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Groundwater Maps of the Hanford Site

December 1995

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Approved for Public Release

RELEASE AUTHORIZATION

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GROUNDWATER MAPS OF THE HANFORD SITE DECEMBER 1995

1.0 INTRODUCTION

The *Groundwater Maps of the Hanford Site, December 1995* is the latest in a series of reports (see Serkowski et al. 1995) that document the configuration of the water table aquifer beneath the Hanford Site (Figure 1). This series presents the results of the semiannual water level measurement program and the water table maps generated from these measurements. The reports document the changes in the groundwater level at the Hanford Site during the transition from nuclear material production to environmental restoration and remediation. In addition, these reports provide water level data to support the various site characterization and groundwater monitoring programs currently in progress on the Hanford Site.

Groundwater Maps of the Hanford Site is prepared for the U.S. Department of Energy by the Hanford Site Operations and Engineering Contractor, Westinghouse Hanford Company (WHC). This document fulfills reporting requirements specified in *Environmental Compliance*, Section 8.0, "Water Quality" (WHC-CM-7-5) and described in the environmental monitoring plan for the Hanford Site (DOE-RL 1993a).

This document highlights the three major operations areas (the 100, 200, and 300/1100 Areas) where wastes were discharged to the soil. Each area includes a summary discussion of the data, a well index map, and a contoured map of the water table surface. Appendix A contains all of the data collected for this program.

The National Geodetic Vertical Datum of 1988 (NGVD88) is used as the vertical datum and Washington State Lambert coordinates are used for horizontal location of the wells. Elevation data were converted from feet to meters for this report.

2.0 DATA COLLECTION, MANAGEMENT, EVALUATION, AND PRESENTATION

During December 1995, the depth to groundwater was measured in 432 Hanford Site wells by personnel from the Well Services Group under the direction of the Geosciences Manager. Wells were selected for measurement using on the following criteria:

- The well must monitor only the uppermost (<15 m [50 ft]) part of the aquifer
- The screened interval of the well should not exceed 15 m and the water table should intersect the screened interval. Exceptions were made where no alternative wells exist and vertical gradients were not considered significant.
- Well location and elevation must be accurately known.

Many wells that met these criteria were not selected because an adequate number of suitable nearby wells exist. The procedure for measuring the depth to water and recording the data is contained in EII 10.2, *Environmental Investigation and Site Characterization Manual* (WHC-CM-7-7). Field data were collected using the Groundwater Monitoring System, which employs a bar code interface to enter readings that have been taken manually with a steel tape from the reference point at the top of the well casing. The bar code hand-held computer downloaded the field data to a supervisory work station that stores all groundwater level measurements. These data were transferred to the Hanford Environmental Information System (HEIS) database and were later downloaded to a Paradox[1] application program called GeoDAT to help organize, evaluate, and tabulate the data.

A model grid of the water table elevations was generated using the Earthvision[2] geologic modeling program. The modeling software then created contour lines of equal water table elevations from the model grid. The contours and annotation information were modified on the ARC/INFO[3] geographic information system (GIS) software. Contours are not present in areas where the basalt surface is believed to be above the water table, based on Connelly (1992a and 1992b).

Hydrologists familiar with regional and local groundwater properties reviewed the maps to evaluate data interpolations made by the computer model. The contours were adjusted manually to reflect the known hydrologic environment.

3.0 HANFORD SITE MAPS

This section summarizes the results of the water table surface model generated from the December 1995 data. Figure 1 shows the relative locations of the detail facility area maps included in this document. To provide context, Figure 2 shows the water table surface for the entire Hanford Site. The detail maps are enlargements of this sitewide model.

3.1 100 AREAS MAPS

For the purposes of this report, the 100 Areas comprise the various 100 Area reactor facilities and the surrounding land south of the Columbia River and north of Gable Mountain and Gable Butte. Reactor operations have ceased in all of the facilities, and environmental restoration activities are in progress. Maps for this area include: Figure 3, Index Map of the 100 Areas Groundwater Monitoring Wells; and Figure 4, 100 Areas Water Table. Some of the wells used have screened intervals exceeding 15 meters within the top of the unconfined aquifer because the vertical gradients are not believed to be significant in this area.

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Earthvision is a trademark of Dynamic Graphics, Inc.

ARC/INFO is a trademark of Environmental Systems Research Institute, Inc.

The high water levels north of Gable Mountain are consistent with past measurements. Driller's logs indicate the presence of fine-grained sediments in this area. The high water levels may be remnants of artificial recharge from pre-Hanford irrigation, or may represent perched groundwater. The steep groundwater gradient in the southeastern portion of the map area is believed to result from the influence of the fine-grained sediments.

3.2 200 AREAS MAPS

These maps encompass the 200 East and 200 West Areas and the surrounding vicinity on the Hanford Site, which was once referred to as the Separations Area. There are several active and many inactive liquid waste disposal facilities in this region. The set of maps for the 200 Areas consists of: Figure 5, 200 Areas Monitoring Well Index Map; and Figure 6, 200 Areas Water Table.

Three facilities are notable for their impact on the water levels in this area: U Pond (216-U-10), located in the southwestern corner of the 200 West Area, Z Plant (234-5), north of the U Pond Site, and B Pond (216-B-3), located east of 200 East Area. U Pond was deactivated in 1984 after 40 years of use as a disposal site for large volumes of liquid wastes. The relatively low hydraulic conductivity found beneath the 200 West Area coupled with continued effluent discharge in cribs associated with Z Plant has helped to maintain a significant water table mound under the 200 West Area. Since 1984, the high point of the groundwater mound has shifted northward from U pond toward Z Plant. A steep gradient occurs east of the 200 West Area as the water table intersects the higher conductivity sediments beneath the 200 East Area. With higher conductivities, the water table beneath the 200 East Area is generally flat. B Pond, which received significant volumes of liquid effluent, has a residual groundwater mound that influences the direction of groundwater travel over a wide area. The W049H Facility, active since 1995, shows a negligible effect on groundwater flow in the 200 East Area.

3.3 300/1100 AREAS MAPS

This section covers the June 1995 water table measurements for the 300 Area and the adjacent 1100 Area. Liquid waste disposal to the 300 Area Process Trenches ended in December 1994, and clean river water is discharged during the summer months at the Richland well field recharge ponds located east of the 1100 Area. The 300/1100 Area set of maps consists of: Figure 7, 300 Area Monitoring Well Index Map; and Figure 8, 300 Areas Water Table.

The water table is close to the position of the Hanford-Ringold Formations contact, but near the river it rises and falls in response to river level. During average to low river stages, groundwater in the unconfined aquifer enters the 300 Area from the northwest and southwest, flows through the 300 Area in a west-to-east or northwest-to-southeast direction, and eventually flows into the river. The water table is close to or slightly below the Hanford-Ringold Formations contact. During high water stages the water table can quickly rise above the Hanford-Ringold Formations contact near the river, and groundwater may temporarily flow in a reverse direction. Channeling in the top of the Ringold Formation further complicates the direction and flow rate of groundwater in the unconfined aquifer. Confined

amount of pressure than the overlying unconfined aquifer, causing any interaquifer flow to be upward (DOE 1996).

The major influences on water table elevations in the map area are river fluctuations, irrigation, and river water recharged into the City of Richland well field near the 1100 Area. During the spring, high water levels in the Columbia River reverse the normal groundwater flow into the river along the shoreline. Combined with high permeabilities in the Hanford formation, these influences result in a complex flow regime where local flow directions are difficult to predict.

4.0 REFERENCES

Connelly, M. P., B. H. Ford, and J. V. Borghese, 1992a, *Hydrogeologic Model for the 200 West Groundwater Aggregate Area*, WHC-SD-EN-TI-014, Westinghouse Hanford Company, Richland, Washington.

Connelly, M. P., B. H. Ford, J. W. Lindberg, S. J. Trent, C. D. Delaney, and J. V. Borghese, 1992b, *Hydrogeologic Model for the 200 East Groundwater Aggregate Area*, WHC-SD-EN-TI-019, Westinghouse Hanford Company, Richland, Washington

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Serkowski, J. A., M. J. Hartman, and M. D. Sweeney, 1995, *Ground Water Maps of the Hanford Site--June 1995*, WHC-EP-0394-11, Westinghouse Hanford Company, Richland, Washington.

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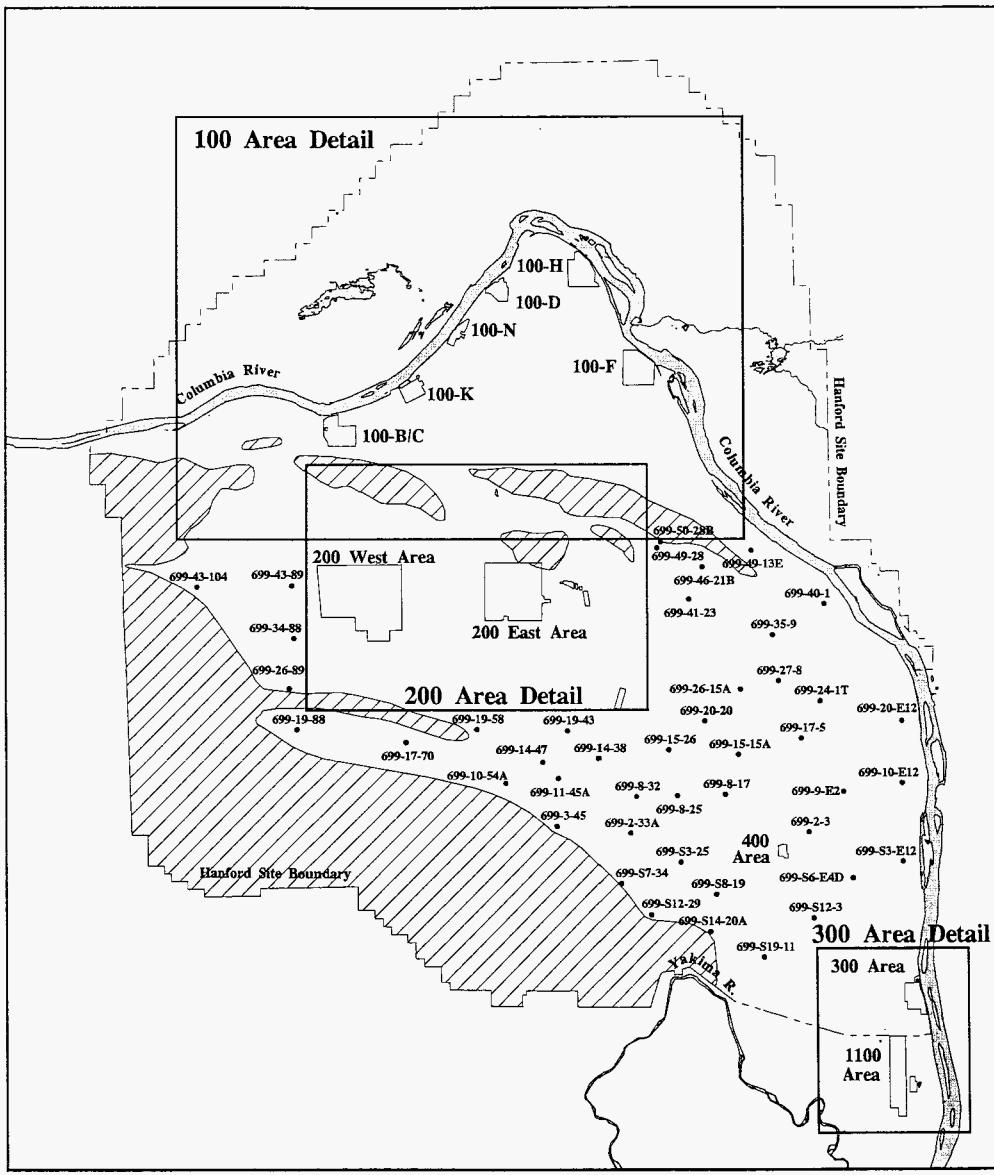
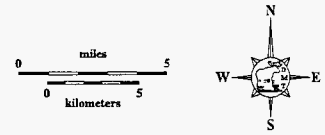
Figure 1. Hanford Site Location Map.



Hanford Site Index Map

December 1995



- Well location used for creating this model
- Ponds, lakes, and rivers
- Areas where basalt surface is generally above the water table

Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.

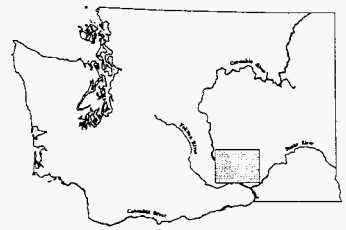


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Figure 2. Hanford Site Water Table Map.

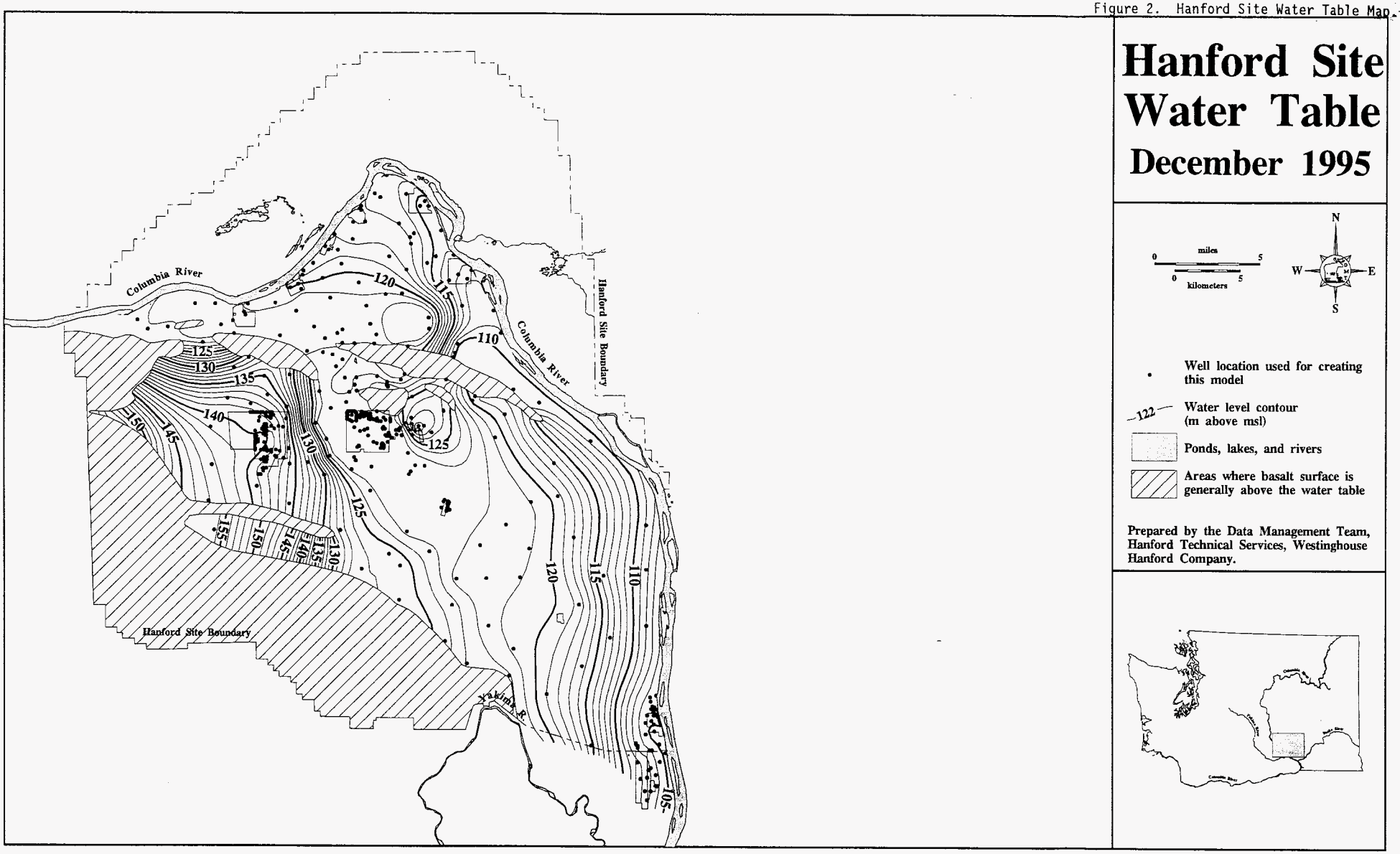

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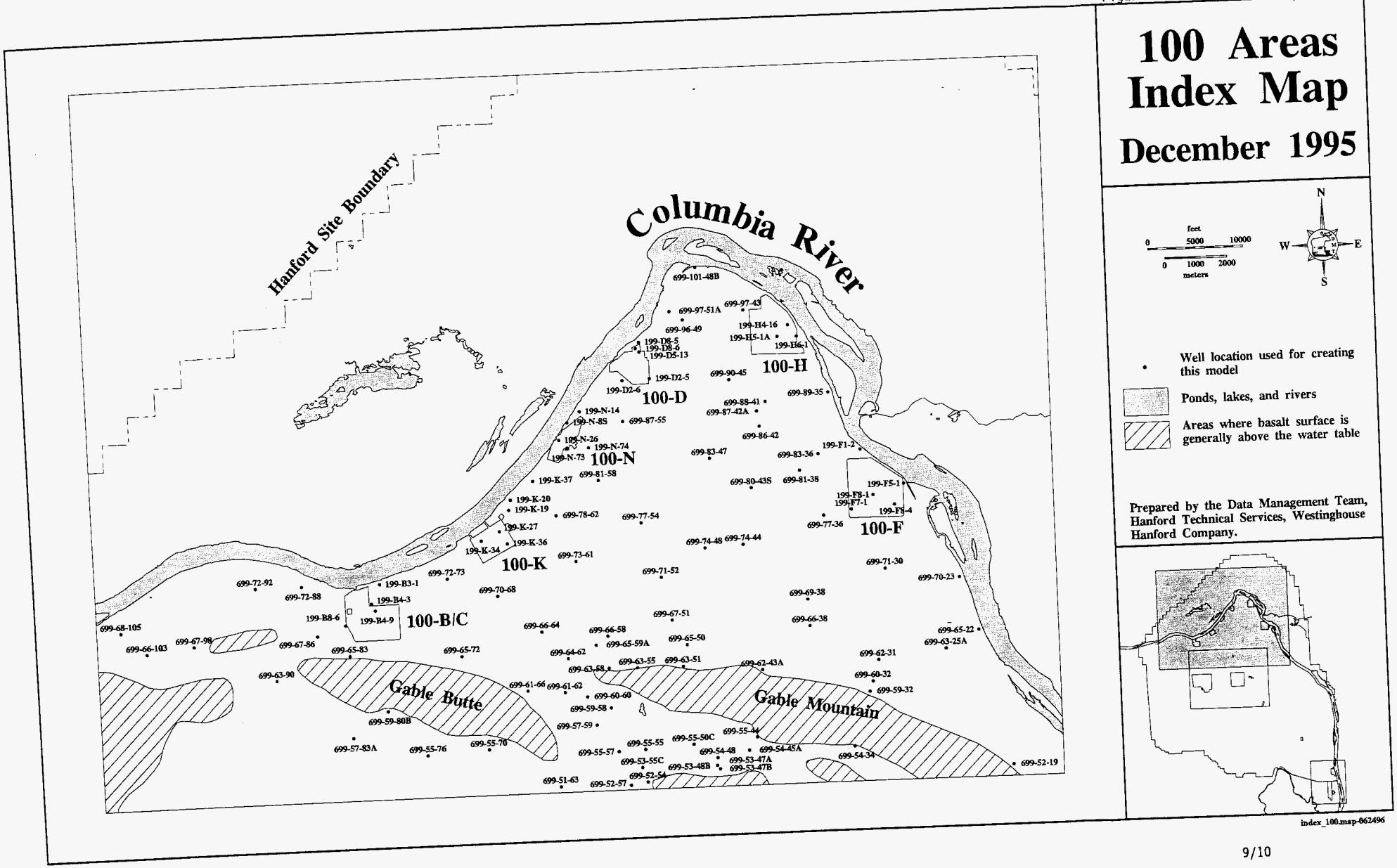
Figure 3. 100 Area Location Map.



100 Areas Index Map

December 1995

feet
0 5000 10000
0 1000 2000
meters

N
W E
S

- Well location used for creating this model
- Ponds, lakes, and rivers
- Areas where basalt surface is generally above the water table

Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.

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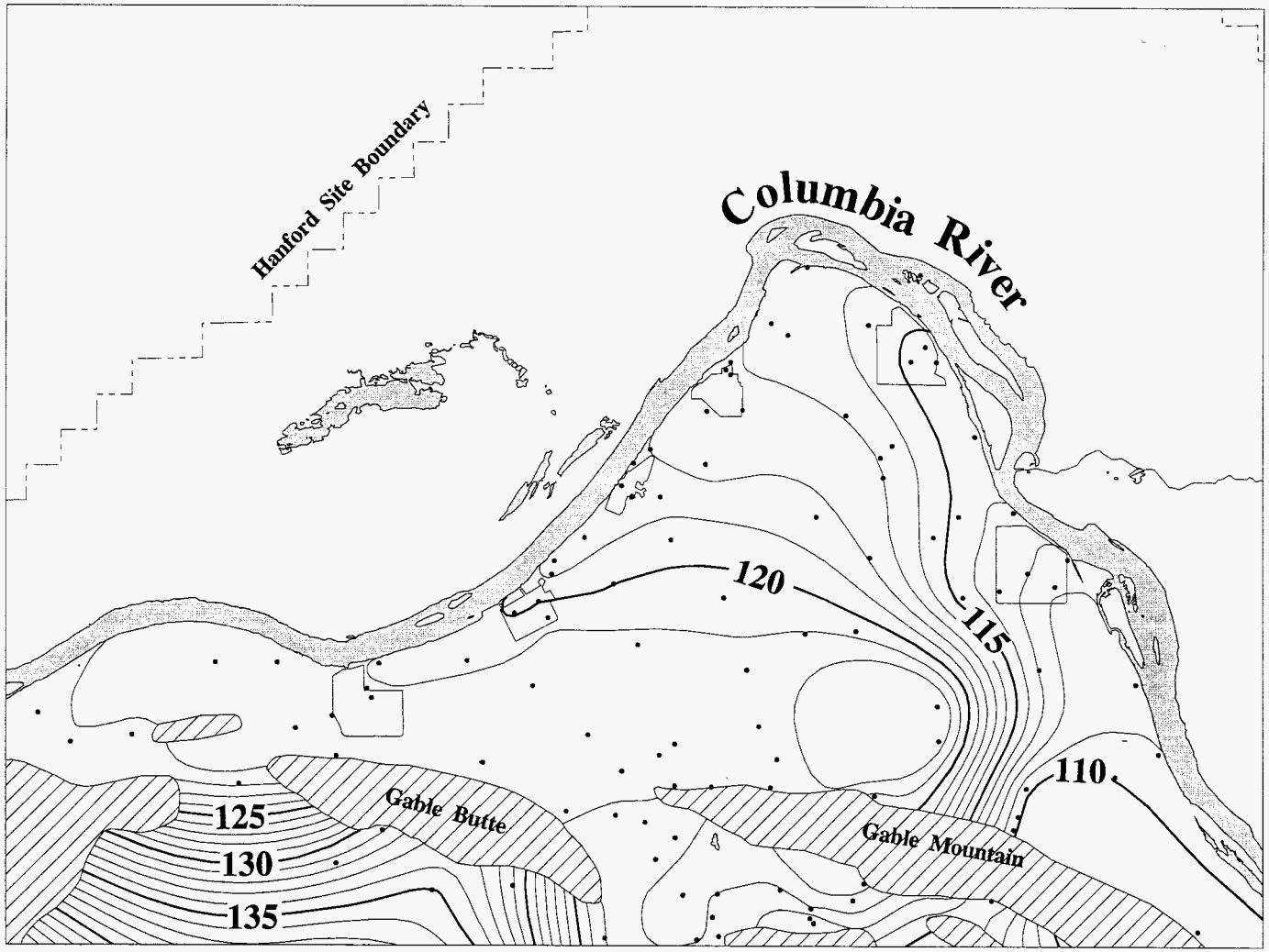
Figure 4. 100 Area Water Table.



100 Areas Water Table

December 1995

feet
0 5000 10000
0 1000 2000
meters

N
W E
S

Well location used for creating this model

122 Water level contour (m above msl)

Ponds, lakes, and rivers

Areas where basalt surface is generally above the water table

Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.

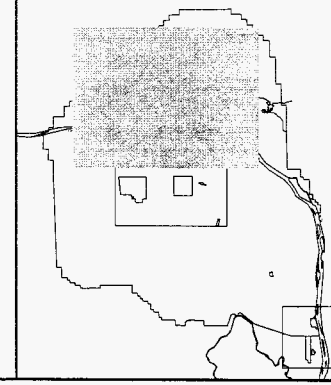


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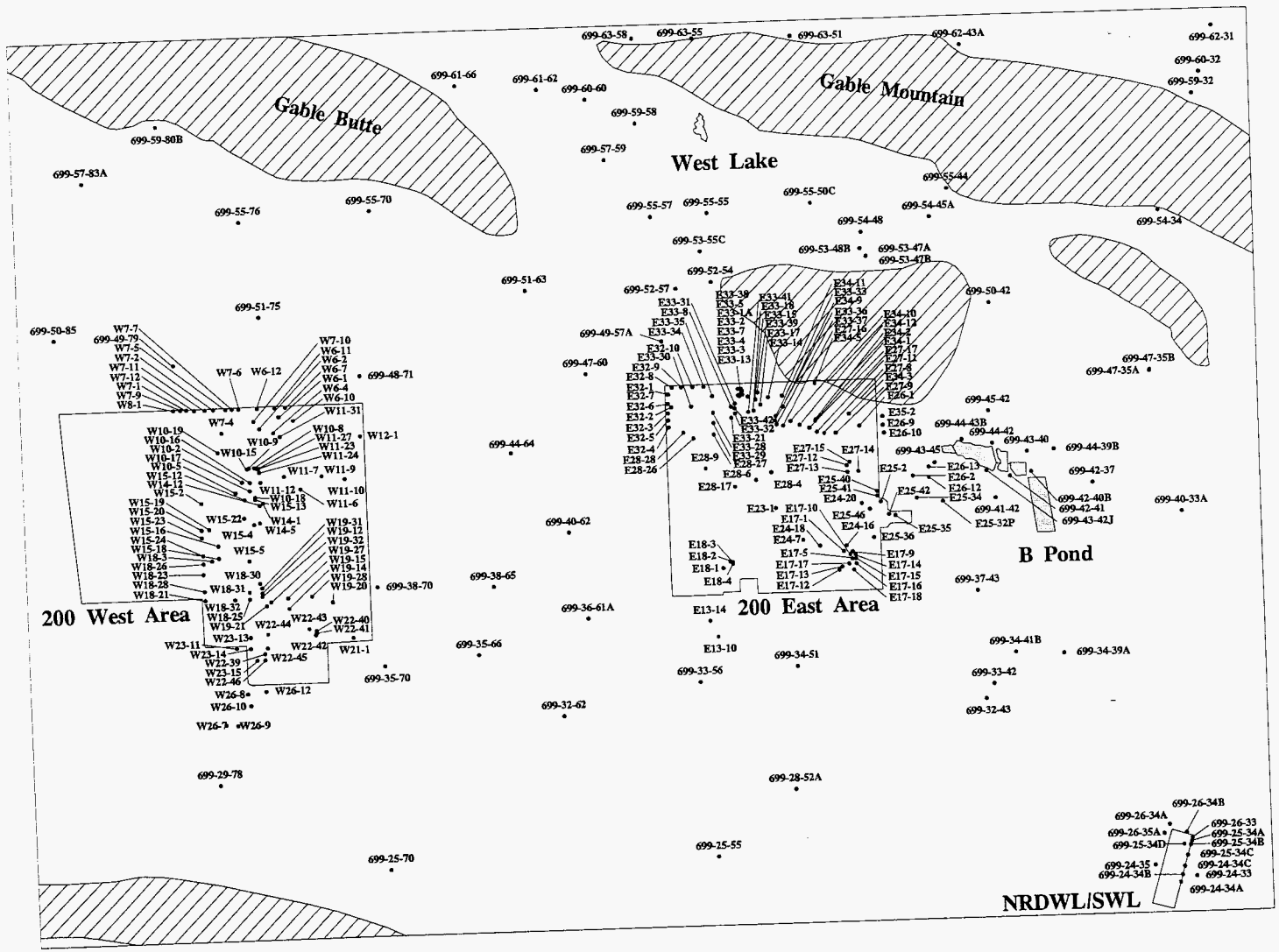
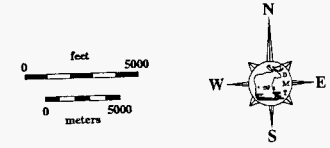
Figure 5. 200 Area Location Map.



200 Areas Index Map

December 1995



- Well location used for creating this model
- Ponds, lakes, and rivers
- Areas where basalt surface is generally above the water table

Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.

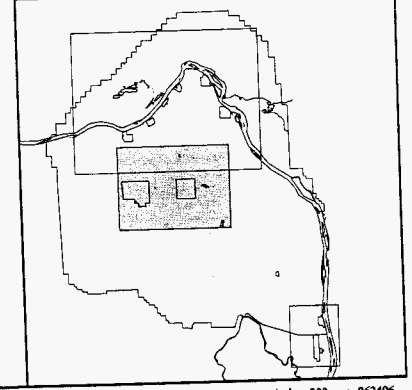


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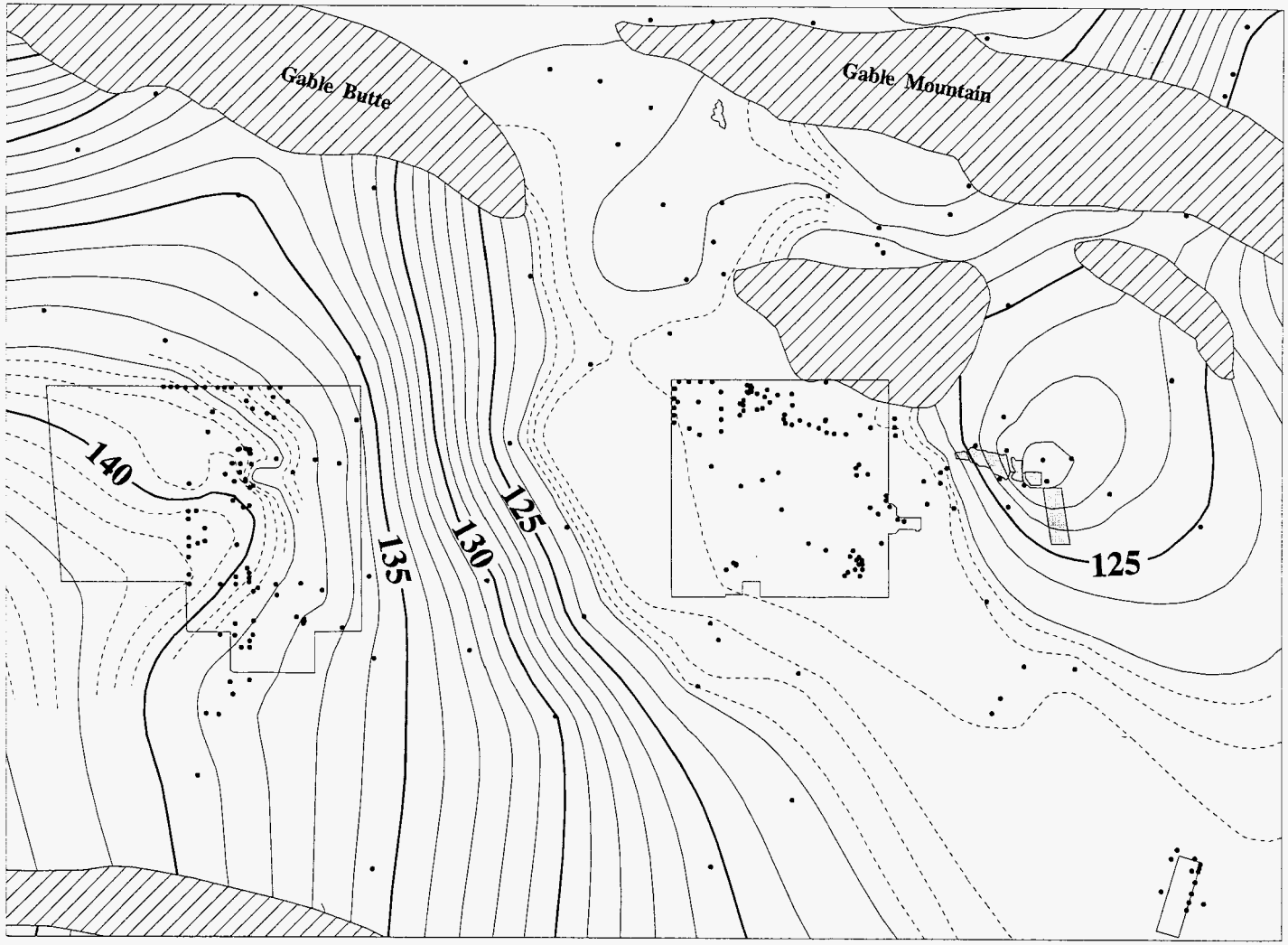
Figure 6. 200 Area Water Table.



200 Areas Water Table

December 1995

feet 0 5000

0 5000 meters

N W E S

Well location used for creating this model

122 Water level contour (m above msl) .25 m inverval for dashed lines

Ponds, lakes, and rivers

Areas where basalt surface is generally above the water table

Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.

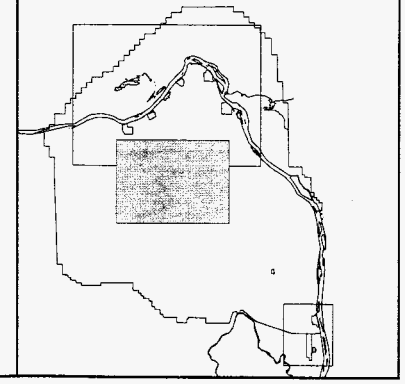


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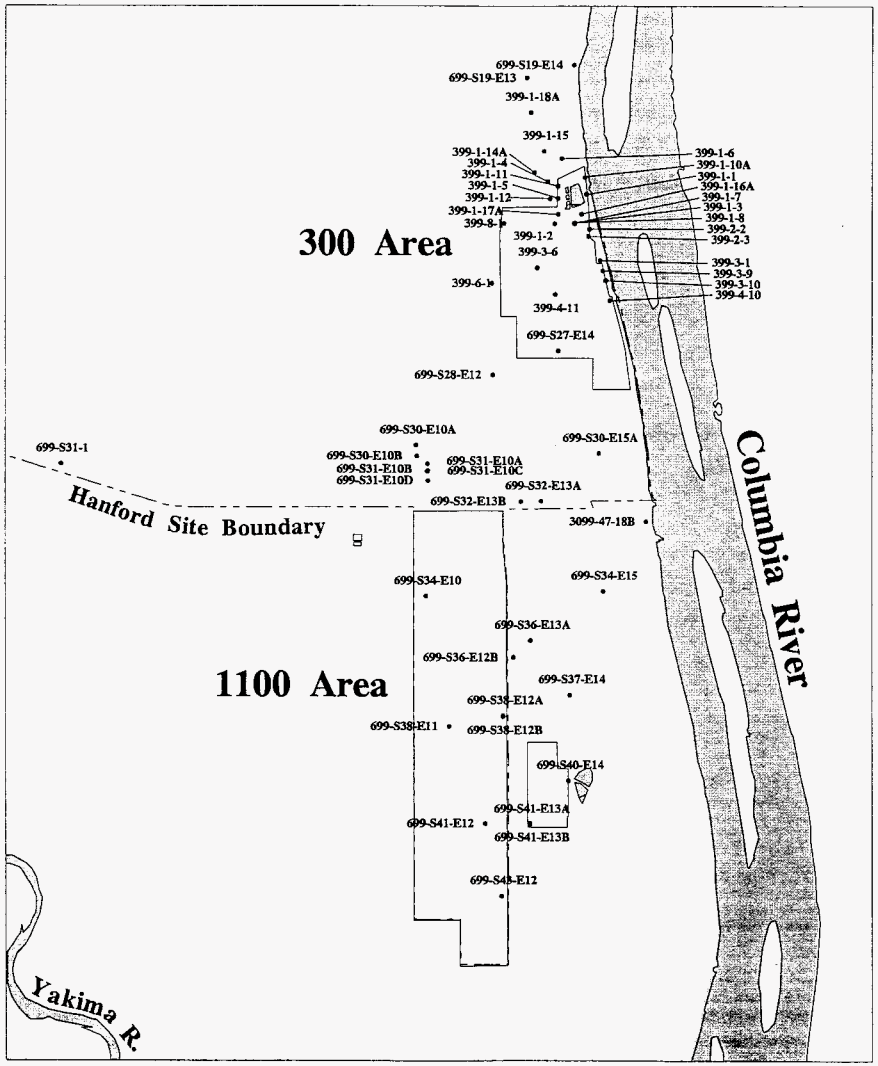
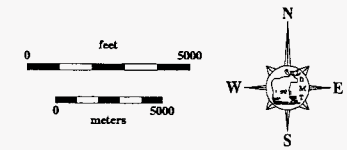
Figure 7. 300 Area Location Map.



300 Area Index Map

December 1995



- Well location used for creating this model
- Ponds, lakes, and rivers
- Areas where basalt surface is generally above the water table

Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.

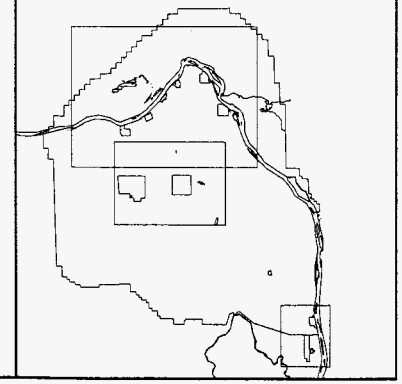


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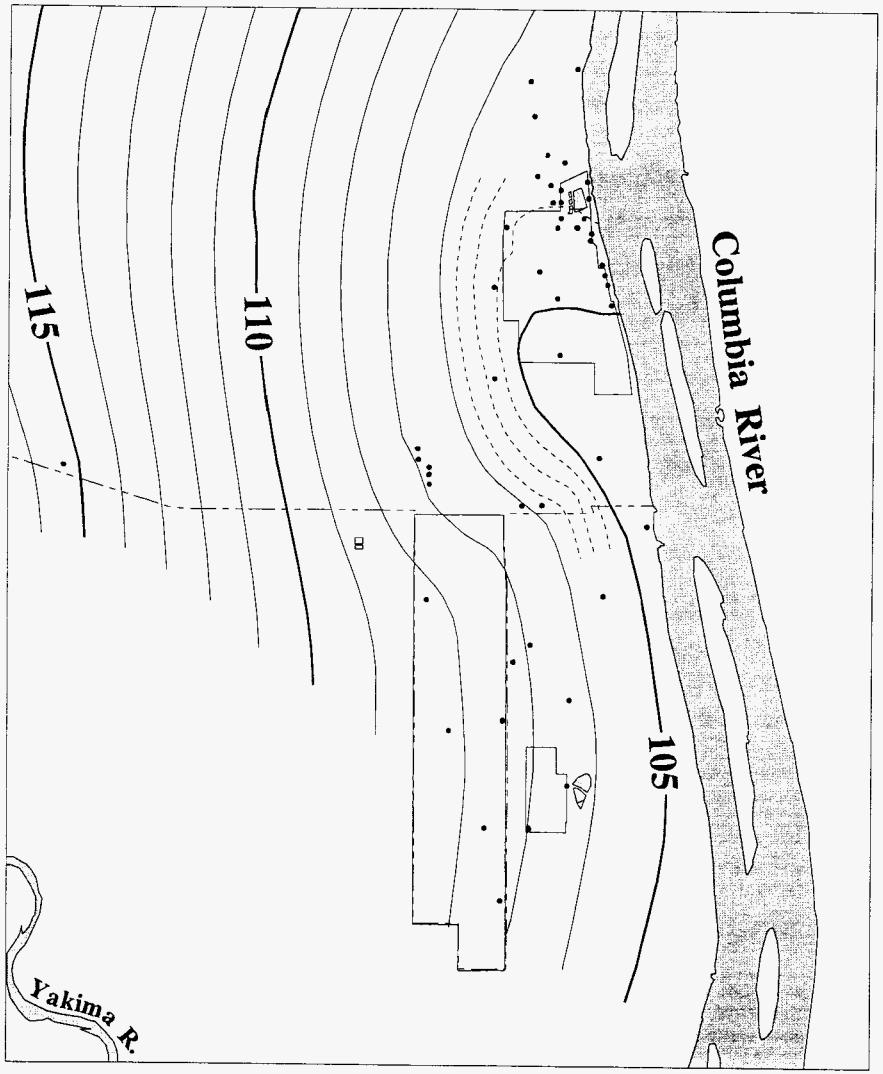
Figure 8. 300 Area Water Table.



300 Area Water Table
December 1995

feet 0 5000

meters 0 5000

N
W E
S

- Well location used for creating this model
- 122 Water level contour (m above msl) .25 m inverval for dashed lines
- Ponds, lakes, and rivers
- Areas where basalt surface is generally above the water table

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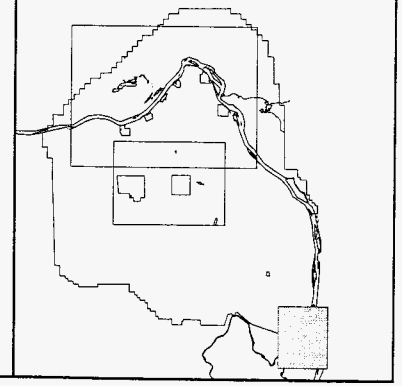

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APPENDIX A

WATER LEVEL MEASUREMENT DATA

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Table A-1. December 1995 Water Level Measurement Data

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
199-B3-1	13.33	133.87	120.53
199-B8-6	23.51	144.90	121.39
199-D2-5	22.96	140.30	117.34
199-D2-6	25.68	143.04	117.36
199-D5-13	26.72	143.71	116.99
199-D8-5	20.75	137.92	117.17
199-D8-6	28.09	145.24	117.15
199-F1-2	7.77	121.30	113.53
199-F5-1	10.21	123.54	113.33
199-F7-1	5.29	118.32	113.02
199-F8-1	10.60	123.70	113.10
199-F8-4	13.16	125.25	112.09
199-H4-16	14.74	129.31	114.56
199-H5-1A	13.44	128.06	114.63
199-H6-1	13.19	127.44	114.25
199-K-19	9.84	128.66	118.82
199-K-20	9.98	128.61	118.63
199-K-27	22.32	142.24	119.92
199-K-34	22.91	142.67	119.76
199-K-36	29.93	150.59	120.66
199-K-37	16.21	134.66	118.45
199-N-14	20.34	138.28	117.93
199-N-26	20.71	139.06	118.35
199-N-73	22.98	141.19	118.21
199-N-74	20.91	139.48	118.57
299-E13-10	102.85	224.85	122.35
299-E13-14	104.77	224.85	122.36
299-E17-1	97.04	219.20	122.17
299-E17-10	95.59	217.85	122.26
299-E17-12	97.76	219.97	122.21
299-E17-13	97.00	219.23	122.22
299-E17-14	97.86	220.12	122.26
299-E17-16	97.47	219.63	122.16
299-E17-18	97.47	219.65	122.19
299-E17-5	96.97	219.06	122.09
299-E17-9	96.58	218.74	122.16
299-E18-1	97.22	219.53	122.31
299-E18-2	97.68	219.82	122.15
299-E18-3	97.77	220.08	122.31
299-E18-4	97.62	219.93	122.31
299-E23-1	95.05	217.35	122.30
299-E24-16	96.81	218.93	122.12
299-E24-18	97.16	219.24	122.08
299-E24-20	87.67	210.09	122.42
299-E24-7	95.99	218.24	122.25
299-E25-2	83.59	205.94	122.35
299-E25-32P	81.87	204.23	122.36
299-E25-34	79.70	202.04	122.34
299-E25-35	83.29	205.55	122.26
299-E25-36	93.39	215.61	122.22
299-E25-40	80.60	202.97	122.37
299-E25-41	82.26	204.66	122.40
299-E25-42	85.97	208.27	122.29
299-E25-46	89.44	211.78	122.34
299-E26-1	65.73	188.14	122.41
299-E26-10	60.96	183.33	122.37
299-E26-12	69.81	192.25	122.44
299-E26-13	61.99	184.41	122.42
299-E26-2	71.32	193.64	122.32
299-E26-9	61.33	183.76	122.44
299-E27-11	73.86	196.07	122.22
299-E27-13	81.61	203.97	122.36

Table A-1. Water Level Measurements for June 1995

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-E27-14	78.41	200.72	122.32
299-E27-15	76.80	198.99	122.19
299-E27-16	76.47	198.77	122.30
299-E27-17	71.13	193.46	122.33
299-E27-8	72.15	194.41	122.26
299-E27-9	69.50	191.78	122.28
299-E28-17	93.38	215.97	122.58
299-E28-26	87.22	209.48	122.25
299-E28-27	85.25	207.44	122.19
299-E28-28	87.03	209.26	122.23
299-E28-4	88.40	210.78	122.38
299-E28-6	91.03	213.39	122.37
299-E28-9	91.24	213.59	122.36
299-E32-1	77.68	200.00	122.32
299-E32-10	72.10	194.43	122.33
299-E32-2	82.03	204.23	122.21
299-E32-3	84.09	206.20	122.11
299-E32-4	86.87	209.06	122.19
299-E32-5	85.80	207.92	122.11
299-E32-6	81.13	203.44	122.31
299-E32-7	78.39	200.67	122.28
299-E32-8	74.38	196.76	122.38
299-E32-9	73.89	196.09	122.20
299-E33-13	69.19	191.52	122.33
299-E33-14	67.27	189.60	122.33
299-E33-15	68.86	191.20	122.34
299-E33-17	70.20	192.53	122.32
299-E33-18	76.38	198.69	122.31
299-E33-2	70.30	192.55	122.26
299-E33-21	81.42	203.73	122.31
299-E33-28	80.21	202.46	122.25
299-E33-29	83.10	205.37	122.27
299-E33-30	80.04	202.30	122.26
299-E33-31	75.05	197.35	122.30
299-E33-32	78.91	201.17	122.26
299-E33-33	72.90	195.19	122.29
299-E33-34	70.83	193.11	122.28
299-E33-35	73.82	195.99	122.17
299-E33-36	75.29	197.11	121.82
299-E33-37	76.78	199.04	122.26
299-E33-38	70.37	192.62	122.25
299-E33-39	67.81	189.98	122.16
299-E33-4	69.66	191.38	121.72
299-E33-41	77.36	199.63	122.27
299-E33-42	77.13	199.43	122.30
299-E33-5	71.13	193.46	122.33
299-E33-7	69.06	191.34	122.28
299-E33-8	76.09	198.42	122.33
299-E34-1	69.51	191.86	122.35
299-E34-10	72.66	195.00	122.34
299-E34-11	66.03	188.35	122.33
299-E34-12	72.44	194.72	122.27
299-E34-2	70.00	192.27	122.27
299-E34-3	64.21	186.39	122.18
299-E34-5	57.44	180.07	122.63
299-E34-9	69.32	191.62	122.31
299-E35-2	61.14	183.60	122.46
299-W10-15	66.41	206.01	139.61
299-W10-17	64.89	204.47	139.59
299-W10-18	64.85	204.50	139.65
299-W10-19	68.52	208.18	139.66
299-W10-5	65.08	204.92	139.84

Table A-1. Water Level Measurements for June 1995

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-W10-9	66.22	205.72	139.50
299-W11-10	84.85	222.17	137.32
299-W11-12	67.64	207.04	139.40
299-W11-23	70.50	209.75	139.24
299-W11-24	70.10	209.53	139.43
299-W11-27	69.53	208.87	139.34
299-W11-31	76.91	215.45	138.54
299-W11-6	79.91	218.31	138.40
299-W11-7	77.04	216.14	139.10
299-W11-9	82.38	220.35	137.98
299-W12-1	85.29	221.43	136.14
299-W14-1	64.16	203.85	139.69
299-W14-12	64.64	204.37	139.74
299-W14-5	63.09	203.18	140.08
299-W15-12	64.48	204.24	139.76
299-W15-13	64.56	204.25	139.69
299-W15-18	68.68	209.00	140.33
299-W15-19	70.60	210.80	140.20
299-W15-2	71.14	210.53	139.39
299-W15-20	72.59	212.86	140.27
299-W15-22	64.42	204.45	140.03
299-W15-23	72.88	213.20	140.32
299-W15-4	62.07	201.78	139.71
299-W18-21	63.43	203.80	140.36
299-W18-23	72.02	212.39	140.37
299-W18-25	63.22	203.01	139.78
299-W18-26	72.74	213.07	140.33
299-W18-28	66.80	207.26	140.46
299-W18-30	65.32	205.08	139.77
299-W18-31	62.65	202.44	139.78
299-W19-12	65.56	205.21	139.65
299-W19-14	72.51	211.29	138.78
299-W19-15	72.35	211.31	138.96
299-W19-20	72.49	210.63	138.14
299-W19-21	67.58	206.90	139.31
299-W19-27	68.98	208.46	139.48
299-W19-31	65.73	205.49	139.77
299-W19-32	66.00	205.71	139.71
299-W22-39	65.11	203.69	138.57
299-W22-40	73.06	210.99	137.93
299-W22-41	72.92	210.84	137.92
299-W22-42	72.76	210.74	137.99
299-W22-43	72.52	210.72	138.20
299-W22-44	67.77	206.69	138.92
299-W22-45	64.35	203.06	138.71
299-W22-46	66.03	204.58	138.54
299-W23-11	63.16	202.43	139.27
299-W23-13	63.93	203.10	139.16
299-W23-14	63.32	202.39	139.07
299-W23-15	67.42	199.78	132.36
299-W26-10	66.20	204.48	138.28
299-W26-12	67.58	205.95	138.37
299-W26-7	59.82	198.73	138.91
299-W26-8	64.64	203.09	138.46
299-W26-9	60.96	199.39	138.43
299-W6-1	75.96	214.13	138.17
299-W6-10	79.27	217.16	137.89
299-W6-11	76.23	214.23	138.00
299-W6-12	72.78	211.08	138.30
299-W6-2	72.40	211.06	138.66
299-W6-4	75.12	213.74	138.62
299-W6-7	78.76	216.49	137.74

Table A-1. Water Level Measurements for June 1995

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-W7-1	71.40	210.53	139.13
299-W7-10	71.68	210.21	138.53
299-W7-11	68.70	207.71	139.00
299-W7-12	70.58	209.68	139.10
299-W7-2	67.17	205.92	138.75
299-W7-4	65.49	204.80	139.31
299-W7-5	66.54	205.15	138.60
299-W7-6	68.29	206.85	138.56
299-W7-9	71.68	210.95	139.27
299-W8-1	74.44	213.77	139.33
3099-47-188	9.20	114.36	105.16
399-1-1	9.51	114.81	105.29
399-1-10A	8.53	113.86	105.34
399-1-11	9.83	115.13	105.30
399-1-12	11.96	117.17	105.21
399-1-14A	11.49	116.81	105.31
399-1-15	10.35	115.68	105.33
399-1-16A	11.10	116.27	105.17
399-1-17A	9.85	115.04	105.19
399-1-18A	13.71	119.11	105.40
399-1-2	12.75	117.20	104.45
399-1-3	12.09	117.26	105.17
399-1-4	10.71	116.00	105.29
399-1-5	10.51	115.75	105.24
399-1-6	8.57	113.94	105.36
399-1-7	12.36	117.53	105.17
399-1-8	12.13	117.31	105.18
399-2-2	9.90	115.07	105.17
399-2-3	9.27	114.43	105.16
399-3-1	12.02	117.16	105.14
399-3-10	12.05	117.45	105.41
399-3-6	14.55	119.73	105.18
399-3-9	13.18	118.29	105.11
399-4-10	10.29	115.38	105.09
399-4-11	18.17	123.28	105.11
399-6-1	13.32	118.50	105.19
399-8-1	15.54	120.74	105.20
699-10-54A	31.33	157.40	126.07
699-10-E12	22.57	131.33	108.76
699-101-48B	2.33	118.90	116.57
699-11-45A	50.73	176.35	125.62
699-14-38	33.66	156.94	123.28
699-14-47	53.36	178.99	125.62
699-15-15A	45.76	166.77	121.01
699-15-26	37.98	159.66	121.68
699-17-5	14.15	132.04	117.88
699-17-70	27.05	171.66	144.60
699-19-43	45.52	168.12	122.61
699-19-58	47.17	174.63	127.46
699-19-88	39.90	196.43	156.53
699-2-3	26.80	145.43	118.63
699-2-33A	40.34	163.49	123.15
699-20-20	32.44	154.10	121.66
699-20-E12	24.44	133.27	108.83
699-24-33	37.65	159.80	122.14
699-24-34A	40.59	162.73	122.14
699-24-34B	40.46	162.61	122.15
699-24-34C	40.19	162.33	122.14
699-24-35	42.07	164.23	122.16
699-25-34A	39.54	161.64	122.10
699-25-34B	39.25	161.36	122.11
699-25-34C	41.07	163.21	122.14

Table A-1. Water Level Measurements for June 1995

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-25-34D	41.77	163.95	122.19
699-25-70	56.49	191.93	135.44
699-26-15A	14.03	134.92	120.88
699-26-33	41.18	163.27	122.09
699-26-34A	38.93	161.06	122.13
699-26-34B	39.47	161.63	122.15
699-26-35A	40.37	162.35	121.98
699-26-89	56.05	199.06	143.01
699-27-8	22.41	141.94	119.52
699-29-78	57.89	197.21	139.32
699-3-45	28.18	153.78	125.61
699-32-43	35.19	157.47	122.28
699-32-62	85.30	215.53	130.23
699-33-42	34.96	157.28	122.31
699-33-56	95.98	218.54	122.56
699-34-39A	41.43	163.70	122.27
699-34-41B	51.70	174.01	122.31
699-34-51	102.18	224.51	122.33
699-34-88	50.74	192.88	142.14
699-35-70	75.33	211.29	135.96
699-35-9	35.42	152.35	116.93
699-36-61A	103.96	228.02	124.07
699-37-43	87.83	210.36	122.53
699-38-65	99.20	229.68	130.47
699-38-70	80.35	216.67	136.32
699-40-1	23.06	133.72	110.66
699-40-33A	32.97	157.90	124.93
699-40-62	104.84	227.90	123.06
699-41-23	21.44	142.19	120.75
699-41-42	71.12	196.26	125.14
699-42-37	31.96	158.31	126.35
699-42-40B	38.33	166.56	128.23
699-42-41	44.94	172.91	127.97
699-43-104	83.87	233.50	149.63
699-43-40	37.36	165.26	127.90
699-43-42J	38.02	177.30	139.27
699-43-45	59.66	182.17	122.52
699-43-89	55.61	196.34	140.73
699-44-39B	28.55	156.48	127.94
699-44-42	48.95	176.55	127.59
699-44-43B	51.08	176.82	125.75
699-44-64	97.72	221.16	123.44
699-45-42	49.59	175.97	126.38
699-46-21B	40.29	159.11	118.82
699-47-35A	19.39	145.19	125.81
699-47-35B	19.48	145.28	125.81
699-47-60	76.32	198.58	122.26
699-48-71	74.92	209.75	134.83
699-49-13E	15.70	125.80	110.09
699-49-28	43.52	163.19	119.67
699-49-57A	46.45	168.49	122.04
699-49-79	71.92	210.04	138.12
699-50-28B	44.12	163.77	119.65
699-50-42	17.43	142.29	124.86
699-50-85	87.26	225.35	138.09
699-51-63	51.32	174.30	122.98
699-51-75	59.39	195.53	136.15
699-52-19	15.18	125.30	110.12
699-52-54	51.14	173.26	122.12
699-52-57	49.35	171.24	121.89
699-53-47A	10.12	133.59	123.47
699-53-47B	10.22	133.68	123.46

Table A-1. Water Level Measurements for June 1995

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-53-48B	11.50	134.94	123.44
699-54-34	43.10	167.71	124.61
699-54-45A	29.43	150.66	121.23
699-54-48	17.24	139.30	122.06
699-55-44	37.72	158.40	120.68
699-55-50C	13.41	135.46	122.06
699-55-55	49.81	171.84	122.03
699-55-70	42.30	173.44	131.14
699-55-76	43.03	177.77	134.74
699-57-59	53.58	175.64	122.06
699-57-83A	44.67	176.14	131.48
699-59-32	19.13	129.31	110.18
699-59-58	29.70	151.77	122.08
699-59-80B	46.97	177.77	130.80
699-60-32	19.47	129.61	110.14
699-60-60	34.02	156.04	122.02
699-61-62	29.61	151.63	122.02
699-61-66	37.34	159.16	121.82
699-62-31	22.17	132.30	110.14
699-62-43A	11.23	131.78	120.54
699-63-25A	10.34	120.44	110.10
699-63-51	8.00	129.38	121.38
699-63-55	8.42	129.98	121.56
699-63-58	28.23	149.89	121.65
699-63-90	33.63	155.82	122.19
699-64-62	30.82	152.44	121.62
699-65-22	8.07	119.18	111.11
699-65-50	20.98	142.33	121.35
699-65-59A	32.89	154.51	121.61
699-65-72	43.37	164.64	121.27
699-65-83	26.78	148.01	121.24
699-66-103	18.90	141.31	122.41
699-66-38	10.50	132.94	122.45
699-66-58	31.83	153.37	121.54
699-66-64	32.68	154.16	121.48
699-67-51	38.52	159.85	121.33
699-67-86	22.75	143.98	121.23
699-67-98	16.33	138.81	122.48
699-68-105	15.91	138.42	122.51
699-69-38	6.35	128.91	122.56
699-70-23	7.94	119.35	111.41
699-70-68	39.09	160.35	121.26
699-71-30	9.28	122.10	112.82
699-71-52	38.30	159.40	121.09
699-72-73	26.34	147.09	120.75
699-72-88	10.96	132.07	121.10
699-72-92	15.58	137.02	121.44
699-73-61	40.88	161.98	121.11
699-74-44	15.04	135.67	120.64
699-77-36	11.19	125.64	114.45
699-77-54	26.01	146.32	120.31
699-78-62	23.30	143.16	119.87
699-8-17	38.27	159.24	120.97
699-8-25	33.89	155.23	121.34
699-8-32	47.48	168.98	121.50
699-80-43S	7.90	125.81	117.91
699-81-38	8.47	123.86	115.39
699-81-58	14.57	133.96	119.39
699-83-47	14.50	132.67	118.17
699-86-42	7.91	124.91	117.01
699-87-42A	10.13	126.94	116.81

Table A-1. Water Level Measurements for June 1995

Well	Depth to Water (m)	Elevation, m above msl	
		Adjusted Casing	Water Level
699-87-55	22.20	140.09	117.89
699-88-41	10.47	126.79	116.32
699-89-35	7.32	121.32	114.00
699-9-E2	14.01	127.43	113.42
699-90-45	11.62	128.48	116.86
699-96-49	11.42	127.78	116.35
699-97-43	12.92	128.58	115.65
699-97-51A	6.16	122.61	116.45
699-S12-29	25.67	148.64	122.98
699-S12-3	16.72	132.75	116.03
699-S14-20A	28.11	150.19	122.08
699-S19-11	28.57	147.44	118.87
699-S19-E13	14.67	120.25	105.57
699-S19-E14	8.42	113.95	105.53
699-S27-E14	17.49	121.82	104.33
699-S28-E12	13.45	118.80	105.35
699-S3-25	38.25	159.56	121.32
699-S3-E12	13.43	121.28	107.85
699-S30-E10	12.83	119.55	106.72
699-S30-E10	12.63	119.48	106.85
699-S30-E15	17.05	122.12	105.07
699-S31-1	24.92	140.20	115.29
699-S31-E10	10.58	117.20	106.62
699-S31-E10	10.11	116.94	106.82
699-S31-E10	9.89	116.69	106.80
699-S31-E10	9.21	115.98	106.77
699-S32-E13	13.15	118.99	105.84
699-S32-E13	14.39	120.29	105.90
699-S34-E10	8.42	116.52	108.10
699-S34-E15	16.72	123.31	106.59
699-S36-E12	13.76	121.62	107.86
699-S36-E13	13.90	121.69	107.79
699-S37-E14	16.60	124.43	107.83
699-S38-E11	13.36	121.48	108.12
699-S38-E12	15.39	123.41	108.02
699-S38-E12	15.39	123.43	108.03
699-S40-E14	14.38	122.78	108.40
699-S41-E12	14.58	122.50	107.92
699-S41-E13	16.85	125.12	108.27
699-S41-E13	16.72	124.98	108.27
699-S43-E12	15.45	123.61	108.16
699-S6-E4D	17.82	131.21	113.38
699-S7-34	36.22	160.67	124.45
699-S8-19	32.84	153.56	120.72

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