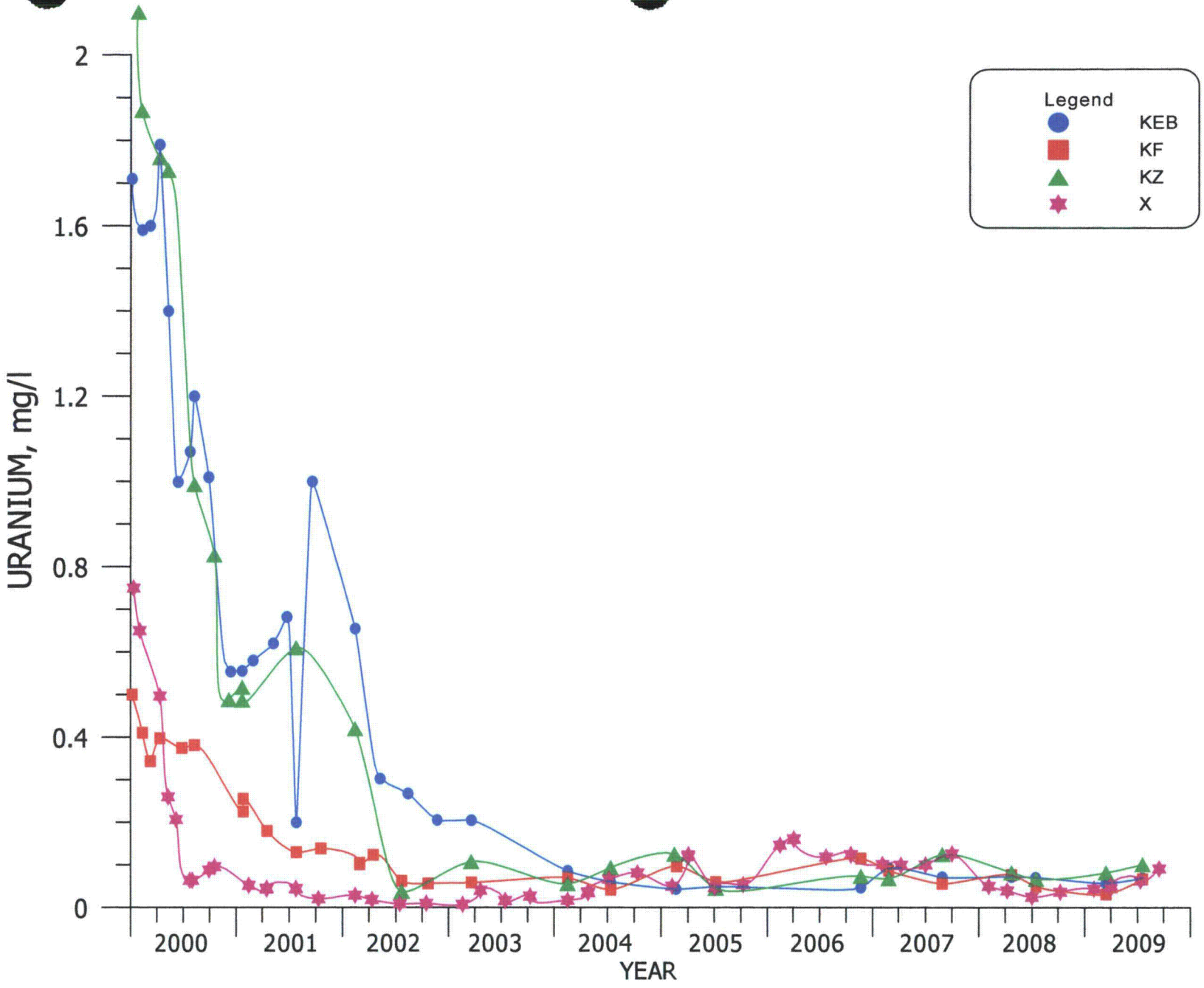


FIGURE 4.3-60. URANIUM CONCENTRATIONS FOR WELLS KEB, KF, KZ AND X.

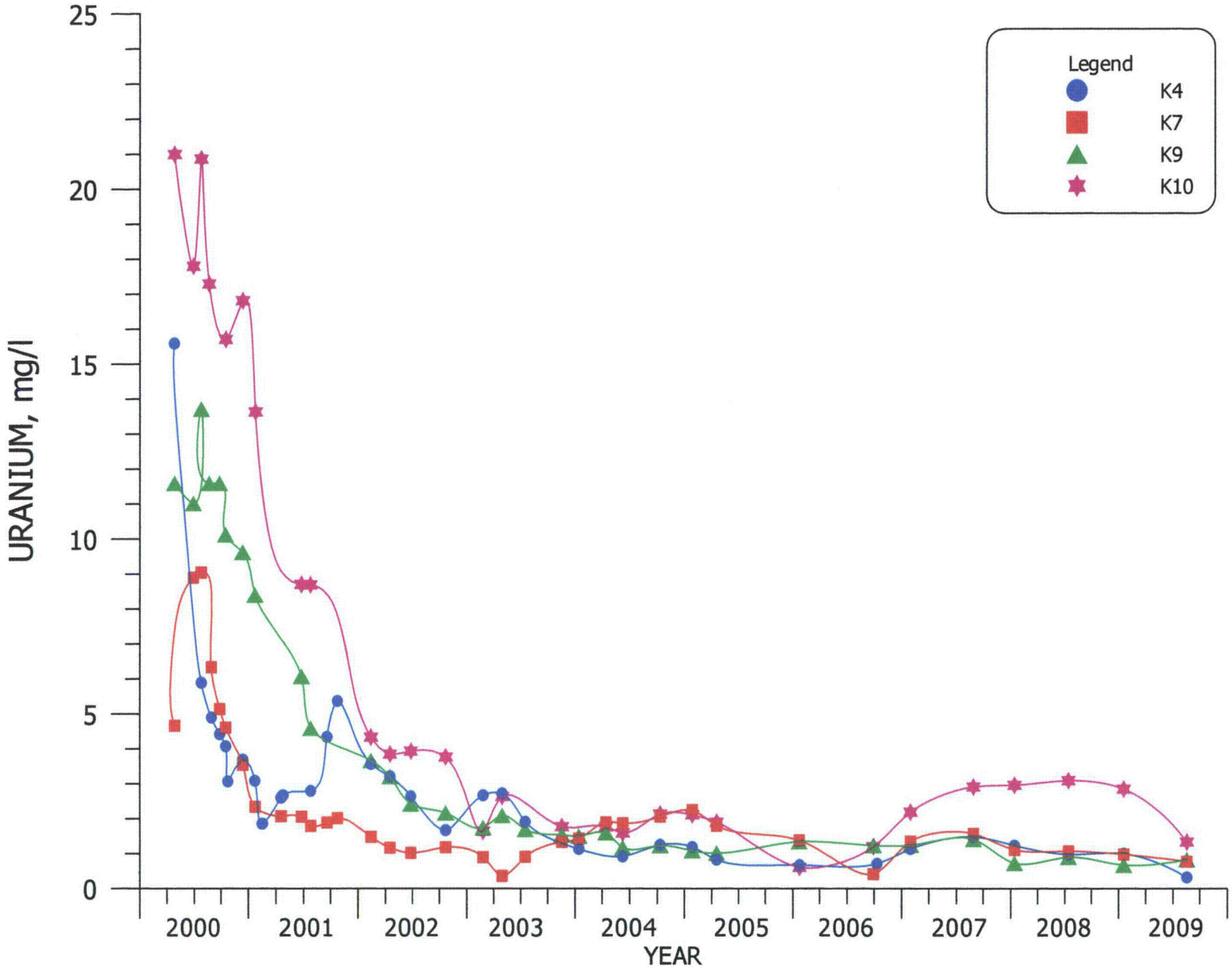


FIGURE 4.3-61. URANIUM CONCENTRATIONS FOR WELLS K4, K7, K9 AND K10.

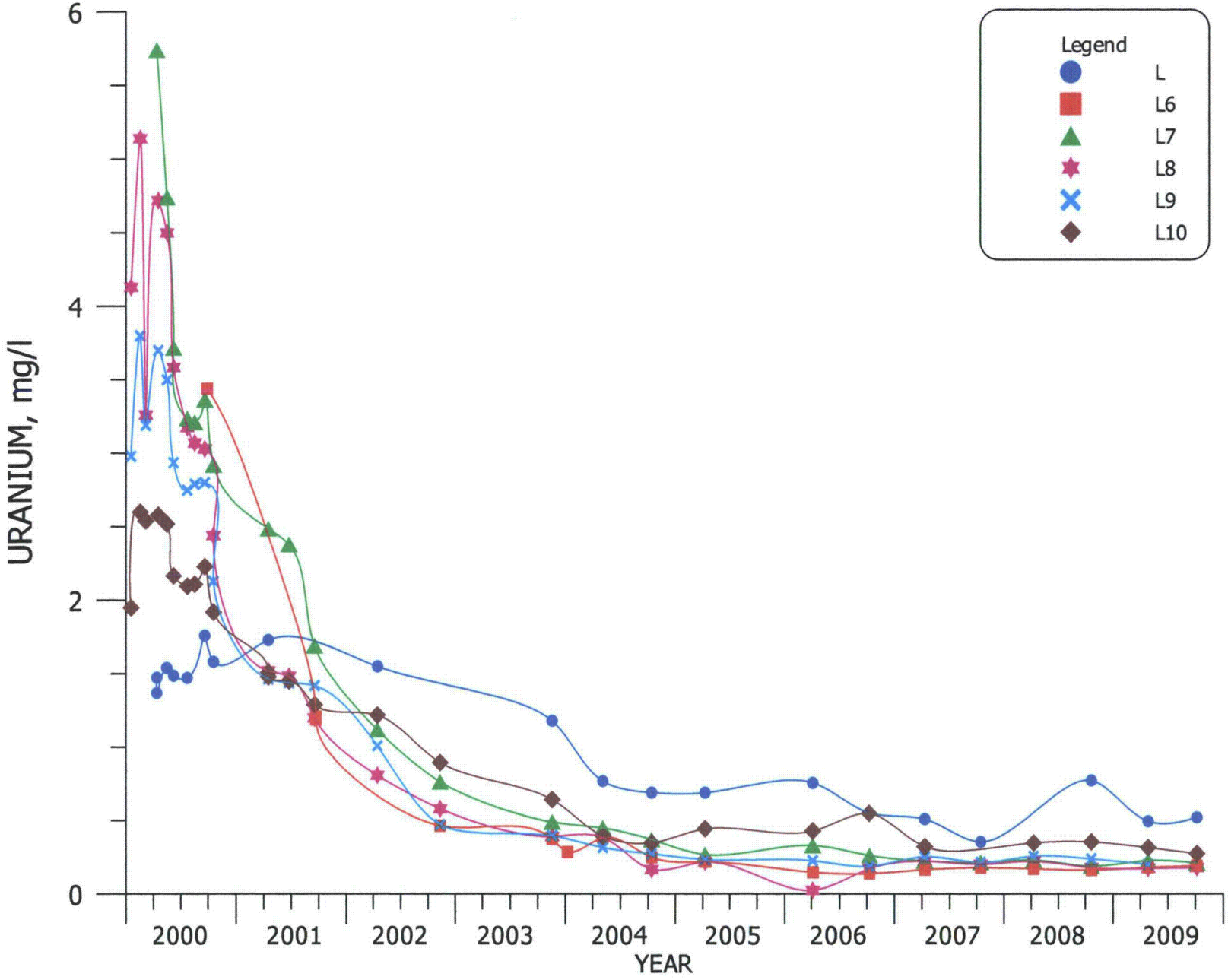


FIGURE 4.3-62. URANIUM CONCENTRATIONS FOR WELLS L, L6, L7, L8, L9 AND L10.

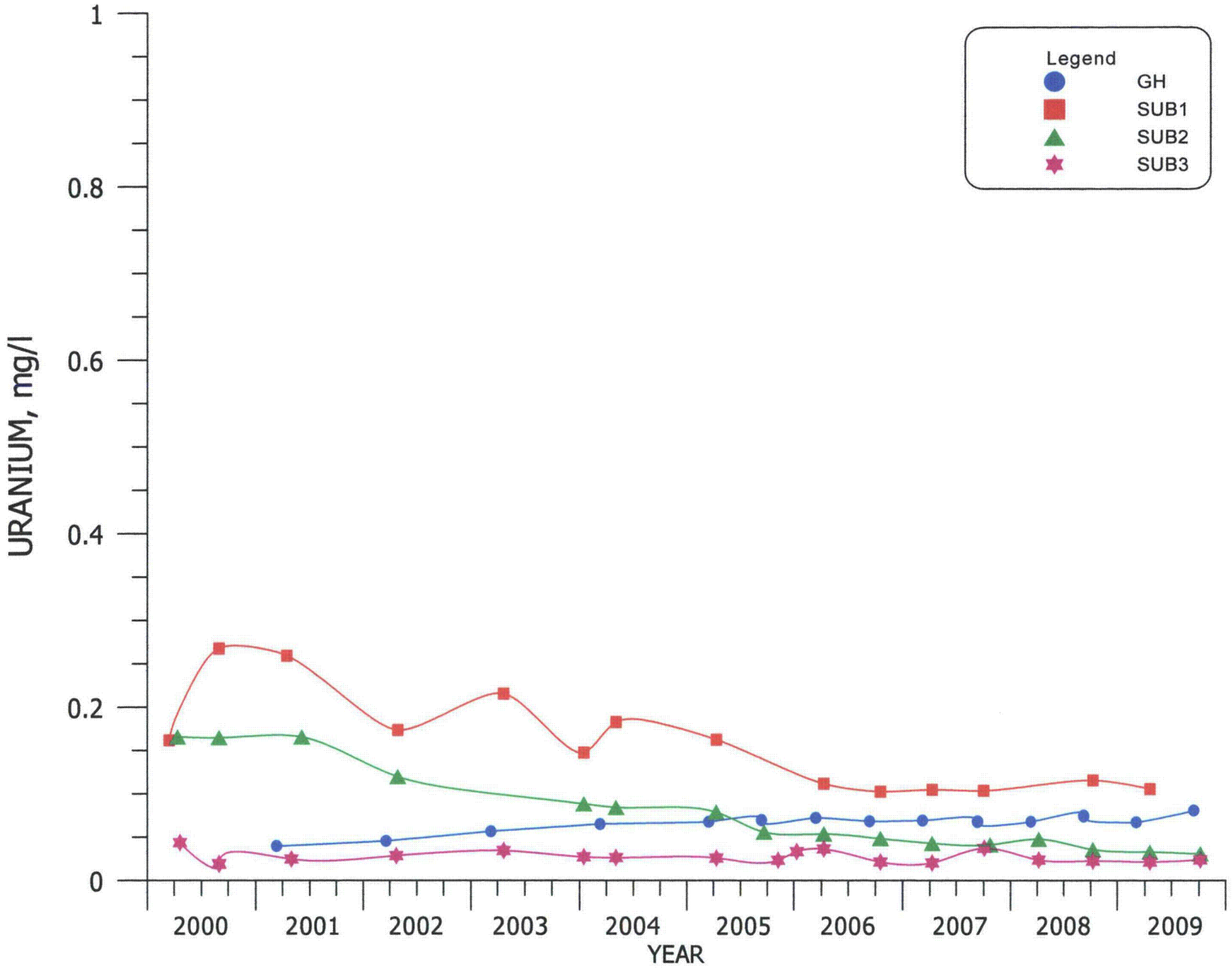


FIGURE 4.3-63. URANIUM CONCENTRATIONS FOR WELLS GH, SUB1, SUB2 AND SUB3.

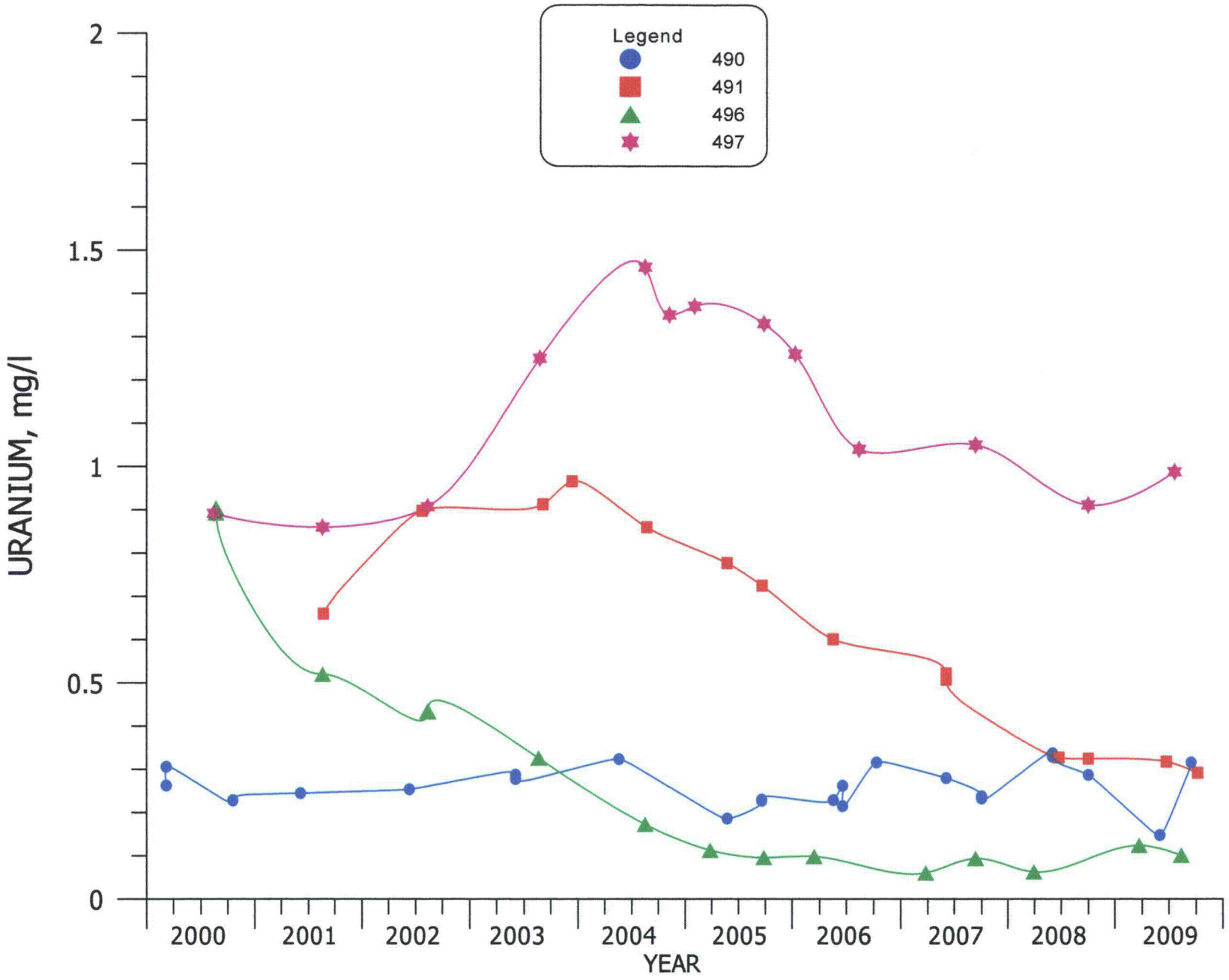


FIGURE 4.3-64. URANIUM CONCENTRATIONS FOR WELLS 490, 491, 496 AND 497.

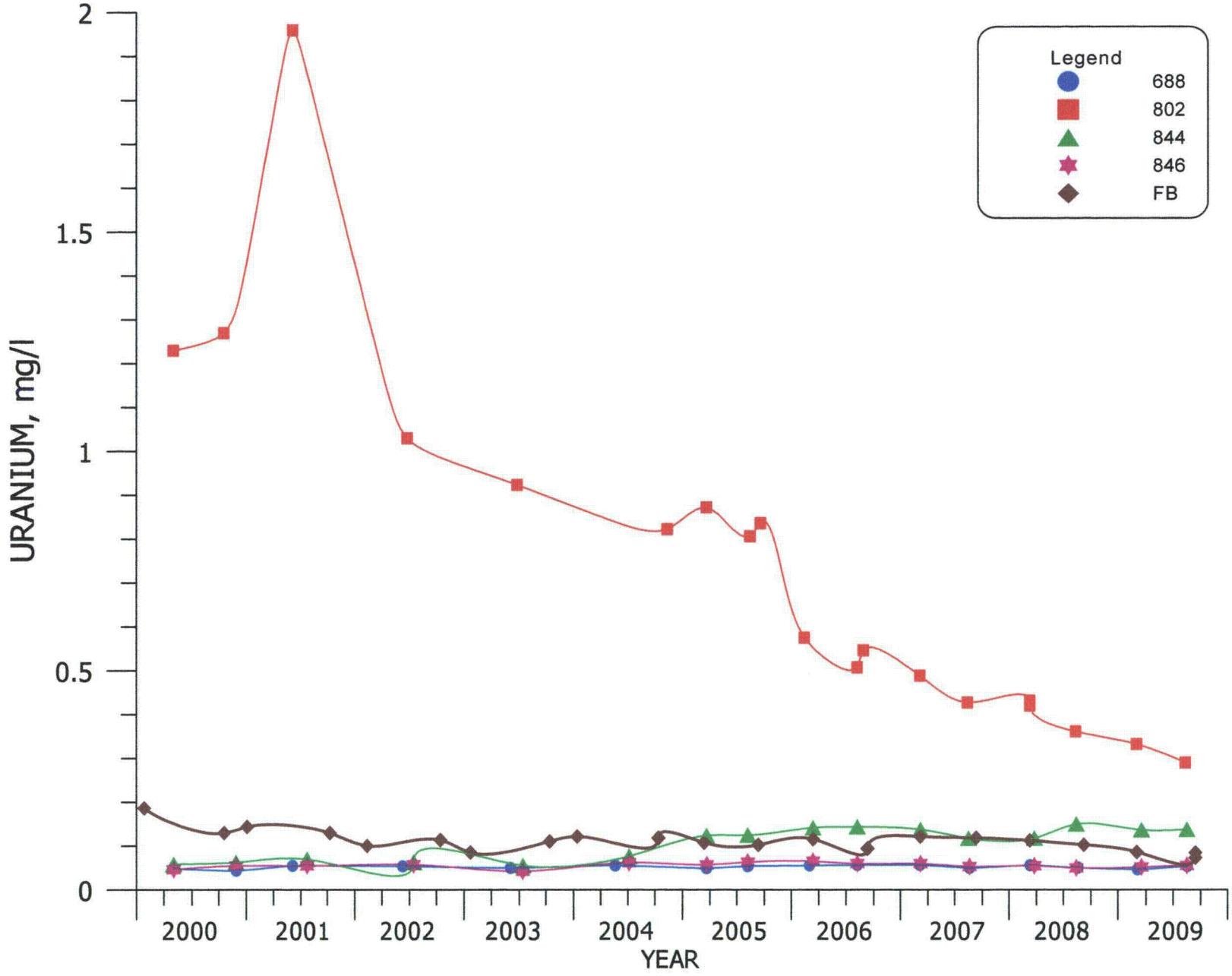


FIGURE 4.3-65. URANIUM CONCENTRATIONS FOR WELLS 688, 802, 844, 846 AND FB.

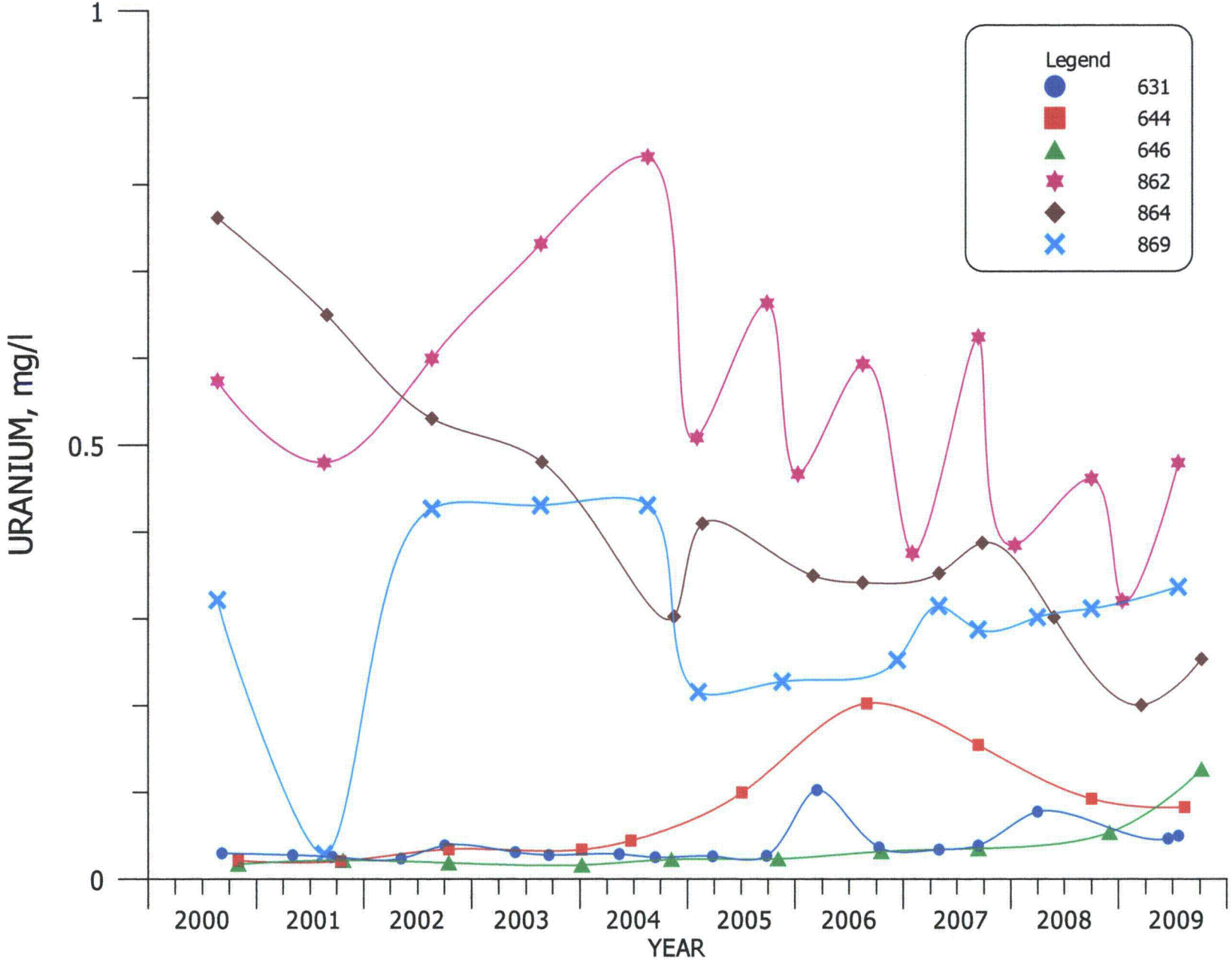


FIGURE 4.3-66. URANIUM CONCENTRATIONS FOR WELLS 631, 644, 646, 862, 864 AND 869.

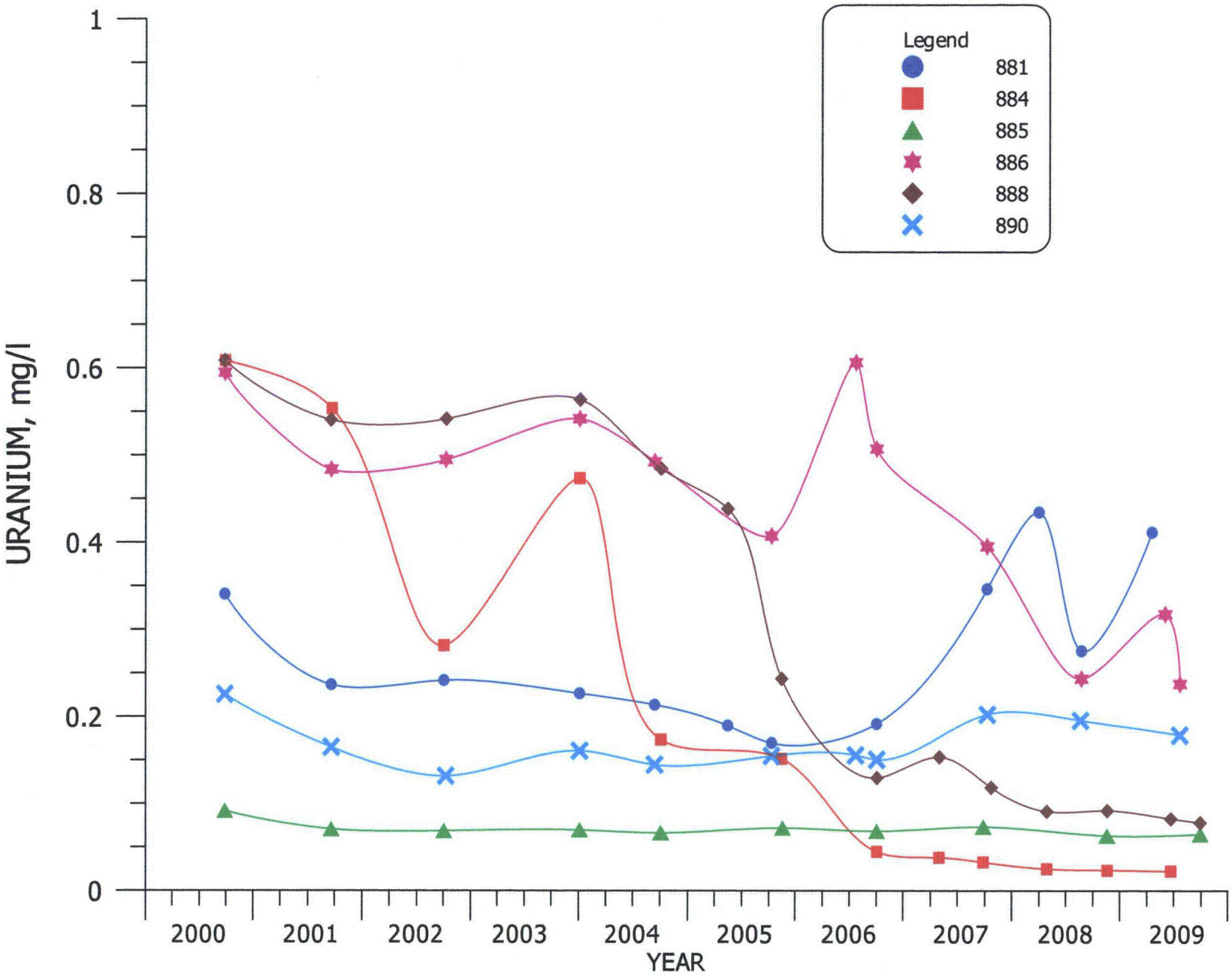


FIGURE 4.3-67. URANIUM CONCENTRATIONS FOR WELLS 881, 884, 885, 886, 888 AND 890.

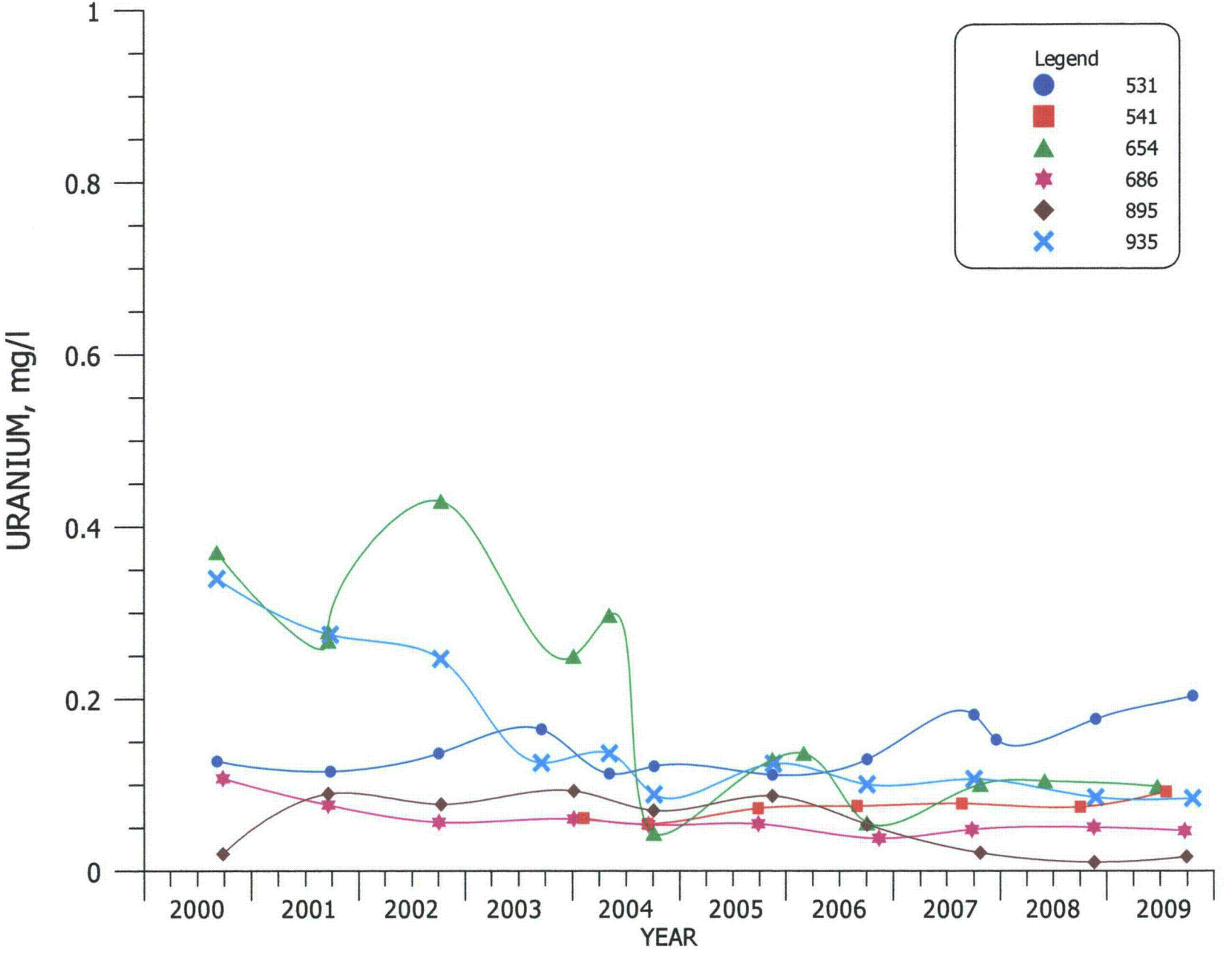


FIGURE 4.3-68. URANIUM CONCENTRATIONS FOR WELLS 531, 541, 654, 686, 895 AND 935.

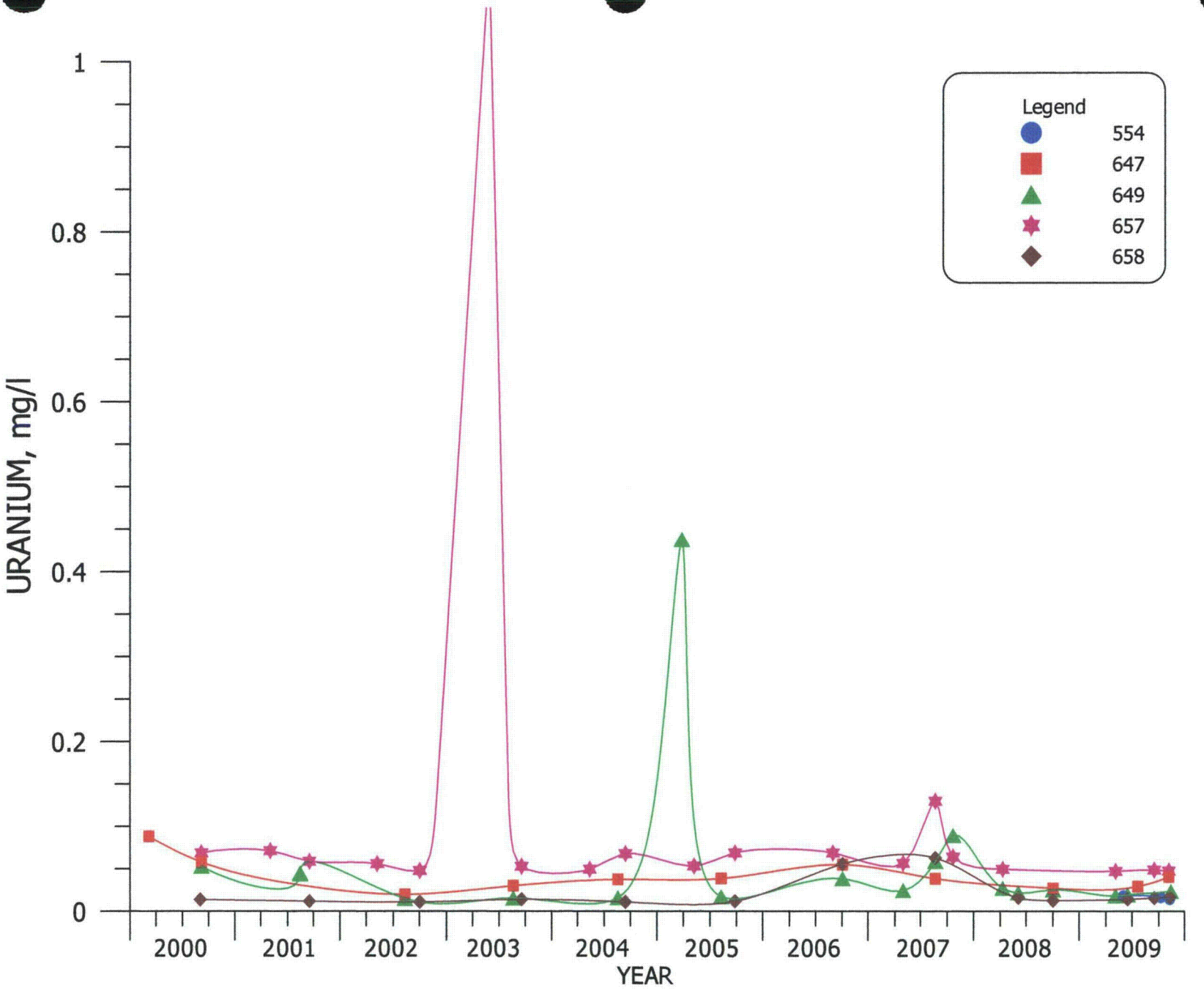
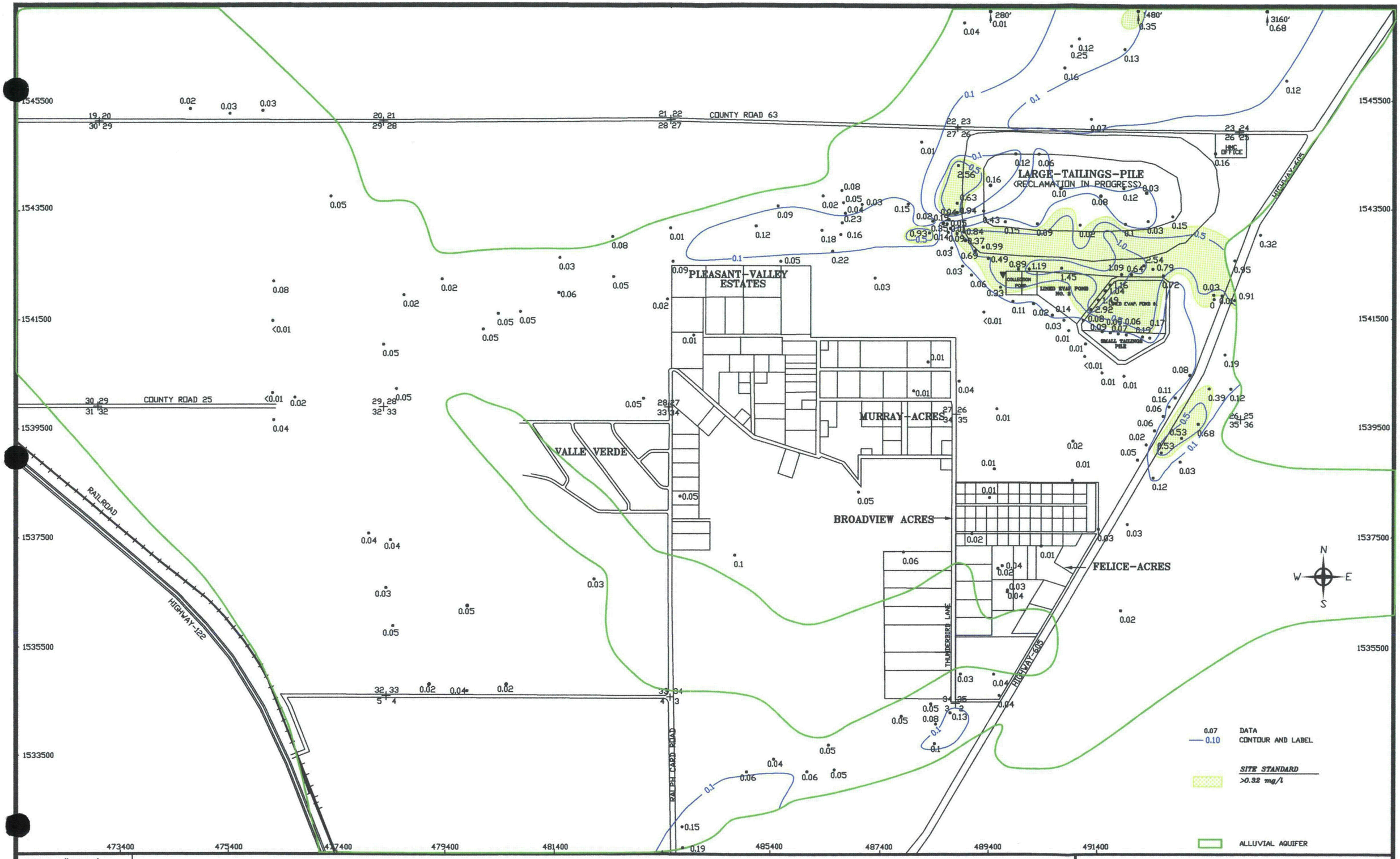


FIGURE 4.3-69. URANIUM CONCENTRATIONS FOR WELLS 554, 647, 649, 657 AND 658.



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DATE: 2/22/2010

FIGURE 4.3-70. SELENIUM CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2009 mg/l

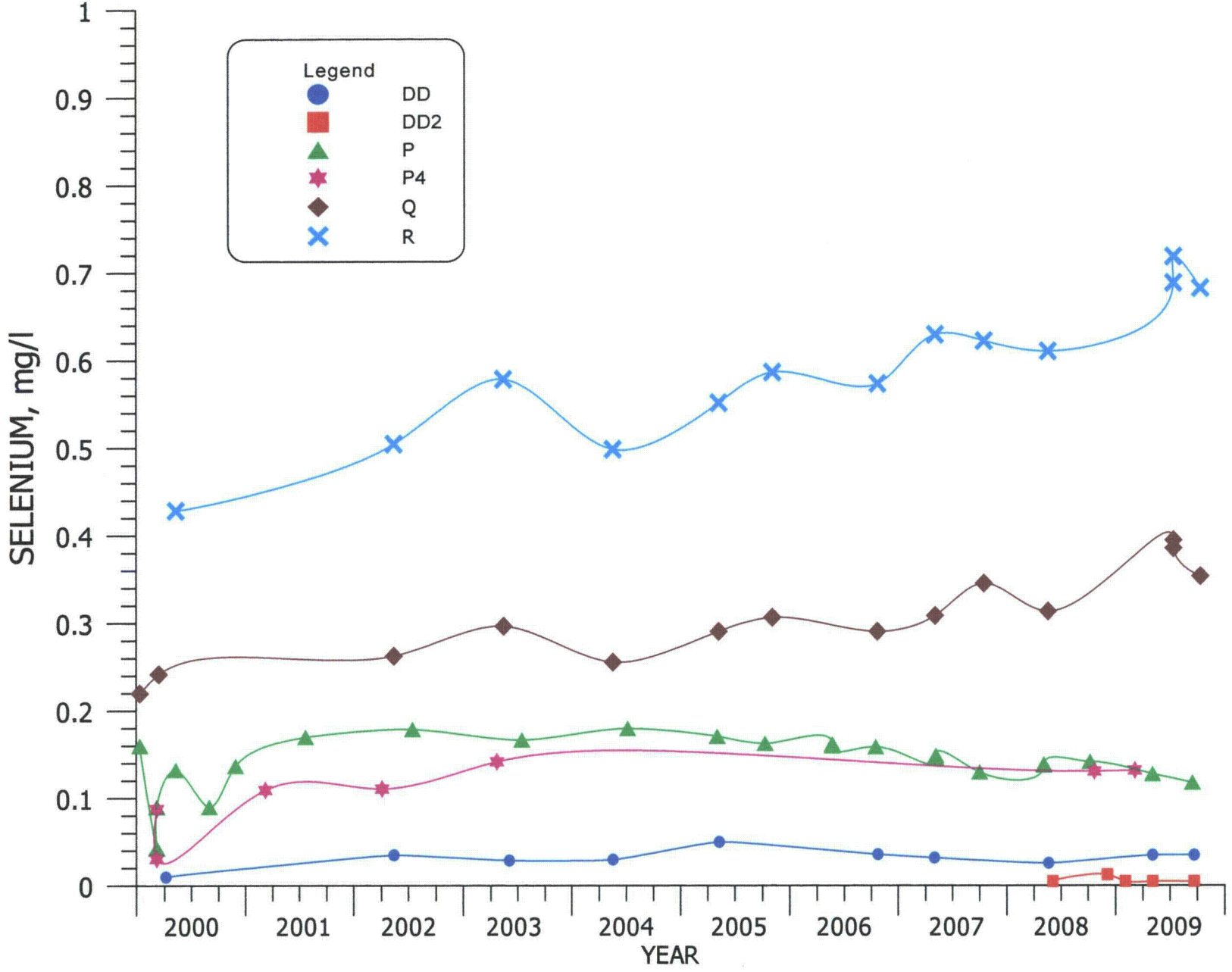


FIGURE 4.3-71. SELENIUM CONCENTRATIONS FOR WELLS DD, DD2, P, P4, Q AND R.

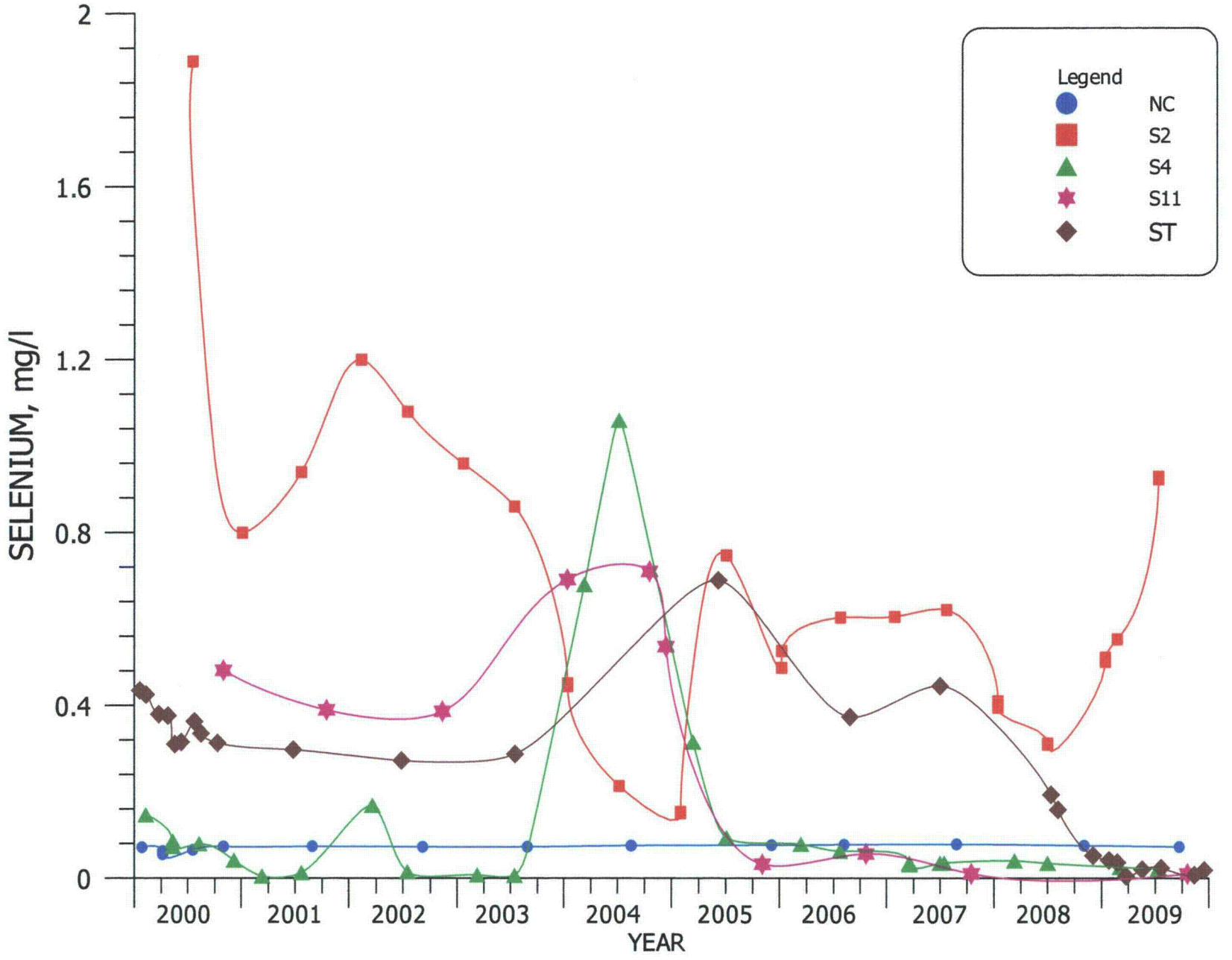


FIGURE 4.3-72. SELENIUM CONCENTRATIONS FOR WELLS NC, S2, S4, S11 AND ST.

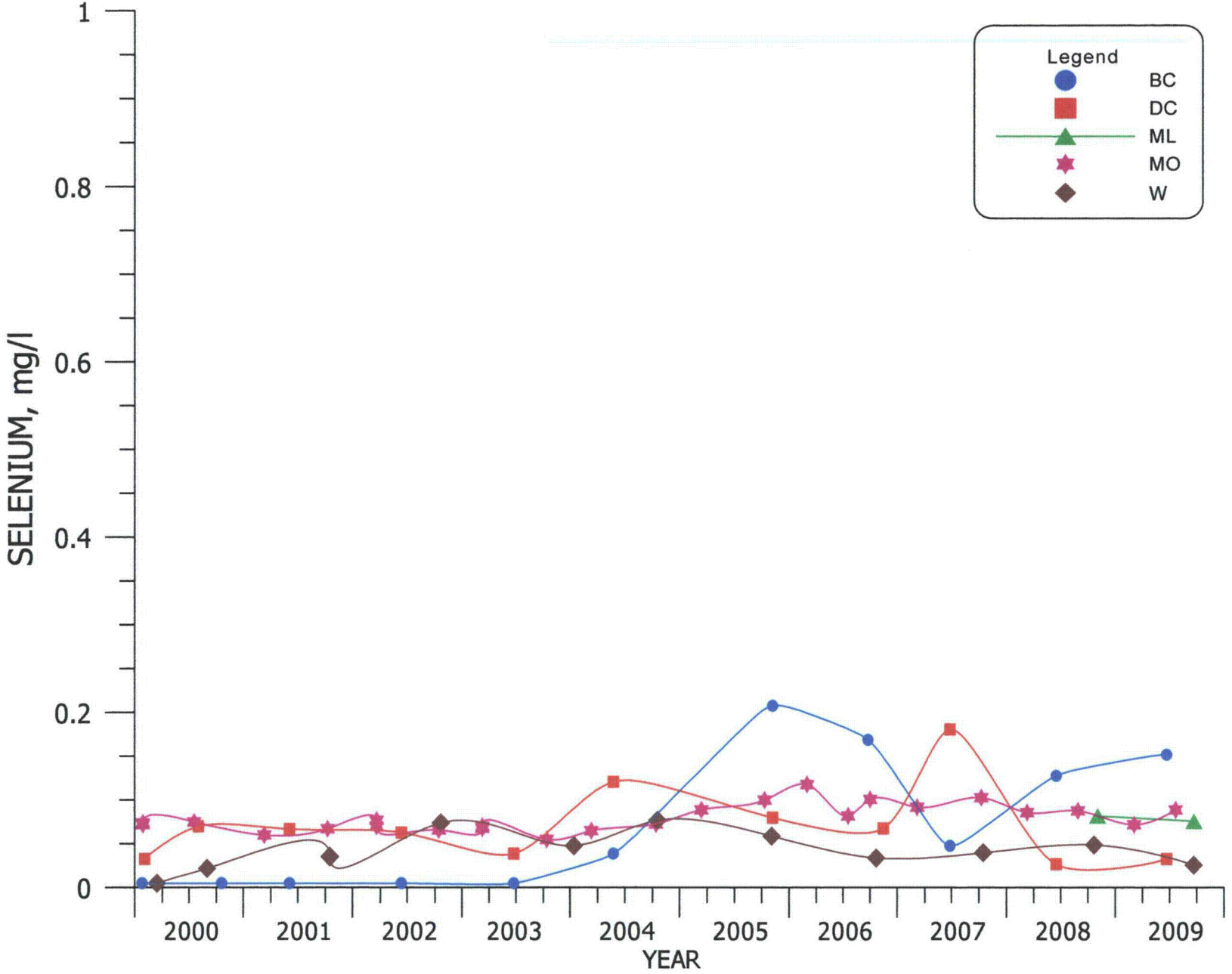


FIGURE 4.3-73. SELENIUM CONCENTRATIONS FOR WELLS BC, DC, ML, MO AND W.

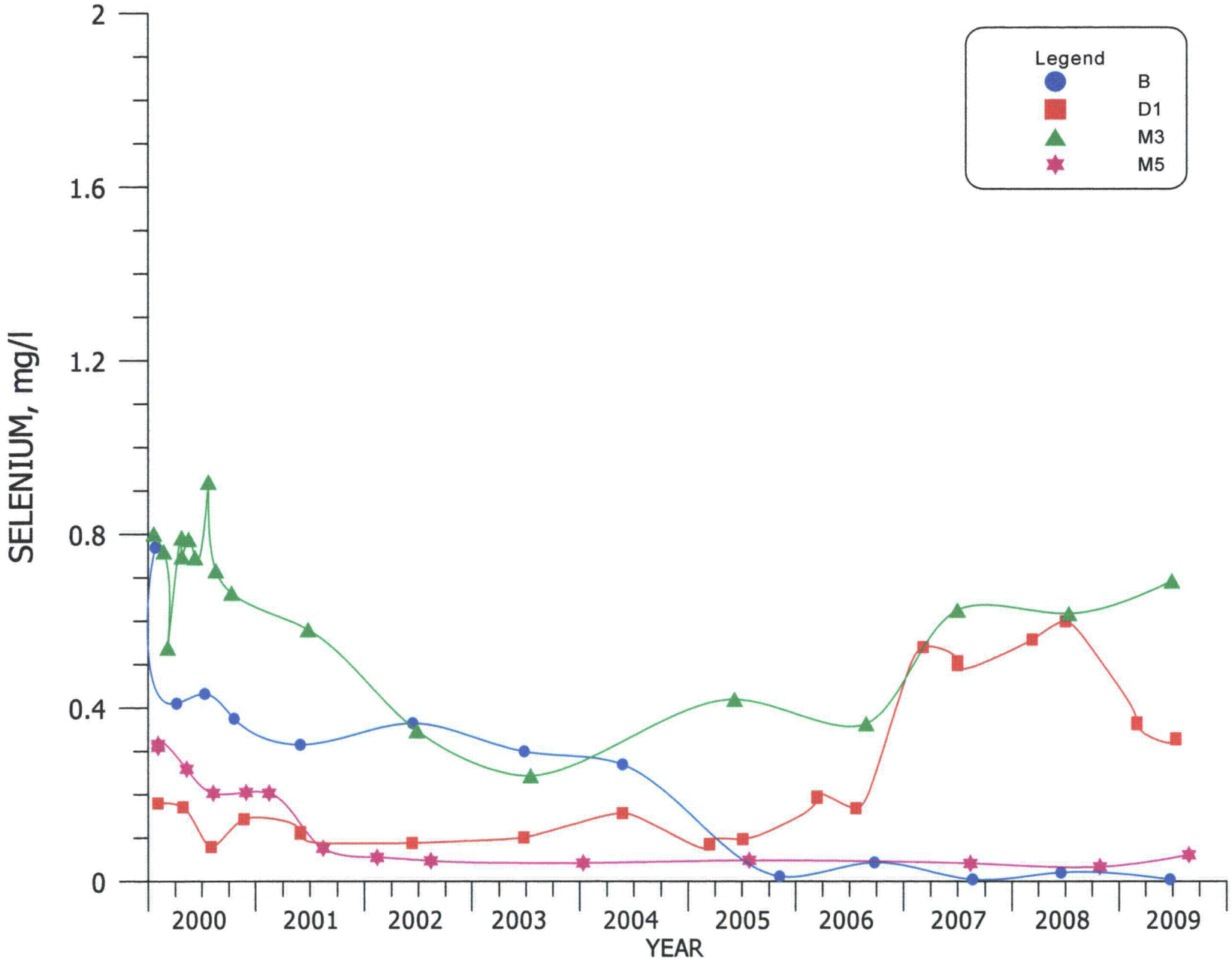


FIGURE 4.3-74. SELENIUM CONCENTRATIONS FOR WELLS B, D1, M3 AND M5.

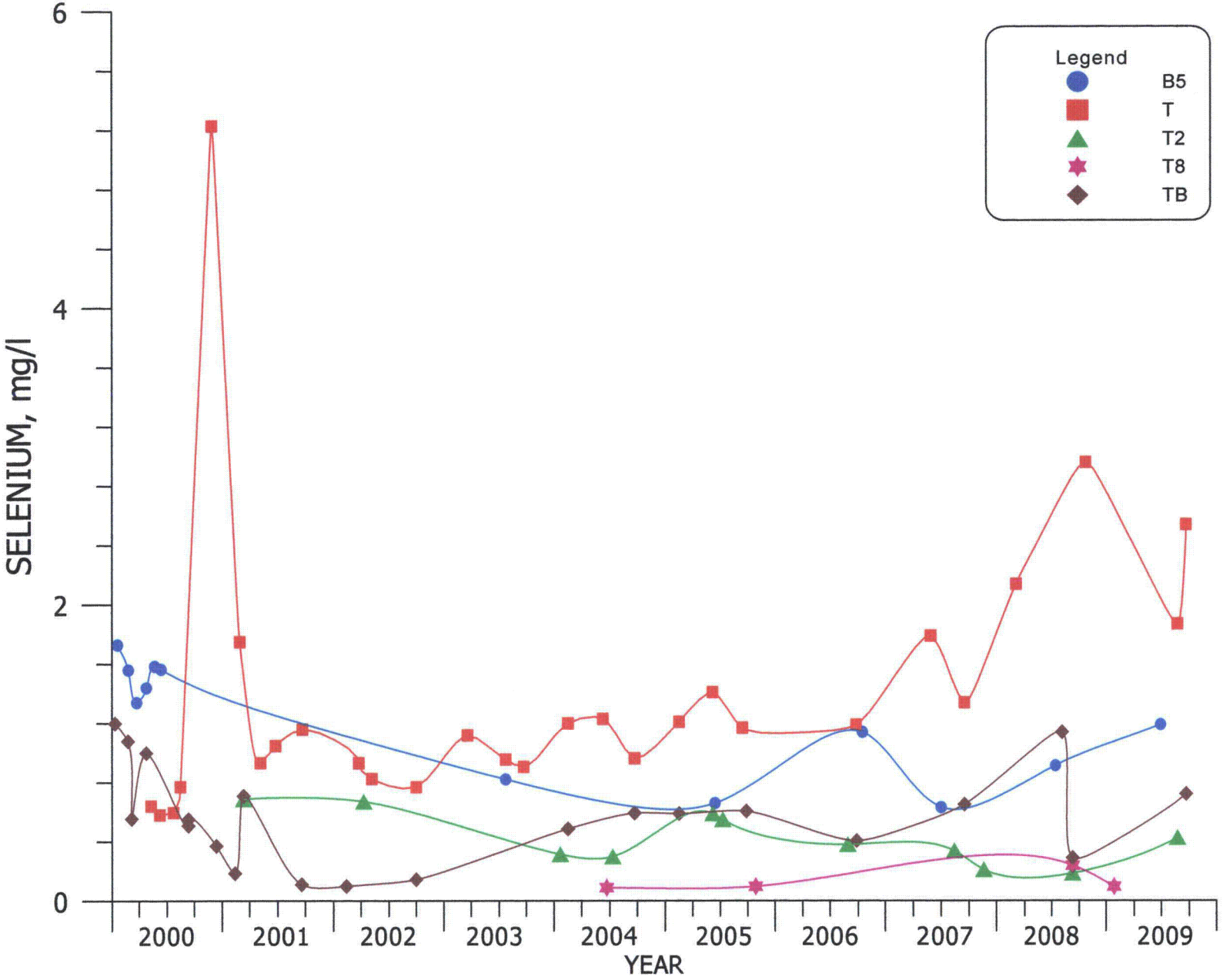


FIGURE 4.3-75. SELENIUM CONCENTRATIONS FOR WELLS B5, T, T2, T8 AND TB.

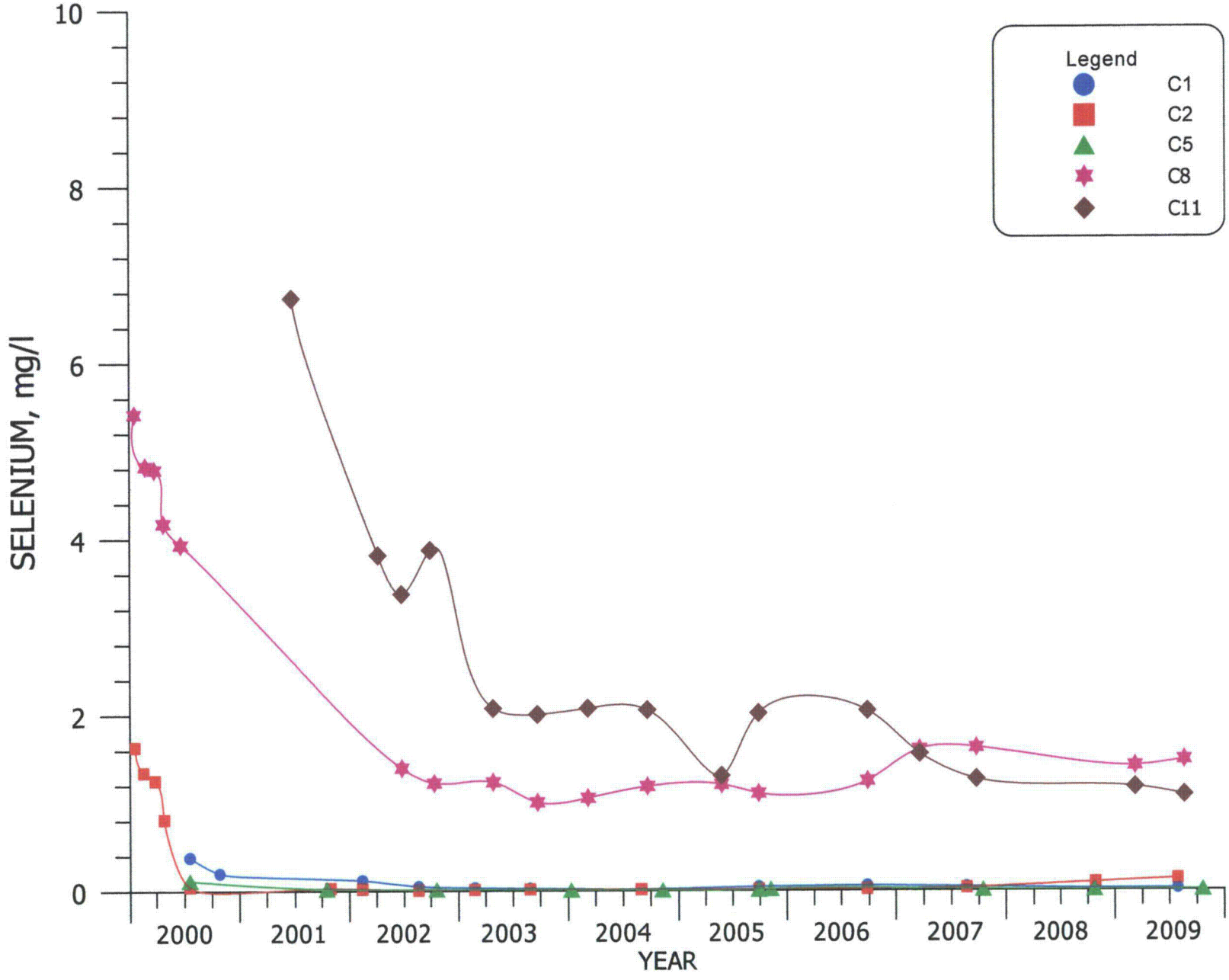


FIGURE 4.3-76. SELENIUM CONCENTRATIONS FOR WELLS C1, C2, C5, C8 AND C11.

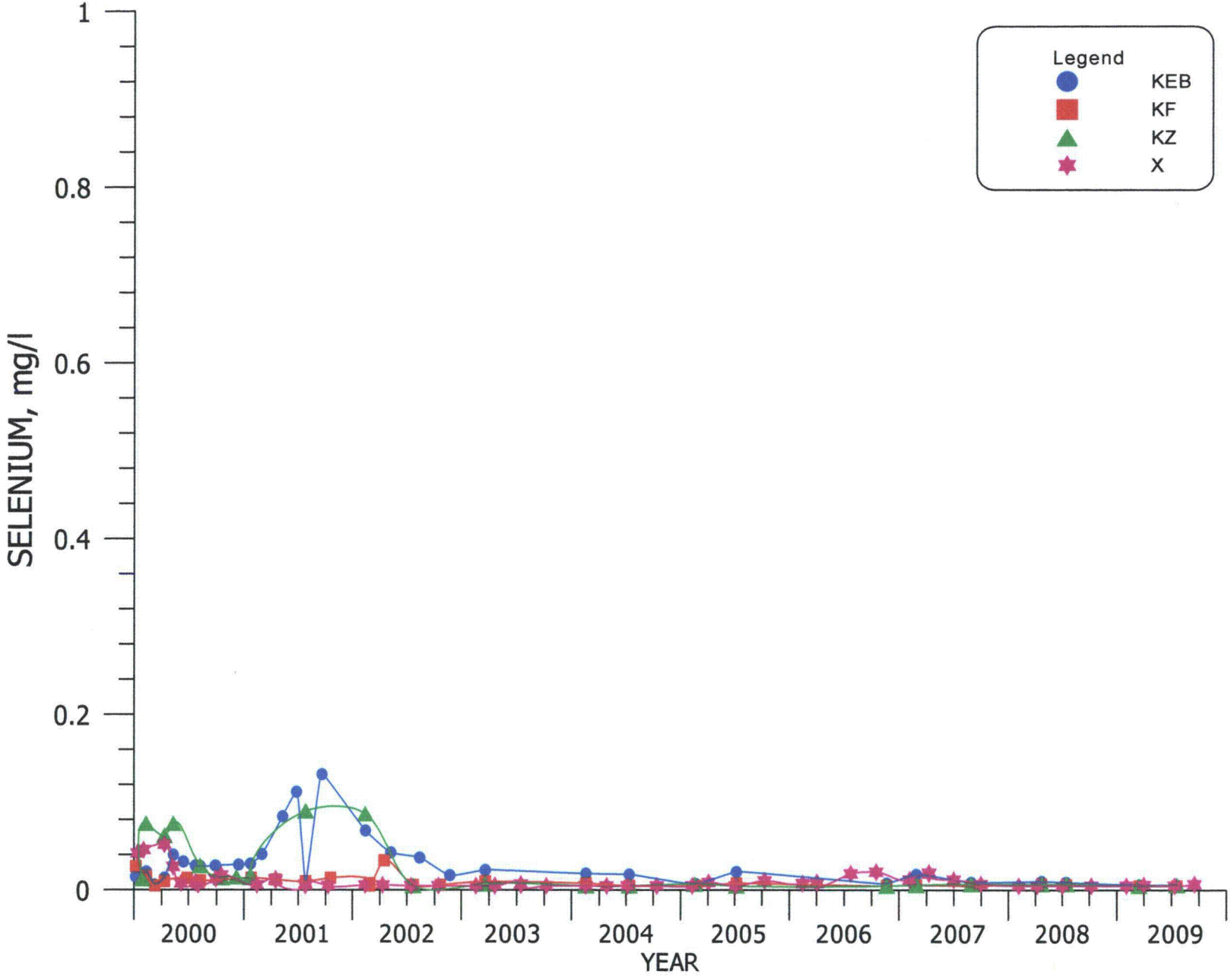


FIGURE 4.3-77. SELENIUM CONCENTRATIONS FOR WELLS KEB, KF, KZ AND X.

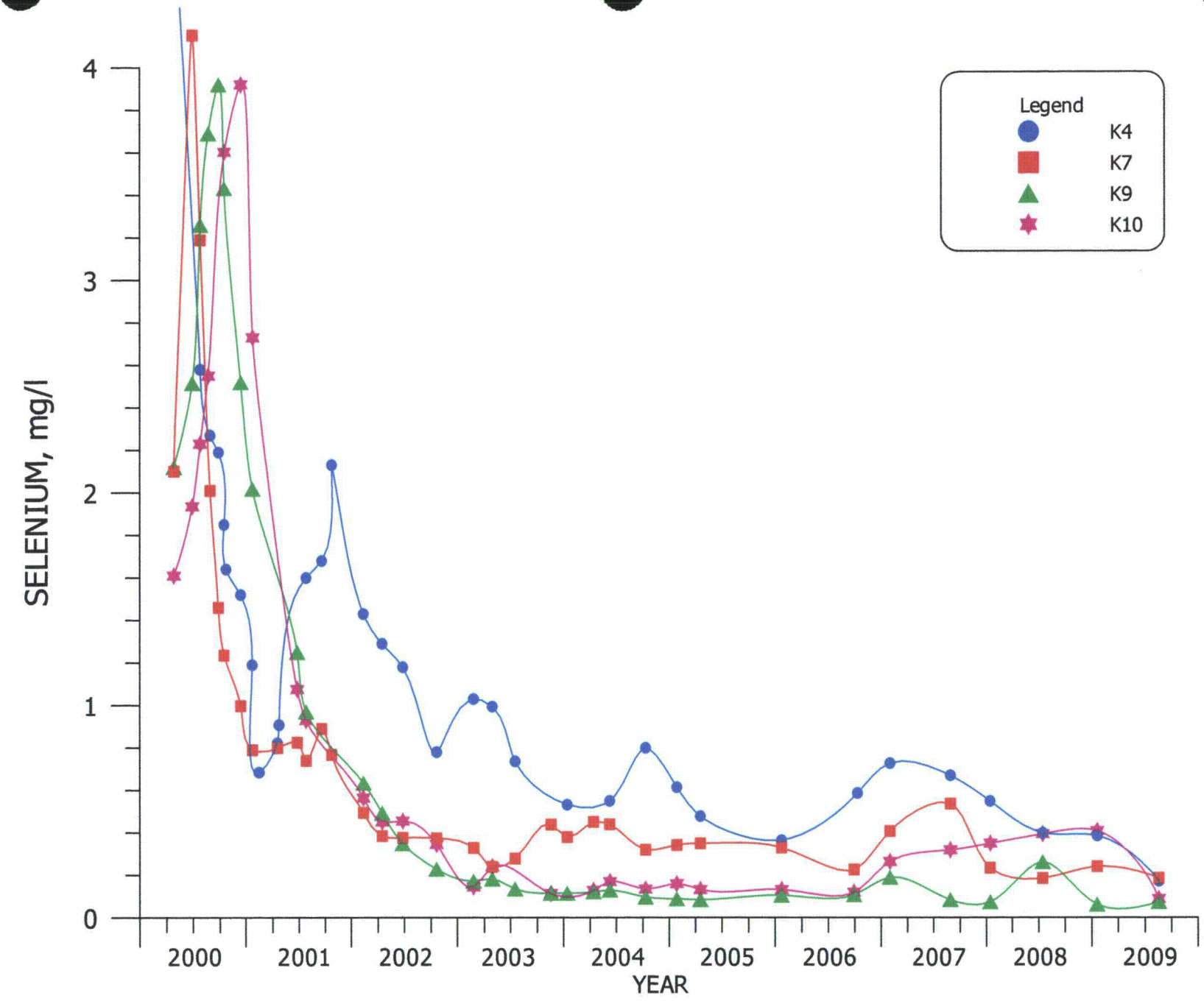


FIGURE 4.3-78. SELENIUM CONCENTRATIONS FOR WELLS K4, K7, K9 AND K10.

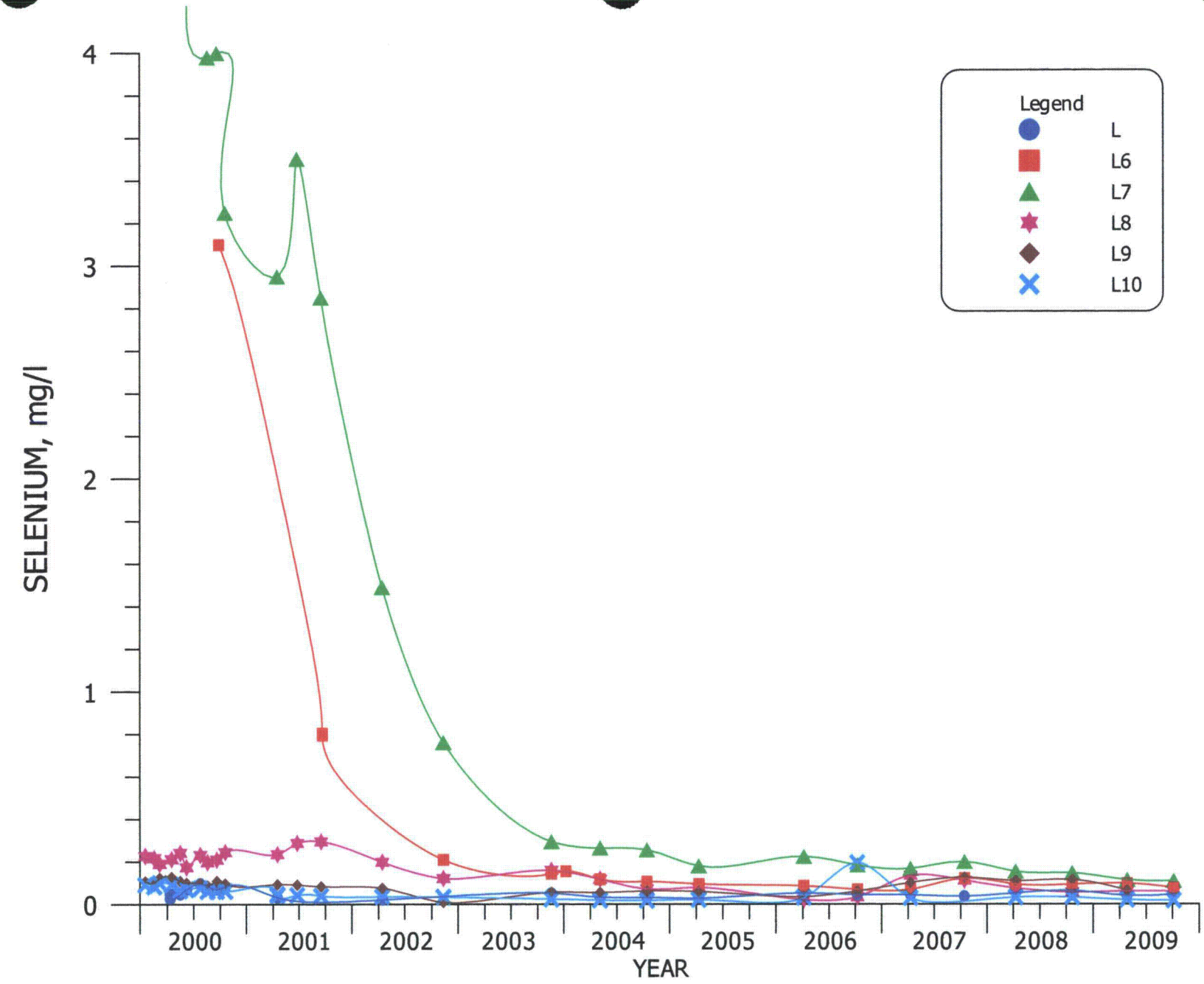


FIGURE 4.3-79. SELENIUM CONCENTRATIONS FOR WELLS L, L6, L7, L8, L9 AND L10.

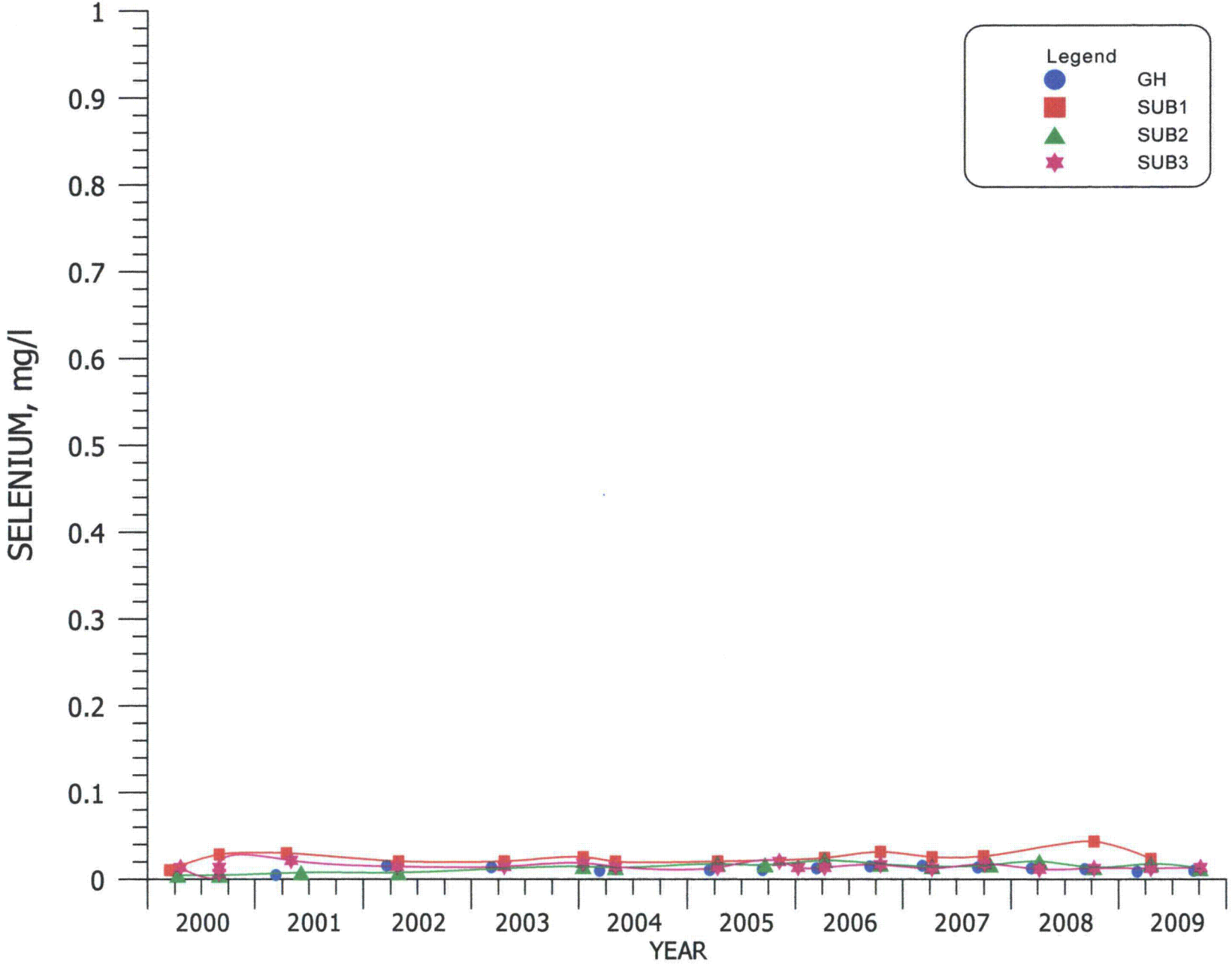


FIGURE 4.3-80. SELENIUM CONCENTRATIONS FOR WELLS GH, SUB1, SUB2 AND SUB3.

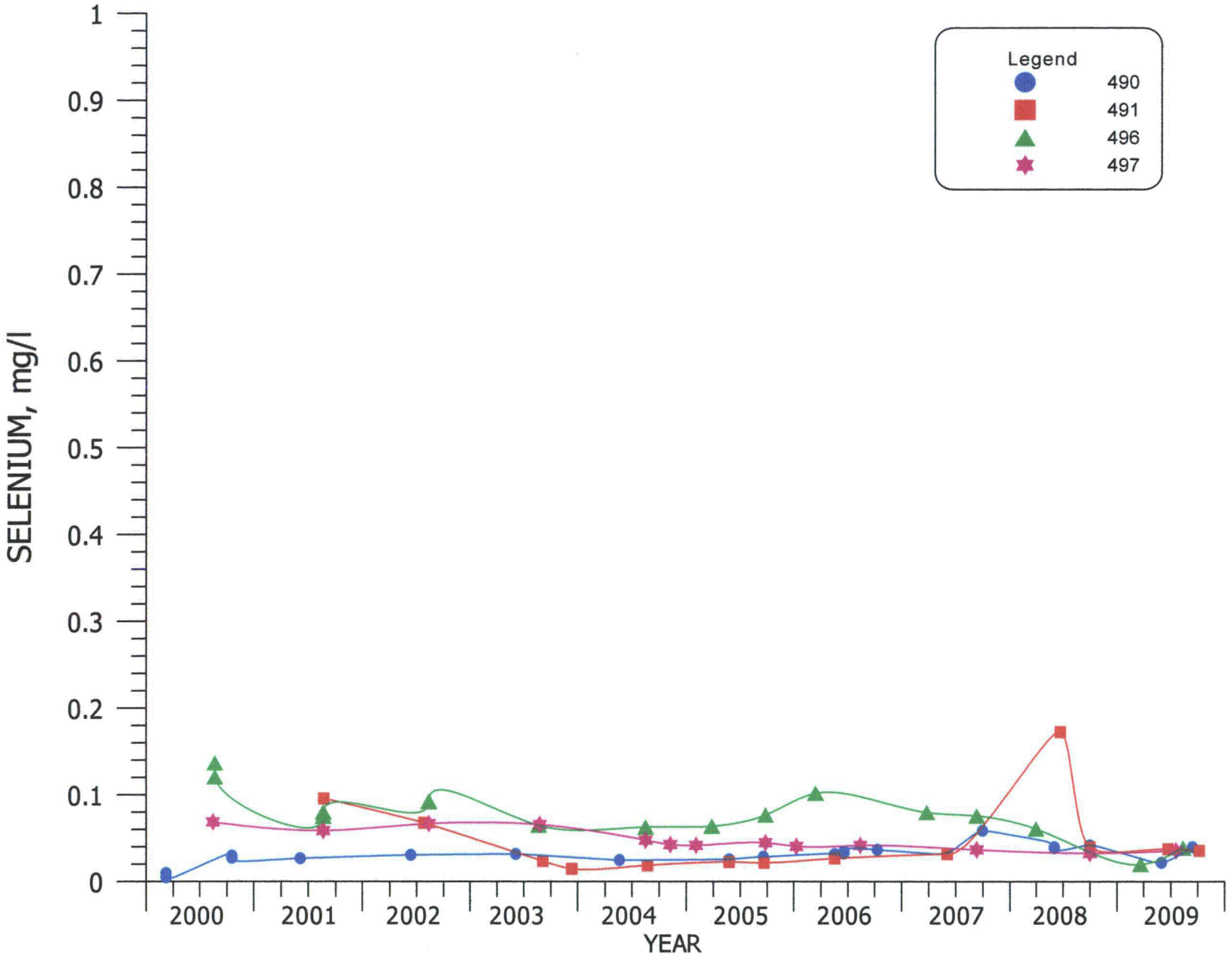


FIGURE 4.3-81. SELENIUM CONCENTRATIONS FOR WELLS 490, 491, 496 AND 497.

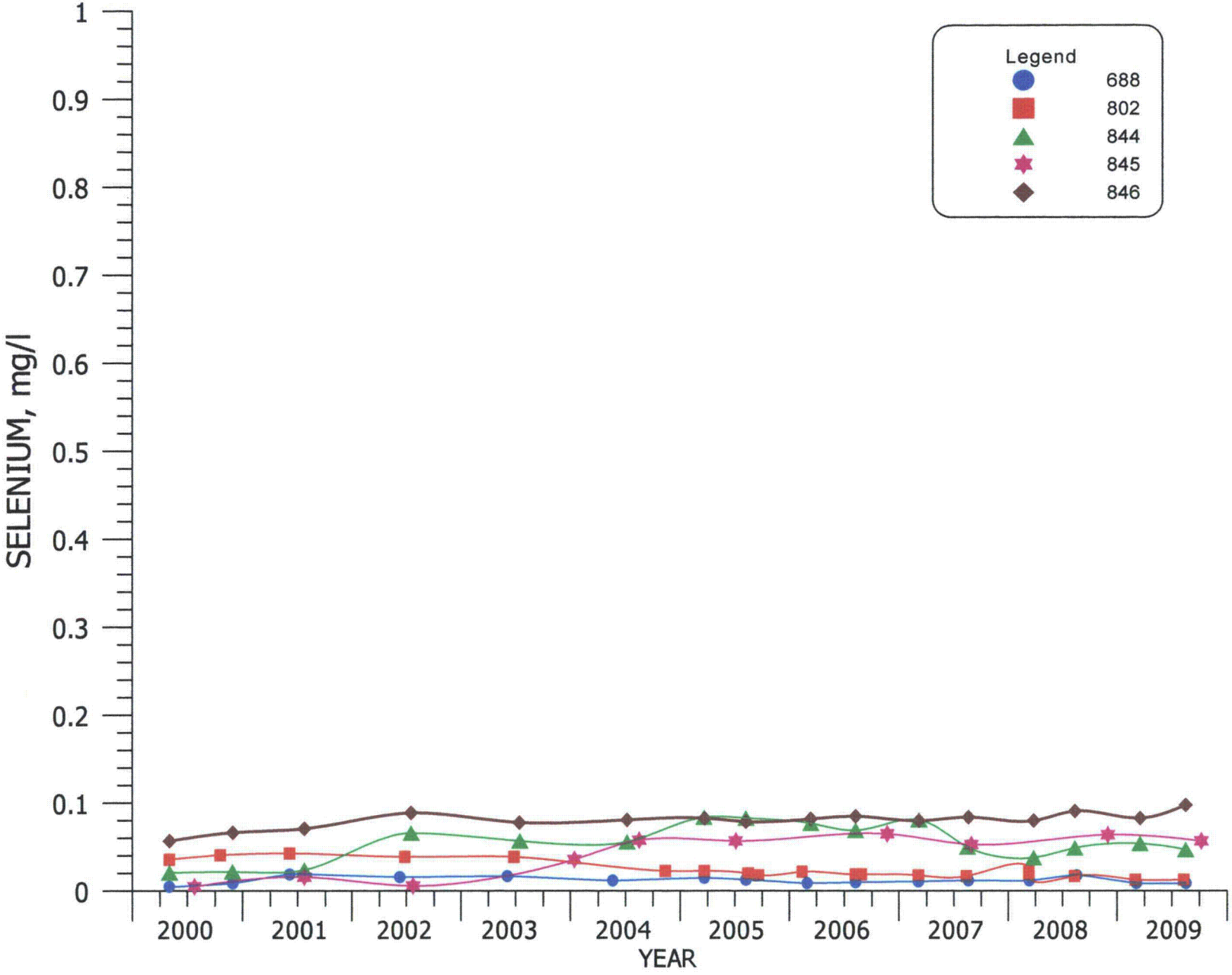


FIGURE 4.3-82. SELENIUM CONCENTRATIONS FOR WELLS 688, 802, 844, 846 AND FB.

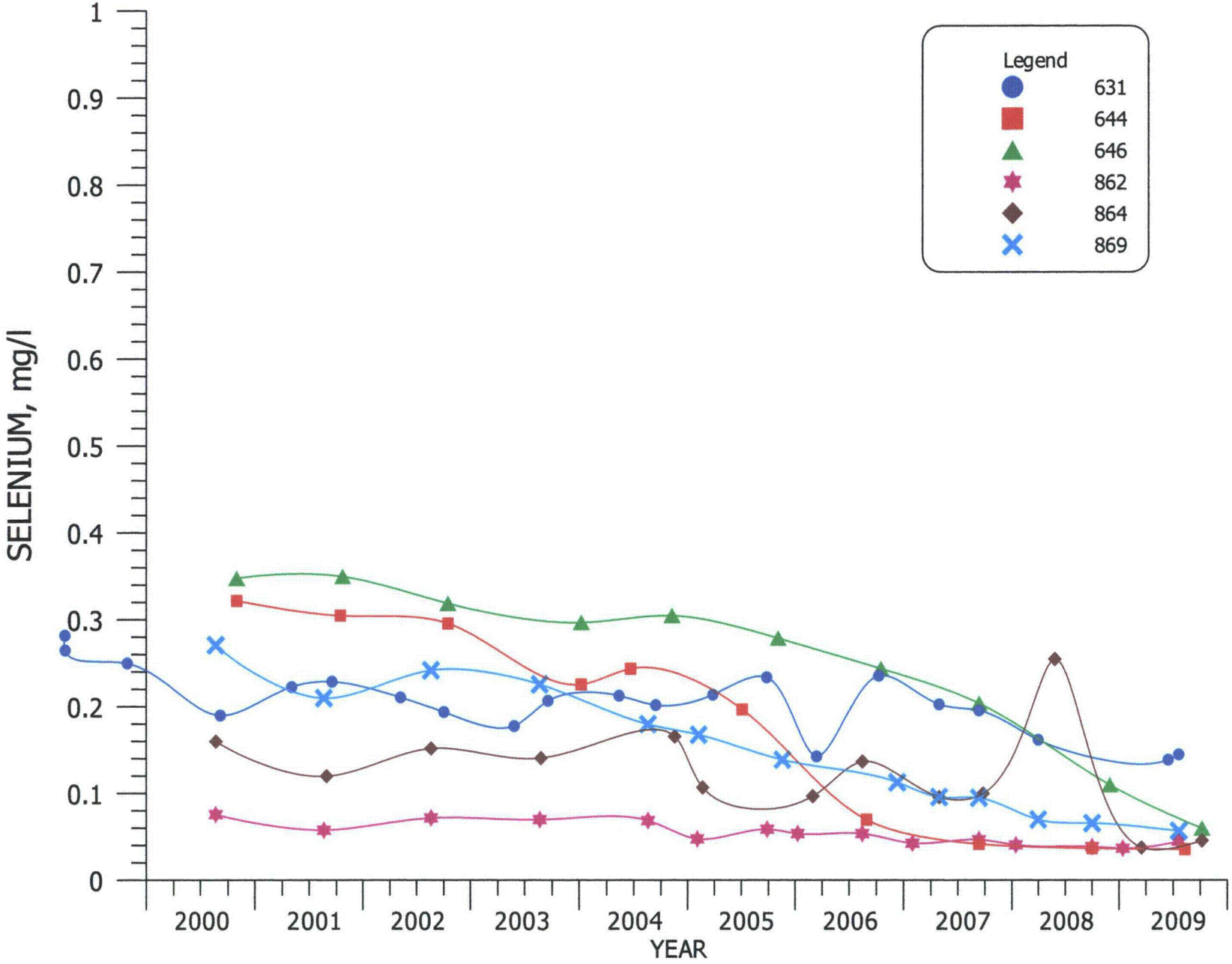


FIGURE 4.3-83. SELENIUM CONCENTRATIONS FOR WELLS 631, 644, 646, 862, 864 AND 869.

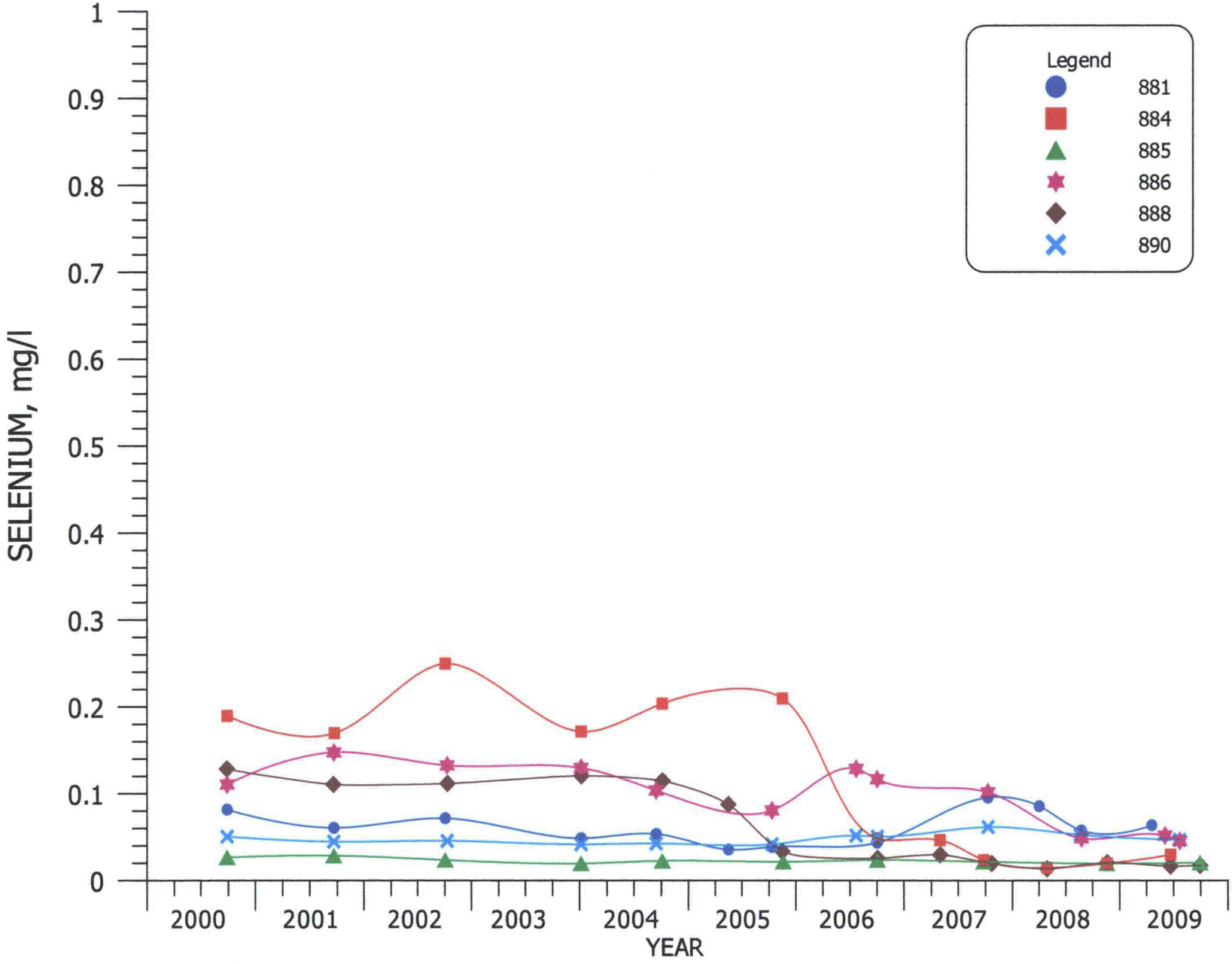


FIGURE 4.3-84. SELENIUM CONCENTRATIONS FOR WELLS 881, 884, 885, 886, 888 AND 890.

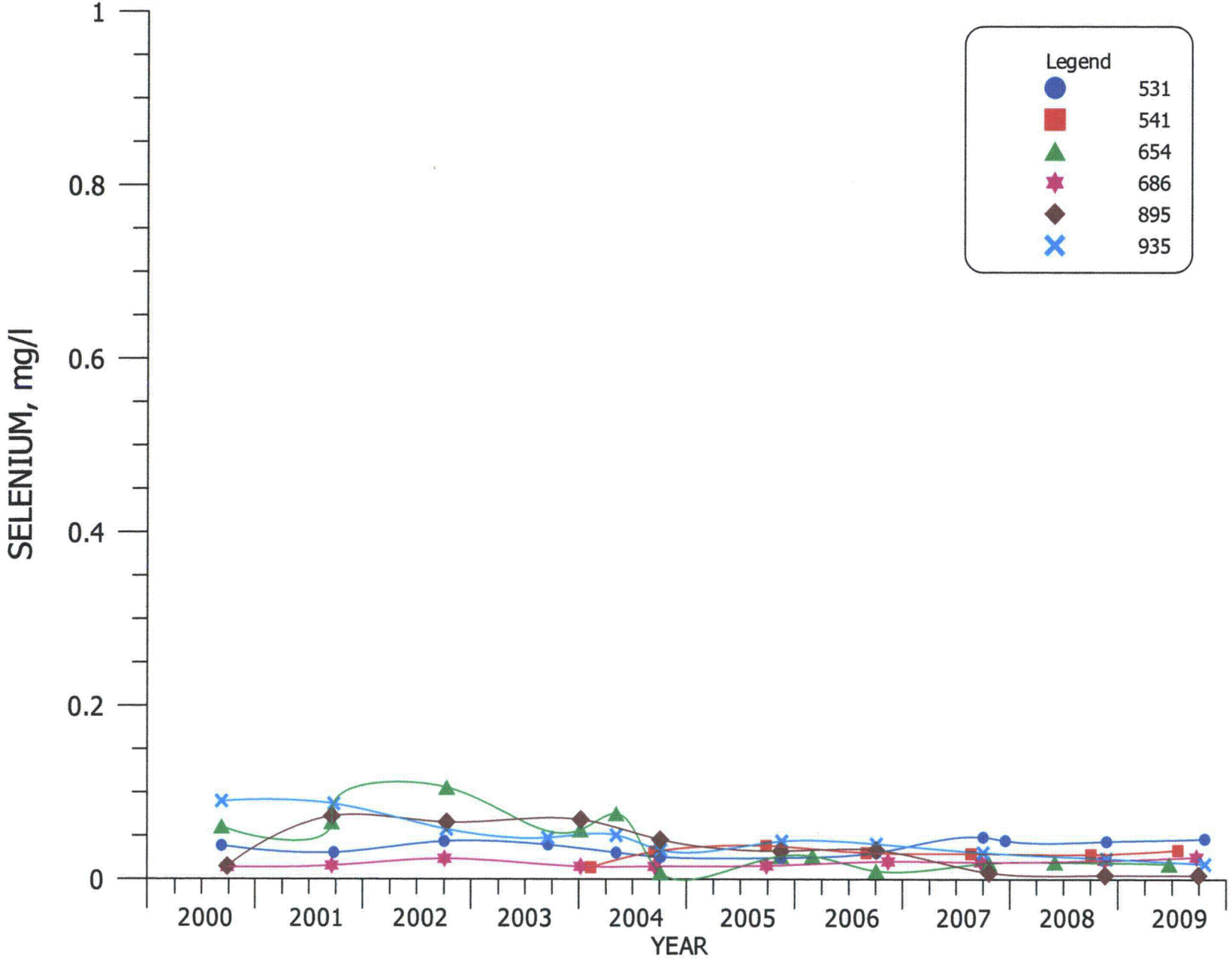


FIGURE 4.3-85. SELENIUM CONCENTRATIONS FOR WELLS 531, 541, 654, 686, 895 AND 935.

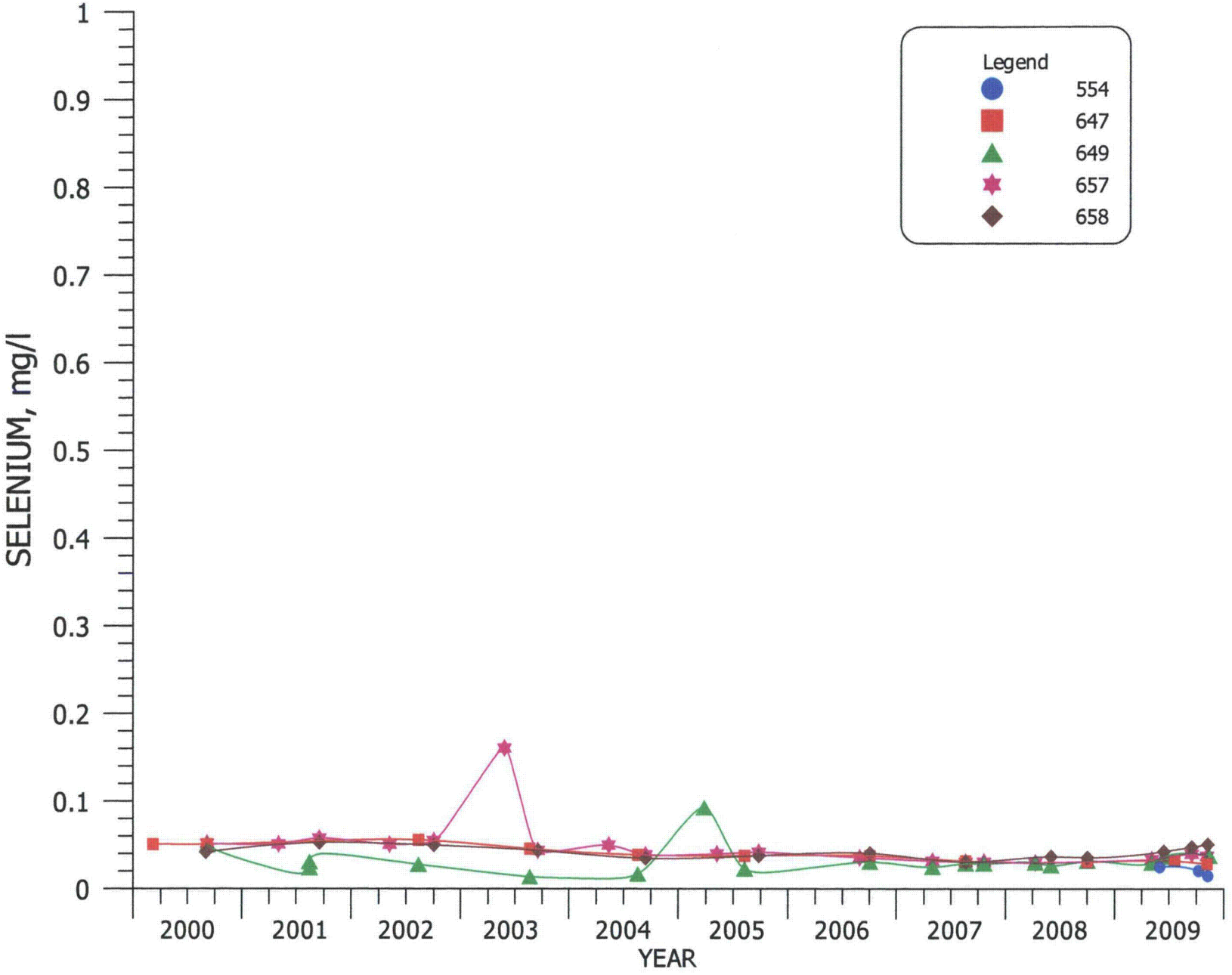
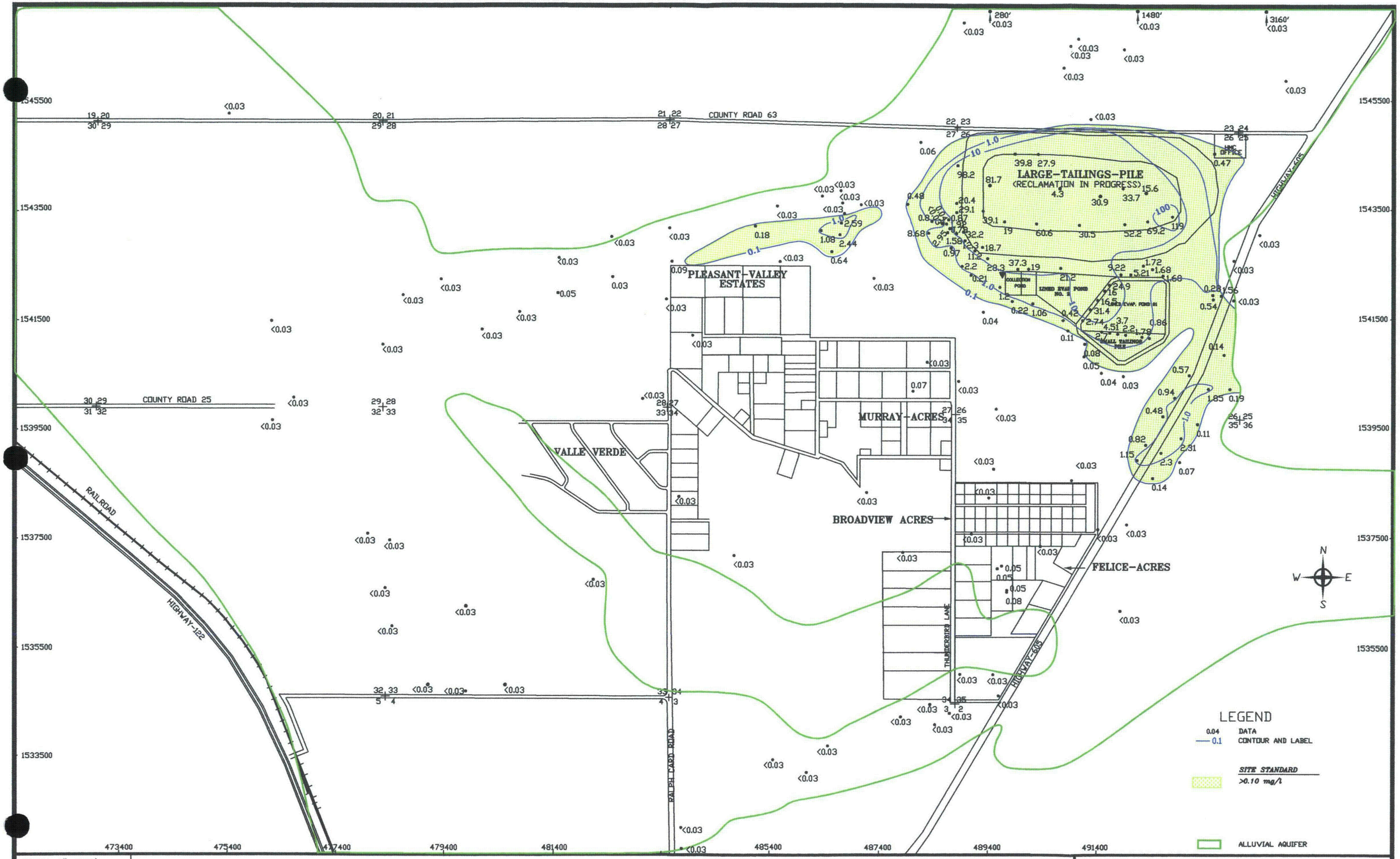


FIGURE 4.3-86. SELENIUM CONCENTRATIONS FOR WELLS 554, 647, 649, 657 AND 658.



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DATE: 2/22/2010

FIGURE 4.3-87. MOLYBDENUM CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2009, mg/l

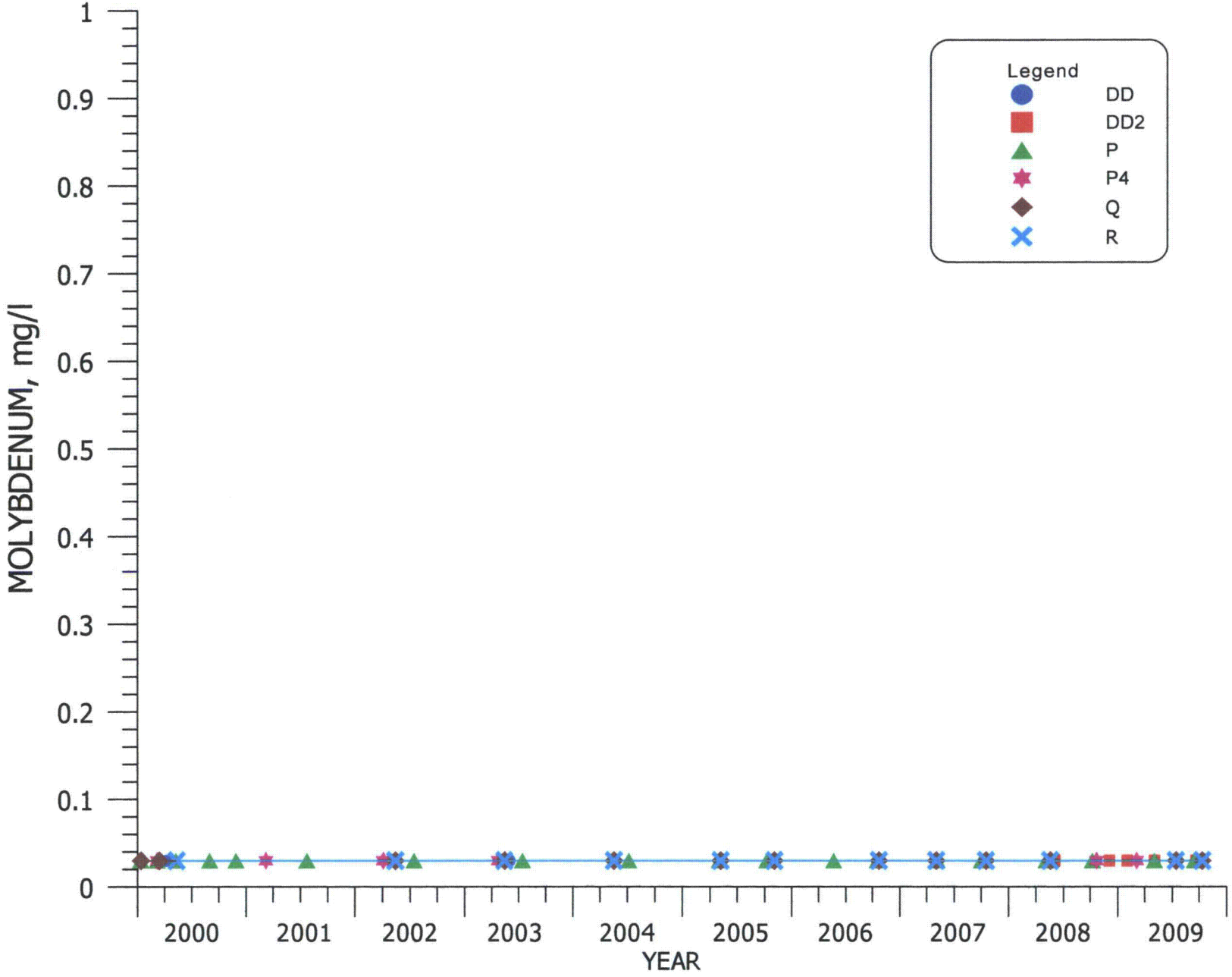


FIGURE 4.3-88. MOLYBDENUM CONCENTRATIONS FOR WELLS DD, DD2, P, P4, Q AND R.

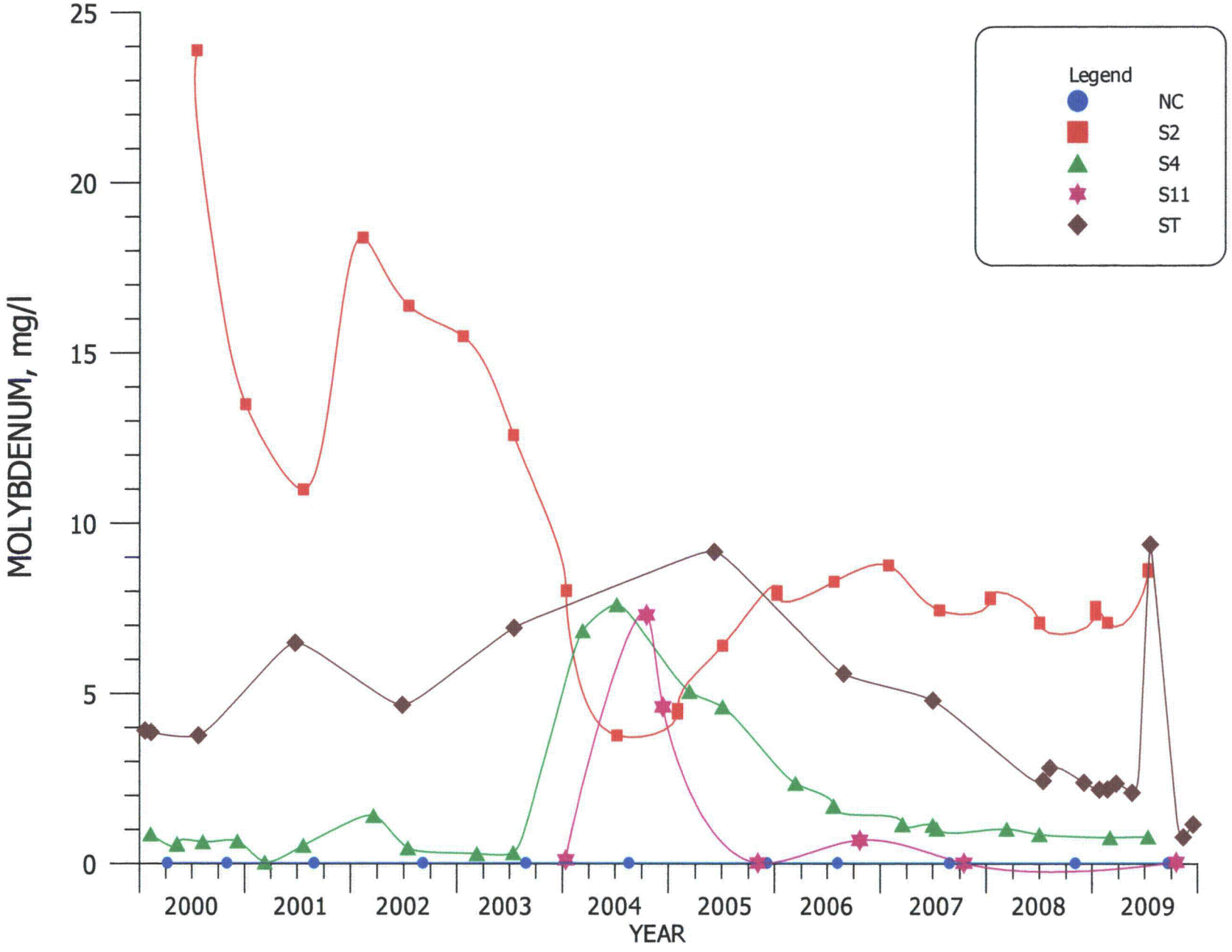


FIGURE 4.3-89. MOLYBDENUM CONCENTRATIONS FOR WELLS NC, S2, S4, S11 AND ST.

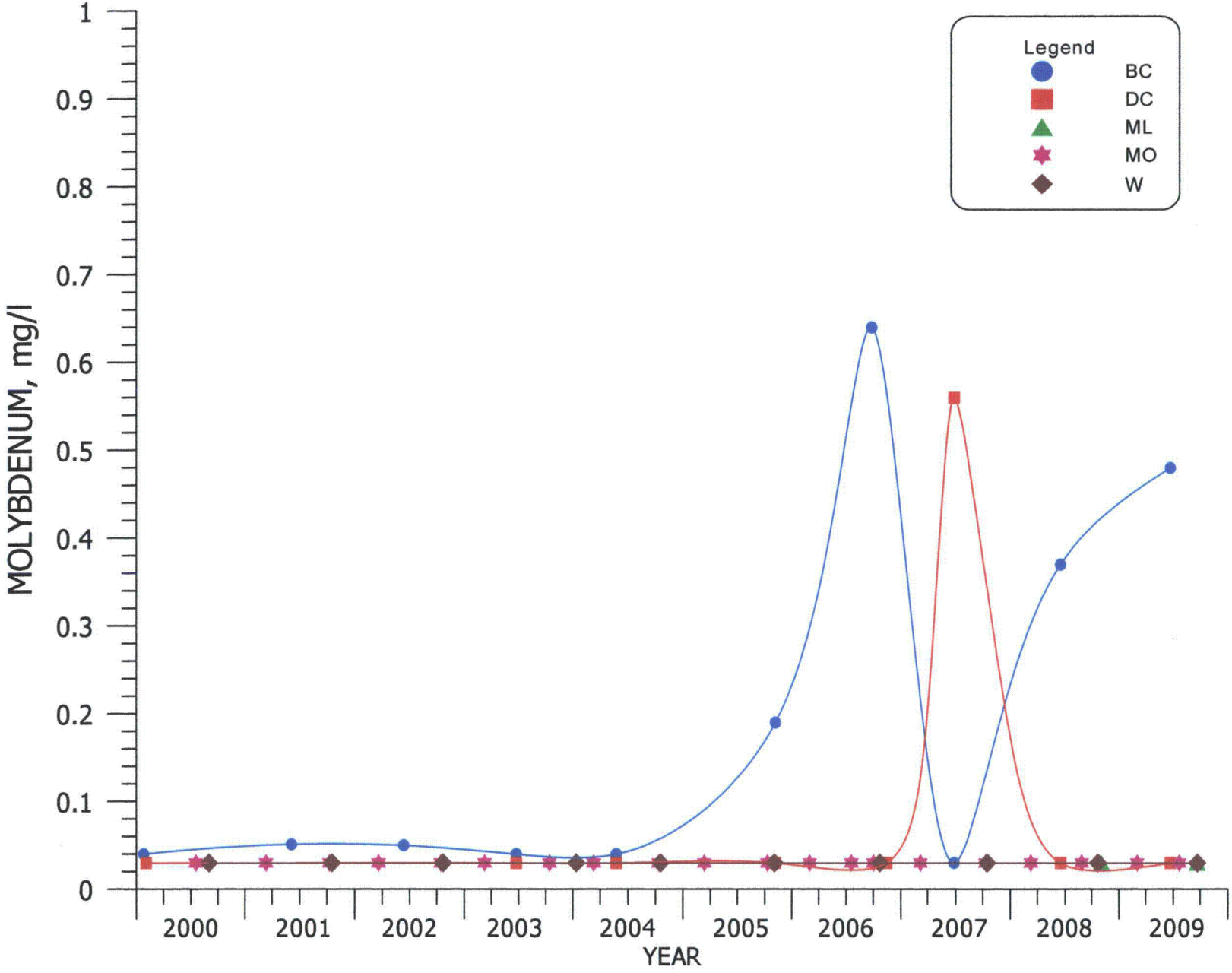


FIGURE 4.3-90. MOLYBDENUM CONCENTRATIONS FOR WELLS BC, DC, ML, MO AND W.

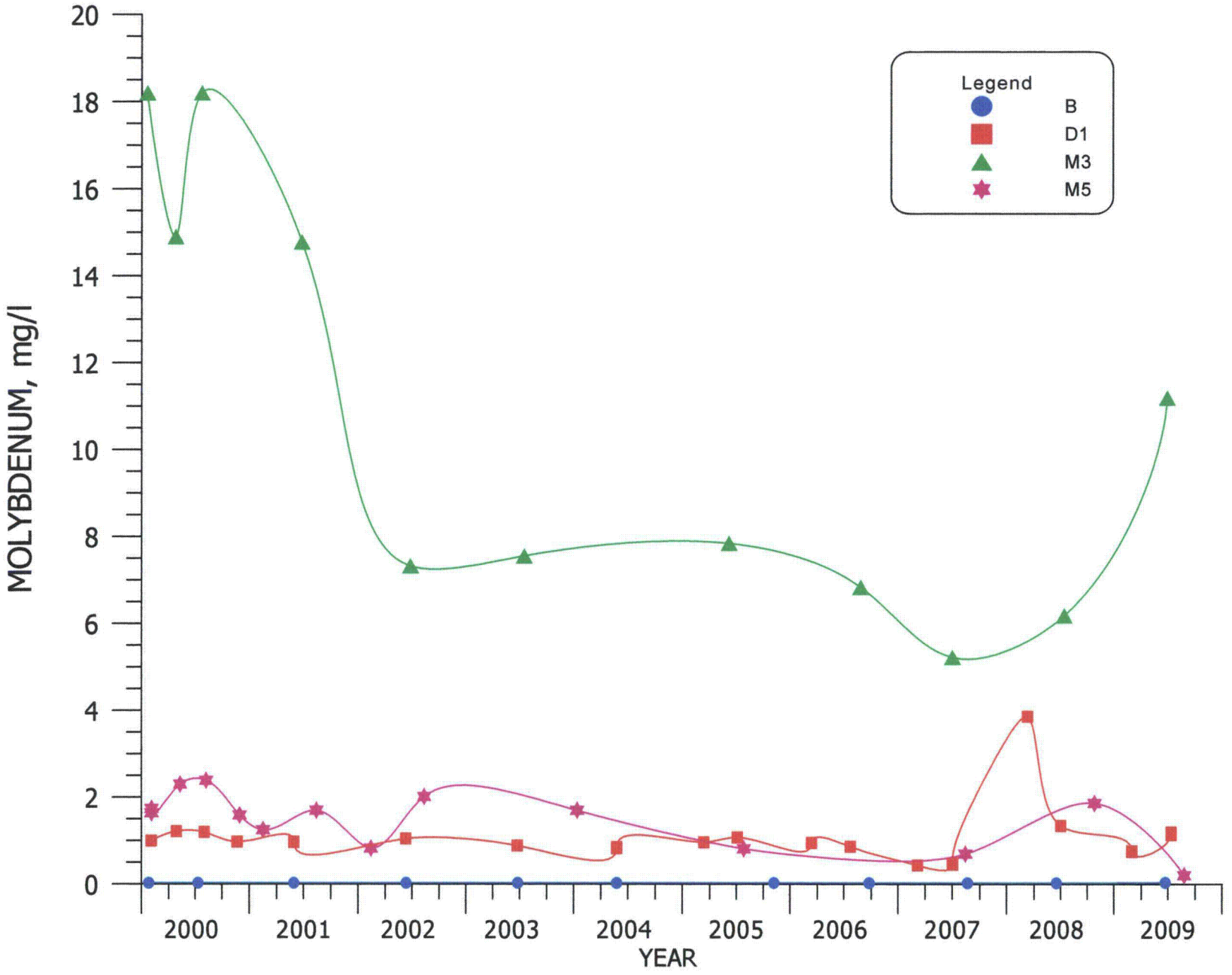


FIGURE 4.3-91. MOLYBDENUM CONCENTRATIONS FOR WELLS B, D1, M3 AND M5.

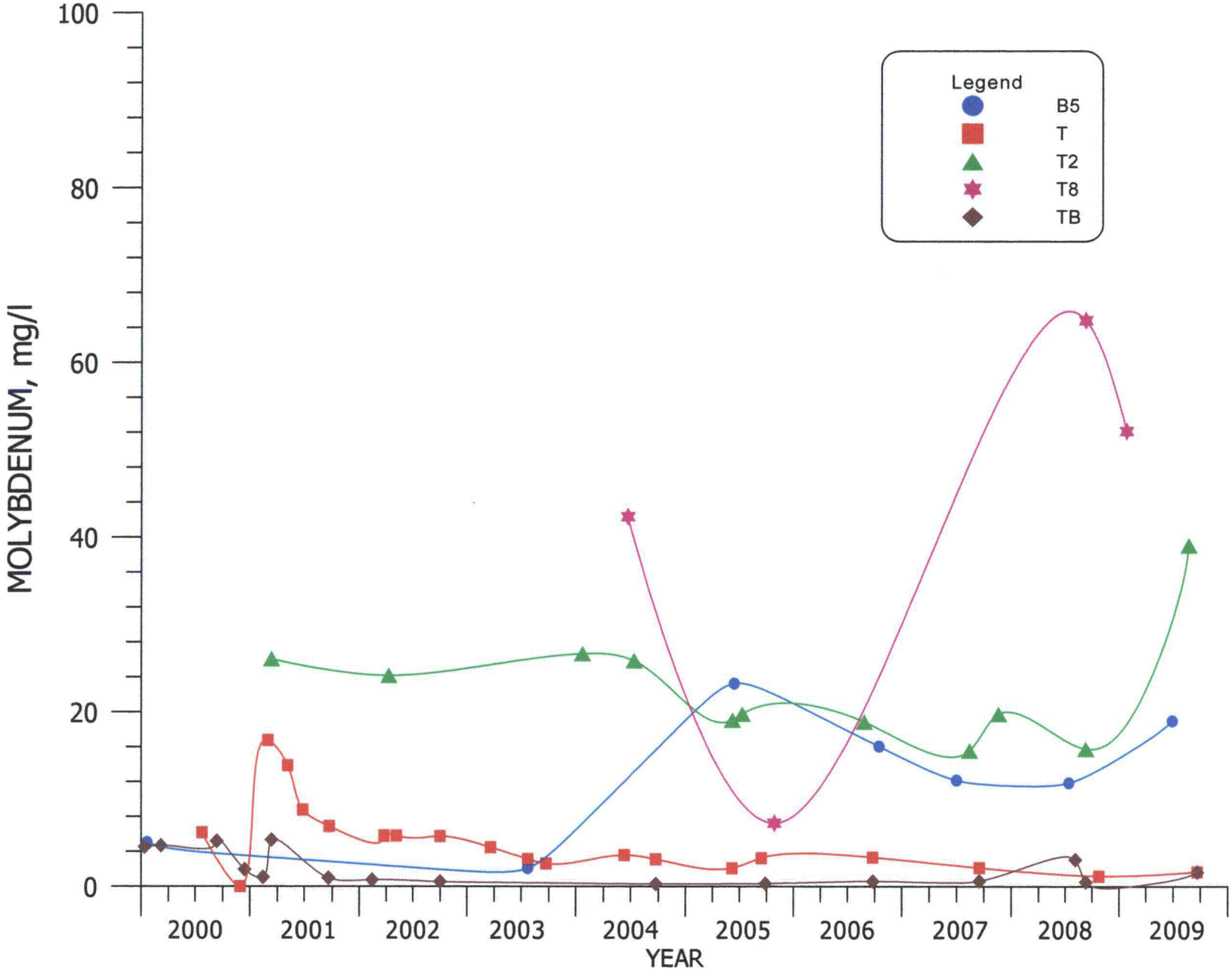


FIGURE 4.3-92. MOLYBDENUM CONCENTRATIONS FOR WELLS B5, T, T2, T8 AND TB.

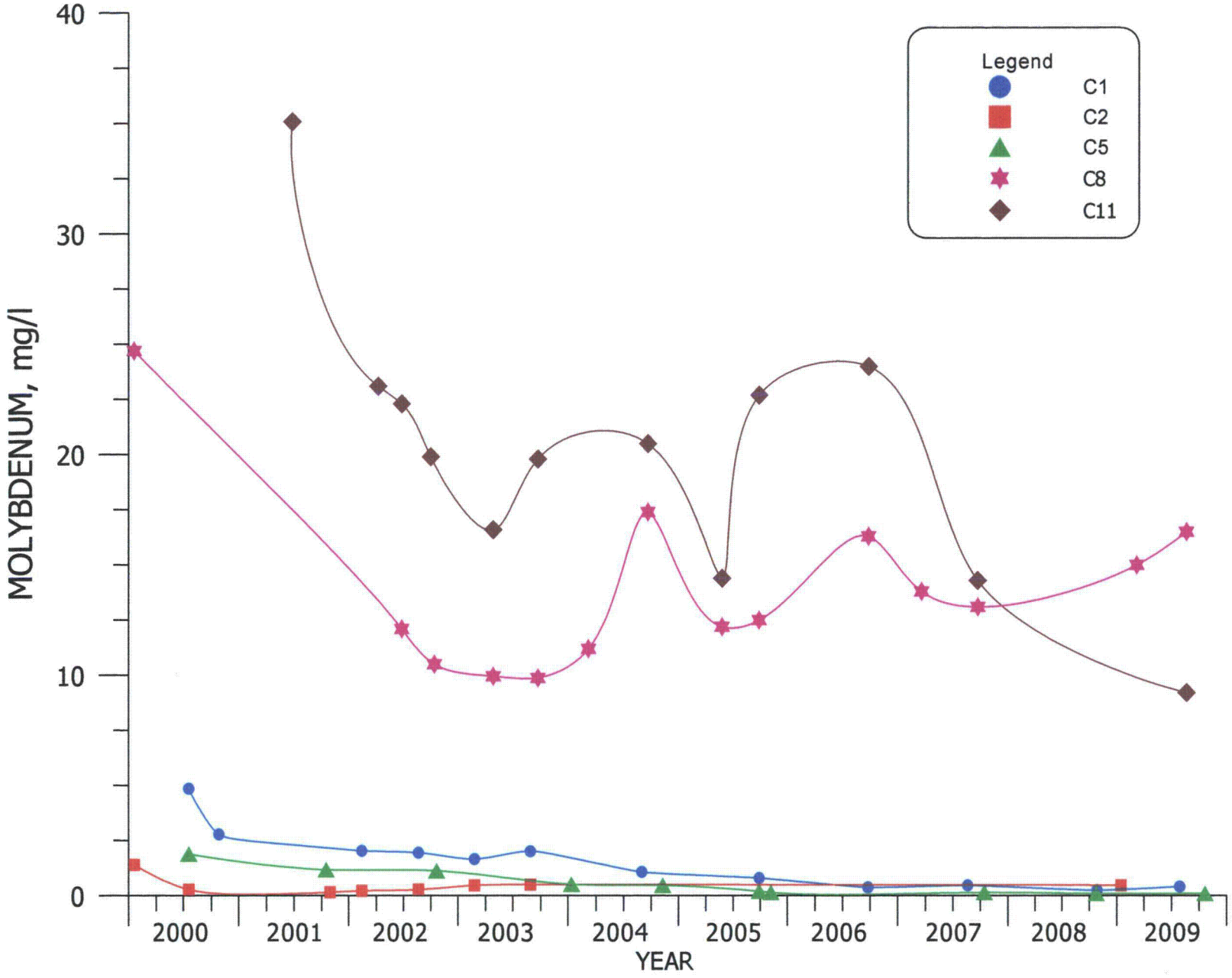


FIGURE 4.3-93. MOLYBDENUM CONCENTRATIONS FOR WELLS C1, C2, C5, C8 AND C11.

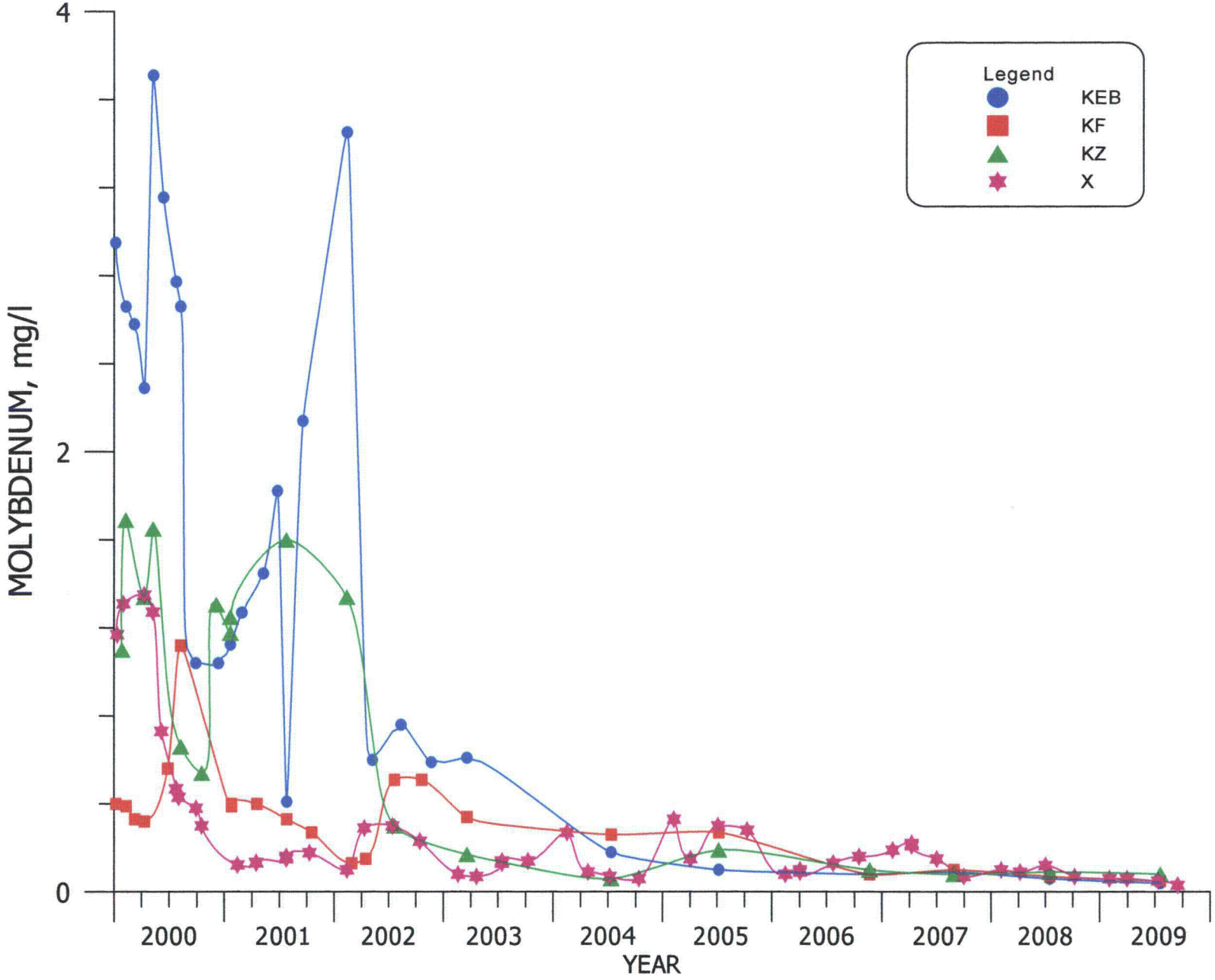


FIGURE 4.3-94. MOLYBDENUM CONCENTRATIONS FOR WELLS KEB, KF, KZ AND X.

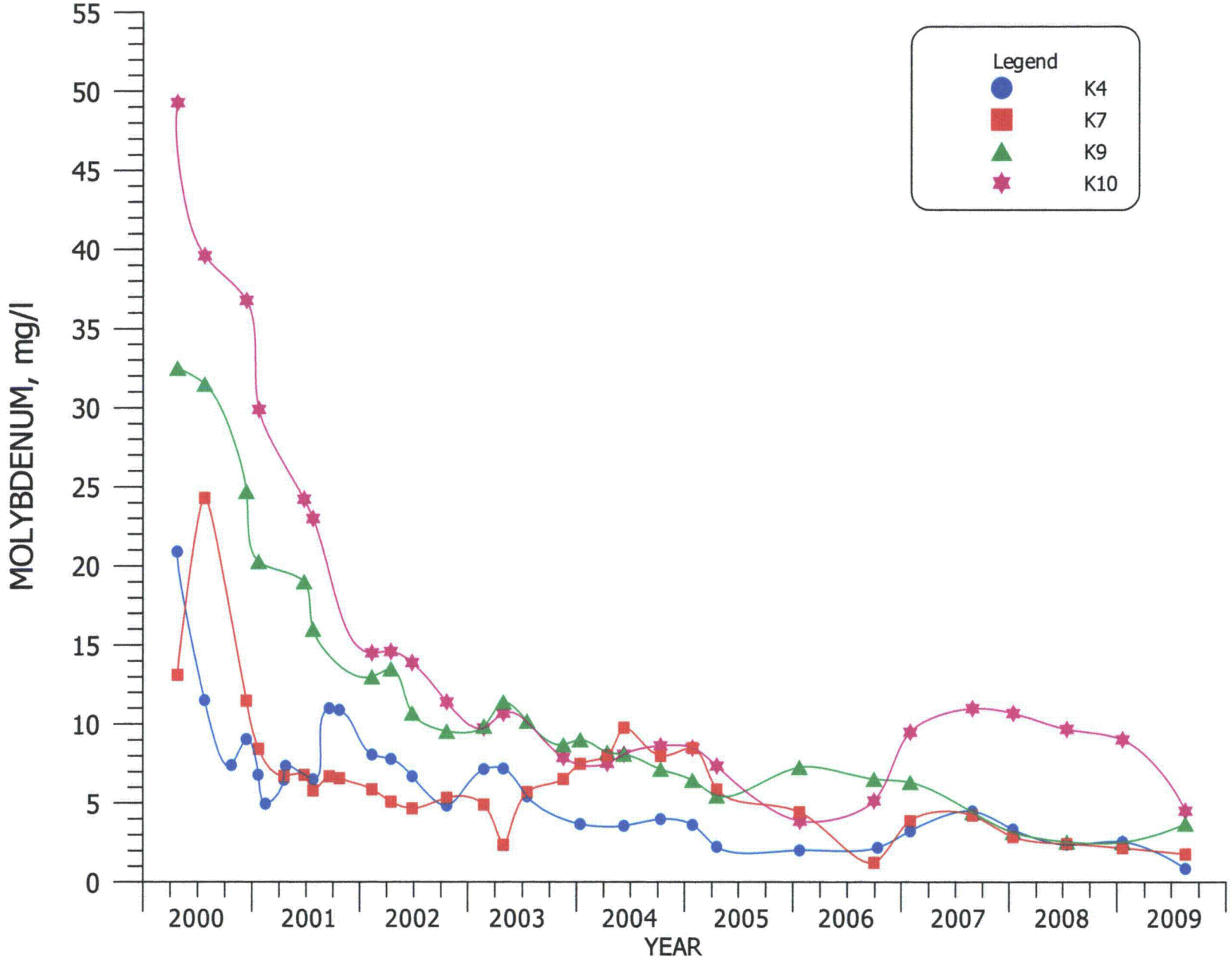


FIGURE 4.3-95. MOLYBDENUM CONCENTRATIONS FOR WELLS K4, K7, K9 AND K10.

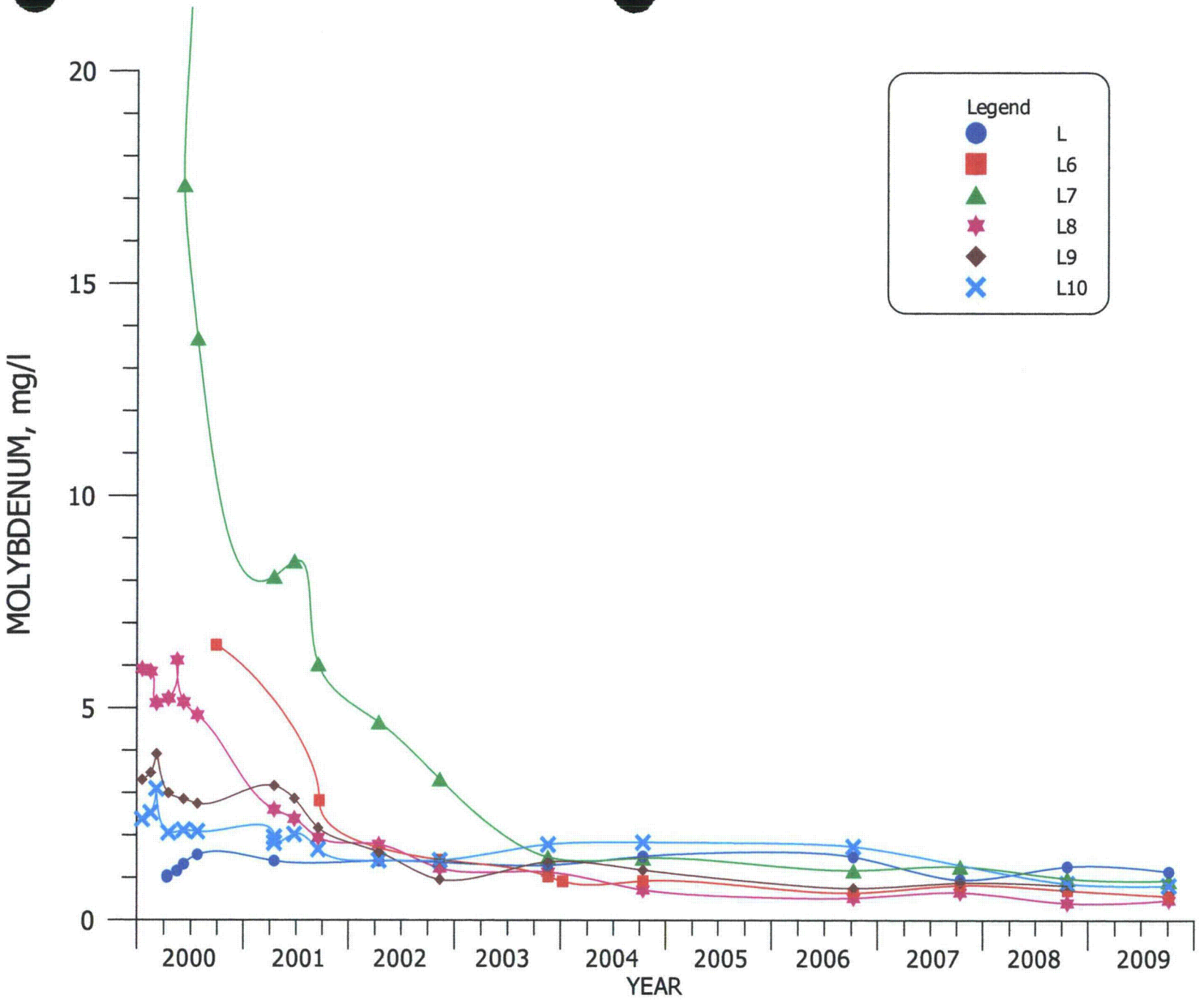


FIGURE 4.3-96. MOLYBDENUM CONCENTRATIONS FOR WELLS L, L6, L7, L8, L9 AND L10.

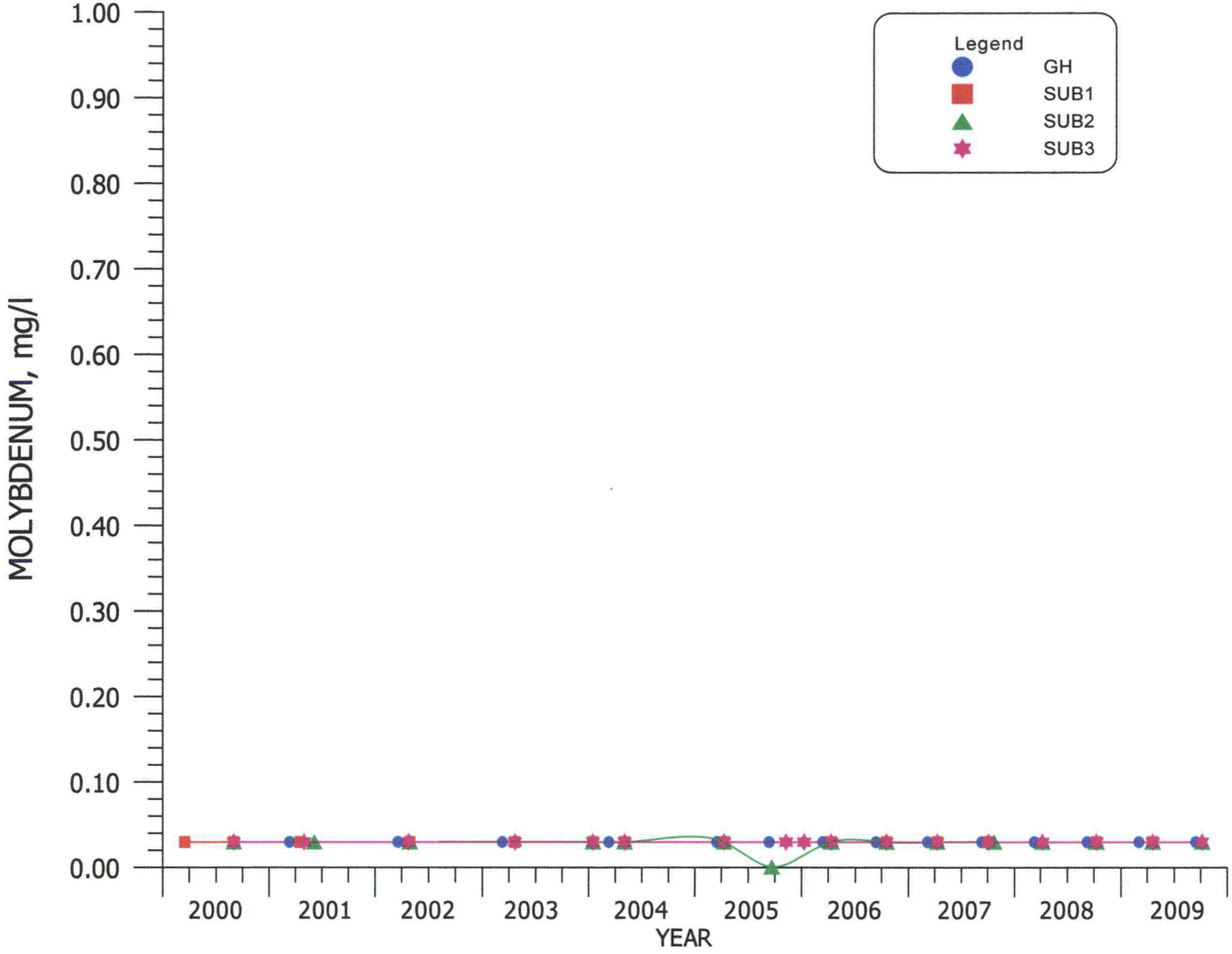


FIGURE 4.3-97. MOLYBDENUM CONCENTRATIONS FOR WELLS GH, SUB1, SUB2 AND SUB3.

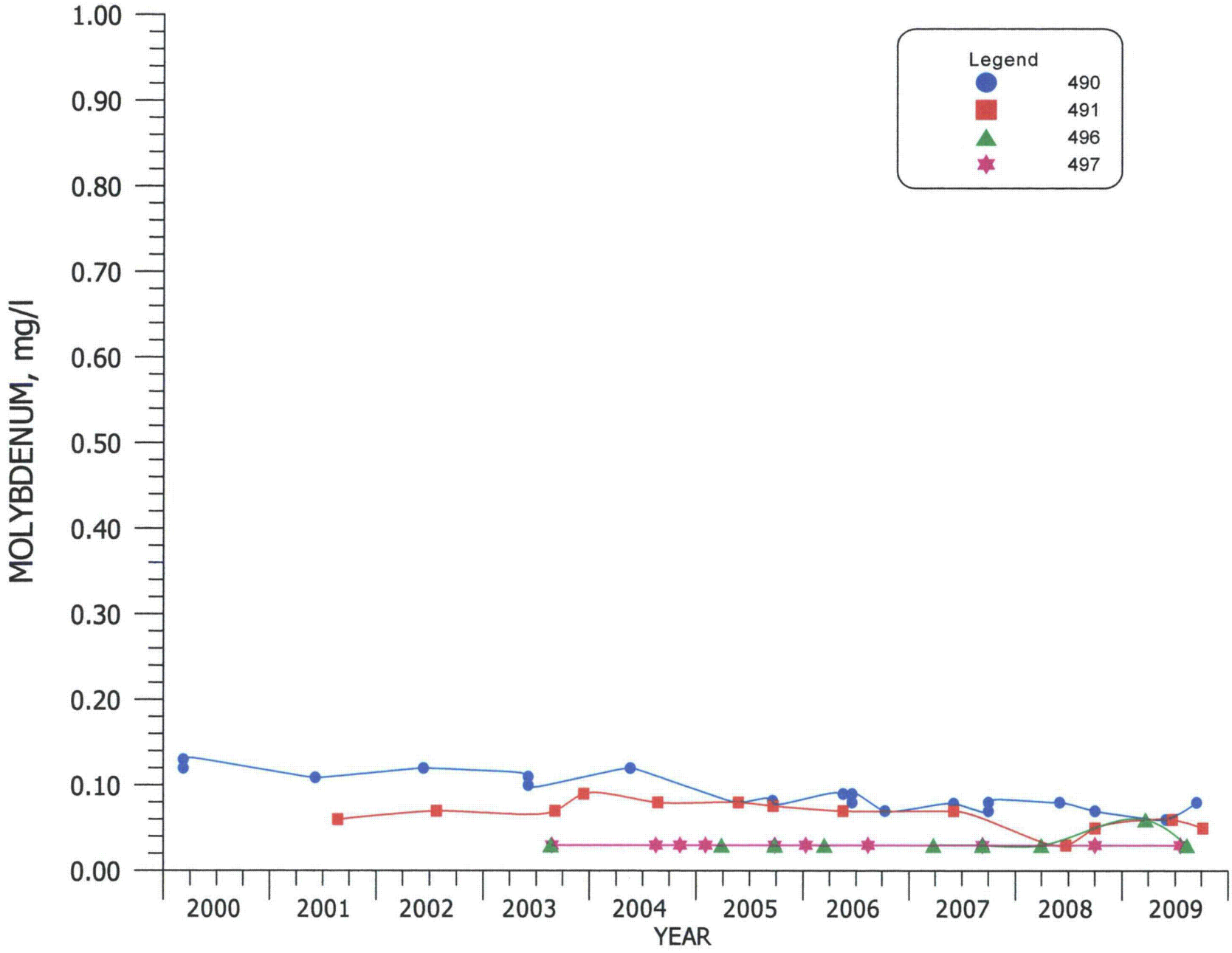


FIGURE 4.3-98. MOLYBDENUM CONCENTRATIONS FOR WELLS 490, 491, 496 AND 497.

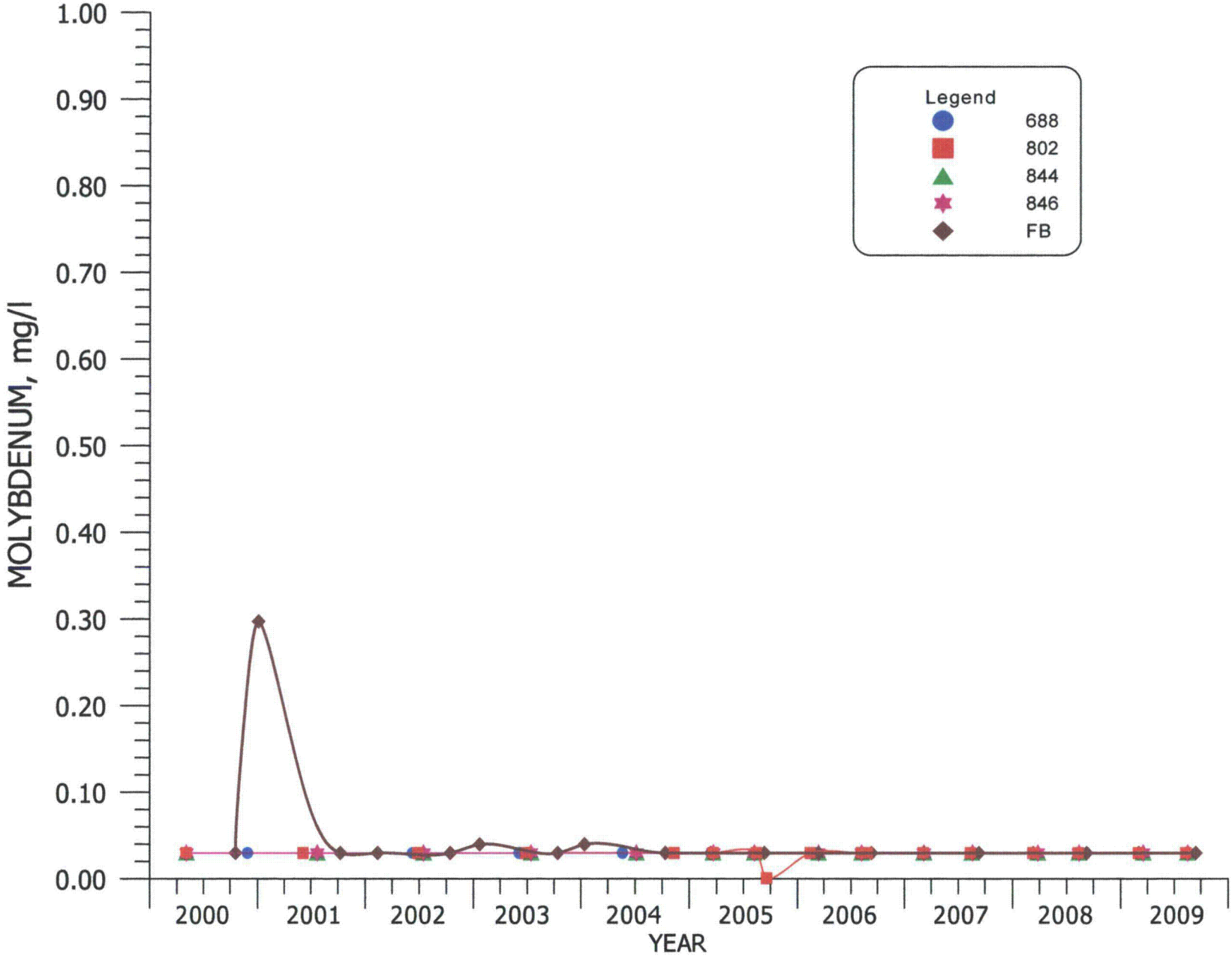


FIGURE 4.3-99. MOLYBDENUM CONCENTRATIONS FOR WELLS 688, 802, 844, 846 AND FB.

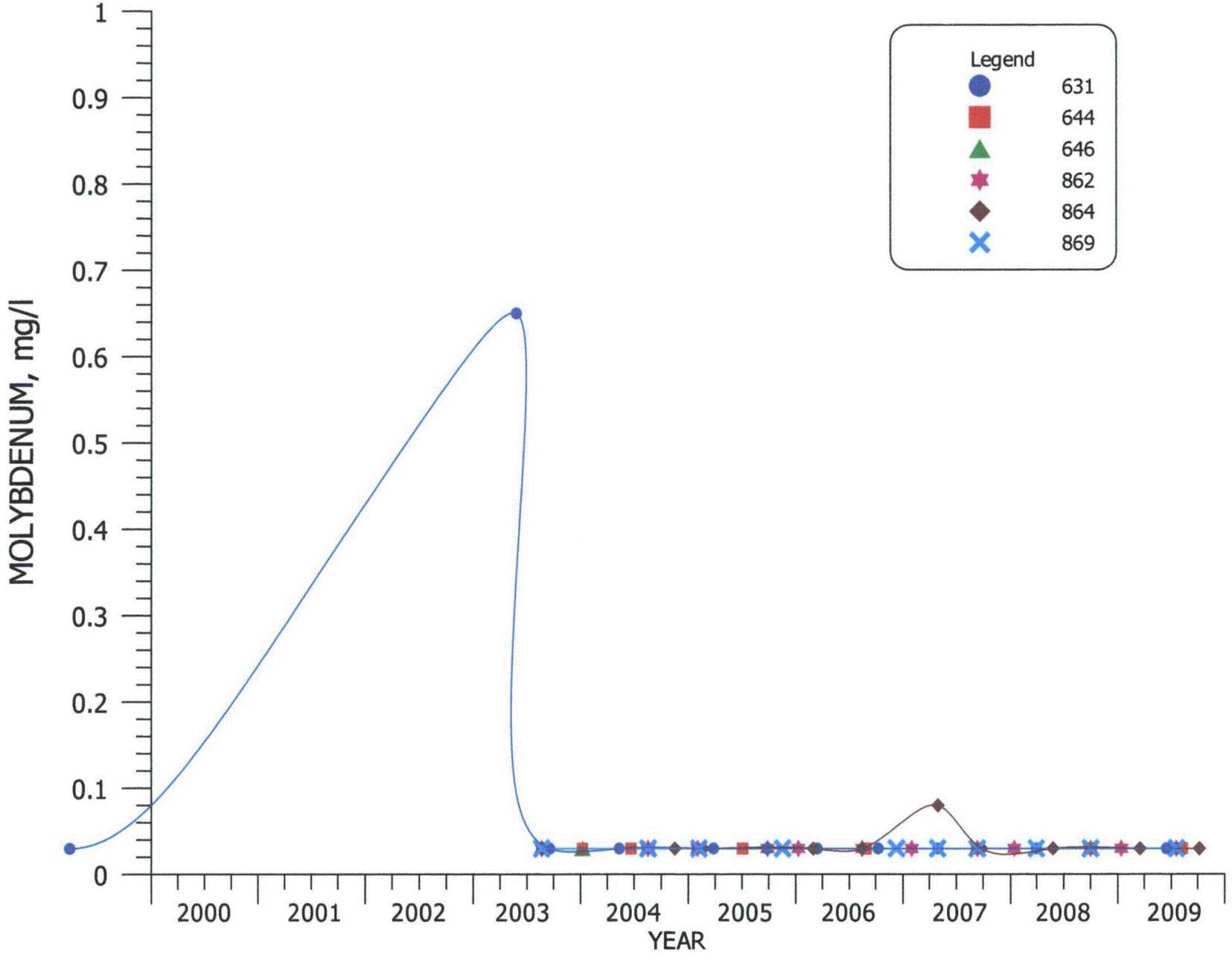


FIGURE 4.3-100. MOLYBDENUM CONCENTRATIONS FOR WELLS 631, 644, 646, 862, 864 AND 869.

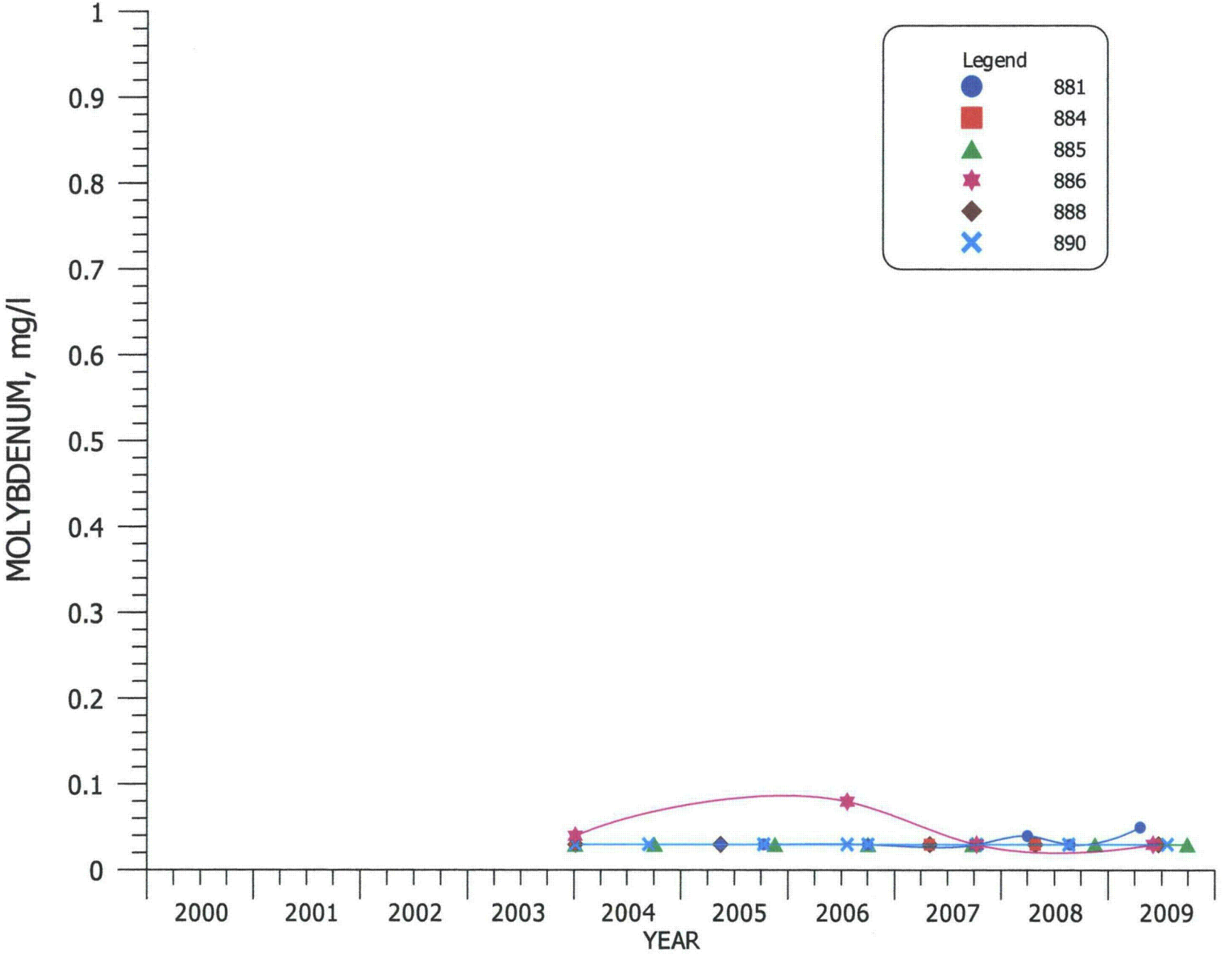


FIGURE 4.3-101. MOLYBDENUM CONCENTRATIONS FOR WELLS 881, 884, 885, 886, 888 AND 890.

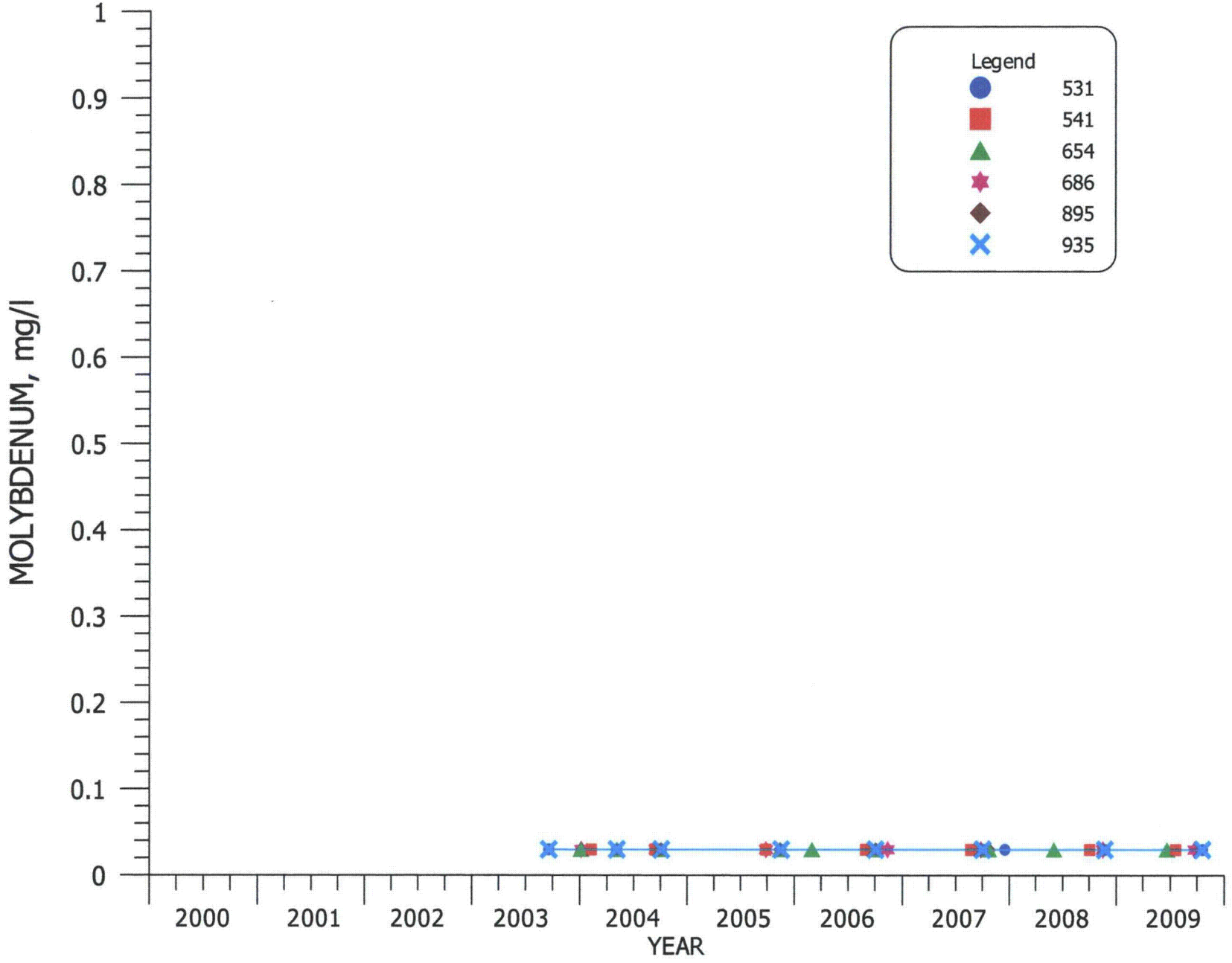


FIGURE 4.3-102. MOLYBDENUM CONCENTRATIONS FOR WELLS 531, 541, 654, 686, 895 AND 935.

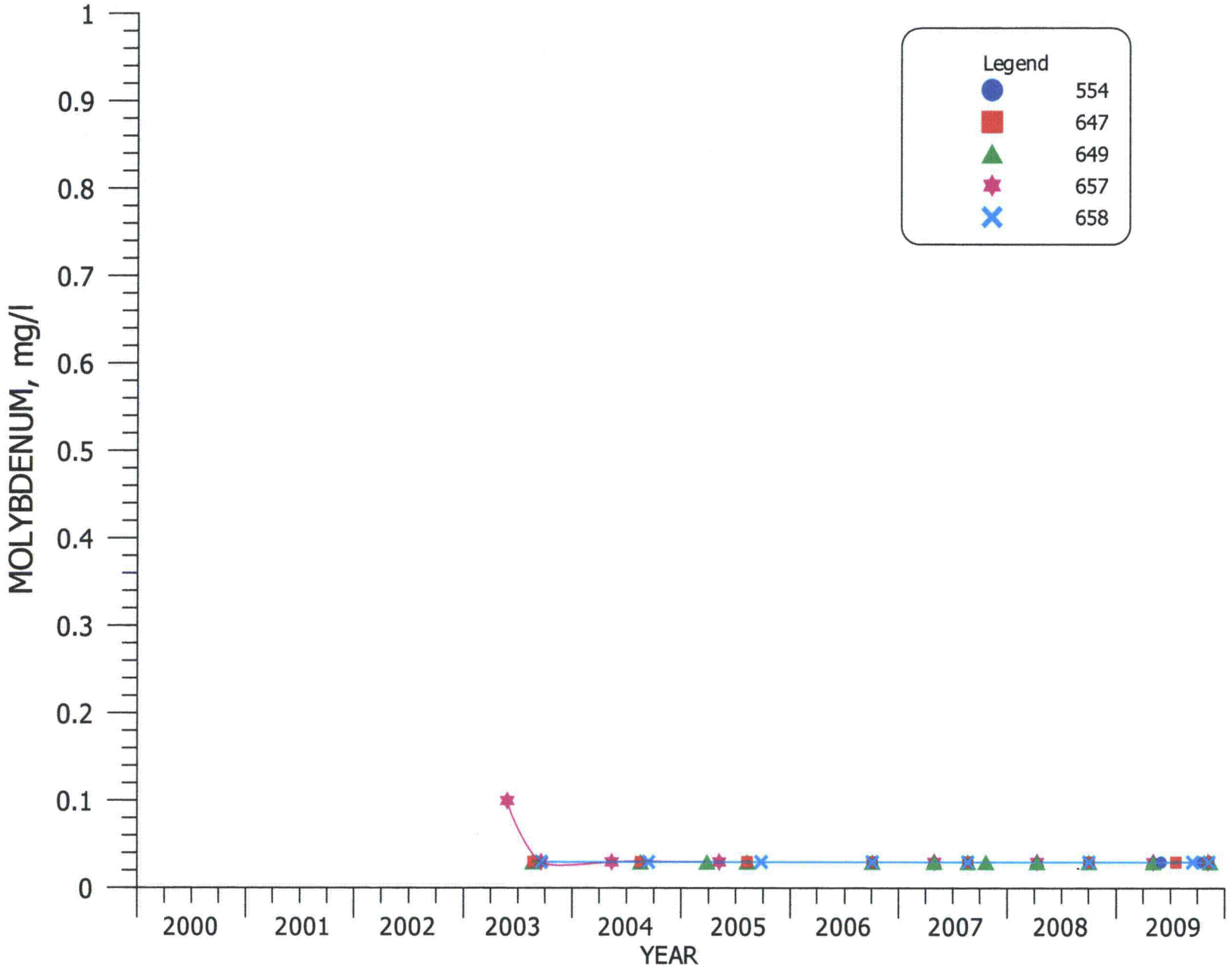


FIGURE 4.3-103. MOLYBDENUM CONCENTRATIONS FOR WELLS 554, 647, 649, 657 AND 658.

LARGE-TAILINGS-PILE
(RECLAMATION IN PROGRESS)

PLEASANT-VALLEY ESTATES

VALLE VERDE

MURRAY-ACRES

BROADVIEW ACRES

FELICE-ACRES

COUNTY ROAD 63

COUNTY ROAD 25

RAILROAD

HIGHWAY-122

HIGHWAY-605

THUNDERBIRD LANE

ARKANSAS RIVER

COLLECTION POND

LINED EVAP. POND NO. 2

LINED EVAP. POND #1

SMALL TAILINGS PILE

MW OFFICE

290'

1480'

3160'

1545500

1543500

1541500

1539500

1537500

1535500

1533500

473400

475400

477400

479400

481400

485400

487400

489400

491400

N

W

E

S

0.1 DATA

10 CONTOUR AND LABEL

SITE STANDARD
>12 mg/l

ALLUVIAL AQUIFER

SCALE: 1"=1600'

C:\PROJECTS\2010-06 1600QAL09

DATE: 2/22/2010

FIGURE 4.3-104. NITRATE CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2009, mg/l

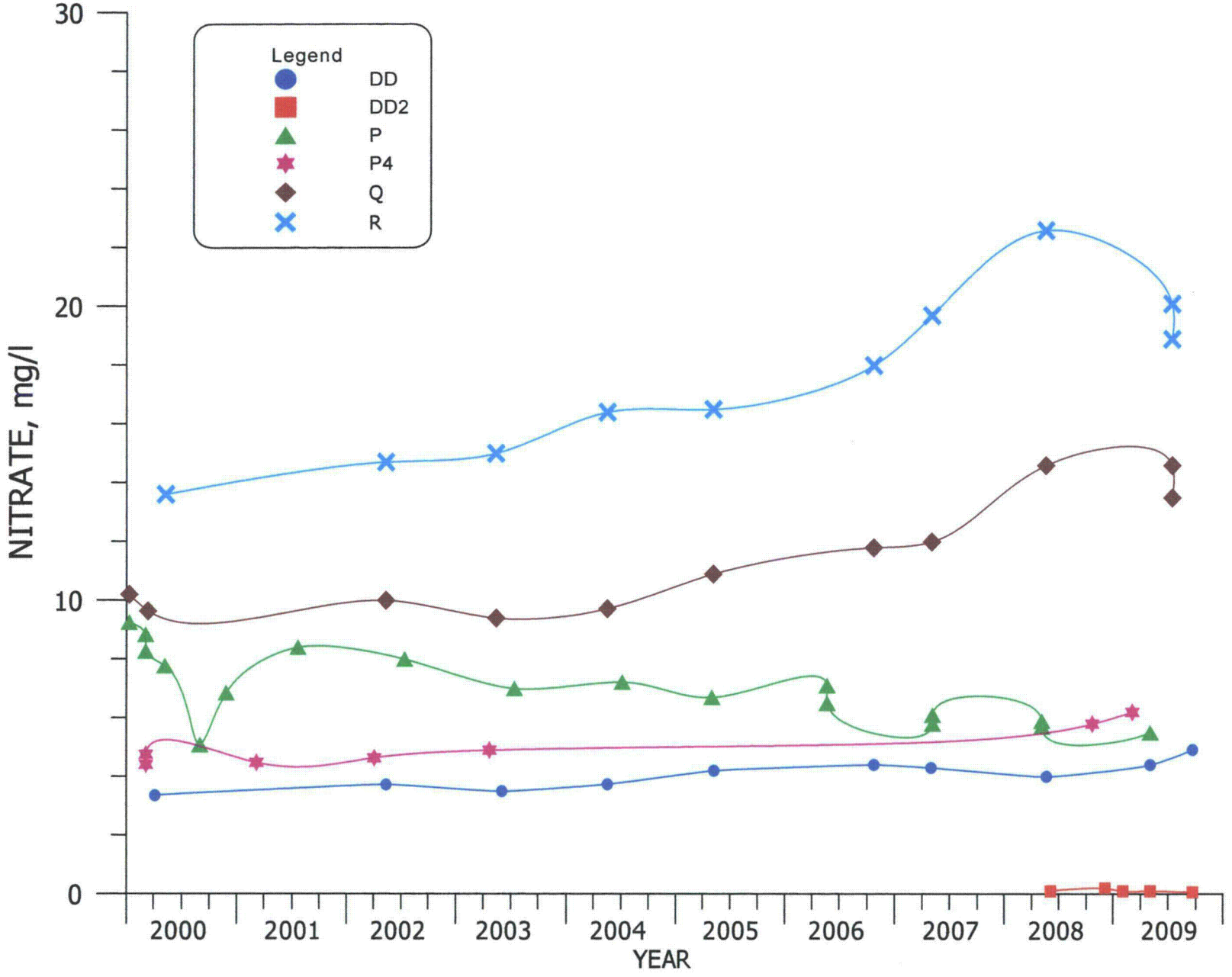


FIGURE 4.3-105. NITRATE CONCENTRATIONS FOR WELLS DD, DD2, P, P4, Q AND R.

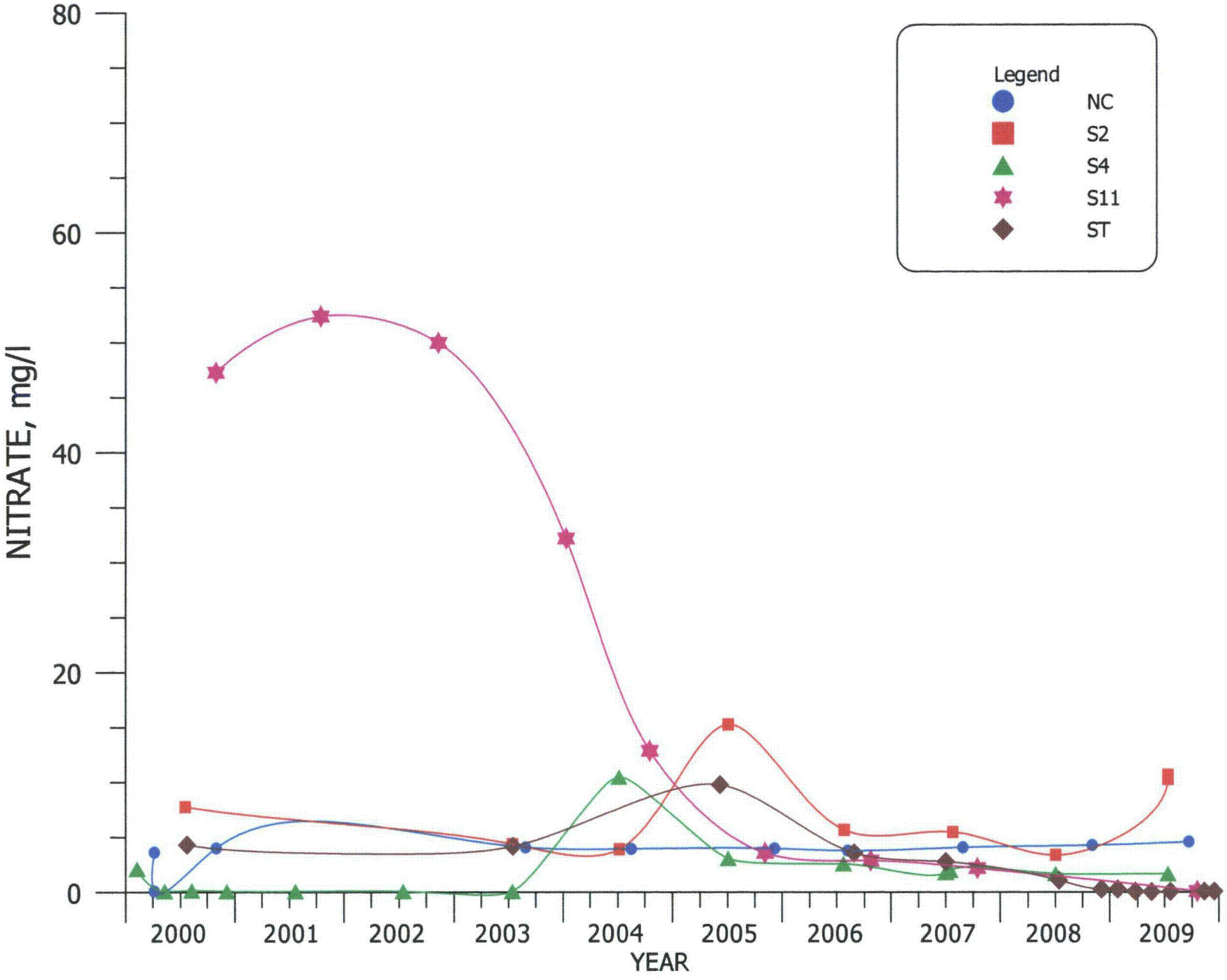


FIGURE 4.3-106. NITRATE CONCENTRATIONS FOR WELLS NC, S2, S4, S11 AND ST.

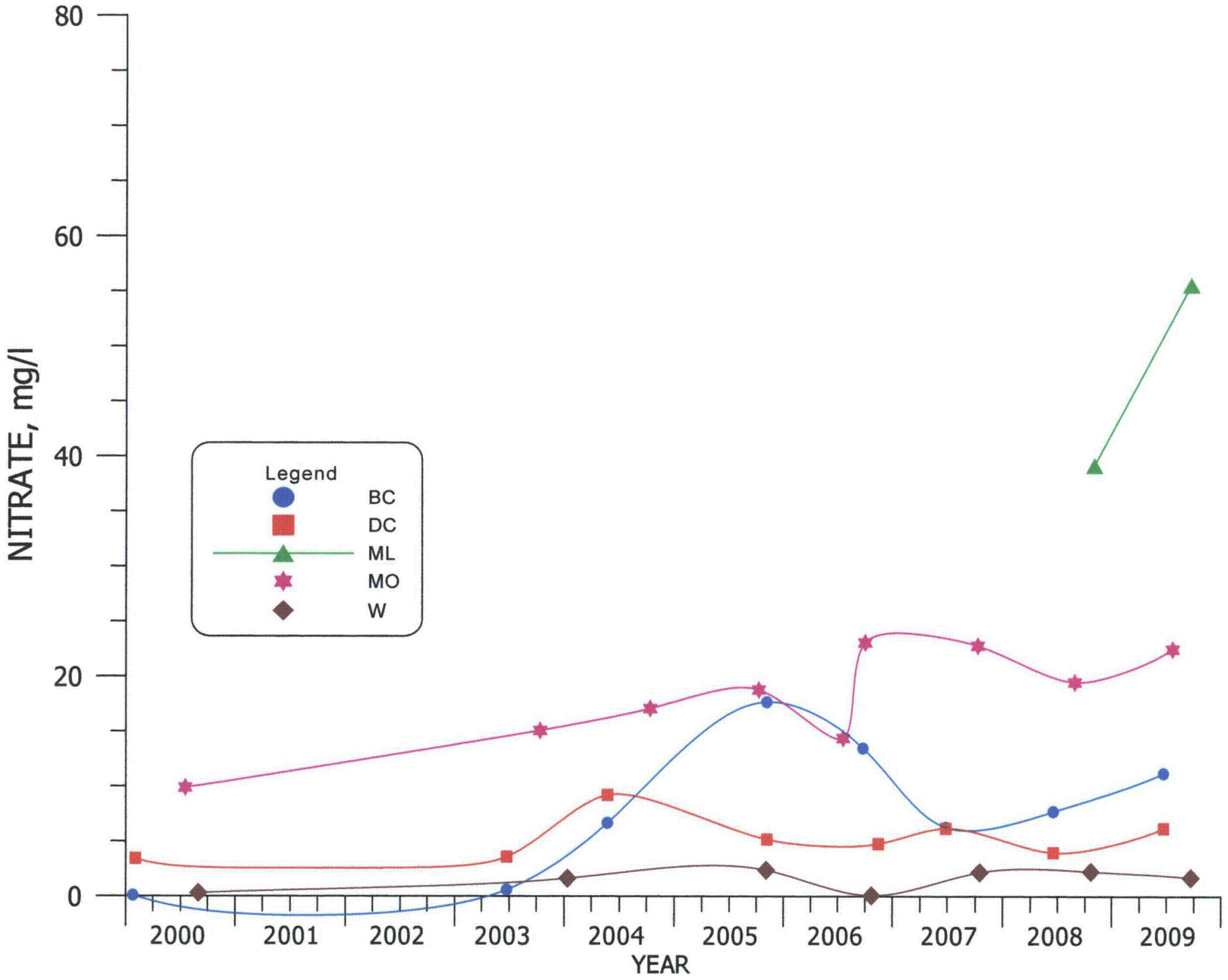


FIGURE 4.3-107. NITRATE CONCENTRATIONS FOR WELLS BC, DC, ML, MO AND W.

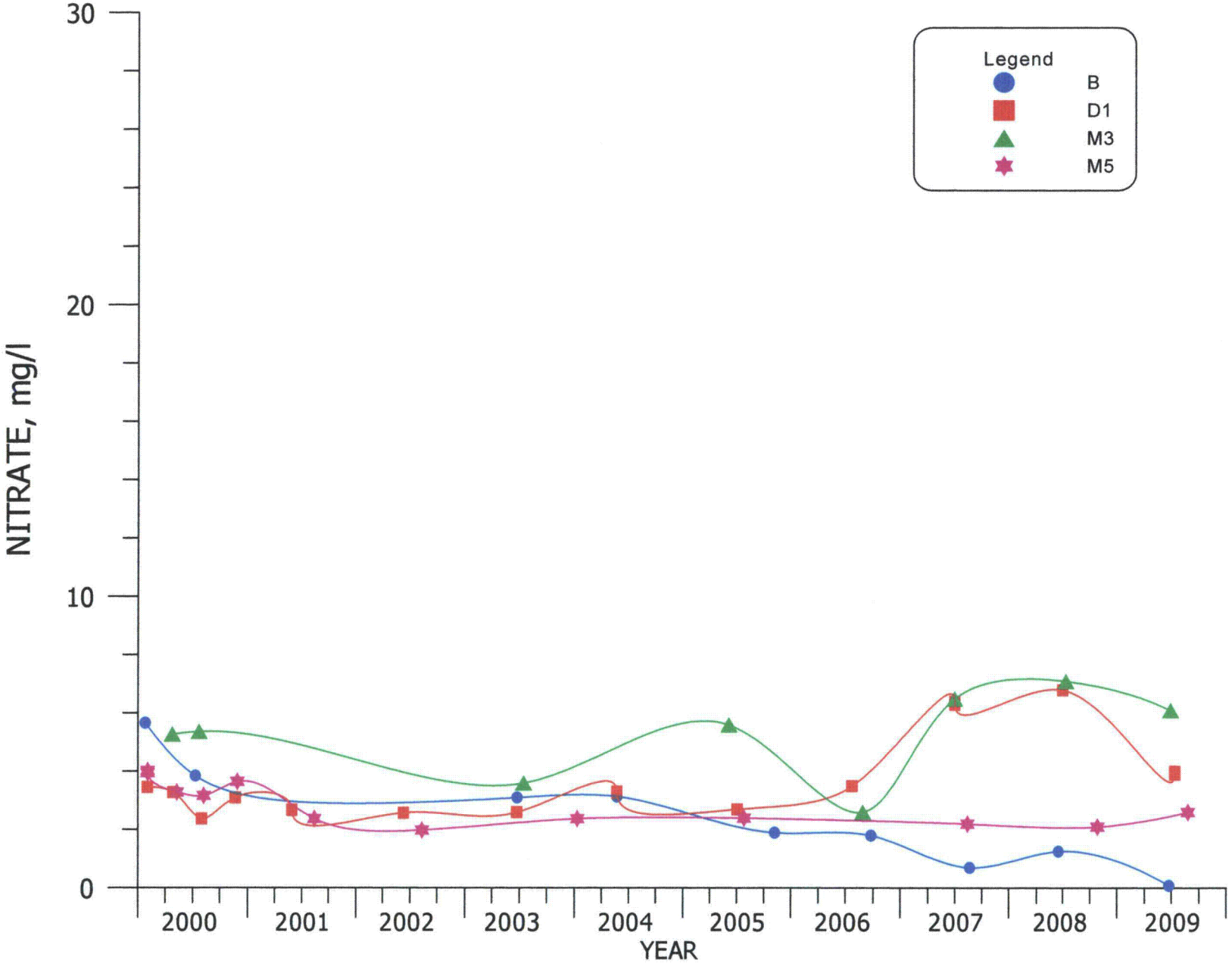


FIGURE 4.3-108. NITRATE CONCENTRATIONS FOR WELLS B, D1, M3 AND M5.

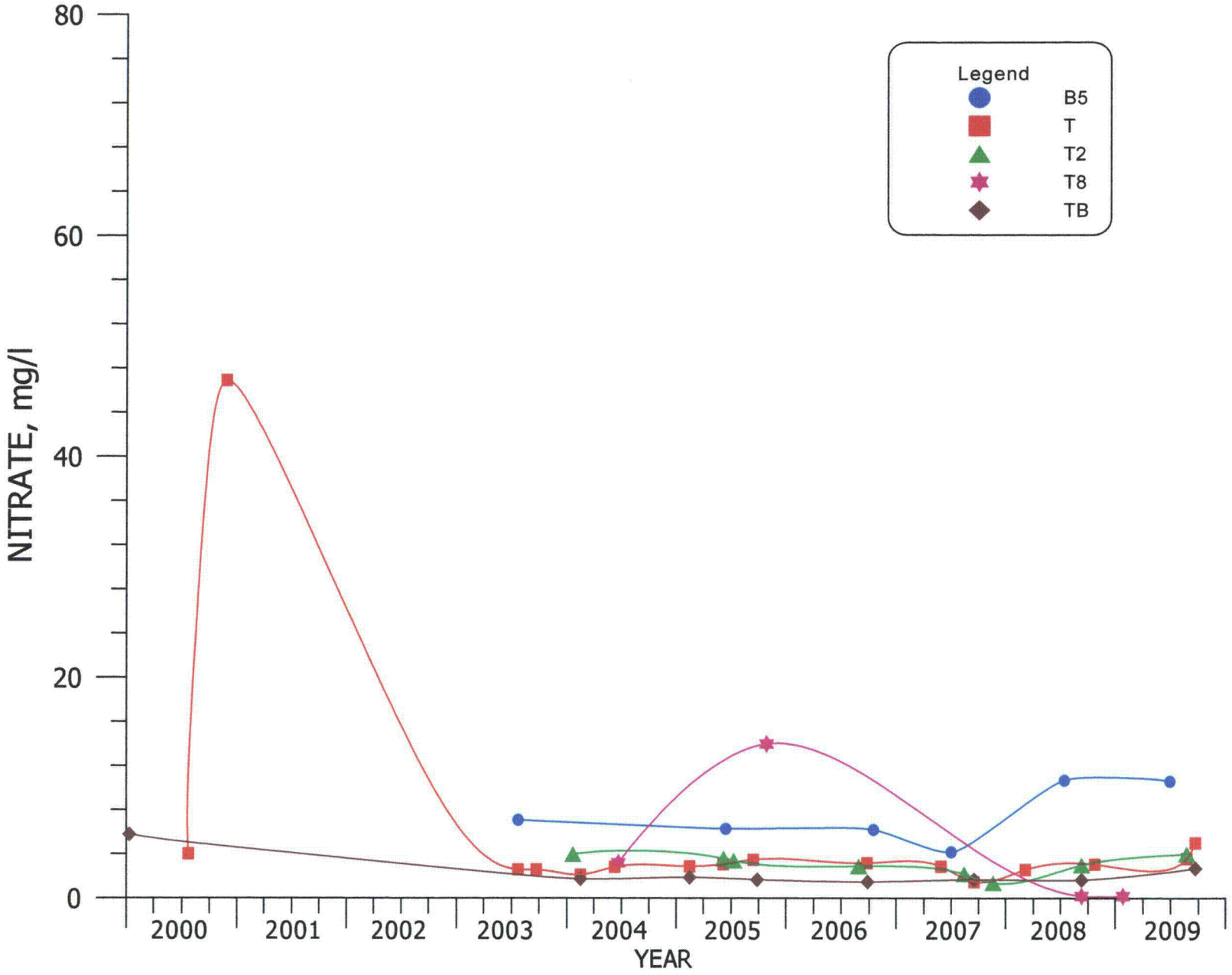


FIGURE 4.3-109. NITRATE CONCENTRATIONS FOR WELLS B5, T, T2, T8 AND TB.

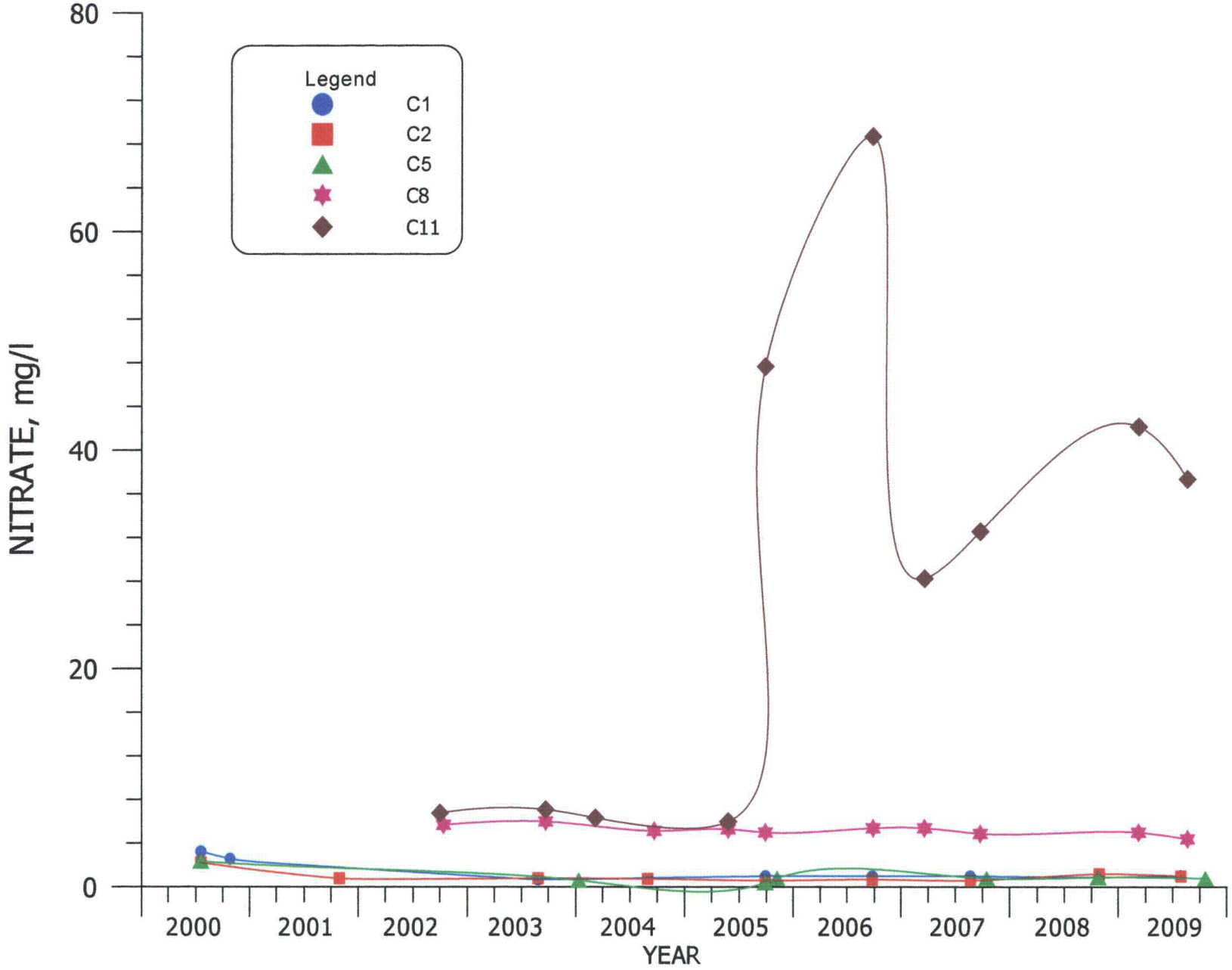


FIGURE 4.3-110. NITRATE CONCENTRATIONS FOR WELLS C1, C2, C5, C8 AND C11.

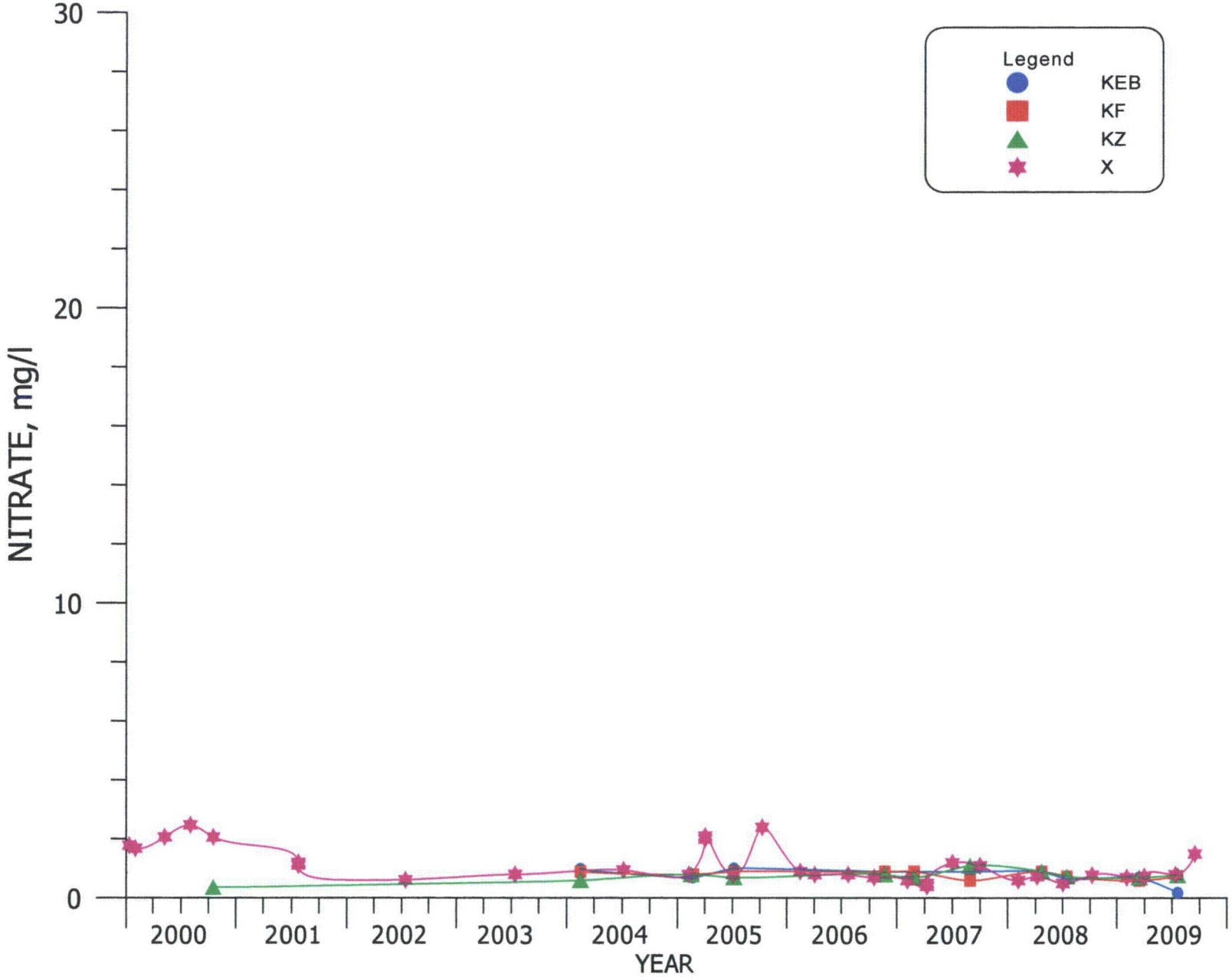


FIGURE 4.3-111. NITRATE CONCENTRATIONS FOR WELLS KEB, KF, KZ AND X.

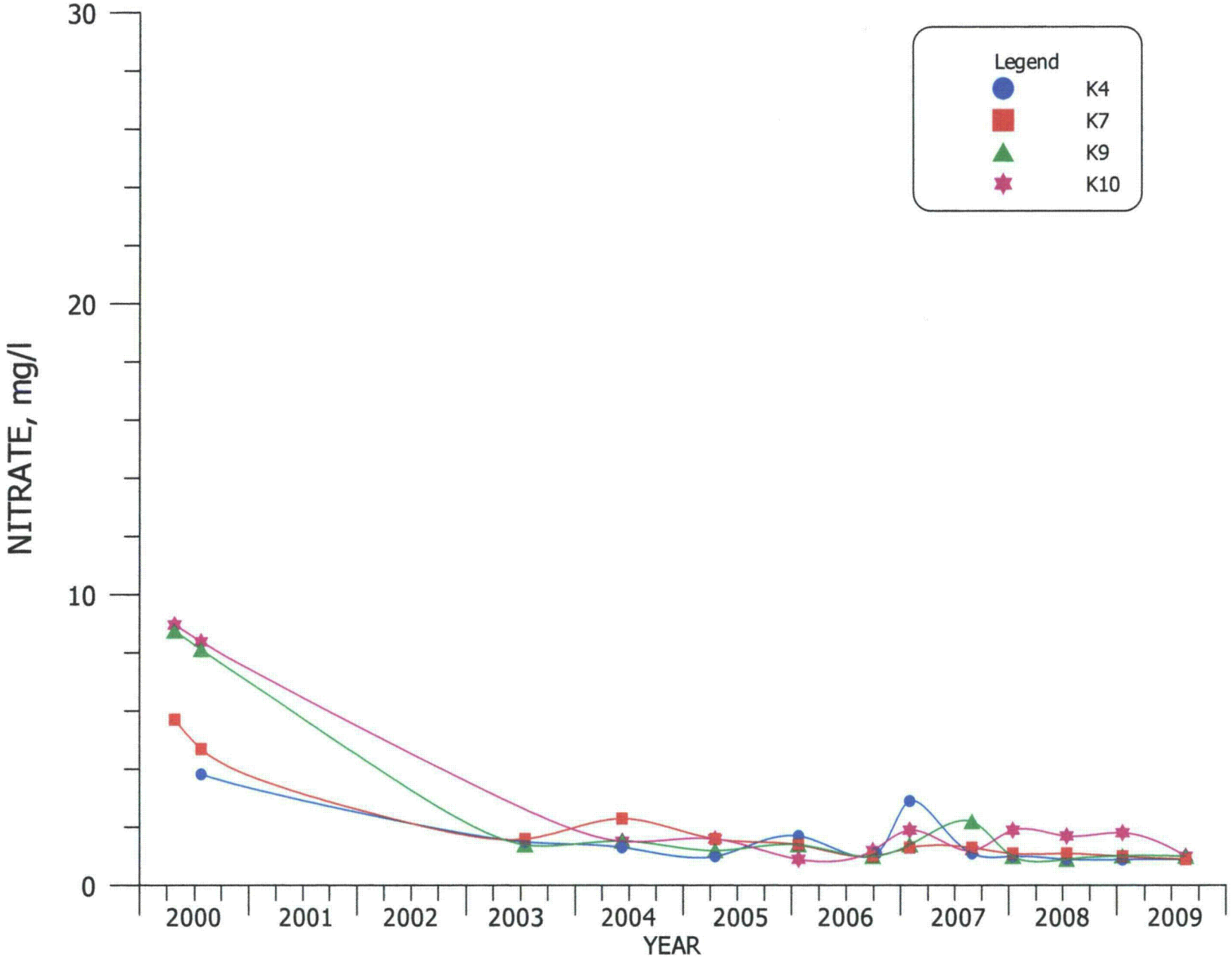


FIGURE 4.3-112. NITRATE CONCENTRATIONS FOR WELLS K4, K7, K9 AND K10.

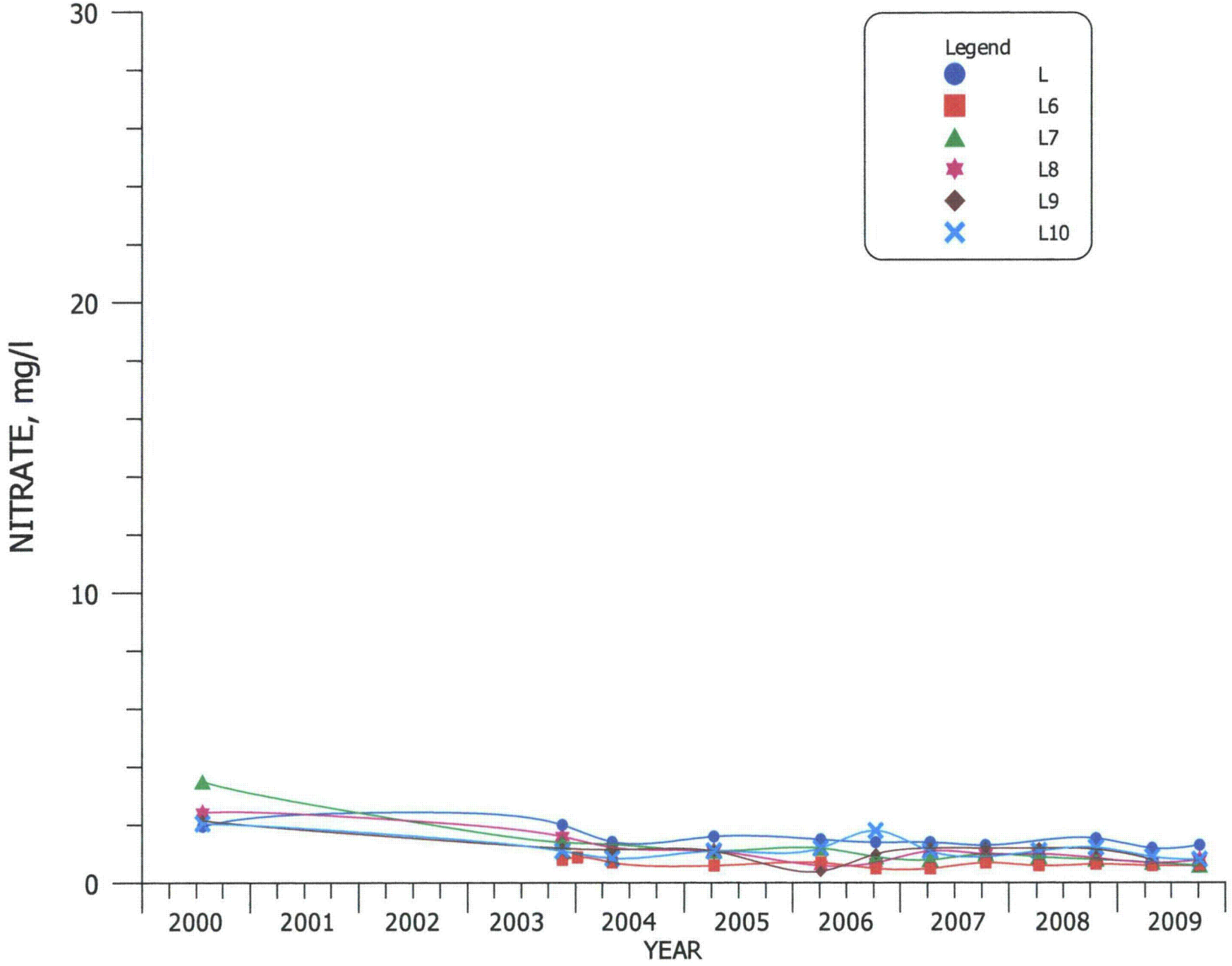


FIGURE 4.3-113. NITRATE CONCENTRATIONS FOR WELLS L, L6, L7, L8, L9 AND L10.

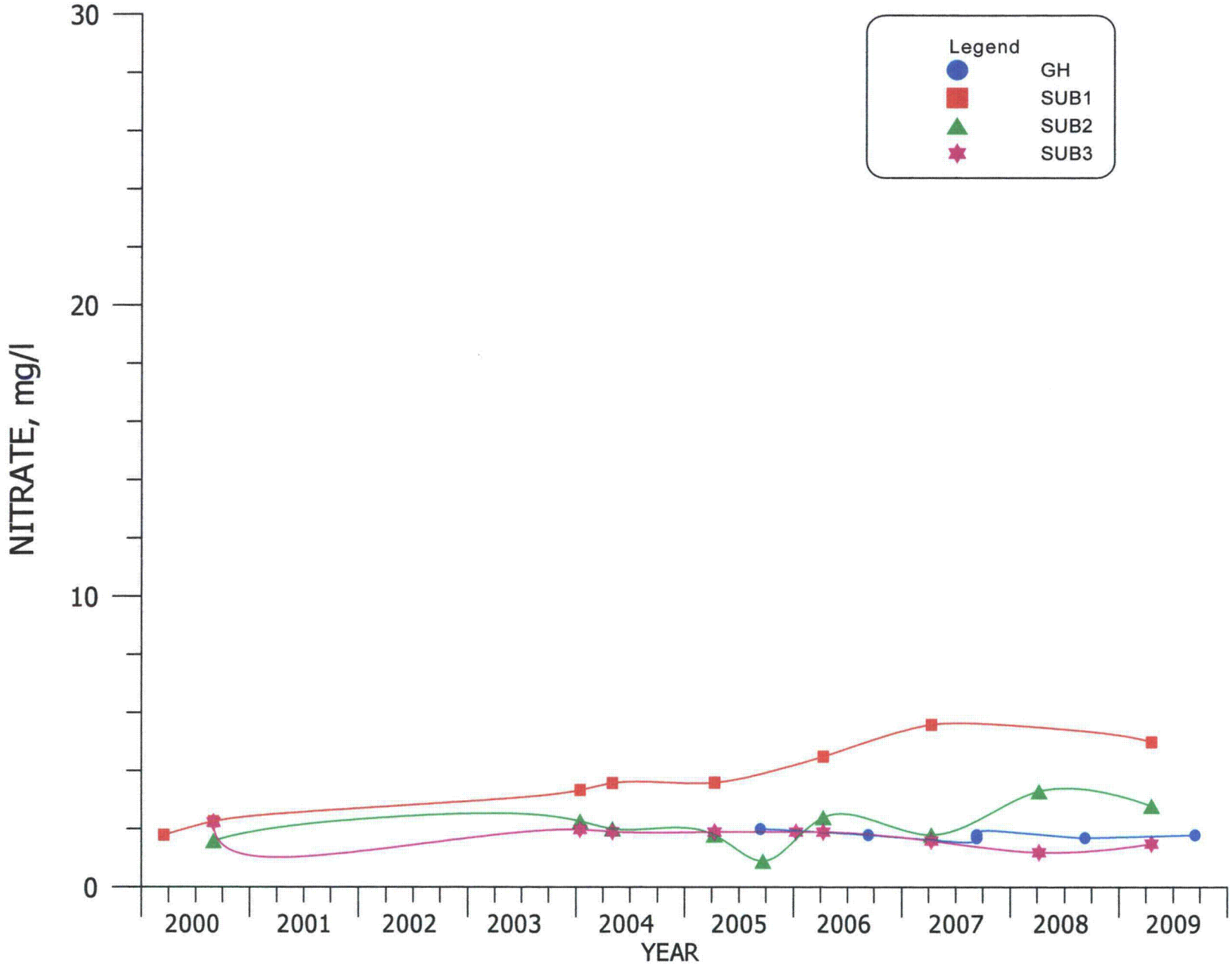


FIGURE 4.3-114. NITRATE CONCENTRATIONS FOR WELLS GH, SUB1, SUB2 AND SUB3.

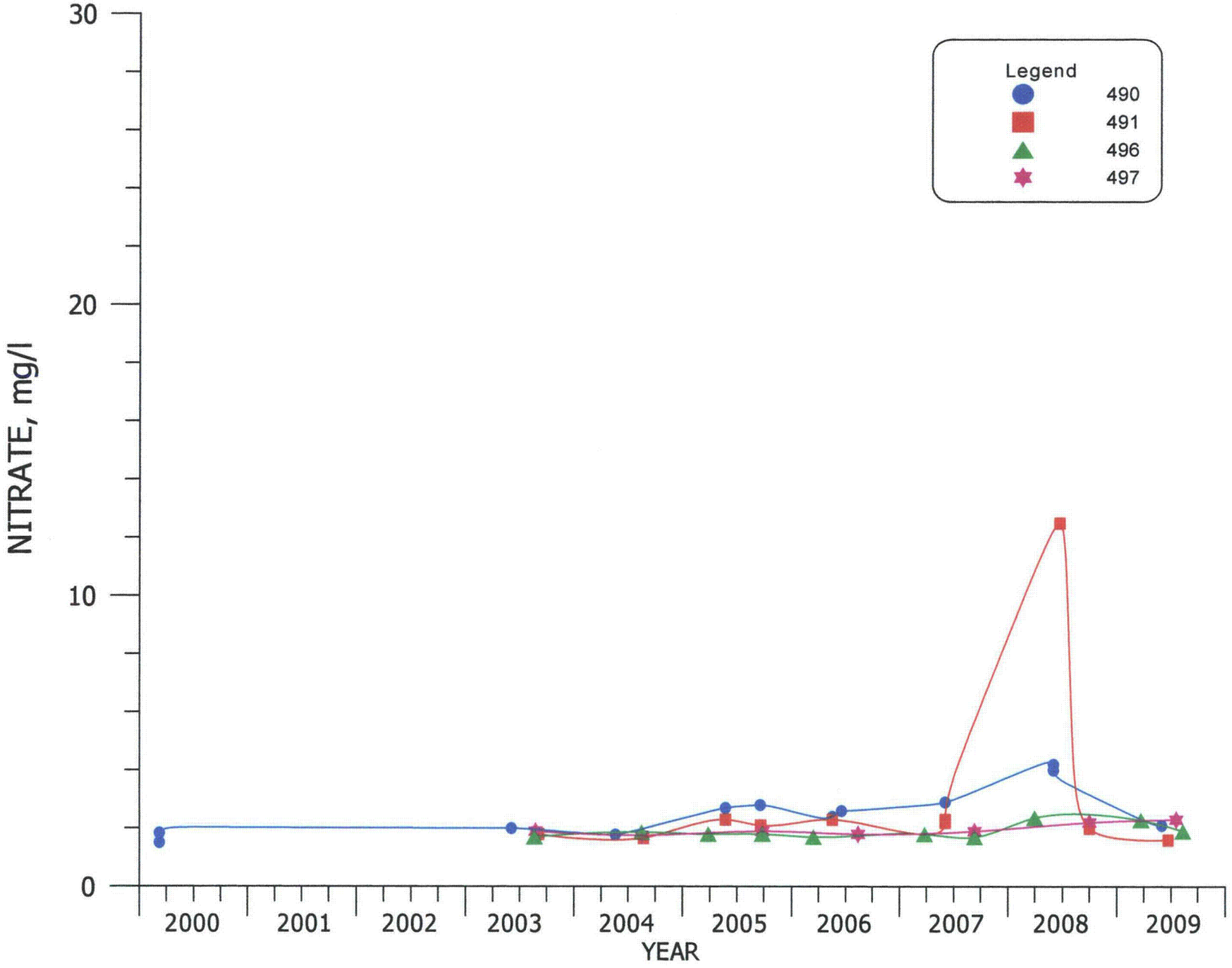


FIGURE 4.3-115. NITRATE CONCENTRATIONS FOR WELLS 490, 491, 496 AND 497.

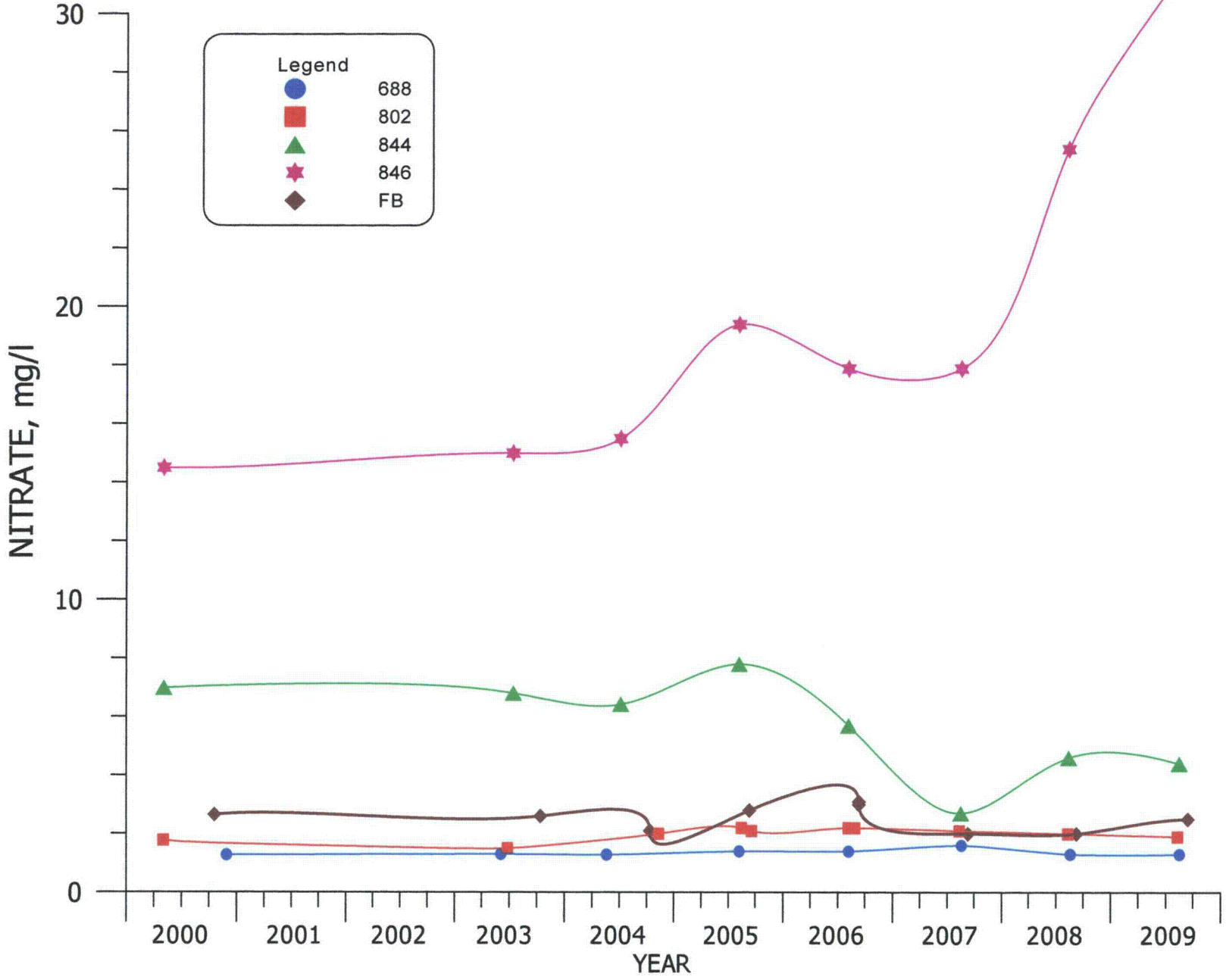


FIGURE 4.3-116. NITRATE CONCENTRATIONS FOR WELLS 688, 802, 844, 846 AND FB.

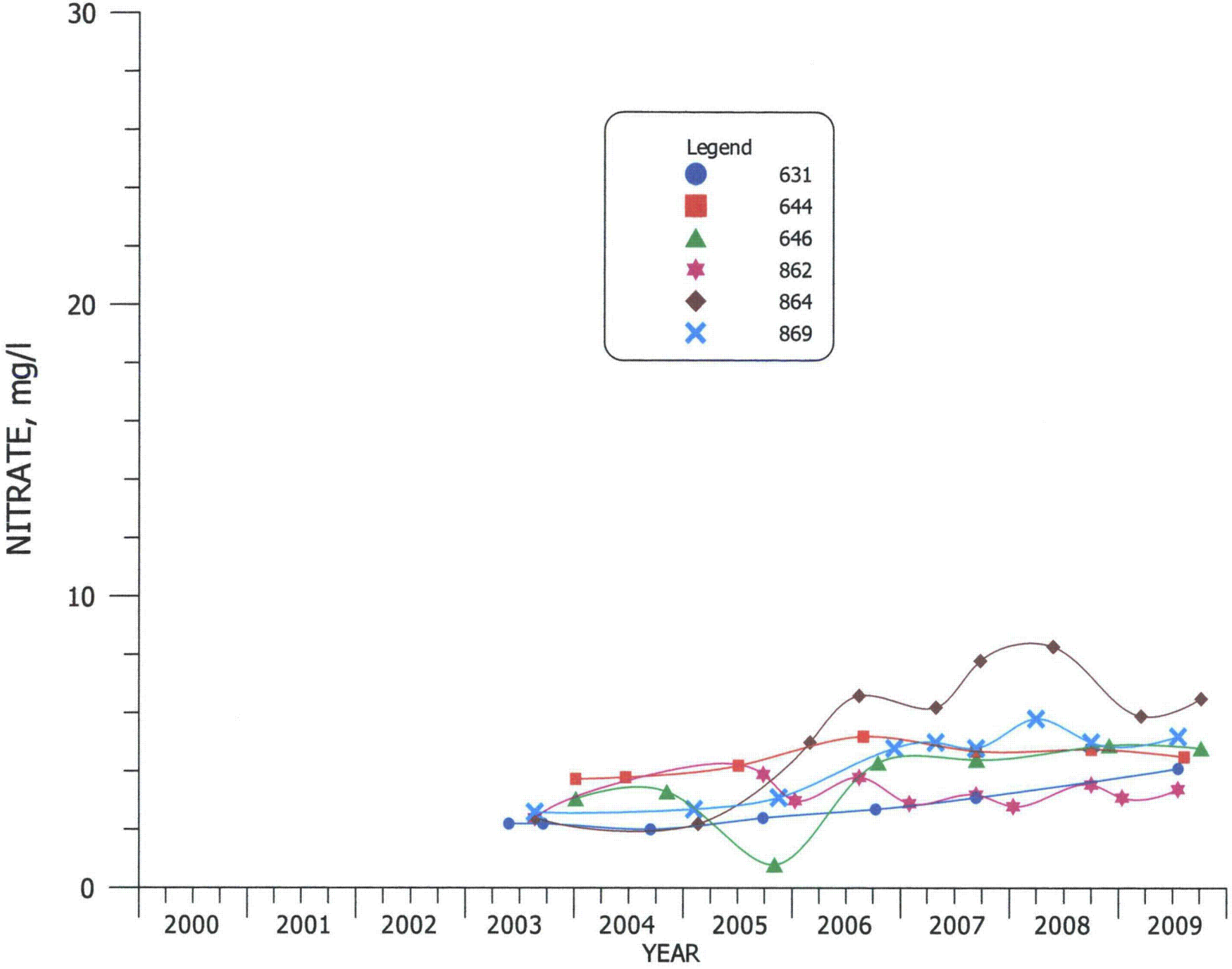


FIGURE 4.3-117. NITRATE CONCENTRATIONS FOR WELLS 631, 644, 646, 862, 864 AND 869.

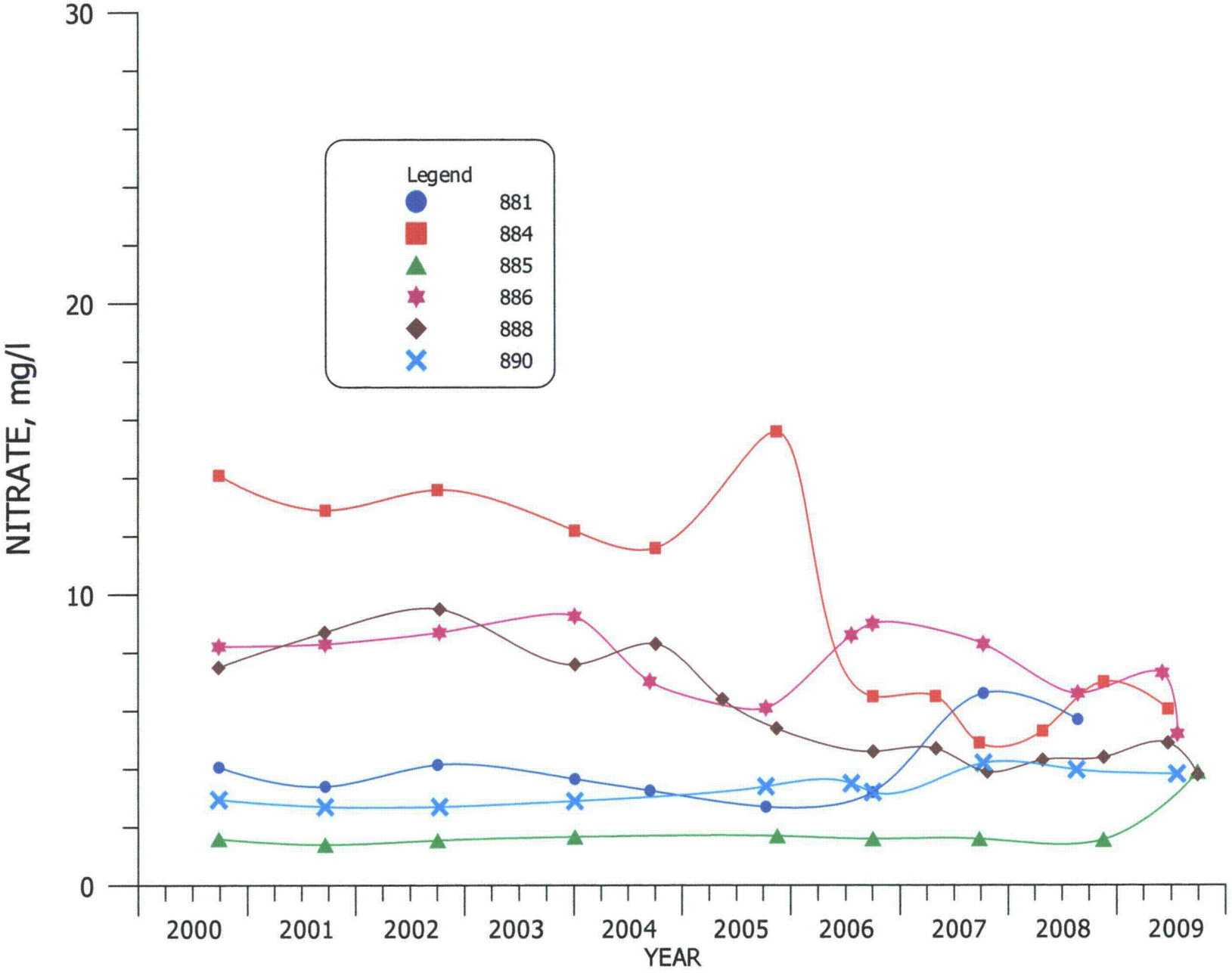


FIGURE 4.3-118. NITRATE CONCENTRATIONS FOR WELLS 881, 884, 885, 886, 888 AND 890.

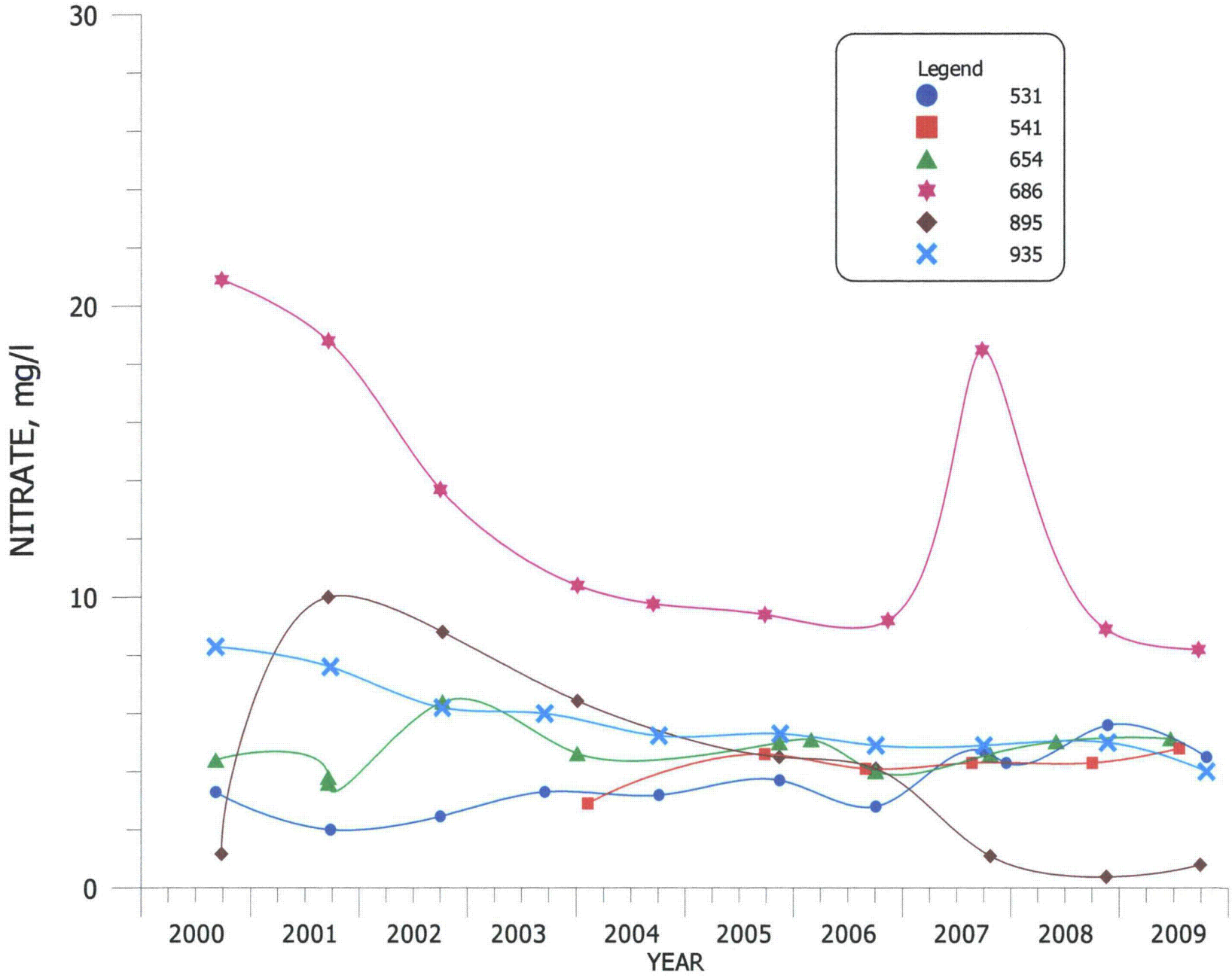


FIGURE 4.3-119. NITRATE CONCENTRATIONS FOR WELLS 531, 541, 654, 686, 895 AND 935.

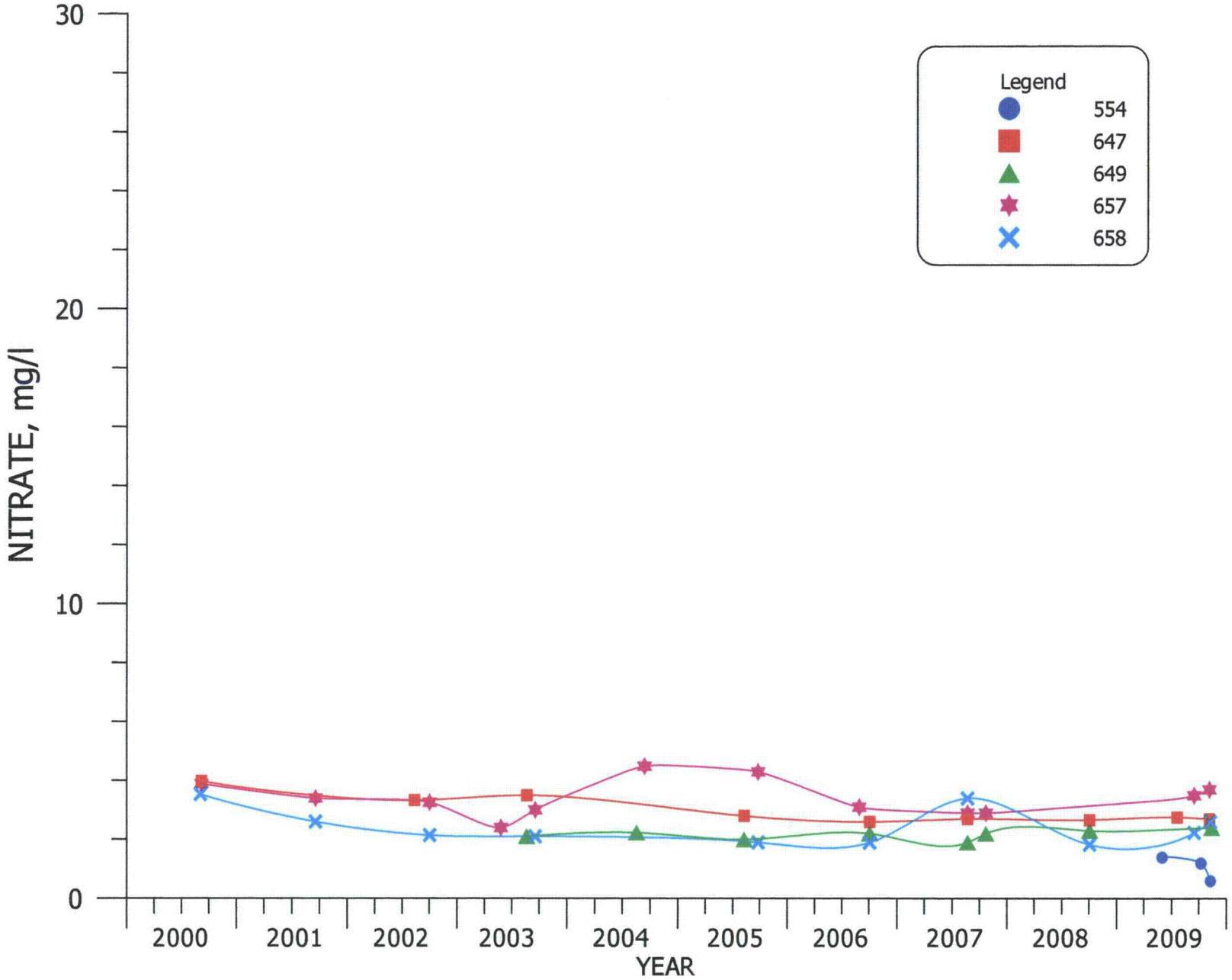
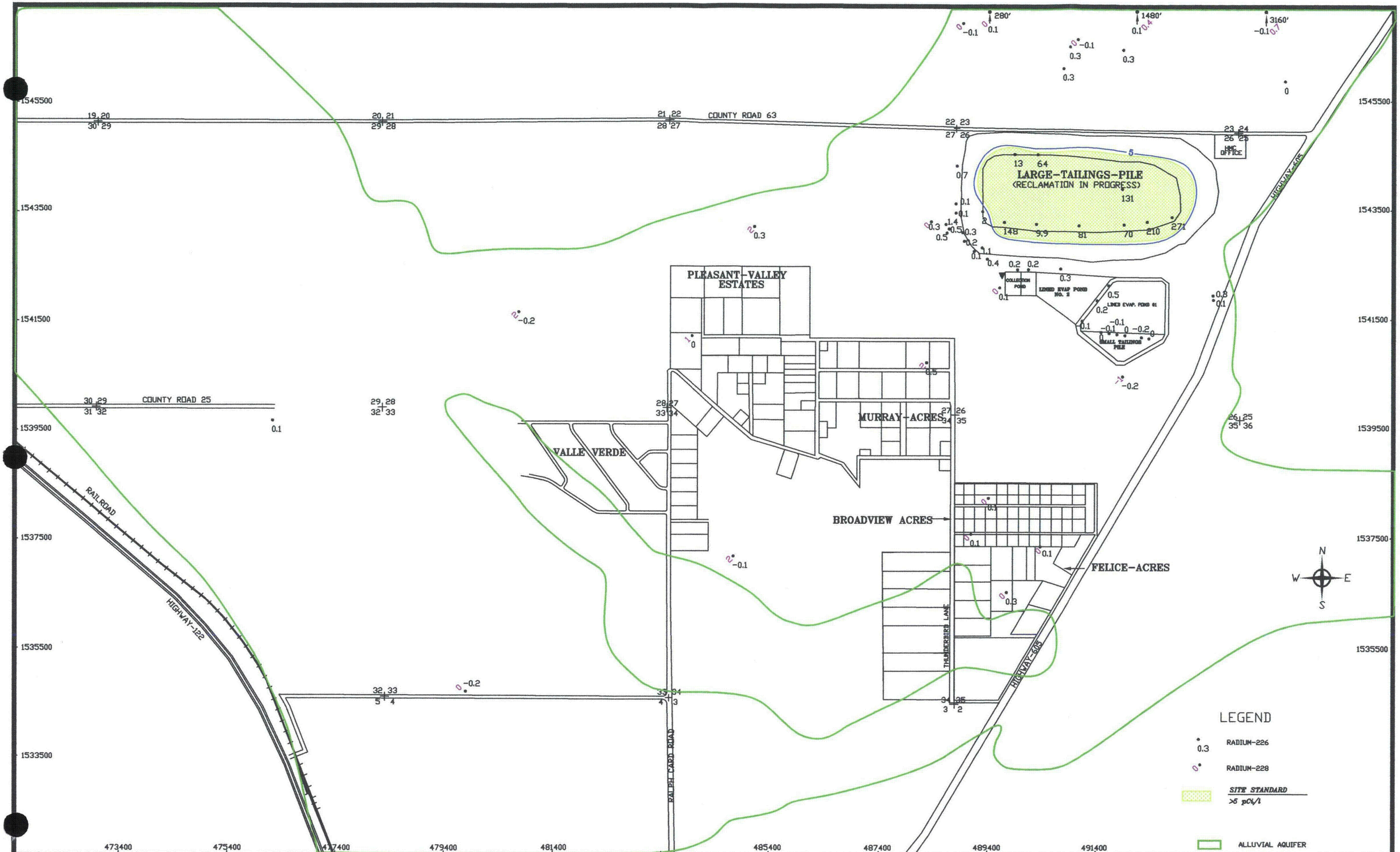
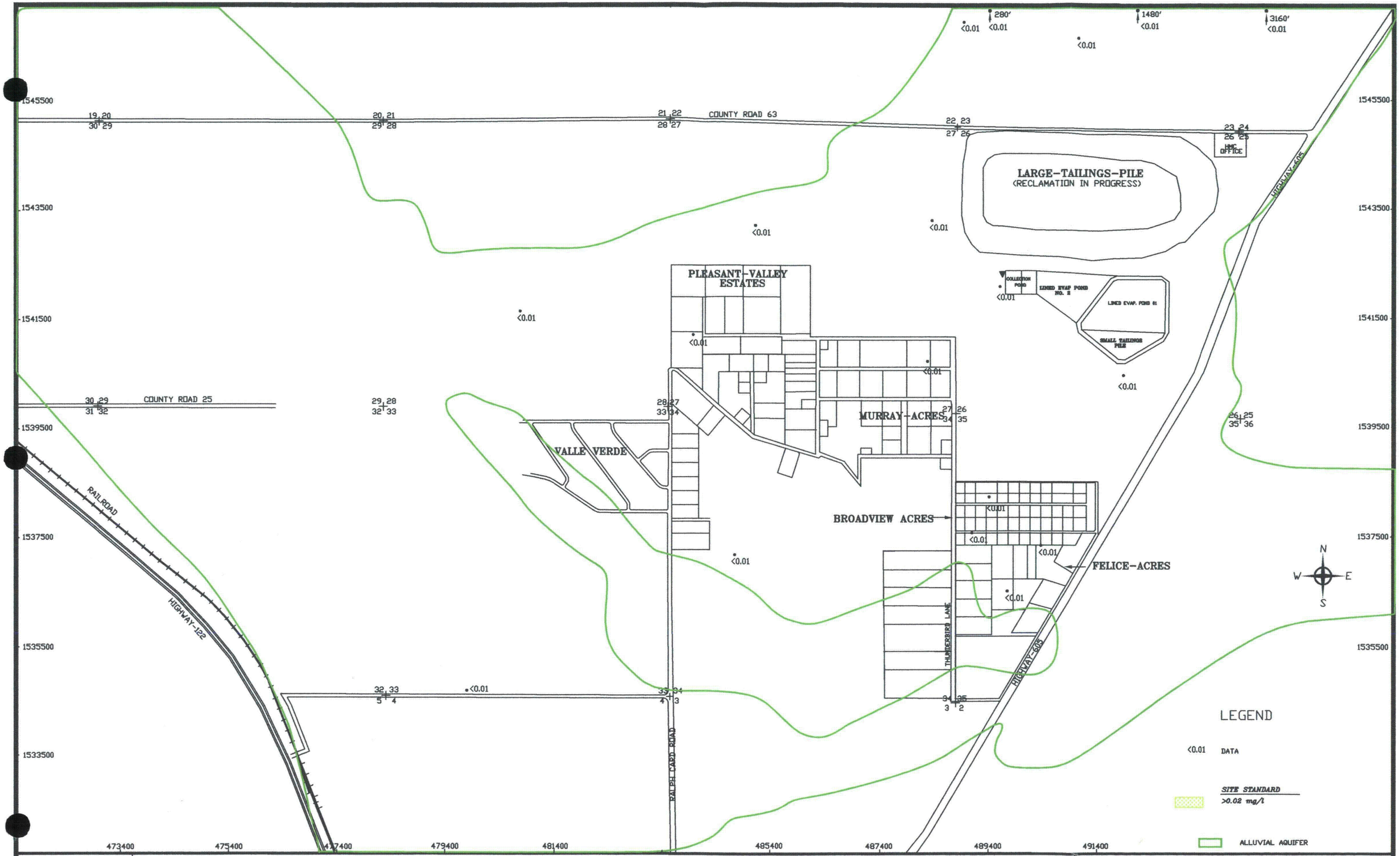


FIGURE 4.3-120. NITRATE CONCENTRATIONS FOR WELLS 554, 647, 649, 657 AND 658.



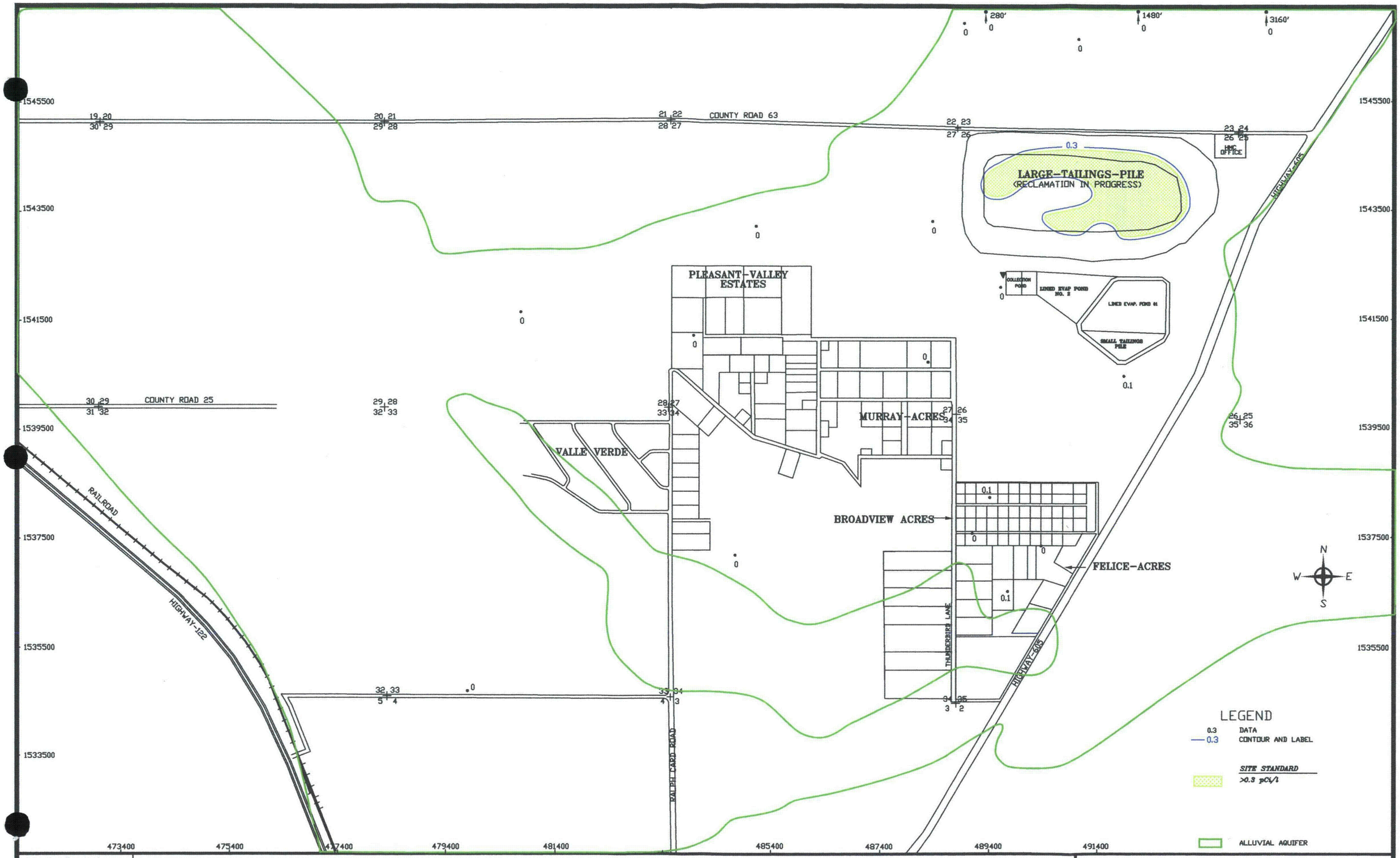
SCALE: 1"=1600'
C:\PROJECTS\2010-06 1600QAL09
DATE: 2/22/2010

FIGURE 4.3-121. RADIUM-226 AND RADIUM-228 CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2009, pCi/l



SCALE: 1"=1600'	
C:\PROJECTS\2010-06 1600QAL09	
DATE: 2/22/2010	

FIGURE 4.3-122. VANADIUM CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2009, mg/l



SCALE: 1"=1600'	
C:\PROJECTS\2010-06 1600QAL09	
DATE: 2/22/2010	

FIGURE 4.3-123. THORIUM-230 CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2009, pCi/l

SECTION 5

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GROUND WATER MONITORING FOR HOMESTAKE'S GRANTS PROJECT

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GROUND WATER MONITORING FOR HOMESTAKE'S GRANTS PROJECT

FIGURES (continued)

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GROUND WATER MONITORING FOR HOMESTAKE'S GRANTS PROJECT

FIGURES (continued)

TABLES

5.0 UPPER CHINLE AQUIFER MONITORING

5.1 UPPER CHINLE WELL COMPLETION

Chinle aquifer well locations are shown on Figure 5.1-1. The Upper and Middle Chinle aquifers do not exist in the area west of Ralph Card Road. Table 5.1-1 presents basic information for the Chinle wells located on the Homestake property. This table indicates well coordinates, well depth, casing diameter, water level, measuring point in feet above land surface and elevation, and depth and elevation to the top of the Chinle aquifers. A "U" follows the elevation of the top of the Upper Chinle aquifer, and an "M" and an "L" have the same meaning for the Middle and Lower Chinle aquifers, respectively. Some of the wells have been used to define the depth to the base of the alluvium, and an "A" is presented following the elevation to denote that these values are for the base of the alluvium. The casing perforation interval and aquifer unit are also presented in this table.

Table 5.1-2 presents basic well data for Chinle wells in Broadview Acres and Felice Acres. Table 5.1-3 presents similar data for Murray Acres and Pleasant Valley Estates Chinle wells. Wells that are not located within the immediate Grants Project property or within the four subdivision boundaries are denoted on Table 5.1-4 as the regional Chinle wells (see Figure 5.1-1 for inner regional boundary shown in blue). No new Chinle wells were drilled by HMC in 2009.

An analysis of the background water quality for the Chinle aquifers was presented in Hydro-Engineering 2003b. Background values for the Chinle mixing zone and the Upper, Middle and Lower Chinle non-mixing zones were also defined in the previously cited report. These site standard values are listed in the title block of the water-quality figures in this report.

The location of Upper Chinle wells and the areal extent of the Upper Chinle aquifer at the Grants Project are shown on Figure 5.1-2. Upper Chinle wells CW4R, CW5, CW13 and CW25 are shown in green to denote that these are fresh-water injection wells. Upper Chinle wells CE2, CE5, CE6, CE11, CE12 and CW3 were pumped as a source of flushing water for the Large Tailings Pile in 2009 and are shown in orange. Well CW18 was used as a supply for fresh-water injection starting in late September of 2002 but was not used continuously after May of 2004. It was not used as a freshwater injection supply in 2009. Figure 5.1-2 also shows the location of the West and East Faults. A blue dot pattern is used to show the limits of the Upper Chinle sandstone where Chinle shale exists between the sandstone and the alluvium. Figure 5.1-

3 presents a typical geologic cross section to show the relative position of the alluvial and Chinle aquifers (see Figure 5.1-2 for the location of this cross section).

The subcrop of the Upper Chinle sandstone where the alluvium is saturated or unsaturated above the Upper Chinle sandstone is also shown on Figure 5.1-2. The Upper Chinle aquifer does not exist to the west and south of the subcrop area. The Upper Chinle sandstone, therefore, does not exist west of the West Fault.

WELLS OUTSIDE THIS BORDER ARE IN REGIONAL TABLE 5.1-4

WEST FAULT

EAST FAULT

COUNTY ROAD 63

COUNTY ROAD 25

LARGE-TAILINGS-PILE
(RECLAMATION IN PROGRESS)

HMC OFFICE

HIGHWAY-605

PLEASANT-VALLEY ESTATES

MURRAY-ACRES

VALLE VERDE

BROADVIEW ACRES

FELICE-ACRES

THUNDERBIRD LANE

RALPH CARD ROAD

RAILROAD

HIGHWAY-122

COLLECTION POND

LINED EVAP POND NO. 2

LINED EVAP. POND #1

SMALL TAILINGS PILE

CE1 CE2 CE5 CE6 CE7 CE8 CE10 CE11 CE12 CE13

CW1 CW2 CW2-1 CW3 CW4R CW5 CW6 CW9 CW13 CW14 CW15 CW16 CW17 CW18 CW24 CW25 CW26 CW27 CW28 CW29 CW30 CW31 CW32 CW33 CW34 CW35 CW36 CW37 CW38 CW39 CW40 CW41 CW42 CW43 CW45 CW46 CW50 CW52 CW54 CW55 CW63

WR25

536R

1545500 1543500 1541500 1539500 1537500 1535500 1533500

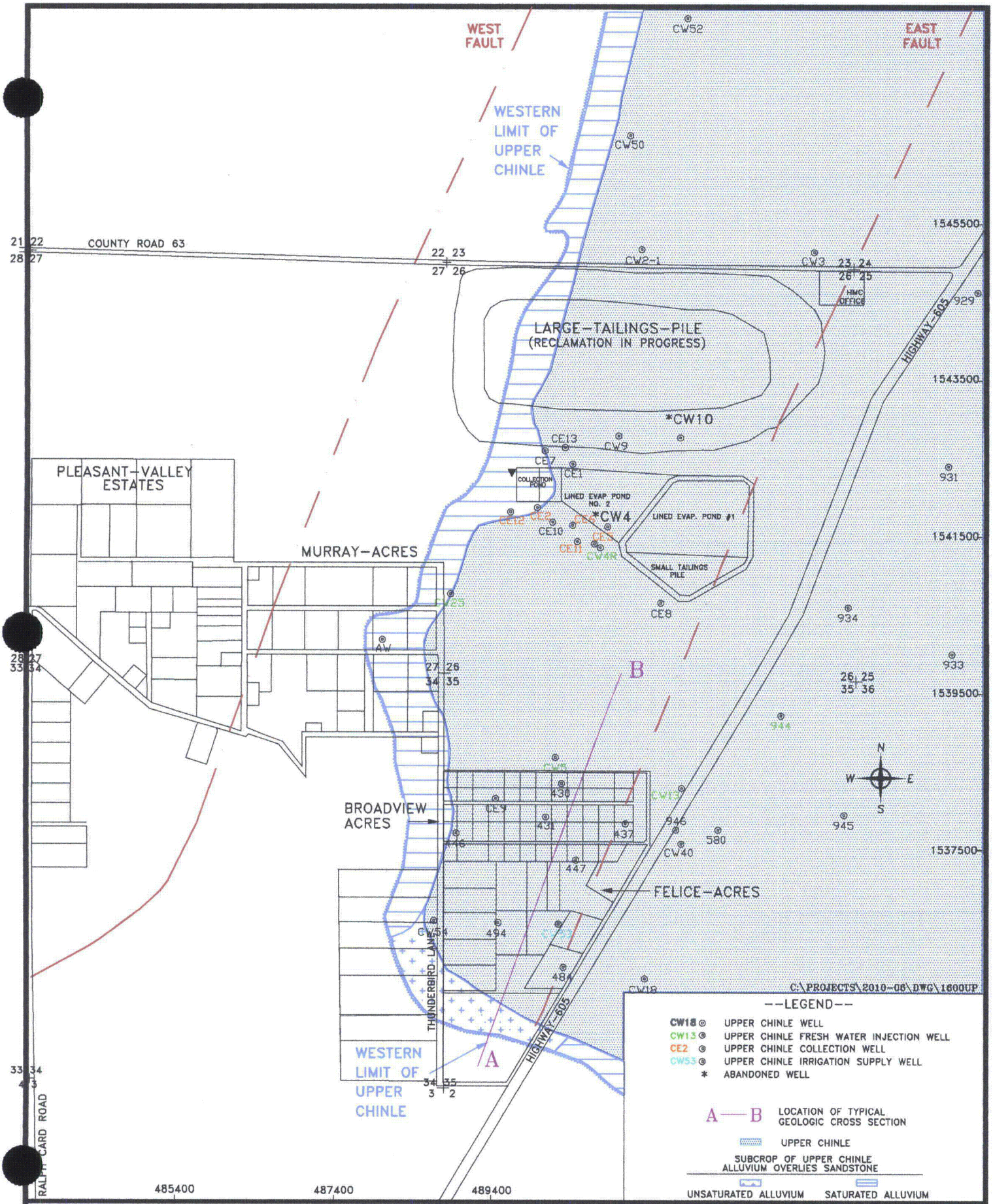
473400 475400 477400 479400 481400 485400 487400 489400 491400

N W E S

- LOWER CHINLE WELL
- MIDDLE CHINLE WELL
- UPPER CHINLE WELL
- CHINLE WELL
- UPPER, MIDDLE OR LOWER CHINLE IRRIGATION SUPPLY WELL
- UPPER, MIDDLE OR LOWER CHINLE COLLECTION
- UPPER, MIDDLE OR LOWER CHINLE FRESH WATER INJECTION WELL
- OFFSET WELL
- INTERIOR REGIONAL BOUNDARY

SCALE:	
C:\PROJECTS\2010-06 2006-06\BASE08	
DATE: 03/28/08	

FIGURE 5.1-1. CHINLE AQUIFER WELL LOCATIONS



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/27/10

FIGURE 5.1-2. LIMITS OF UPPER CHINLE AQUIFER AND WELL LOCATIONS

SCALE: 1"=650'

PAGE: 5.1-4

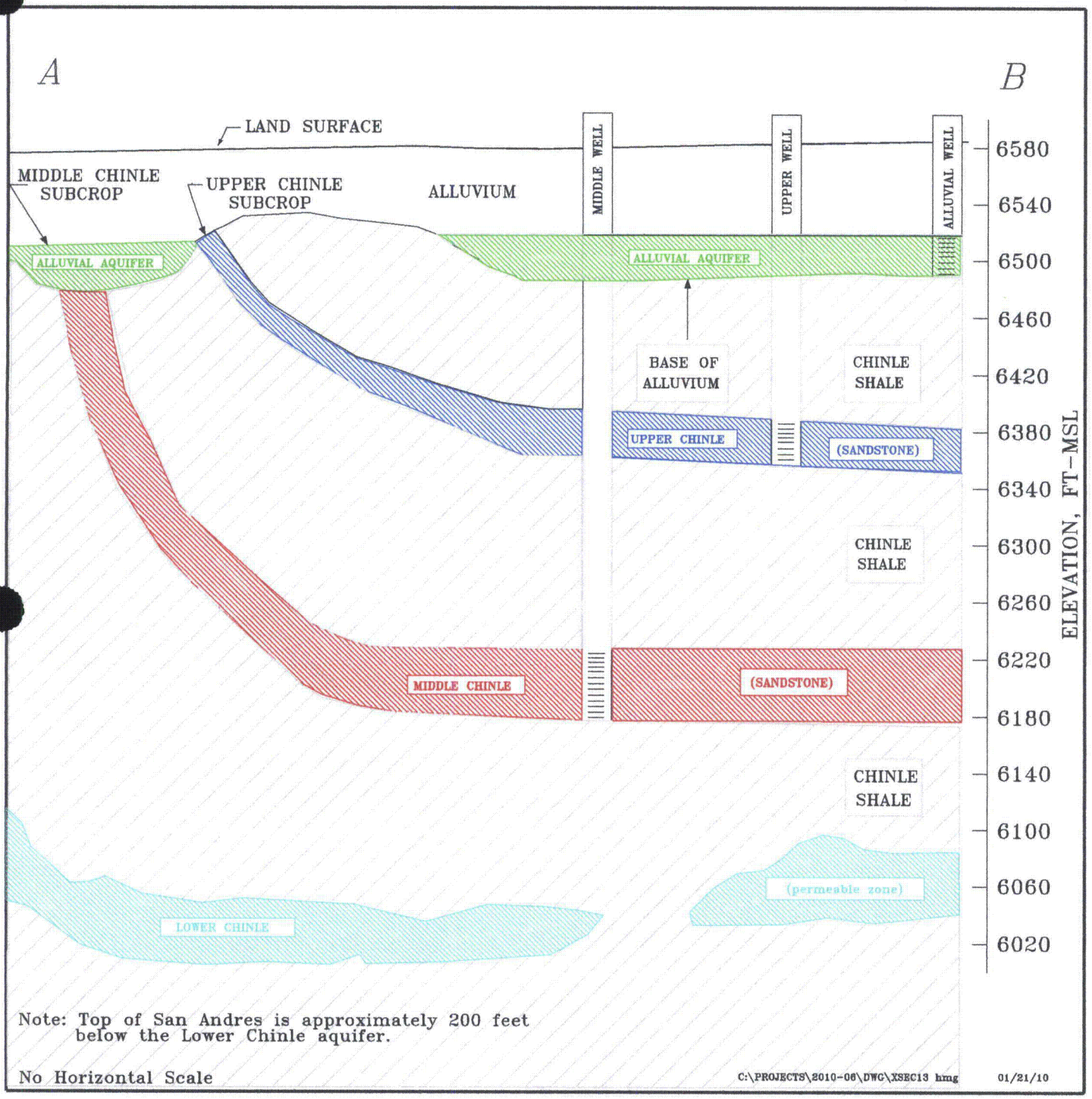


FIGURE 5.1-3. TYPICAL GEOLOGIC CROSS SECTION

TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
0930	1542848	494997	410.0	6.0	12/14/2009	178.28	6420.26	0.0	6598.54	30	6569	A -	---
										335	6264	M 330-400	Middle
0931	1542461	495207	366.7	6.0	12/14/2009	80.43	6530.13	0.9	6610.56	339	6271	U -	Upper
0934	1540641	493941	293.0	6.0	12/28/2009	54.60	6530.99	2.0	6585.59	30	6554	A -	---
										282	6302	U 330-400	Upper
CE1	1541923	489979	137.0	5.0	12/12/2009	15.88	6554.31	4.4	6570.19	75	6491	A -	---
										106	6460	U 98-138	Upper
CE2	1542475	490434	119.7	5.0	12/28/2009	62.70	6513.65	1.8	6576.35	74	6501	U 78-118	Upper
										74	6501	A -	---
CE5	1541453	490695	140.0	5.0	12/28/2009	46.42	6522.13	1.6	6568.55	63	6504	A -	---
										103	6464	U 100-140	Upper
CE6	1541698	490433	140.0	6.0	12/28/2009	91.00	6474.19	1.5	6565.19	75	6489	U -	Upper
CE7	1542652	490079	120.0	6.0	12/28/2009	42.20	6533.79	1.9	6575.99	95	6479	U 100-140	Upper
CE8	1540704	491556	216.6	6.0	12/12/2009	43.14	6526.56	1.7	6569.70	90	6478	U 160-200	Upper
CE10	1541737	490177	130.0	6.0	12/12/2009	46.83	6524.03	2.3	6570.86	75	6494	U 90-130	Upper
CE11	1541487	490494	140.0	6.0	12/28/2009	62.25	6503.17	1.6	6565.42	90	6474	U 100-140	Upper
CE12	1541867	489642	120.0	6.0	12/28/2009	54.15	6518.08	2.1	6572.23	80	6490	U 80-120	Upper
CE13	1542693	490338	129.2	6.0	12/12/2009	41.81	6532.83	1.7	6574.64	95	6478	U 90-130	Upper
CW1	1545235	490295	325.0	5.0	12/28/2009	155.30	6429.92	0.7	6585.22	105	6480	A -	---
										272	6313	M 212-323	Middle
CW2	1545212	491302	355.0	5.0	12/28/2009	143.20	6442.28	1.7	6585.48	85	6499	A -	---
										136	6448	U -	---
										305	6279	M 306-353	Middle
CW2-1	1545212	491302	168.0	5.0	12/9/2009	47.42	6538.06	1.7	6585.48	85	6499	A -	---
										136	6448	U 243-253	Upper
CW3	1545200	493496	235.0	5.0	12/28/2009	59.29	6527.89	0.7	6587.18	70	6516	A -	---
										209	6377	U 210-235	Upper
										348	6238	M -	---
* CW4	1541682	490874	145.0	5.0	9/7/1994	39.06	6531.89	0.8	6570.95	70	6500	A -	---
										112	6458	U 110-145	Upper
CW4R	1541416	490787	138.9	6.0	6/29/2009	9.55	6559.18	1.3	6568.73	61	6506	A -	---
										104	6463	U 102-142	Upper
CW5	1538729	490221	170.0	5.0	12/3/2007	2.41	6566.93	1.6	6569.34	65	6503	A -	---
										137	6431	U 135-170	Upper
CW6	1542588	488301	282.0	4.0	12/9/2009	112.28	6463.36	1.0	6575.64	236	6339	M 246-276	Middle
CW7	1545285	488773	---	---	10/17/1995	60.80	6522.79	0.0	6583.59	---	---	C 120-130	Chinle
CW8	1545009	491238	285.0	6.0	12/5/2000	38.90	6552.93	0.0	6591.83	---	---	C 276-286	Chinle
										85	6507	A -	---
CW9	1542840	491015	180.0	5.0	12/9/2009	62.00	6529.83	0.0	6591.83	---	---	U 130-180	Upper

TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
CW9	1542840	491015	180.0	5.0	12/9/2009	62.00	6529.83	0.0	6591.83	80	6512	A -	---
* CW10	1542823	491803	185.0	5.0	11/13/1995	50.03	6537.86	0.0	6587.89	75	6513	A -	---
										167	6421	U 155-185	Upper
CW13	1538349	491827	267.7	6.0	8/3/2009	2.00	6574.70	2.7	6576.70	230	6344	U 225-265	Upper
										378	6196	M -	---
CW14	1538786	488884	360.9	6.0	11/2/2009	22.00	6544.09	2.9	6566.09	56	6507	A -	---
										66	6497	U -	---
										310	6253	M 278-358	Middle
CW17	1545279	487771	108.0	5.0	12/14/2009	50.41	6538.91	3.1	6589.32	73	6513	A -	---
										85	6501	M 83-103	Middle
CW24	1545773	487760	118.0	5.0	12/14/2009	50.28	6538.39	3.0	6588.67	61	6525	A -	---
										65	6521	M 78-118	Middle
CW25	1540802	488866	102.0	5.0	3/2/2009	96.80	6470.40	3.0	6567.20	53	6511	U 62-102	Upper
										53	6511	A -	---
CW32	1543413	483523	300.0	6.0	12/14/2009	141.51	6425.77	1.7	6567.28	70	6496	A -	---
										157	6409	L 158-188	Lower
										157	6409	L 218-303	---
CW33	1543814	486347	347.0	6.0	12/14/2009	105.91	6468.98	1.8	6574.89	83	6490	A -	---
										272	6301	L 307-347	---
										272	6301	L 267-287	Lower
CW34	1547827	487707	65.7	6.0	8/27/1996	65.65	6528.75	3.2	6594.40	20	6571	A -	---
										40	6551	M 33-63	Middle
CW35	1547001	488794	120.0	5.0	12/14/2009	51.96	6539.21	1.9	6591.17	63	6526	A -	---
										90	6499	M 93-118	Middle
CW50	1546687	491159	170.0	5.0	12/9/2009	49.76	6538.80	3.0	6588.56	128	6458	U 130-170	Upper
CW52	1548171	491887	180.0	5.0	12/9/2009	70.32	6522.08	2.0	6592.40	138	6452	U 140-180	Upper
WR25	1545267	487430	113.3	5.0	12/14/2009	48.01	6538.45	2.8	6586.46	50	6534	A -	---
										71	6513	M 71-111	Middle

NOTE: A = Alluvial Aquifer, Base
U = Upper Chinle Aquifer,Top
M = Middle Chinle Aquifer,Top
L = Lower Chinle Aquifer,Top
* = Abandoned

E = Estimated Depth

TABLE 5.1-2. WELL DATA FOR THE CHINLE BROADVIEW AND FELICE ACRES WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
Broadview													
0430	1538469	490300	145.0	---	---	---	---	0.0	6568.00	72	6496	A -	Alluvium
										135	6433	U -	Upper
0431	1538045	490090	130.0	6.0	4/12/1994	35.00	6533.00	0.0	6568.00	60	6508	A 125-130	Alluvium
										118	6450	U 125-130	Upper
0434	1538370	489420	280.0	6.0	10/4/2007	39.51	6524.17	0.0	6563.68	75	6489	A -	---
										265	6299	M -	Middle
0436	1538439	488947	295.0	5.0	10/29/1996	71.82	6490.91	0.0	6562.73	90	6473	A -	---
										280	6283	M 280-295	Middle
0437	1537859	491128	340.0	5.0	10/29/1996	63.23	6508.77	1.8	6572.00	90	6480	A -	---
										180	6390	U -	---
										280	6290	M 240-300	Middle
0446	1537830	488960	110.0	6.0	9/8/1983	41.28	6518.72	0.0	6560.00	60	6500	A 60-95	Alluvium
										60	6500	U 60-95	Upper
0447	1537490	490480	142.0	6.0	4/11/1985	41.18	6526.82	0.0	6568.00	80	6488	A 120-142	Alluvium
										138	6430	U 120-142	Upper
0449	1537440	488830	267.0	6.0	12/5/1994	63.42	6496.58	0.0	6560.00	---	---	M -	Middle
0456	1538240	490060	300.0	5.0	---	---	---	---	6559.00	---	---	A -	Alluvium
										---	---	M -	Middle
0457	1538210	490000	300.0	5.0	7/2/2008	124.88	6446.12	---	6571.00	---	---	M -	Middle
CE9	1538203	489458	130.0	6.0	12/12/2009	37.41	6525.71	1.2	6563.12	---	---	U 90-130	Upper
CW55	1538283	489471	360.0	6.0	12/12/2009	41.42	6522.74	2.3	6564.16	260	6302	M -	Middle
Felice Acres													
0481	1538350	490180	320.0	4.0	---	---	---	0.0	6568.00	110	6458	A 270-310	Alluvium
										270	6298	M 270-310	Middle
0482	1536981	489579	260.0	5.0	12/10/2009	38.37	6524.29	0.0	6562.66	80	6483	A 220-260	Alluvium
										210	6353	M 220-260	Middle
0483	1536586	489753	280.0	5.0	10/6/2009	53.11	6509.55	0.0	6562.66	40	6523	A -	Alluvium
										65	6498	U -	---
										236	6327	M 270-300	Middle
0484	1536448	490356	320.0	5.0	12/26/1996	39.43	6524.55	0.0	6563.98	38	6526	A -	---
										129	6435	U -	---
										280	6284	M 220-300	Middle
0485	1535800	489630	260.0	6.0	7/18/1996	70.90	6494.10	0.0	6565.00	35	6530	A -	---
										70	6495	U -	---
										223	6342	M 220-260	Middle
0486	1535800	489024	260.0	4.0	8/4/2004	90.40	6468.00	0.0	6558.40	---	---	M 200-260	Middle
										21	6537	A -	---
										21	6537	U -	---

TABLE 5.1-2. WELL DATA FOR THE CHINLE BROADVIEW AND FELICE ACRES WELLS.

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)		CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
0487	1536175	488950	260.0	---	7/24/1996	49.20	6511.80	0.0	6561.00	---	---	M	-	Middle
0488	1536500	488950	190.0	6.0	8/19/2003	113.80	6448.20	0.0	6562.00	---	---	M	-	Middle
0489	1536850	488950	---	---	---	---	---	0.0	6562.00	---	---	M	-	Middle
0493	1536702	489492	300.0	5.0	12/10/2009	110.36	6449.92	0.9	6560.28	40	6519	A	-	---
										65	6494	U	-	---
										236	6323	M	270-300	Middle
0494	1536689	489494	85.0	5.0	12/10/2009	36.72	6523.42	0.6	6560.14	40	6520	A	-	---
										65	6495	U	65-85	Upper
0498	1534661	488953	150.0	6.0	12/14/2009	60.60	6499.99	2.0	6560.59	80	6479	A	70-110	Alluvium
										80	6479	M	130-150	Middle
CW44	1535048	488891	208.0	6.0	12/10/2009	63.93	6496.81	2.5	6560.74	94	6464	A	-	Alluvium
										130	6428	M	69-208	Middle
CW45	1535036	489494	193.0	5.0	12/10/2009	62.18	6499.13	0.6	6561.31	90	6471	A	-	---
										166	6395	M	163-193	Middle
CW46	1534642	489595	187.3	5.0	12/18/2006	72.20	6490.06	1.5	6562.26	88	6473	A	-	---
										112	6449	M	125-185	Middle
CW53	1536668	490262	157.0	5.0	12/10/2009	28.83	6536.11	3.0	6564.94	110	6452	U	117-157	Upper

NOTE: A = Alluvial Aquifer, Base
U = Upper Chinle Aquifer,Top
M = Middle Chinle Aquifer,Top
L = Lower Chinle Aquifer,Top
* = Abandoned

E = Estimated Depth

TABLE 5.1-3. WELL DATA FOR THE CHINLE MURRAY ACRES AND PLEASANT VALLEY WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
Murray													
0803	1540800	487430	---	6.0	9/19/1983	84.86	6476.14	0.0	6561.00	---	---	C 85-180	Chinle
										85	6476	A 85-180	Alluvium
0807	1540598	488610	287.0	6.0	---	---	---	0.0	6565.00	63	6502	A -	---
										275	6290	M 275-285	Middle
0808	1540080	487490	290.0	5.0	---	---	---	1.6	6561.00	85	6474	A -	---
										255	6304	M 260-290	Middle
0812	1539910	488505	300.0	6.0	---	---	---	0.6	6566.00	68	6497	A -	---
										268	6297	M 264-284	Middle
0813	1539300	488620	280.0	6.0	---	---	---	0.0	6565.00	63	6502	A -	---
										230	6335	M 235-255	Middle
0814	1539030	488590	280.0	6.0	---	---	---	0.0	6565.00	---	---	M -	Middle
0816	1539110	487705	255.0	6.0	---	---	---	0.0	6557.00	35	6522	A -	---
										240	6317	M 240-250	Middle
0817	1539190	487590	---	---	7/22/1995	70.34	6486.66	0.0	6557.00	---	---	M -	Middle
0818	1539085	487547	243.0	4.0	---	---	---	0.0	6557.00	62	6495	A -	---
										230	6327	M 223-243	Middle
0819	1539000	487000	222.0	6.0	---	---	---	0.0	6557.00	62	6495	A -	---
										210	6347	M 210-220	Middle
0820	1539254	486513	230.0	---	5/9/2002	99.20	6458.80	0.0	6558.00	---	---	M 125-230	Middle
0821	1538810	487320	260.0	7.0	11/1/1994	35.88	6524.12	0.0	6560.00	---	---	M -	Middle
0823	1540150	487720	265.0	6.0	---	---	---	0.0	6561.00	---	---	M 257-267	Middle
										40	6521	A -	---
ACW	1540235	488070	325.0	6.0	12/14/2009	118.54	6445.26	1.2	6563.80	40	6523	A -	---
										57	6506	U -	---
										264	6299	M 265-325	Middle
AW	1540235	488015	156.0	6.0	12/14/2009	35.09	6528.34	0.1	6563.43	63	6500	A -	Alluvium
										100	6463	U 66-155	Upper
HCW	1541060	487785	295.0	6.0	7/20/2000	75.61	6486.39	1.0	6562.00	82	6479	A -	---
										264	6297	M 264-295	Middle
WCW	1541045	488520	307.0	6.0	12/9/2009	122.21	6445.16	0.8	6567.37	83	6484	A -	---
										254	6313	M 257-307	Middle
Pleasant Valley													
0530	1540229	484358	490.0	5.0	10/30/1998	95.78	6463.41	1.5	6559.19	265	6293	L -	Lower
0832	1539263	485629	280.0	4.0	---	---	---	0.0	6557.00	85	6472	A -	---
										240	6317	L 238-278	Lower
0837	1540995	485950	200.0	5.0	9/7/1983	59.87	6507.13	0.0	6567.00	80	6487	A -	---
										160	6407	L 160-200	Lower
842	1541650	483980	250.0	---	---	---	---	0.0	6558.00	---	---	L -	Lower

TABLE 5.1-3. WELL DATA FOR THE CHINLE MURRAY ACRES AND PLEASANT VALLEY WELLS.

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)		AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)							
0900	1540800	483700	172.1	---	7/24/1995	91.41	6468.59	1.5	6560.00	---	---	L	-	Lower

NOTE: A = Alluvial Aquifer, Base
U = Upper Chinle Aquifer,Top
M = Middle Chinle Aquifer,Top
L = Lower Chinle Aquifer,Top
* = Abandoned

E = Estimated Depth

TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
0536	1539560	479701	160.0	5.0	9/12/2000	144.70	---	-2.0	---	---	---	L -	Lower
0536R	1539888	479654	264.0	4.0	12/5/2007	139.06	6415.94	2.0	6555.00	62	6491	A -	---
										160	6393	L -	Lower
0538	1533486	486899	170.0	6.0	12/12/2009	81.12	6467.82	2.0	6548.94	95	6452	A 50-90	Alluvium
										133	6414	L 130-170	Lower
0539	1534014	487596	210.0	6.0	12/12/2009	84.25	6471.07	2.0	6555.32	100	6453	A 50-70	Alluvium
										100	6453	A 80-100	---
										175	6378	L 170-210	Lower
0544	1535653	487969	80.0	4.0	---	---	---	---	6558.00	60	---	M 60-80	Middle
0546	1536330	487560	160.0	5.0	5/4/2009	78.14	6480.86	---	6559.00	80	---	M 130-160	Middle
0547	1529133	483106	127.0	---	---	---	---	---	---	---	---	L -	Lower
0548	1521230	482903	220.0	---	---	---	---	---	---	---	---	L -	Lower
0549	1528942	483572	313.0	---	---	---	---	---	---	---	---	L -	Lower
0580	1537700	492300	235.0	4.5	---	---	---	---	6579.00	---	---	U -	Upper
0653	1533283	486570	206.0	6.0	12/10/2009	79.85	6465.12	1.6	6544.97	97	6446	A 69-206	Alluvium
										135	6408	L -	Lower
0850	1534652	486044	54.0	5.0	12/10/2009	55.71	6493.44	3.2	6549.15	37	6509	M 29-54	Middle
										37	6509	A -	---
0853	1532124	484824	95.0	5.0	12/10/2009	82.99	6458.39	1.7	6541.38	60	6480	L 55-95	Lower
										60	6480	A -	---
0859	1534549	487426	83.0	5.0	12/10/2009	71.06	6481.70	2.7	6552.76	52	6498	M 50-83	Middle
0901	1531531	492846	270.0	5.0	11/4/1981	46.88	6552.12	0.0	6599.00	40	6559	A -	---
										190	6409	L 240-260	Lower
0902	1533700	488800	150.0	6.0	1/28/1995	52.10	6507.90	0.0	6560.00	72	6488	M 78-102	Middle
										72	6488	A -	---
0903	1530250	486900	281.0	5.0	---	---	---	0.0	6559.00	220	6339	L 120-260	Lower
0904	1531100	487150	200.0	4.0	---	---	---	0.0	6560.00	---	---	L 170-200	Lower
0908	1534430	483325	282.8	5.0	11/3/1998	81.16	6463.21	1.5	6544.37	107	6436	A -	---
										232	6311	L -	Lower
0927	1548300	491700	---	---	10/8/2008	160.00	6435.00	1.0	6595.00	---	---	M -	Middle
0929	1544684	495585	320.0	5.0	12/28/2009	50.52	6542.05	2.0	6592.57	---	---	U 290-320	Upper
0932	1540436	495407	501.0	6.0	4/19/2001	86.73	6515.38	0.0	6602.11	354	6248	U -	---
										492	6110	M 450-490	Middle
0933	1540087	495231	---	5.0	12/14/2009	78.28	6522.23	0.5	6600.51	---	---	U -	Upper
0937	1542180	471478	182.0	5.0	---	---	---	0.0	6578.00	70	6508	A -	---
										160	6418	L 95-182	Lower
0944	1539280	493091	300.0	5.0	12/28/2009	57.45	6531.16	1.6	6588.61	64	6523	A -	---
										252	6335	U 220-280	Upper

TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
0945	1537986	493900	300.0	---	3/21/1985	92.41	6498.08	0.0	6590.49	---	---	U -	Upper
0946	1537804	491754	260.0	5.0	10/17/1996	37.45	6541.59	0.0	6579.04	220	6359	U 230-260	Upper
0948	1535190	490400	255.0	5.0	---	---	---	0.0	6568.10	200	6368	M 200-255	Middle
0954	1534187	483910	307.0	5.0	12/27/1994	77.22	6467.78	0.0	6545.00	225	6320	L 285-307	Lower
0960	1534730	490110	305.0	6.0	4/5/1995	67.46	6497.54	0.0	6565.00	280	6285	M 285-305	Middle
0961	1534190	489720	240.0	5.0	4/5/1995	67.40	6497.60	6.9	6565.00	200	6358	L 200-240	Lower
0962	1533750	489796	238.0	6.0	---	---	---	0.0	6560.00	225	6335	L 220-238	Lower
0963	1532555	488792	---	4.0	---	---	---	0.0	6557.00	---	---	L -	Lower
0964	1531817	488371	200.0	6.0	---	---	---	0.0	6560.00	170	6390	L 170-200	Lower
0965	1531550	489100	200.0	4.0	8/21/2003	3.00	6572.00	0.0	6575.00	---	---	L 130-200	Lower
0966	1531300	489000	---	---	---	---	---	0.0	6575.00	---	---	L -	Lower
0967	1530500	487600	---	---	---	---	---	0.0	6570.00	---	---	L -	Lower
0968	1529700	488400	---	---	---	---	---	0.0	6630.00	---	---	L -	Lower
0969	1529400	488450	---	---	---	---	---	0.0	6640.00	---	---	L -	Lower
0970	1529100	488500	---	5.0	---	---	---	0.0	6660.00	---	---	L -	Lower
0988	1538124	483423	155.0	5.0	7/18/1996	59.86	6489.14	1.3	6549.00	18	6530	A -	---
										152	6396	L 152-155	Lower
0990	1537600	482750	---	---	---	---	---	0.5	6550.00	---	---	L -	Lower
CW15	1536259	485961	134.6	5.0	12/12/2009	102.47	6448.85	2.6	6551.32	50	6499	A -	---
										91	6458	M 73-133	Middle
										311	6238	L -	---
CW16	1534747	488507	---	5.0	12/26/1996	68.02	6490.52	0.0	6558.54	82	6477	M 112-152	Middle
										82	6477	A -	---
CW18	1535924	491378	230.7	5.0	12/28/2009	36.35	6536.30	1.5	6572.65	90	6481	A -	---
										190	6381	U 177-232	Upper
										340	6231	M -	---
CW26	1534116	489593	300.0	5.0	12/14/2009	108.66	6452.77	0.5	6561.43	50	6511	A -	---
										50	6511	M -	---
										231	6330	L 245-285	Lower
CW27	1534109	489600	110.0	5.0	12/14/2009	70.56	6492.32	1.9	6562.88	50	6511	M 80-110	Middle
										50	6511	A -	---
CW28	1535112	491008	370.0	5.0	12/28/2009	164.30	6407.38	1.9	6571.68	90	6480	A -	---
										110	6460	U -	---
										294	6276	M 280-360	Middle
CW29	1534551	487435	290.0	5.0	12/10/2009	95.93	6456.29	1.7	6552.22	52	6499	M -	---
										52	6499	A -	---
										228	6323	L 230-270	Lower
CW30	1536642	488704	251.5	5.0	12/14/2004	8.00	6550.31	2.0	6558.31	35	6521	A -	---
										220	6336	M 219-249	Middle

TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
CW31	1540689	482738	311.0	6.0	12/14/2009	87.91	6472.35	2.0	6560.26	111	6447	A -	---
										254	6304	L 291-311	---
										254	6304	L 231-271	---
										254	6304	L 136-156	Lower
CW36	1540053	481329	180.0	5.0	12/9/2009	79.48	6471.61	2.8	6551.09	96	6452	A -	---
										152	6396	L 155-177	Lower
CW37	1537240	484853	150.1	5.0	12/12/2009	60.93	6490.24	1.3	6551.17	55	6495	A -	---
										100	6450	L 100-150	Lower
CW38	1540103	483429	174.8	5.0	11/14/1997	55.18	6500.42	2.1	6555.60	108	6446	A -	---
										130	6424	L 133-173	Lower
CW39	1537260	483754	126.3	5.0	12/12/2009	60.88	6489.83	3.4	6550.71	40	6507	A -	---
										87	6460	L 90-123	Lower
CW40	1537624	491819	264.0	5.0	12/14/2009	40.08	6538.86	2.6	6578.94	75	6501	A -	---
										220	6356	U 224-264	Upper
CW41	1533174	488584	206.0	6.0	12/10/2009	102.23	6453.18	1.5	6555.41	59	6495	A -	---
										138	6416	L 146-206	Lower
CW42	1533169	487177	205.0	6.0	12/10/2009	89.25	6459.53	0.0	6548.78	98	6451	A -	---
										124	6425	L 125-205	Lower
CW43	1537587	482493	104.1	5.0	12/12/2009	63.00	6485.79	2.0	6548.79	57	6490	A -	---
										57	6490	L 81-101	Lower
CW54	1536645	488675	103.1	5.0	12/12/2009	31.84	6526.71	2.2	6558.55	70	6486	C 60-100	Chinle

NOTE: A = Alluvial Aquifer, Base
U = Upper Chinle Aquifer,Top
M = Middle Chinle Aquifer,Top
L = Lower Chinle Aquifer,Top
* = Abandoned

E = Estimated Depth

5.2 UPPER CHINLE WATER LEVELS

Measured water levels in Homestake's Upper, Middle and Lower Chinle aquifer wells are presented in Appendix A. Table A.2-1 of Appendix A includes water levels for Homestake, subdivision, and regional Chinle wells. Figure 5.2-1 presents water-level elevation contours of the Upper Chinle aquifer during the fall of 2009. The blue arrows on Figure 5.2-1 show the direction of ground-water flow, which is greatly influenced by the fresh-water injection into the Upper Chinle at wells CW4R, CW5, CW13 and CW25 and collection from wells CE2, CE5, CE6, CE11 and CE12. Well CW13, an injection well on the east side of the East Fault, is in the high permeability zone of the Upper Chinle aquifer that parallels the East Fault. This high permeability zone extends to a distance of at least 1000 feet parallel and adjacent to the East Fault near well CW18. Injection of fresh water has created piezometric-surface mounds along the east side of the East Fault. The permeability is much smaller at greater distances to the east of the East Fault and, therefore, an easterly gradient occurs in the Upper Chinle away from the East Fault near injection well CW13. The CW13 injection affects water levels on the west side of the East Fault in the area of Upper Chinle well CW53. Water level changes in well CW53 respond quickly to change in levels in well CW13 showing that a good connection exists in the Upper Chinle where the East Fault pinches out south of well CW53.

Injection of fresh water into Upper Chinle well CW5 is causing ground water flow to the north and south of this area. The flow that moves to the south discharges to the alluvial aquifer in the subcrop area of the Upper Chinle, and the flow that moves to the north converges toward collection wells CE2, CE5, CE6, CE11 or CE12. Injection into Upper Chinle well CW25 was started in 2000, and this injection is causing ground water to flow from this well back toward these collection wells. The naturally occurring flow direction in the Upper Chinle aquifer west of the East Fault is from the north. Well CW3 has not been pumped since January 2007 and therefore does not intercept any of the flow from the north.

Figure 5.2-2 shows the location of the Upper Chinle wells that are used to monitor water-level changes with time. Figure 5.2-3 presents water-level elevations for Upper Chinle wells 494, CE2, CE7, CE10, CW3 and CW50. The water level in well CW3 remained high in 2009 without the pumping of this well. The changes in water levels from collection well CE2 are due to variations in pumping rate in this well and collection from wells CE5, CE6, CE11 and

CE12. This pumping has caused a small decline in the water levels in wells CE7 and CE10. Water levels in well 494 were overall steady in 2009 with a small affect from the irrigation supply pumping.

Figure 5.2-4 presents the water-level elevation changes for the Upper Chinle wells east of the East Fault. The variation in water levels in wells 929, 931, 934, CW18 and CW40 were due to variation in injection into well CW13 and pumping from well CW53 during 2009.

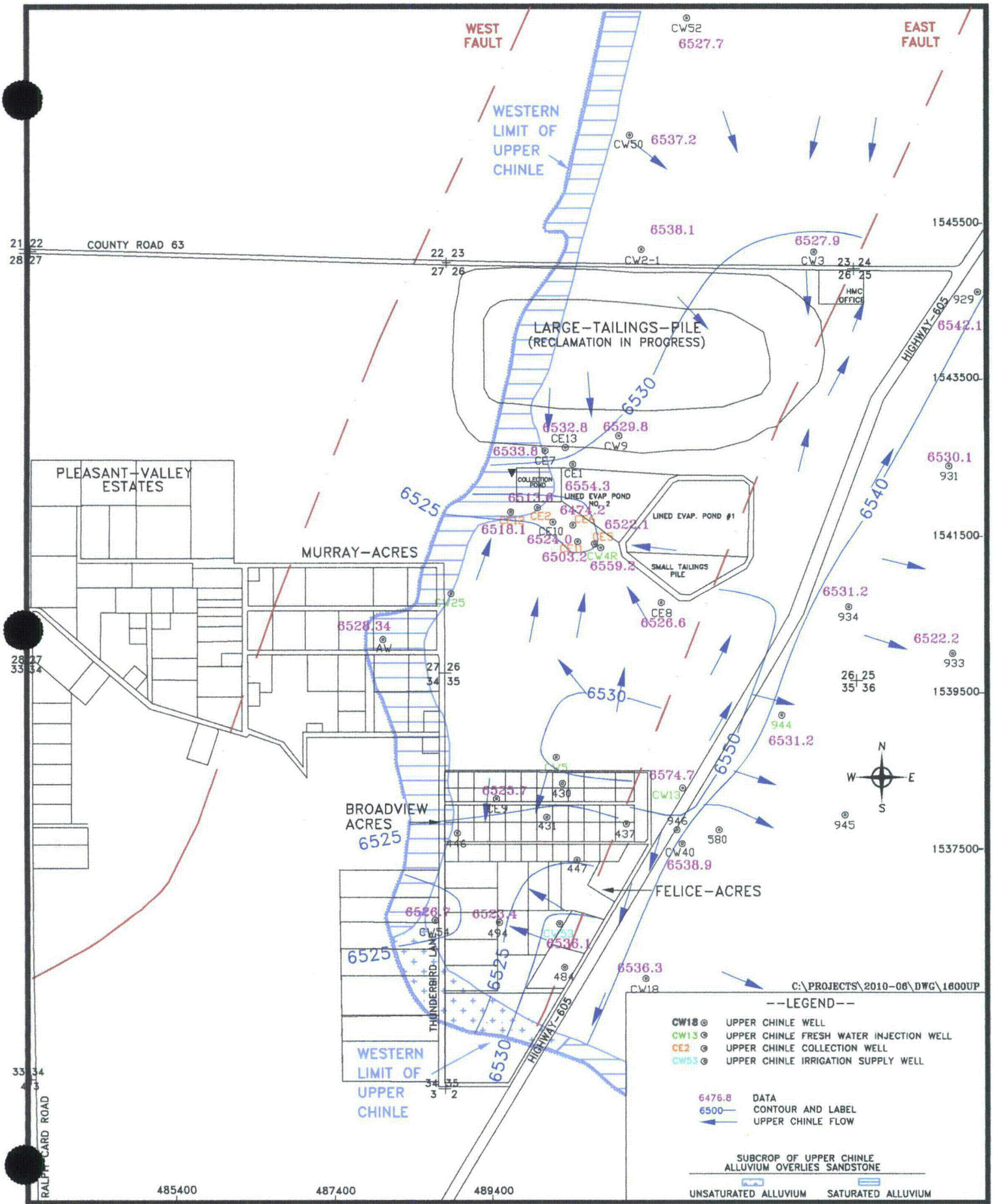


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FIGURE 5.2-1. WATER-LEVEL ELEVATIONS OF THE UPPER CHINLE AQUIFER, FALL 2009, FT-MSL | SCALE: 1"=650'

PAGE: 5.2-3

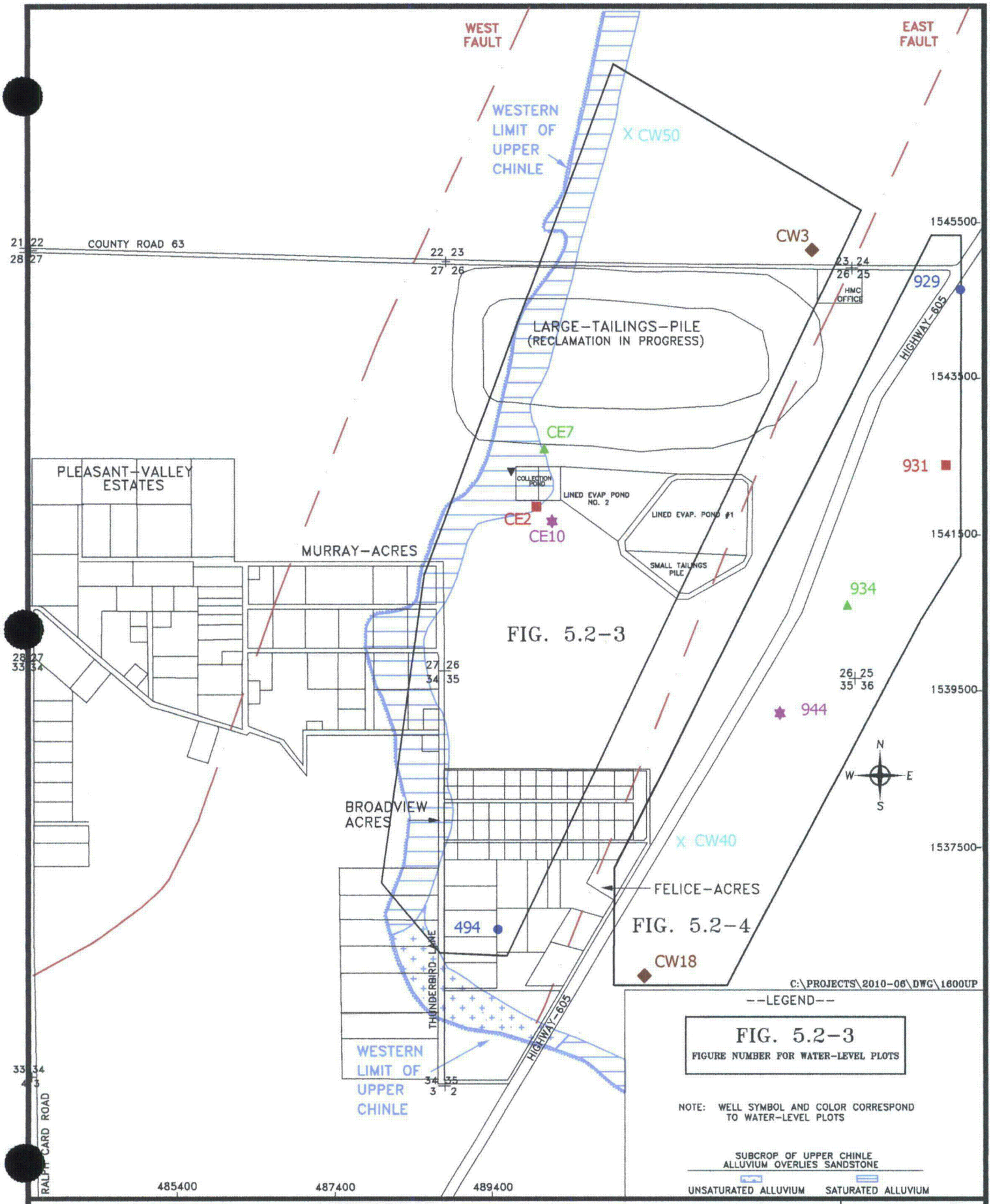

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FIGURE 5.2-2. LOCATION OF UPPER CHINLE WELLS WITH WATER-LEVEL PLOTS, 2009 | SCALE: 1"=650'

PAGE: 5.2-4

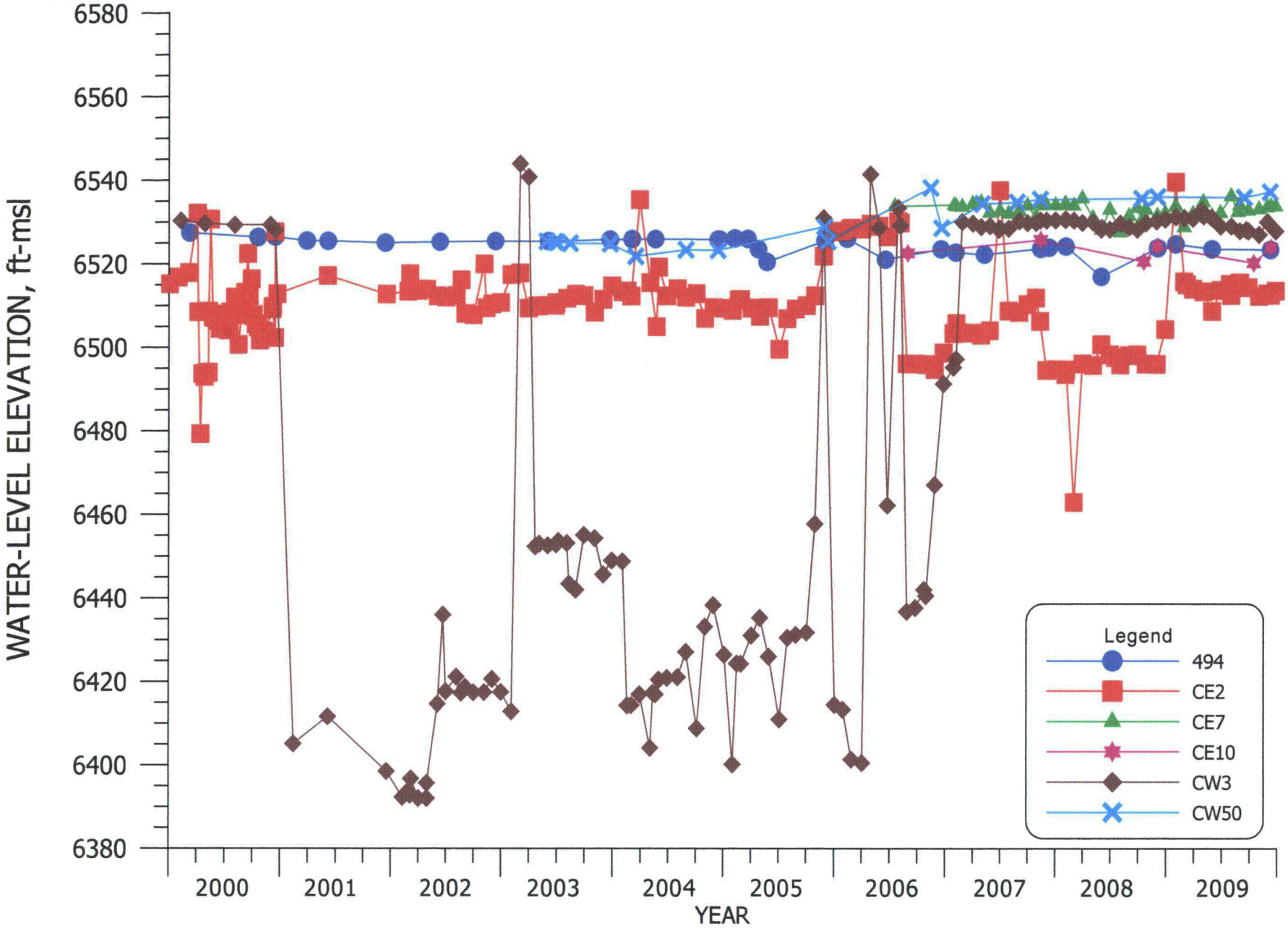


FIGURE 5.2-3. WATER-LEVEL ELEVATION FOR WELLS 494, CE2, CE7, CE10, CW3 AND CW50.

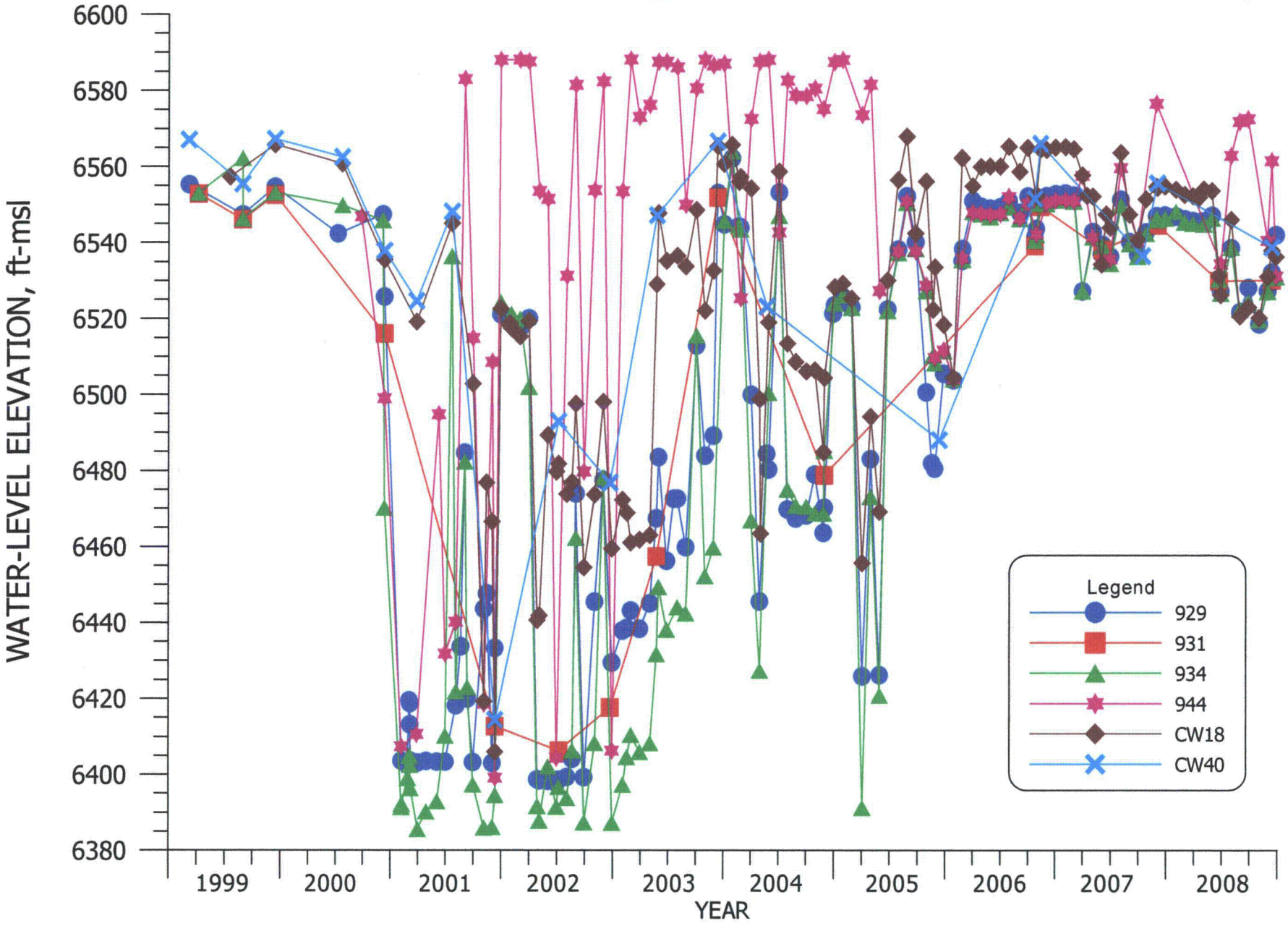


FIGURE 5.2-4. WATER-LEVEL ELEVATION FOR WELLS 929, 931, 934, 944, CW18 AND CW40

5.3 UPPER CHINLE WATER QUALITY

Water-quality data for 2009 for the Chinle aquifers is presented in Tables B.5-1 and B.5-2 of Appendix B. The basic well data is presented in Tables 5.1-1 through 5.1-4 and Figure 5.1-2 shows locations of the Upper Chinle wells.

Concentrations of key constituents exceed site standards for the Upper Chinle aquifer in only a few locations. Sulfate concentrations have been adequately restored in the Upper Chinle aquifer except for an area near the Large Tailings Pile. Selenium concentrations during 2009 are less than the site standard in all Upper Chinle wells except wells CE2, CE6, CE7, CE12 and CE13 which are all near the LTP. Uranium concentrations exceed the site standard in eleven wells. The slower pace of restoration is attributed to leaching of this constituent from the formation. Molybdenum concentrations in the Upper Chinle aquifer exceed the site standard in ten wells in close proximity to the tailings piles.

5.3.1 SULFATE - UPPER CHINLE

Figure 5.3-1 presents sulfate concentrations in the Upper Chinle aquifer during 2009. Upper Chinle sulfate concentrations varied from 249 to 6610 mg/l. Only the values from wells CE7 and CE13 exceeded the site standards for the mixing zone of 1750 mg/l and no non-mixing zone wells exceeded the site standard of 914 mg/l in the Upper Chinle in 2009 (see Section 3 or the well grouping on Figure 5.3-2 for zone areas). Upper Chinle site standards based on background data are presented for sulfate in the legend of Figure 5.3-1. These site standards have a greater than sign in front of the numeric value which is associated with the pattern for the particular zone. Therefore, only an area in the western portion of the Large Tailings to the north side of the collection ponds requires restoration in the mixing zone. The information regarding the analysis of background results that were used to develop the background and related site standards is presented in Section 3 of this report.

The locations of wells used in the time plots of water quality are presented on Figure 5.3-2. The color and symbol of the individual wells correspond with those used on the various water-quality time plots. Sulfate time-plot figure numbers are also shown on Figure 5.3-2 for each group. The same color and symbol scheme is used for other constituents in the Upper Chinle discussed in this section. Notations on Figure 5.3-2 indicate that mixing zone Upper

Chinle wells 494, CE2, CE5, CE8, CE11 and CW50 are grouped together on the water-quality time plots, whereas the non-mixing zone wells 929, 934, CW3, CW18 and CW40 are grouped together on a second plot.

Figure 5.3-3 presents sulfate concentrations versus time for the mixing zone group of wells listed above. The sulfate concentrations in water sampled from each of these wells are less than the mixing-zone site standard (see Figure 5.3-3). Sulfate concentrations in well CE2, near the subcrop area south of the Large Tailings Pile, have been steady in 2009 but are still below the remainder of the Upper Chinle wells in this area. The sulfate concentrations in well CE5 were also steady in 2009. A decrease in the sulfate concentration was observed in collection well CE11.

A plot of sulfate concentrations versus time for non-mixing zone Upper Chinle wells 929, 934, CW3, CW18 and CW40 is presented on Figure 5.3-4 (see Figure 5.3-2 for location of these wells). This plot shows some minor variability with fairly steady sulfate concentrations in these Upper Chinle wells in 2009. The sulfate concentration in 2007 in well CW3 declined to near the 2001 pre-pumping concentration in this well and has since become steady after gradually increasing. Pumping of well CW3 ceased after January of 2007.

5.3.2 TOTAL DISSOLVED SOLIDS - UPPER CHINLE

Figure 5.3-5 presents contours of total dissolved solids (TDS) concentrations for the Upper Chinle aquifer during 2009. All concentrations are less than 2000 mg/l, with the exception of areas of the Upper Chinle near the Large Tailings Pile and east of State Highway 605 in Sections25, 35 and 36. The TDS concentration naturally increases with increasing distance east of the East Fault due to the slower movement of ground water in this less transmissive portion of the aquifer. The blue dashed pattern on Figure 5.3-5 shows where the Upper Chinle TDS concentrations are greater than 2010 mg/l, which is the non-mixing zone site standard. TDS concentrations in this area are natural and not attributable to the Grants site tailings piles. The sulfate concentrations exceed the mixing zone standard of 3140 mg/l near the Large Tailings in wells CE7 and CE13. The Upper Chinle aquifer near the Large Tailings Pile still requires restoration with respect to TDS concentration.

Figure 5.3-6 presents TDS concentrations for mixing zone Upper Chinle wells 494, CE2, CE5, CE11 and CW50. The TDS concentrations in well CE2 were fairly steady in 2009 after increasing in 2006 and 2007. The TDS was steady in well CE11 in 2009 as this well was continuously pumped. All of these wells contain water with TDS concentrations less than the mixing zone standard of 3140 mg/l.

Time plots of TDS concentrations for non-mixing zone wells 929, 934, CW3, CW18 and CW40 are presented in Figure 5.3-7. This figure shows overall steady TDS concentrations in these wells for 2009. The TDS concentrations in well CW3 in 2009 were close to their pre-pumping levels in 2001.

5.3.3 CHLORIDE – UPPER CHINLE

Chloride concentrations in the Upper Chinle aquifer during 2009 are presented on Figure 5.3-8. In the two up-gradient Upper Chinle wells CW50 and CW52, chloride concentrations are less than 100 mg/l. Typical measured chloride concentrations are between 100 and 220 mg/l in the Upper Chinle aquifer, because this range encompasses natural variations and the range of chloride concentrations in the injection water. Concentrations near the subcrop located under the western portion of the Large Tailings exceed 250 mg/l and require restoration in this area. Chloride concentrations east of the East Fault naturally increase due to the slower movement of ground water with increasing distance east of the East Fault and are not attributable to the Grants site.

The chloride concentrations in water collected from mixing zone Upper Chinle wells 494, CE2, CE5, CE8, CE11 and CW50 are presented on Figure 5.3-9. In Upper Chinle well CE2 chloride concentrations were steady in 2009. The September 2008 chloride concentrations from well CE5 are thought to be an outlier. Overall, the chloride concentrations in wells 494, CE5, CE11 and CW50 have not changed significantly in 2009.

The chloride concentrations in the wells in the non-mixing zone are presented on Figure 5.3-10. This plot shows a gradual increase in chloride concentrations in 2009 in wells 929, 934 and CW18. A decrease in concentrations in well CW3 has been observed due to the ceasing of pumping of this Upper Chinle well in January of 2007. The chloride concentration in well CW3 is still above the pre-pumping levels in 2001.

5.3.4 URANIUM - UPPER CHINLE

Uranium is an important parameter for identifying impacts to the Upper Chinle aquifer. Figure 5.3-11 presents contours of uranium concentrations in the Upper Chinle aquifer for 2009. Eleven of the uranium concentrations measured in Upper Chinle water in 2009 exceeded the corresponding mixing or non-mixing zone site standards. These concentrations are expected to gradually decrease to below background concentrations with the ongoing ground water-quality restoration efforts in the Large Tailings Pile area. The highest value measured east of the East Fault in 2009 was observed in wells 929 and 934 with values of 0.04 mg/l. This value is below the corresponding non-mixing zone standard of 0.09 mg/l.

Plots of uranium concentrations versus time for Upper Chinle wells 494, CE2, CE8, CE5, CE11 and CW50 are presented on Figure 5.3-12 (see Figure 5.3-2 for location of these wells). This plot demonstrates that the uranium concentrations in Upper Chinle well CE11 increased in early 2008 and then declined in 2009. Uranium concentrations in wells 494 and CW50 were overall steady in 2009. The uranium concentrations in Upper Chinle collection well CE2 increased in early 2008 and then decreased with similar values in 2009 to those observed later in 2008.

The uranium concentrations in all of the Upper Chinle wells in the non-mixing zone are very low except for a larger value measured in well CW3. The decrease in uranium concentration at well CW3 in 2007 is due to the cessation of pumping this well after January of 2007. Concentrations in well CW3 were fairly steady in 2008 but have declined in 2009. Figure 5.3-13 shows uranium concentration plotted versus time for Upper Chinle wells 929, 934, CW3, CW18 and CW40. With the exception of well CW3, concentrations in these wells are less than the site standard.

5.3.5 SELENIUM - UPPER CHINLE

Contours of 2009 selenium concentrations in the Upper Chinle aquifer are presented on Figure 5.3-14. This figure shows that the selenium concentrations are less than the mixing-zone site standard of 0.14 mg/l with the exception of wells CE2, CE6, CE7, CE12 and CE13. The non-mixing zone NRC site standard of 0.06 mg/l is not exceeded.

Figure 5.3-15 presents selenium concentrations for wells 494, CE2, CE5, CE8 and CW50. The selenium concentration in collection wells CE2 and CE11 were steady in 2009 while pumping of these wells. The selenium concentrations for all of the remaining wells on this plot are low.

Figure 5.3-16 presents the selenium concentrations for Upper Chinle wells 929, 934, CW3, CW18 and CW40. This plot shows that selenium concentrations for these wells have remained low during 2009. The selenium concentration in water collected from Upper Chinle well CW3 declined in 2007 to a level that existed prior to its continuous pumping which started in 2001. The previously observed decreases in selenium concentrations in wells CW40 and CW18 were due to the injection of fresh water in Upper Chinle well CW13 east of the East Fault; selenium concentrations remain low in these wells. The higher selenium from well 929 in early 2007 is questionable because the value before and after is very small as with all previous observed concentrations.

5.3.6 MOLYBDENUM - UPPER CHINLE

Figure 5.3-17 presents the molybdenum concentrations in the Upper Chinle aquifer during 2009. Molybdenum concentrations near and underlying the Large Tailings Pile exceeded both the mixing and non-mixing zone site standards. Concentrations are greater than 1.0 mg/l in a region extending from the Upper Chinle-alluvium subcrop area, below the Large Tailings Pile, and toward well CW3. Additional restoration is needed in this area, and should be easily accomplished after the alluvial aquifer is restored in the subcrop area. All molybdenum concentrations south of the Small Tailings Pile and east of the East Fault in the Upper Chinle aquifer are below the site standards.

Figure 5.3-18 presents molybdenum concentrations for Upper Chinle wells from the mixing zone. In 2009, concentrations in wells 494 and CW50 were fairly similar to those observed in previous years. Concentrations increased at collection wells CE2, CE5 and CE11 in late 2007 and early 2008 due to their pumping but have since been variable.

Figure 5.3-19 contains time plots of molybdenum concentrations for wells 929, 934, CW3, CW18 and CW40. Small concentrations of molybdenum are generally present in each of these wells except for the larger values observed in well CW3. Molybdenum concentrations in

well CW3 decreased in 2007 due to the ceasing of pumping this well but were fairly steady in 2008 and have declined in 2009.

5.3.7 NITRATE - UPPER CHINLE

Nitrate concentrations for the Upper Chinle aquifer were measured in 2009 to confirm that concentrations are significantly below the site standards of 15 mg/l for the mixing zone. Figure 5.3-20 presents nitrate concentrations in the Upper Chinle aquifer during 2009. The largest nitrate concentration observed in 2009 was 12.2 mg/l in well CE13. Therefore, all of the nitrate concentrations are less than the site standard. Routine monitoring of nitrate concentrations in the Upper Chinle aquifer is only warranted near the west edge of the LTP because concentrations are well below levels of concern except near the subcrop area near the LTP.

Plots of nitrate concentration versus time were not prepared, because historic values in Upper Chinle wells are similar to the low concentrations measured in 2009. In the future, nitrate concentrations in the Upper Chinle aquifer are not expected to be significant because of the very limited extent of elevated concentrations in the alluvial aquifer. Therefore, a nitrate site standard for the non-mixing zone for the Upper Chinle aquifer is not considered necessary.

5.3.8 RADIUM-226 AND RADIUM-228 - UPPER CHINLE

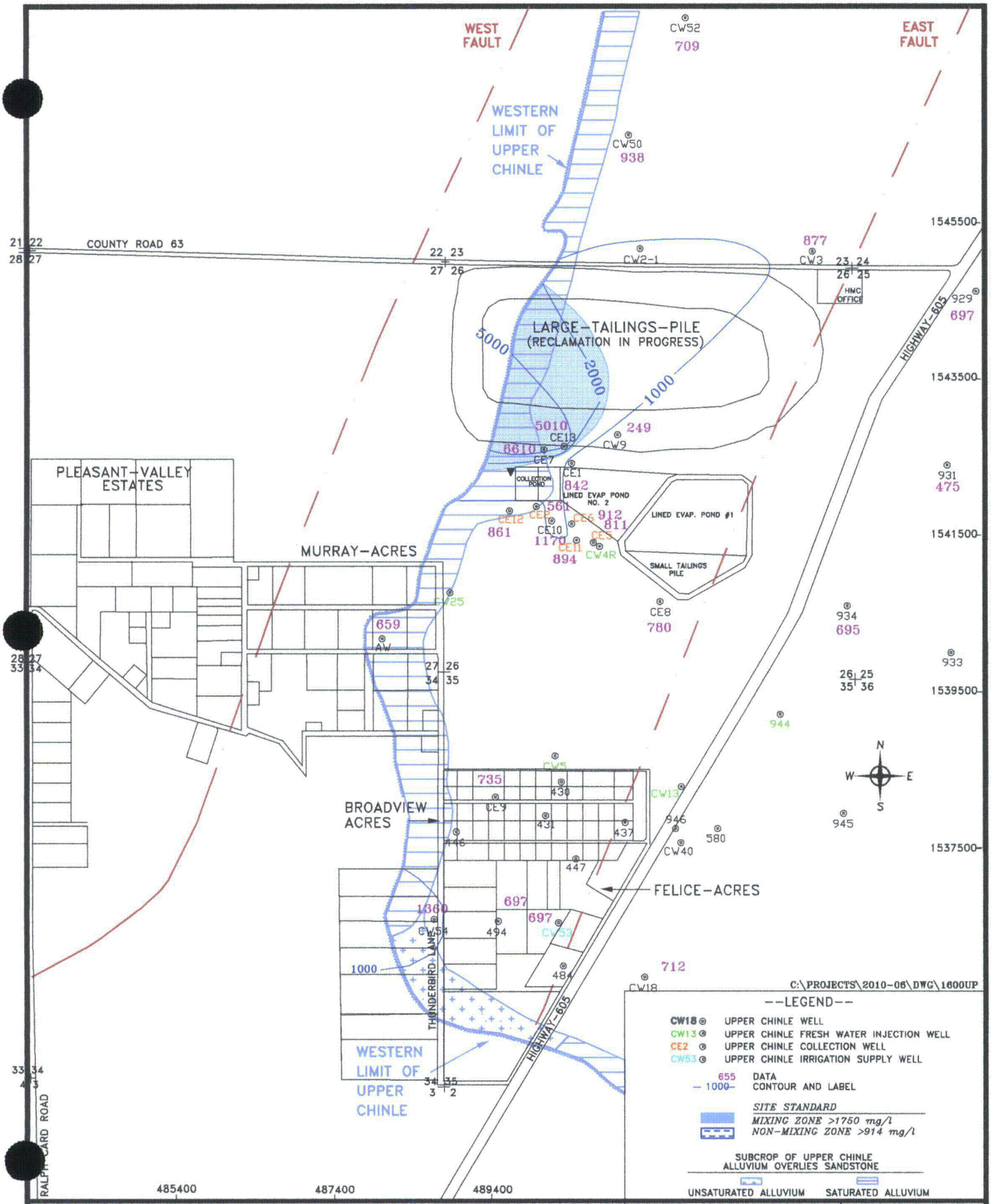
All radium concentrations in the Upper Chinle aquifer have been low in past years. Radium concentrations were analyzed for all Upper Chinle wells in 2003 to update the database. Figure 5.3-21 presents the radium-226 and the radium-228 concentrations measured in 2009. The largest radium-226 concentration measured in the Upper Chinle wells in 2009 was 1.9 pCi/l in well CE10. All of the radium-228 values were less than or equal to one pCi/l. This data shows that radium-226 and radium-228 are not present at concentrations that are significant in the Upper Chinle aquifer at the Homestake site. No concentration plots were prepared for radium because observed concentrations have been low and remained so through 2009. A radium site standard is not considered to be necessary for the Upper Chinle aquifer and has therefore not been established.

5.3.9 VANADIUM - UPPER CHINLE

Vanadium concentrations have always been low in the Upper Chinle aquifer except the recent values in wells CW3 and CE7 that have been only slightly elevated above detection limits. The occurrence of significant concentrations in the Upper Chinle aquifer is unlikely because this constituent is not present at elevated concentrations in the alluvial aquifer with the exception of the immediate tailings area. Figure 5.3-22 shows that all of the 2009 measured vanadium concentrations are less than 0.01 mg/l except for the two wells previously mentioned. Vanadium was measured in wells CW3 and CE7 in 2009 at slightly above the site standard. A small amount of restoration is needed in the LTP area for the Upper Chinle aquifer. A site standard was set for the Upper Chinle aquifer for vanadium because a small amount of restoration is needed close to the LTP.

5.3.10 THORIUM-230 - UPPER CHINLE

Thorium-230 concentrations have never been significant in the Upper Chinle aquifer. The values measured in 2009 are presented in Figure 5.3-23. This figure shows that all measured thorium-230 concentrations in 2009 were less than or equal to 0.2. None of the concentrations in 2009 exceed the mixing zone or non-mixing zone background values therefore, a site standard for thorium has not been set for the Upper Chinle aquifer. No plots of the thorium-230 concentration with time were developed due to the lack of any significant change in the low concentrations over the period of record. Thorium-230 levels do not warrant establishment of a site standard for this constituent.



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DATE: 1/27/10

FIGURE 5.3-1. SULFATE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

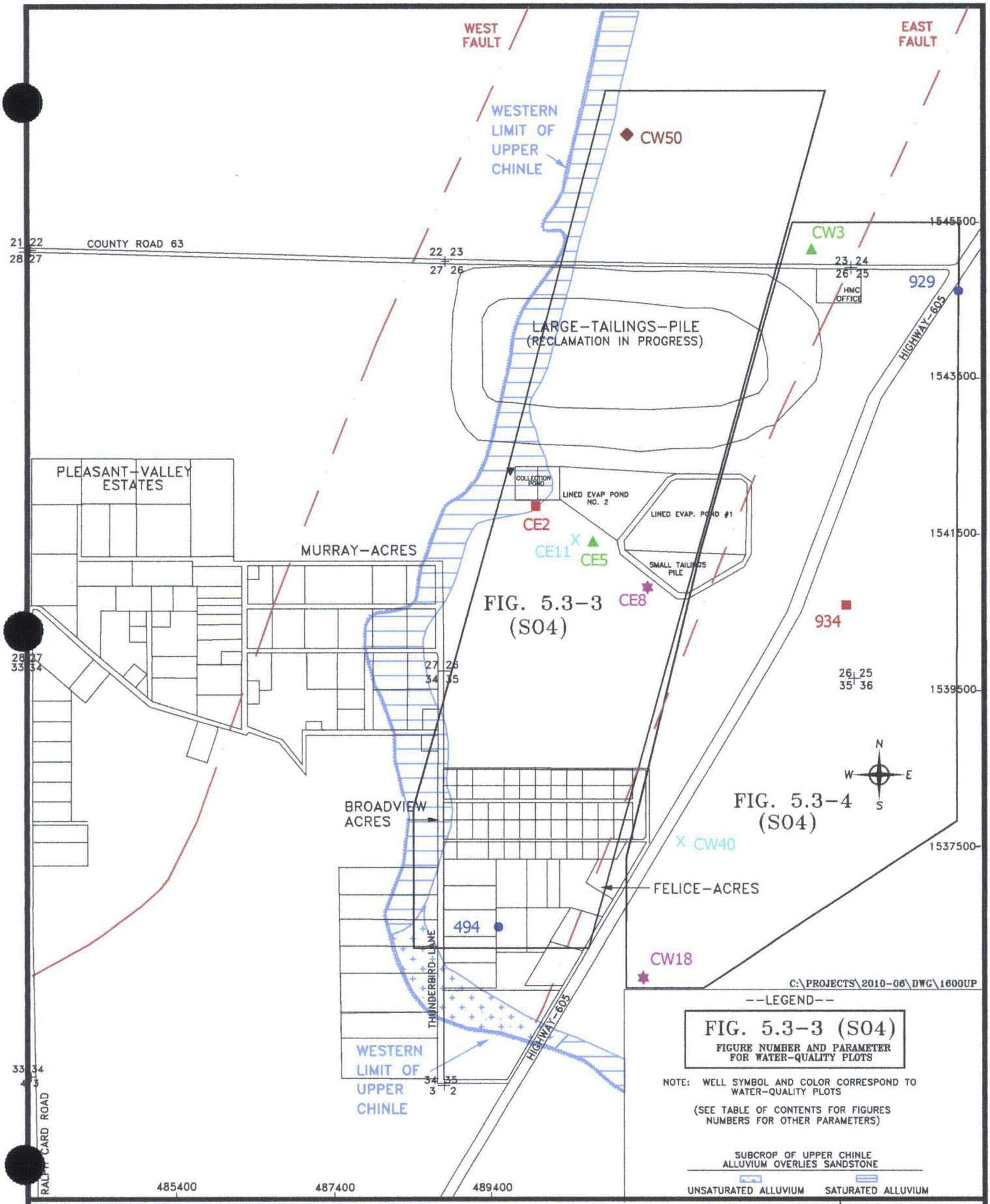

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FIGURE 5.3-2. LOCATION OF UPPER CHINLE WELLS WITH WATER-QUALITY PLOTS, 2009 | SCALE: 1"=650'

PAGE: 5.3-9

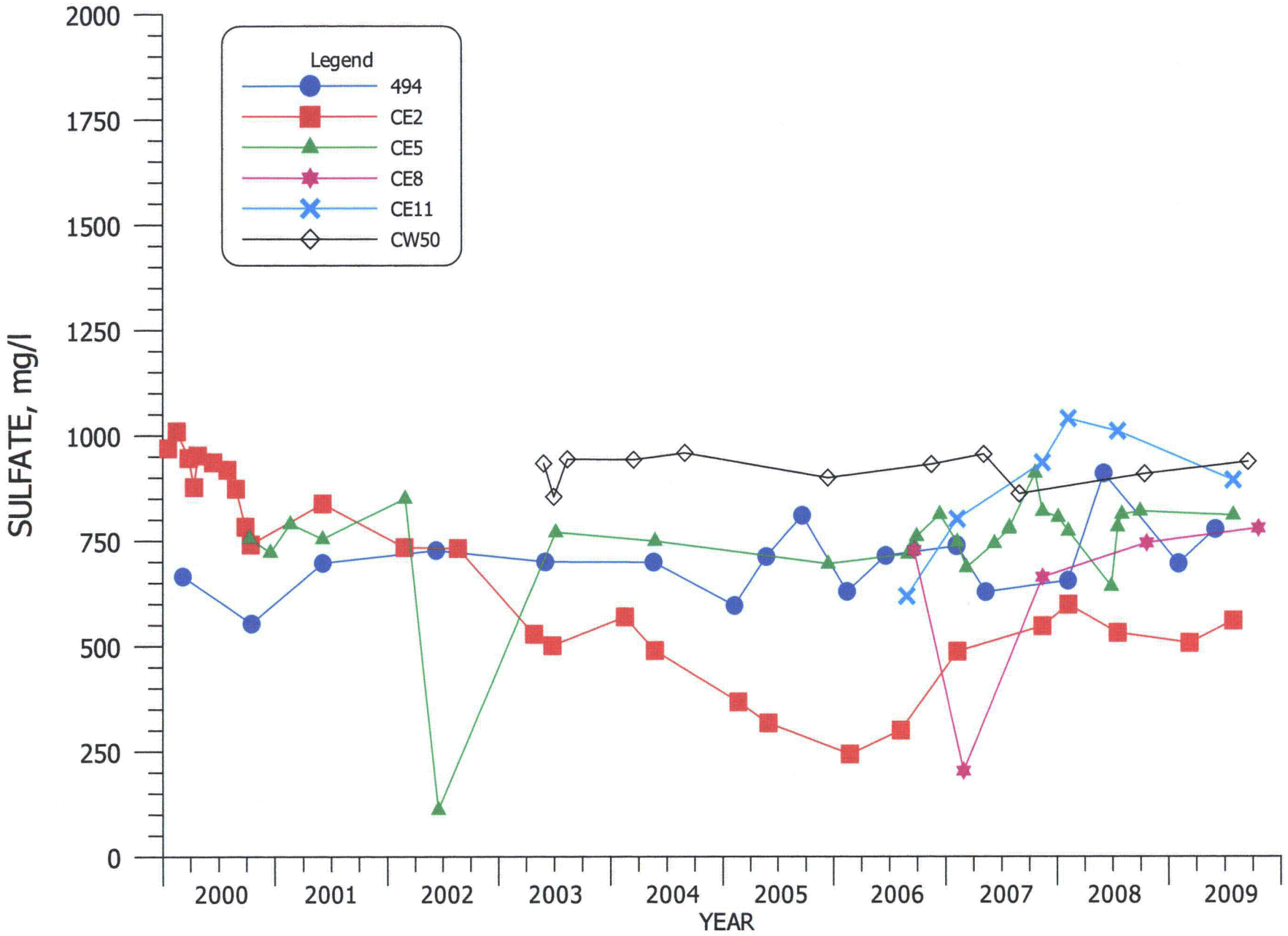

FIGURE 5.3-3. SULFATE CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE5, CE8, CE11 AND CW50.

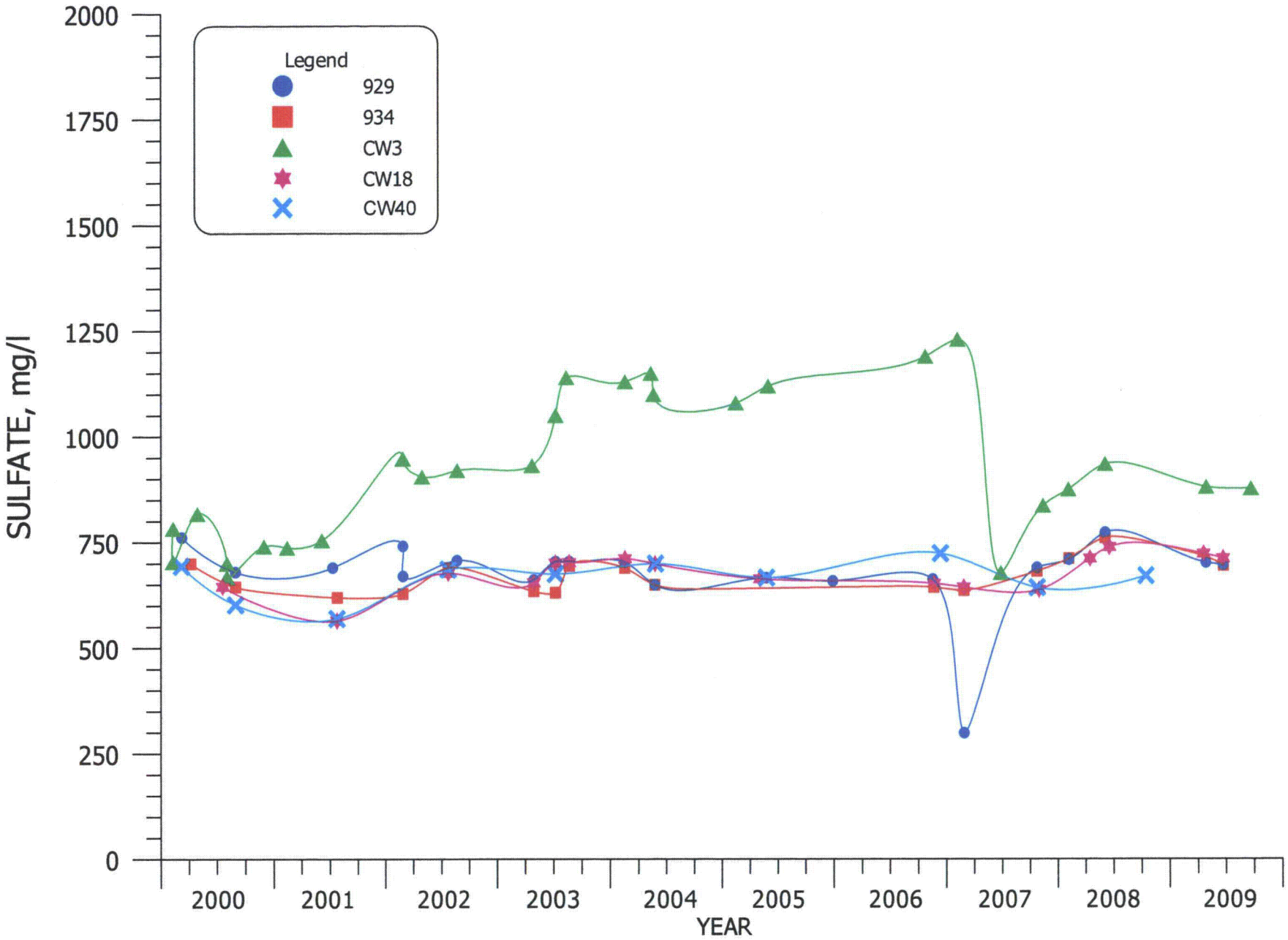

FIGURE 5.3-4. SULFATE CONCENTRATIONS FOR NON-MIXING ZONE WELLS 929, 934, CW3, CW18 AND CW40.

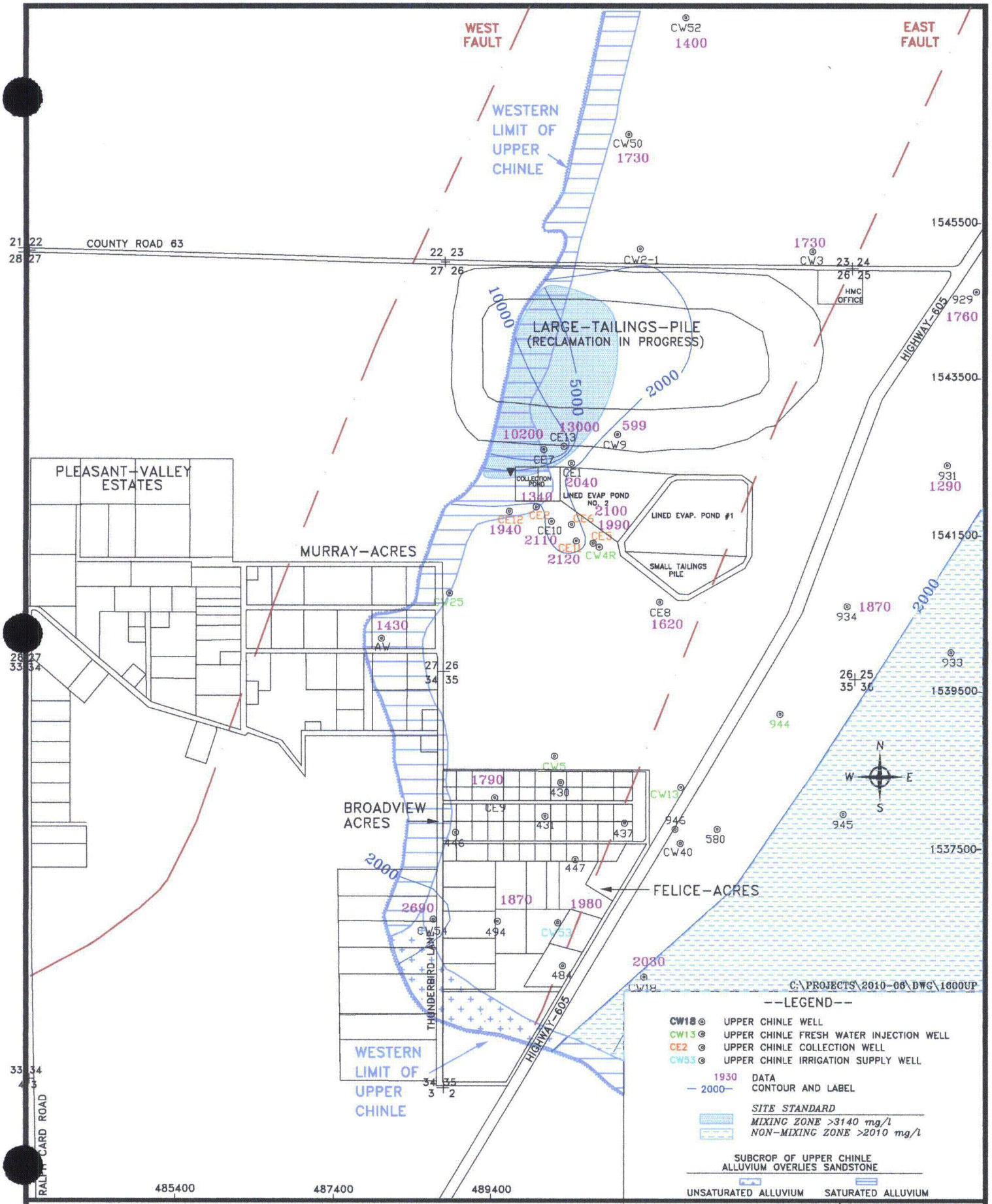

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FIGURE 5.3-5. TDS CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

PAGE: 5.3-12

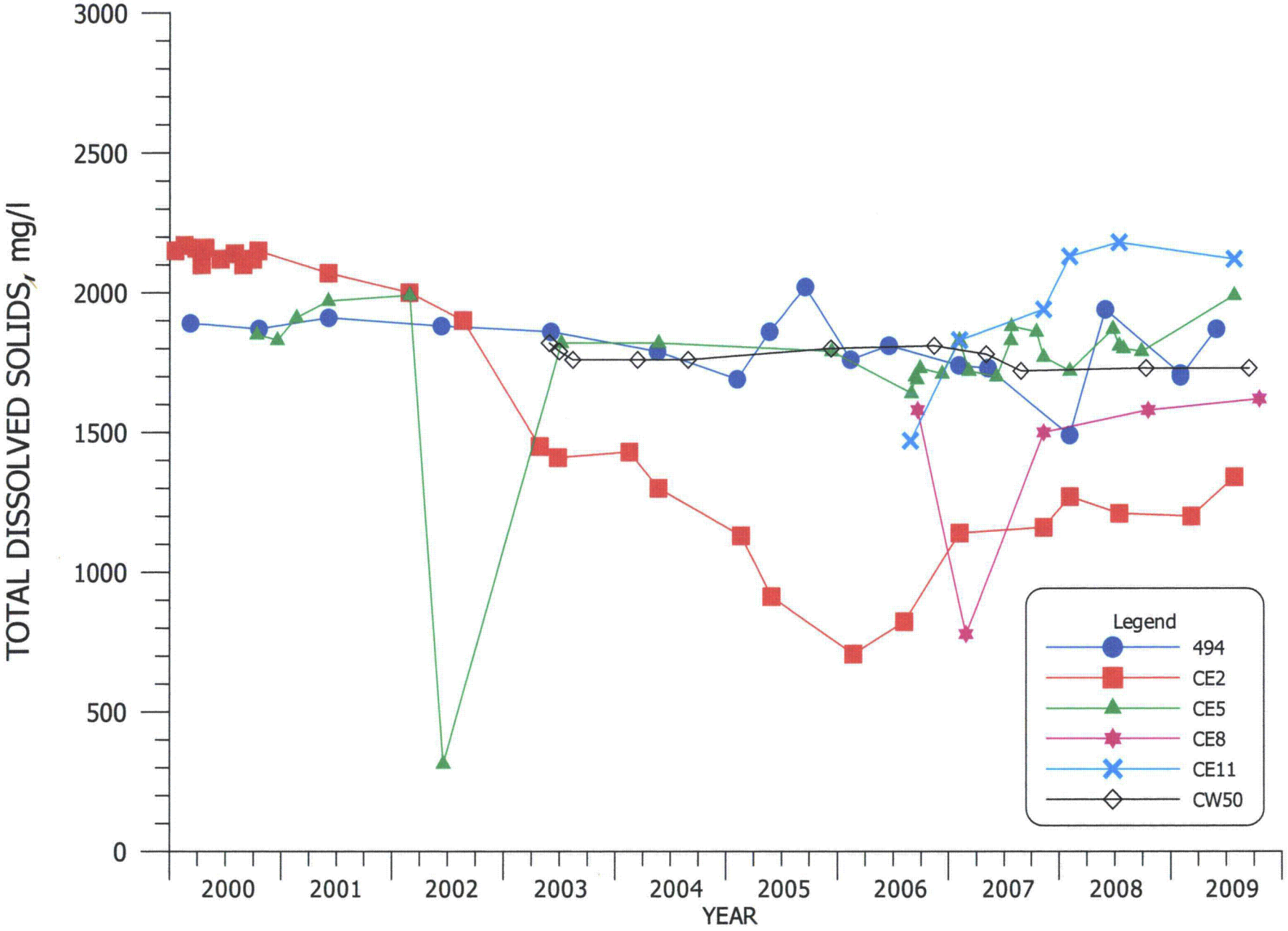

FIGURE 5.3-6. TDS CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE5, CE8, CE11 AND CW50.

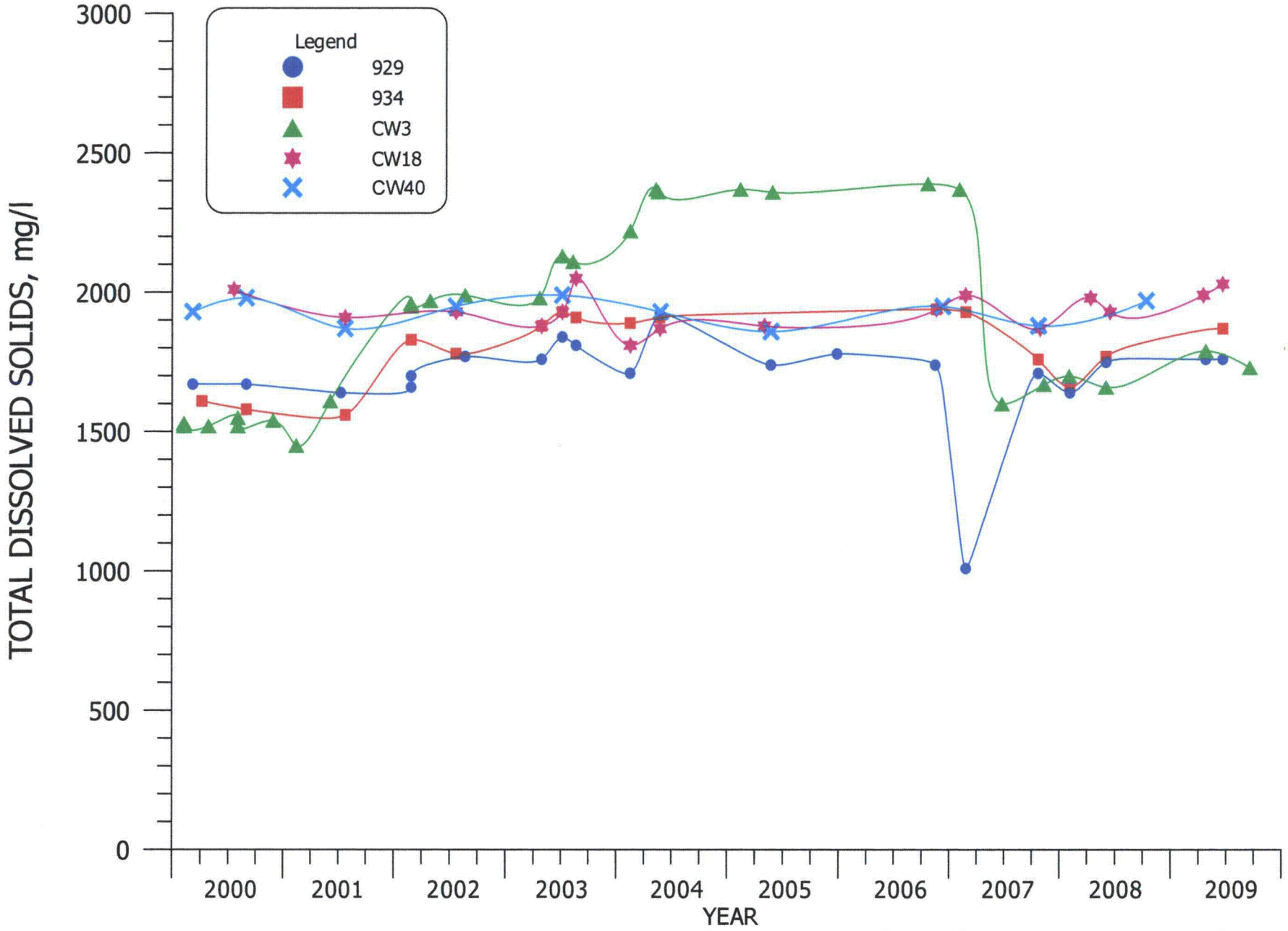

FIGURE 5.3-7. TDS CONCENTRATIONS FOR NON-MIXING ZONE WELLS 929, 934, CW3, CW18 AND CW40.

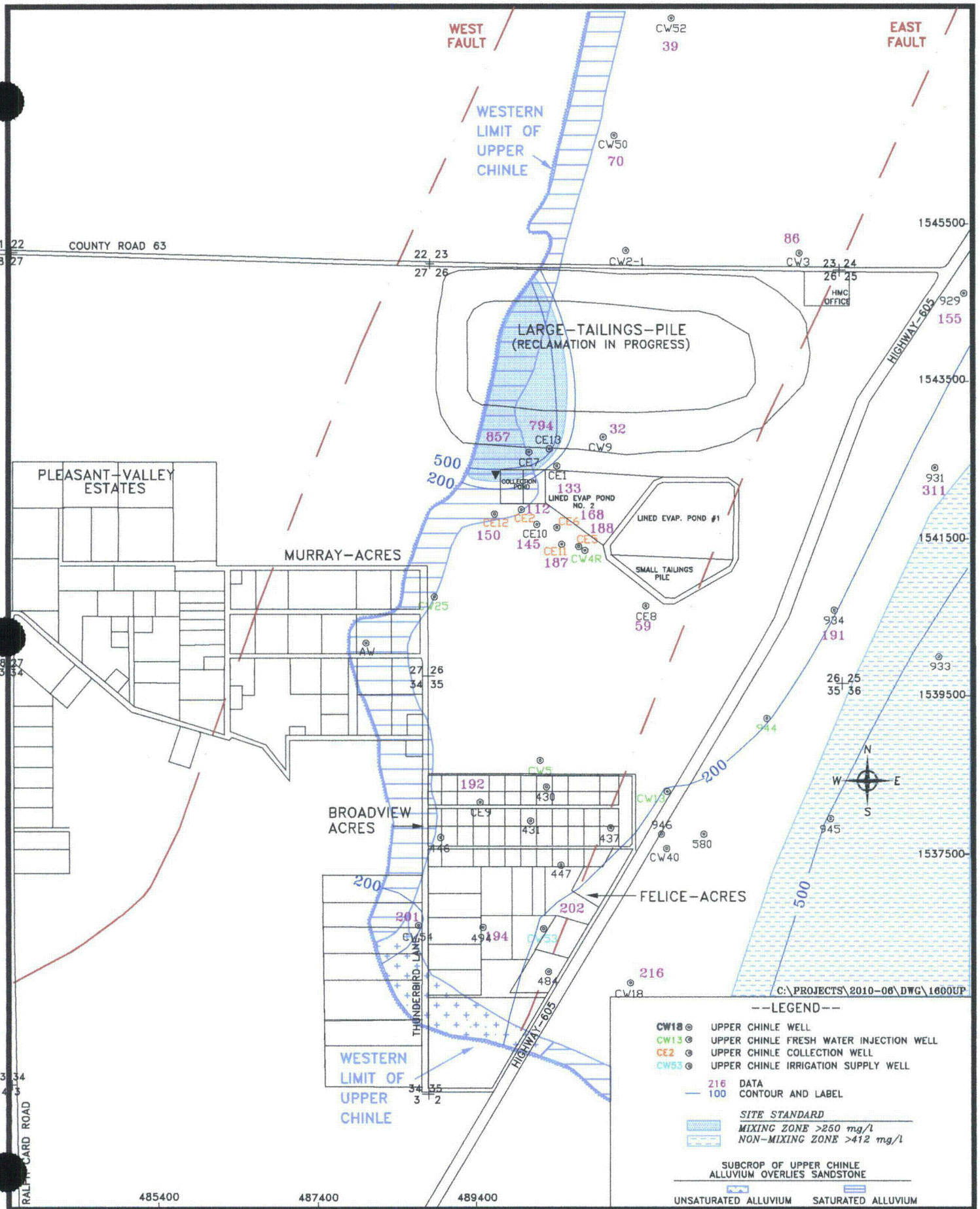

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FIGURE 5.3-8. CHLORIDE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

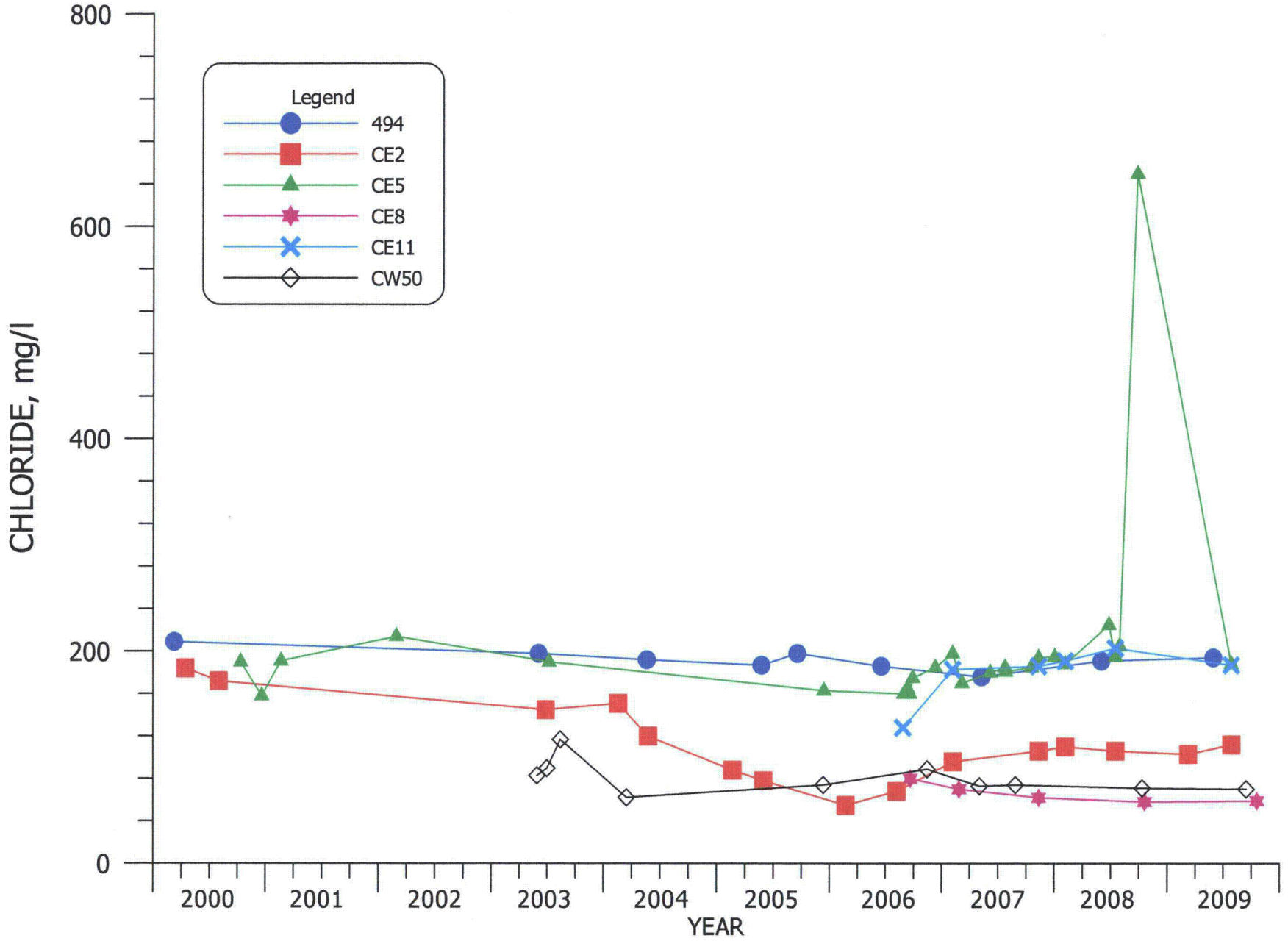

FIGURE 5.3-9. CHLORIDE CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE5, CE8, CE11 AND CW50.

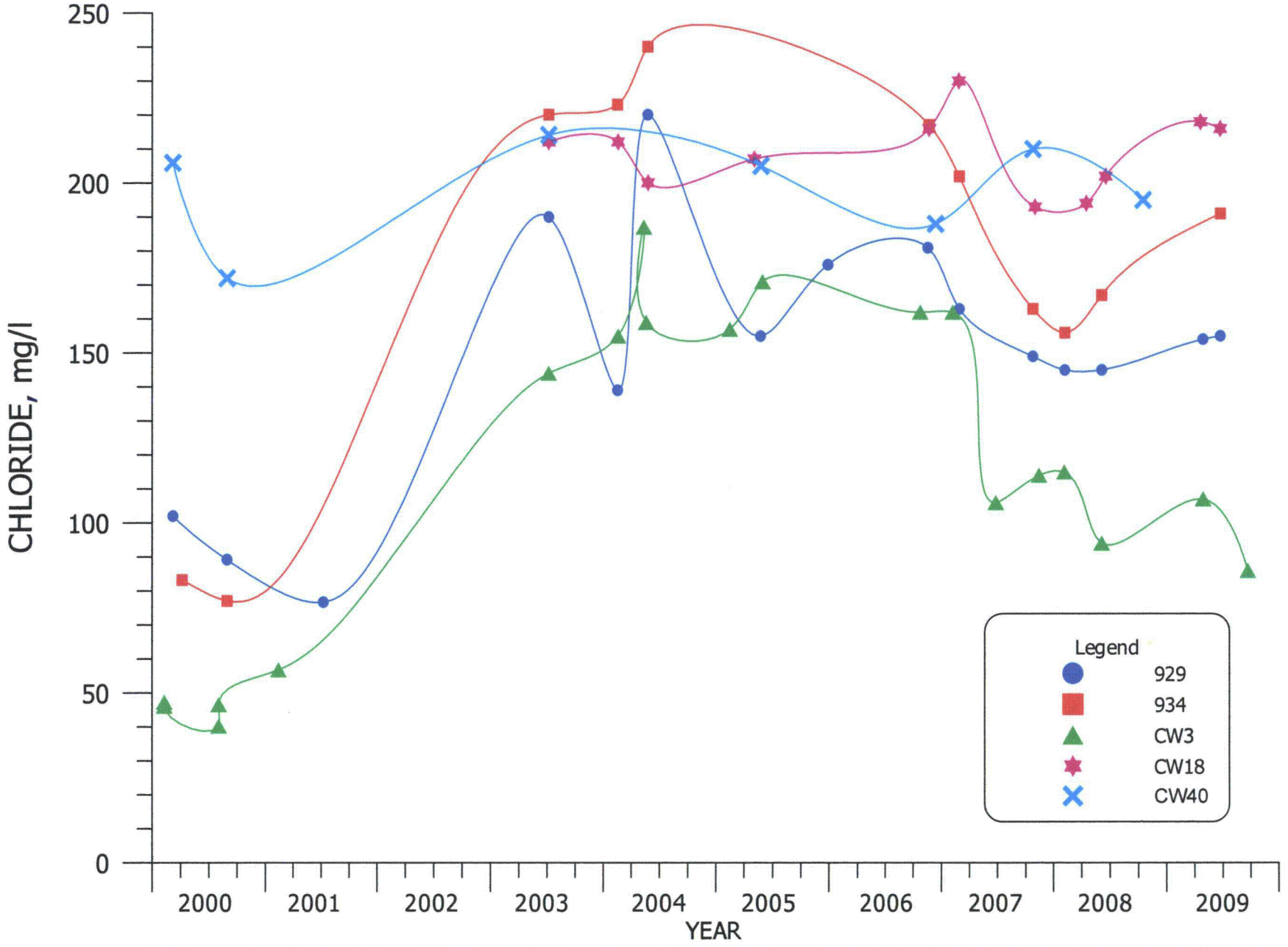

FIGURE 5.3-10. CHLORIDE CONCENTRATIONS FOR NON-MIXING ZONE WELLS 929, 934, CW3, CW18 AND CW40.

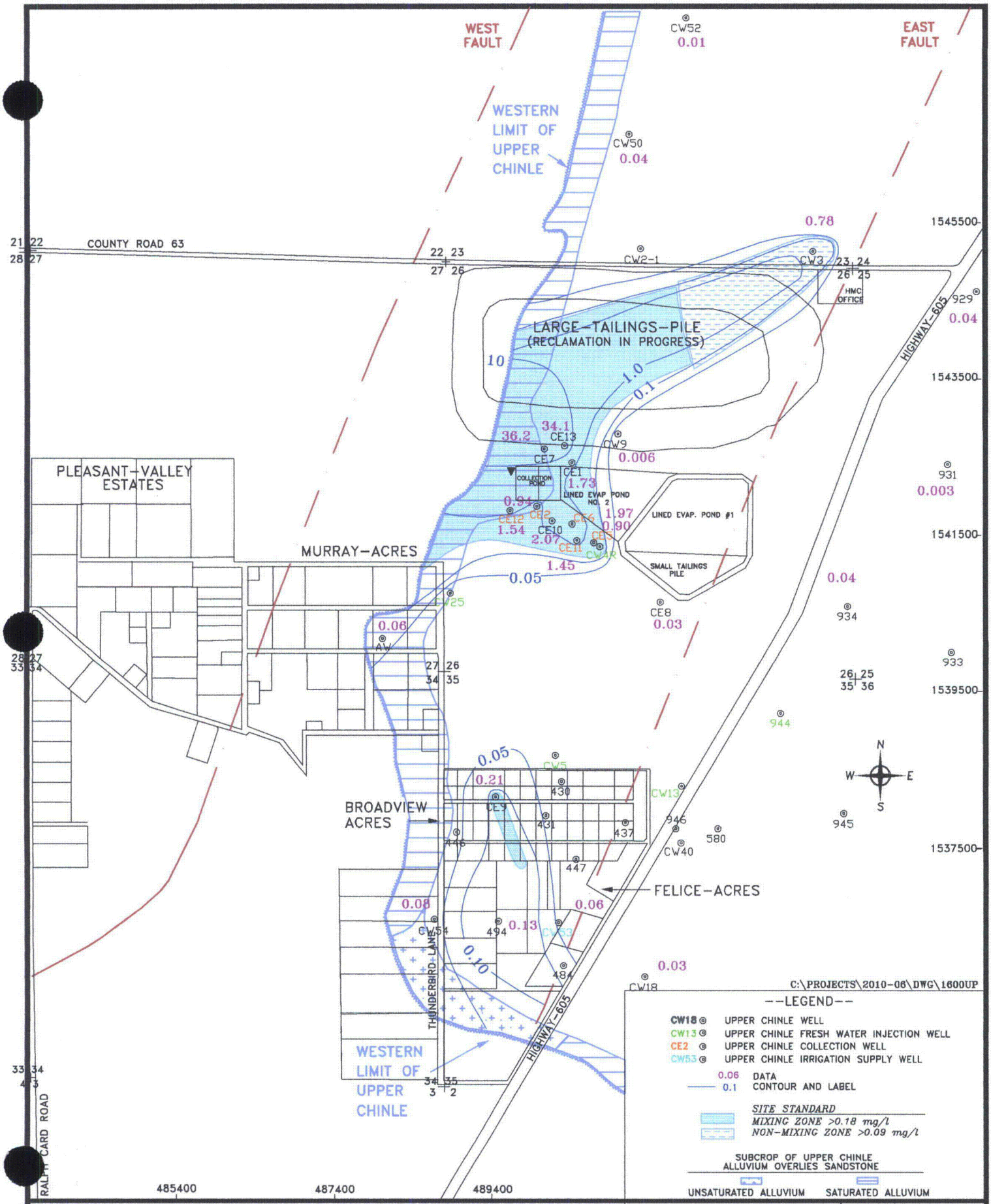

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FIGURE 5.3-11. URANIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

PAGE: 5.3-18

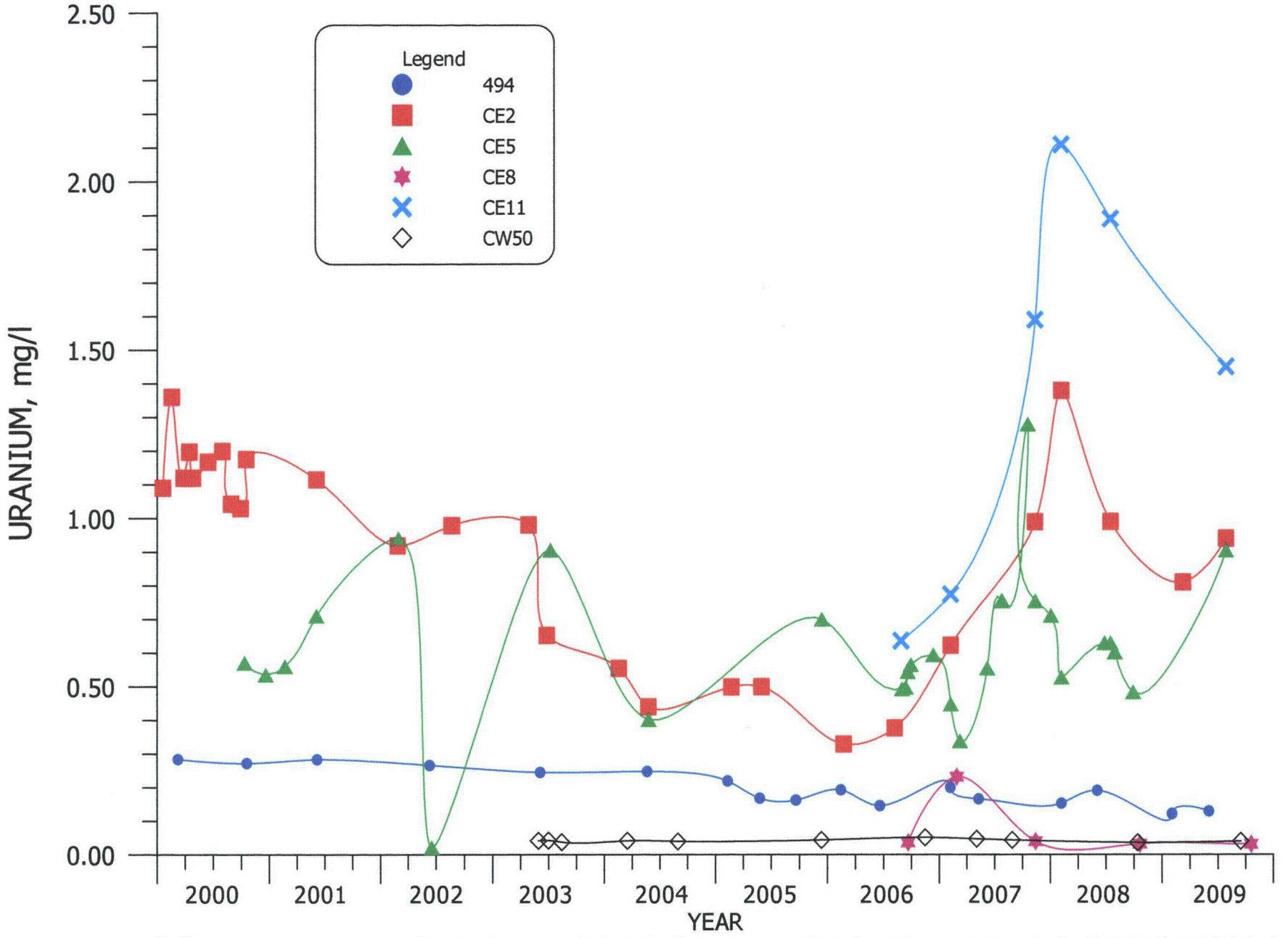

FIGURE 5.3-12. URANIUM CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE5, CE8, CE11 AND CW50.

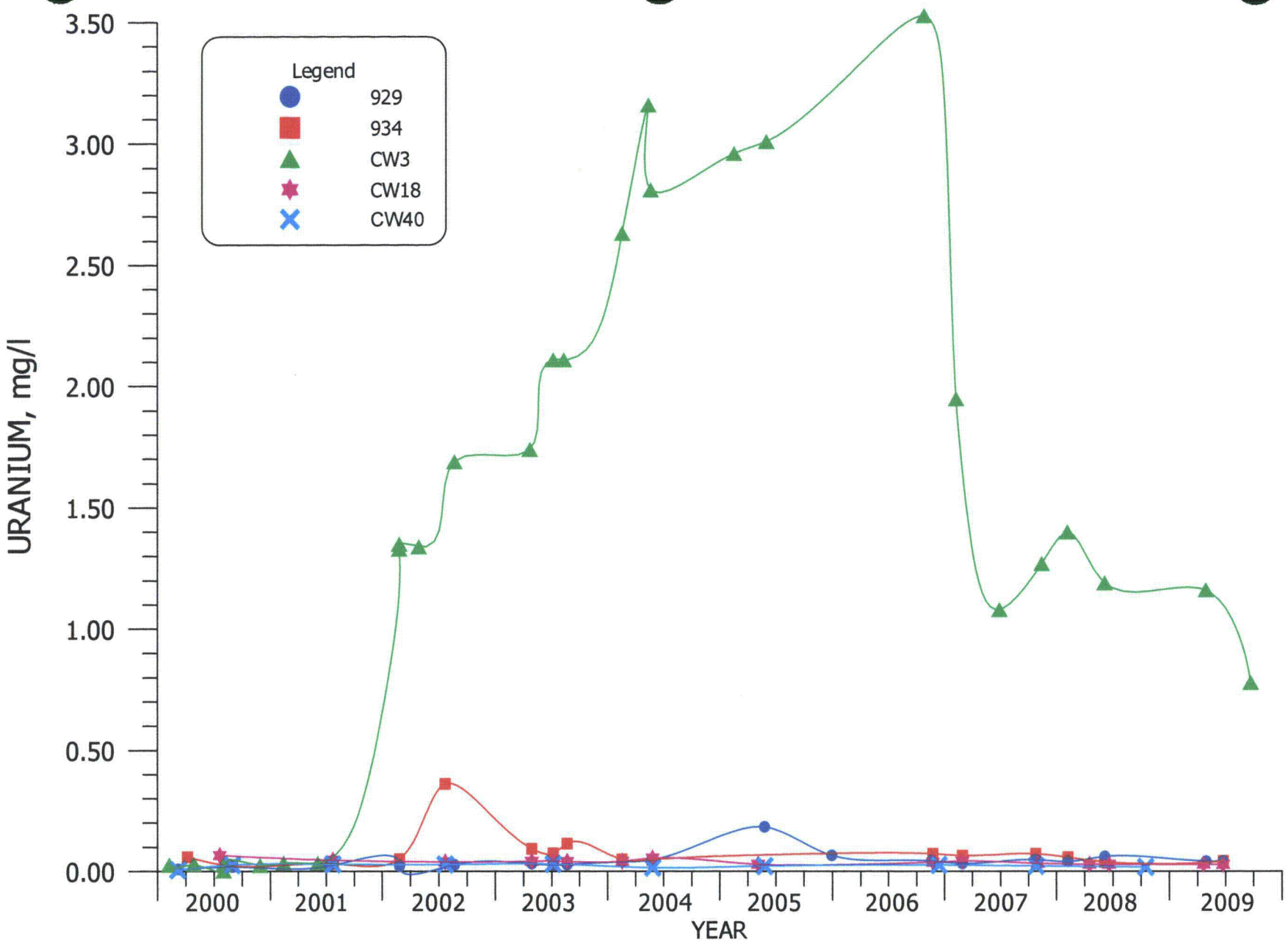

FIGURE 5.3-13. URANIUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS 929, 934, CW3, CW18 AND CW40.

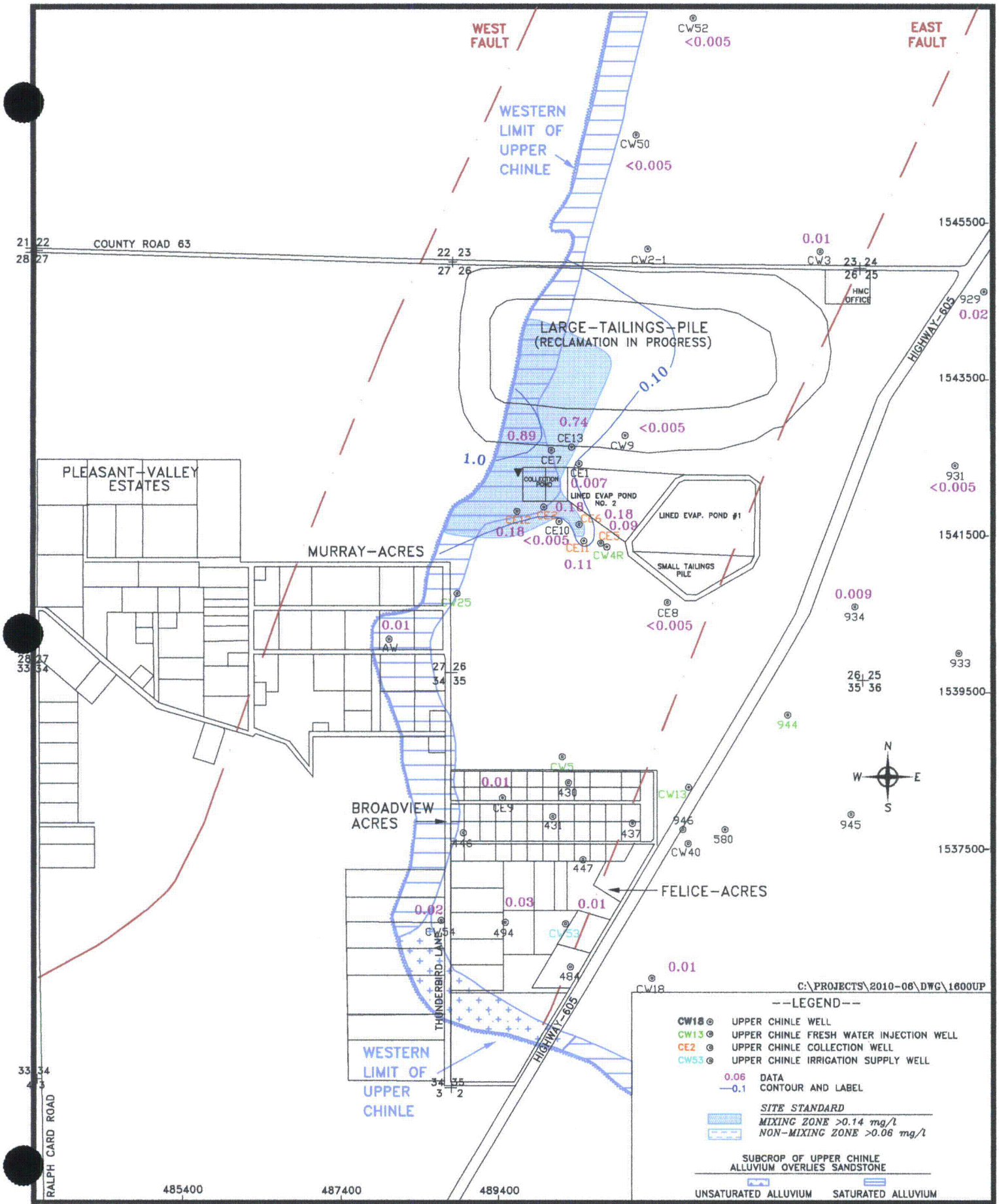

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FIGURE 5.3-14. SELENIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

PAGE: 5.3-21

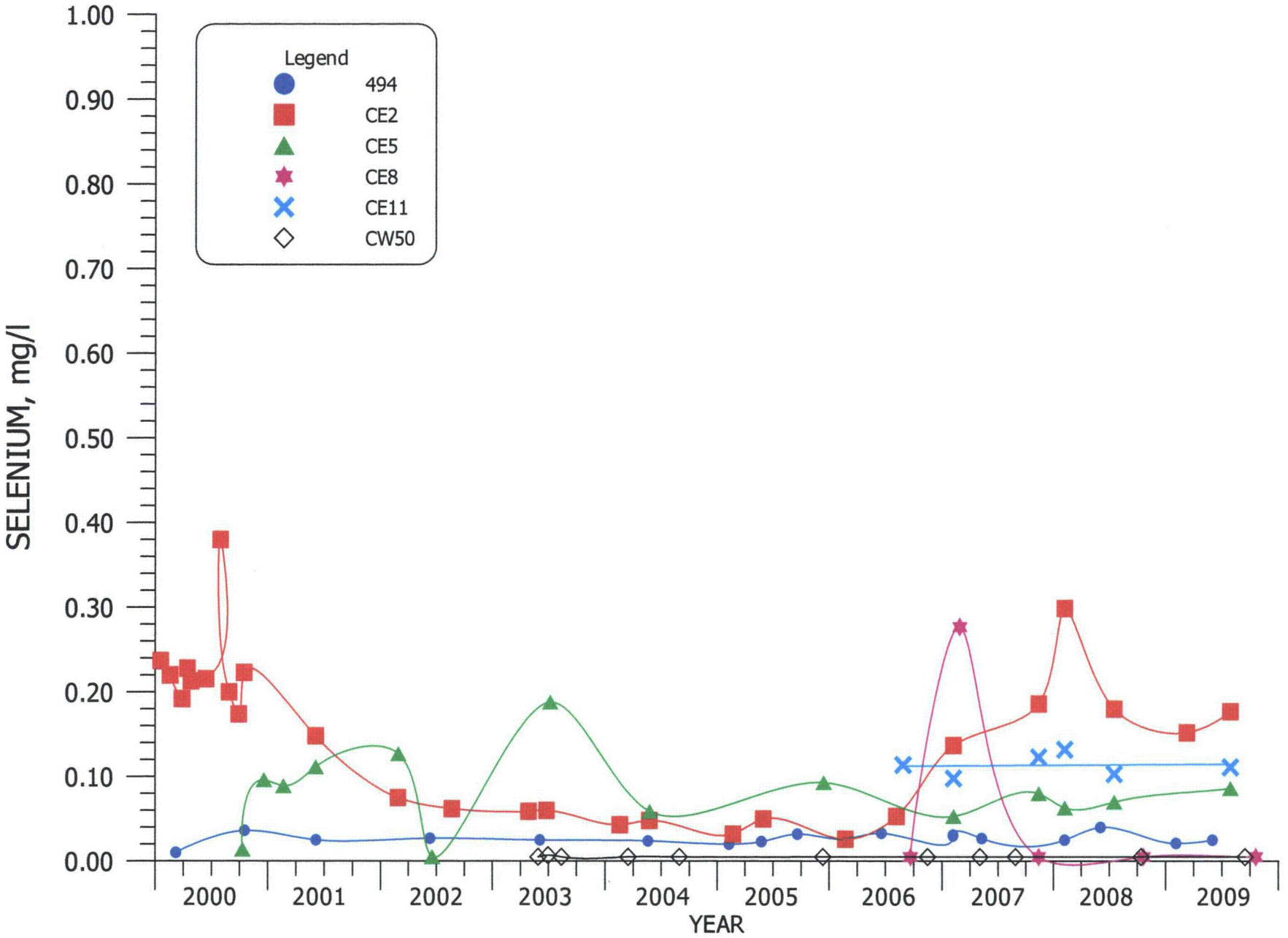


FIGURE 5.3-15. SELENIUM CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE5, CE8, CE11 AND CW50.

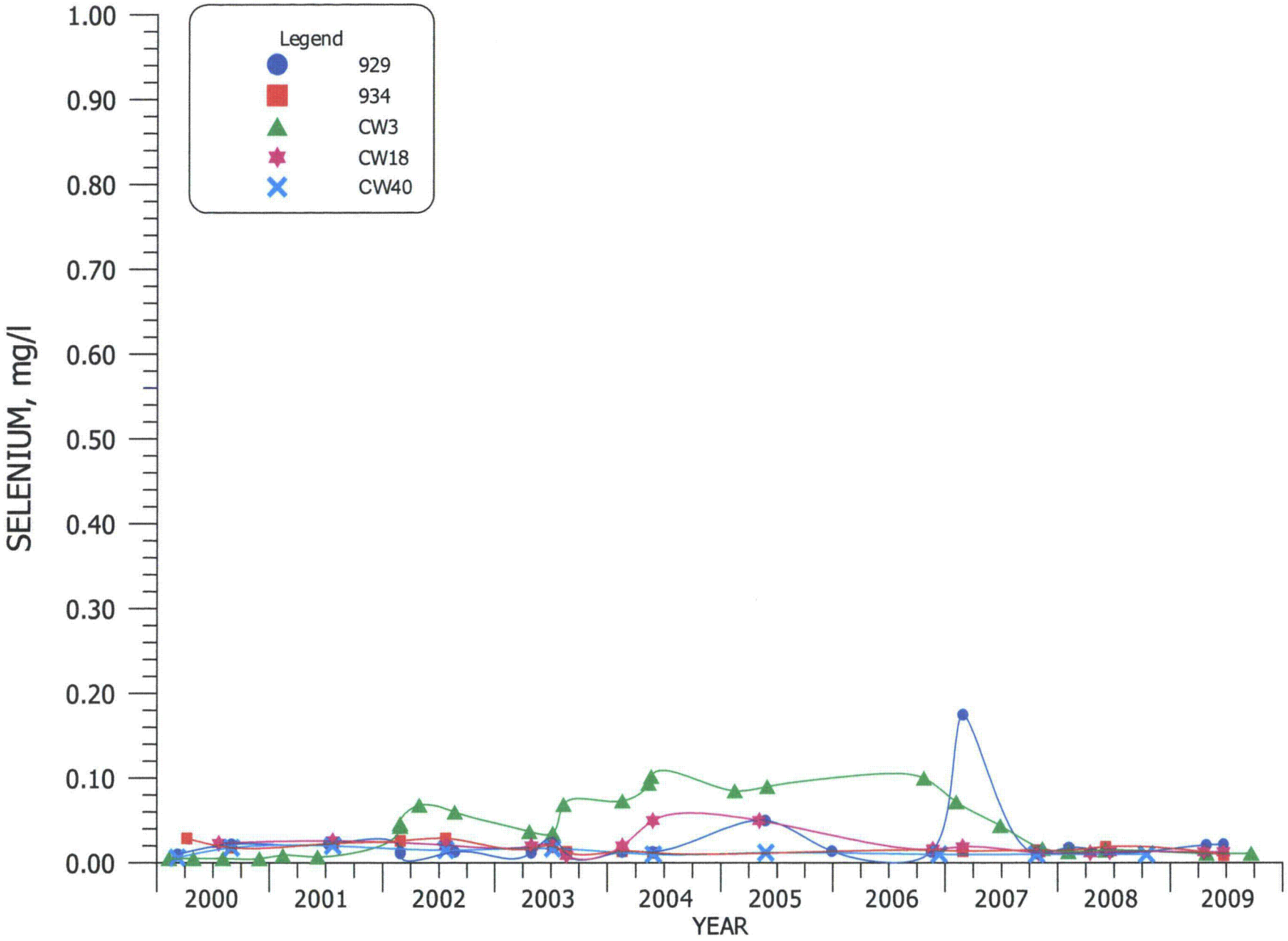
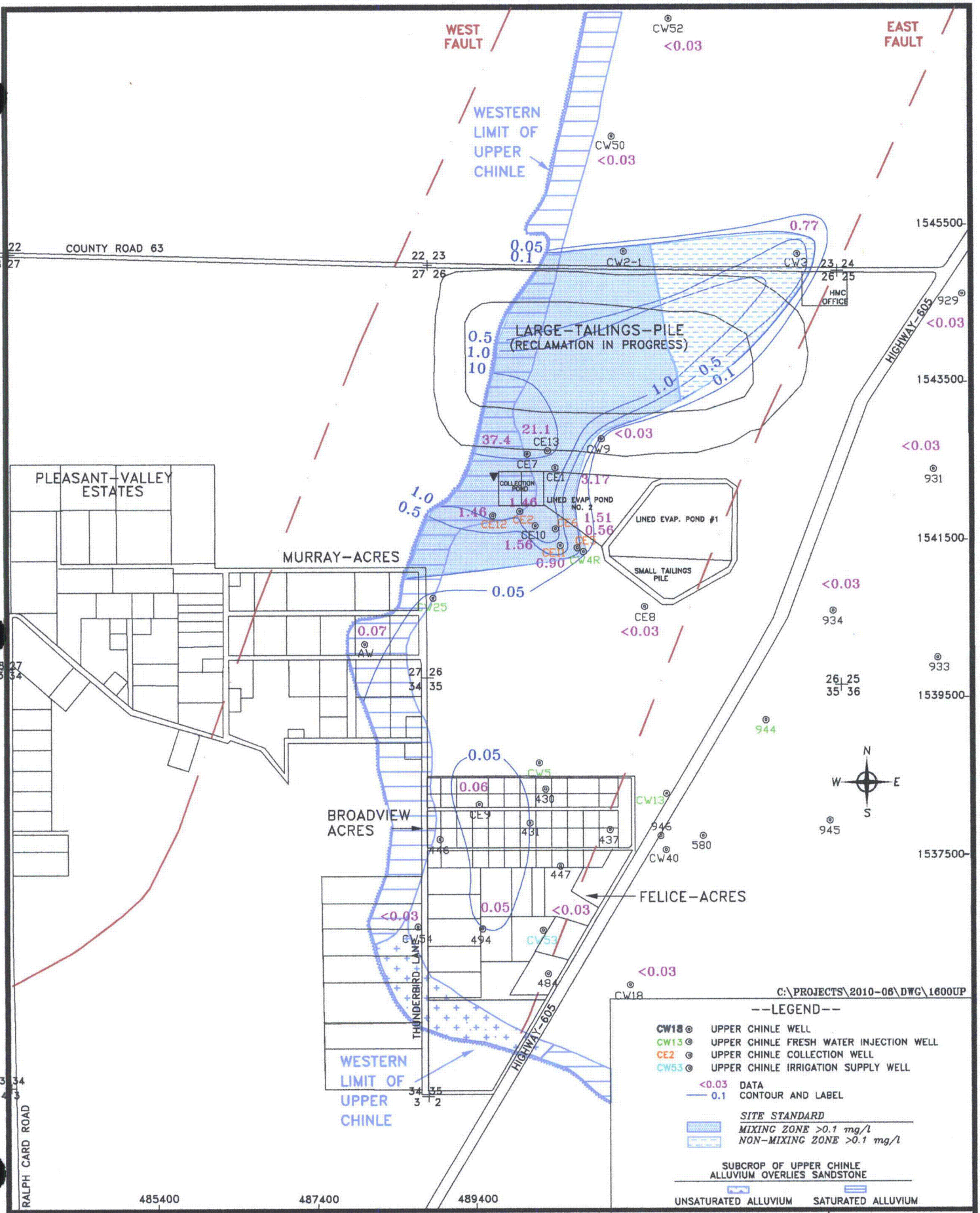


FIGURE 5.3-16. SELENIUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS 929, 934, CW3, CW18 AND CW40.



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/27/10

FIGURE 5.3-17. MOLYBDENUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

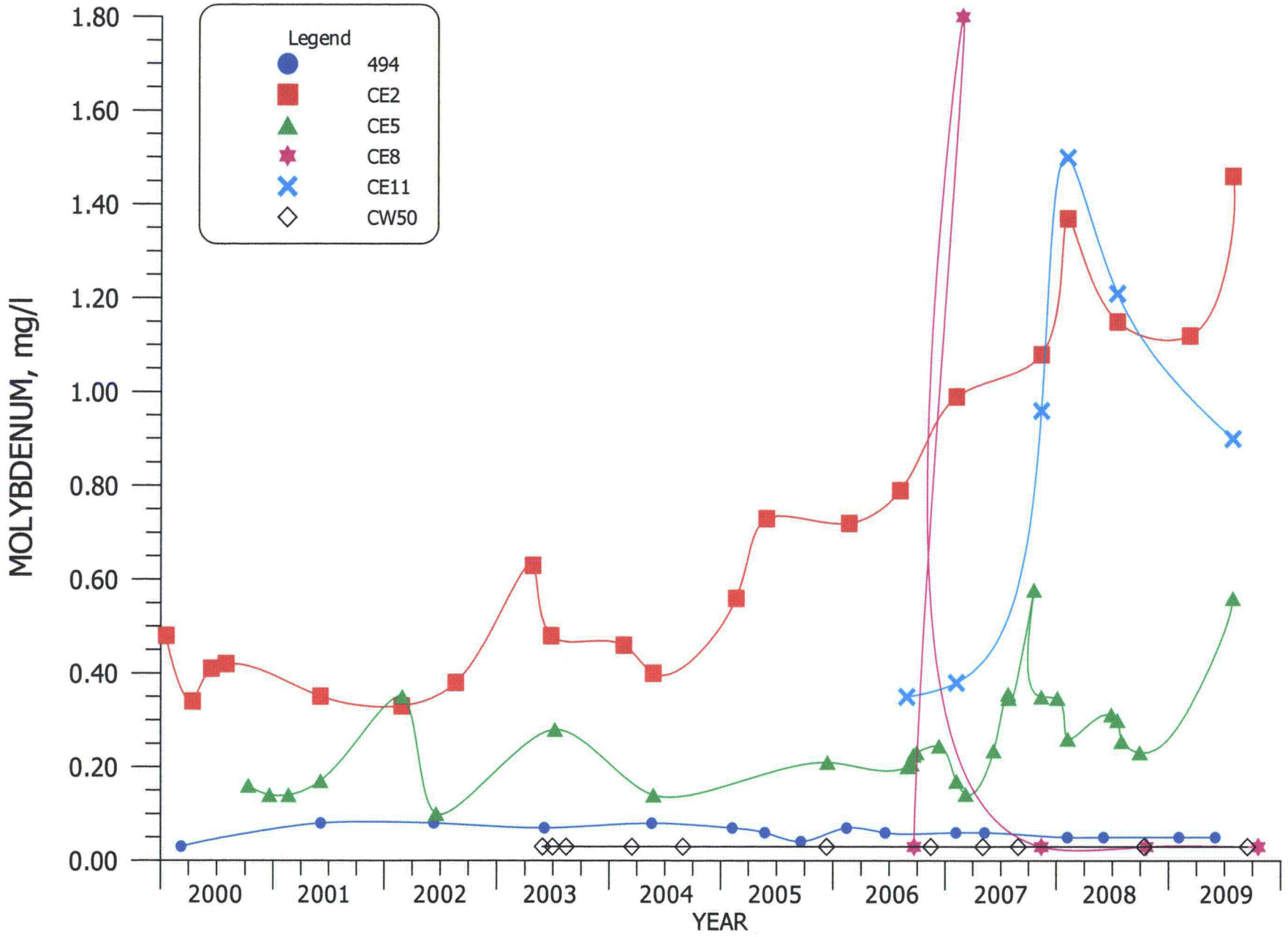


FIGURE 5.3-18. MOLYBDENUM CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE5, CE8, CE11 AND CW50.

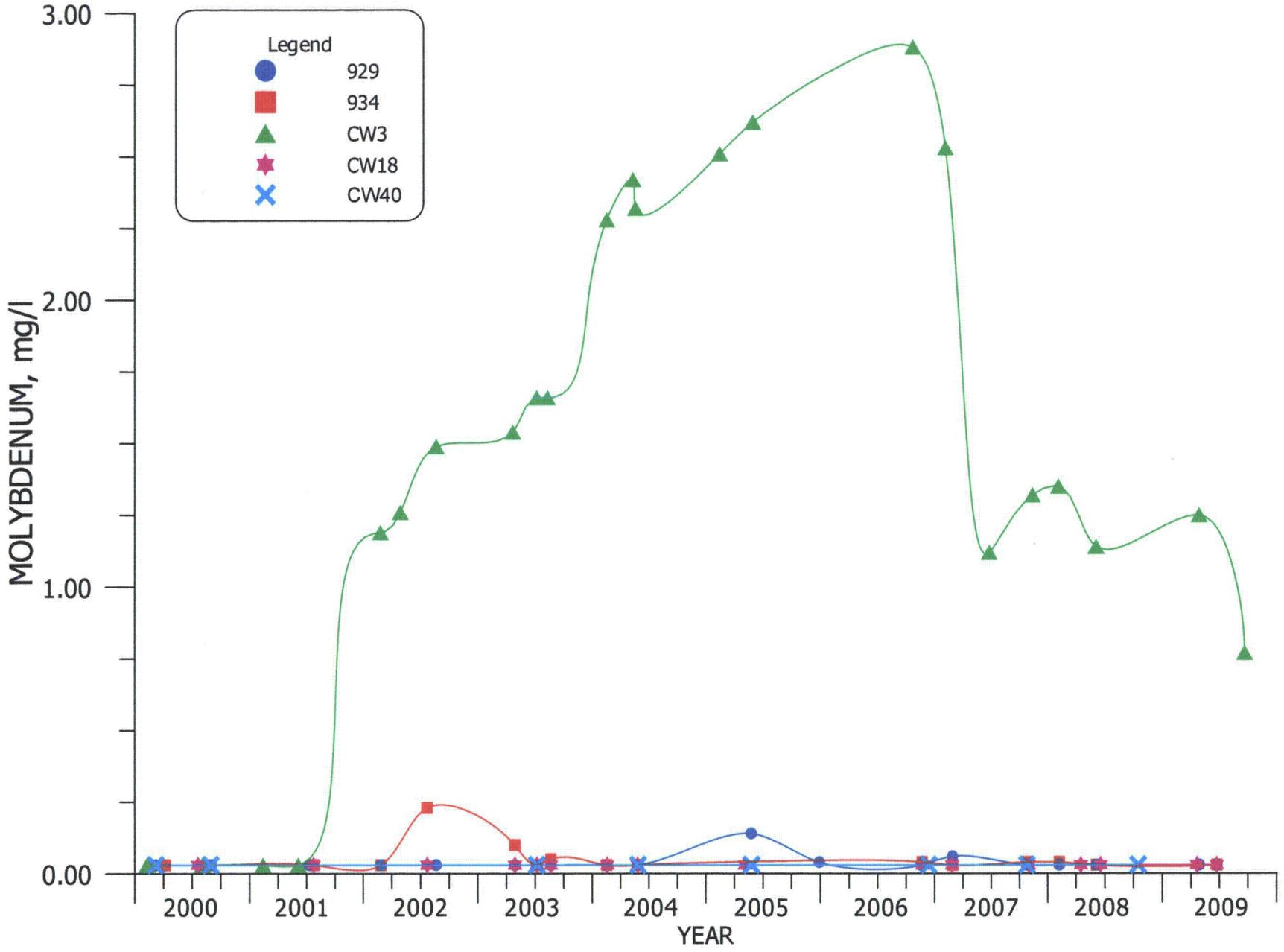
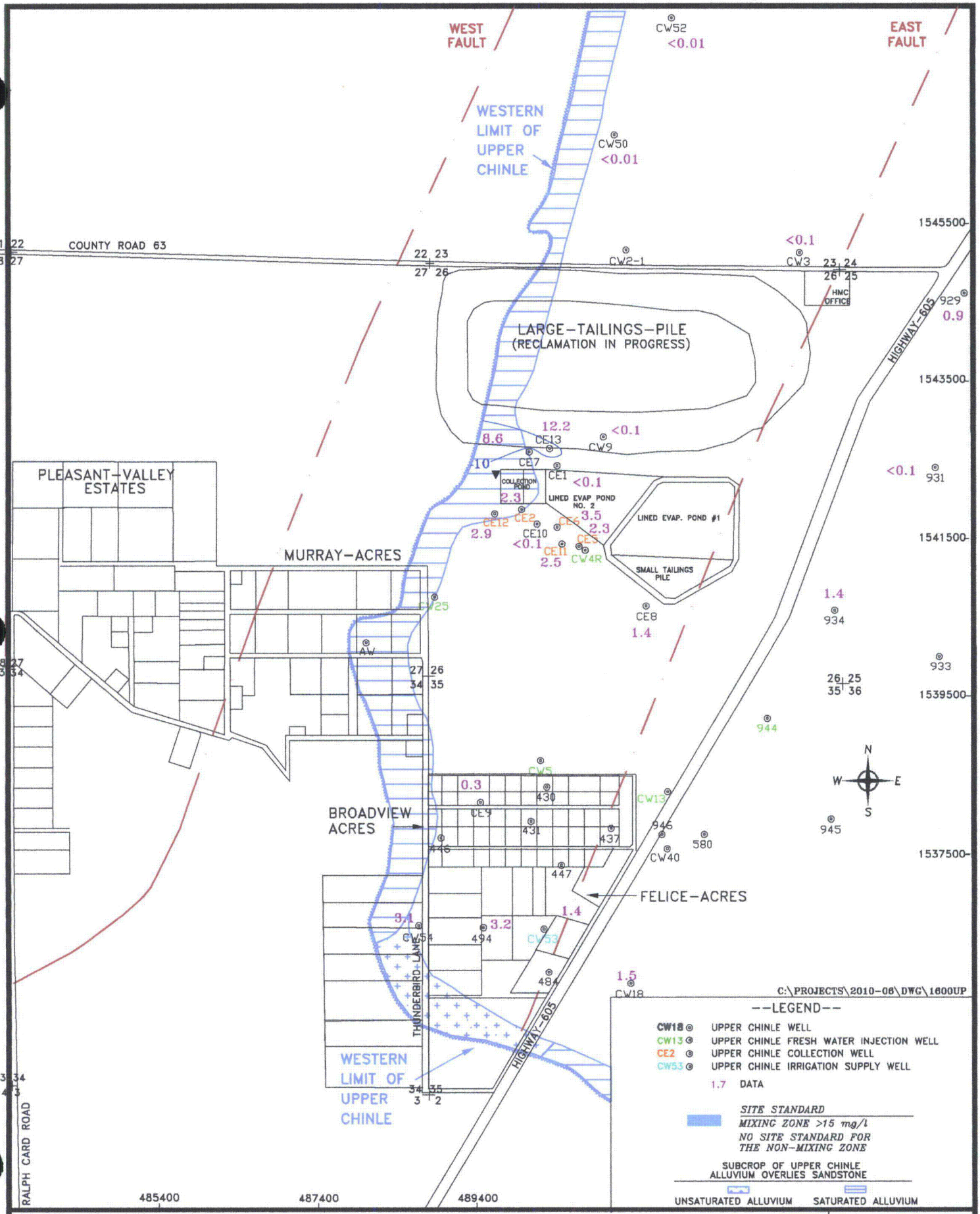


FIGURE 5.3-19. MOLYBDENUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS 929, 934, CW3, CW18 AND CW40.



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/27/10

FIGURE 5.3-20. NITRATE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

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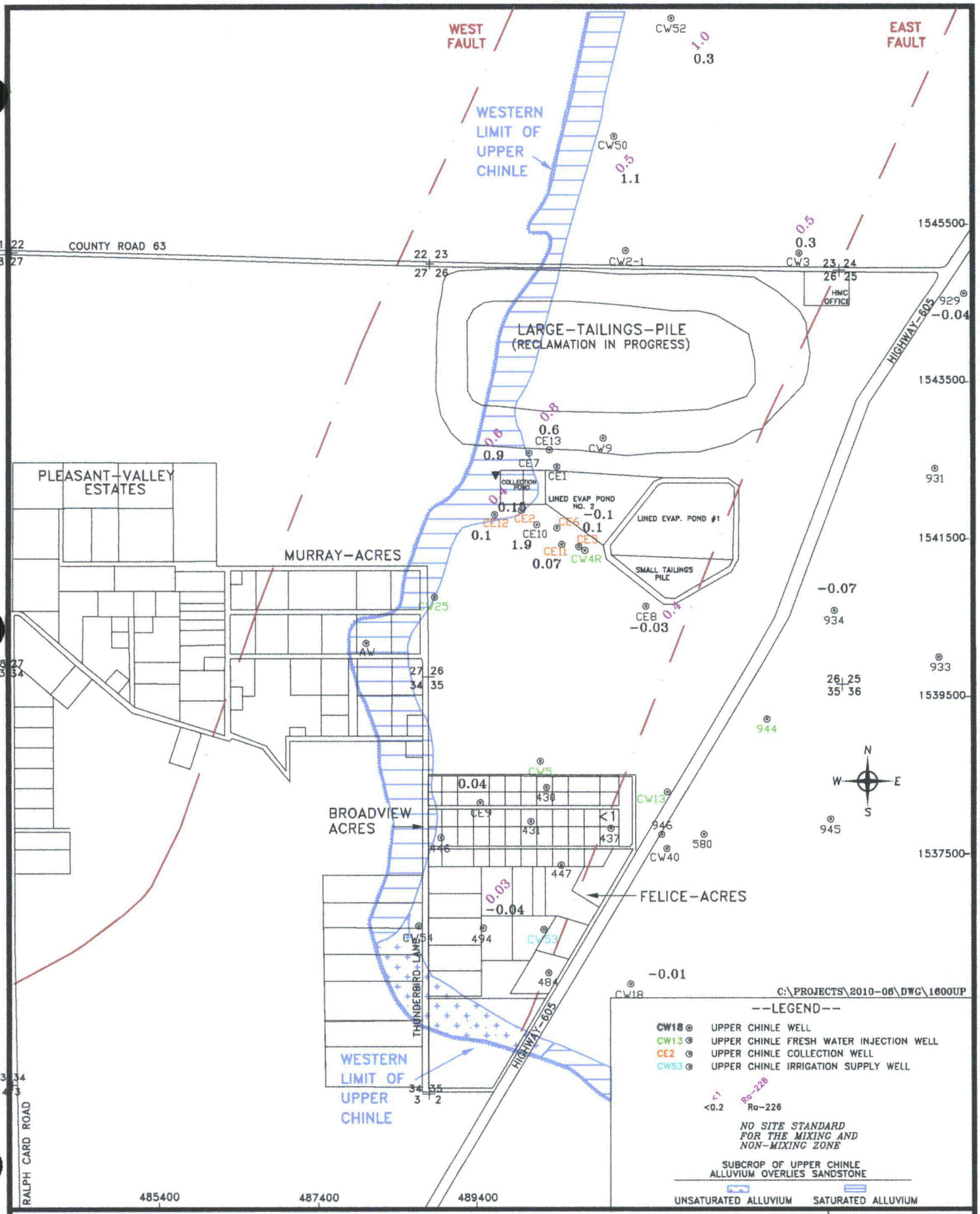

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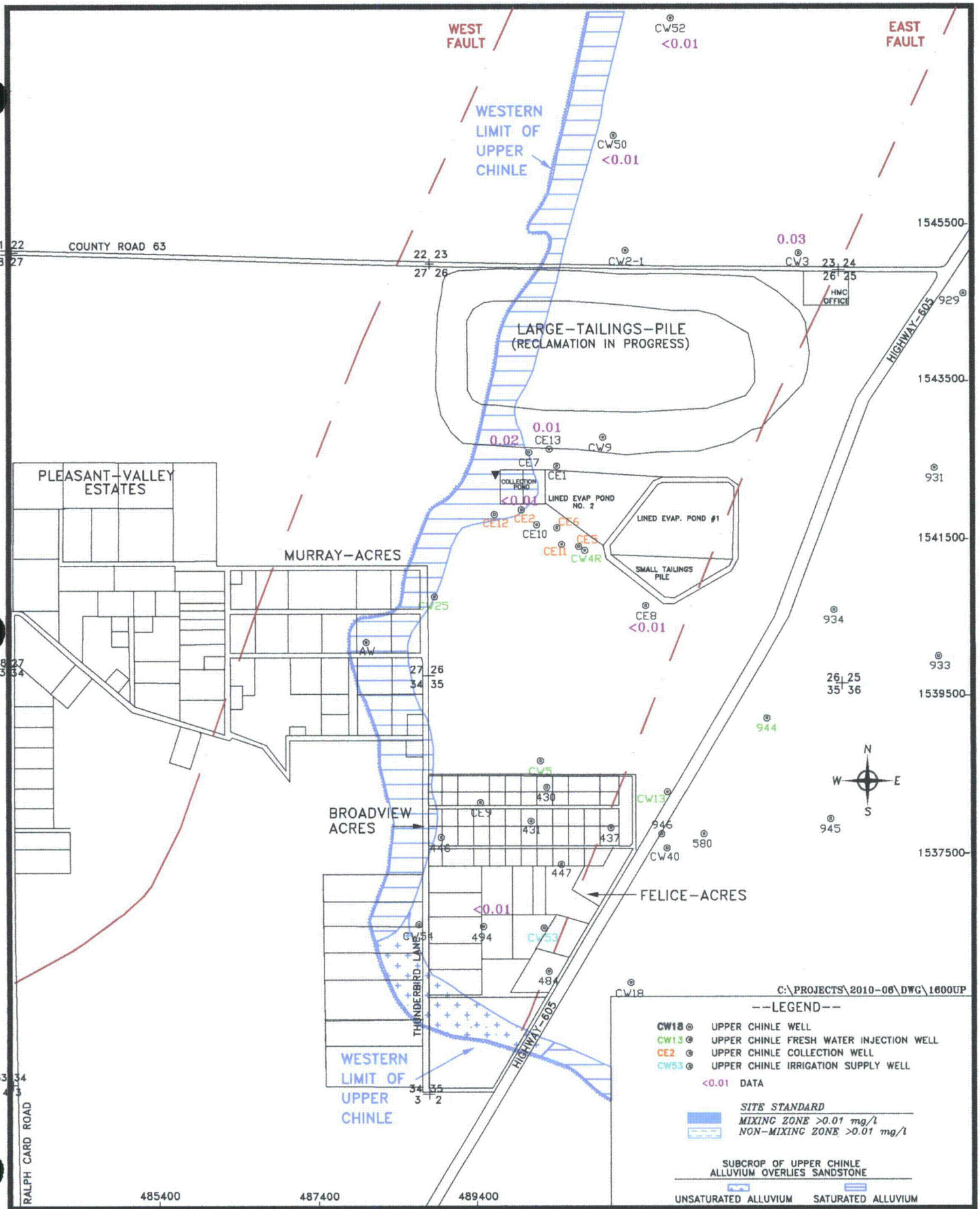
DATE: 1/27/10

FIGURE 5.3-21. RADIUM-226 AND RADIUM-228 CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, pCi/l

SCALE: 1"=650'

PAGE: 5.3-28



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/27/10

FIGURE 5.3-22. VANADIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, mg/l

SCALE: 1"=650'

PAGE: 5.3-29

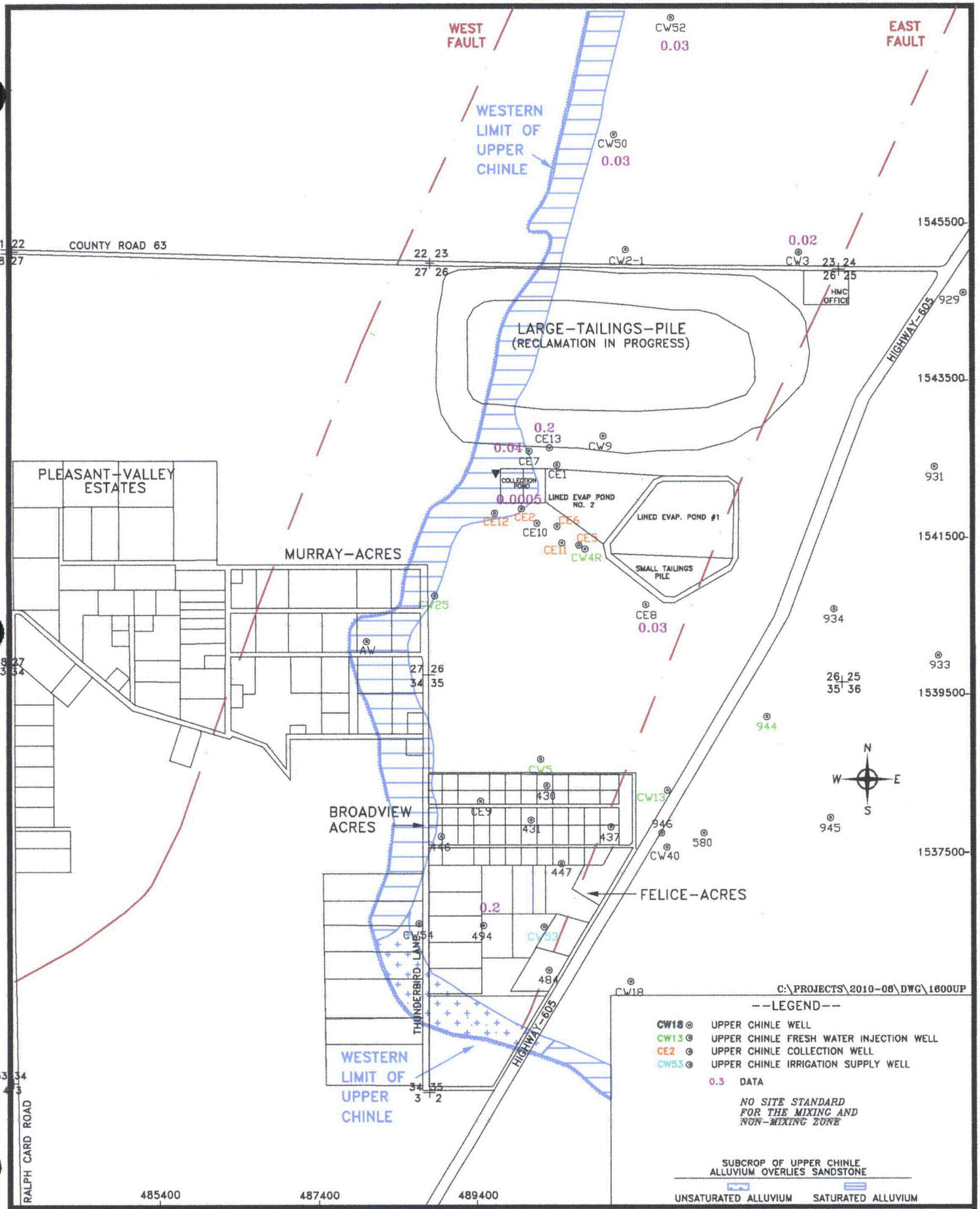


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FIGURE 5.3-23. THORIUM-230 CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2009, pCi/l | SCALE: 1"=650'

PAGE: 5.3-30