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Groundwater Maps of the Hanford Site, December 1994

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June 1995

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Westinghouse Hanford Company
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CONTENTS

1.0 INTRODUCTION 1

2.0 DATA COLLECTION, MANAGEMENT, EVALUATION, AND PRESENTATION 1

3.0 HANFORD SITE MAPS 2
3.1 100 AREAS MAPS 3
3.2 200 AREAS MAPS 3
3.3 300/1100 AREAS MAPS 4

4.0 REFERENCES 4

APPENDIX

A Water Level Measurement Data A-1

LIST OF FIGURES

1. Hanford Site Location Map 7

2. Hanford Site Water Table 9

3. 100 Area Location Map 11

4. 100 Area Water Table 13

5. 200 Area Location Map 15

6. 200 Area Water Table 17

7. 300 Area Location Map 19

8. 300 Area Water Table 21

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GROUNDWATER MAPS OF THE HANFORD SITE DECEMBER 1994

1.0 INTRODUCTION

The Groundwater Maps of the Hanford Site, December 1994 is a continuation of a series of reports (see Serkowski et al 1994) that document the configuration of the uppermost unconfined 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 WHC-CM-7-5, Section 8.0 "Water Quality" (WHC 1993a) and described in the environmental monitoring plan for the Hanford Site. (DOE-RL 1991)

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 1994, the depth to groundwater was measured in 814 Hanford Site wells by personnel from the Well Services Group under the direction of the Groundwater Management Group project leader. Wells were selected for inclusion in this report based on the following criteria:

- The well must monitor only the uppermost (<15.5 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 alternate wells exist and vertical gradients were not considered significant.

- Well location and elevation must be accurately known.

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 (WHC 1993b). Field data were collected using the Groundwater Monitoring System, which employs a barcode 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 barcode hand-held computer downloaded the field data to a supervisory workstation which stores all groundwater level measurements. These data were transferred to the Hanford Environmental Information System (HEIS) data base and were later downloaded to a [1]Paradox[tm] application program called GeoDAT to help organize, evaluate, and tabulate the data.

Of the 814 wells measured in June 1994, 442 were selected to create a water table surface model. A model grid of the remaining wells was generated using a minimum tension algorithm available in [2]Earthvision[tm] 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 [3]ARC/INFO[tm] geographic information system 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 1994 data. Figure 1 shows the relative locations of the detail facility area maps included in this document. To provide

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[1]Paradox[tm] - Borland International, 1800 Green Hills Road P.O. Box 660001, Scotts Valley, CA 95067-0001

[2]ARC/INFO[tm] - Environmental Systems Research Institute, Inc., Redlands, CA 92373-8100

[3]Earthvision[tm] - Dynamic Graphics, Inc., 1015 Atlantic Avenue Alameda, CA 94501

context, Figure 2 shows the water table surface for the entire Hanford Site. The detail maps are enlargements of this same site-wide 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 since the vertical gradients are not believed to be significant in this area.

Throughout most of the map area, groundwater flows from the unconfined aquifer into the Columbia River. West of the 100-B/C Area, water is believed to flow from the river into the aquifer.

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 that was once referred to as the Separations Area. There are several active and many inactive liquid waste disposal facilities in this region. The 200 Areas set of maps consists of: Figure 5, 200 Areas Monitoring Well Index Map; and, Figure 6, 200 Areas Water Table.

Three facilities are notable in their impact on the water levels in this area: U Pond (216-U-10), located in the southwestern corner of 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 200 West Area coupled with continued effluent discharge in cribs associated with Z Plant has helped to maintain a significant water table mound under 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 200 West Area as the water table intersects the higher conductivity sediments beneath 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 groundwater travel direction over a wide area.

3.3 300/1100 AREAS MAPS

This section contains a discussion on the December 1994 water table measurements for the 300 Area and the adjacent 1100 Area. Liquid waste disposal continues only at the 300 Area Process Trenches, though 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 unconfined aquifer within this area is contained in the Ringold Formation and the Hanford formation (Swanson et al, 1992). The top of the unconfined aquifer is close to the Hanford/Ringold contact. Generally, west of an imaginary north-south line near the west boundary of the 300 Area the unconfined aquifer is within the Ringold Formation. East of the line it is within the Hanford formation, which is more permeable than the Ringold and may be expected to permit higher flow velocities.

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. Water table elevation may also be dependent on recharge from the Yakima River to the west. 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.

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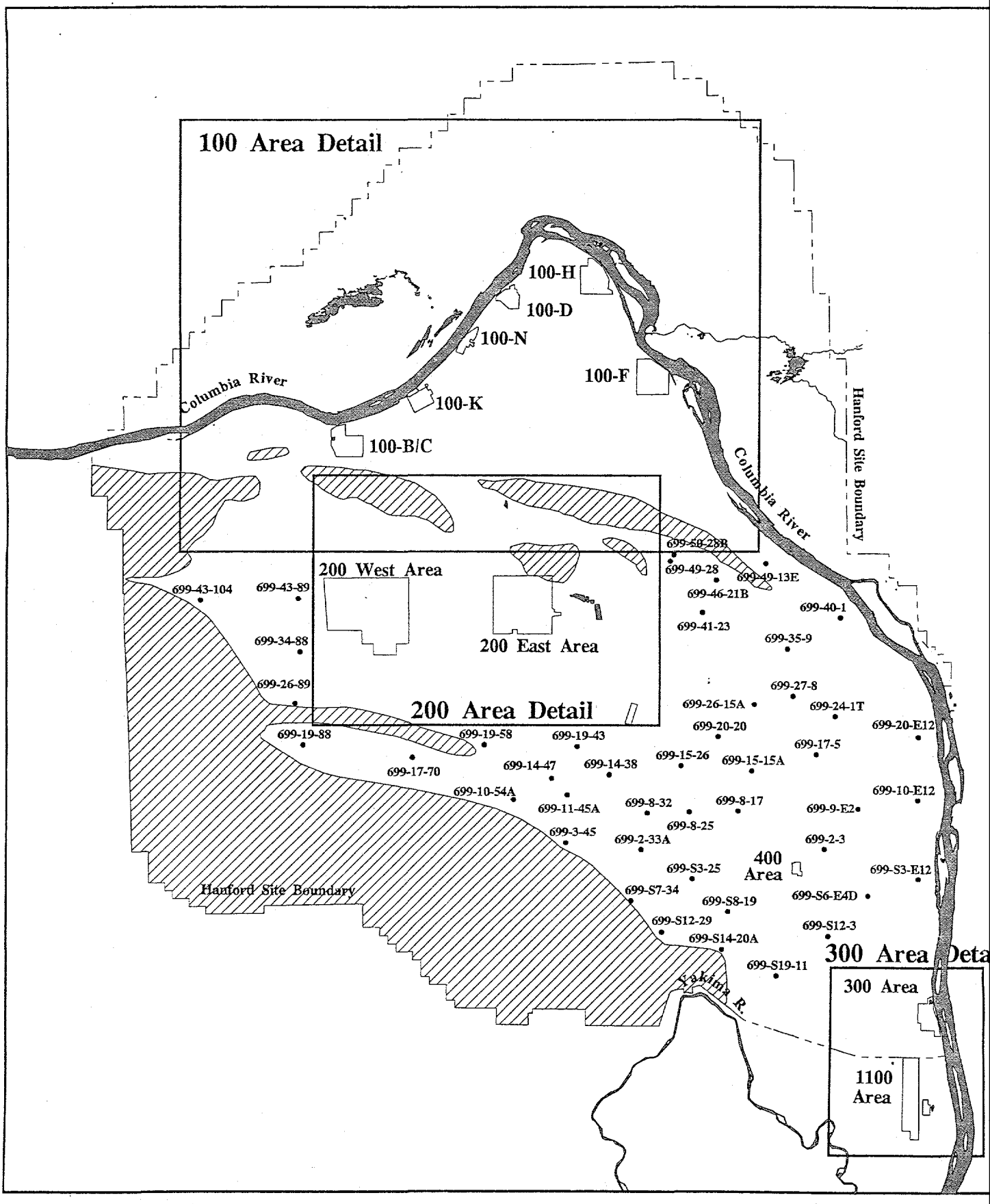
100 Area Detail
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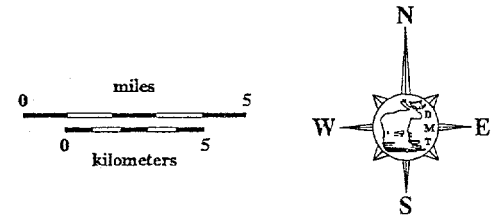
100-D
100-N
100-F
100-K
100-B/C
Columbia River
Columbia River
Hanford Site Boundary
200 West Area
200 East Area
200 Area Detail
699-50-28B
699-49-28
699-49-13E
699-46-21B
699-40-1
699-41-23
699-35-9
699-43-104
699-43-89
699-34-88
699-26-89
699-27-8
699-26-15A
699-24-1T
699-20-20
699-20-E12
699-19-88
699-19-58
699-19-43
699-17-5
699-17-70
699-14-47
699-14-38
699-15-26
699-15-15A
699-10-54A
699-10-E12
699-11-45A
699-8-32
699-8-17
699-9-E2
699-8-25
699-3-45
699-2-33A
699-2-3
400 Area
699-S3-25
699-S3-E12
Hanford Site Boundary
699-S7-34
699-S8-19
699-S6-E4D
699-S12-29
699-S12-3
699-S14-20A
699-S19-11
300 Area Deta
Yakima R.
300 Area
1100 Area

Hanford Site Index Map Dec 1994

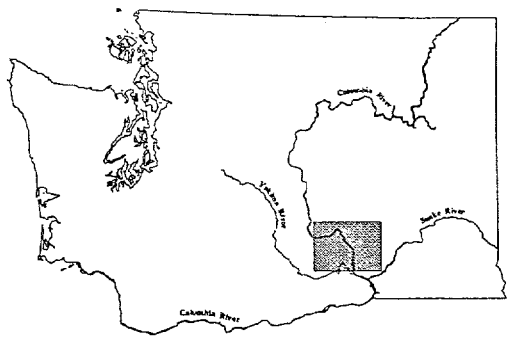


Well location used for creating this model

Ponds, lakes, and rivers

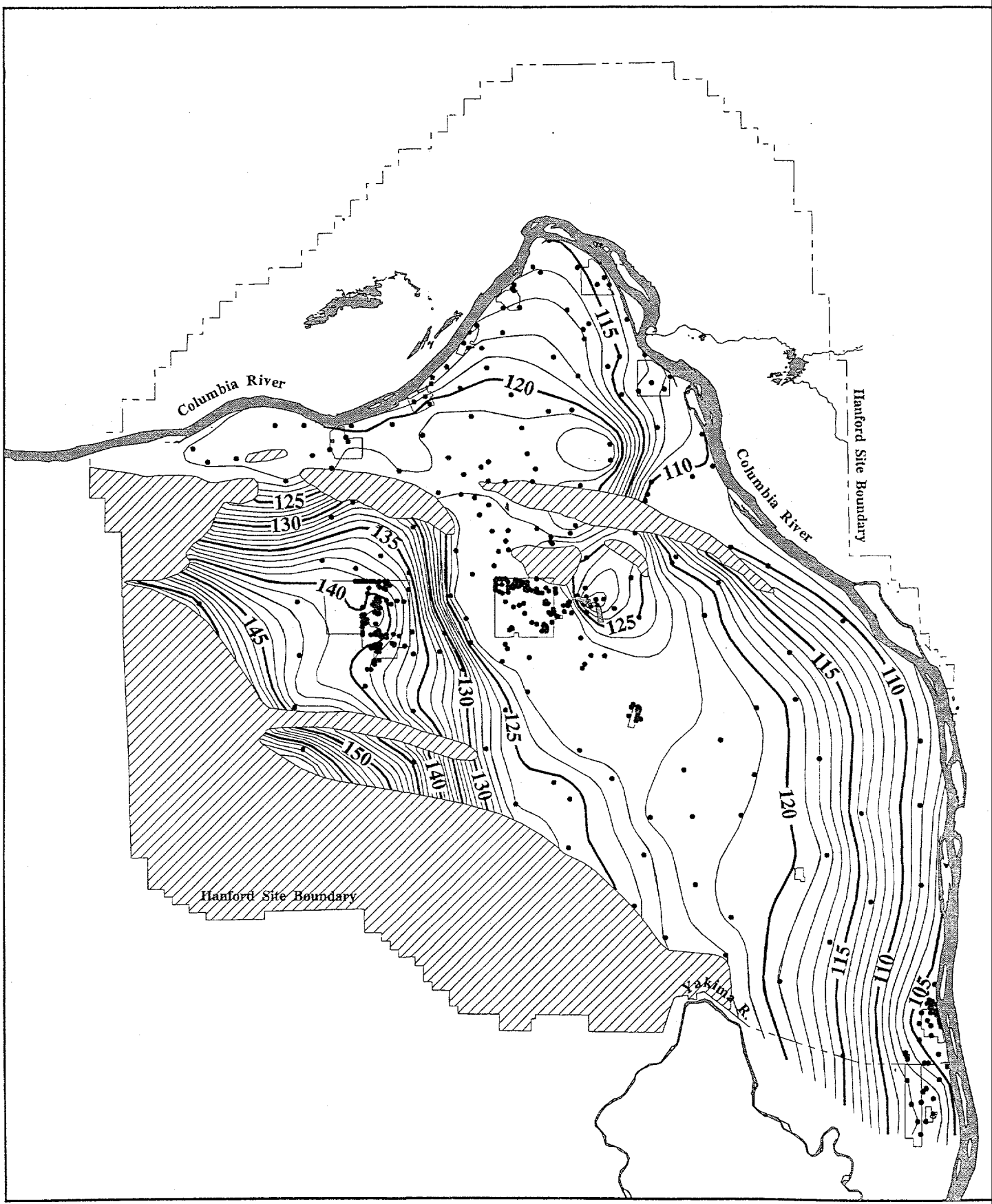
Areas where basalt surface is generally above the water table

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



index_hs.map-062895

Figure 1. Hanford Site Location Map.


Columbia River
Columbia River
Hanford Site Boundary
Hanford Site Boundary
Yakima R.
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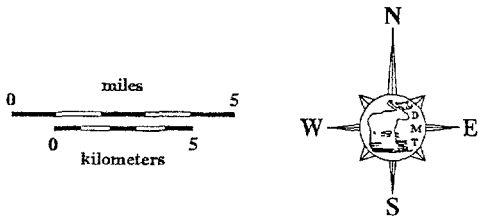
Hanford Site Water Table Dec 1994



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.

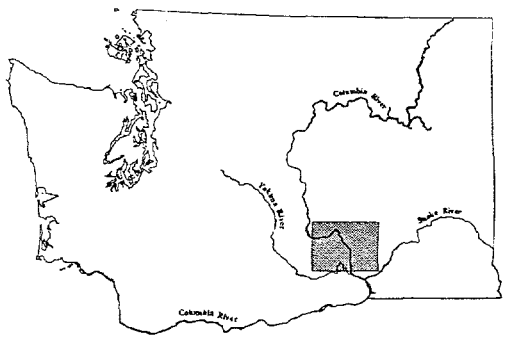


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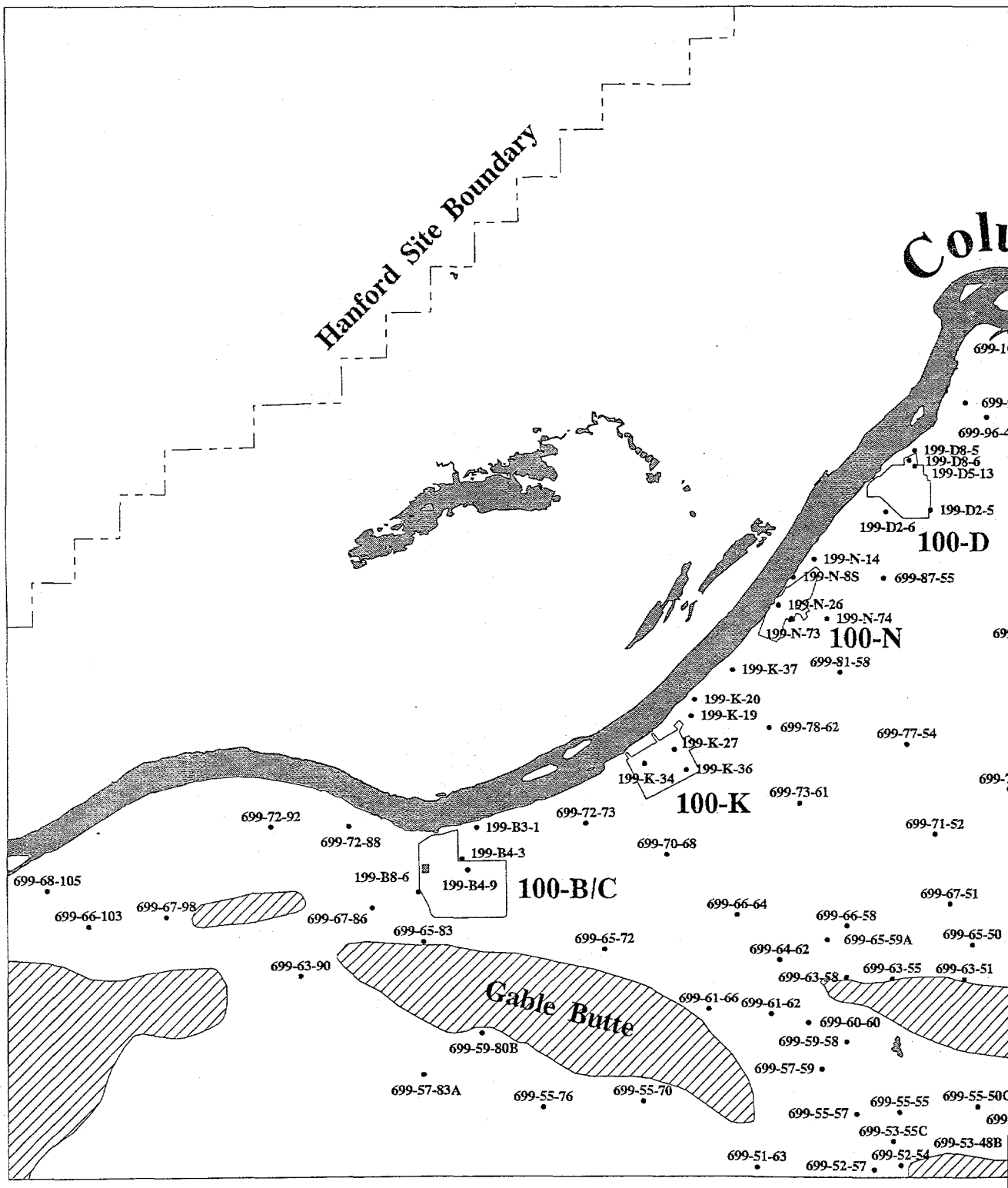
Figure 2. Hanford Site Water Table Map.


Hanford Site Boundary
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699-1
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699-96-4
199-D8-5
199-D8-6
199-D5-13
199-D2-5
199-D2-6
100-D
199-N-14
199-N-8S
699-87-55
199-N-26
199-N-74
199-N-73
100-N
699-81-58
199-K-37
199-K-20
199-K-19
699-78-62
699-77-54
199-K-27
199-K-36
199-K-34
699-73-61
100-K
699-72-92
699-72-73
199-B3-1
699-71-52
699-72-88
199-B4-3
699-70-68
699-68-105
199-B8-6
199-B4-9
100-B/C
699-67-51
699-66-64
699-66-103
699-67-98
699-67-86
699-66-58
699-65-83
699-65-59A
699-65-50
699-65-72
699-64-62
699-63-90
699-63-55
699-63-51
699-63-58
Gable Butte
699-61-66
699-61-62
699-60-60
699-59-80B
699-59-58
699-57-59
699-57-83A
699-55-76
699-55-70
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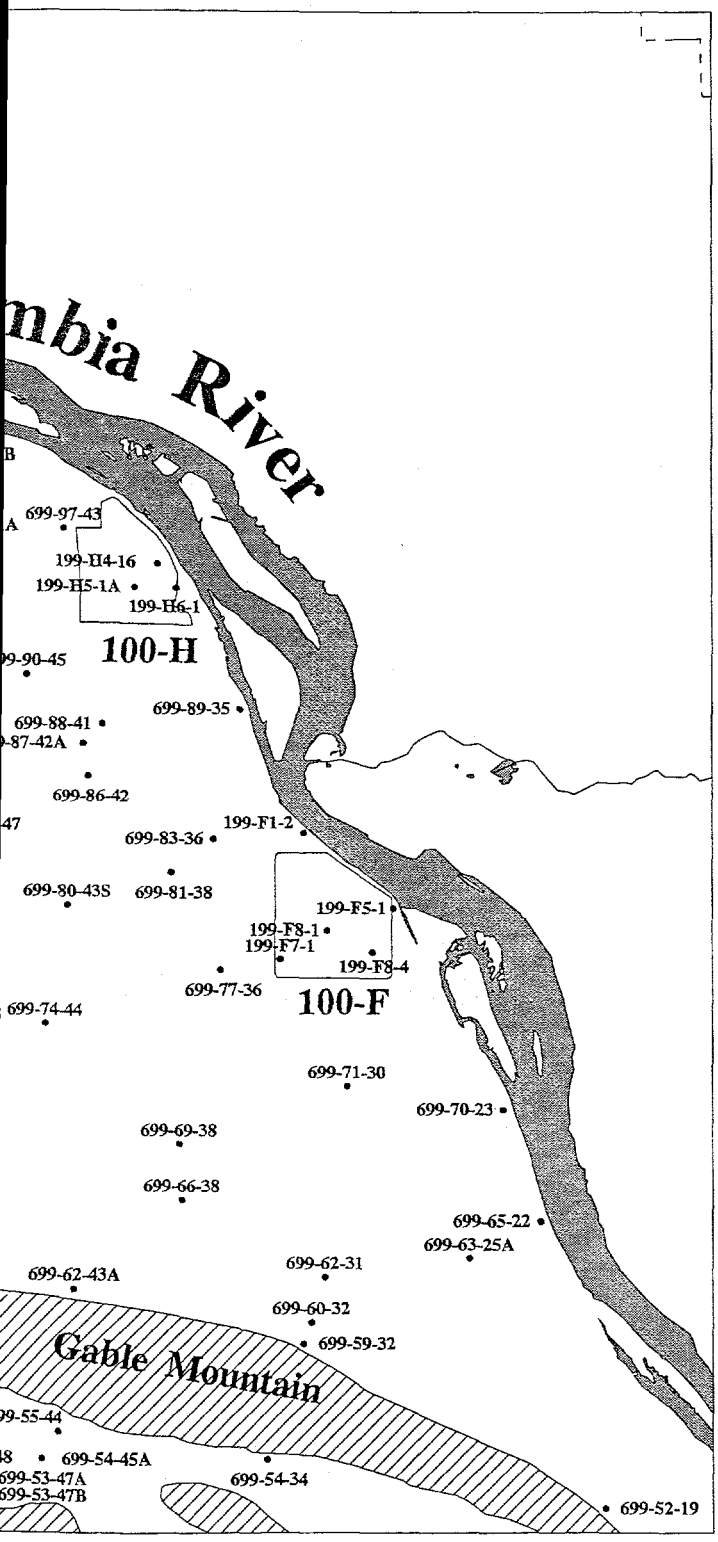
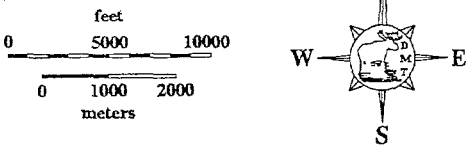
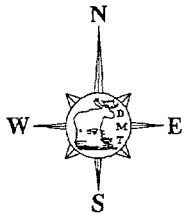
699-52-57



100 Areas Index Map Dec 1994



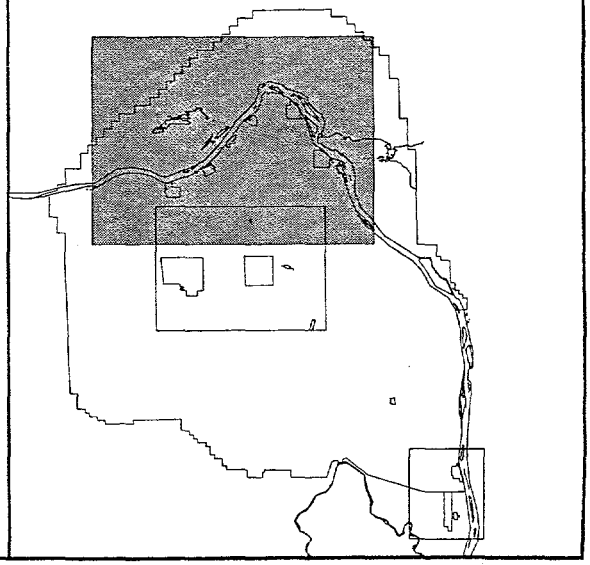


Well location used for creating this model

Ponds, lakes, and rivers

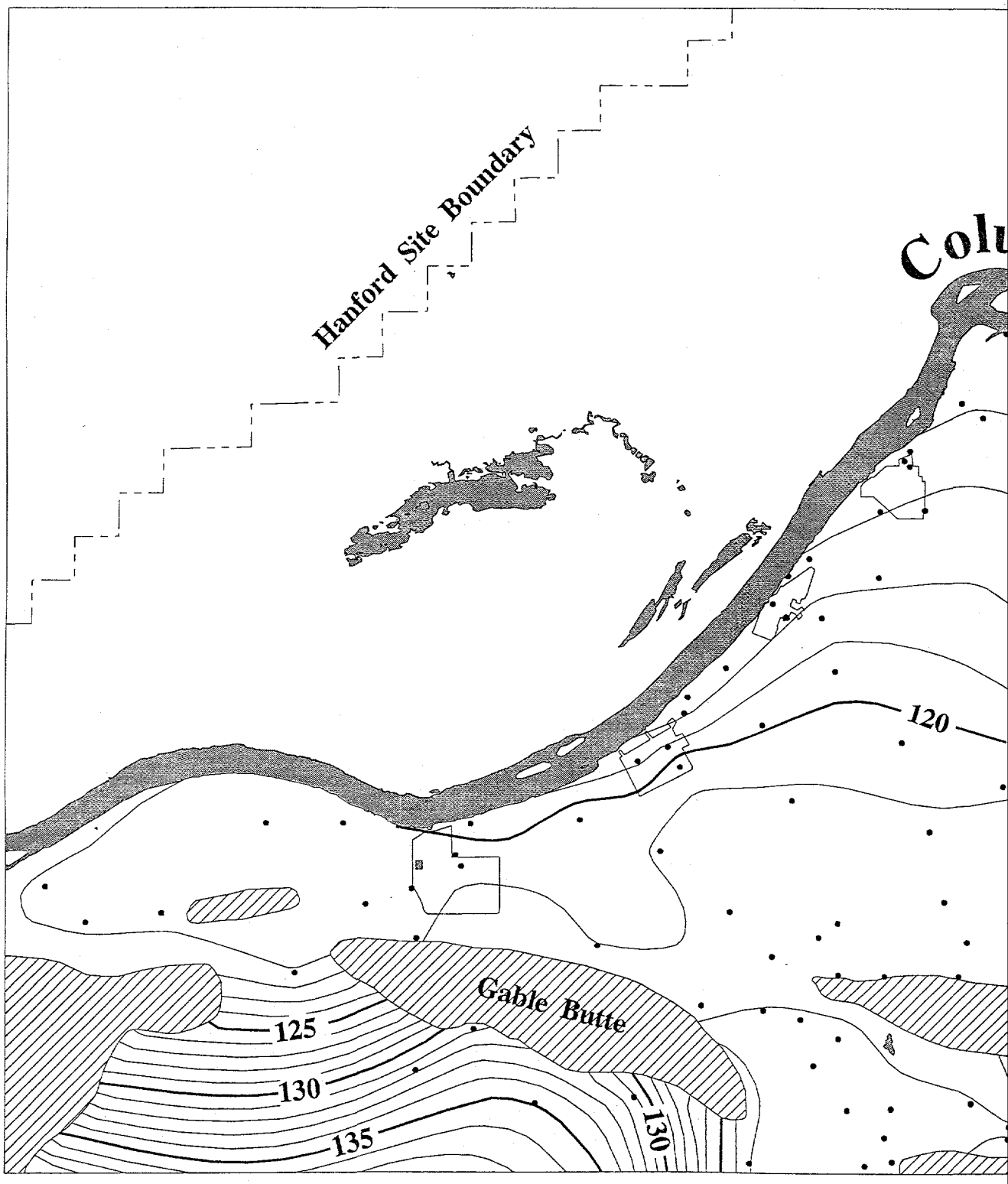
Areas where basalt surface is generally above the water table

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



index_100.map-070595

Figure 3. 100 Area Location Map.


Hanford Site Boundary
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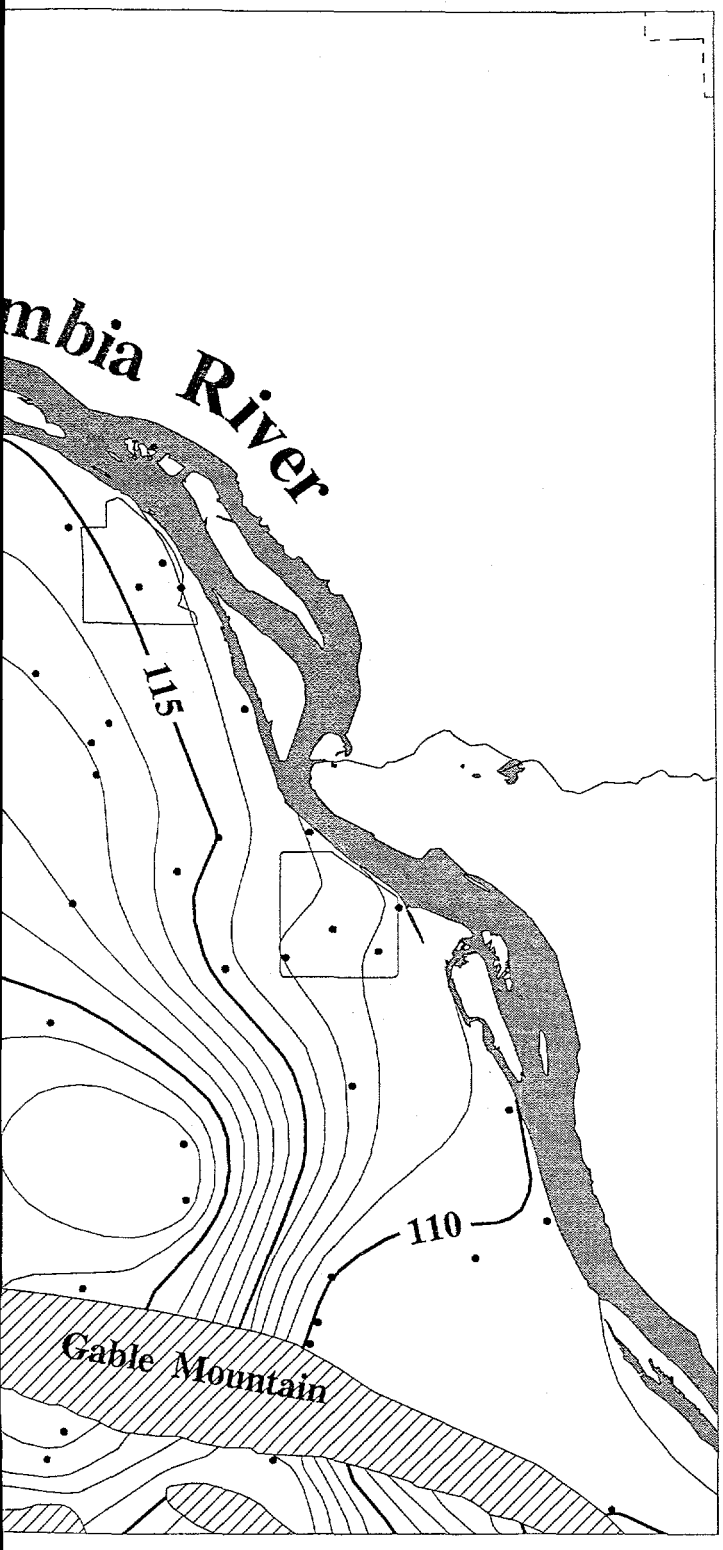

100 Areas Water Table Dec 1994

feet
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0 1000 2000
meters

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W E
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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.

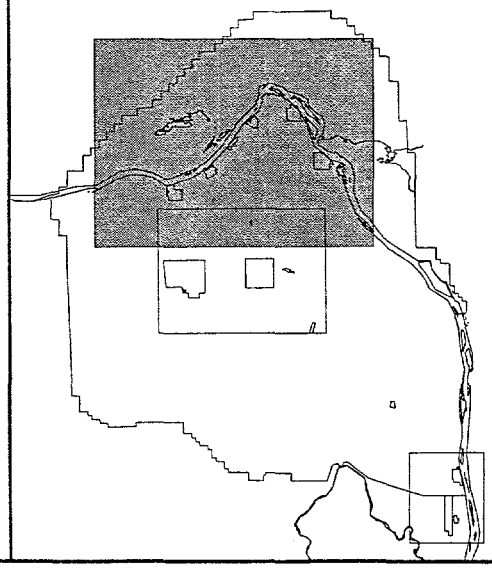

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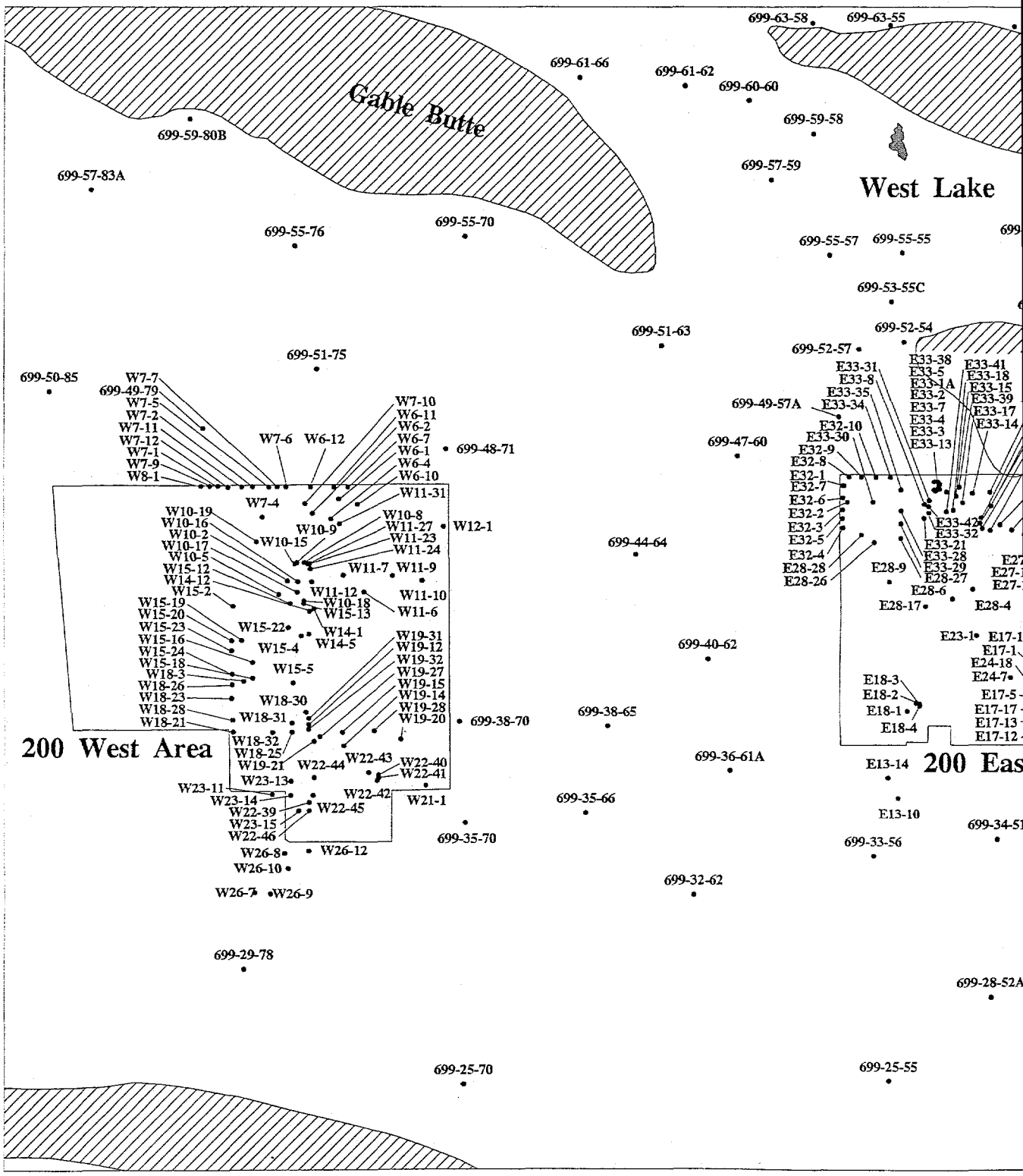
Figure 4. 100 Area Water Table.


Gable Butte
West Lake
200 West Area
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699-59-80B
699-57-59
699-57-83A
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699-38-70
699-36-61A
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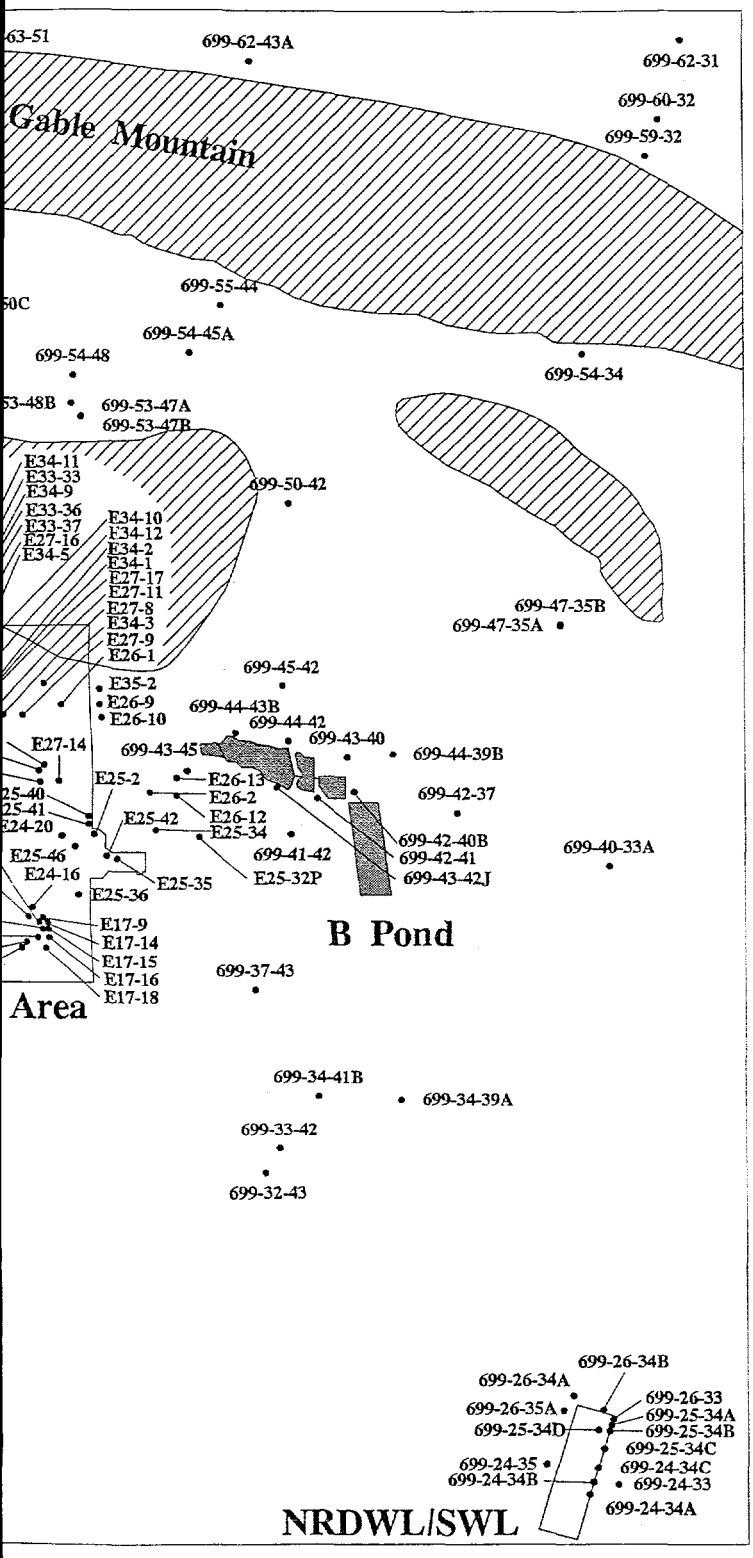
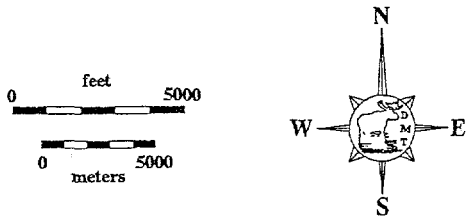


200 Areas Index Map Dec 1994



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.

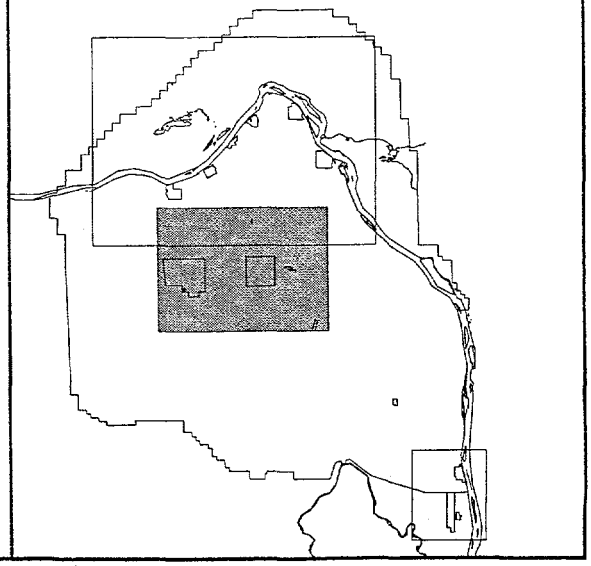


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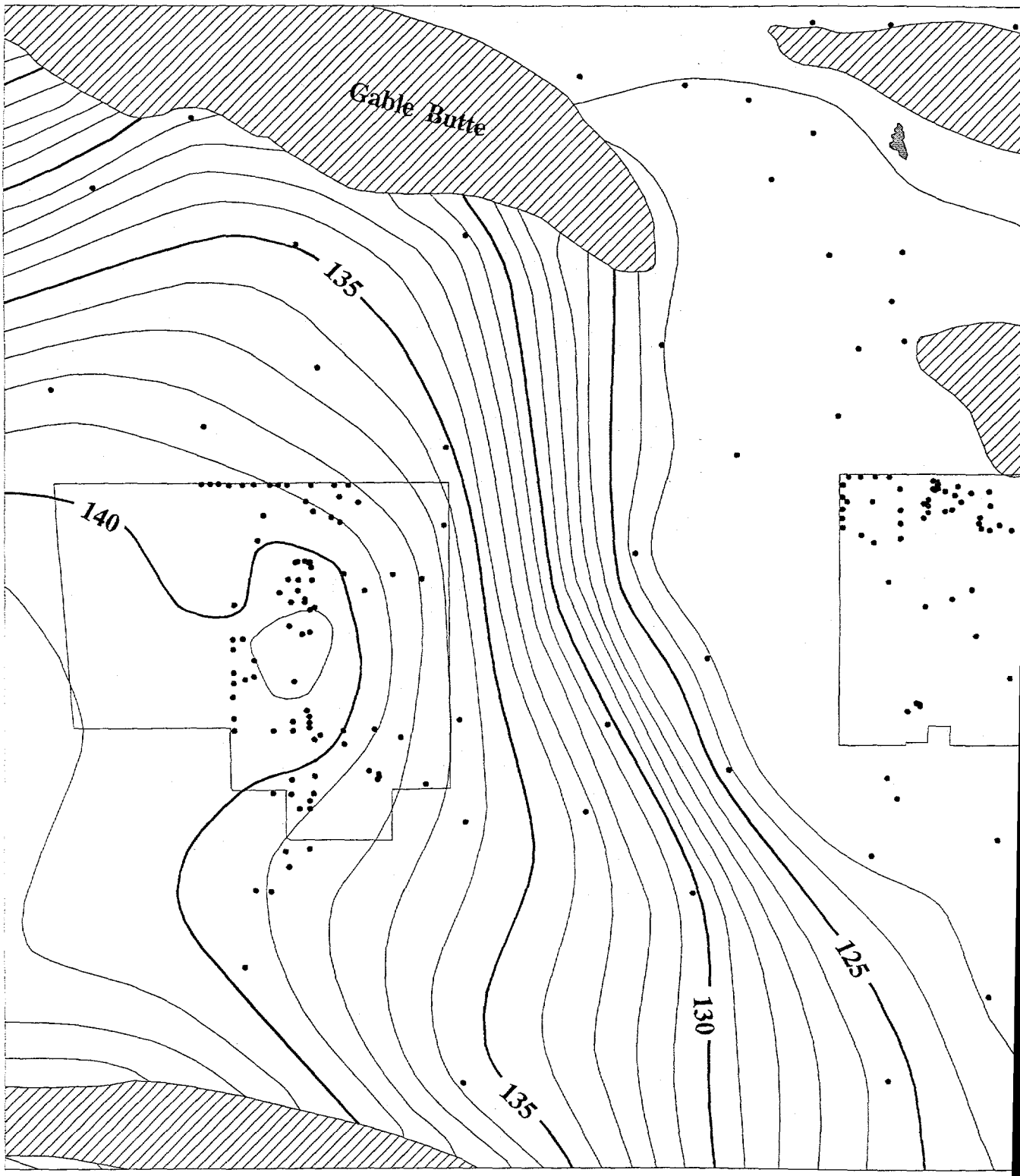
Figure 5. 200 Area Location Map.


Gable Butte
135
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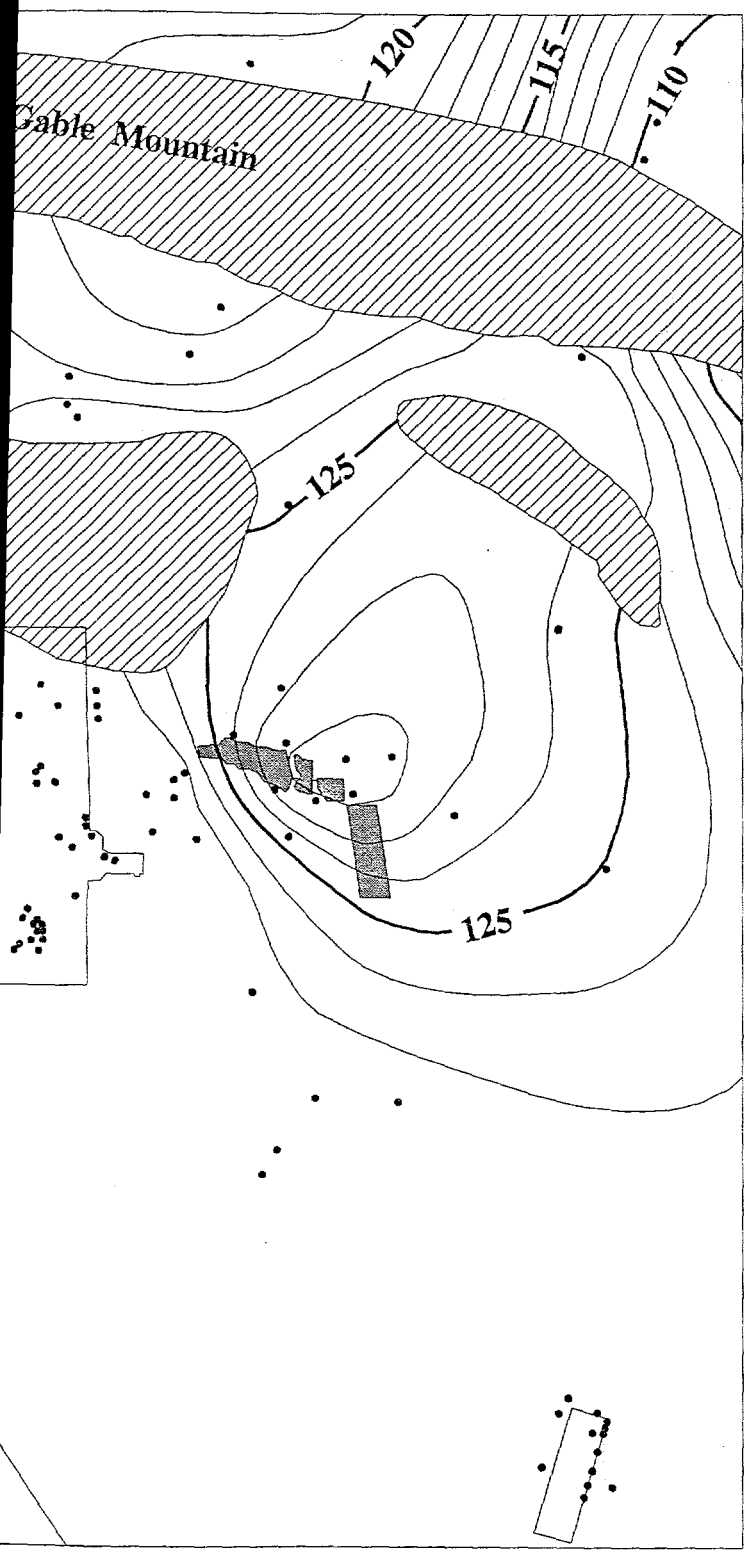
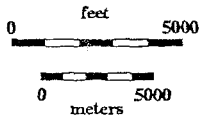
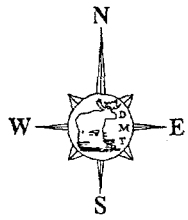
135
130
125



200 Areas Water Table Dec 1994





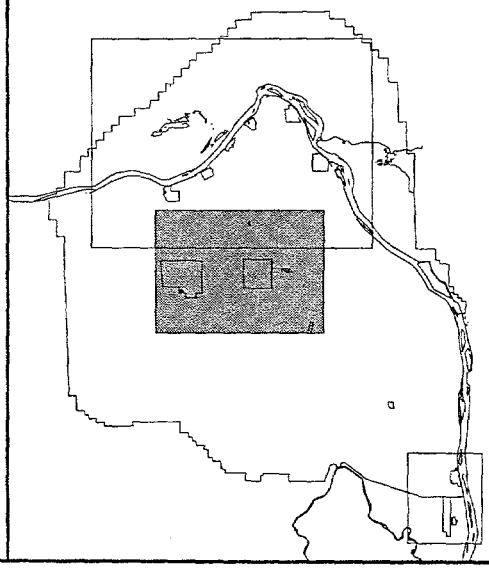
Well location used for creating this model

122 Water level contour (m above msl)

Ponds, lakes, and rivers

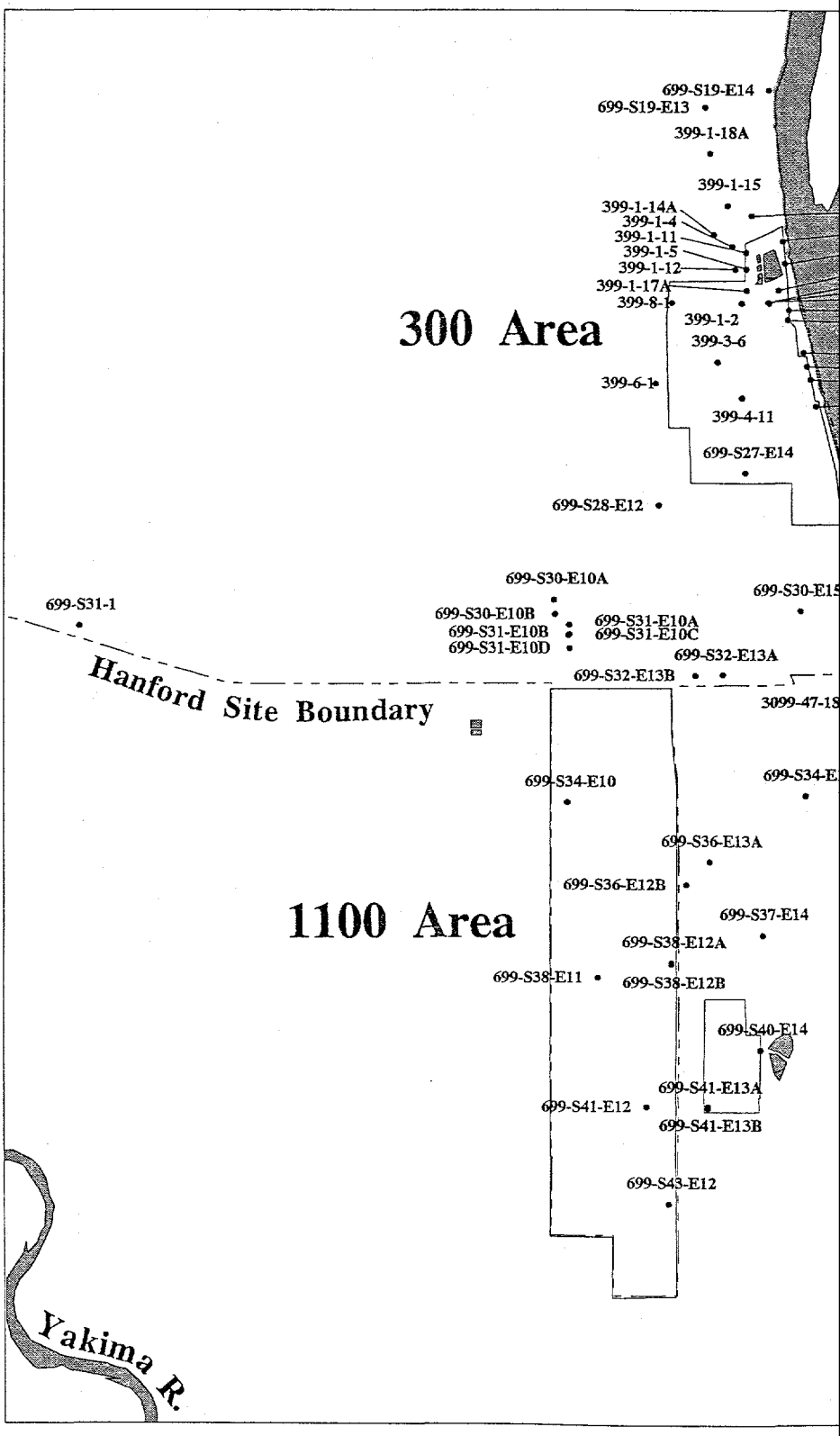
Areas where basalt surface is generally above the water table

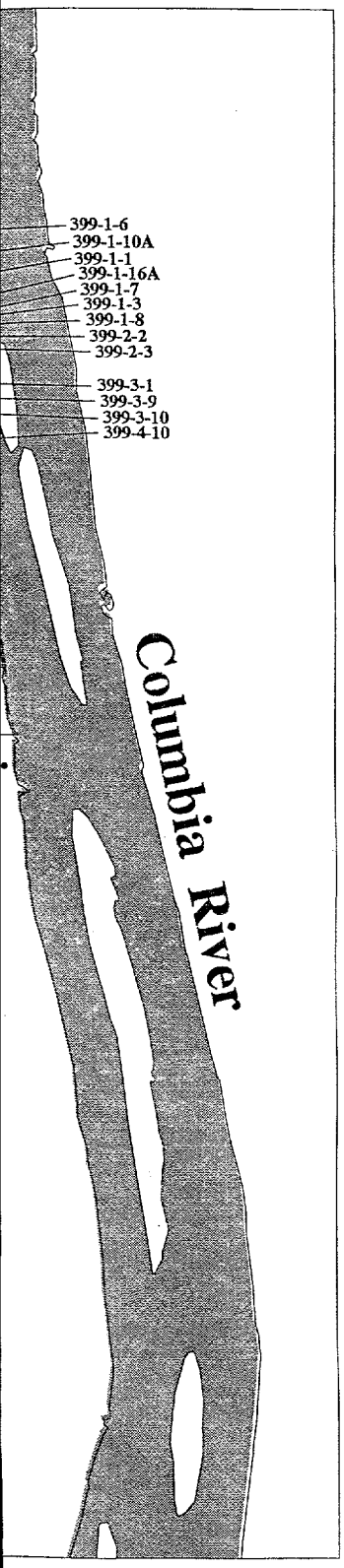
Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.



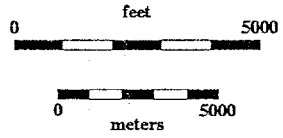
wl_200.map-062895

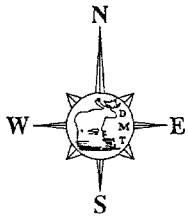
Figure 6. 200 Area Water Table.


699-S19-E14
699-S19-E13
399-1-18A
399-1-15
399-1-14A
399-1-4
399-1-11
399-1-5
399-1-12
399-1-17A
399-8-1
399-1-2
300 Area
399-3-6
399-6-1
399-4-11
699-S27-E14
699-S28-E12
699-S30-E10A
699-S30-E15
699-S31-1
699-S30-E10B
699-S31-E10A
699-S31-E10B
699-S31-E10C
699-S31-E10D
699-S32-E13A
699-S32-E13B
3099-47-18
Hanford Site Boundary
699-S34-E10
699-S34-E
699-S36-E13A
699-S36-E12B
1100 Area
699-S37-E14
699-S38-E12A
699-S38-E11
699-S38-E12B
699-S40-E14
699-S41-E13A
699-S41-E12
699-S41-E13B
699-S43-E12
Yakima R.



300 Area Index Map Dec 1994



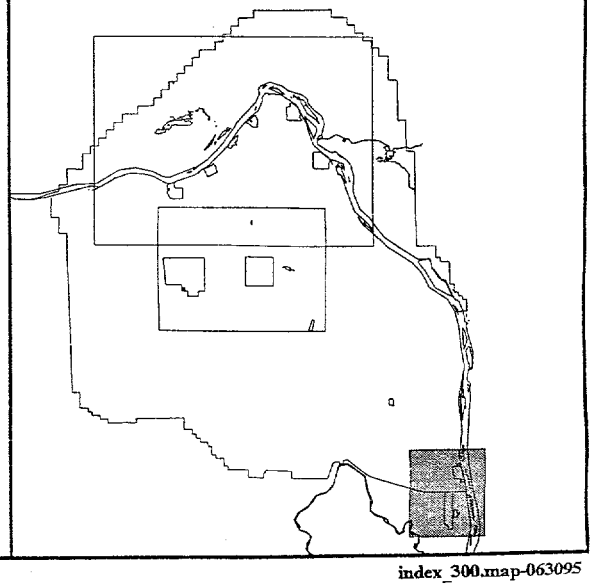


Well location used for creating this model

Ponds, lakes, and rivers

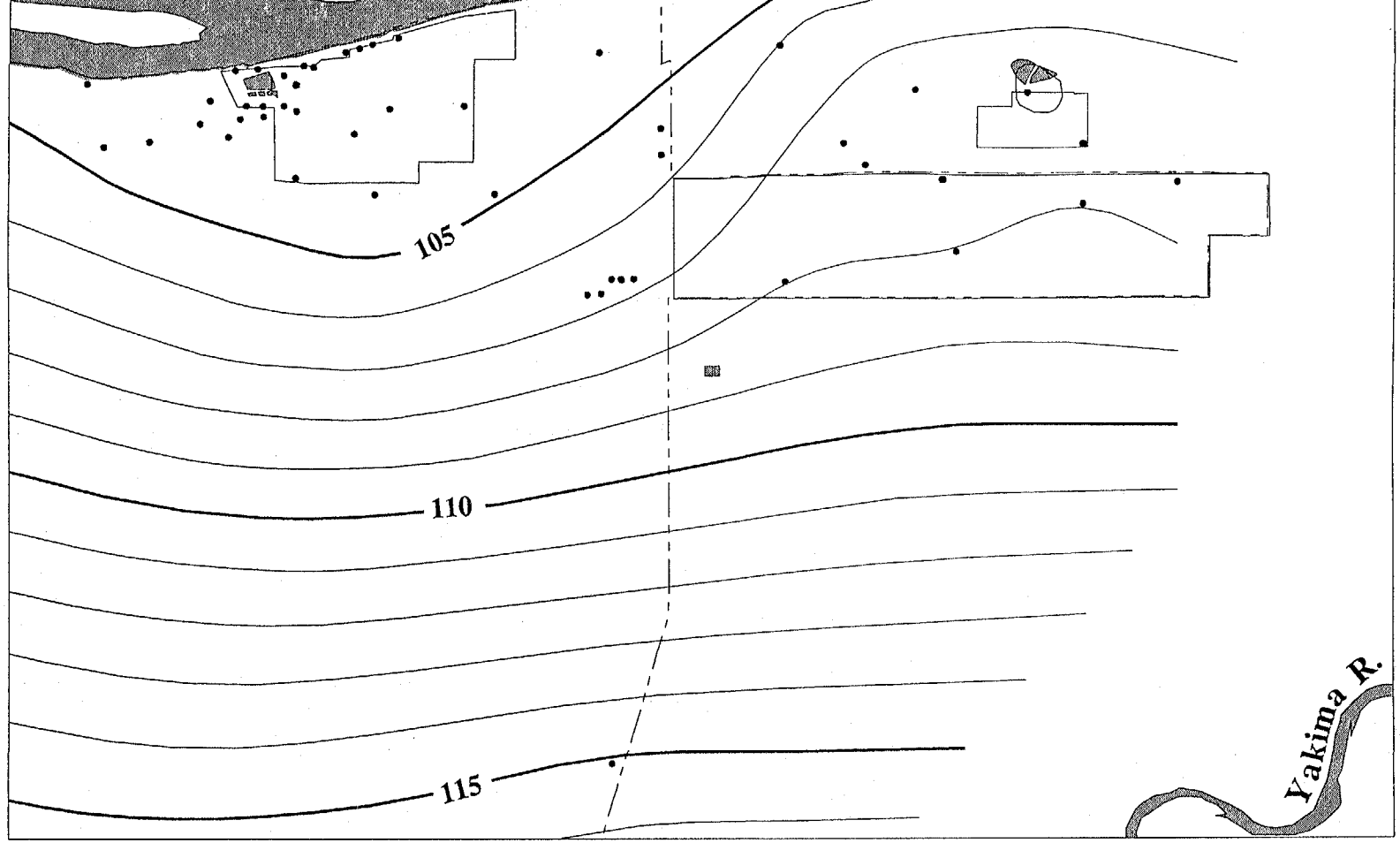
Areas where basalt surface is generally above the water table

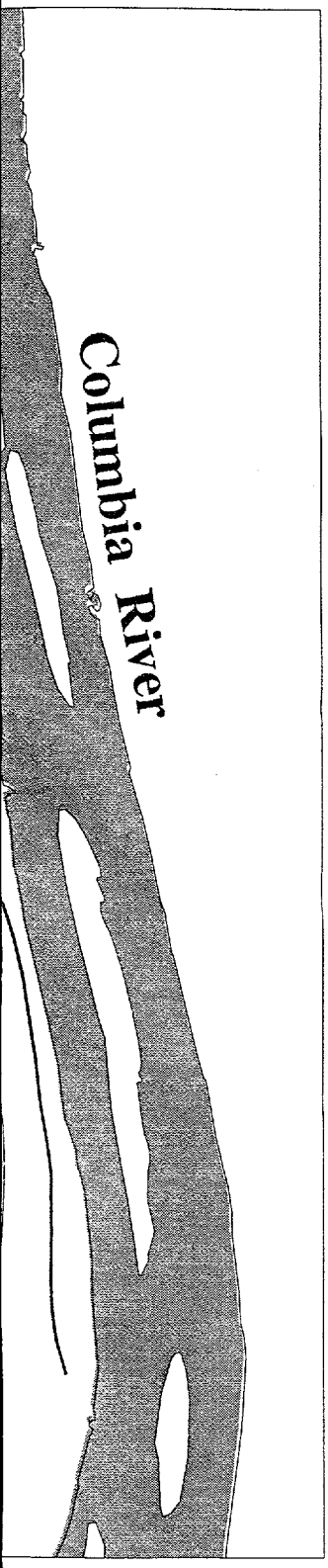
Prepared by the Data Management Team, Hanford Technical Services, Westinghouse Hanford Company.



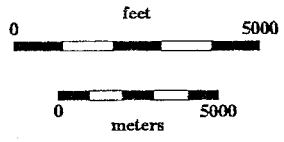
index_300.map-063095

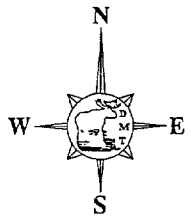
Figure 7. 300 Area Location Map.


105
110
115
Yakima R.



300 Area Water Table Dec 1994





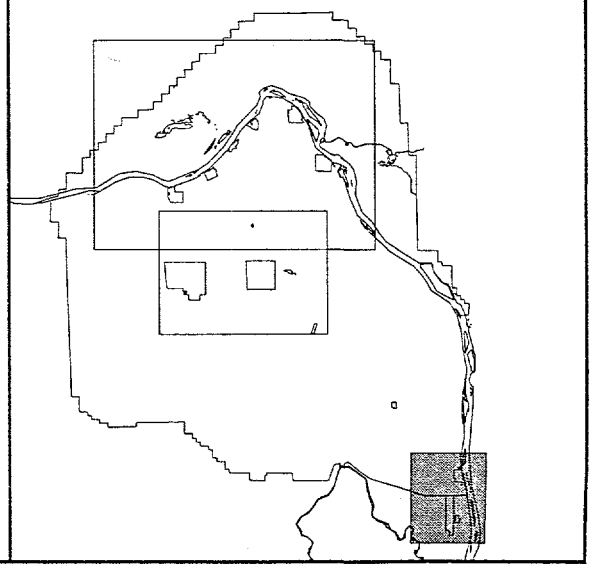
Well location used for creating this model

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.



wl_300.map-062895

Figure 8. 300 Area Water Table.

APPENDIX A

WATER LEVEL MEASUREMENT DATA

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Appendix A: December 1994 Water Level Measurement Data
(Sheet 1 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
199-B3-1	14.40	133.87	119.46
199-B4-3	20.07	140.73	120.66
199-B4-9	22.91	143.70	120.79
199-B8-6	24.12	144.90	120.78
199-D2-5	23.10	140.30	117.20
199-D2-6	26.20	143.04	116.84
199-D5-13	27.18	143.71	116.53
199-D8-5	21.65	137.92	116.27
199-D8-6	28.84	145.24	116.40
199-F1-2	8.68	121.30	112.61
199-F5-1	11.34	123.54	112.21
199-F7-1	5.40	118.32	112.91
199-F8-1	10.85	123.70	112.85
199-F8-4	13.48	125.25	111.78
199-H4-16	15.37	129.31	113.93
199-H5-1A	13.59	128.06	114.47
199-H6-1	13.60	127.44	113.84
199-K-19	10.84	128.66	117.82
199-K-20	11.00	128.61	117.61
199-K-27	22.91	142.24	119.34
199-K-34	23.85	142.67	118.82
199-K-36	30.07	150.59	120.52
199-K-37	16.97	134.66	117.70
199-N-14	21.18	138.28	117.09
199-N-26	21.87	139.06	117.19
199-N-73	23.37	141.19	117.82
199-N-74	21.01	139.48	118.47
199-N-8S	6.45	123.47	117.02
299-E13-10	102.47	224.85	122.38
299-E13-14	104.62	224.85	120.23
299-E17-1	96.97	219.20	122.24
299-E17-10	95.53	217.85	122.32
299-E17-12	97.67	219.97	122.30
299-E17-13	96.93	219.23	122.29
299-E17-14	97.78	220.12	122.34

Appendix A: December 1994 Water Level Measurement Data
(Sheet 2 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-E17-15	97.91	220.00	122.08
299-E17-16	97.37	219.63	122.26
299-E17-17	97.12	219.43	122.31
299-E17-18	97.34	219.65	122.31
299-E17-5	96.88	219.06	122.17
299-E17-9	96.48	218.74	122.26
299-E18-1	97.13	219.53	122.40
299-E18-2	97.52	219.82	122.31
299-E18-3	97.70	220.08	122.38
299-E18-4	97.55	219.93	122.39
299-E23-1	94.93	217.35	122.42
299-E24-16	96.59	218.93	122.34
299-E24-18	96.91	219.24	122.33
299-E24-20	87.62	210.09	122.47
299-E24-7	95.87	218.24	122.37
299-E25-2	83.42	205.94	122.52
299-E25-32P	81.77	204.23	122.46
299-E25-34	79.48	202.04	122.57
299-E25-35	83.13	205.55	122.42
299-E25-36	93.28	215.61	122.33
299-E25-40	80.49	202.97	122.48
299-E25-41	82.15	204.66	122.51
299-E25-42	85.82	208.27	122.45
299-E25-46	89.28	211.78	122.50
299-E26-1	65.55	188.14	122.59
299-E26-10	60.81	183.33	122.52
299-E26-12	69.67	192.25	122.58
299-E26-13	61.78	184.41	122.63
299-E26-2	71.21	193.64	122.43
299-E26-9	61.24	183.76	122.52
299-E27-11	73.73	196.07	122.35
299-E27-12	79.08	201.52	122.44
299-E27-13	81.49	203.97	122.48
299-E27-14	78.26	200.72	122.46
299-E27-15	76.65	198.99	122.34

Appendix A: December 1994 Water Level Measurement Data
(Sheet 3 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-E27-16	76.49	198.77	122.28
299-E27-17	71.00	193.46	122.46
299-E27-8	72.02	194.41	122.39
299-E27-9	69.34	191.78	122.44
299-E28-17	93.57	215.97	122.40
299-E28-26	87.11	209.48	122.37
299-E28-27	85.02	207.44	122.42
299-E28-28	86.94	209.26	122.32
299-E28-4	88.30	210.78	122.49
299-E28-6	90.95	213.39	122.45
299-E28-9	91.17	213.59	122.43
299-E32-1	77.61	200.00	122.39
299-E32-10	72.04	194.43	122.38
299-E32-2	81.94	204.23	122.30
299-E32-3	83.89	206.20	122.31
299-E32-4	86.72	209.06	122.33
299-E32-5	85.50	207.92	122.42
299-E32-6	81.05	203.44	122.39
299-E32-7	78.31	200.67	122.37
299-E32-8	74.42	196.76	122.34
299-E32-9	73.56	196.09	122.53
299-E33-13	69.33	191.52	122.19
299-E33-14	67.17	189.60	122.44
299-E33-15	68.75	191.20	122.44
299-E33-17	70.13	192.53	122.40
299-E33-18	76.23	198.69	122.46
299-E33-1A	70.24	192.67	122.43
299-E33-2	70.10	192.55	122.45
299-E33-21	81.27	203.73	122.46
299-E33-28	80.12	202.46	122.34
299-E33-29	83.02	205.37	122.34
299-E33-3	69.78	192.20	122.42
299-E33-30	79.95	202.30	122.34
299-E33-31	74.93	197.35	122.43
299-E33-32	78.78	201.17	122.39

Appendix A: December 1994 Water Level Measurement Data
(Sheet 4 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-E33-33	72.77	195.19	122.42
299-E33-34	70.55	193.11	122.57
299-E33-35	73.66	195.99	122.33
299-E33-36	75.21	197.11	121.89
299-E33-37	76.72	199.04	122.32
299-E33-38	70.25	192.62	122.37
299-E33-39	67.68	189.98	122.30
299-E33-4	69.54	191.38	121.84
299-E33-41	77.31	199.63	122.32
299-E33-42	77.00	199.43	122.43
299-E33-5	71.02	193.46	122.45
299-E33-7	68.94	191.34	122.41
299-E33-8	75.97	198.42	122.46
299-E34-1	69.40	191.86	122.46
299-E34-10	72.55	195.00	122.46
299-E34-11	65.90	188.35	122.45
299-E34-12	72.31	194.72	122.40
299-E34-2	69.88	192.27	122.39
299-E34-3	63.95	186.39	122.44
299-E34-5	57.34	180.07	122.73
299-E34-9	69.18	191.62	122.44
299-E35-2	60.99	183.60	122.61
299-W10-15	65.72	206.01	140.30
299-W10-16	64.72	205.06	140.33
299-W10-17	64.04	204.47	140.44
299-W10-18	63.81	204.50	140.69
299-W10-19	68.20	208.18	139.98
299-W10-2	65.04	205.43	140.39
299-W10-5	64.36	204.92	140.56
299-W10-8	67.14	207.36	140.22
299-W10-9	65.37	205.72	140.35
299-W11-10	84.23	222.17	137.94
299-W11-12	66.73	207.04	140.31
299-W11-23	69.63	209.75	140.11
299-W11-24	69.28	209.53	140.25

Appendix A: December 1994 Water Level Measurement Data
(Sheet 5 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-W11-27	68.69	208.87	140.18
299-W11-31	76.37	215.45	139.08
299-W11-6	79.02	218.31	139.29
299-W11-7	76.12	216.14	140.02
299-W11-9	81.69	220.35	138.66
299-W12-1	84.81	221.43	136.62
299-W14-1	62.95	203.85	140.90
299-W14-12	63.45	204.37	140.93
299-W14-5	61.49	203.18	141.69
299-W15-12	63.54	204.24	140.70
299-W15-13	63.51	204.25	140.74
299-W15-16	67.86	208.75	140.90
299-W15-18	68.14	209.00	140.86
299-W15-19	69.89	210.80	140.91
299-W15-2	70.84	210.53	139.68
299-W15-20	72.11	212.86	140.75
299-W15-22	63.26	204.45	141.19
299-W15-23	72.46	213.20	140.74
299-W15-24	72.44	213.17	140.73
299-W15-4	60.73	201.78	141.05
299-W15-5	63.24	204.42	141.18
299-W18-21	63.06	203.80	140.73
299-W18-23	71.64	212.39	140.74
299-W18-25	62.26	203.01	140.74
299-W18-26	72.32	213.07	140.75
299-W18-28	66.44	207.26	140.82
299-W18-3	70.43	209.70	139.28
299-W18-30	64.20	205.08	140.88
299-W18-31	61.66	202.44	140.78
299-W18-32	65.40	206.24	140.84
299-W19-12	64.32	205.21	140.88
299-W19-14	71.69	211.29	139.60
299-W19-15	71.45	211.31	139.86
299-W19-20	72.43	210.63	138.20
299-W19-21	66.17	206.90	140.72

Appendix A: December 1994 Water Level Measurement Data
(Sheet 6 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-W19-27	67.10	208.46	141.36
299-W19-28	75.19	214.30	139.12
299-W19-31	64.60	205.49	140.89
299-W19-32	64.83	205.71	140.88
299-W21-1	75.57	213.13	137.56
299-W22-39	64.55	203.69	139.13
299-W22-40	72.55	210.99	138.44
299-W22-41	72.41	210.84	138.43
299-W22-42	72.34	210.74	138.41
299-W22-43	72.06	210.72	138.67
299-W22-44	67.01	206.69	139.68
299-W22-45	63.77	203.06	139.29
299-W22-46	65.51	204.58	139.07
299-W23-11	62.55	202.43	139.88
299-W23-13	63.25	203.10	139.85
299-W23-14	62.69	202.39	139.70
299-W23-15	60.44	199.78	139.34
299-W26-10	65.76	204.48	138.72
299-W26-12	67.12	205.95	138.83
299-W26-7	59.42	198.73	139.31
299-W26-8	64.17	203.09	138.92
299-W26-9	60.53	199.39	138.86
299-W6-1	75.53	214.13	138.60
299-W6-10	78.92	217.16	138.25
299-W6-11	75.93	214.23	138.30
299-W6-12	72.45	211.08	138.62
299-W6-2	71.94	211.06	139.12
299-W6-4	74.72	213.74	139.02
299-W6-7	78.45	216.49	138.05
299-W7-1	71.17	210.53	139.36
299-W7-10	71.28	210.21	138.93
299-W7-11	68.44	207.71	139.27
299-W7-12	70.33	209.68	139.35
299-W7-2	66.89	205.92	139.03
299-W7-4	65.19	204.80	139.61

Appendix A: December 1994 Water Level Measurement Data
(Sheet 7 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
299-W7-5	66.27	205.15	138.88
299-W7-6	68.01	206.85	138.84
299-W7-7	66.83	205.72	138.89
299-W7-9	71.44	210.95	139.51
299-W8-1	74.26	213.77	139.51
3099-47-18B	10.36	114.36	104.00
399-1-1	10.71	114.81	104.09
399-1-10A	9.80	113.86	104.06
399-1-11	10.82	115.13	104.31
399-1-12	12.95	117.17	104.22
399-1-14A	12.46	116.81	104.35
399-1-15	11.28	115.68	104.40
399-1-16A	12.21	116.27	104.06
399-1-17A	10.88	115.04	104.17
399-1-18A	14.62	119.11	104.49
399-1-2	13.78	117.20	103.42
399-1-3	13.16	117.26	104.10
399-1-4	11.70	116.00	104.31
399-1-5	11.54	115.75	104.21
399-1-6	9.65	113.94	104.29
399-1-7	13.47	117.53	104.06
399-1-8	13.19	117.31	104.12
399-2-2	11.03	115.07	104.04
399-2-3	10.40	114.43	104.03
399-3-1	13.13	117.16	104.03
399-3-10	13.46	117.45	103.99
399-3-6	15.60	119.73	104.13
399-3-9	14.26	118.29	104.03
399-4-10	11.40	115.38	103.98
399-4-11	19.25	123.28	104.03
399-6-1	14.32	118.50	104.19
399-8-1	16.40	120.74	104.34
699-10-54A	31.37	157.40	126.03
699-10-E12	22.56	131.33	108.77
699-101-48B	3.86	118.90	115.04

Appendix A: December 1994 Water Level Measurement Data
(Sheet 8 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-11-45A	50.77	176.35	125.58
699-14-38	33.65	156.94	123.29
699-14-47	53.39	178.99	125.59
699-15-15A	45.70	166.77	121.07
699-15-26	37.91	159.66	121.75
699-17-5	14.03	132.04	118.01
699-17-70	27.04	171.66	144.61
699-19-43	45.45	168.12	122.67
699-19-58	47.18	174.63	127.45
699-19-88	39.81	196.43	156.62
699-2-3	26.69	145.43	118.74
699-2-33A	40.32	163.49	123.16
699-20-20	32.35	154.10	121.76
699-20-E12	24.43	133.27	108.85
699-24-33	37.56	159.80	122.23
699-24-34A	40.50	162.73	122.23
699-24-34B	40.37	162.61	122.24
699-24-34C	40.10	162.33	122.23
699-24-35	41.99	164.23	122.24
699-25-34A	39.59	161.64	122.05
699-25-34B	39.59	161.36	121.77
699-25-34C	40.98	163.21	122.23
699-25-34D	41.71	163.95	122.24
699-25-55	80.64	206.24	125.60
699-25-70	56.22	191.93	135.71
699-26-15A	13.96	134.92	120.96
699-26-33	41.12	163.27	122.15
699-26-34A	38.93	161.06	122.13
699-26-34B	39.38	161.63	122.24
699-26-35A	40.24	162.35	122.11
699-26-89	55.69	199.06	143.37
699-27-8	22.32	141.94	119.61
699-28-52A	85.80	208.61	122.81
699-29-78	57.56	197.21	139.65
699-3-45	28.15	153.78	125.64

Appendix A: December 1994 Water Level Measurement Data
(Sheet 9 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-32-43	35.09	157.47	122.37
699-32-62	85.22	215.53	130.31
699-33-42	34.88	157.28	122.40
699-33-56	95.83	218.54	122.71
699-34-39A	41.32	163.70	122.38
699-34-41B	51.62	174.01	122.39
699-34-51	102.00	224.51	122.51
699-34-88	50.65	192.88	142.23
699-35-66	88.01	221.42	133.41
699-35-70	74.95	211.29	136.35
699-35-9	35.32	152.35	117.03
699-36-61A	103.88	228.02	124.15
699-37-43	87.74	210.36	122.63
699-38-65	99.06	229.68	130.61
699-38-70	80.00	216.67	136.67
699-40-1	23.30	133.72	110.42
699-40-33A	32.91	157.90	124.99
699-40-62	104.73	227.90	123.17
699-41-23	21.37	142.19	120.82
699-41-42	70.98	196.26	125.29
699-42-37	31.81	158.31	126.51
699-42-40B	38.15	166.56	128.41
699-42-41	44.83	172.91	128.09
699-43-104	83.40	233.50	150.10
699-43-40	37.07	165.26	128.20
699-43-42J	50.09	177.30	127.21
699-43-45	59.49	182.17	122.69
699-43-89	54.97	196.34	141.37
699-44-39B	28.27	156.48	128.21
699-44-42	48.70	176.55	127.84
699-44-43B	50.66	176.82	126.16
699-44-64	97.62	221.16	123.54
699-45-42	49.31	175.97	126.66
699-46-21B	40.24	159.11	118.88
699-47-35A	19.42	145.19	125.78

Appendix A: December 1994 Water Level Measurement Data
(Sheet 10 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-47-35B	19.51	145.28	125.78
699-47-60	76.20	198.58	122.38
699-48-71	74.58	209.75	135.17
699-49-13E	15.88	125.80	109.91
699-49-28	43.41	163.19	119.78
699-49-57A	46.36	168.49	122.13
699-49-79	71.59	210.04	138.46
699-50-28B	44.05	163.77	119.72
699-50-42	17.31	142.29	124.99
699-50-85	86.98	225.35	138.37
699-51-63	51.27	174.30	123.03
699-51-75	59.11	195.53	136.42
699-52-19	15.35	125.30	109.95
699-52-54	50.98	173.26	122.28
699-52-57	49.13	171.24	122.11
699-53-47A	10.09	133.59	123.50
699-53-47B	10.17	133.68	123.50
699-53-48B	11.61	134.94	123.33
699-53-55C	53.32	175.60	122.29
699-54-34	43.02	167.71	124.70
699-54-45A	29.35	150.66	121.31
699-54-48	17.17	139.30	122.13
699-55-44	37.73	158.40	120.66
699-55-50C	13.31	135.46	122.15
699-55-55	49.71	171.84	122.12
699-55-57	51.02	173.17	122.14
699-55-70	42.06	173.44	131.38
699-55-76	42.79	177.77	134.98
699-57-59	53.46	175.64	122.19
699-57-83A	44.52	176.14	131.62
699-59-32	19.26	129.31	110.04
699-59-58	29.63	151.77	122.14
699-59-80B	46.93	177.77	130.84
699-60-32	19.60	129.61	110.01
699-60-60	33.98	156.04	122.06

Appendix A: December 1994 Water Level Measurement Data
(Sheet 11 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-61-62	29.57	151.63	122.06
699-61-66	37.34	159.16	121.83
699-62-31	22.31	132.30	110.00
699-62-43A	11.21	131.78	120.57
699-63-25A	10.57	120.44	109.87
699-63-51	7.96	129.38	121.42
699-63-55	8.39	129.98	121.59
699-63-58	28.22	149.89	121.67
699-63-90	34.67	155.82	121.15
699-64-62	30.84	152.44	121.61
699-65-22	9.71	119.18	109.47
699-65-50	20.95	142.33	121.38
699-65-59A	32.90	154.51	121.61
699-65-72	43.59	164.64	121.05
699-65-83	27.19	148.01	120.82
699-66-103	20.68	141.31	120.63
699-66-38	10.39	132.94	122.55
699-66-58	31.82	153.37	121.55
699-66-64	32.72	154.16	121.44
699-67-51	38.49	159.85	121.37
699-67-86	23.27	143.98	120.72
699-67-98	18.21	138.81	120.60
699-68-105	17.82	138.42	120.60
699-69-38	6.37	128.91	122.54
699-70-23	9.38	119.35	109.97
699-70-68	39.23	160.35	121.12
699-71-30	9.35	122.10	112.75
699-71-52	38.23	159.40	121.17
699-72-73	26.63	147.09	120.47
699-72-88	11.94	132.07	120.12
699-72-92	16.78	137.02	120.24
699-73-61	40.83	161.98	121.15
699-74-44	14.96	135.67	120.71
699-74-48	27.66	148.39	120.73
699-77-36	11.20	125.64	114.44

Appendix A: December 1994 Water Level Measurement Data
(Sheet 12 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-77-54	25.88	146.32	120.43
699-78-62	23.26	143.16	119.91
699-8-17	38.21	159.24	121.03
699-8-25	33.83	155.23	121.40
699-8-32	47.38	168.98	121.60
699-80-43S	7.81	125.81	117.99
699-81-38	8.45	123.86	115.41
699-81-58	14.45	133.96	119.51
699-83-36	12.60	127.56	114.96
699-83-47	14.41	132.67	118.26
699-86-42	7.86	124.91	117.06
699-87-42A	10.08	126.94	116.86
699-87-55	22.39	140.09	117.70
699-88-41	10.43	126.79	116.36
699-89-35	8.30	121.32	113.02
699-9-E2	14.00	127.43	113.44
699-90-45	11.57	128.48	116.91
699-96-49	11.68	127.78	116.10
699-97-43	13.29	128.58	115.28
699-97-51A	6.64	122.61	115.97
699-S12-29	25.55	148.64	123.10
699-S12-3	16.66	132.75	116.09
699-S14-20A	28.09	150.19	122.10
699-S19-11	28.56	147.44	118.88
699-S19-E13	15.58	120.25	104.67
699-S19-E14	9.40	113.95	104.55
699-S27-E14	17.86	121.82	103.96
699-S28-E12	13.79	118.80	105.01
699-S3-25	38.16	159.56	121.40
699-S3-E12	13.40	121.28	107.88
699-S30-E10	12.87	119.55	106.68
699-S30-E10	12.66	119.48	106.82
699-S30-E15	18.05	122.12	104.07
699-S31-1	25.08	140.20	115.13
699-S31-E10	10.65	117.20	106.55

Appendix A: December 1994 Water Level Measurement Data
(Sheet 13 of 13)

Well	Depth to Water (m)	Elevation, m above msl Adjusted Casing	Water Level
699-S31-E10	10.16	116.94	106.77
699-S31-E10	9.95	116.69	106.74
699-S31-E10	9.27	115.98	106.71
699-S32-E13	13.44	118.99	105.55
699-S32-E13	14.65	120.29	105.64
699-S34-E10	8.53	116.52	107.98
699-S34-E15	17.13	123.31	106.18
699-S36-E12	14.09	121.62	107.53
699-S36-E13	14.21	121.69	107.48
699-S37-E14	16.98	124.43	107.45
699-S38-E11	13.46	121.48	108.02
699-S38-E12	15.73	123.41	107.68
699-S38-E12	15.75	123.43	107.68
699-S40-E14	14.72	122.78	108.06
699-S41-E12	14.50	122.50	108.00
699-S41-E13	17.22	125.12	107.90
699-S41-E13	17.11	124.98	107.87
699-S43-E12	15.83	123.61	107.78
699-S6-E4D	17.78	131.21	113.43
699-S7-34	36.20	160.67	124.47
699-S8-19	32.78	153.56	120.79

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