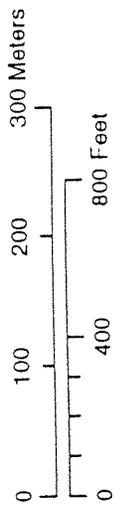
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TA-74

Pueblo-3

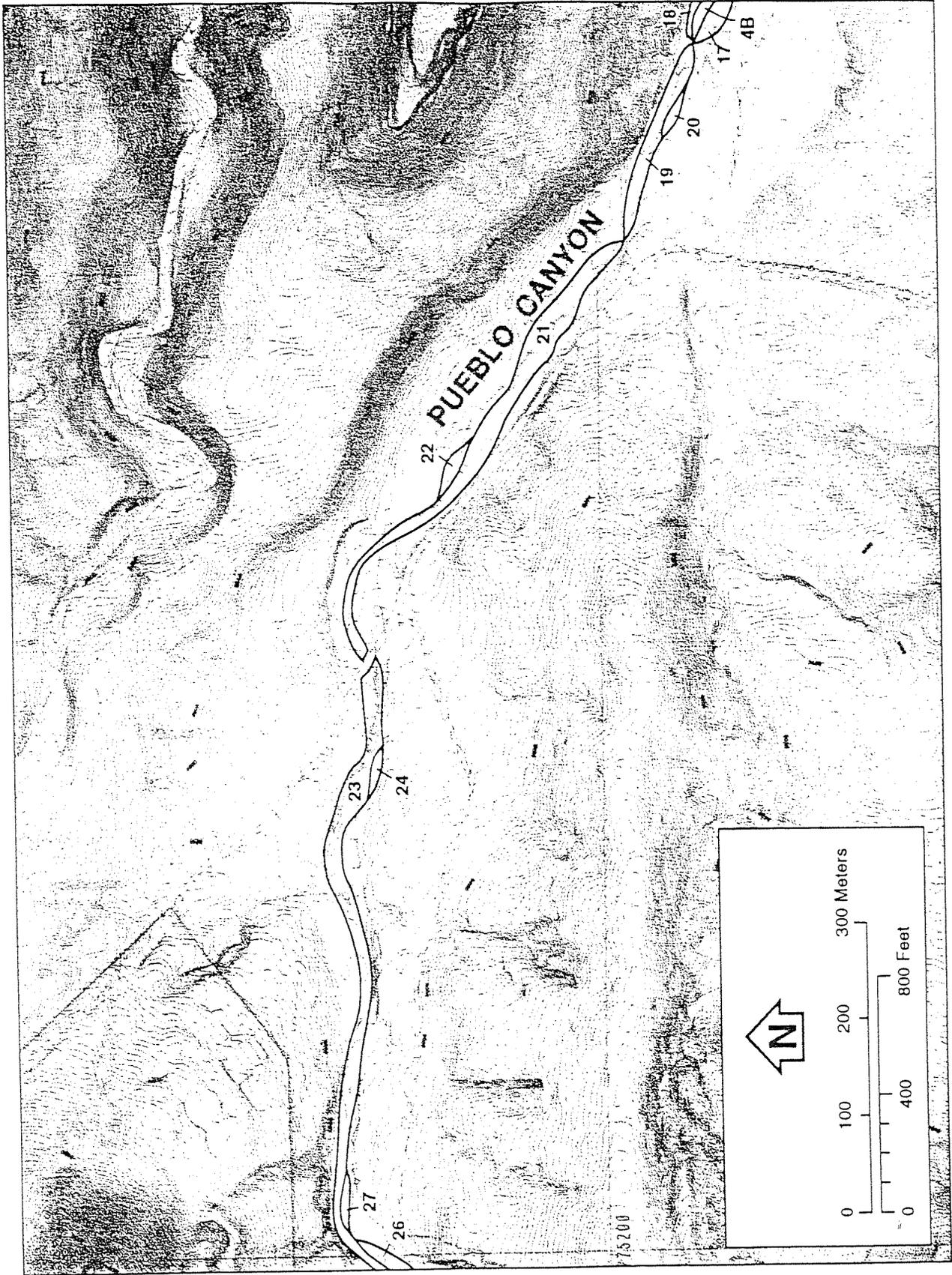


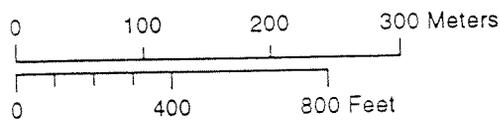
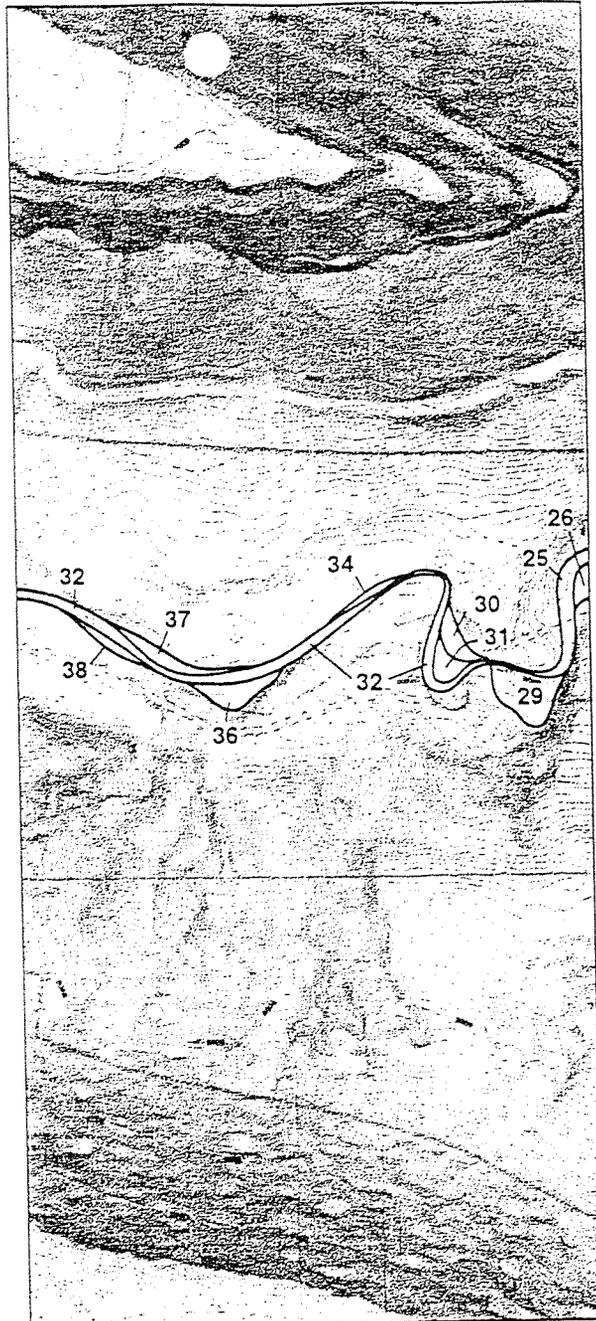
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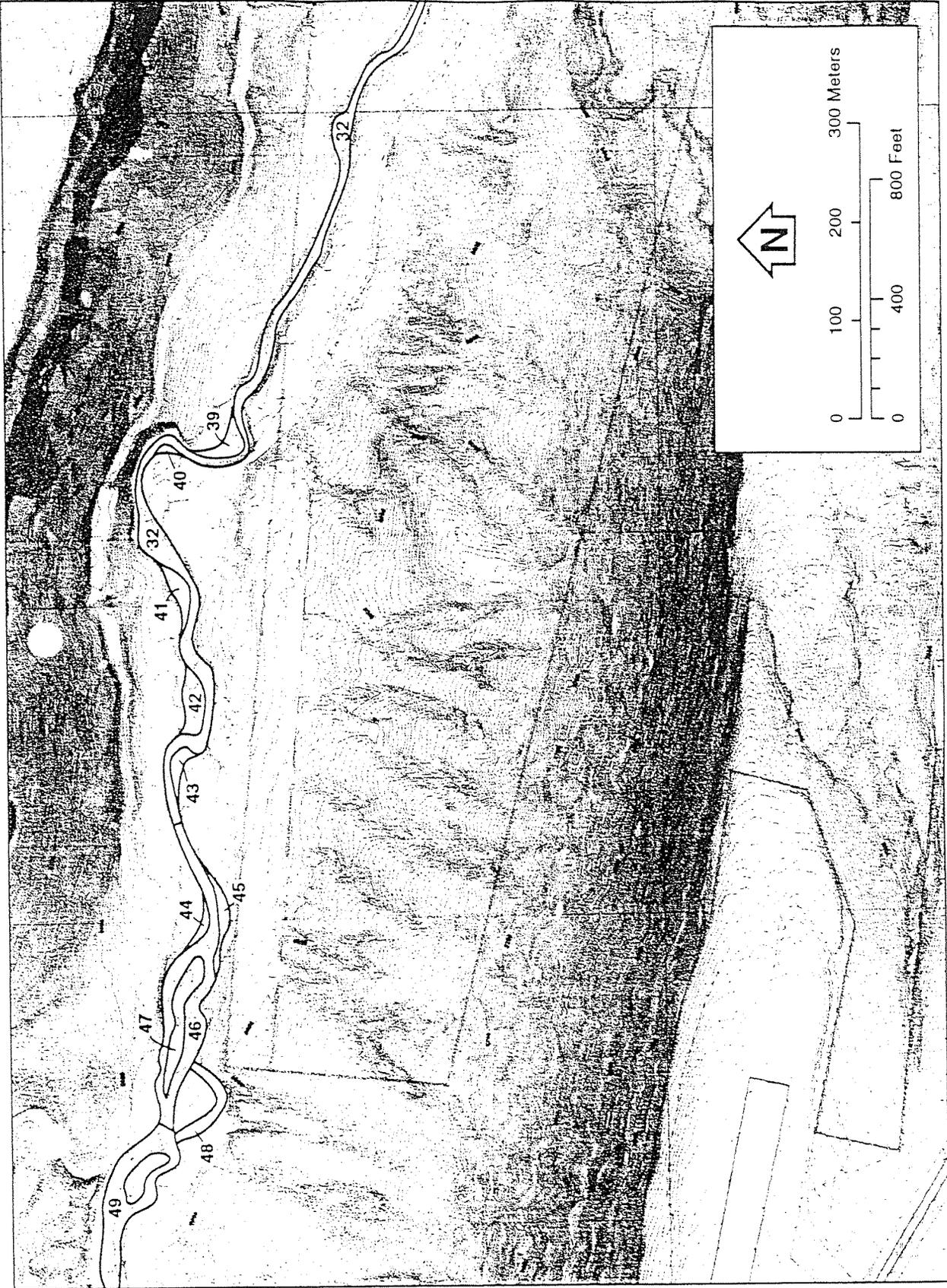
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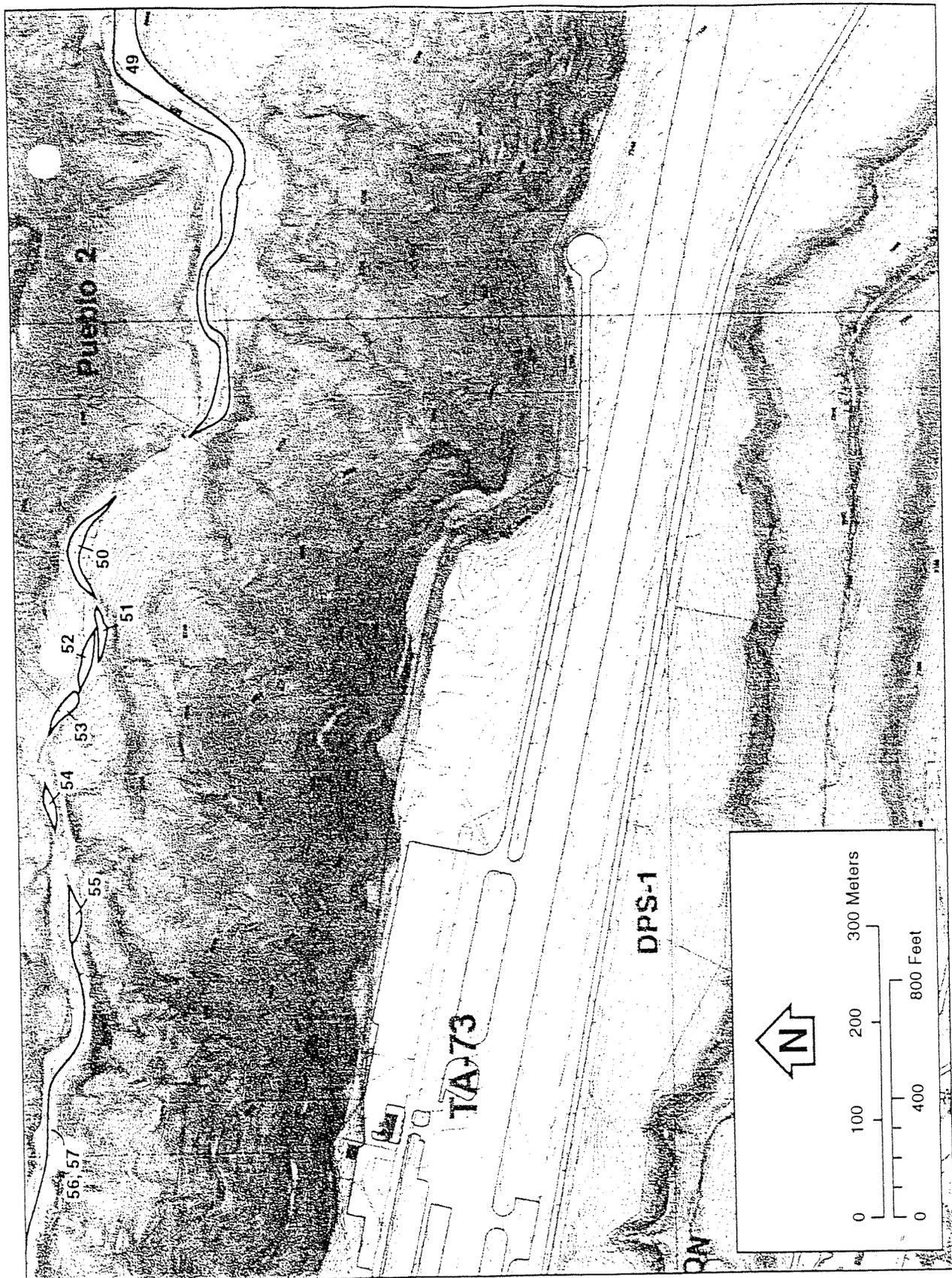
16

48









pueblo 2

49

50

51

52

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56

57

TA-73

DPS-1



300 Meters

200

100

0

800 Feet

400

0