
SUPPLEMENTAL INFORMATION

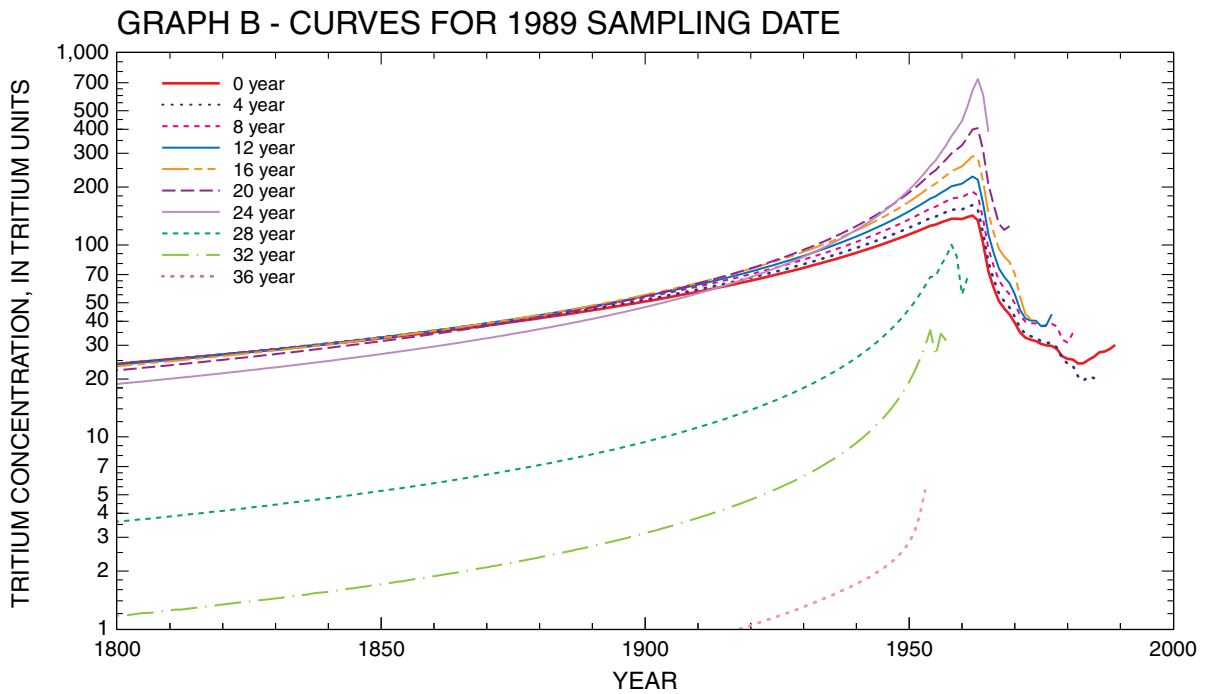
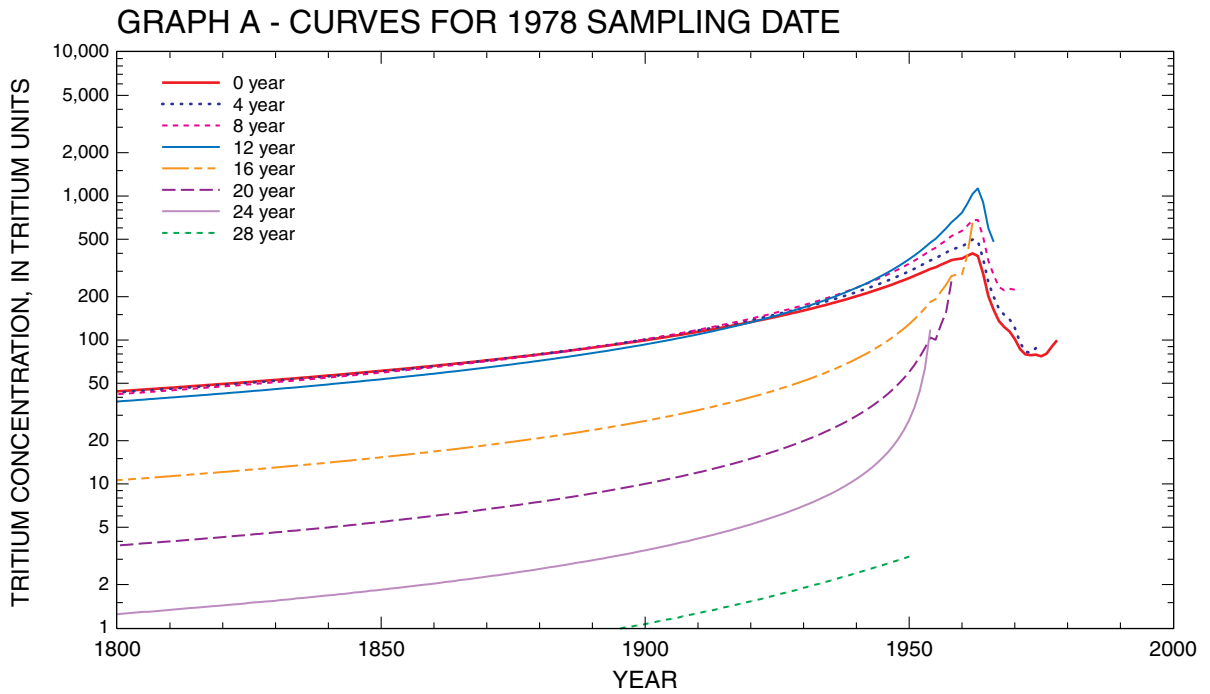


Figure 36. Decay-curve families for time-delay mixing model. Each graph shows a family of curves for a given sampling year. Each curve shows average decayed tritium concentrations, for hypothetical mixes over time, for specified delay times that are provided in 4-year increments.

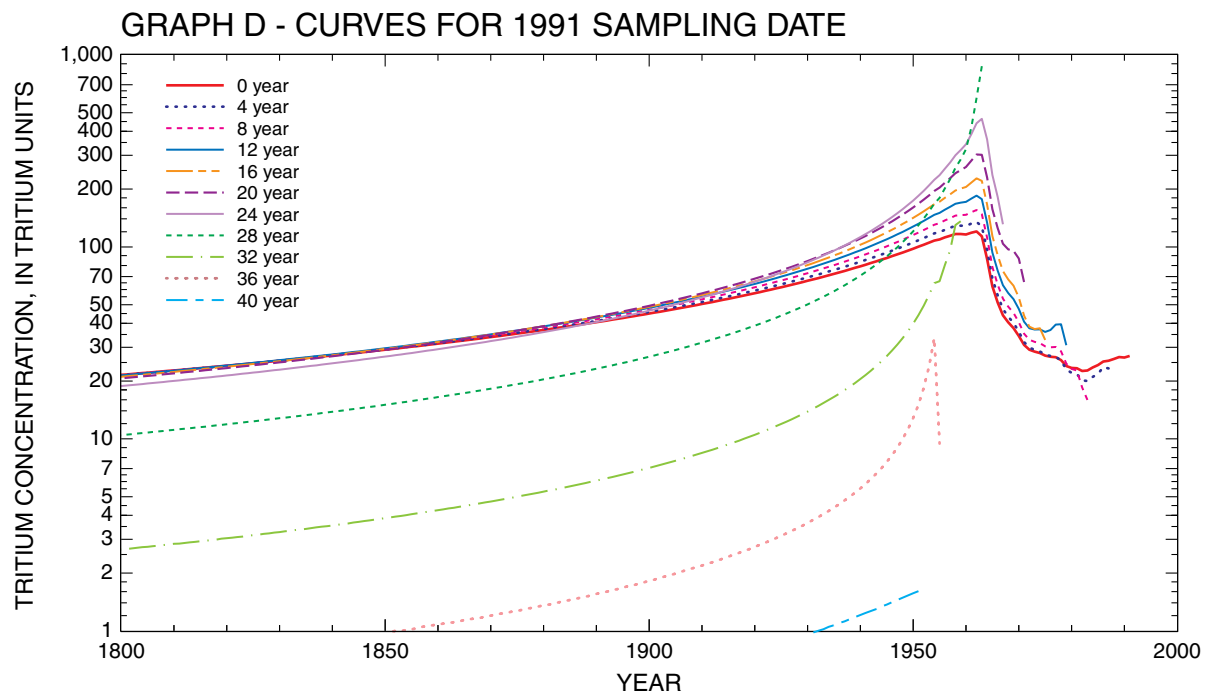
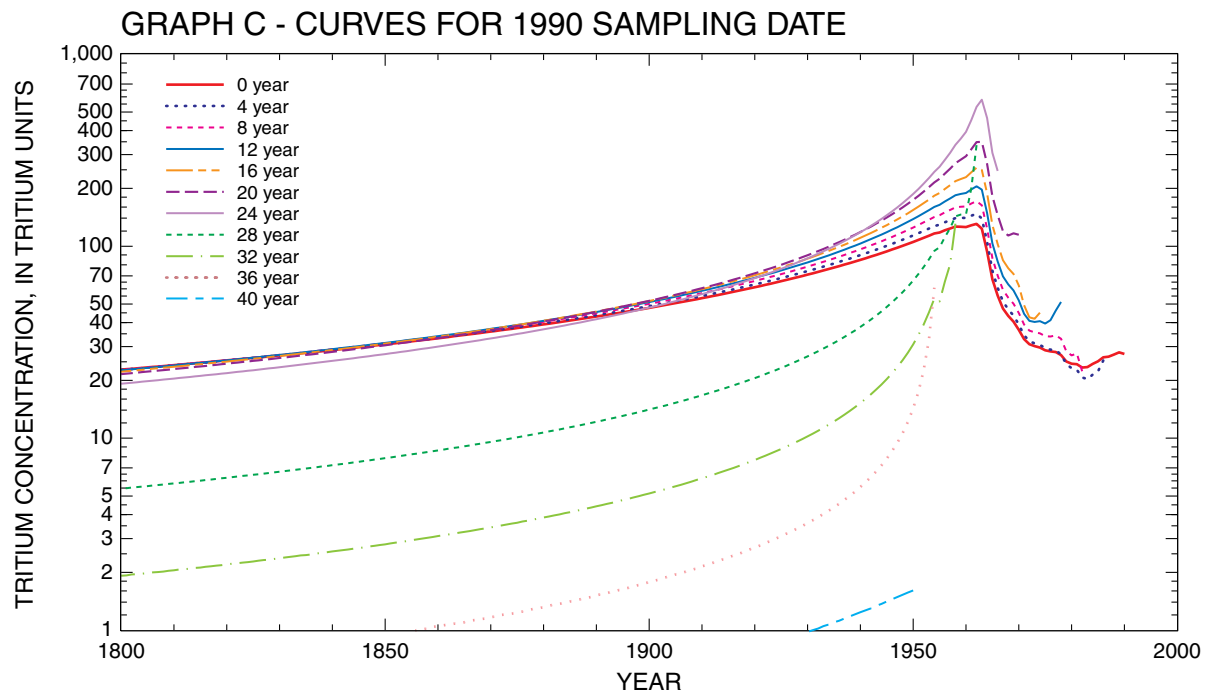


Figure 36. Decay-curve families for time-delay mixing model. Each graph shows a family of curves for a given sampling year. Each curve shows average decayed tritium concentrations, for hypothetical mixes over time, for specified delay times that are provided in 4-year increments.--Continued

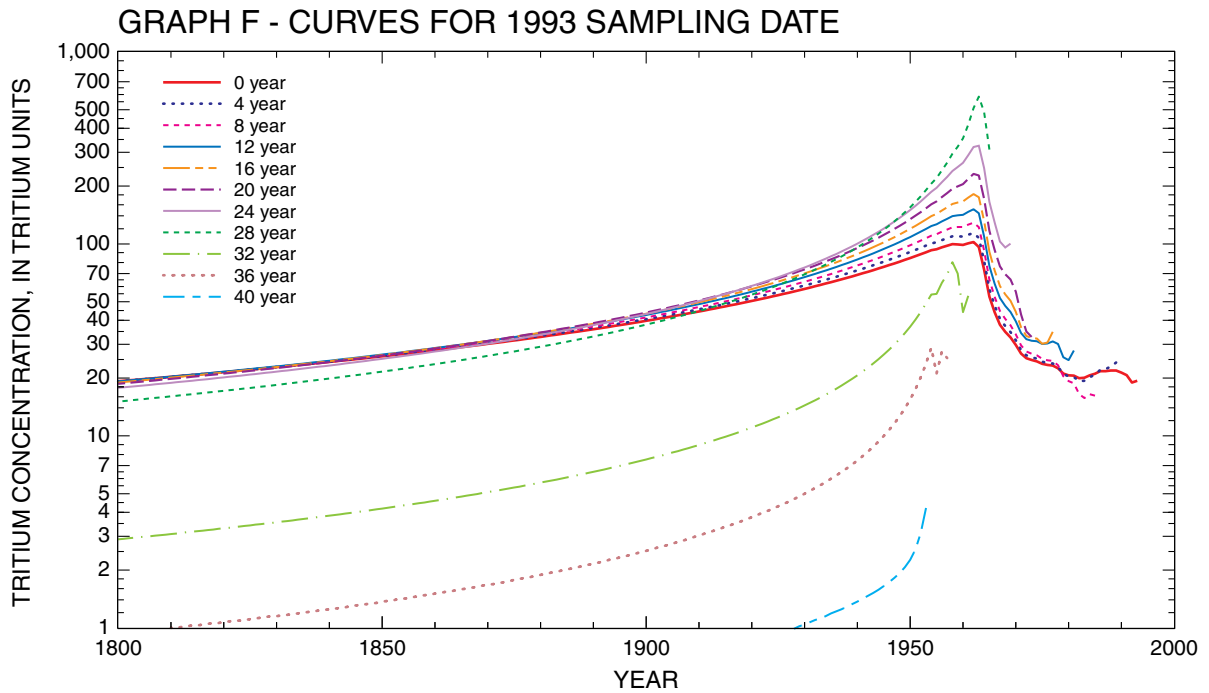
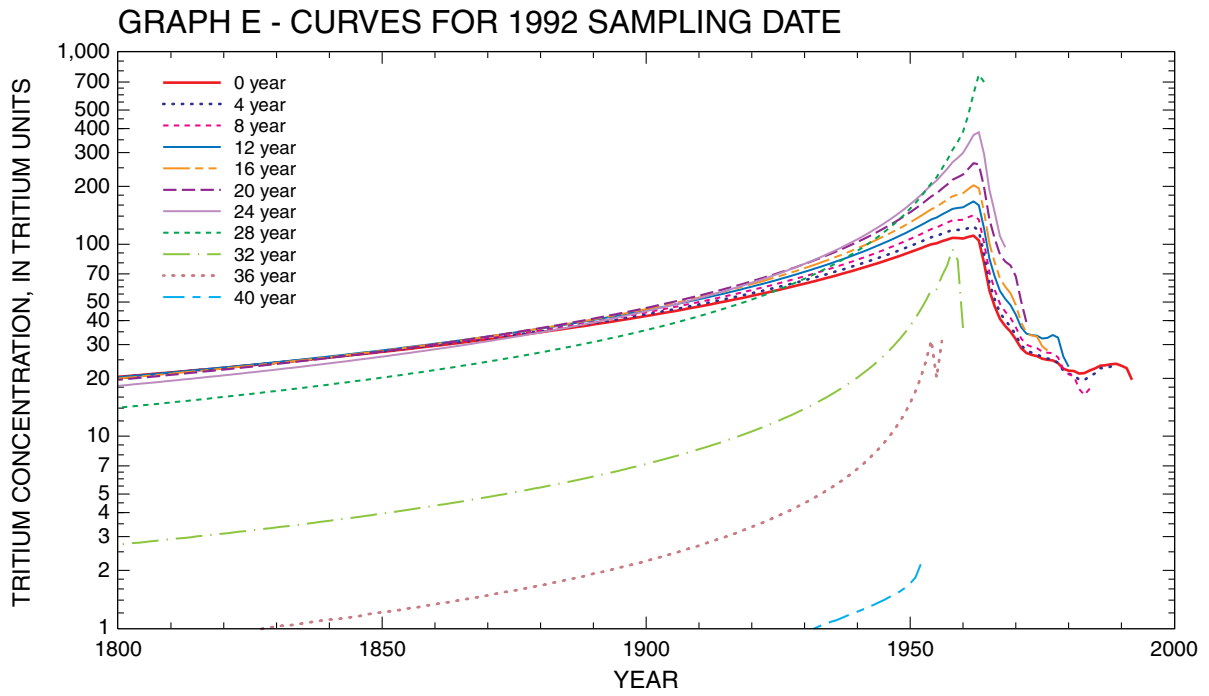


Figure 36. Decay-curve families for time-delay mixing model. Each graph shows a family of curves for a given sampling year. Each curve shows average decayed tritium concentrations, for hypothetical mixes over time, for specified delay times that are provided in 4-year increments.--Continued

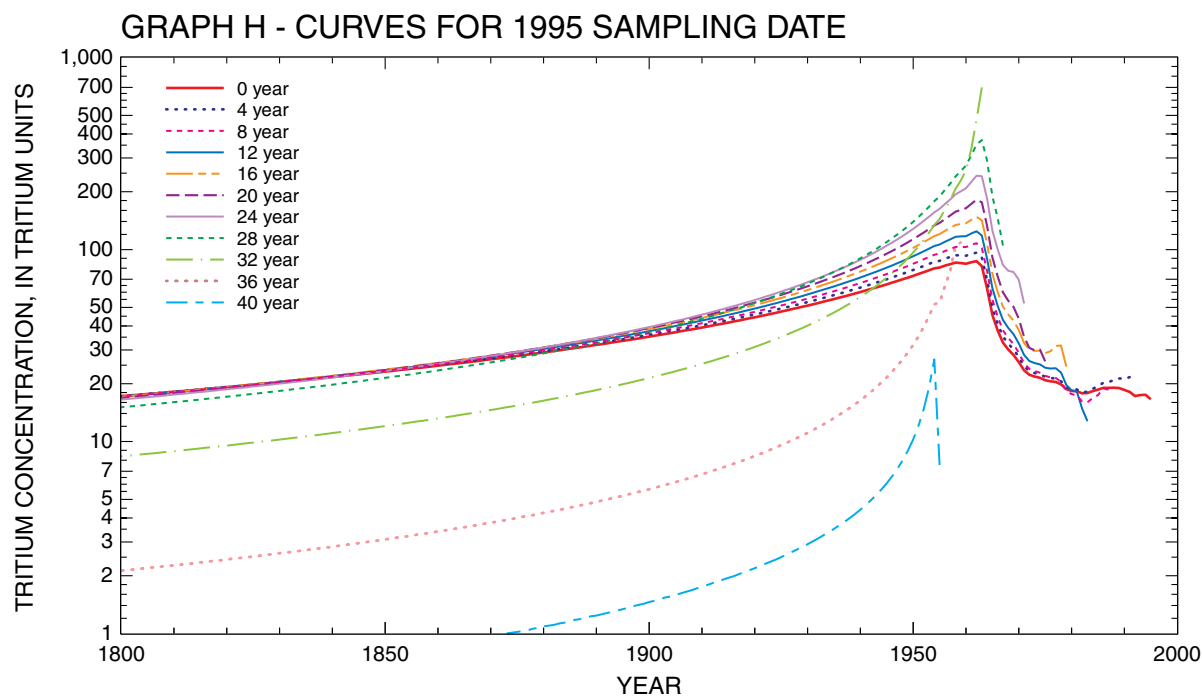
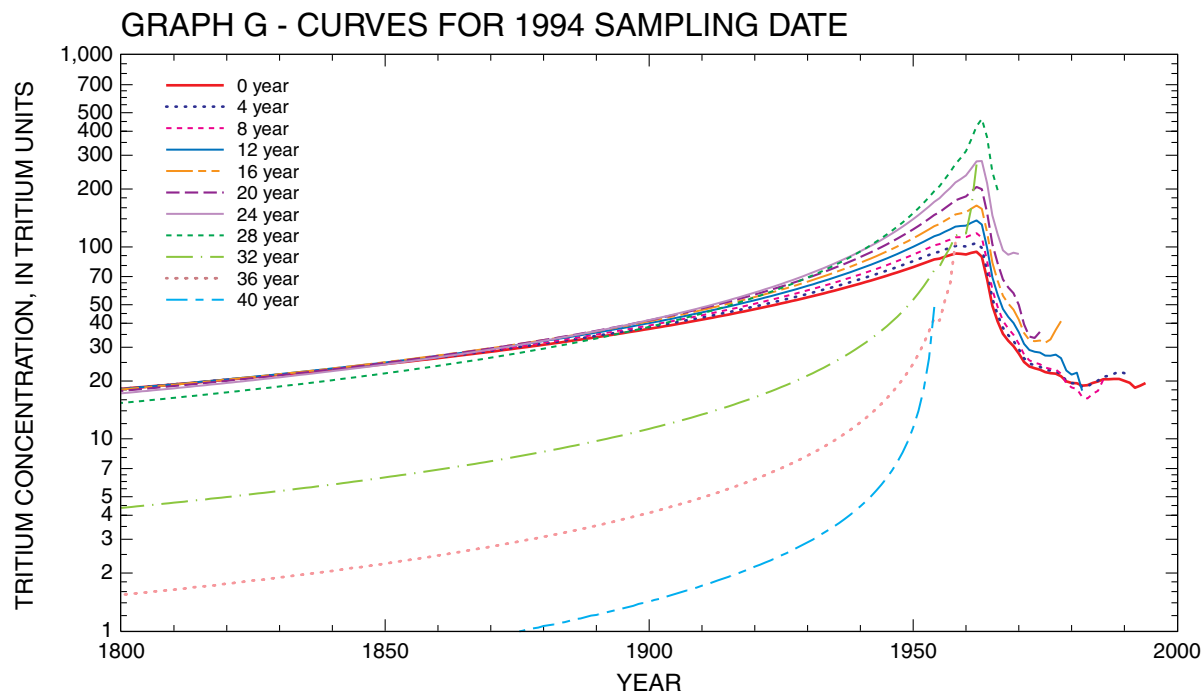


Figure 36. Decay-curve families for time-delay mixing model. Each graph shows a family of curves for a given sampling year. Each curve shows average decayed tritium concentrations, for hypothetical mixes over time, for specified delay times that are provided in 4-year increments.--Continued

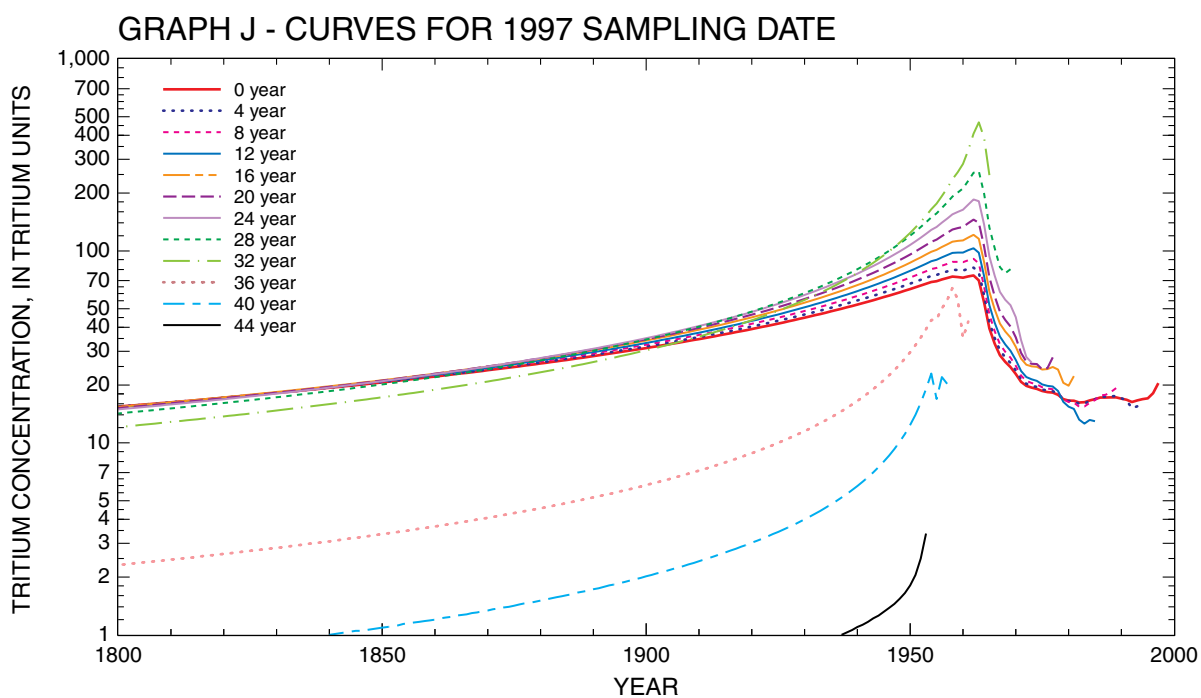
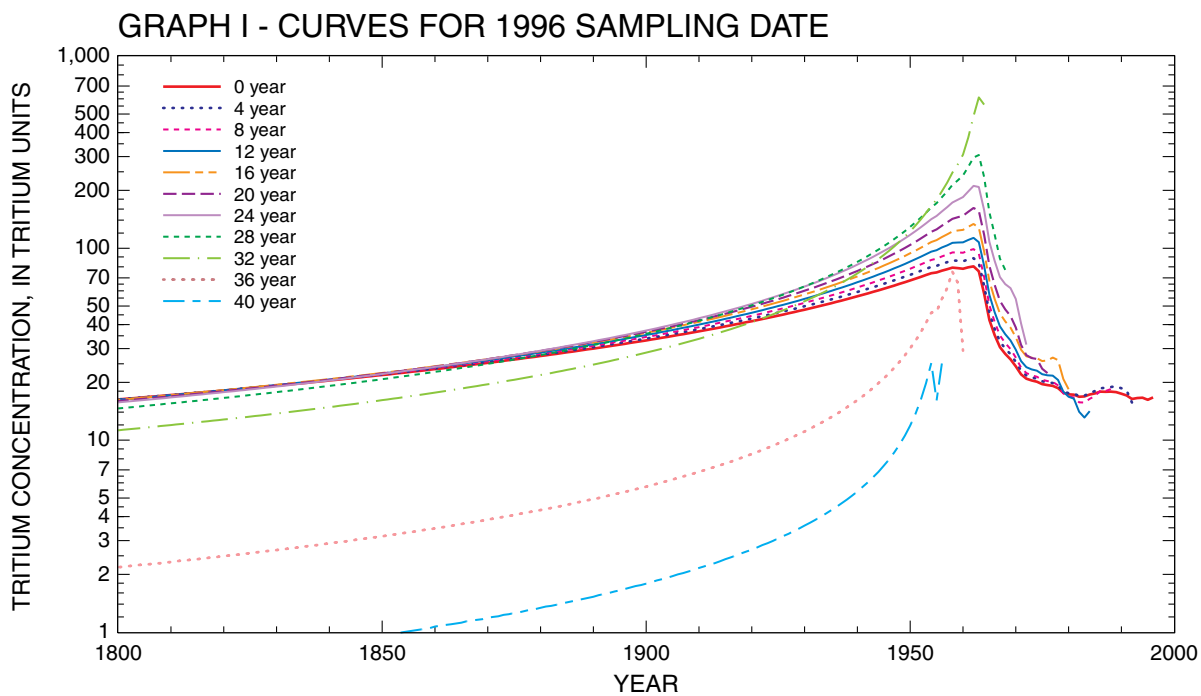


Figure 36. Decay-curve families for time-delay mixing model. Each graph shows a family of curves for a given sampling year. Each curve shows average decayed tritium concentrations, for hypothetical mixes over time, for specified delay times that are provided in 4-year increments.--Continued

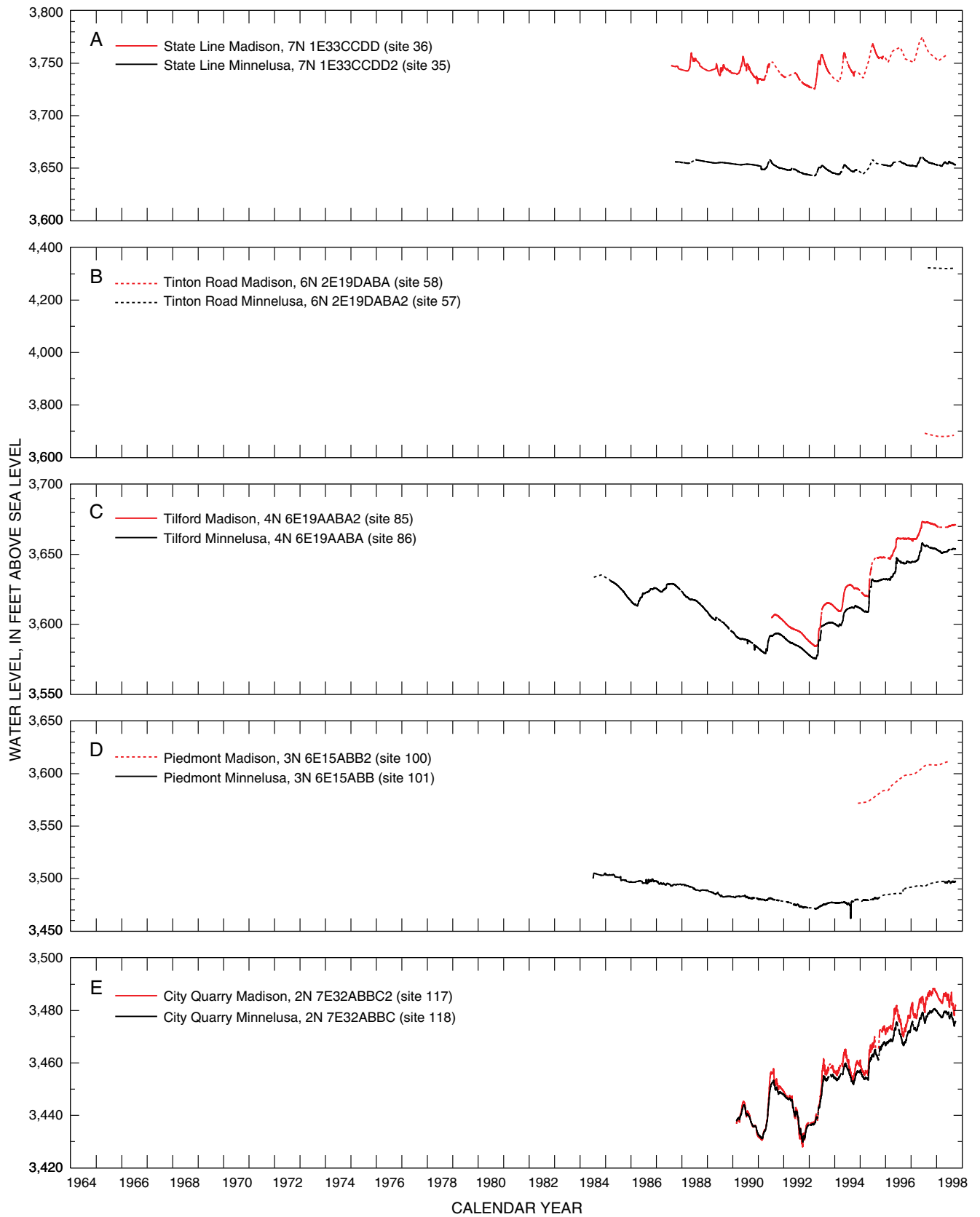


Figure 37. Hydrographs of selected well pairs.

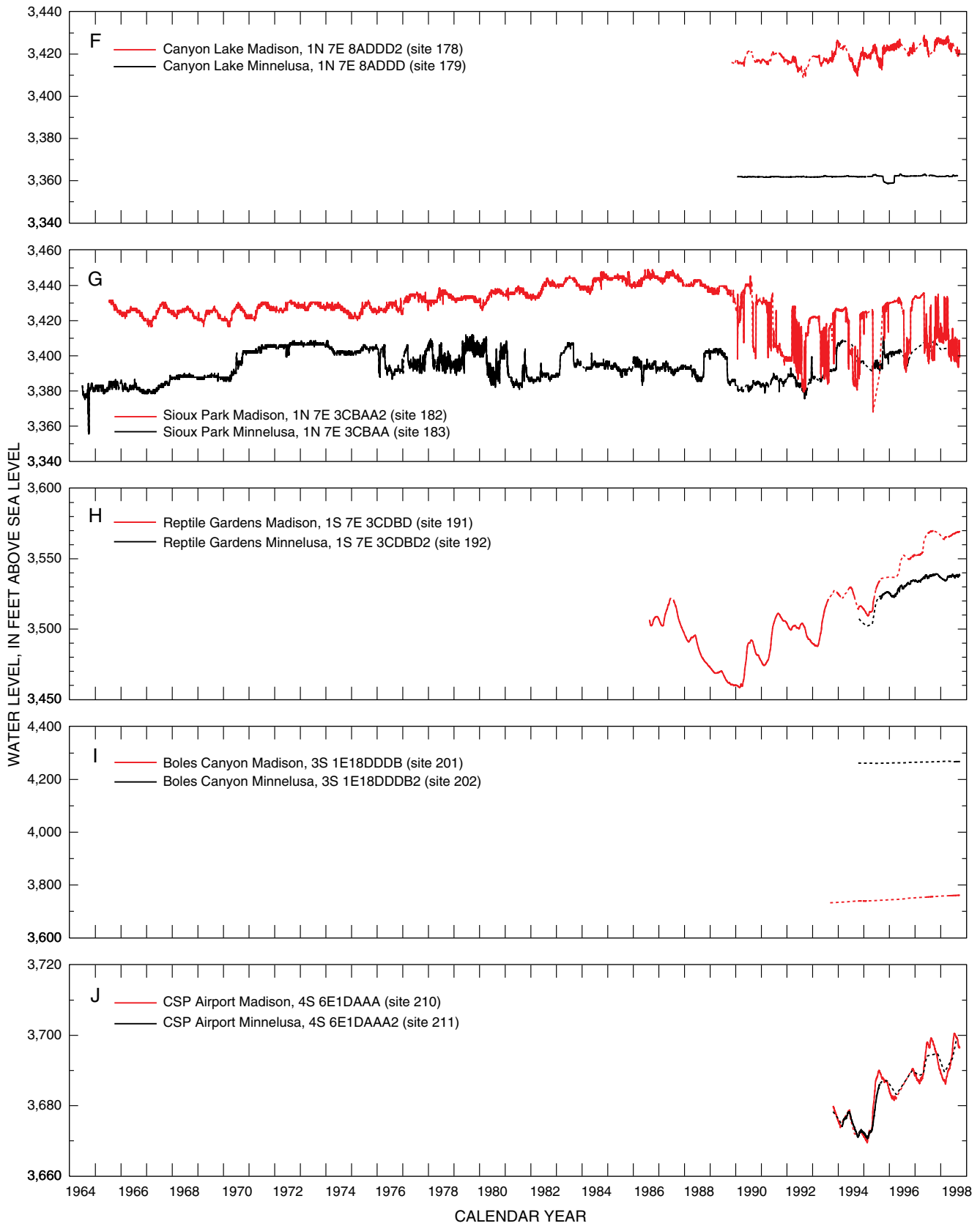


Figure 37. Hydrographs of selected well pairs.--Continued

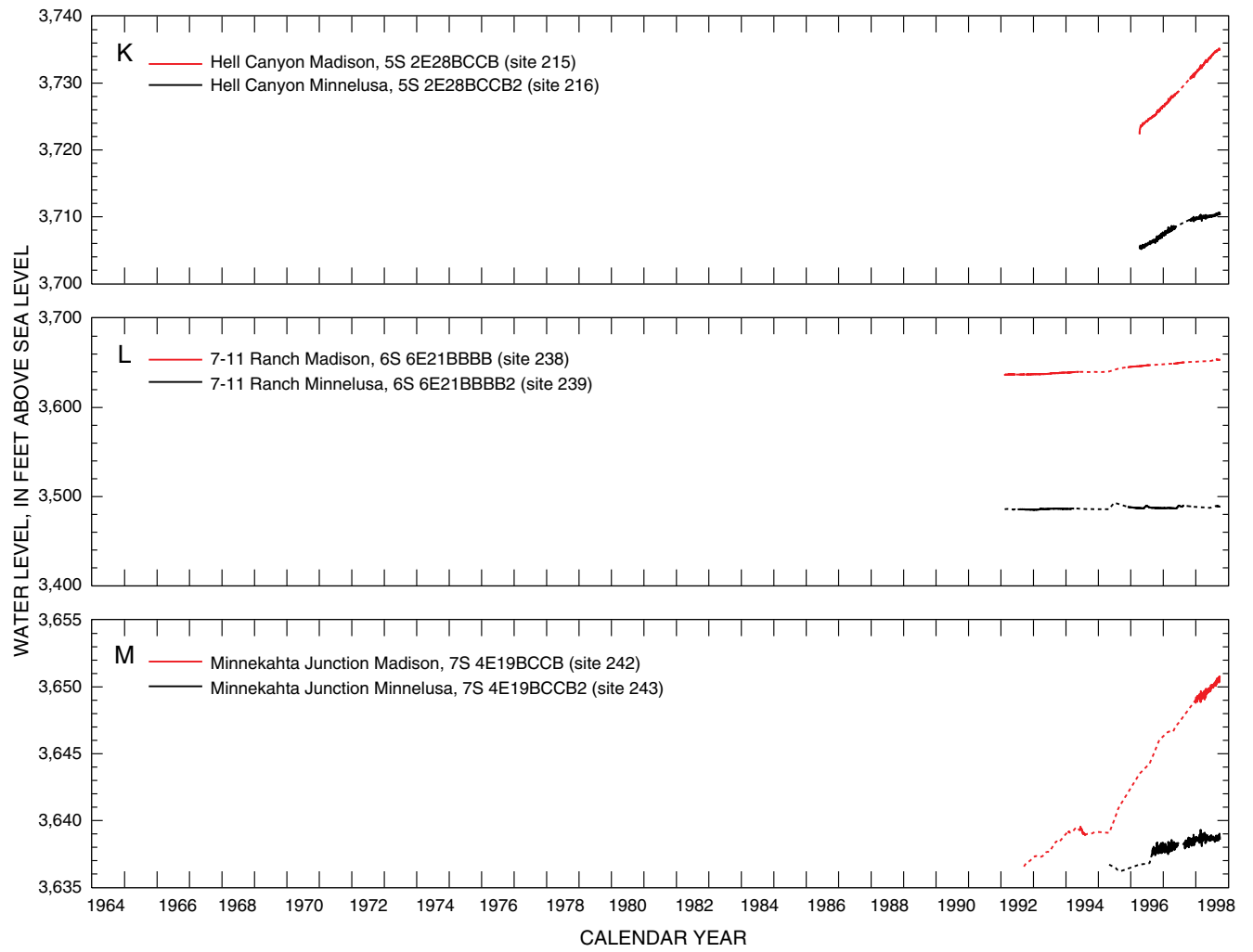


Figure 37. Hydrographs of selected well pairs.--Continued

Table 7. Selected site information and isotope data for sites used in report

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves													
1	445739103465301	12N 3E32ACBC	Delzer #2	445739	1034653	Mdsn	NA	² 07-21-78	-18.13	--	<1.0	--	<0.3
2	445842103454301	12N 3E28ACBB2	Delzer #1	445842	1034543	Mdsn	NA	² 08-11-78	-19.66	--	<1.0	--	<.3
3	444253103440001	9N 3E27ADBD	NA	444253	1034359	Mnls	NA	--	--	--	--	--	--
4	444312103465901	9N 3E20CDDD	Bean	444313	1034653	Mdsn	NA	² 08-23-78	-17.80	--	--	--	--
5	444320103471801	9N 3E20CC	NA	444320	1034718	Mdsn	NA	--	--	--	--	--	--
6	444129103514801	9N 2E34CDDCA	Belle Fourche Municipal	444129	1035148	Mdsn	NA	08-17-94	-17.07	-131.0	<1.0	1	<.3
7	444128103514701	9N 2E34CDD	NA	444128	1035147	Mdsn	NA	--	--	--	--	--	--
8	444114103323901	8N 5E 5BCAB	NA	444114	1033239	Mdsn	NA	--	--	--	--	--	--
9	443627103460301	8N 3E33CCB	NA	443625	1034555	Mnls	NA	--	--	--	--	--	--
10	443655103482001	8N 3E31ACA	NA	443650	1034744	Mnls	NA	--	--	--	--	--	--
11	444108103432201	8N 3E 2BDBC	NA	444108	1034322	Mnls	NA	--	--	--	--	--	--
12	443716103522501	8N 2E28DDCB	NA	443716	1035225	Mdsn	NA	--	--	--	--	--	--
13	443124103433401	7N 3E35CB	NA	443124	1034334	Mnls	NA	--	--	--	--	--	--
14	443515103473001	7N 3E 7AABA	NA	443525	1034732	Mnls	NA	--	--	--	--	--	--
15	443124103531601	7N 2E33CBCD2	NA	443124	1035316	Mnls	NA	--	--	--	--	--	--
16	443117103541301	7N 2E32BAC	NA	443147	1035413	Mnls	NA	--	--	--	--	--	--
17	443148103534001	7N 2E32AAC	NA	443148	1035340	Mdsn	NA	--	--	--	--	--	--
18	443215103533001	7N 2E29D	NA	443215	1035330	Mnls	NA	--	--	--	--	--	--
19	443240103531002	7N 2E29AA2	NA	443240	1035310	Mnls	NA	--	--	--	--	--	--
20	443227103503401	7N 2E26BDB	NA	443227	1035034	Mdsn	NA	--	--	--	--	--	--
21	443230103504101	7N 2E26BCDA	NA	443230	1035041	Mnls	NA	--	--	--	--	--	--
22	443255103502501	7N 2E23CDAB	NA	443300	1035028	Mnls	NA	--	--	--	--	--	--
23	443323103515501	7N 2E22BCA	NA	443324	1035158	Mnls	NA	--	--	--	--	--	--
24	443318103532701	7N 2E20ADD	NA	443318	1035327	Mnls	NA	--	--	--	--	--	--
25	443420103551001	7N 2E19CAAA	NA	443315	1035514	Mnls	NA	--	--	--	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Minnelusa; Mnl, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
26	443355103553001	7N 2E18CA	NA	443359	1035532	Mnls	NA	--	--	--	--	--	--
27	443330103520301	7N 2E15CC	NA	443348	1035203	Mnls	NA	--	--	--	--	--	--
28	443423103510801	7N 2E15AADC	NA	443423	1035108	Mnls	NA	--	--	--	--	--	--
29	443515103513901	7N 2E10BADC	LA-62A Redwater	443513	1035143	Mnls	Obs	04-12-94	-16.88	-127.0	3.0	1	0.9
30	443010103523001	7N 2E 9ABAB	NA	443010	1035230	Mnls	NA	--	--	--	--	--	--
31	443108103530601	7N 2E 4BD	NA	443108	1035306	Mnls	NA	--	--	--	--	--	--
32	443553103502101	7N 2E 2CACA	NA	443553	1035021	Mnls	NA	--	--	--	--	--	--
33	443603103494001	7N 2E 1BBC	NA	443603	1034940	Mnls	NA	--	--	--	--	--	--
34	443100104002003	7N 1E33CCDD3	LA-94A State Line Minnekahta	443104	1040025	Mnkt	Pair	08-18-94	-15.58	-121.0	24.0	2	7.5
35	443100104002002	7N 1E33CCDD2	LA-87B State Line Minnelusa	443104	1040025	Mnls	Pair	04-11-94	-16.98	-128.0	<1.0	1	<.3
36	443100104002001	7N 1E33CCDD	LA-87A State Line Madison	443104	1040025	Mdsn	Pair	04-11-94	-17.28	-130.0	61.0	5	19.1
37	443153104015101	7N 1E32BBBB	NA	443153	1040151	Mnls	NA	--	--	--	--	--	--
38	443150104020001	7N 1E30DDDC	NA	443156	1040205	Mnls	NA	--	--	--	--	--	--
39	443210104021601	7N 1E30DDAB	NA	443210	1040216	Mdsn	NA	--	--	--	--	--	--
40	443330104024501	7N 1E30CADD	NA	443230	1040241	Mnls	NA	--	--	--	--	--	--
41	443240104024001	7N 1E30AAAD	NA	443240	1040155	Mnls	NA	--	--	--	--	--	--
42	443215103573001	7N 1E26ACD	NA	443215	1035730	Mnls	NA	--	--	--	--	--	--
43	443320104003501	7N 1E21BBC	McNenny Well No. 1	443334	1040035	Mnls ³	NA	² 01-01-78	-17.43	-127.0	36.4	--	11.4
44	443320104004501	7N 1E20AAD	McNenny Well No. 2	443328	1040045	Mnls ³	NA	08-17-94	-17.07	-132.0	62.0	4	19.4
45	443355103574501	7N 1E14CCDD	NA	443343	1035802	Mnls	NA	--	--	--	--	--	--
46	443339103575701	7N 1E14CCD	NA	443339	1035757	Mnls	NA	--	--	--	--	--	--
47	443511103575801	7N 1E11BCAD	NA	443511	1035758	Mdsn	NA	--	--	--	--	--	--
48	443515103572501	7N 1E11ACAC	Swanson Well	443508	1035730	Mnls	NA	08-16-94	--	--	2.0	1	.6
48	443515103572501	7N 1E11ACAC	Swanson Well	443508	1035730	Mnls	NA	mean ⁴	-17.46	-132.5	--	--	--
49	442754103220801	6N 6E22DABD	NA	442754	1032208	Mnls	NA	--	--	--	--	--	--
50	442901103281601	6N 5E14ADBD	NA	442901	1032816	Mnls	NA	--	--	--	--	--	--

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[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekakhta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
51	442749103381401	6N 4E21DBCD	NA	442749	1033814	Mnls	NA	--	--	--	--	--	--
52	442917103462901	6N 3E17ABAA	NA	442917	1034629	Mnls	NA	--	--	--	--	--	--
53	442721103493701	6N 2E25BBCB	NA	442721	1034937	Mnls	NA	--	--	--	--	--	--
54	442820103503501	6N 2E23BBBA	NA	442820	1035035	Mnls	NA	--	--	--	--	--	--
55	442857103513401	6N 2E22ABBB	NA	442827	1035132	Mnls	NA	--	--	--	--	--	--
56	442822103534501	6N 2E20ABAB2	NA	442822	1035345	Mdsn	NA	--	--	--	--	--	--
57	442802103544602	6N 2E19DABA2	LA-96C Tinton Road Minnelusa	442759	1035449	Mnls	Pair	09-08-98	-15.90	-119.5	78.4	5.1	24.6
58	442802103544601	6N 2E19DABA	LA-96B Tinton Road Madison	442802	1035446	Mdsn	Pair	09-08-98	-16.66	-124.8	30.4	2.6	9.5
59	442919103511601	6N 2E15BBBB	City of Spearfish - Dickey Well	442917	1035206	Mdsn	NA	08-06-96	-16.65	-126.0	63.0	4	19.7
60	442906103510501	6N 2E15AADC	NA	442906	1035105	Mnls	NA	--	--	--	--	--	--
61	442842103505501	6N 2E14CBCC	City of Spearfish - Nevin Well	442842	1035055	Mdsn	NA	08-06-96	-16.84	-128.0	87.0	5	27.3
62	442906103504201	6N 2E14BBCC	NA	442906	1035042	Mnls	NA	--	--	--	--	--	--
63	442937103511201	6N 2E10DACB	NA	442937	1035112	Mnls	NA	--	--	--	--	--	--
64	442930103522001	6N 2E 9D	NA	442930	1035220	Mnls	NA	--	--	--	--	--	--
65	443100103543001	6N 2E 5BBBB	NA	443104	1035437	Mnls	NA	--	--	--	--	--	--
66	443019103523101	6N 2E 4DCAD	NA	443019	1035231	Mnls	NA	--	--	--	--	--	--
67	443032103575001	6N 1E 2CABC	NA	443032	1035750	Mnls	NA	--	--	--	--	--	--
68	442111103265701	5N 5E36ADDA	NA	442111	1032657	Mnls	NA	--	--	--	--	--	--
69	442217103272201	5N 5E26ABDA	Black Hills National Cemetery	442215	1032829	Mdsn	NA	² 08-10-78	-15.04	--	--	--	--
70	442148103273801	5N 5E25CADB2	NA	442148	1032738	Mnls	NA	--	--	--	--	--	--
71	442311103303501	5N 5E21AAAA	NA	442311	1033035	Mnls	NA	--	--	--	--	--	--
72	442337103303501	5N 5E16DAA	NA	442337	1033035	Mnls	NA	--	--	--	--	--	--
73	442335103311001	5N 5E16CAAD	MD-86A Sturgis	442336	1033111	Mdsn	Obs	12-02-97	-15.11	-111.7	1.0	1	.3
74	442431103314101	5N 5E 9CBCC	NA	442431	1033141	Mnls	NA	--	--	--	--	--	--
75	442443103312701	5N 5E 9BCAA	NA	442443	1033127	Mnls	NA	--	--	--	--	--	--
76	442435103320301	5N 5E 8ACDD	NA	442435	1033203	Mnls	NA	--	--	--	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Minnelusa; Mnls, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
77	442502103325401	5N 5E 5CC	NA	442511	1033238	Mnls	NA	--	--	--	--	--	--
78	442533103324801	5N 5E 5BBCB	NA	442533	1033248	Mnls	NA	--	--	--	--	--	--
79	442306103352001	5N 4E23AAAD	NA	442306	1033520	Mnls	NA	--	--	--	--	--	--
80	442515103340401	5N 4E 1DAAD	NA	442515	1033404	Mnls	NA	--	--	--	--	--	--
81	442545103343701	5N 4E 1ABBD	LA-86C Whitewood Minnelusa	442544	1033437	Mnls	NA	--	--	--	--	--	--
82	442504103415301	5N 3E 1DCCB	Fuhs	442504	1034153	Mdsn	NA	2 ⁰⁷⁻²¹⁻⁷⁸	-16.13	--	209.3	--	65.6
83	4424351033571101	5N 1E11DABA	LA-95C Big Hill Madison	442434	1035710	Mdsn	Obs	10-29-97	-17.19	-128.9	105.3	6.4	33.0
84	441759103261203	4N 6E19AABA3	MD-95A Tilford Minnekahta	441759	1032612	Mnkt	Pair	09-19-96	-14.63	-110.0	140.0	8	43.9
85	441759103261202	4N 6E19AABA2	MD-90A Tilford Madison	441759	1032612	Mdsn	Pair	09-03-96	-15.61	-118.0	4.0	1	1.3
86	441759103261201	4N 6E19AABA	MD-84B Tilford Minnelusa	441800	1032612	Mnls	Pair	08-27-96	-15.52	-117.0	100.0	6	31.3
87	441812103230501	4N 6E16DCB	NA	441812	1032405	Mnls	NA	--	--	--	--	--	--
88	441807103235601	4N 6E16DCAC	NA	441807	1032356	Mnls	NA	--	--	--	--	--	--
89	441749103515701	4N 2E22BACB	NA	441749	1035157	Mdsn	NA	--	--	--	--	--	--
90	442024103545701	4N 2E 6AACD	NA	442024	1035457	Mdsn	NA	--	--	--	--	--	--
91	441023103194401	3N 7E31CBDD	NA	441023	1031944	Mnls	NA	--	--	--	--	--	--
92	441033103193001	3N 7E31CAA	NA	441033	1031930	Mnls	NA	--	--	--	--	--	--
93	441028103200401	3N 6E36DA	NA	441028	1032004	Mnls	NA	--	--	--	--	--	--
94	441033103210301	3N 6E35ADDA	NA	441040	1032107	Mdsn	NA	--	--	--	--	--	--
95	441055103230501	3N 6E34BA	High Meadows	441055	1032305	Mdsn	NA	12-18-91	-13.90	-103.0	<1.0	1	<.3
96	441130103205601	3N 6E25BCDC	NA	441130	1032056	Mnls	NA	--	--	--	--	--	--
97	441127103195801	3N 6E25ADDC	NA	441127	1031958	Mnls	NA	--	--	--	--	--	--
98	441318103221301	3N 6E24CADD	NA	441207	1032033	Mnls	NA	--	--	--	--	--	--
99	441208103205001	3N 6E24C	NA	441208	1032050	Mnls	NA	--	--	--	--	--	--
100	441337103225002	3N 6E15ABB2	MD-94A Piedmont Madison	441335	1032250	Mdsn	Pair	09-04-96	-13.68	-103.0	<1.0	1	<.3
101	441337103225001	3N 6E15ABB	MD-84A Piedmont Minnelusa	441335	1032250	Mnls	Pair	09-04-96	-13.61	-100.0	3.0	1	.9
102	441247103220701	3N 6E14CCDD	NA	441247	1032207	Mnls	NA	--	--	--	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekakhta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
103	441311103220801	3N 6E14CBAB	NA	441311	1032208	Mnls	NA	--	--	--	--	--	--
104	441355103230901	3N 6E10CDBB	NA	441355	1032309	Mdsn	NA	--	--	--	--	--	--
105	441303103232601	3N 6E10CBBA	NA	441303	1032326	Mnls	NA	--	--	--	--	--	--
106	440629103040901	2N 9E29BBCC	City of Box Elder	440629	1030409	Mdsn	NA	10-14-92	-14.15	-105.0	<1.0	1	<0.3
106	440629103040901	2N 9E29BBCC	City of Box Elder	440629	1030409	Mdsn	NA	10-22-93	--	--	<1.0	--	<.3
107	440851103044801	2N 9E 7CDCC	Ellsworth AFB	440855	1030510	Mdsn	NA	² 01-01-78	-14.13	-107.0	--	--	--
108	440650103110001	2N 8E20CCDD	NA	440641	1031120	Mdsn	NA	--	--	--	--	--	--
109	440730103112001	2N 8E17CCDD	NA	440730	1031120	Mnls	NA	--	--	--	--	--	--
110	440850103045001	2N 8E13BDC	NA	440801	1030616	Mdsn	NA	--	--	--	--	--	--
111	440504103161501	2N 7E34CCBC	NA	440504	1031615	Mnls	NA	--	--	--	--	--	--
112	440519103160701	2N 7E34CBAA	Black Hills Power & Light	440523	1031557	Mdsn	NA	mean ⁴	-14.30	-108.3	--	--	--
112	440519103160701	2N 7E34CBAA	Black Hills Power & Light	440523	1031557	Mdsn	NA	09-30-93	--	--	11.7	--	3.7
113	440528103155201	2N 7E34BDAD	Timberline	440528	1031552	Mnls	NA	06-22-90	-13.95	-105.0	--	--	--
114	440528103161001	2N 7E34BCCA	NA	440528	1031610	Mnls	NA	--	--	--	--	--	--
115	440538103161201	2N 7E34BBBC	NA	440538	1031612	Mnls	NA	--	--	--	--	--	--
116	440526103173001	2N 7E32ADDD	Rapid City No. 6	440526	1031730	Mdsn	NA	10-04-93	--	--	46.3	--	14.5
116	440526103173001	2N 7E32ADDD	Rapid City No. 6	440526	1031730	Mdsn	NA	mean ⁴	-14.28	-107.2	--	--	--
117	440544103180002	2N 7E32ABBD2	PE-89C City Quarry Madison	440543	1031805	Mdsn	Pair	05-13-92	-14.35	-108.0	96.0	6	30.1
117	440544103180002	2N 7E32ABBD2	PE-89C City Quarry Madison	440543	1031805	Mdsn	Pair	10-13-93	--	--	83.9	--	26.3
118	440544103180001	2N 7E32ABBD	PE-89D City Quarry Minnelusa	440543	1031805	Mnls	Pair	05-12-92	-14.25	-107.0	2.0	1	.6
119	440516103194001	2N 7E31CDCB	Westberry Trails - Minnelusa	440501	1031933	Mnls	NA	08-15-90	-13.65	-101.0	--	--	--
120	440500103195001	2N 7E31CCCA2	NA	440500	1031950	Mdsn	NA	--	--	--	--	--	--
121	440500103193601	2N 7E31CCCA	Westberry Trails - Madison	440458	1031950	Mdsn	NA	09-30-93	--	--	98.9	--	31.0
121	440500103193601	2N 7E31CCCA	Westberry Trails - Madison	440458	1031950	Mdsn	NA	mean ⁴	-13.94	-104.3	--	--	--
122	440541103192301	2N 7E31BADA	NA	440541	1031923	Mdsn	NA	--	--	--	--	--	--
123	440612103152001	2N 7E27DABB	Rapid City No. 10	440612	1031522	Mdsn	NA	10-01-93	--	--	14.9	--	4.7

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
123	440612103152001	2N 7E27DABB	Rapid City No. 10	440612	1031522	Mdsn	NA	⁵ 07-19-00	--	--	23.4	1.6	7.3
123	440612103152001	2N 7E27DABB	Rapid City No. 10	440612	1031522	Mdsn	NA	mean ⁴	-14.38	-108.8	--	--	--
124	440655103140501	2N 7E23DADC	Rapid City No. 8	440655	1031407	Mdsn	NA	09-28-93	--	--	<1.0	--	<.3
124	440655103140501	2N 7E23DADC	Rapid City No. 8	440655	1031407	Mdsn	NA	mean ⁴	-14.40	-108.5	--	--	--
125	440647103183201	2N 7E20CCDB	NA	440647	1031832	Mnls	NA	--	--	--	--	--	--
126	440808103193701	2N 7E18BCA	Lien	440808	1031937	Mdsn	NA	² 07-20-78	--	--	53.0	--	16.6
126	440808103193701	2N 7E18BCA	Lien	440808	1031937	Mdsn	NA	mean ⁴	-14.18	-106.0	--	--	--
127	440738103173601	2N 7E17DDDB	NA	440738	1031736	Mnls	NA	--	--	--	--	--	--
128	440817103181701	2N 7E17BACA2	NA	440817	1031817	Mnls	NA	--	--	--	--	--	--
129	440818103180801	2N 7E17BAAD	PE-84B - Dog Track	440819	1031809	Mnls	Obs	05-19-92	-13.40	-101.0	<1.0	1	<.3
130	440823103162701	2N 7E16AAB	Fischer Sand and Gravel	440823	1031627	Mdsn	NA	09-18-96	-13.66	-102.0	--	--	--
131	440832103160901	2N 7E10CDCA	NA	440837	1031609	Mnls	NA	--	--	--	--	--	--
132	440824103160401	2N 7E10CCDC	NA	440824	1031604	Mnls	NA	--	--	--	--	--	--
133	440826103174701	2N 7E 8DDCC2	NA	440826	1031747	Mnls	NA	--	--	--	--	--	--
134	440833103184101	2N 7E 8CCBC	NA	440833	1031841	Mnls	NA	--	--	--	--	--	--
135	440907103183501	2N 7E 8BBCD	NA	440907	1031835	Mnls	NA	--	--	--	--	--	--
136	440901103184801	2N 7E 7ADAB	NA	440901	1031848	Mnls	NA	--	--	--	--	--	--
137	440919103170501	2N 7E 4CDCE	NA	440920	1031658	Mnls	NA	--	--	--	--	--	--
138	440931103141401	2N 7E 2DBDDC	Weston Development	440931	1031414	Mdsn	NA	10-08-92	-13.45	-100.0	<1.0	1	<.3
138	440931103141401	2N 7E 2DBDDC	Weston Development	440931	1031414	Mdsn	NA	10-14-93	--	--	<1.0	--	<.3
139	440939103142001	2N 7E 2DBDD	NA	440939	1031420	Mnls	NA	--	--	--	--	--	--
140	440527103220401	2N 6E35BCAB	NA	440527	1032204	Mdsn	NA	--	--	--	--	--	--
141	440541103211401	2N 6E35AADA	NA	440541	1032114	Mdsn	NA	--	--	--	--	--	--
142	44058103213001	2N 6E23DBAB	Stanley	440704	1032132	Mdsn	NA	mean ⁴	-14.43	-110.0	--	--	--
143	440708103214301	2N 6E23BDD	NA	440708	1032143	Mdsn	NA	--	--	--	--	--	--
144	440811103222202	2N 6E15ADAA2	PE-96B Doty Deadwood	440811	1032221	Ddwd	Pair	10-21-97	-13.07	-98.0	138.9	8.3	43.5

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Mammelusa; Mnkt, Minnekakhta; Dtdvd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
145	44081103222201	2N 6E15ADAA	PE-95C Doty Madison	440811	10322221	Mdsn	Pair	10-22-97	-13.25	-98.7	25.9	1.9	8.1
146	440919103210201	2N 6E 1CCCD2	NA	440919	1032102	Mnls	NA	--	--	--	--	--	--
147	440920103210401	2N 6E 1CCCD	NA	440920	1032104	Mnls	NA	--	--	--	--	--	--
148	440334103095601	IN 8E 9CAB2	Rapid Valley	440334	1030956	Mdsn	NA	10-13-92	-12.55	-92.5	<1.0	1	<.3
149	440004103174001	IN 7E32DABA	Highland Hills	440006	1031742	Mdsn	NA	07-25-96	--	--	71.0	5	22.3
149	440004103174001	IN 7E32DABA	Highland Hills	440006	1031742	Mdsn	NA	mean ⁴	-12.66	-96.7	--	--	--
150	440002103173901	IN 7E32DA2	NA	440002	1031739	Mdsn	NA	--	--	--	--	--	--
151	440523103194201	IN 7E31BCAD	Beardsley	440019	1031941	Mdsn	NA	09-17-96	-12.26	-91.5	--	--	--
152	440026103194001	IN 7E31BBDA	NA	440026	1031940	Mdsn	NA	--	--	--	--	--	--
153	440032103184601	IN 7E30DDDC	NA	440032	1031846	Mdsn	NA	--	--	--	--	--	--
154	440054103173801	IN 7E29DAAC	Hamm's Well A	440054	1031738	Mdsn	NA	mean ⁴	-12.44	-92.8	--	--	--
155	440148103150001	IN 7E23CBBA	NA	440148	1031500	Mnls	NA	--	--	--	--	--	--
156	440203103143601	IN 7E23BDAB	NA	440203	1031436	Mnls	NA	--	--	--	--	--	--
157	440140103152601	IN 7E22D	NA	440140	1031526	Mnls	NA	--	--	--	--	--	--
158	440213103153401	IN 7E22AB	NA	440213	1031534	Mnls	NA	--	--	--	--	--	--
159	440130103163401	IN 7E21DDC	NA	440130	1031634	Mnls	NA	--	--	--	--	--	--
160	440142103164301	IN 7E21DBDB	NA	440142	1031643	Mnls	NA	--	--	--	--	--	--
161	440223103173201	IN 7E21BCAB	Carriage Hills	440205	1031720	Mdsn	NA	--	--	--	--	--	--
162	440202103164101	IN 7E21ACA	NA	440202	1031641	Mnls	NA	--	--	--	--	--	--
163	440307103193001	IN 7E18BABB	NA	440307	1031930	Mnls	NA	--	--	--	--	--	--
164	440308103184601	IN 7E18AAAD	Cleghorn Well	440308	1031847	Mdsn	NA	11-13-96	-12.44	-96.8	82.0	5	25.7
165	440223103173201	IN 7E17DDDA	Carriage Hills Main Well	440225	1031734	Mdsn	NA	07-24-96	--	--	73.0	5	22.9
165	440223103173201	IN 7E17DDDA	Carriage Hills Main Well	440225	1031734	Mdsn	NA	mean ⁴	-12.13	-92.8	--	--	--
166	440237103173401	IN 7E17DADA	NA	440237	1031734	Mnls	NA	--	--	--	--	--	--
167	440308103180701	IN 7E17ABCC	Steuerwald	440304	1031807	Mdsn	NA	09-13-96	-12.09	-91.9	--	--	--
168	440300103173501	IN 7E17AAAC2	Chapel Lane Madison (CHPLN-2)	440305	1031739	Mdsn	NA	09-30-93	--	--	87.7	--	27.5

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
168	440300103173501	IN 7E17AAAAC2	Chapel Lane Madison (CHPLN-2)	440305	1031739	Mdsn	NA	mean ⁴	-12.05	-92.3	--	--	--
169	440220103164001	IN 7E16DCDC	Rapid City No. 11 (Corral Drive)	440220	1031640	Mdsn	NA	12-17-91	--	--	34.0	3	10.7
169	440220103164001	IN 7E16DCDC	Rapid City No. 11 (Corral Drive)	440220	1031640	Mdsn	NA	10-05-93	--	--	53.0	--	16.6
169	440220103164001	IN 7E16DCDC	Rapid City No. 11 (Corral Drive)	440220	1031640	Mdsn	NA	07-24-96	--	--	51.0	3	16.0
169	440220103164001	IN 7E16DCDC	Rapid City No. 11 (Corral Drive)	440220	1031640	Mdsn	NA	⁵ 07-19-00	--	--	38.4	2.6	12.0
169	440220103164001	IN 7E16DCDC	Rapid City No. 11 (Corral Drive)	440220	1031640	Mdsn	NA	mean ⁴	-12.09	-91.5	--	--	--
170	440300103165801	IN 7E16BADB	NA	440300	1031658	Mnls	NA	--	--	--	--	--	--
171	440225103160801	IN 7E15CC	NA	440225	1031608	Mnls	NA	--	--	--	--	--	--
172	440342103160701	IN 7E10BCDB	Rapid City No. 9 (Meadowbrook)	440342	1031609	Mdsn	NA	05-08-91	--	--	67.0	5	21.0
172	440342103160701	IN 7E10BCDB	Rapid City No. 9 (Meadowbrook)	440342	1031609	Mdsn	NA	09-29-93	--	--	77.5	--	24.3
172	440342103160701	IN 7E10BCDB	Rapid City No. 9 (Meadowbrook)	440342	1031609	Mdsn	NA	05-13-97	--	--	71.0	4.5	22.3
172	440342103160701	IN 7E10BCDB	Rapid City No. 9 (Meadowbrook)	440342	1031609	Mdsn	NA	⁵ 07-19-00	--	--	58.2	3.2	18.2
172	440342103160701	IN 7E10BCDB	Rapid City No. 9 (Meadowbrook)	440342	1031609	Mdsn	NA	mean ⁴	-12.77	-98.3	--	--	--
173	440331103171601	IN 7E9CBAC	NA	440331	1031716	Mnls	NA	--	--	--	--	--	--
174	440338103171601	IN 7E9BCDC	NA	440338	1031716	Mnls	NA	--	--	--	--	--	--
175	440351103171301	IN 7E9BBCA	Rapid City No. 3	440351	1031713	Mnls	NA	mean ⁴	-13.11	-98.7	--	--	--
176	440310103173802	IN 7E8DDCD2	Chapel Lane-Madison (CHPLN-3)	440312	1031740	Mdsn	Pair	12-11-91	-12.35	-92.0	6.0	1	1.9
176	440310103173802	IN 7E8DDCD2	Chapel Lane-Madison (CHPLN-3)	440312	1031740	Mdsn	Pair	09-30-93	--	--	6.9	--	2.2
177	440310103173801	IN 7E8DDCD	Chapel Lane-Minnelusa (CHPLN-1)	440312	1031741	Mnls	Pair	05-20-92	-12.90	-96.5	64.0	4	20.1
178	440338103173302	IN 7E8ADDD2	PE-89A Canyon Lake Madison	440337	1031734	Mdsn	Pair	09-28-93	--	--	75.9	--	23.8
178	440338103173302	IN 7E8ADDD2	PE-89A Canyon Lake Madison	440337	1031734	Mdsn	Pair	mean ⁴	-12.70	-98.0	--	--	--
179	440338103173301	IN 7E8ADDD	PE-89B Canyon Lake Minnelusa	440337	1031735	Mnls	Pair	05-14-92	-13.90	-103.0	22.0	2	6.9
180	440446103193201	IN 7E6BACB	Crosswaite	440446	1031932	Mdsn	NA	09-16-96	-13.69	-104.0	--	--	--
181	440414103164601	IN 7E4DCBA	Rapid City No. 4	440413	1031649	Mnls	NA	mean ⁴	-13.83	-103.0	--	--	--
182	440430103160202	IN 7E3CBAA2	PE-65A Sioux Park 2 Madison	440427	1031605	Mdsn	Pair	mean ⁴	-14.16	-105.7	--	--	--
183	440430103160201	IN 7E3CBAA	PE-64B Sioux Park 1 Minnelusa	440427	1031605	Mnls	Pair	mean ⁴	-14.38	-107.5	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekakhta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
184	440436103161201	IN 7E 3BCBC	NA	440436	1031612	Mnls	NA	--	--	--	--	--	--
185	440443103161301	IN 7E 3BBBCD	Rapid City No. 5	440443	1031613	Mdsn	NA	10-07-93	--	--	13.7	--	4.3
185	440443103161301	IN 7E 3BBBCD	Rapid City No. 5	440443	1031613	Mdsn	NA	mean ⁴	-14.23	-107.0	--	--	--
186	440446103161701	IN 7E 3BBCC	PE-89E Lime Creek	440444	1031618	Mdsn	NA	06-20-90	--	--	<1.0	1	<.3
186	440446103161701	IN 7E 3BBCC	PE-89E Lime Creek	440444	1031618	Mdsn	NA	09-25-93	--	--	<1.0	--	<.3
186	440446103161701	IN 7E 3BBCC	PE-89E Lime Creek	440444	1031618	Mdsn	NA	mean ⁴	-14.38	-109.0	--	--	--
187	440452103155301	IN 7E 3BABD	Camp Rapid	440452	1031553	Mnls	NA	07-16-90	-13.70	-103.0	<1.0	1	<.3
188	440427103131701	IN 7E 1DBBB	Rapid City No. 7 (Star Village)	440426	1031318	Mdsn	Obs	02-07-91	-14.40	-108.0	2.0	1	.6
188	440427103131701	IN 7E 1DBBB	Rapid City No. 7 (Star Village)	440426	1031318	Mdsn	Obs	10-31-93	--	--	<1.0	--	<.3
189	440032103195901	IN 6E36AAAB	NA	440032	1031959	Mdsn	NA	--	--	--	--	--	--
190	440224103195401	IN 6E13DDDD	Brooks Cave	440224	1031954	Mdsn	Cave	03-06-87	-13.40	-102.5	--	--	--
191	435916103161801	IS 7E 3CDBD	PE-86A Reptile Gardens Madison	435915	1031620	Mdsn	Pair	10-30-93	--	--	9.5	--	3.0
191	435916103161801	IS 7E 3CDBD	PE-86A Reptile Gardens Madison	435915	1031620	Mdsn	Pair	07-29-96	-12.78	-95.0	15.0	1	4.7
192	435916103161802	IS 7E 3CDBD2	PE-94B Reptile Gardens Minnelusa	435915	1031620	Mnls	Pair	07-30-96	-12.51	-90.7	4.0	1	1.3
193	435937103184401	IS 7E 5BDCA	Spring Canyon (Main Well) No. 1	435937	1031844	Mdsn	NA	08-28-96	-12.36	-96.8	--	--	--
194	435845103163401	IS 7E10BCAC	NA	435845	1031634	Mnls	NA	--	--	--	--	--	--
195	435851103143501	IS 7E11ACAB	Hart Ranch	435848	1031445	Mdsn	NA	10-19-93	--	--	75.0	--	23.5
195	435851103143501	IS 7E11ACAB	Hart Ranch	435848	1031445	Mdsn	NA	07-23-96	--	--	69.0	4	21.6
195	435851103143501	IS 7E11ACAB	Hart Ranch	435848	1031445	Mdsn	NA	⁵ 07-19-00	--	--	56.6	3.2	17.7
195	435851103143501	IS 7E11ACAB	Hart Ranch	435848	1031445	Mdsn	NA	mean ⁴	-12.27	-93.3	--	--	--
196	435635103181401	IS 7E20CAD	Pine Grove	435635	1031814	Mdsn	NA	10-15-93	--	--	82.6	--	25.9
196	435635103181401	IS 7E20CAD	Pine Grove	435635	1031814	Mdsn	NA	mean ⁴	-11.89	-88.1	--	--	--
197	435227103185301	2S 7E17CCAA	PE-95A Hayward	435227	1031852	Mdsn	Obs	11-20-97	-12.06	-87.9	59.8	3.8	18.7
198	435042103171101	2S 7E28DB	NA	435042	1031711	Mnls	NA	--	--	--	--	--	--
199	435018103155801	2S 7E34ABBA	CU-83A Hermosa West	435020	1031600	Mnls	Obs	10-28-97	-11.98	-87.3	<1.0	1	<.3
200	435004103161301	2S 7E34BD	NA	435004	1031613	Mnls	NA	--	--	--	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
201	434700104021401	3S 1E18DDDB	CU-93C Boles Canyon Madison	434701	1040215	Mdsn	Pair	03-22-94	-16.32	-125.0	9.0	1	2.8
202	434700104021402	3S 1E18DDDB2	CU-93D Boles Canyon Minnelusa	434701	1040215	Mnls	Pair	12-17-97	-15.88	-123.6	3.2	1	1.0
203	434846103481801	3S 3E 6DCBB	NA	434846	1034818	Mdsn	NA	--	--	--	--	--	--
204	434503103183601	3S 7E32BABA	NA	434503	1031836	Mnls	NA	--	--	--	--	--	--
205	434502103165801	3S 7E33AACB	NA	434502	1031658	Mnls	NA	--	--	--	--	--	--
206	434402103502301	4S 2E 2ADB	NA	434402	1035023	Mdsn	NA	--	--	--	--	--	--
207	434326103555101	4S 2E 6CCDC	NA	434326	1035551	Mnls	NA	--	--	--	--	--	--
208	434351103461501	4S 3E 4BCDA	NA	434351	1034615	Mnls	NA	--	--	--	--	--	--
209	434218103463701	4S 3E17ADAB	NA	434218	1034637	Mnls	NA	--	--	--	--	--	--
210	434350103201901	4S 6E 1DAAA	CU-93A CSP Airport Madison	434350	1032020	Mdsn	Pair	09-06-95	-11.75	-87.6	<1.0	1	<.3
211	434350103201902	4S 6E 1DAAA2	CU-93A CSP Airport Minnelusa	434350	1032020	Mnls	Pair	08-31-95	-11.50	-84.9	3.0	1	.9
212	434236103201601	4S 6E12DDAD	NA	434236	1032016	Mnls	NA	--	--	--	--	--	--
213	434001103131301	4S 7E25DDDB	NA	434001	1031313	Mnls	NA	--	--	--	--	--	--
214	433545103502701	5S 2E23DCAB	NA	433545	1035027	Mnls	NA	--	--	--	--	--	--
215	433517103534201	5S 2E28BCCB	CU-95A Hell Canyon Madison	433517	1035342	Mdsn	Pair	11-05-97	-17.23	-130.8	1.9	1	.6
216	433517103534202	5S 2E28BCCB2	CU-95B Hell Canyon Minnelusa	433517	1035342	Mnls	Pair	11-03-97	-14.21	-111.4	<1.0	1	<.3
217	433849103442701	5S 3E 3ADBB	NA	433849	1034427	Mdsn	NA	--	--	--	--	--	--
218	433831103475201	5S 3E 6DAAC	NA	433831	1034752	Mnls	NA	--	--	--	--	--	--
219	433440103465501	5S 3E32ABAB	NA	433440	1034655	Mnls	NA	--	--	--	--	--	--
220	433852103384901	5S 4E 4ABCB	NA	433852	1033849	Mdsn	NA	--	--	--	--	--	--
221	433607103383401	5S 4E21ACAD	NA	433607	1033834	Mdsn	NA	--	--	--	--	--	--
222	433506103344001	5S 4E25DAAA	NA	433510	1033445	Mdsn	NA	--	--	--	--	--	--
223	433628103173801	5S 7E16CDCA	NA	433628	1031738	Mnls	NA	--	--	--	--	--	--
224	432927103520401	6S 2E34BA	NA	432927	1035204	Mnls	NA	--	--	--	--	--	--
225	432927103521001	6S 2E34BABC	NA	432927	1035210	Mnls	NA	--	--	--	--	--	--
226	432917103522101	6S 2E34BC	NA	432917	1035221	Mnls	NA	--	--	--	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnls, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
227	433003103420701	6S 3E25ADDC	Myrvik	433000	1034158	Mnls	NA	05-04-94	-14.27	-109.0	<1.0	1	<0.3
228	433347103385101	6S 4E 4BADA	NA	433343	1033857	Mnls	NA	--	--	--	--	--	--
229	433339103385601	6S 4E 4BADD	NA	433339	1033856	Mnls	NA	--	--	--	--	--	--
230	433119103360001	6S 4E14DDAC	NA	433119	1033600	Mnls	NA	--	--	--	--	--	--
231	433000103393901	6S 4E29ADCA	NA	433000	1033939	Mdsn	NA	--	--	--	--	--	--
232	433302103281501	6S 5E12DBAB	Windy City Lake	433255	1032827	Mdsn	Cave	mean ⁴	-12.25	-90.3	--	--	--
233	433114103281601	6S 5E24BAAA	Kaiser	433114	1032816	Mdsn	NA	² 07-19-78	-12.13	--	88.4	--	27.7
234	433021103273601	6S 5E24DDDD	NA	433021	1032736	Mnls	NA	--	--	--	--	--	--
235	432945103323801	6S 5E29DBDA	NA	432945	1033238	Mnls	NA	--	--	--	--	--	--
236	433303103225801	6S 6E 3DDCA	NA	433303	1032258	Mnls	NA	--	--	--	--	--	--
237	433150103230501	6S 6E15ABDD	Streeter Ranch	433150	1032305	Mdsn	NA	² 11-01-77	--	--	33.8	--	10.6
237	433150103230501	6S 6E15ABDD	Streeter Ranch	433150	1032305	Mdsn	NA	03-11-97	--	--	37.4	2.6	11.7
237	433150103230501	6S 6E15ABDD	Streeter Ranch	433150	1032305	Mdsn	NA	mean ⁴	-11.96	-87.6	--	--	--
238	433115103251401	6S 6E21BBBB	CU-91A (7-11 Ranch 1)	433115	1032516	Mdsn	Pair	03-31-94	-11.93	-88.7	<1.0	1	<.3
239	433115103251402	6S 6E21BBBB2	CU-91B (7-11 Ranch 2)	433115	1032516	Mnls	Pair	04-05-94	-12.38	-93.3	<1.0	1	<.3
240	433115103251403	6S 6E21BBBB3	CU-96A (7-11 Ranch 3)	433115	1032516	Mnkt	Pair	11-13-97	-12.44	-94.5	79.0	4.5	24.8
241	432613103584001	7S 1E15DD	Superior #1 Peterson	432613	1035840	Mnls	NA	10-04-68	--	--	<2.3	--	<.7
242	432548103414801	7S 4E19BCCB	FR-92A Minnekahta Jct Madison	432545	1034151	Mdsn	Pair	03-24-94	-14.88	-114.0	<1.0	1	<.3
243	432548103414802	7S 4E19BCCB2	FR-94A Minnekahta Jct Minnelusa	432545	1034151	Mnls	Pair	09-11-95	-13.87	-104.0	<1.0	1	<.3
244	432808103294901	7S 5E 2CBAB	NA	432808	1032949	Mnls	NA	--	--	--	--	--	--
245	432616103294701	7S 5E14CBDD	NA	432616	1032947	Mnls	NA	--	--	--	--	--	--
246	432616103294702	7S 5E14CBDD2	NA	432616	1032947	Mnls	NA	--	--	--	--	--	--
247	432603103295901	7S 5E14CCCC	FR-95A Vets Home Madison	432602	1032958	Mdsn	Obs	11-18-97	-15.97	-121.9	<1.0	1	<.3
248	432622103291501	7S 5E14DBC	NA	432622	1032915	Mnls	NA	--	--	--	--	--	--
249	432537103301401	7S 5E22ADBC	NA	432537	1033014	Mnls	NA	--	--	--	--	--	--
250	432523103305401	7S 5E22CDCB	NA	432523	1033054	Mnls	NA	--	--	--	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnl, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Wells or Caves—Continued													
251	432510103304801	7S 5E22CDCD	NA	432510	1033048	Mnls	NA	--	--	--	--	--	--
252	432459103290101	7S 5E26AACA	NA	432459	1032901	Mnls	NA	--	--	--	--	--	--
253	432136103321001	8S 5E16BBAD	Fetters	432136	1033210	Mdsn	NA	05-12-94	-16.59	-127.0	<1.0	1	<0.3
254	432127103325601	8S 5E17ACBB	Chiller	432127	1033256	Mnls	NA	05-11-94	-15.15	-118.0	<1.0	1	<.3
255	431810103491701	9S 2E 1AABC	NA	431810	1034917	Mdsn	NA	--	--	--	--	--	--
256	431804103492101	9S 2E 1ABDD	NA	431804	1034921	Mdsn	NA	--	--	--	--	--	--
257	431753103492601	9S 2E 1ACDB	NA	431753	1034926	Mdsn	NA	--	--	--	--	--	--
258	431750103500301	9S 2E 1BCDC	NA	431750	1035003	Mdsn	NA	--	--	--	--	--	--
259	431743103501501	9S 2E 2DAAA	NA	431743	1035015	Mdsn	NA	--	--	--	--	--	--
260	431232103513501	10S 2E 3DAAA	NA	431232	1035135	Mdsn	NA	--	--	--	--	--	--
261	431218103512501	10S 2E 3DADD	NA	431218	1035125	Mdsn	NA	--	--	--	--	--	--
262	431220103514001	10S 2E 3DDAA	NA	431220	1035140	Mdsn	NA	--	--	--	--	--	--
263	431246103515901	10S 2E13ACBA	Black Hills Army Depot #2 (Provo)	431105	1034935	Mdsn	NA	2 ⁰ 1-01-78	-17.09	-131.0	--	--	--
264	445546104382701	57N 65W15DA - Wyo	HTH No. 1	445546	1043827	Mdsn	NA	2 ⁰ 1-01-78	--	--	17.2	--	5.4
265	443458104425801	53N 65W18BBD - Wyo	Devils Tower	443458	1044258	Mdsn	NA	2 ⁰ 1-01-78	-17.85	-139.9	4.8	--	1.5
266	442930104063501	52N 60W18C - Wyo	Ranch A	442930	1040635	Mdsn	NA	2 ⁰ 1-01-78	-17.49	--	132.7	--	41.6
267	440621104364301	48N 65W25CC - Wyo	Upton	440621	1043643	Mdsn	NA	2 ⁰ 1-01-78	-18.18	-133.0	--	--	--
268	435740104294002	46N 64W13CC - Wyo	Coronado No. 2	435740	1042940	Mdsn	NA	2 ⁰ 1-01-78	-17.60	-133.3	<1.0	--	<.3
269	435800104244001	46N 63W15BD - Wyo	Osage	435800	1042440	Mdsn	NA	2 ⁰ 1-01-78	-18.15	-135.0	1.6	--	.5
270	435800104210001	46N 62W18BDC - Wyo	Seeley	435800	1042100	Mdsn	NA	2 ⁰ 1-01-78	-17.75	-133.5	2.6	--	.8
271	435540104063001	46N 60W31BA - Wyo	Martens	435540	1040630	Mdsn	NA	2 ⁰ 1-01-78	-17.45	-130.9	--	--	--
272	435030104110001	45N 61W33AB - Wyo	Self	435030	1041100	Mdsn	NA	2 ⁰ 1-01-78	-17.60	-131.8	<1.0	--	<.3
273	435125104110502	45N 61W28AB - Wyo	Voss	435125	1041105	Mdsn	NA	2 ⁰ 1-01-78	-17.40	-130.6	7.3	--	2.3
274	435138104121101	45N 61W20DCA - Wyo	Newcastle	435138	1041211	Mdsn	NA	2 ⁰ 1-01-78	-17.66	-130.0	<1.0	--	<.3
275	434700104230001	44N 63W26CAC - Wyo	JBJ	434700	1042300	Mdsn	NA	2 ⁰ 1-01-78	-17.95	-130.6	<1.0	--	<.3

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnl, Minnelusa; Mnkt, Minnekakhta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Springs													
276	442706104015401	6N 1E30DAAD	Knight Spring	442706	1040154	Mnl	HW	08-04-95	--	--	130.0	7	40.8
276	442706104015401	6N 1E30DAAD	Knight Spring	442706	1040154	Mnl	HW	mean ⁴	-16.91	-126.6	--	--	--
277	441726103285801	4N 5E23DBC	Jones Spring	441726	1032858	Mdsn	HW	² 01-01-78	-14.61	-110.0	880.4	--	276.0
278	441949103583201	4N 1E 3DD	NA	441950	1035830	Mdsn	HW	--	--	--	--	--	--
279	441232103264301	3N 6E19BDBA	NA	441232	1032643	Mdsn	HW	07-18-96	-14.06	-103.0	130.0	8	40.8
280	441322103272801	3N 5E13ACAA	NA	441322	1032728	Ddwd	HW	08-08-95	--	--	170.0	9	53.3
280	441322103272801	3N 5E13ACAA	NA	441322	1032728	Ddwd	HW	mean ⁴	-13.96	-104.4	--	--	--
281	441310103435901	3N 3E14CBBB	JHD Spring	441310	1034359	Ddwd	HW	09-13-95	--	--	170.0	9	53.3
281	441310103435901	3N 3E14CBBB	JHD Spring	441310	1034359	Ddwd	HW	mean ⁴	-16.56	-126.8	--	--	--
282	441434103560001	3N 2E 6CCCD	Intake Gulch	441434	1035600	Mdsn	HW	08-03-95	--	--	100.0	6	31.3
282	441434103560001	3N 2E 6CCCD	Intake Gulch	441434	1035600	Mdsn	HW	mean ⁴	-17.59	-133.7	--	--	--
283	06408700	2N 2E15ADB	Rhoads Fork near Rochford	440812	1035129	Mdsn	HW	² 01-01-78	--	--	198.4	--	62.2
283	06408700	2N 2E15ADB	Rhoads Fork near Rochford	440812	1035129	Mdsn	HW	08-07-95	--	--	140.0	8	43.9
283	06408700	2N 2E15ADB	Rhoads Fork near Rochford	440812	1035129	Mdsn	HW	mean ⁴	-16.96	-127.1	--	--	--
284	440820104004000	2N 1E16BBD	Cold Creek Springs	440820	1040040	Mdsn	HW	--	--	--	--	--	--
285	06409000	1N 2E25CCA	Castle Creek above Deerfield	440049	1034948	Mdsn	HW	mean ⁴	-16.41	-123.7	--	--	--
286	440415104014000	1N 1E 5CCA	Beaver Creek Springs	440415	1040140	Mdsn	HW	--	--	--	--	--	--
287	434953103585201	2S 1E34DBAC	Barrel Spring	434953	1035852	Mnl	HW	07-25-95	--	--	59.0	4	18.5
287	434953103585201	2S 1E34DBAC	Barrel Spring	434953	1035852	Mnl	HW	mean ⁴	-14.60	-113.6	--	--	--
288	434045103502301	4S 2E26AABC	Water Draw Spring	434045	1035023	Mnl	HW	09-14-95	--	--	41.0	3	12.9
288	434045103502301	4S 2E26AABC	Water Draw Spring	434045	1035023	Mnl	HW	mean ⁴	-14.27	-112.5	--	--	--
289	433944103521801	4S 2E34BCAB	Mckenna Spring	433944	1035218	Mnl	HW	09-14-95	--	--	26.0	2	8.2
289	433944103521801	4S 2E34BCAB	Mckenna Spring	433944	1035218	Mnl	HW	mean ⁴	-13.41	-103.6	--	--	--
290	443237103525801	7N2E28BACD	Higgins Gulch below I-90	443237	1035258	Mnl	DG	09-26-94	--	--	100.0	6	31.3
290	443237103525801	7N2E28BACD	Higgins Gulch below I-90	443237	1035258	Mnl	DG	10-10-97	--	--	89.6	5.1	28.1
290	443237103525801	7N2E28BACD	Higgins Gulch below I-90	443237	1035258	Mnl	DG	mean ⁴	-16.36	-123.8	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnl, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Springs—Continued													
291	443012103544700		Higgins Gulch above Spearfish	443012	1035447		DG	08-21-97	-16.75	-126.2	76.5	4.5	24.0
292	443309103532401	7N 2E20DAAD	Old Spearfish Hatchery	443309	1035324		DG	09-26-94	-16.71	-128.0	83.0	5	26.0
292	443309103532401	7N 2E20DAAD	Old Spearfish Hatchery	443309	1035324		DG	08-21-97	--	--	42.9	2.6	13.4
293	443330104003401	7N 1E21BBBCD	McNenny Rearing Pond	443330	1040034		DG	09-28-94	-17.19	-132.0	66.0	4	20.7
294	443335104010001	7N 1E20AABC	Mirror Lake	443335	1040100		DG	09-28-94	-15.34	-123.0	54.0	3	16.9
295	443356103593701	7N 1E16DADC	Cox Lake	443356	1035937		DG	09-27-94	-16.95	-129.0	67.0	4	21.0
296	06430532	7N 1E16BDB	Crow Creek near Beulah, WY	443414	1040019		DG	08-30-96	-16.67	-128.0	61.0	4	19.1
297	06425100	3N 8E 9AA	Elk Creek near Rapid City	441425	1030903		DG	09-05-96	-13.79	-106.0	96.0	6	30.1
298	440525103173701	2N 7E32ADDA2	City Springs	440525	1031737		DG	09-26-93	--	--	130.2	--	40.8
298	440525103173701	2N 7E32ADDA2	City Springs	440525	1031737		DG	⁵ 06-06-00	--	--	81.9	4.8	25.7
298	440525103173701	2N 7E32ADDA2	City Springs	440525	1031737		DG	mean ⁴	-14.37	-107.9	--	--	--
299	440243103193701	1N 7E18CBAA	Tittle Spring	440243	1031937		DG	07-22-96	-14.45	-111.0	92.0	5	28.8
300	440327103180503	1N 7E 8DBBD	Cleghorn Springs	440331	1031801		DG	² 01-01-78	--	--	580.6	--	182.0
300	440327103180503	1N 7E 8DBBD	Cleghorn Springs	440331	1031801		DG	09-27-93	--	--	96.3	--	30.2
300	440327103180503	1N 7E 8DBBD	Cleghorn Springs	440331	1031801		DG	mean ⁴	-12.92	-99.1	--	--	--
301	435013103162600	2S 7E34BBB	Battle Creek bel. Minnelusa outcrop	435013	1031626		DG	09-06-96	-11.62	-85.9	65.0	4	20.4
302	434655103181701	3S 7E17DCDD	Grace Coolidge Creek	434655	1031817		DG	09-10-96	-11.68	-88.5	55.0	3	17.2
303	433128103223401	6S 6E14CDB	Beaver Creek Spring	433128	1032234		DG	04-25-94	--	--	19.0	2	6.0
303	433128103223401	6S 6E14CDB	Beaver Creek Spring	433128	1032234		DG	10-03-94	-14.10	-108.0	--	--	--
304	432703103302801	7S 5E10DCBA	Hot Brook Spring	432703	1033028		DG	04-21-94	--	--	13.0	1	4.1
304	432703103302801	7S 5E10DCBA	Hot Brook Spring	432703	1033028		DG	10-03-94	-14.86	-113.0	12.0	1	3.8
305	432630103284701	7S 5E13BCCC	Evans Plunge Spring	432630	1032847		DG	² 01-01-78	-16.71	-121.0	--	--	--
305	432630103284701	7S 5E13BCCC	Evans Plunge Spring	432630	1032847		DG	04-21-94	--	--	2.0	1	.6
306	06402000	7S 5E24BB	Fall River at Hot Springs	432550	1032833		DG	09-11-96	-15.43	-119.0	8.0	1	2.5
307	432028103331601	8S 5E20BDCB	Cool Spring	432028	1033316		DG	09-12-96	-15.23	-116.0	8.0	1	2.5
308	432006103330501	8S 5E20CDAB	Cascade Springs	432006	1033305		DG	10-19-95	--	--	7.0	1	2.2

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnl, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Springs—Continued													
308	432006103330501	8S 5E20CDAB	Cascade Springs	432006	1033305		DG	09-12-96	--	--	7.0	1	2.2
308	432006103330501	8S 5E20CDAB	Cascade Springs	432006	1033305		DG	mean ⁴	-15.40	-118.5	--	--	--
Surface Water													
309	06429920		Bear Gulch near Maurice	442514	1040226	NA	LZ	10-10-96	--	--	42.0	3	13.2
309	06429920		Bear Gulch near Maurice	442514	1040226	NA	LZ	09-11-97	--	--	59.2	3.8	18.6
309	06429920		Bear Gulch near Maurice	442514	1040226	NA	LZ	mean ⁴	-16.96	-128.8	--	--	--
310	06430520		Beaver Creek near Maurice	442257	1040013	NA	LZ	10-09-96	--	--	75.0	5	23.5
310	06430520		Beaver Creek near Maurice	442257	1040013	NA	LZ	09-11-97	--	--	68.8	4.5	21.6
310	06430520		Beaver Creek near Maurice	442257	1040013	NA	LZ	mean ⁴	-16.59	-127.4	--	--	--
311	442405103485100		False Bottom Cr ab Madison outcrop	442405	1034851	NA	LZ	08-21-97	-16.93	-127.7	43.5	2.6	13.6
312	06437020		Bear Butte Creek near Deadwood	442008	1033806	NA	LZ	10-09-96	--	--	99.0	6	31.0
312	06437020		Bear Butte Creek near Deadwood	442008	1033806	NA	LZ	10-10-97	--	--	81.9	5.1	25.7
312	06437020		Bear Butte Creek near Deadwood	442008	1033806	NA	LZ	mean ⁴	-16.01	-121.2	--	--	--
313	441742103333300		Elk Creek above Meadow Creek	441742	1033333	NA	LZ	09-20-96	--	--	100.0	6	31.3
313	441742103333300		Elk Creek above Meadow Creek	441742	1033333	NA	LZ	10-09-97	--	--	81.0	4.5	25.4
313	441742103333300		Elk Creek above Meadow Creek	441742	1033333	NA	LZ	mean ⁴	-16.24	-123.7	--	--	--
314	441738103333400		Meadow Creek above Elk Creek	441738	1033334	NA	LZ	09-20-96	--	--	120.0	7	37.6
314	441738103333400		Meadow Creek above Elk Creek	441738	1033334	NA	LZ	10-09-97	--	--	113.6	6.4	35.6
314	441738103333400		Meadow Creek above Elk Creek	441738	1033334	NA	LZ	mean ⁴	-15.74	-118.2	--	--	--
315	06422500		Boxelder Creek near Nemo	440838	1032716	NA	LZ	09-27-93	--	--	185.3	--	58.1
315	06422500		Boxelder Creek near Nemo	440838	1032716	NA	LZ	10-08-97	--	--	85.4	5.1	26.8
315	06422500		Boxelder Creek near Nemo	440838	1032716	NA	LZ	⁵ 06-06-00	--	--	50.6	3.2	15.9
315	06422500		Boxelder Creek near Nemo	440838	1032716	NA	LZ	mean ⁴	-15.35	-116.3	--	--	--
316	06412200		Rapid Creek above Victoria Creek	440248	1032106	NA	LZ	09-27-93	--	--	110.7	--	34.7
316	06412200		Rapid Creek above Victoria Creek	440248	1032106	NA	LZ	mean ⁴	-14.18	-109.9	--	--	--
317	440110103245101		Victoria Creek	440110	1032451	NA	LZ	mean ⁴	-13.49	-99.7	--	--	--

Table 7. Selected site information and isotope data for sites used in report—Continued

[pCi/L, picocuries per liter; TU, tritium unit; Mdsn, Madison; Mnl, Minnelusa; Mnkt, Minnekahta; Ddwd, Deadwood; <, less than; NA, not applicable; Obs, observation; LZ, loss zone; --, no data. Site types: Obs, observation well; Pair, observation well pair; HW, headwater spring; DG, downgradient spring; LZ, stream above loss zone]

Site number	Station identification number	Local number	Name	Latitude	Longitude	Aquifer	Site type	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)	Tritium (pCi/L)	Tritium 2-sigma (pCi/L)	Tritium (TU) ¹
Surface Water—Continued													
318	06407500		Spring Creek near Keystone	435845	1032025	NA	LZ	09-27-93	--	--	94.7	--	29.7
318	06407500		Spring Creek near Keystone	435845	1032025	NA	LZ	09-09-96	--	--	80.0	5	25.1
318	06407500		Spring Creek near Keystone	435845	1032025	NA	LZ	mean ⁴	-12.59	-96.5	--	--	--
319	06404000		Battle Creek near Keystone	435221	1032010	NA	LZ	09-06-96	--	--	61.0	4	19.1
319	06404000		Battle Creek near Keystone	435221	1032010	NA	LZ	09-12-97	--	--	61.1	3.8	19.2
319	6404000		Battle Creek near Keystone	435221	1032010	NA	LZ	mean ⁴	-11.51	-84.8	--	--	--
320	06404998		Grace Coolidge Cr nr Game Lodge	434540	1032149	NA	LZ	09-10-96	--	--	51.0	3	16.0
320	06404998		Grace Coolidge Cr nr Game Lodge	434540	1032149	NA	LZ	09-12-97	--	--	50.6	3.2	15.9
320	06404998		Grace Coolidge Cr nr Game Lodge	434540	1032149	NA	LZ	mean ⁴	-11.58	-85.8	--	--	--
321	06403300		French Creek above Fairburn	434302	1032203	NA	LZ	10-07-96	--	--	65.0	4	20.4
321	06403300		French Creek above Fairburn	434302	1032203	NA	LZ	09-11-97	--	--	57.6	3.8	18.1
321	06403300		French Creek above Fairburn	434302	1032203	NA	LZ	mean ⁴	-11.58	-89.5	--	--	--
322	06402430		Beaver Creek near Pringle	433453	1032834	NA	LZ	10-01-96	--	--	83.0	5	26.0
322	06402430		Beaver Creek near Pringle	433453	1032834	NA	LZ	09-10-97	--	--	73.3	4.5	23.0
322	06402430		Beaver Creek near Pringle	433453	1032834	NA	LZ	mean ⁴	-12.28	-92.2	--	--	--
Meteorological													
323	441852103594800		Precip at Little Spearfish Cr	441852	1035948	NA	NA	06-20-98	--	--	40.3	2.6	12.6
324	440415103151500		Precip at USGS at Rapid City	440415	1031515	NA	NA	05-22-97	--	--	45.8	3.2	14.4
324	440415103151500		Precip at USGS at Rapid City	440415	1031515	NA	NA	05-21-98	--	--	66.9	3.8	21.0

¹ 1 TU = 3.19 pCi/L.

² Data from Busby and others (1983, 1991). In some cases, exact sample dates are unknown but are listed as 01-01-78.

³ Recent drilling in the vicinity indicates that these may be Opeche or Minnekahta.

⁴ Mean values for individual samples listed in table 8.

⁵ Table includes only data collected through water year 1998, with exception of tritium data for six selected sites collected during water year 2000.

Table 8. Stable isotope data for sites with multiple samples

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
48	Swanson Well	08-16-94	-17.45	-133.0
48	Swanson Well	08-30-96	-17.46	-132.0
112	Black Hills Power & Light	06-26-90	-14.30	-108.0
112	Black Hills Power & Light	09-30-93	-14.40	-108.0
112	Black Hills Power & Light	04-20-95	-14.20	-109.0
116	Rapid City No. 6	04-03-90	-14.15	-105.0
116	Rapid City No. 6	12-13-90	-14.45	-109.0
116	Rapid City No. 6	10-04-93	-14.40	-107.0
116	Rapid City No. 6	04-20-95	-14.20	-108.0
116	Rapid City No. 6	08-26-96	-14.22	-107.0
121	Westberry Trails - Madison	08-21-90	-14.00	-103.0
121	Westberry Trails - Madison	09-30-93	-14.00	-105.0
121	Westberry Trails - Madison	04-26-95	-13.80	-106.0
121	Westberry Trails - Madison	09-11-96	-13.96	-103.0
123	Rapid City No. 10	09-06-91	-14.35	-110.0
123	Rapid City No. 10	10-01-93	-14.40	-108.0
123	Rapid City No. 10	10-14-94	-14.40	-109.0
123	Rapid City No. 10	08-26-96	-14.36	-108.0
124	Rapid City No. 8	09-05-91	-14.30	-108.0
124	Rapid City No. 8	09-28-93	-14.50	-109.0
124	Rapid City No. 8	04-18-95	-14.40	-109.0
124	Rapid City No. 8	08-26-96	-14.41	-108.0
126	Lien	¹ 07-20-78	-14.19	--
126	Lien	09-10-96	-14.17	-106.0
142	Stanley	08-23-89	-14.36	-109.0
142	Stanley	09-10-96	-14.49	-111.0
149	Highland Hills	07-25-96	-12.53	-96.3
149	Highland Hills	11-18-96	-12.47	-94.8
149	Highland Hills	01-09-97	-12.50	-95.6
149	Highland Hills	03-03-97	-12.54	-94.9
149	Highland Hills	05-13-97	-12.72	-97.9
149	Highland Hills	07-14-97	-12.94	-100.3
149	Highland Hills	09-10-97	-12.79	-97.4
149	Highland Hills	12-05-97	-12.73	-96.4
149	Highland Hills	02-06-98	-12.63	-96.1

Table 8. Stable isotope data for sites with multiple samples—Continued

[-, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
149	Highland Hills	05-11-98	-12.74	-95.9
149	Highland Hills	07-08-98	-12.73	-97.2
149	Highland Hills	09-30-98	-12.56	-98.0
154	Hamms Well A	12-04-86	-12.55	-93.0
154	Hamms Well A	02-06-87	-12.40	-93.0
154	Hamms Well A	04-09-87	-12.50	-92.0
154	Hamms Well A	06-04-87	-12.40	-94.0
154	Hamms Well A	07-02-87	-12.35	-91.0
154	Hamms Well A	08-11-87	-12.45	-93.5
165	Carriage Hills Main Well	07-24-96	-11.93	-91.3
165	Carriage Hills Main Well	11-18-96	-12.03	-90.6
165	Carriage Hills Main Well	01-07-97	-11.98	-91.0
165	Carriage Hills Main Well	03-03-97	-11.99	-90.7
165	Carriage Hills Main Well	05-13-97	-12.04	-93.4
165	Carriage Hills Main Well	07-11-97	-12.13	-92.9
165	Carriage Hills Main Well	09-10-97	-12.12	-94.3
165	Carriage Hills Main Well	12-05-97	-12.15	-91.8
165	Carriage Hills Main Well	02-06-98	-12.20	-94.7
165	Carriage Hills Main Well	05-07-98	-12.24	-93.9
165	Carriage Hills Main Well	07-08-98	-12.34	-94.6
165	Carriage Hills Main Well	09-29-98	-12.35	-93.8
168	Chapel Lane Madison (CHPLN-2)	04-09-87	-11.85	-90.5
168	Chapel Lane Madison (CHPLN-2)	05-07-87	-11.81	-90.5
168	Chapel Lane Madison (CHPLN-2)	08-21-87	-11.90	-91.5
168	Chapel Lane Madison (CHPLN-2)	01-21-88	-11.75	-89.8
168	Chapel Lane Madison (CHPLN-2)	03-22-88	-11.79	-91.0
168	Chapel Lane Madison (CHPLN-2)	05-17-88	-11.76	-90.3
168	Chapel Lane Madison (CHPLN-2)	06-24-88	-11.80	-90.0
168	Chapel Lane Madison (CHPLN-2)	07-22-88	-11.80	-91.7
168	Chapel Lane Madison (CHPLN-2)	08-19-88	-11.82	-92.3
168	Chapel Lane Madison (CHPLN-2)	01-19-90	-12.10	-94.5
168	Chapel Lane Madison (CHPLN-2)	07-23-90	-12.15	-92.5
168	Chapel Lane Madison (CHPLN-2)	09-30-93	-11.90	-91.0
168	Chapel Lane Madison (CHPLN-2)	04-25-95	-11.80	-92.0
168	Chapel Lane Madison (CHPLN-2)	09-13-96	-12.09	-92.5

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
168	Chapel Lane Madison (CHPLN-2)	10-24-96	-12.07	-91.8
168	Chapel Lane Madison (CHPLN-2)	11-18-96	-12.04	-90.2
168	Chapel Lane Madison (CHPLN-2)	01-07-97	-12.11	-91.1
168	Chapel Lane Madison (CHPLN-2)	03-03-97	-12.16	-91.6
168	Chapel Lane Madison (CHPLN-2)	05-13-97	-12.16	-95.3
168	Chapel Lane Madison (CHPLN-2)	07-11-97	-12.20	-94.3
168	Chapel Lane Madison (CHPLN-2)	09-10-97	-12.29	-93.4
168	Chapel Lane Madison (CHPLN-2)	12-05-97	-12.36	-94.6
168	Chapel Lane Madison (CHPLN-2)	02-06-98	-12.39	-93.3
168	Chapel Lane Madison (CHPLN-2)	05-07-98	-12.36	-94.4
168	Chapel Lane Madison (CHPLN-2)	07-08-98	-12.34	-94.2
168	Chapel Lane Madison (CHPLN-2)	09-29-98	-12.39	-95.0
169	Rapid City No. 11 (Corral Drive)	12-17-91	-11.90	-90.5
169	Rapid City No. 11 (Corral Drive)	10-05-93	-12.20	-92.0
169	Rapid City No. 11 (Corral Drive)	04-21-95	-12.00	-91.0
169	Rapid City No. 11 (Corral Drive)	07-24-96	-12.07	-90.8
169	Rapid City No. 11 (Corral Drive)	08-26-96	-12.13	-92.5
169	Rapid City No. 11 (Corral Drive)	11-14-96	-12.07	-91.0
169	Rapid City No. 11 (Corral Drive)	01-07-97	-12.04	-90.8
169	Rapid City No. 11 (Corral Drive)	03-11-97	-12.00	-92.0
169	Rapid City No. 11 (Corral Drive)	05-13-97	-12.07	-92.1
169	Rapid City No. 11 (Corral Drive)	07-11-97	-12.13	-91.5
169	Rapid City No. 11 (Corral Drive)	09-10-97	-12.13	-92.6
169	Rapid City No. 11 (Corral Drive)	05-07-98	-12.13	-91.2
169	Rapid City No. 11 (Corral Drive)	07-08-98	-12.21	-90.8
169	Rapid City No. 11 (Corral Drive)	09-29-98	-12.21	-92.6
172	Rapid City No. 9 (Meadowbrook)	05-08-91	-13.40	-101.0
172	Rapid City No. 9 (Meadowbrook)	09-26-93	-12.70	-97.0
172	Rapid City No. 9 (Meadowbrook)	04-24-95	-12.60	-97.0
172	Rapid City No. 9 (Meadowbrook)	07-26-96	-12.65	-99.3
172	Rapid City No. 9 (Meadowbrook)	08-26-96	-12.69	-98.1
172	Rapid City No. 9 (Meadowbrook)	05-13-97	-12.68	-97.8
172	Rapid City No. 9 (Meadowbrook)	07-08-98	-12.70	-97.9
175	Rapid City No. 3	12-05-86	-13.30	-99.0
175	Rapid City No. 3	02-06-87	-13.25	-98.0

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
175	Rapid City No. 3	03-10-87	-13.10	--
175	Rapid City No. 3	04-10-87	-13.30	-98.5
175	Rapid City No. 3	06-16-87	-13.30	-99.0
175	Rapid City No. 3	07-02-87	-11.55	-95.5
175	Rapid City No. 3	08-20-87	-13.30	-97.9
175	Rapid City No. 3	09-01-87	-13.25	-98.5
175	Rapid City No. 3	03-17-88	-13.25	-99.5
175	Rapid City No. 3	05-17-88	-13.20	-98.5
175	Rapid City No. 3	07-19-88	-13.40	-102.5
178	PE-89A Canyon Lake Madison	12-06-89	-12.85	-100.0
178	PE-89A Canyon Lake Madison	09-28-93	-12.70	-98.0
178	PE-89A Canyon Lake Madison	04-19-95	-12.60	-97.0
178	PE-89A Canyon Lake Madison	10-10-96	-12.63	-97.1
181	Rapid City No. 4	12-05-86	-13.90	-104.5
181	Rapid City No. 4	02-06-87	-13.90	-102.0
181	Rapid City No. 4	03-10-87	-13.90	-102.0
181	Rapid City No. 4	04-10-87	-13.85	-102.5
181	Rapid City No. 4	06-16-87	-13.85	-105.0
181	Rapid City No. 4	07-02-87	-13.30	-102.5
181	Rapid City No. 4	08-07-87	-13.90	-103.0
181	Rapid City No. 4	09-01-87	-14.00	-103.5
181	Rapid City No. 4	03-22-88	-13.85	-102.5
181	Rapid City No. 4	05-17-88	-13.85	-103.0
181	Rapid City No. 4	07-15-88	-13.90	-103.0
181	Rapid City No. 4	07-18-90	-13.75	-101.0
181	Rapid City No. 4	08-26-96	-13.81	-104.0
182	PE-65A Sioux Park 2 Madison	03-14-90	-14.25	-105.0
182	PE-65A Sioux Park 2 Madison	08-30-90	-14.45	-108.0
182	PE-65A Sioux Park 2 Madison	10-10-96	-13.79	-104.0
183	PE-64B Sioux Park 1 Minnelusa	03-14-90	-14.50	-109.0
183	PE-64B Sioux Park 1 Minnelusa	08-29-90	-14.25	-106.0
185	Rapid City No. 5	04-25-90	-14.50	-108.0
185	Rapid City No. 5	10-07-93	-14.30	-107.0
185	Rapid City No. 5	10-13-94	-14.10	-106.0
185	Rapid City No. 5	08-26-96	-14.01	-107.0

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
186	PE-89E Lime Creek	11-21-89	-14.45	-109.0
186	PE-89E Lime Creek	06-20-90	-14.30	-109.0
195	Hart Ranch	12-08-86	-11.70	-89.0
195	Hart Ranch	06-08-87	-11.70	-90.0
195	Hart Ranch	07-12-87	-11.70	-89.5
195	Hart Ranch	08-20-87	-11.70	-90.0
195	Hart Ranch	10-19-93	-11.70	-90.0
195	Hart Ranch	04-26-95	-11.80	-91.0
195	Hart Ranch	07-23-96	-12.37	-93.3
195	Hart Ranch	11-14-96	-12.38	-93.0
195	Hart Ranch	01-08-97	-12.41	-94.9
195	Hart Ranch	03-11-97	-12.36	-95.0
195	Hart Ranch	05-13-97	-12.47	-93.8
195	Hart Ranch	07-11-97	-12.54	-94.5
195	Hart Ranch	09-10-97	-12.70	-97.1
195	Hart Ranch	12-05-97	-12.73	-95.8
195	Hart Ranch	02-06-98	-12.68	-95.3
195	Hart Ranch	05-07-98	-12.53	-94.5
195	Hart Ranch	07-08-98	-12.69	-96.0
195	Hart Ranch	09-29-98	-12.65	-97.2
196	Pine Grove	12-09-86	-11.90	-87.5
196	Pine Grove	02-10-87	-11.85	-87.5
196	Pine Grove	03-10-87	-11.95	-87.0
196	Pine Grove	04-10-87	-11.95	-89.0
196	Pine Grove	07-13-87	-11.95	-87.0
196	Pine Grove	08-16-89	-11.76	-88.4
196	Pine Grove	10-15-93	-12.00	-89.0
196	Pine Grove	04-21-95	-11.80	-88.0
196	Pine Grove	11-18-96	-11.89	-88.6
196	Pine Grove	01-09-97	-11.86	-88.0
196	Pine Grove	03-05-97	-11.90	-88.5
232	Windy City Lake	03-10-87	-12.45	-91.0
232	Windy City Lake	05-17-88	-12.05	-89.5
237	Streeter Ranch	¹ 11-01-77	-12.05	-88.4
237	Streeter Ranch	03-11-97	-11.87	-86.8

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
276	Knight Spring	08-04-95	-16.85	-125.0
276	Knight Spring	08-28-96	-16.90	-127.0
276	Knight Spring	09-11-97	-16.98	-127.8
280		08-08-95	-13.86	-103.0
280		09-09-96	-13.97	-106.0
280		09-09-97	-14.04	-104.2
281	JHD Spring	09-13-95	-16.55	-128.0
281	JHD Spring	09-06-96	-16.61	-126.0
281	JHD Spring	09-09-97	-16.53	-126.4
282	Intake Gulch	08-03-95	-17.55	-135.0
282	Intake Gulch	08-28-96	-17.67	-133.0
282	Intake Gulch	09-09-97	-17.54	-133.0
283	Rhoads Fork near Rochford	¹ 01-01-78	-17.22	-125.0
283	Rhoads Fork near Rochford	12-05-86	-16.95	-126.5
283	Rhoads Fork near Rochford	04-14-87	-16.95	-127.5
283	Rhoads Fork near Rochford	06-12-87	-17.05	-128.0
283	Rhoads Fork near Rochford	07-06-87	-17.05	-127.5
283	Rhoads Fork near Rochford	08-11-87	-17.00	-129.0
283	Rhoads Fork near Rochford	08-07-95	-16.89	-125.0
283	Rhoads Fork near Rochford	08-28-96	-16.79	-127.0
283	Rhoads Fork near Rochford	09-09-97	-16.75	-128.5
285	Castle Creek above Deerfield	02-09-87	-16.45	-123.0
285	Castle Creek above Deerfield	04-14-87	-16.60	-124.0
285	Castle Creek above Deerfield	05-05-87	-16.50	-124.0
285	Castle Creek above Deerfield	06-12-87	-16.40	-123.5
285	Castle Creek above Deerfield	07-06-87	-16.35	-125.0
285	Castle Creek above Deerfield	08-11-87	-16.25	-122.5
285	Castle Creek above Deerfield	10-20-87	-16.35	-124.0
285	Castle Creek above Deerfield	07-14-88	-16.35	-123.5
287	Barrel Spring	07-25-95	-14.67	-115.0
287	Barrel Spring	09-13-96	-14.44	-112.0
287	Barrel Spring	09-08-97	-14.69	-113.8
288	Water Draw Spring	09-14-95	-14.34	-113.0
288	Water Draw Spring	09-13-96	-14.26	-113.0
288	Water Draw Spring	09-08-97	-14.22	-111.5

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
289	Mckenna Spring	09-14-95	-13.46	-103.0
289	Mckenna Spring	09-13-96	-13.53	-106.0
289	Mckenna Spring	09-08-97	-13.24	-101.8
290	Higgins Gulch below I-90	09-26-94	-16.47	-126.0
290	Higgins Gulch below I-90	10-10-97	-16.25	-121.6
298	City Springs	12-04-86	-14.35	-107.0
298	City Springs	04-09-87	-14.20	-107.0
298	City Springs	05-12-87	-14.40	-107.5
298	City Springs	06-04-87	-14.40	-108.5
298	City Springs	09-29-87	-14.50	-109.0
298	City Springs	05-12-88	-14.50	-109.0
298	City Springs	09-26-93	-14.20	-106.0
298	City Springs	10-15-94	-14.40	-109.0
300	Cleghorn Springs	12-05-86	-12.95	-98.5
300	Cleghorn Springs	02-06-87	-12.95	-98.0
300	Cleghorn Springs	04-10-87	-12.90	-98.0
300	Cleghorn Springs	06-04-87	-12.85	-99.0
300	Cleghorn Springs	07-02-87	-12.90	-100.0
300	Cleghorn Springs	08-07-87	-12.90	-98.5
300	Cleghorn Springs	09-27-93	-12.80	-99.0
300	Cleghorn Springs	04-20-95	-12.80	-100.0
300	Cleghorn Springs	08-05-98	-13.26	-100.7
308	Cascade Spring	¹ 01-01-78	-15.48	-118.0
308	Cascade Spring	09-12-96	-15.32	-119.0
309	Bear Gulch near Maurice	10-10-96	-16.76	-127.0
309	Bear Gulch near Maurice	09-11-97	-17.16	-130.6
310	Beaver Creek near Maurice	10-09-96	-16.40	-126.0
310	Beaver Creek near Maurice	09-11-97	-16.77	-128.8
312	Bear Butte Creek near Deadwood	10-09-96	-16.03	-122.0
312	Bear Butte Creek near Deadwood	10-10-97	-15.98	-120.3
313	Elk Creek above Meadow Creek	09-20-96	-16.10	-123.0
313	Elk Creek above Meadow Creek	10-09-97	-16.37	-124.4
314	Meadow Creek above Elk Creek	09-20-96	-15.69	-119.0
314	Meadow Creek above Elk Creek	10-09-97	-15.78	-117.4
315	Boxelder Creek near Nemo	09-27-93	-14.70	-111.0

Table 8. Stable isotope data for sites with multiple samples—Continued

[-, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
315	Boxelder Creek near Nemo	10-29-93	-14.70	-113.0
315	Boxelder Creek near Nemo	11-24-93	-15.00	-113.0
315	Boxelder Creek near Nemo	12-22-93	-15.10	-114.0
315	Boxelder Creek near Nemo	01-20-94	-15.20	-114.0
315	Boxelder Creek near Nemo	02-18-94	-17.10	-129.0
315	Boxelder Creek near Nemo	03-25-94	-16.10	-121.0
315	Boxelder Creek near Nemo	04-20-94	-16.30	-125.0
315	Boxelder Creek near Nemo	05-19-94	-15.60	-118.0
315	Boxelder Creek near Nemo	06-27-94	-14.70	-112.0
315	Boxelder Creek near Nemo	07-15-94	-14.80	-112.0
315	Boxelder Creek near Nemo	08-17-94	-14.30	-108.0
315	Boxelder Creek near Nemo	09-27-94	-14.60	-112.0
315	Boxelder Creek near Nemo	10-26-94	-15.10	-115.0
315	Boxelder Creek near Nemo	11-23-94	-15.40	-118.0
315	Boxelder Creek near Nemo	12-29-94	-15.40	-114.0
315	Boxelder Creek near Nemo	03-10-95	-16.10	-123.0
315	Boxelder Creek near Nemo	04-13-95	-15.50	-118.0
315	Boxelder Creek near Nemo	10-18-95	-14.91	-114.0
315	Boxelder Creek near Nemo	11-29-95	-15.33	-113.0
315	Boxelder Creek near Nemo	01-16-96	-15.23	-115.0
315	Boxelder Creek near Nemo	08-28-96	-14.77	-112.0
315	Boxelder Creek near Nemo	10-11-96	-14.97	-115.0
315	Boxelder Creek near Nemo	12-31-96	-16.04	-122.0
315	Boxelder Creek near Nemo	03-17-97	-15.92	-120.1
315	Boxelder Creek near Nemo	04-25-97	-16.45	-124.0
315	Boxelder Creek near Nemo	06-23-97	-15.36	-118.0
315	Boxelder Creek near Nemo	08-12-97	-15.17	-114.1
315	Boxelder Creek near Nemo	10-08-97	-14.76	-112.8
315	Boxelder Creek near Nemo	12-11-97	-15.12	-113.2
315	Boxelder Creek near Nemo	02-12-98	-15.29	-116.8
315	Boxelder Creek near Nemo	03-23-98	-16.27	-122.7
315	Boxelder Creek near Nemo	07-01-98	-15.53	-117.5
315	Boxelder Creek near Nemo	08-14-98	-15.06	-112.9
316	Rapid Creek above Victoria Creek	01-19-90	-13.30	-107.0
316	Rapid Creek above Victoria Creek	09-27-93	-13.70	-108.0

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
316	Rapid Creek above Victoria Creek	10-29-93	-13.40	-103.0
316	Rapid Creek above Victoria Creek	11-24-93	-13.60	-106.0
316	Rapid Creek above Victoria Creek	12-22-93	-13.50	-106.0
316	Rapid Creek above Victoria Creek	01-20-94	-13.60	-105.0
316	Rapid Creek above Victoria Creek	02-18-94	-13.80	-108.0
316	Rapid Creek above Victoria Creek	03-25-94	-13.80	-103.0
316	Rapid Creek above Victoria Creek	04-20-94	-13.70	-108.0
316	Rapid Creek above Victoria Creek	05-19-94	-13.80	-107.0
316	Rapid Creek above Victoria Creek	06-27-94	-13.80	-109.0
316	Rapid Creek above Victoria Creek	07-15-94	-14.00	-109.0
316	Rapid Creek above Victoria Creek	08-17-94	-14.00	-109.0
316	Rapid Creek above Victoria Creek	09-27-94	-14.00	-109.0
316	Rapid Creek above Victoria Creek	10-26-94	-13.80	-108.0
316	Rapid Creek above Victoria Creek	11-23-94	-13.60	-107.0
316	Rapid Creek above Victoria Creek	12-29-94	-13.50	-108.0
316	Rapid Creek above Victoria Creek	03-10-95	-13.70	-109.0
316	Rapid Creek above Victoria Creek	04-13-95	-13.70	-107.0
316	Rapid Creek above Victoria Creek	10-18-95	-14.04	-109.0
316	Rapid Creek above Victoria Creek	11-30-95	-13.72	-105.0
316	Rapid Creek above Victoria Creek	01-16-96	-13.97	-107.0
316	Rapid Creek above Victoria Creek	08-28-96	-14.74	-113.0
316	Rapid Creek above Victoria Creek	10-11-96	-14.68	-113.0
316	Rapid Creek above Victoria Creek	11-04-96	-14.16	-109.0
316	Rapid Creek above Victoria Creek	12-05-96	-14.12	-109.0
316	Rapid Creek above Victoria Creek	01-08-97	-14.38	-109.0
316	Rapid Creek above Victoria Creek	02-13-97	-14.56	-111.9
316	Rapid Creek above Victoria Creek	03-20-97	-14.50	-113.3
316	Rapid Creek above Victoria Creek	04-29-97	-14.72	-116.1
316	Rapid Creek above Victoria Creek	05-29-97	-14.91	-114.5
316	Rapid Creek above Victoria Creek	07-10-97	-15.10	-115.5
316	Rapid Creek above Victoria Creek	08-21-97	-15.23	-116.2
316	Rapid Creek above Victoria Creek	10-03-97	-15.06	-114.3
316	Rapid Creek above Victoria Creek	11-12-97	-14.44	-110.7
316	Rapid Creek above Victoria Creek	12-16-97	-14.43	-110.4
316	Rapid Creek above Victoria Creek	01-26-98	-14.69	-114.1

Table 8. Stable isotope data for sites with multiple samples—Continued

[-, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
316	Rapid Creek above Victoria Creek	03-02-98	-14.80	-113.1
316	Rapid Creek above Victoria Creek	04-14-98	-14.85	-115.5
316	Rapid Creek above Victoria Creek	06-30-98	-14.94	-115.1
316	Rapid Creek above Victoria Creek	09-08-98	-15.04	-113.9
317	Victoria Creek	04-09-87	-13.95	-102.5
317	Victoria Creek	06-09-87	-13.55	-100.0
317	Victoria Creek	07-06-87	-13.30	-98.4
317	Victoria Creek	08-13-87	-13.15	-98.0
318	Spring Creek near Keystone	12-04-86	-11.15	-89.5
318	Spring Creek near Keystone	09-27-93	-12.20	-93.0
318	Spring Creek near Keystone	10-29-93	-11.90	-91.0
318	Spring Creek near Keystone	11-24-93	-12.20	-93.0
318	Spring Creek near Keystone	12-22-93	-12.20	-92.0
318	Spring Creek near Keystone	01-20-94	-12.30	-94.0
318	Spring Creek near Keystone	02-18-94	-12.60	-96.0
318	Spring Creek near Keystone	03-25-94	-12.40	-93.0
318	Spring Creek near Keystone	04-20-94	-12.30	-93.0
318	Spring Creek near Keystone	05-19-94	-12.50	-96.0
318	Spring Creek near Keystone	06-27-94	-11.90	-93.0
318	Spring Creek near Keystone	07-15-94	-11.60	-90.0
318	Spring Creek near Keystone	08-17-94	-10.90	-88.0
318	Spring Creek near Keystone	09-27-94	-10.70	-87.0
318	Spring Creek near Keystone	10-26-94	-11.60	-91.0
318	Spring Creek near Keystone	11-23-94	-11.70	-93.0
318	Spring Creek near Keystone	12-29-94	-11.80	-93.0
318	Spring Creek near Keystone	03-10-95	-12.00	-93.0
318	Spring Creek near Keystone	04-13-95	-12.00	-95.0
318	Spring Creek near Keystone	10-18-95	-12.54	-96.1
318	Spring Creek near Keystone	11-29-95	-12.62	-96.4
318	Spring Creek near Keystone	01-16-96	-12.81	-96.9
318	Spring Creek near Keystone	08-28-96	-13.20	-101.0
318	Spring Creek near Keystone	09-09-96	-12.89	-98.9
318	Spring Creek near Keystone	10-14-96	-13.33	-102.0
318	Spring Creek near Keystone	11-06-96	-12.70	-95.8
318	Spring Creek near Keystone	12-06-96	-12.66	-96.6

Table 8. Stable isotope data for sites with multiple samples—Continued

[--, no data]

Site number	Name	Date	$\delta^{18}\text{O}$ (per mil)	δD (per mil)
318	Spring Creek near Keystone	01-08-97	-12.93	-97.5
318	Spring Creek near Keystone	02-14-97	-13.01	-99.3
318	Spring Creek near Keystone	03-17-97	-13.11	-101.1
318	Spring Creek near Keystone	04-30-97	-13.54	-104.0
318	Spring Creek near Keystone	06-13-97	-14.10	-106.0
318	Spring Creek near Keystone	07-23-97	-13.66	-102.6
318	Spring Creek near Keystone	08-22-97	-13.53	-102.1
318	Spring Creek near Keystone	10-07-97	-13.24	-98.9
318	Spring Creek near Keystone	11-13-97	-13.05	-98.7
318	Spring Creek near Keystone	12-18-97	-13.10	-98.5
318	Spring Creek near Keystone	01-29-98	-13.11	-99.8
318	Spring Creek near Keystone	03-05-98	-13.19	-100.3
318	Spring Creek near Keystone	04-16-98	-13.37	-102.6
318	Spring Creek near Keystone	06-05-98	-13.18	-101.3
318	Spring Creek near Keystone	07-06-98	-13.53	-101.9
318	Spring Creek near Keystone	08-13-98	-12.88	-98.3
319	Battle Creek near Keystone	09-06-96	-11.09	-82.4
319	Battle Creek near Keystone	09-12-97	-11.92	-87.2
320	Grace Coolidge Cr nr Game Lodge	09-10-96	-11.33	-84.2
320	Grace Coolidge Cr nr Game Lodge	09-12-97	-11.82	-87.4
321	French Creek above Fairburn	10-07-96	-11.54	-89.8
321	French Creek above Fairburn	09-11-97	-11.62	-89.1
322	Beaver Creek near Pringle	10-01-96	-12.38	-92.4
322	Beaver Creek near Pringle	09-10-97	-12.18	-91.9

¹Data from Busby and others (1983, 1991). Sites for which exact sample date is unknown are listed as 01-01-78.

Table 9. Weighted annual tritium concentrations in precipitation for Black Hills area

[TU-m, tritium-unit-meters; TU, tritium units; mm, millimeters; --, no data]

Year	Deposition (TU-m)	Precipitation (mm)	Weighted tritium concentration (TU)
Assumed Values			
1952 and prior	--	--	15.00
Data from Michel (1989)			
1953	18	460	39.13
1954	190	420	452.38
1955	26	370	70.27
1956	77	330	233.33
1957	87	460	189.13
1958	320	410	780.49
1959	300	370	810.81
1960	85	390	217.95
1961	99	310	319.35
1962	960	600	1,600.00
1963	2,000	480	4,166.67
1964	1,200	360	3,333.33
1965	680	460	1,478.26
1966	470	500	940.00
1967	240	480	500.00
1968	180	490	367.35
1969	130	340	382.35
1970	140	400	350.00
1971	93.8	469	200.00
1972	53.4	445	120.00
1973	48.8	488	100.00
1974	27.4	249	110.04
1975	35.4	443	79.91
1976	27.0	396	68.18
1977	56.2	661	85.02
1978	39.5	395	100.00
1979	21.3	355	60.00
1980	19.6	436	44.95
1981	19.4	357	54.34
1982	23.0	660	34.85
1983	9.8	393	24.94
Regression Estimates from Table 10			
1984	--	--	23.75
1985	--	--	25.31
1986	--	--	31.72
1987	--	--	29.14
1988	--	--	28.83
1989	--	--	30.14
1990	--	--	27.46
1991	--	--	27.07
1992	--	--	19.66
1993	--	--	19.37
1994	--	--	19.52
1995	--	--	16.61
1996	--	--	16.72
1997	--	--	20.48
1998	--	--	20.76

Table 10. Monthly estimated tritium concentrations in precipitation, monthly precipitation, and weighted annual tritium concentrations in precipitation for Black Hills area

[Estimated tritium input based on average of extended records for Bismarck, North Dakota, and Lincoln, Nebraska. TU, tritium unit; mm, millimeter; --, no data]

Month	1984		1985		1986		1987		1988		1989		1990		1991	
	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)
January	33.35	7	27.22	9	19.58	12	29.00	5	33.14	10	30.54	3	24.76	6	41.13	12
February	--	--	25.66	5	23.73	26	32.62	41	26.92	11	38.97	14	43.42	15	35.71	26
March	24.15	23	24.06	29	30.34	19	15.10	44	39.54	31	22.85	29	25.77	33	20.47	21
April	--	--	26.19	28	--	--	21.56	9	26.71	20	31.61	58	20.93	53	20.99	81
May	--	--	39.54	31	32.71	44	29.05	104	25.82	81	29.50	49	25.40	100	24.92	144
June	21.55	116	--	--	34.55	124	35.98	22	28.30	57	28.25	45	26.92	35	35.02	94
July	26.35	69	31.56	43	35.39	49	34.41	34	33.23	29	37.17	49	27.12	83	29.30	40
August	--	--	29.90	28	39.81	32	34.36	57	32.42	51	41.69	44	33.75	31	28.30	32
September	--	--	13.43	50	26.76	111	24.81	22	26.60	27	21.04	82	39.59	30	26.92	19
October	--	--	29.90	19	36.44	54	42.26	13	23.51	16	20.17	37	23.57	21	24.38	29
November	--	--	15.10	43	27.79	30	20.05	13	20.87	23	27.28	21	31.61	17	18.62	30
December	--	--	29.70	23	19.10	3	26.76	13	26.92	11	47.08	26	20.17	16	31.46	2
Weighted annual tritium input	23.75		25.31		31.72		29.14		28.83		30.14		27.46		27.07	

Table 10. Monthly estimated tritium input concentrations, monthly precipitation, and weighted annual tritium input concentrations for Black Hills area—Continued
 [Estimated tritium input based on average of extended records for Bismarck, North Dakota, and Lincoln, Nebraska. TU, tritium unit; mm, millimeter; --, no data]

Month	1992		1993		1994		1995		1996		1997		1998	
	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)	Tritium input (TU)	Precipitation (mm)
January	18.00	7	14.48	20	17.50	24	12.55	8	17.19	30	--	--	12.10	14
February	22.91	12	21.62	25	21.90	19	20.70	19	13.21	6	20.81	22	19.22	31
March	14.76	47	16.03	27	16.42	19	24.17	26	18.74	41	16.23	15	19.22	48
April	16.36	37	16.03	66	17.88	52	18.62	56	17.13	60	20.76	75	25.19	20
May	20.29	71	21.79	90	20.58	40	14.07	175	14.42	147	20.17	104	13.79	71
June	20.99	82	19.94	147	20.87	38	14.96	118	19.70	46	18.43	70	18.98	148
July	20.23	86	20.52	98	20.64	46	20.29	72	17.88	41	20.47	134	27.74	82
August	23.51	34	22.57	54	20.58	31	19.70	26	20.41	77	22.96	51	27.48	83
September	16.74	13	20.05	34	19.70	16	20.58	43	18.43	53	23.13	32	19.16	55
October	24.55	16	17.75	36	21.04	117	13.50	71	14.21	90	23.24	27	21.33	129
November	13.64	22	12.41	21	13.57	21	16.23	21	15.30	16	17.13	11	15.83	35
December	22.74	27	17.13	25	13.36	14			14.62	34	17.50	12	17.19	8
Weighted annual tritium input	19.66		19.37		19.52		16.61		16.72		20.48		20.76	

Table 11. Estimated tritium concentrations in precipitation for Black Hills area, adjusted for decay—Continued
 [TU, tritium units; --, not computed]

Recharge year	Tritium input (TU)	Sample collection date																				
		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1975	80	68	64	61	57	54	51	48	46	43	41	39	37	35	33	31	29	28	26	25	23	22
1976	68	61	58	54	51	49	46	44	41	39	37	35	33	31	29	28	26	25	24	22	21	20
1977	85	80	76	72	68	64	61	58	54	51	49	46	44	41	39	37	35	33	31	29	28	26
1978	100	100	95	89	85	80	76	72	68	64	61	57	54	51	48	46	43	41	39	37	35	33
1979	60	--	60	57	54	51	48	45	43	41	38	36	34	32	31	29	27	26	25	23	22	21
1980	45	--	--	45	43	40	38	36	34	32	30	29	27	26	24	23	22	21	19	18	17	16
1981	54	--	--	--	54	51	48	46	43	41	39	37	35	33	31	29	28	26	25	23	22	21
1982	35	--	--	--	--	35	33	31	30	28	26	25	24	22	21	20	19	18	17	16	15	14
1983	25	--	--	--	--	--	25	24	22	21	20	19	18	17	16	15	14	13	12	11	11	11
1984	24	--	--	--	--	--	--	24	23	21	20	19	18	17	16	15	15	14	13	12	12	11
1985	25	--	--	--	--	--	--	--	25	24	22	21	20	19	18	17	16	15	14	14	13	12
1986	32	--	--	--	--	--	--	--	--	32	30	29	27	26	24	23	22	20	19	18	17	16
1987	29	--	--	--	--	--	--	--	--	--	29	27	26	25	23	22	21	20	19	18	17	16
1988	29	--	--	--	--	--	--	--	--	--	--	29	27	26	25	23	22	21	20	19	18	17
1989	30	--	--	--	--	--	--	--	--	--	--	--	30	28	27	25	24	23	21	20	19	18
1990	27	--	--	--	--	--	--	--	--	--	--	--	--	27	26	24	23	22	20	19	18	17
1991	27	--	--	--	--	--	--	--	--	--	--	--	--	--	27	26	24	23	22	20	19	18
1992	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	19	18	17	16	15	14
1993	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19	18	17	16	15	14
1994	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	19	18	17	16
1995	17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	16	15	14
1996	17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	16	15
1997	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	19
1998	21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22