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ENVIRONMENTAL SCIENTISTS AND ENGINEERS

SANTA FE COUNTY WATER RESOURCE INVENTORY

VOLUME 2: APPENDICES

Prepared for
Santa Fe County Land Use and Planning Department
Santa Fe, New Mexico

July 13, 1994

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APPENDIX A

HYDROLOGIC CONCEPTS OF WATER SUPPLY DEVELOPMENT

HYDROLOGIC CONCEPTS OF WATER SUPPLY DEVELOPMENT

Provided here is a brief review of some of the important hydrogeologic concepts that control the efficient use of ground water. First, some basic terminology is presented and then the way a ground-water basin behaves when it is subjected to pumping is explained. The following discussion is intended primarily as a basic review; for additional information for the non-hydrologist, the primer by Heath (1983) is highly recommended.

A.1 Aquifer Characteristics

An aquifer is a subsurface geologic unit that yields significant quantities of water to wells. The determination of what constitutes "significant" is determined by the user or the regulator. One geologic unit could be considered an aquifer suitable for furnishing sufficient quantities for domestic use, while this same unit may not be an aquifer to a golf course operator if it cannot produce enough water for high capacity irrigation wells.

There are two basic types of aquifers: unconfined and confined. In an unconfined aquifer the top of the aquifer is the water table, and the water obtained from aquifer storage is derived from dewatering the pore space. Thus, the amount of stored available water is roughly equivalent to the aquifer's effective porosity; in other words, the storage in an unconfined (water table) aquifer is the amount of water that would freely drain from a representative volume of aquifer material as the water level is lowered. In almost all cases, an unconfined aquifer occurs above a confined aquifer if both are present at the same location within a basin. When an unconfined aquifer is pumped, a cone of depression of the water table is created surrounding the well. As pumping continues, water drains from the pores, the water table declines, the cone of depression expands, and the aquifer is dewatered.

A perched aquifer is a special type of unconfined aquifer. A perched aquifer is always underlain by a lower-permeability layer, has limited areal extent, and is separated from the underlying regional aquifer by an unsaturated zone.

In a confined aquifer, the top of the aquifer is bounded by a low-permeability layer (e.g., clay). Consequently, the water in the aquifer is under pressure so that when a well penetrates the top of the aquifer, the water level rises above it. If water from a well that penetrates a confined aquifer reaches the land surface and spills over the top of the well casing, the well is called a flowing artesian well. In thick alluvial basins, clay layers often form the confining beds of confined aquifers, and there can be multiple such aquifers within a basin. Wells pumping from confined aquifers derive water from storage by causing a compression of the aquifer pore space and to a lesser extent by inducing the water to expand due to the lowering of fluid pressure surrounding the pumped well. Clay lenses and layers within pumped aquifer systems can also contribute significant quantities of water to wells when they are slowly compressed as the fluid pressure decreases. In fact, it is the consolidation of these clay zones which can cause land subsidence.

Pumping confined aquifers creates a cone of depression in the fluid pressure field, rather than a dewatering of the pore space as in the unconfined aquifer. Given the same pumping rate, the cone of depression in a confined aquifer spreads much faster (it behaves as a pressure wave) and covers a much larger area than in an unconfined aquifer. The reason for this difference is that the amount of elastic storage in a volume of a confined aquifer is roughly 100 to 1000 times smaller than that of a typical unconfined aquifer. If a confined aquifer is pumped hard enough, it may eventually lose all confining pressure and behave as an unconfined aquifer.

In any aquifer, two important hydrogeologic properties affect the drawdown caused by pumping (i.e., the nature of the cone of depression). The most important of these is the transmissivity of the aquifer. Transmissivity is the product of the hydraulic conductivity (permeability) and the saturated thickness of the aquifer. Examples of aquifers having high transmissivity would include thick deposits of coarse sand and gravel as well as highly fractured bedrock or karstic limestone.

The transmissivity strongly controls the quantity of flow through an aquifer and the quantity of water that a well can produce. In highly transmissive aquifers, the cone of depression is relatively flat, and the drawdown in the aquifer near the pumped well is much less than in a low-transmissivity aquifer pumped at the same rate.

There is also an important distinction in the way transmissivity behaves in unconfined and confined aquifers. In an unconfined aquifer, transmissivity decreases as the water table and the saturated thickness decline, and for this reason, the yields of wells in thin, unconfined aquifers can decrease considerably over time. On the other hand, transmissivity is virtually constant over time in a confined aquifer.

The second important hydrogeologic property is the aquifer storage coefficient. The storage coefficient primarily affects the rate of expansion of the cone of depression. In an unconfined aquifer the storage coefficient is called the specific yield. Because unconfined aquifers have large storage coefficients, as explained above, the cones of depression grow slowly and have limited areal extent.

Basin geometry also affects the behavior of aquifer drawdown and the propagation of the cone of depression. Of greatest importance is the location of the margins of a basin with respect to the pumped well. Take for example an alluvial basin bounded by dense, unfractured, crystalline bedrock. A well pumping near the edge of the basin will create a cone of depression that expands gradually until it reaches the bedrock. The bedrock, because it is much lower in permeability and has very low storage, does not yield much water in response to the effects of the pumping. Consequently, the cone of depression cannot expand beyond the basin margin, resulting in an increase in the rate of drawdown in the pumped well and a deepening of the cone of depression in the vicinity of the basin margin. Faults within alluvial basins can also have the same effect if the faults are filled with relatively low-permeability material. These types of boundaries are referred to as no-flow, or impermeable, boundaries.

Free-water bodies within a basin or along the basin margin also comprise boundaries of an aquifer. These include major lakes and perennial streams. When the cone of depression reaches such bodies of surface water, expansion of the cone of depression in the underlying aquifer may slow or cease, because the lake or stream can furnish ample water to the pumped aquifer. With continued pumping, the cone of depression eventually stabilizes and acts as a conduit to convey water from the surface water source to the well. These types of boundaries are called constant head or recharge boundaries.

A.2 The Source of Water Derived From Wells

In 1940, C.V. Theis wrote the classic paper with the above title. The simple concepts discussed in this paper are highly relevant to the management of a ground-water basin. Unfortunately, too often his work is forgotten by those who undertake water development. The following is a summary of some of the principles set forth by Theis, who lived and did much of his work in New Mexico.

Within every ground-water basin the ground water is moving. It moves from areas of recharge, where water enters the aquifer, to areas of discharge, where water leaves an aquifer. An excellent example of such movement in Santa Fe County occurs where the regional aquifer is recharged in the Sangre de Cristo Mountains, flows westward, and discharges to the Rio Grande. Close examination of the recharge area reveals that sources of recharge include the infiltration of precipitation on fractured bedrock in the mountains, infiltration of runoff along the arroyos, seepage from lakes and ponds, and diffuse areal recharge from precipitation throughout significant parts of the basin. The sources of discharge from the aquifer include pumping by wells, evapotranspiration by phreatophytes (plants with roots that reach the water table) and other vegetation, seepage to springs or cienegas, and seepage along the banks of the Rio Grande.

Theis noted that prior to ground-water development, aquifers are in a state of what he called *dynamic equilibrium*. Theis uses this term to mean that there is on average a balance of recharge and discharge over the long term. However, while in the state of dynamic equilibrium, the water levels in the aquifer do fluctuate in response to seasonal recharge or drought. When a well begins to pump in a pristine basin, the water produced is initially derived from aquifer storage near the well bore. The cone of depression expands over time, taking more water from storage in the aquifer. The cone of depression will continue to grow until a new state of dynamic equilibrium is reached. At this time, the water table is at a depth greater than that of the pristine basin, but no more water is derived from aquifer storage to fulfill pumping requirements. If there is now an increase in the pumping, the additional pumped water must come from either an increase in the recharge to the aquifer or a decrease in the discharge from the aquifer, if the system is to return to yet another state of dynamic equilibrium.

To illustrate this concept, consider for illustrative purposes the first well producing from the aquifer between the Sangre de Cristos and the Rio Grande. The source of water was initially aquifer storage due to the dewatering of the pores in the Santa Fe Group sands. Subsequently, we hypothesize that a new state of dynamic equilibrium would probably have developed. If the well were located near the mountain front, it is possible that the pumped water could be derived in part from increased recharge captured by lowering the water table near small perennial tributary steams. As a consequence, such pumping would decrease some of the stream flow. Another source of pumped water would be a decrease in evapotranspiration by phreatophytes (e.g., cottonwood and willow trees) caused by lowering the water table below the rooting depth.

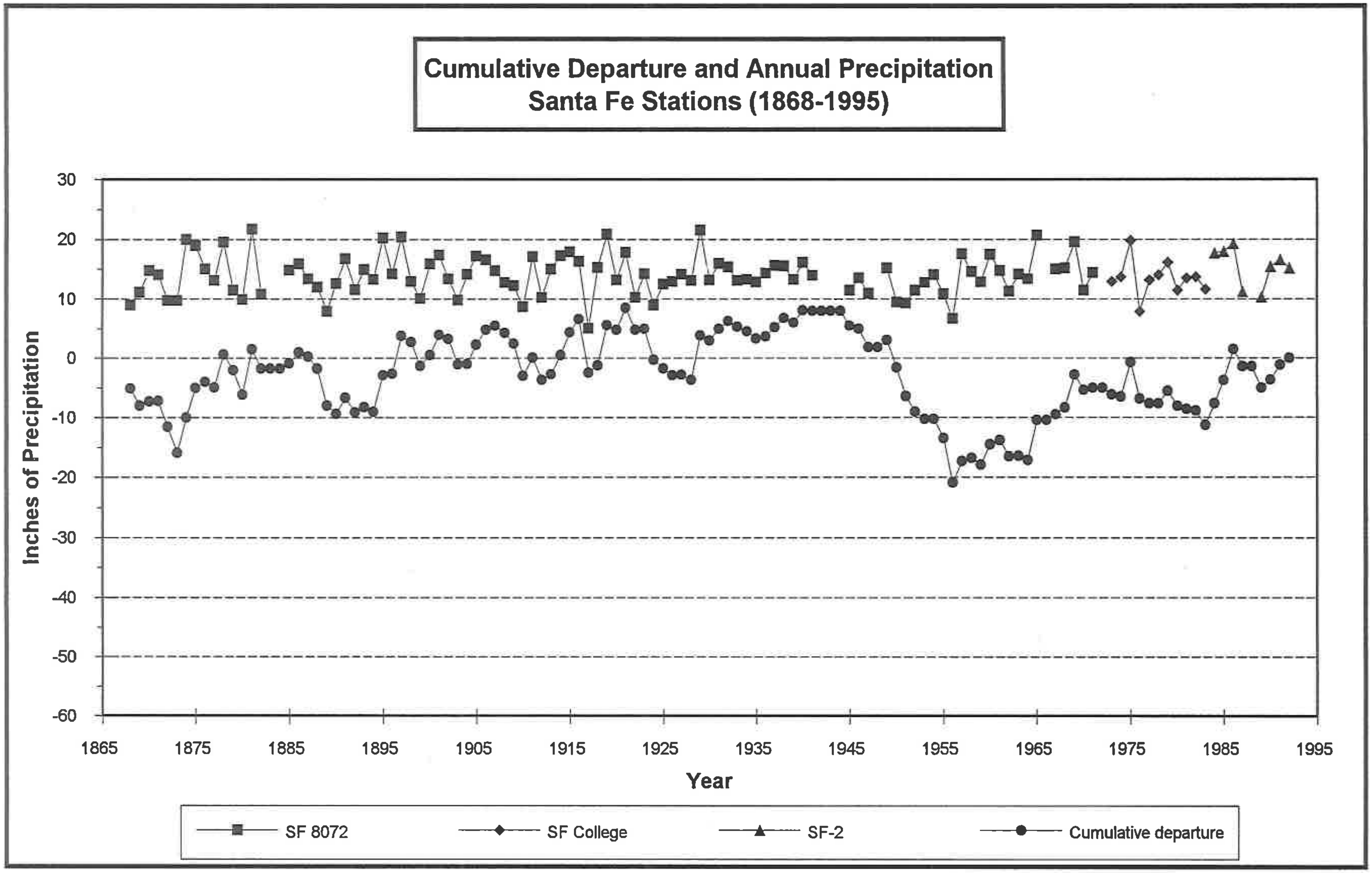
On the other hand, if the well were located near the Rio Grande, at the new equilibrium, the pumped water would be derived primarily by decreasing the aquifer discharge to the stream or by decreasing the discharge to cienegas, for example. As a result, there could be an injury to prior surface water rights. Clearly, the ground water, springs, and surface water, as well as the native vegetation, are closely linked. All water produced by wells is balanced by a loss of water from somewhere else in the basin.

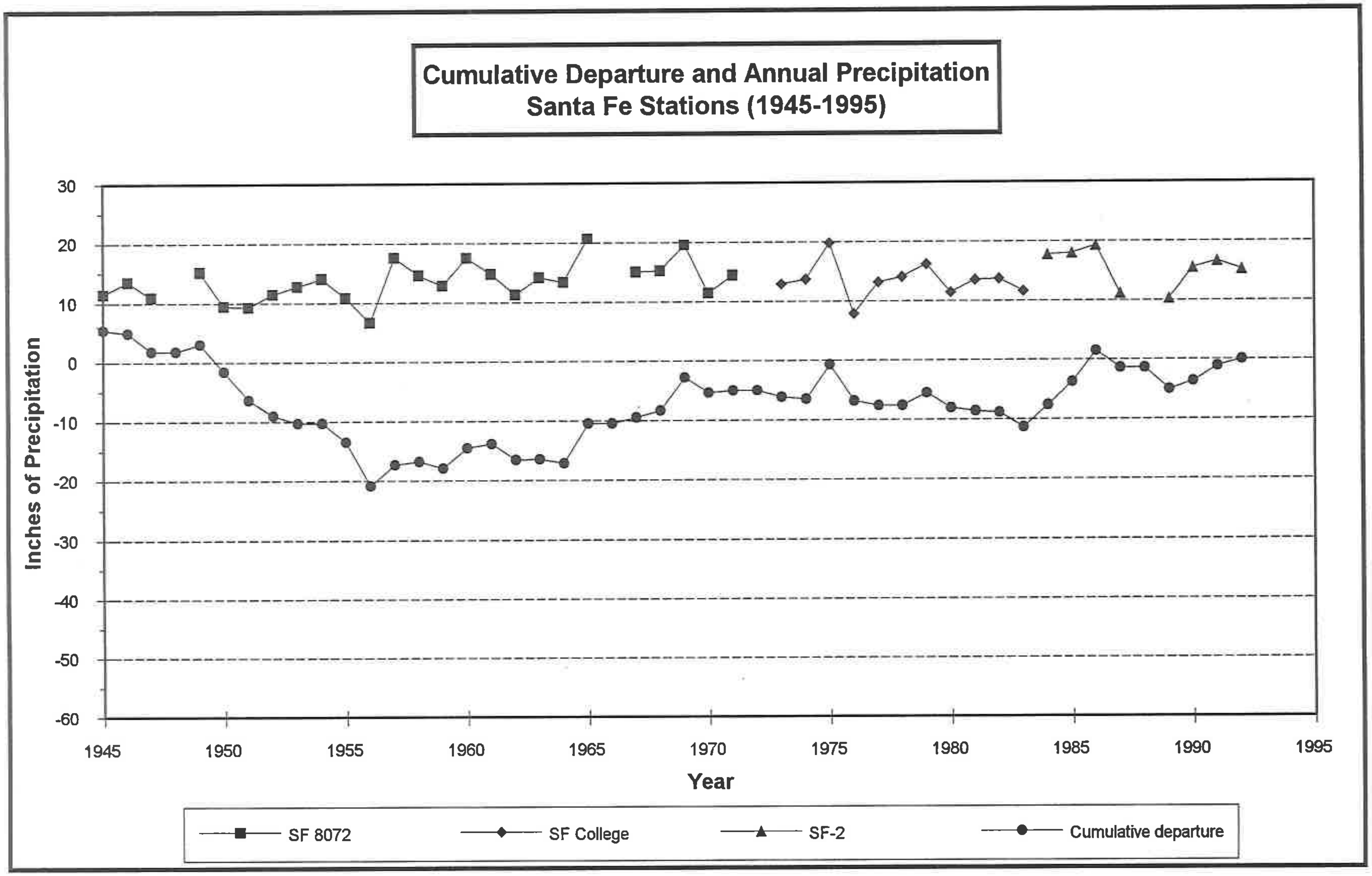
From the standpoint of developing the basin, it is essential to recognize the sources of recharge and discharge. In particular we need to know whether there exist potential sources of rejected recharge that can be salvaged, or sources of discharge that can be captured. Water levels will decline until a new dynamic equilibrium can be achieved by tapping these new sources. Such a condition is often referred to as *mining* the ground water.

As Theis (1940) described, the ideal development of the aquifer will strive to maintain a dynamic equilibrium by strategically locating the wells. He indicates that pumping wells should be located as close as economically possible to areas of rejected recharge or natural discharge where ground water is consumed by non-beneficial vegetation, or where the surface water fed by, or rejected by, the ground water cannot be used. In so doing, the lost water would be produced by the well with a minimum lowering of the water table. In areas distant from the recharge and discharge zones, the wells should be spaced as uniformly as possible throughout the area, depending of course on the geologic conditions. This practice also tends to minimize drawdown by minimizing the interference effects between nearby wells; hence the lifetime of the well field is prolonged.

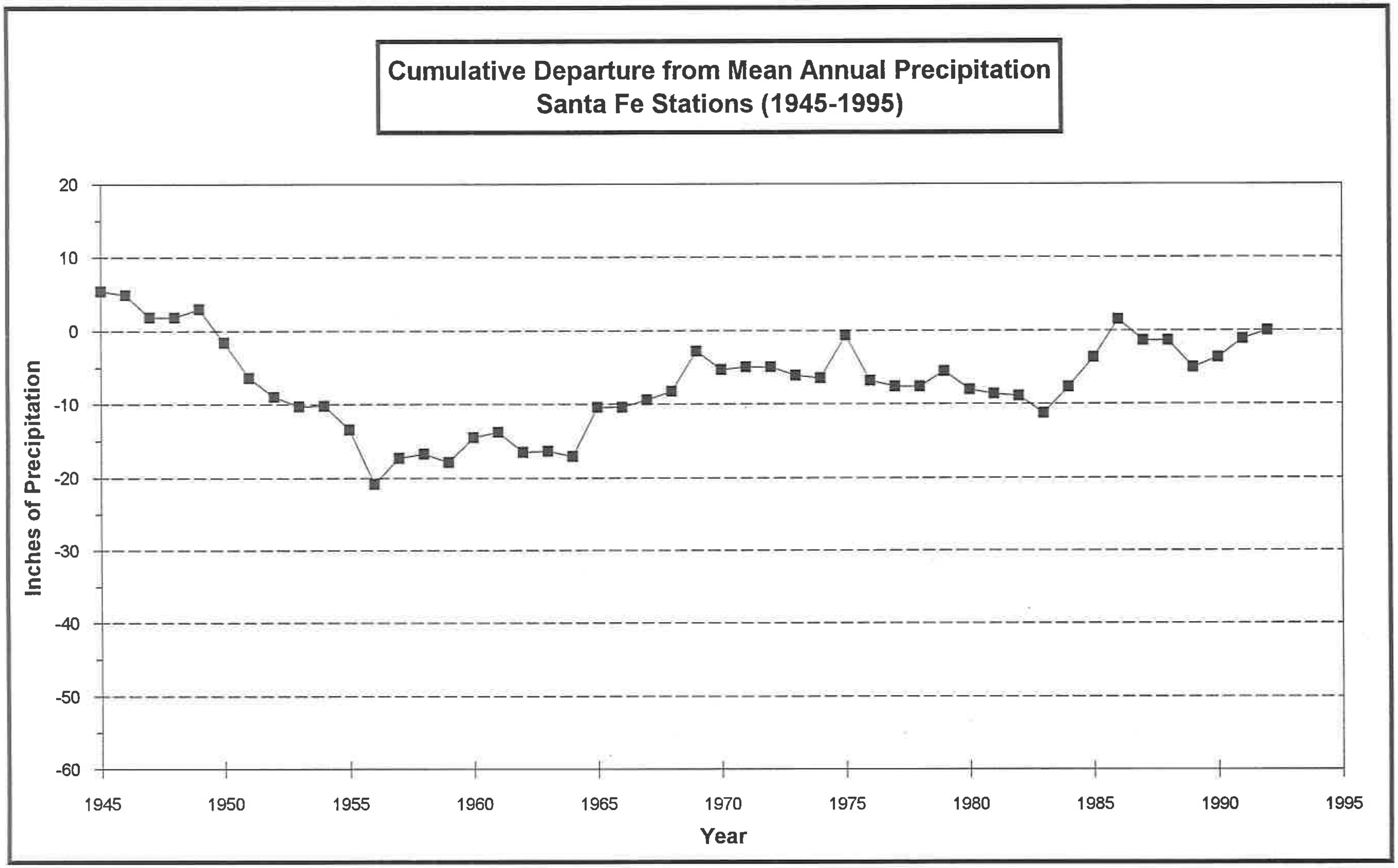
APPENDIX B

GRAPHS OF ANNUAL PRECIPITATION AND CUMULATIVE DEPARTURE FROM MEAN ANNUAL PRECIPITATION FOR GAUGES IN SANTA FE COUNTY


Cumulative Departure and Annual Precipitation
Santa Fe Stations (1868-1995)
Inches of Precipitation
30
20
10
0
-10
-20
-30
-40
-50
-60
1865
1875
1885
1895
1905
1915
1925
1935
1945
1955
1965
1975
1985
1995
Year
SF 8072
SF College
SF-2
Cumulative departure



Cumulative Departure and Annual Precipitation
Santa Fe Stations (1945-1995)
Inches of Precipitation
30
20
10
0
-10
-20
-30
-40
-50
-60
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Year
SF 8072
SF College
SF-2
Cumulative departure


Cumulative Departure from Mean Annual Precipitation
Santa Fe Stations (1945-1995)
Inches of Precipitation
20
10
0
-10
-20
-30
-40
-50
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1945
1950
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1965
1970
1975
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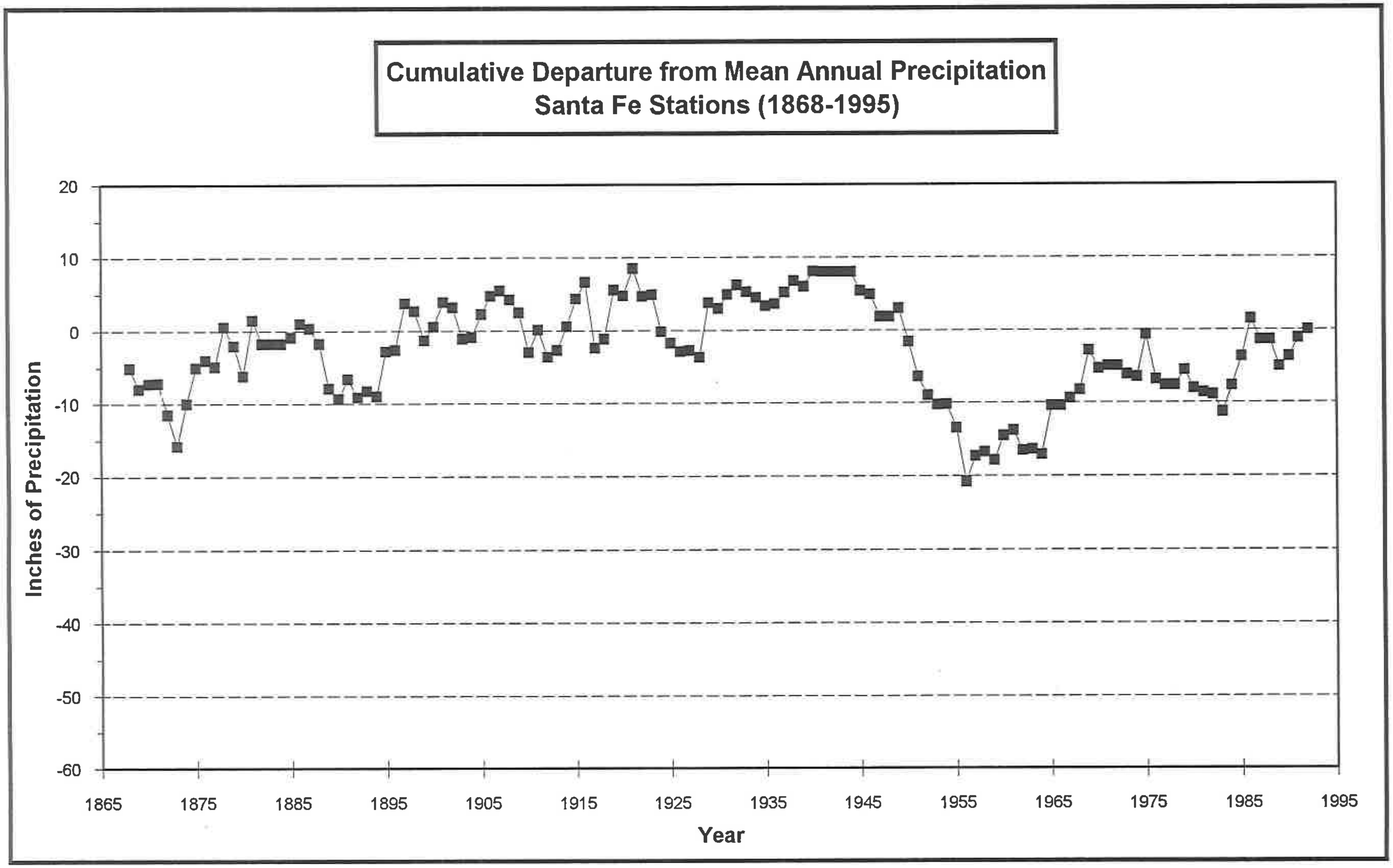
Year


Cumulative Departure from Mean Annual Precipitation
Santa Fe Stations (1868-1995)
Inches of Precipitation
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10
0
-10
-20
-30
-40
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1885
1895
1905
1915
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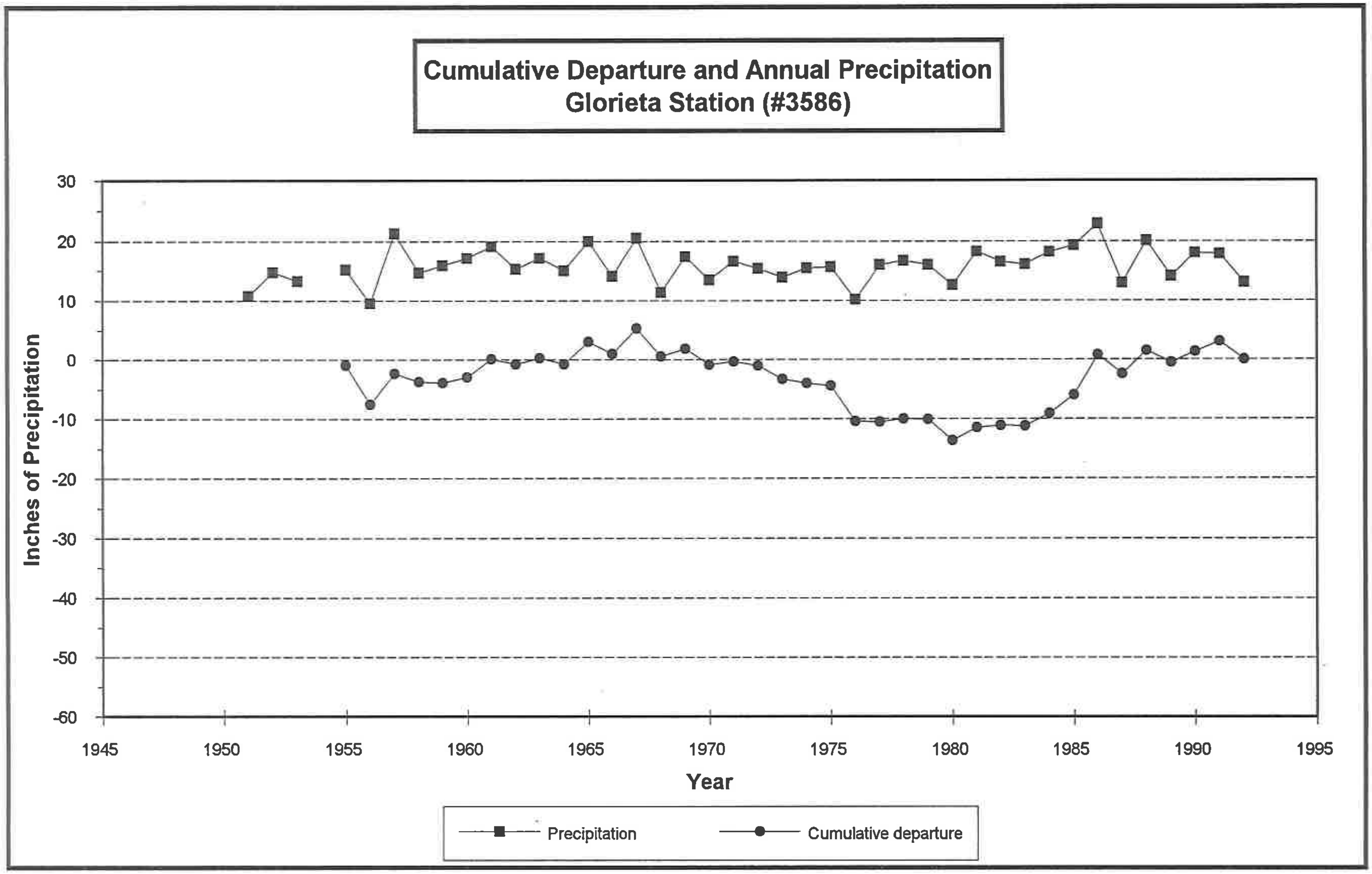
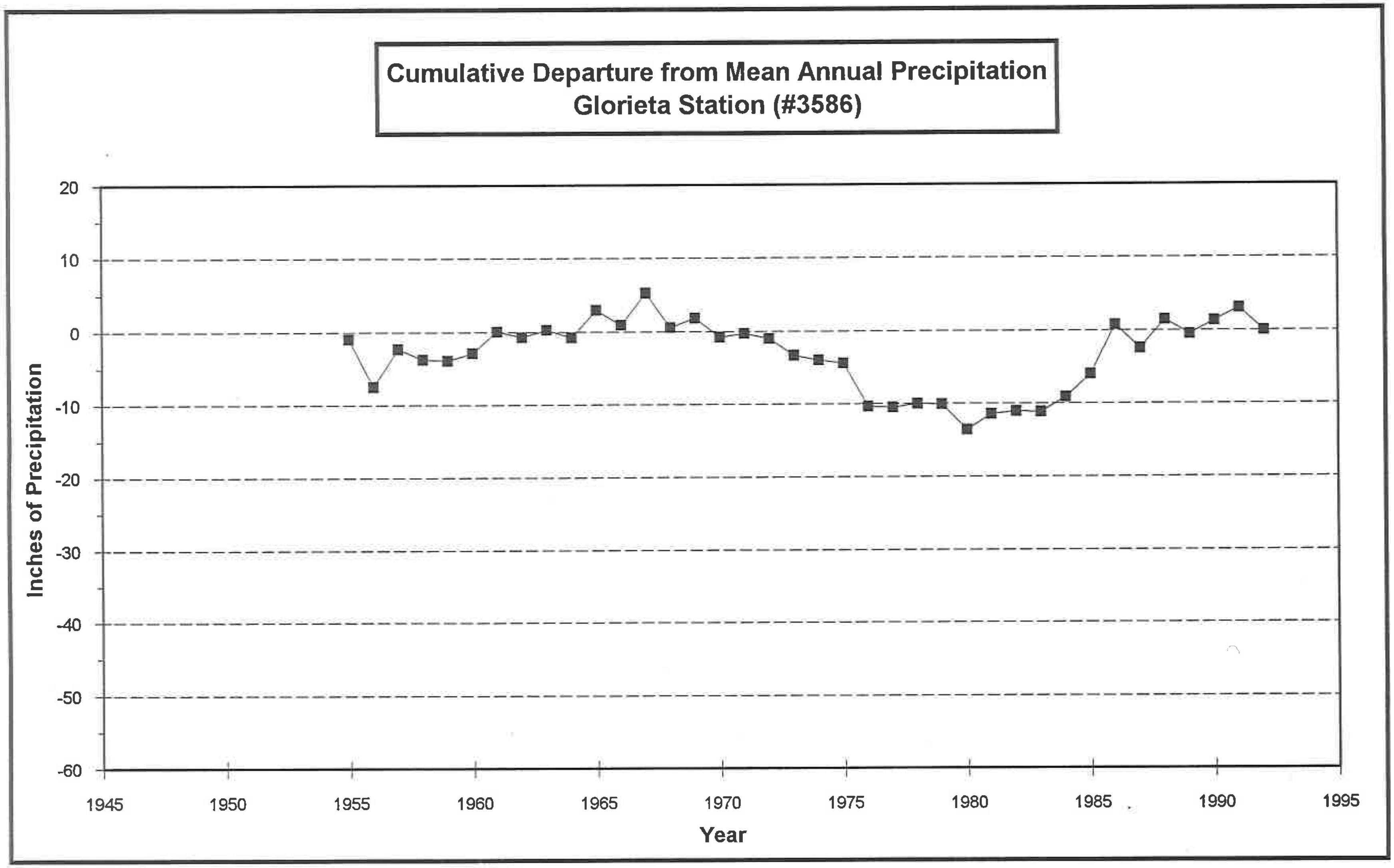
1965
1975
1985
1995
Year


Cumulative Departure and Annual Precipitation
Glorieta Station (#3586)
30
20
10
0
-10
-20
-30
-40
-50
-60
Inches of Precipitation
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Year
Precipitation
Cumulative departure


Cumulative Departure from Mean Annual Precipitation
Glorieta Station (#3586)
20
10
0
-10
-20
-30
-40
-50
-60
Inches of Precipitation
1945
1950
1955
1960
1965
1970
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1980
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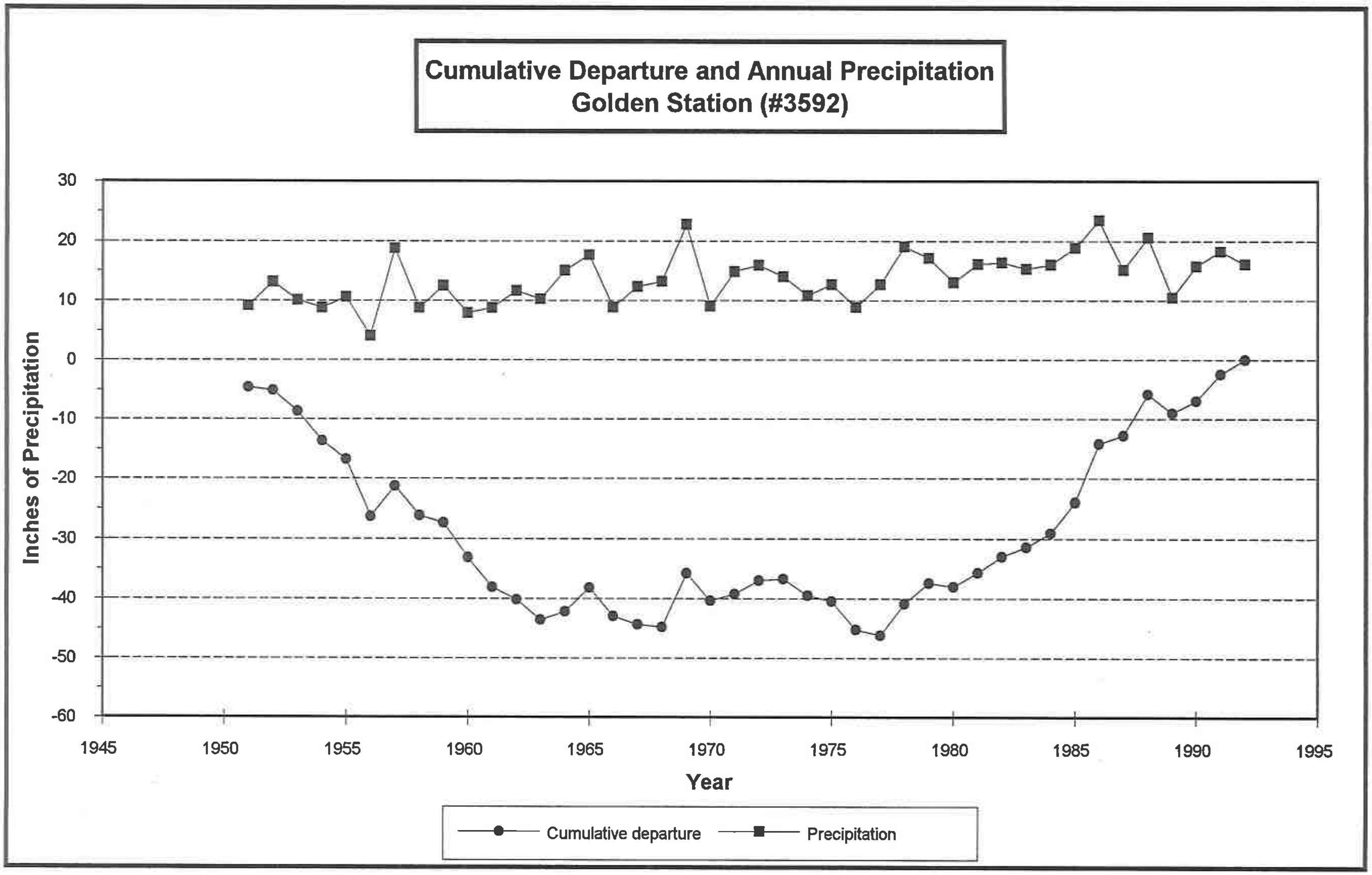
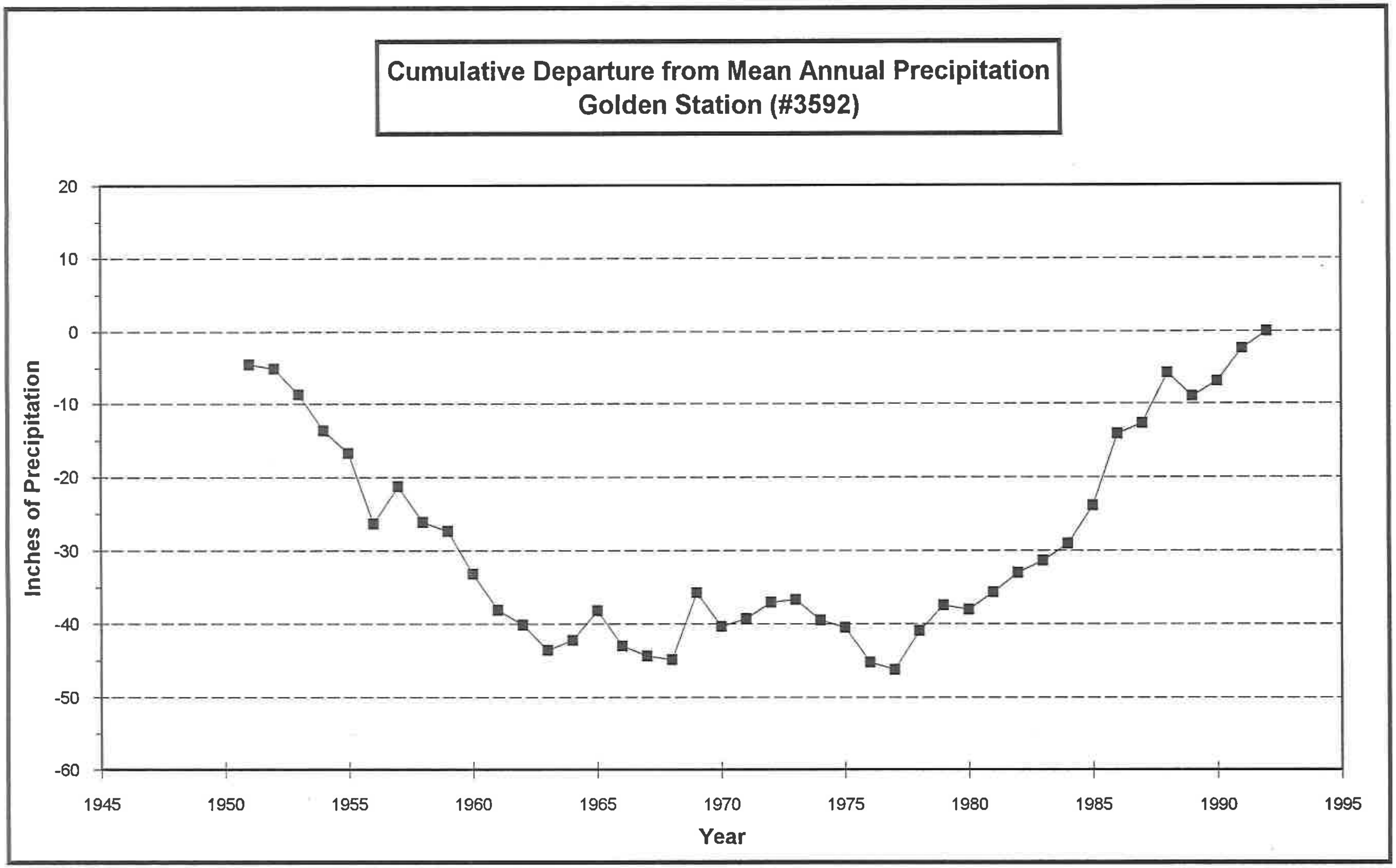
1995
Year


Cumulative Departure and Annual Precipitation
Golden Station (#3592)
Inches of Precipitation
30
20
10
0
-10
-20
-30
-40
-50
-60
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Year
Cumulative departure
Precipitation


Cumulative Departure from Mean Annual Precipitation
Golden Station (#3592)
Inches of Precipitation
20
10
0
-10
-20
-30
-40
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1945
1950
1955
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1975
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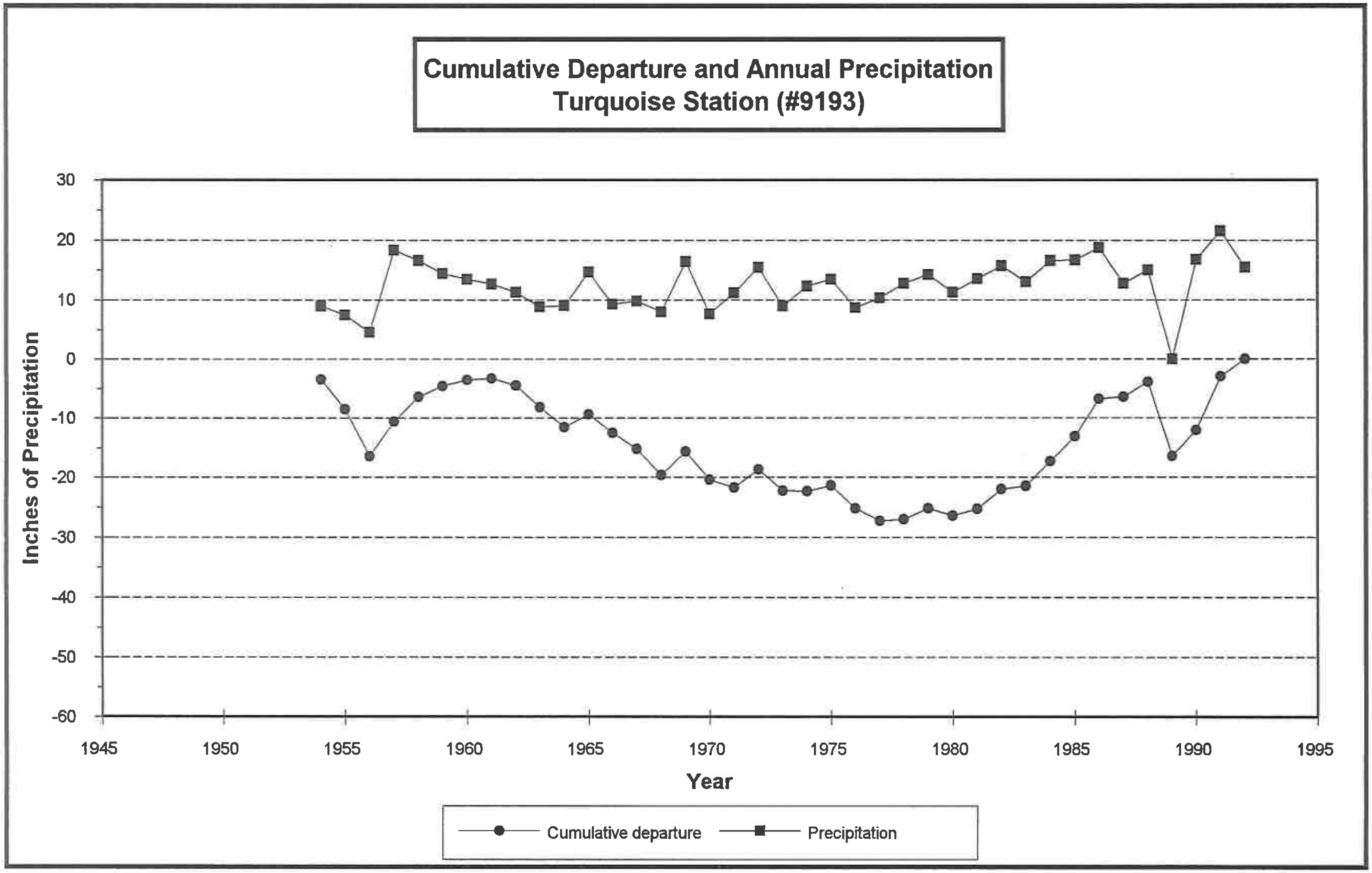
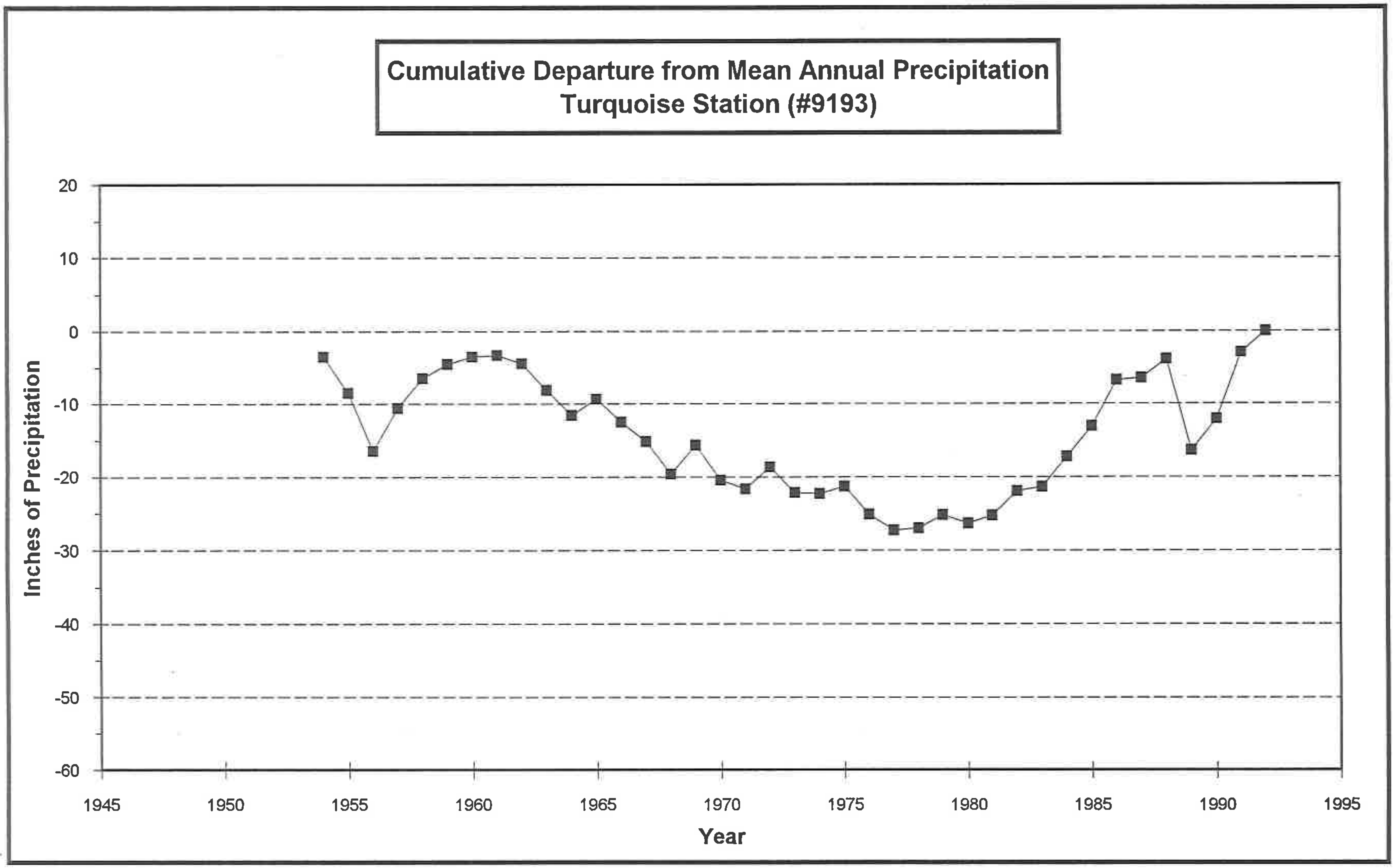
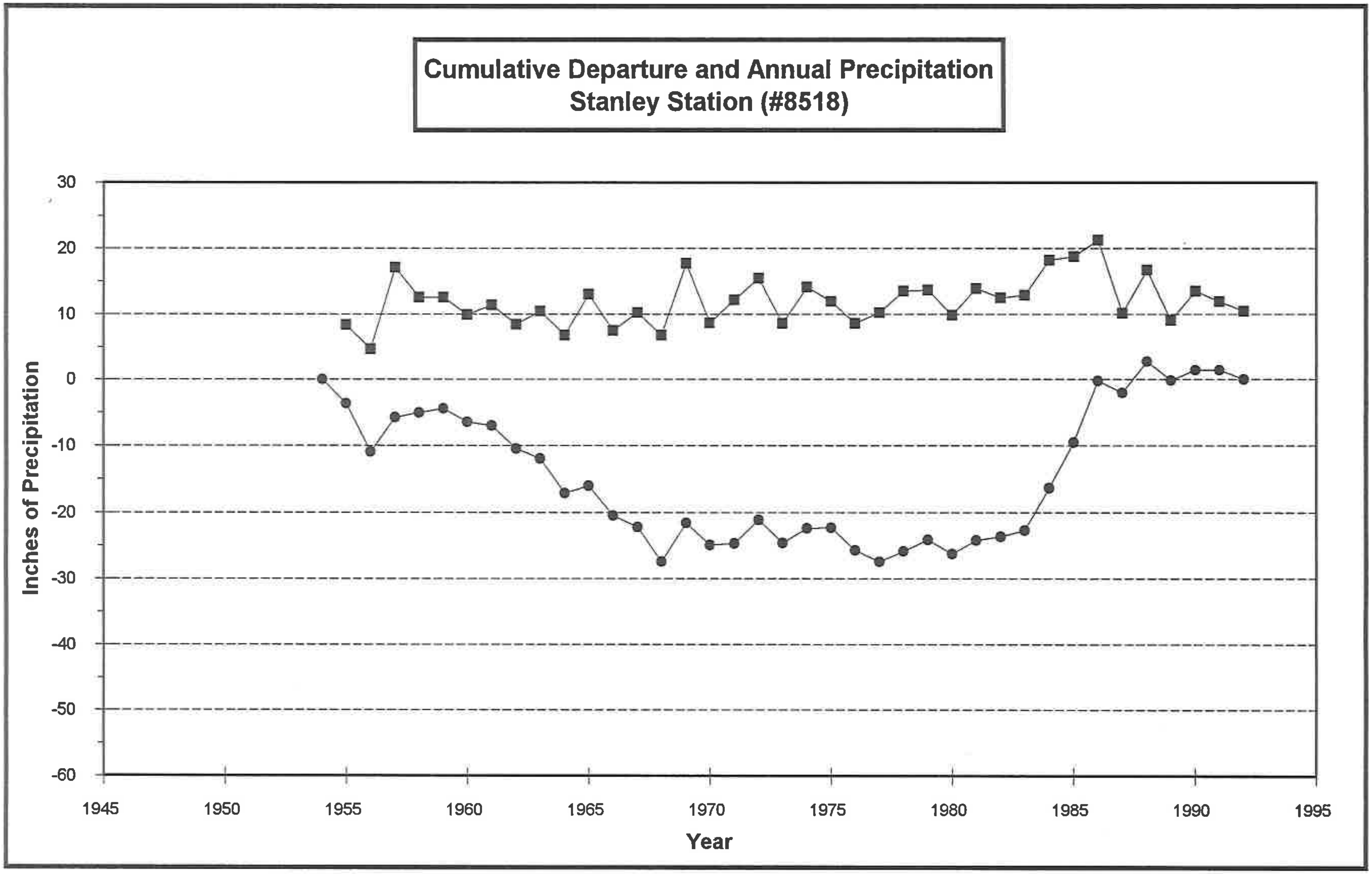
1985
1990
1995
Year

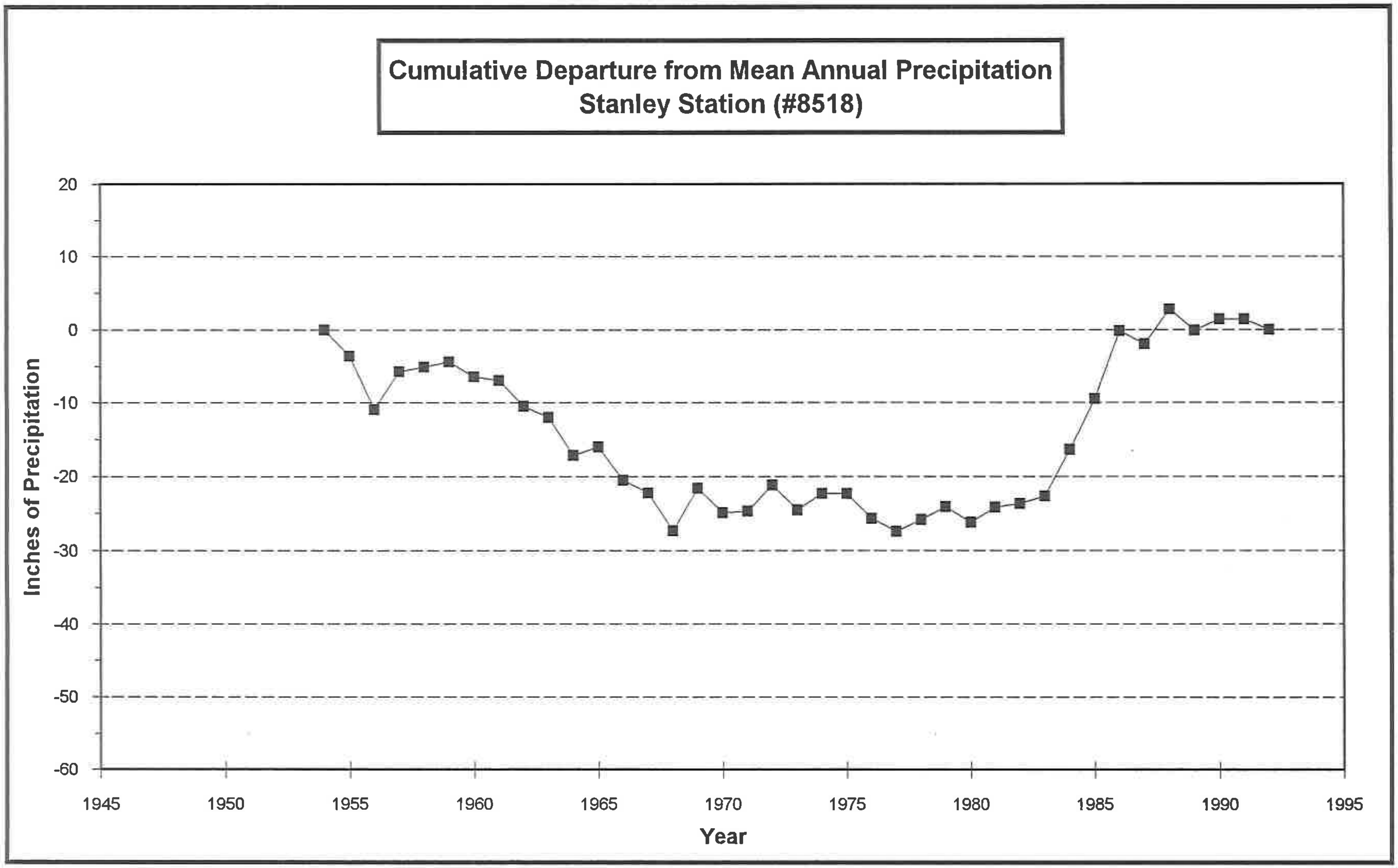


Cumulative Departure and Annual Precipitation
Turquoise Station (#9193)
Inches of Precipitation
30
20
10
0
-10
-20
-30
-40
-50
-60
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Year
Cumulative departure
Precipitation



Cumulative Departure from Mean Annual Precipitation
Turquoise Station (#9193)
Inches of Precipitation
20
10
0
-10
-20
-30
-40
-50
-60
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Year


Cumulative Departure and Annual Precipitation
Stanley Station (#8518)
Inches of Precipitation
30
20
10
0
-10
-20
-30
-40
-50
-60
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Year


Cumulative Departure from Mean Annual Precipitation
Stanley Station (#8518)
Inches of Precipitation
Year
20
10
0
-10
-20
-30
-40
-50
-60
1945
1950
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1995

APPENDIX C

DOCUMENTATION OF DATABASES

Summary of Santa Fe County Databases

Filename	No. of Records	Description of Contents	Documentation	Original Source of Database
SFGWINFO.DB	1393	Location, construction details, use, aquifer code	Section C.1	USGS GWSI
SFCON.DB	3419	Additional construction details, discharge measurements, owner	Section C.2	USGS GWSI
SFGWINF2.DB	3392	Information on logs and data available for a well	Section C.3	USGS GWSI
SFWLE.DB	5558	The depth to water and water level elevation	Section C.4	USGS GWSI
SFSPRNG	11	Information specific to springs	Section C.5	USGS GWSI
SFSAMP.DB	919	Information regarding sampling event such as field measurements and date collected	Section C.6	USGS NWIS
SFCARB.DB	892	Analyses of ground-water samples for alkalinity, nitrates, and phosphates	Section C.7	USGS NWIS
SFMAJ.DB	915	Analyses of ground-water samples for major cations and anions	Section C.7	USGS NWIS
SFMETL.DB	420	Analyses of ground-water samples for selected metals and total dissolved solids	Section C.7	USGS NWIS
SFISO.DB	49	Hydrogen isotopes, oxygen-18 and deuterium ratios and carbon-14 concentrations detected in wells and springs	Section C.7	USGS NWIS
SFDOM.DB	7646	List of 72-12-1 wells with SEO number and location	Section C.8	Neva Van Peski MWB
SFRIGHTS	317	List of water rights with location and diversion	Section C.9	Neva Van Peski MWB

C.1. DOCUMENTATION OF SFGWINFO

Source: USGS Ground-Water Sites Inventory (GWSI)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989).

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
C002	A1	**Type** (Type of site) - designates the type of site. S - Spring W - Well
C003	A3	**Recd** (Record classification) - indicates the reliability of the data available for the site as follows: C - Data have been field checked by the reporting agency L - Location not accurate M - Minimal data U - Data have not been field checked by the reporting agency, but the reporting agency considers the data reliable
C004	A6	**Source** (Source agency code) - denotes the agency providing the data. The USGS is the only source listed in this field.
C005	A10	**ProjNo** (Project number) - number utilized by the USGS for retrieval of all data for a particular project.
C006	N3	**Dcode** (District code) - denotes the USGS Water Resource Division District that reported the data. '35' is the code for the Albuquerque District Office.
C007	N2	**Scode** (State code) - denotes the state in which the site is located. All sites are located in New Mexico (state code 35).

C.1. DOCUMENTATION OF SFGWINFO (CONTINUED)

C008	N3	**Ccode** (County code) - denotes the county in which the site is located. All records have the code for Santa Fe County, which is 49.
C009	N7	**Latitude** (Latitude) - latitude for the site in degrees, minutes, and seconds.
C010	N8	**Longitude** (Longitude) - longitude for the site in degrees, minutes, and seconds.
C011	A3	**LLac** (Lat-Long accuracy code) - indicates the accuracy of the latitude and longitude values as follows: S - Accurate to ± 1 second F - Accurate to ± 5 seconds T - Accurate to ± 10 seconds M - Accurate to ± 1 minute Blank - Accuracy unknown
C012	A26	**Local Well Number** (Local well number) - identifies the location of the well by the township, range and section. The largest subdivision of the quarter section is listed first. The NW quarter is identified with the number 1, NE as 2, SW as 3, and SE as 4.
C013	A22	**Land-net location** (Land-net location) - provides the legal description of the 10-acre tract in which the site is located. The smallest subdivision of the quarter section in listed first.
C014	A12	**Name of location map** (Location map) - name of the USGS topographic map on which the site can be located.
C015	N7	**Map scale** (Map scale) - identifies the scale of the map named in the previous field.
C016	N8	**LSD_feet** (Altitude) - altitude of the land surface in feet above mean sea level.
C017	A3	**LSDmeth** (Method altitude determined) - describes the method used to determine the altitude of land surface as follows: A - Altimeter L - Level or other surveying method M - Interpolated from topographic map

C.1. DOCUMENTATION OF SFGWINFO (CONTINUED)

C018	N3	**Altacc** (Altitude accuracy) - denotes the accuracy of the altitude of land surface in feet.
C019	A3	**Toposet** (Topographic setting code) - describes the topographic setting in which the site is located. The following USGS codes are permitted:

A - Alluvial fan
B - Playa
C - Stream channel
D - Local depression
E - Dunes
F - Flat surface
G - Flood plain
H - Hilltop
K - Sinkhole
L - Lake, swamp, or marsh
M - Mangrove
O - Offshore
P - Pediment
S - Hillside (slope)
T - Alluvial or marine terrace
U - Undulating
V - Valley flat (valleys of all sizes)
W - Upland draw

C020	N8	**Hydrounit** (Hydrologic unit code) - designates the hydrologic unit code for the Office of Water Data Coordination cataloging unit in which the site is located. Figure AA-1 shows the currently designated hydrologic unit codes for the State of New Mexico.
C021	N8	**Drildate** (Date of first construction) - the earliest date for which data are available for the site or the date when construction began, whichever is earlier.
C023	A3	**SUse1** (Primary use of site) - code describing the principal or first use for the site. The USGS codes are as follows:

A - Anode
C - Standby emergency supply
D - Drain
E - Geothermal
G - Seismic
H - Heat reservoir
M - Mine

Map of New Mexico Showing Location of Hydrologic Units

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11-92 JN 2200

Figure AA-1

C.1. DOCUMENTATION OF SFGWINFO (CONTINUED)

O - Observation
P - Oil or gas well
R - Recharge
S - Repressurize
T - Test
U - Unused
W - Withdrawal of water
X - Waste disposal
Z - Destroyed

C024 A3 **WUse1** (Primary use of water) - code describing the principal use of water from the site. The USGS codes are as follows:

A - Air conditioning
B - Bottling
C - Commercial
D - Dewater
E - Power
F - Fire
H - Domestic
I - Irrigation
J - Industrial (cooling)
K - Mining
M - Medicinal
N - Industrial
P - Public supply
Q - Aquaculture
R - Recreation
S - Stock
T - Institutional
U - Unused
Y - Desalination
Z - Other (explained in remarks)

C025 A3 **WUse2** (Secondary use of water) - if the water from the site is used for more than one purpose, a code may have been entered.

C026 A3 **WUse3** (Tertiary use of water) - if a third use of the water from the site exists, a code may have been entered.

C027 N8 **Drildepth** (Hole depth) - total depth in feet the well was drilled below land-surface datum, even though it may have been plugged back in completing the well.

C.1. DOCUMENTATION OF SFGWINFO (CONTINUED)

C028	N8	**Welldepth** (Well depth) - depth of the finished well in feet below land-surface datum.
C029	A3	**Depthsrc** (Source of depth data) - code indicating the source of the depth of the well. The USGS codes are as follows: A - Reported by another government agency D - From driller log or report G - Private geologist-consultant or university associate L - Depth interpreted from geophysical logs by personnel of source agency M - Memory (owner, operator, driller) O - Owner of well R - Other individual S - Measured by personnel of reporting agency Z - Other source, explained in remarks
C030	N7	**DTW** (Inventory water level) - depth to water in feet below land surface. A negative sign precedes the measurement if head is above land surface.
C031	N8	**DTWdate** (Date measured) - year, month and date of water-level measurement. If month or day is not known, 00 is used.
C033	A3	**DTWsrce** (Source of water-level data) - code that describes the source of the water-level measurement. The codes are the same as those used for Depthsrc (C029).
C034	A3	**DTWmeth** (Method of water-level measurement) - code that indicates how the water level was measured. The USGS codes are as follows: A - Airline measurement B - Analog or graphic recorder C - Calibrated airline measurement E - Estimated G - Pressure-gage measurement H - Calibrated pressure-gage measurement L - Interpreted from geophysical logs M - Manometer measurement N - Non-recording gage R - Reported, method not known S - Steel-tape measurement T - Electric-tape measurement

C.1. DOCUMENTATION OF SFGWINFO (CONTINUED)

V - Calibrated electric-tape measurement
Z - Other

C037 A10 **WLstat** (Site status for water level) - code indicating the status of the site at the time the water level was measured. The field is blank if the inventoried water-level measurement represents a static level. The USGS Codes are as follows:

D - Dry
E - Flowing recently
F - Flowing, but head could not be measured
G - A nearby site that taps the same aquifer was flowing
H - A nearby site that taps the same aquifer had been flowing recently
I - Injector site
J - Injector site monitor
N - Measurements were discontinued
O - Obstruction encountered in the well
P - Pumping
R - Pumped recently
S - A nearby site that taps the same aquifer was being pumped
T - A nearby site that taps the same aquifer had been pumped recently
V - Foreign substance was present on the surface of the water
W - Destroyed
X - Water level was affected by stage in nearby surface water site
Z - Other conditions affecting water-level measurement are explained in remarks

C714 A10 **AQUIFCODE** (Primary aquifer) - identifies the primary aquifer unit from which the water is obtained. The primary aquifers identified in the vicinity of the Roswell Basin are as follows:

000EXRV - Extrusive Rocks
000IRSV - Intrusive Rocks
110AVMB - Alluvial Fill
110BLSN - Bolson Fill
1100PTOD - Pediment, Terrace, and other Deposits of Gravel, Sand and Caliche
110TURT - Tuerto Gravel of Santa Fe Group
112ANCH - Ancha Formation, Upper Part of Santa Fe Group

C.1. DOCUMENTATION OF SFGWINFO (CONTINUED)

112CURB	-	Cuerbio Basalt
112SNTF	-	Santa Fe Group
121PUYEF	-	Puye Conglomerate, Fanglomerate Member
121TSUQ	-	Tesuque Formation, undifferentiated unit
123GLST	-	Galisteo Formation
210MNC	-	Mancos Shale
210MNCS	-	Mancos Shale
211MVRD	-	Mesa Verde Group
211PNLK	-	Point Lookout Sandstone
231DCKM	-	Dockum Group
310GLRT	-	Glorieta Sandstone
310SGRC	-	Sangre de Cristo Formation
310YESO	-	Yeso Formation
313SADR	-	San Andres Limestone
318ABO L	-	Abo Sandstone (Lower Tongue)
318ABO U	-	Abo Sandstone (Upper Tongue)
325MDER	-	Madera Limestone
325MDERL	-	Madera Limestone (Lower Gray Limestone Member)
325MDERU	-	Madera Limestone (Upper Arkosic Limestone Member)
400PCMB	-	Precambrian Erathern

--- N10 **X** - the X coordinate in feet using the state plane coordinate system.

--- N10 **Y** - the y coordinate in feet using the state plane coordinate system.

C.2. DOCUMENTATION OF SFCON.DB

Source: USGS Ground-Water Sites Inventory (GWSI)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989).

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
C077	N5	**DcasTop** (Depth to top of this casing string) - depth in feet below land surface to the top of the casing interval reported for this record. If the casing extends above ground surface, then a negative sign will precede the height.
C078	N7	**DcasBot** (Depth to bottom of this casing string) - depth in feet below land surface to the bottom of the casing interval reported for this record.
C079	N6	**Casdiam** (Diameter of this casing string) - diameter in inches of the casing interval reported for this record.
C083	N7	**DscrnTop** (Depth to top of this open interval) - depth to the top of the open section in feet below land surface.
C084	N7	**DscrnBot** (Depth to bottom of this open interval) - depth to the bottom of the open section in feet below land surface.
C087	N7	**Scrndiam** (Diameter of this open interval) - the inside diameter, in inches, of the perforated or slotted pipe, diameter of a screen, or the diameter of the hole, if the well is finished open-hole.

C.2. DOCUMENTATION OF SFCON.DB (CONTINUED)

C093	A8	**AQUIFCODE** (Unit identifier) - identifies the primary aquifer unit from which the water is obtained. The primary aquifers identified in the vicinity of the Roswell Basin are as follows:

000EXRV	- Extrusive Rocks
000IRSV	- Intrusive Rocks
110AVMB	- Alluvial Fill
110BLSN	- Bolson Fill
1100PTOD	- Pediment, terrace, and other deposits of gravel, sand, and caliche
112ANCH	- Ancha Formation, Upper Part of Santa Fe Group
112BDLR	- Bandelier Rhyshite Tuff of Tewa Group
112CURB	- Cuerbio Basalt
112SNTF	- Santa Fe Group
121PUYEF	- Puye Conglomerate, Fanglomerate Member
121TOTV	- Totari Lentil of Puye Conglomerate
121TSUQ	- Tesuque Formation, undifferentiated unit
123GLST	- Galisteo Formation
210MCDK	- Mancos Shale, Lower Part and Dakota Sandstone (undivided)
210MNCS	- Mancos Shale
211MVRD	- Mesa Verde Group
221MRSN	- Morrison Formation
231CHNL	- Chinle Formation
231DCKM	- Dockum Group
231SNRS	- Santa Rose Sandstone
310GLRT	- Glorieta Sandstone
310SGRC	- Sangre de Cristo Formation
310YESO	- Yeso Formation
313BRNL	- Bernal Formation of Artesia Group
313SADG	- San Andres and Glorieta, undifferentiated
313SADR	- San Andres Formation
318ABO U	- Upper Abo Formation
325MDER	- Madera Limestone
325MDERL	- Madera Limestone (Lower Gray Limestone Member)
325MDERU	- Madera Limestone (Upper Arkosic Limestone Member)
400PCMB	- Precambrian Erathern

C095	A8	**Aq_date** (Date) - the date on which aquifer data were collected. If the month or day is not known, 00 are entered.
C096	A4	**LITHCODE** (Lithology) - code identifying the principal lithology of the unit at the screen interval. Codes used in this file are:

C.2. DOCUMENTATION OF SFCON.DB (CONTINUED)

ALVM - Alluvium
ANDR - Anhydrite
BLDR - Boulders
BNTN - Bentonite
BRCC - Breccia
BSLT - Basalt
CGLM - Conglomerate
CLAY - Clay
CLCH - Caliche (hard pan)
CLSD - Clay, some sand
CLSN - Claystone
GPSM - Gypsum
GRCL - Gravel and clay
GRNT - Granite
GRVL - Gravel
HRDP - Hard Pan
IGNS - Igneous (undifferentiated)
LMSN - Limestone
MDSN - Mudstone
MUD - Mud
OTHR - Other
QRTZ - Quartzite
ROCK - Rock
SAND - Sand
SDCL - Sand and Clay
SDGL - Sand and Gravel
SDMN - Sedimentary (undifferentiated)
SDSL - Sandstone and Shale
SDST - Sand and Silt
SGVC - Sand, Gravel and Clay
SHLE - Shale
SILT - Silt
SLSN - Siltstone
SNDS - Sandstone
SOIL - Soil
SPRL - Saprolite
TUFF - Tuff
VLCC - Volcanic (undifferentiated)

C103 **Hyd_type** (Hydraulic unit type) - hydraulic character of unit tested

A - Aquifer
C - Confining layer

C.2. DOCUMENTATION OF SFCON.DB (CONTINUED)

C106		**Seq-no** (Sequence number for COEF subrecord of HYDR file). A USGS number assigned at time of data entry to keep data by category in logical order.
C107		**T** (Transmissivity) - transmissivity determined from aquifer tests. Units in gallons per day per foot.
C110		**Storage coefficient** (Storage Coefficient) - Storage coefficient from aquifer tests. No USGS data available. Dimensionless.
C148	A8	**Dischdate** (Date discharge measured) - date on which the discharge data were determined. If the day and/or month were not known, 00 was entered.
C150	N12	**Discharge** (Discharge) - discharge from the site in gallons per minute.
C151	A1	**DischSource** (Source of data) - code indicating who furnished the data. The following USGS codes were utilized in this field: A - Reported by another government agency D - From driller log or report G - Private geologist-consultant or university associate L - Depth interpreted from geophysical logs by personnel of source agency M - Memory (owner, operator, driller) O - Owner of well R - Other individual S - Measured by personnel of reporting agency Z - Other source, explained in remarks
C152	A1	**DischMeth** (Method of discharge measurement) - code indicating the method used to measure the discharge. The USGS codes are: A - Acoustic meter (transient-time meter) B - Bailer C - Current meter D - Doppler meter E - Estimated F - Flume M - Totaling meter O - Orifice P - Pitot-tube meter R - Reported, method not known T - Trajectory method

C.2. DOCUMENTATION OF SFCON.DB (CONTINUED)

U - Venturi meter
V - Volumetric measurement
W - Weir
Z - Other

C153	N12	**Prodlevel** (Production level) - water level, in feet below land surface, while the well was discharging. The Prodlevel minus the Statwl is equivalent to the drawdown. A negative sign will precede the Prodlevel if the well is naturally flowing.
C154	N12	**Statwl** (Static level) - the static water level, in feet below land surface.
C155	A1	**WlSource** (Source of data) - code indicating who provided the data. The USGS codes are: A - Reported by another government agency D - From driller log or report G - Private geologist-consultant or university associate L - Depth interpreted from geophysical logs by personnel of source agency M - Memory (owner, operator, driller) O - Owner of well R - Other individual S - Measured by personnel of reporting agency Z - Other source, explained in remarks
C156	A1	**WlMet** (Method of water-level measurement) - code that indicates how the water level was measured. The USGS codes are as follows: A - Airline measurement B - Analog or graphic recorder C - Calibrated airline measurement E - Estimated G - Pressure-gage measurement H - Calibrated pressure-gage measurement L - Interpreted from geophysical logs M - Manometer measurement N - Non-recording gage R - Reported, method not known S - Steel-tape measurement T - Electric-tape measurement V - Calibrated electric-tape measurement Z - Other

C.2. DOCUMENTATION OF SFCON.DB (CONTINUED)

C157	A7	**Pumptime** (Pumping period) - length of time, in hours, that the well was pumped prior to the measurement of production levels.
C159	A8	**Dateowned** (Date of ownership) - the date that the owner acquired ownership of the well, spring, etc., or the earliest date on which this owner was known to own the source.
C161	A42	**Owner** (Owner's name) - name of the owner.

C.3. DOCUMENTATION OF SFGWINF2.DB

Source: USGS Ground-Water Sites Inventory (GWSI)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989).

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
C199	A1	**Logtype** (Type of log) - code describing the type of log for the log interval described in this record. The USGS codes are: A - Drilling time B - Casing collar C - Caliper D - Drillers E - Electric F - Fluid conductivity G - Geologist or sample H - Magnetic I - Induction J - Gamma ray K - Dipmeter L - Lateral log M - Microlog N - Neutron O - Microlateral log P - Photographic Q - Radioactive-tracer S - Sonic T - Temperature U - Gamma-gamma V - Fluid velocity X - Core Z - Other (explained in remarks)
C200	N8	**LogTop** (Beginning depth) - depth to top of logged interval.

C.3. DOCUMENTATION OF SFGWINF2.DB (CONTINUED)

C201 N8 **LogBot** (Ending depth) - depth to the bottom of the logged interval, in feet below land surface.

C202 A1 **LogSource** (Source of data) - code indicating who provided the information. The USGS Codes are:

- A - Reported by another government agency
- D - From driller log or report
- G - Private geologist-consultant or university associate
- L - Depth interpreted from geophysical logs by personnel of source agency
- M - Memory (owner, operator, driller)
- O - Owner of well
- R - Other individual
- S - Measured by personnel of reporting agency
- Z - Other source, explained in remarks

C272 N8 **Specific Capacity** (Specific capacity) - specific capacity in (gallons/minute)/feet of drawdown.

C279 A5 **DIV_AFY** (Water use, legal diversion) - USGS database contained no information for this field. Any data added to this field will have the units in acre-feet per year.

C280 A7 **AppNo** (Application number) - USGS database contained no information for this field. The SEO application number may be added for records if identified.

C281 A7 **Perm No** (Water Use Permit Number) - USGS database contained no information for this field. The SEO permit number may be added if identified.

C282 A8 **PRIORITY** (Priority Date) - USGS database contained no information for this field. The water right priority date may be added if identified.

C304 A1 **Aquif** (Contributing unit) - code indicating if unit is considered the principal aquifer. The USGS codes are:

- P - Principal contributing aquifer
- S - Secondary contributing aquifer
- N - Contributes no water
- U - Unknown contribution

C.3. DOCUMENTATION OF SFGWINF2.DB (CONTINUED)

C711 A8 **Date-est** (Date site established/inventioned) - The date the USGS first recorded information on the site. The format is MMDDYYYY. If the month or day is not known, then 00 are entered.

C712 A20 **Data Availability** (Other ground-water data files) - A "Y" in the column indicates if the USGS file is available, as follows:

Column	File
1	- Construction data for site
2	- Miscellaneous data for site
3	- Discharge data for site
4	- Geohydrologic data for site
5	- Hydraulic data for site
6	- Water level data for site
7	- Observation heading data for site
8	- State water-use data for site
9-20	- Unassigned

C713 A1 **Aq-Type** (Aquifer type code) - code indicating the type of aquifer. The USGS codes are:

U - unconfined single aquifer
N - unconfined multiple aquifer
C - confined single aquifer
M - confined multiple aquifers
X - mixed (confined and unconfined) multiple aquifers

C714 A8 **AQUIFCODE** (Primary aquifer) - identifies the primary aquifer unit from which the water is obtained. The primary aquifers identified in the vicinity of the ~~Roswell Basin~~ are as follows:

000EXRV	- Extrusive Rocks
000IRSV	- Intrusive Rocks
110AVMB	- Alluvial Fill
110BLSN	- Bolson Fill
1100PTOD	- Pediment, Terrace, and other Deposits of Gravel, Sand and Caliche
110TURT	- Tuerto Gravel of Santa Fe Group
112ANCH	- Ancha Formation, Upper Part of Santa Fe Group
112CURB	- Cuerbio Basalt
112SNTF	- Santa Fe Group
121PUYEF	- Puye Conglomerate, Fanglomerate Member
121TSUQ	- Tesuque Formation, undifferentiated unit

C.3. DOCUMENTATION OF SFGWINF2.DB (CONTINUED)

123GLST	-	Galisteo Formation
210MNC	-	Mancos Shale
210MNCS	-	Mancos Shale
211MVRD	-	Mesa Verde Group
211PNLK	-	Point Lookout Sandstone
231DCKM	-	Dockum Group
310GLRT	-	Glorieta Sandstone
310SGRC	-	Sangre de Cristo Formation
310YESO	-	Yeso Formation
313SADR	-	San Andres Limestone
318ABO L	-	Abo Sandstone (Lower Tongue)
318ABO U	-	Abo Sandstone (Upper Tongue)
325MDER	-	Madera Limestone
325MDERL	-	Madera Limestone (Lower Gray Limestone Member)
325MDERU	-	Madera Limestone (Upper Arkosic Limestone Member)
400PCMB	-	Precambrian Erathern

C.4. DOCUMENTATION OF SFWLE.DB

Source: USGS Ground-Water Sites Inventory (GWSI)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989).

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**SiteId** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
C235	A8	**DTWDATE** (Date) - year, month and date of water-level measurement. If month or day is not known, 00 is used.
C236	A1	**Dacc** (Date accuracy) - code for accuracy of date as follows: M - to nearest month Y - to nearest year
C237	N7	**DTW** (Water level) - depth to water in feet below land surface. A negative sign precedes the measurement if head is above land surface.
C238	A1	**WLstat** (Status) - code indicating the status of the site at the time the water level was measured. The field is blank if the water-level measurement represents a static level. The USGS Codes are as follows: D - Dry E - Flowing recently F - Flowing, but head could not be measured G - A nearby site that taps the same aquifer was flowing H - A nearby site that taps the same aquifer had been flowing recently I - Injector site J - Injector site monitor N - Measurements were discontinued O - Obstruction encountered in the well P - Pumping

C.4. DOCUMENTATION OF SFWLE.DB (CONTINUED)

- R - Pumped recently
- S - A nearby site that taps the same aquifer was being pumped
- T - A nearby site that taps the same aquifer had been pumped recently
- V - Foreign substance was present on the surface of the water
- W - Destroyed
- X - Water level was affected by stage in nearby surface water site
- Z - Other conditions affecting water level measurement are explained in remarks

C239 A1 **DTWmeth** (Method of measurement) - code that indicates how the water level was measured. The USGS codes are as follows:

- A - Airline measurement
- B - Analog or graphic recorder
- C - Calibrated airline measurement
- E - Estimated
- G - Pressure-gage measurement
- H - Calibrated pressure-gage measurement
- L - Interpreted from geophysical logs
- M - Manometer measurement
- N - Non-recording gage
- R - Reported, method not known
- S - Steel-tape measurement
- T - Electric-tape measurement
- V - Calibrated electric-tape measurement
- Z - Other

C016 N8 **LSD_feet** (Altitude) - altitude of the land surface in feet above mean sea level. (Obtained from Wellinfo.db.)

C020 N8 **Hydrounit** (Hydrologic unit code) - designates the hydrologic unit code for the Office of Water Data Coordination cataloging unit in which the site is located. Figure AA-1 in Appendix A shows the currently designated hydrologic unit codes for the State of New Mexico. (Obtained from Wellinfo.db.)

C714 A10 **AQUIFCODE** (Primary aquifer) - identifies the primary aquifer unit from which the water is obtained. (Obtained from Wellinfo.db.) The primary aquifers identified in the vicinity of the Roswell Basin are as follows:

C.4. DOCUMENTATION OF SFWLE.DB (CONTINUED)

000EXRV	-	Extrusive Rocks
000IRSV	-	Intrusive Rocks
110AVMB	-	Alluvial Fill
110BLSN	-	Bolson Fill
1100PTOD	-	Pediment, Terrace, and other Deposits of Gravel, Sand and Caliche
110TURT	-	Tuerto Gravel of Santa Fe Group
112ANCH	-	Ancha Formation, Upper Part of Santa Fe Group
112CURB	-	Cuerbio Basalt
112SNTF	-	Santa Fe Group
121PUYEF	-	Puye Conglomerate, Fanglomerate Member
121TSUQ	-	Tesuque Formation, undifferentiated unit
123GLST	-	Galisteo Formation
210MNC	-	Mancos Shale
210MNCS	-	Mancos Shale
211MVRD	-	Mesa Verde Group
211PNLK	-	Point Lookout Sandstone
231DCKM	-	Dockum Group
310GLRT	-	Glorieta Sandstone
310SGRC	-	Sangre de Cristo Formation
310YESO	-	Yeso Formation
313SADR	-	San Andres Limestone
318ABO L	-	Abo Sandstone (Lower Tongue)
318ABO U	-	Abo Sandstone (Upper Tongue)
325MDER	-	Madera Limestone
325MDERL	-	Madera Limestone (Lower Gray Limestone Member)
325MDERU	-	Madera Limestone (Upper Arkosic Limestone Member)
400PCMB	-	Precambrian Erathern

---	N10	**X** - the X coordinate in feet using the state plane coordinate system.
---	N10	**Y** - the y coordinate in feet using the state plane coordinate system.
---	N8	**WLE** (A DBS&A generated field) - water-level elevation in feet above mean sea-level, obtained by subtracting the depth to water measurement (DTW) from the elevation of the land surface (LSD_feet).

C.5. DOCUMENTATION OF SFSPRNG.DB

Source: USGS Ground-Water Sites Inventory (GWSI)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989).

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
C172	A40	**SPRING NAME** (Name of spring) - local name of the spring.
C173	A1	**Spring type** (Type of spring) - code indicating the type of spring. The USGS codes are as follows: A - Artesian B - Perched and contact C - Contact D - Depression E - Perched and depression F - Fracture G - Geyser H - Perched and tubular J - Artesian and depression K - Artesian and seepage or filtration L - Fracture and depression P - Perched Q - Perched and fracture R - Perched and seepage or filtration S - Seepage or filtration T - Tubular - cave Z - Other
C176	1	**Improv** (Improvements) - code indicating the type of improvements. The USGS codes are as follows: B - Boxed or small covered basin C - Concrete basin

C.5. DOCUMENTATION OF SFSPRNG.DB (CONTINUED)

G - Gallery
H - Spring house
L - Lined
N - None
P - Pond
R - Pipe (not for conduction of water from spring)
T - Trough
Z - Other (explain in remarks)

C177	3	**Number of openings** (Number of spring openings) - number of spring openings. A 999 indicates that the openings are too numerous to count.

C.6. DOCUMENTATION OF SFSAMP.DB

Source: USGS National Well Inventory System (NWIS)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of some of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989). An explanation for water-quality fields was not available from the USGS, and thus the description provided below is based on the interpretation by DBS&A of the field name provided by the USGS. A -999999 recorded in a field indicates that no data were collected for that sampling event.

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
---	A21	**Local** (Local) - identifies the location of the well by the township, range and section. The largest subdivision of the quarter section is listed first. The NW quarter is identified with the number 1, NE as 2, SW as 3, and SE as 4.
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
---	N10	**Cntyc** (Cntyc) - denotes the state and county in which the site is located. The first two digits refer to the state code and the last two to the county code. The code for New Mexico is 35, and the code for Santa Fe County is 49.
---	A4	**Sitec** (Sitec) - code describing the type of site. GW - Ground Water SP - Spring
---	N10	**SAMPDATE** (Dates) - year, month, and day ground-water sample was collected.
C714	A10	**AQUIFCODE** (Gunit) - identifies the primary aquifer unit from which the water is obtained. The primary aquifers identified in the vicinity of the ~~Roswell Basin~~ are as follows: 000IRSV - Intrusive Rocks 110AVMB - Alluvial Fill 110BLSN - Bolson Fill

C.6. DOCUMENTATION OF SFSAMP.DB (CONTINUED)

110TURT - Tuerto gravel of Santa Fe Group
112ANCH - Ancha Formation of Santa Fe Group
112CURB - Cuerbio Basalt
112SNTF - Santa Fe Group
121PUYEF - Puye conglomerate, Fanglomerate member
121TSUQ - Tesuque Formation, undifferentiated unit
123GLST - Galisteo Formation
210MNCS - Mancos Shale
211MVRD - Mesa Verde Group
211PNLK - Point Lookout Sandstone
231DCKM - Dockum Group
310GLRT - Glorieta Sandstone
310SGRC - Sangre de Cristo Formation
310YESO - Yeso Formation
313SADR - San Andres Limestone
318ABO L - Abo Sandstone (Lower Tongue)
318ABO U - Abo Sandstone (Upper Tongue)
325MDER - Madera Limestone
400PCMB - Precambrian Erathen

72000	N10	**LSD** (Elevation of land surface datum, ft) - elevation of the ground surface in feet above mean sea level.
72001	N10	**Drildepth** (Depth of hole, drilled total, ft) - total depth well was drilled.
72002	N10	**DTWBZ** (Depth to top of water bearing zone, ft) - depth to the top of the water bearing zone.
72008	N10	**Casingdepth** (Depth of well, total, ft) - total depth of well (to bottom of casing or open interval).
00003	N10	**SampDepth** (Sampling depth) - depth (in feet) from top of casing to sample collection.
00010	N10	**Temp** (Water temperature) - temperature of water in degrees Celsius from well at time of sample collection.
00027	N10	**Collect agency** (Collecting agency) - code describing the agency collecting sample. USGS codes included in this field are as follows:

01028 - Geological Survey
80020 - Denver Central Laboratory

C.6. DOCUMENTATION OF SFSAMP.DB (CONTINUED)

00028	N10	**Lab** (Analyzing agency) - code describing the agency performing the water-chemistry analyses. USGS codes included in this field are as follows: 01028 - Geological Survey 80020 - Denver Central Laboratory
00059	N10	**Flow rate** (Flow rate instantaneous, gallons/minute) -discharge rate measured from well in gallons per minute at time of sample collection.
00095	N10	**Cond_25C** (Specific conduct us/cm @ 25C) - electrical conductivity, in micromhos per centimeter, of ground water at time of sample collection, corrected to 25°C.
00400	N10	**pH (field)** (pH, wh, field) - pH of ground-water sample measured in the field at time of sample collection.
00403	N10	**pH (lab)** (pH, wh, laboratory) - pH of ground-water sample measured in the laboratory.

C.7. DOCUMENTATION OF SFCARB.DB, SFMAJ.DB, SFMETL.DB, AND SFISO.DB

Source: USGS National Well Inventory System (NWIS)
Retrieved: December 1993

The following fields are included in this database. The field name utilized by the USGS is included in parentheses and the USGS Code is listed in the left column. A more detailed explanation of some of these codes is presented in the USGS GWSI coding manual (Babcock et al., 1989). An explanation for water-quality fields was not available from the USGS, and thus the description provided below is based on the interpretation by DBS&A of the field name provided by the USGS. A -999999 recorded in a field indicates that no data were collected for that sampling event.

DOCUMENTATION OF SFCARB.DB:

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
---	N10	**SAMPDATE** (Dates) - year, month and day ground-water sample was collected.
00405	N10	**CO2** (Carbon dioxide d (mg/l as CO_2)) - carbon dioxide concentration in milligrams per liter.
00410	N10	**Alk_CaCO3** (Alkalinity, wh, fe (mg/l as $CaCO_3$)) - alkalinity expressed as milligrams per liter of $CaCO_3$.
00440	N10	**HCO3** (Bicarbonate, wh, f (mg/l as HCO_3)) - bicarbonate concentration in milligrams per liter.
00445	N10	**CO3** (Carbonate, wh, fet (mg/l as CO_3)) - carbonate concentration in milligrams per liter.
00618	N10	**NO3_N** (Nitrogen nitrate (mg/l as N)) - nitrate concentration expressed as milligrams per liter of nitrogen.
00630	N10	**NO2+NO3_N** (NO_2 + NO_3 total (mg/l as N)) - nitrite and nitrate concentration expressed as milligrams per liter of nitrogen.
00660	N10	**PO4** (Phosphate ortho. (mg/l as PO_4)) - phosphate concentration in milligrams per liter.

C.7. DOCUMENTATION OF SFCARB.DB (CONTINUED)

00671	N10	**P** (Phosporus ortho. (mg/l as P)) - phosphorus concentration in milligrams per liter.
00900	N10	**Hardness_CaO3** (Hardness total (mg/l as CaO_3)) - total hardness expressed as calcium oxide in milligrams per liter.
00902	N10	**Noncarb Hard_CaCO3** (noncarbonate har (mg/l as $CaCO_3$)) - hardness of water attributed to non-carbonated elements (Mg) expressed as milligrams per liter of calcium carbonate.

C.7. DOCUMENTATION OF SFMAJ.DB:

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**SiteId** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
---	N10	**SAMPDATE** (Dates) - year, month and day ground-water sample was collected.
---	N10	**SAMPTIME** (Times) - time sample was collected.
00915	N10	**Ca** (Calcium dissolved (mg/l as Ca)) - calcium concentration from a filtered water sample in milligrams per liter.
00925	N10	**Mg** (magnesium dissolved (mg/l as Mg) - magnesium concentration from a filtered water sample in milligrams per liter.
00930	N10	**Na** (Sodium dissolved (mg/l as Na) - sodium concentration from a filtered water sample in milligrams per liter.
00931	N10	**SAR** (Sodium adsorption (ratio)) - sodium adsorption ratio.
00932	N10	**Na%** (Sodium percent) - milliequivalent of sodium divided by the total milliequivalent.
00933	N10	**Na+K** (Sodium + potassium (mg/l as Na)) - sodium and potassium concentration expressed as sodium in milligrams per liter.
00935	N10	**K** (Potassium dissolved (mg/l as K)) - potassium concentration from a filtered water sample in milligrams per liter.
00940	N10	**Cl** (Chloride dissolved (mg/l as Cl)) - chloride concentration from a filtered water sample in milligrams per liter.
00945	N10	**SO4** (Sulfate dissolved (mg/l as SO_4)) - sulfate concentration from a filtered water sample in milligrams per liter.
00950	N10	**F** (Flouride dissolved (mg/l as F)) - flouride concentration from a filtered water sample in milligrams per liter.
00955	N10	**SiO2** (Silica dissolved (mg/l as SiO_2)) - silica concentration from a filtered water sample in milligrams per liter.

C.7. DOCUMENTATION OF SFMETL.DB:

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the well location. The last two digits are a sequence number used to distinguish between sites of the same location.
---	N10	**SAMPDATE** (Dates) - year, month and day ground-water sample was collected.
01005	N10	**Ba_dis** (Barium dissolved (μg/l as Ba)) - barium concentration from a filtered water sample in micrograms per liter.
01020	N10	**B_dis** (Boron dissolved (μg/l as B)) - boron concentration from a filtered water sample in micrograms per liter.
01046	N10	**Fe_dis** (Iron dissolved (μg/l as Fe)) - iron concentration from a filtered water sample in micrograms per liter.
01056	N10	**Mn_dis** (Manganese dissolved (μg/l as Mn)) - manganese concentration from a filtered water sample in micrograms per liter.
01090	N10	**Zn_dis** (Zinc dissolved (μg/l as Zn)) - zinc concentration from a filtered water sample in micrograms per liter.
70300	N10	**TDS** (Residue dis 180C mg/l) - total dissolved solids concentration in milligrams per liter determined by evaporating a water sample at 180°C and weighing the remaining residue.
70301	N10	**TDS_sum** (Dissolved solids mg/l) - total dissolved solids concentration in milligrams per liter determined by adding the concentrations of measured constituents.

C.7. DOCUMENTATION OF SFISO.DB:

USGS CODE	FIELD LENGTH	FIELD NAME AND DESCRIPTION
C001	A15	**Siteid** (Siteid) - a unique number provided by the USGS which is initially formed from the latitude and longitude of the spring location. The last two digits are a sequence number used to distinguish between sites of the same location.
--	N10	**SAMPDATE** (Dates) - year, month and day ground-water sample was collected.
82085	N10	0 18/16 (Oxygen 18/16 Ratio Per MIL)
82082	N10	H 2/1 (Hydrogen 2/1 Ratio Per MIL)
82172	N10	C14 (Carbon 14 Percent)

C.8. DOCUMENTATION OF SFDOM.DB

Source: Neva Van Peski, Santa Fe Metropolitan Water Board
Retrieved: December 1993

This database is a list of the domestic wells and their locations. Neva Van Peski obtained the data from SEO well records. The following fields are included in this database.

FIELD LENGTH	FIELD NAME AND DESCRIPTION
A18	Podnum - the State Engineer Office file number.
A3	Township - identifies the township in which the well is located.
A3	Range - identifies the range in which the well is located.
A2	Section - identifies the section in which the well is located.
A6	Quarters - identifies the quarters in which the well is located.
A6	X - the X coordinate in feet using the state plane coordinate system.
A7	Y - the y coordinate in feet using the state plane coordinate system.

C.9. DOCUMENTATION OF SFRIGHTS.DB

Source: Neva Van Peski, Metropolitan Water Board
Retrieved: December 1993

This database is a compilation of water rights in the Rio Grande Basin in Santa Fe County. Neva Van Peski obtained the data from SEO files. The following fields are included in the database.

FIELD LENGTH	FIELD NAME AND DESCRIPTION
A15	Right - SEO file number for which the diversion rate is assigned.
A30	Business - Name of business or owner of the water right.
A30	Owner - Owner of business or water right.
A3	Twn - identifies the township for which the diversion of the right occurs.
A3	Rge - identifies the range for which the diversion of the right occurs.
A12	Sec - identifies the section for which the diversion of the right occurs.
A6	Qtrs - identifies the quarter sections for which the diversion of the right occurs.
A3	Purpose - indicates the use of the water as follows:

AGR - Agriculture
COM - Commercial
DAI - Dairy
DOM - Domestic
FGP -
FPO -
IND - Industrial
IRR - Irrigation
MDW - Mutual domestic water
MIN - Mineral exploration
MOB -
MUL -
MUN - Municipal
OIL - Oil
REC - Recreation
SAN - Sanitary
SCH - School
STK - Stock
XPL - Exploratory

C.9. DOCUMENTATION OF SFRIGHTS.DB (CONTINUED)

A3	Meter - indicates the schedule for which meter readings are to be submitted to the SEO as follows: ANN - Annual MON - Monthly NO - None QTR - Quarterly SEM - Semiannually
A70	Comments - provides diversion allocated to right and/or the status of the right.
A70	Comment 2 - additional explanation of right provided.
A70	Wells - lists additional SEO well numbers that corresponds to the subject right.
N	DIV - the total diversion for the right with units of Acre-Feet per year.

APPENDIX D

LIST OF WELL DATA USED TO PREPARE THE POTENTIOMETRIC MAP SHOWN IN PLATE 1

Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
10N.07E.03.444	287		19850509	6383.54	156.46	350649106102701	522679.00	1496603.96	USGS GWSI
10N.07E.04.242	415	325MDERU	19840410	6317.91	304.09	350720106113601	517111.29	1499734.16	USGS GWSI
10N.07E.09.442	420	325MDER	19841115	6287.42	312.58	350602106113301	517198.91	1491848.88	USGS GWSI
10N.07E.11.111	154		19880401	6377.36	152.64	350645106102101	523177.76	1496199.97	USGS GWSI
10N.07E.15.334A	365	325MDER	19850430	6297.76	257.24	350505106111802	518448.77	1486087.29	USGS GWSI
10N.07E.17.234	480	325MDER	19850501	6308.85	286.15	350533106125301	510553.02	1488914.07	USGS GWSI
10N.07E.17.241	420	325MDER	19850503	6301.7	295.3	350535106124501	511217.71	1489116.50	USGS GWSI
10N.07E.17.243	520	325MDER	19850503	6281.87	300.13	350528106123901	511716.55	1488409.04	USGS GWSI
10N.07E.17.441	400	325MDER	19840501	6310.65	314.35	350509106124101	511551.10	1486488.20	USGS GWSI
10N.07E.19.412	450	325MDER	19850507	6308.8	387.2	350423106135301	505568.66	1481836.19	USGS GWSI
10N.07E.20.121	435	325MDER	19850506	6304.1	357.9	350457106131801	508476.69	1485274.04	USGS GWSI
10N.07E.21.221	380		19850509	6289.51	300.49	350458106114001	516620.91	1485378.56	USGS GWSI
10N.07E.22.322	450	325MDER	19850506	6299.71	290.29	350434106105601	520279.16	1482954.58	USGS GWSI
10N.07E.22.411			19860602	6310.35	281.65	350435106105501	520362.20	1483055.73	USGS GWSI
10N.07E.23.21243	200	325MDER	19830309	6312.71	157.29	350458106094001	526593.46	1485385.79	USGS GWSI
10N.07E.24.132	238		19850507	6318.36	131.64	350446106090901	529170.89	1484175.08	USGS GWSI
10N.07E.24.224	264		19850508	6287	141	350436106081901	533327.41	1483168.50	USGS GWSI
10N.08E.01.442			19860630	6146.3	141.7	350656106015801	564961.80	1497373.82	USGS GWSI
10N.08E.03.244			19880401	6143.51	175.49	350713106040001	554657.79	1499071.74	USGS GWSI
10N.08E.03.3333	180		19830202	6343.56	14.44	350647106050301	549595.10	1496434.42	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

MSL = Mean sea level
LSD = Land surface datum

Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
10N.08E.04.3311	270		19800131	6168.47	209.53	350659106060701	544276.56	1497639.18	USGS GWSI
10N.08E.05.144			19860702	6228.5	161.5	350716106064201	541366.71	1499353.60	USGS GWSI
10N.08E.07.413	180		19860903	6269	168	350608106073801	536723.50	1492473.11	USGS GWSI
10N.08E.11.332A			19880209	6147.8	160.2	350607106035401	555334.71	1492400.76	USGS GWSI
10N.08E.13.1332	513	110BLSN	19890221	6136.93	137.07	350534106024801	560409.67	1489074.50	USGS GWSI
10N.08E.14.231			19860528	6135.55	153.45	350541106032801	557500.00	1489776.41	USGS GWSI
10N.08E.14.433			19870414	6138.83	121.17	350503106032901	557424.30	1485934.69	USGS GWSI
10N.08E.20.231			19860903	6153.5	195.5	350445106064001	541554.12	1484088.66	USGS GWSI
10N.08E.21.221	270	110AVMB	19850219	6159.45	158.55	350501106051901	548283.27	1485716.30	USGS GWSI
10N.08E.22.322			19860903	6151.9	143.1	350433106043401	552027.88	1482891.97	USGS GWSI
10N.08E.25.3111	238	110AVMB	19850219	6136.16	124.84	350340106025501	560099.90	1477852.45	USGS GWSI
10N.08E.33.431			19800131	6141.42	152.58	350231106052801	547142.97	1471055.92	USGS GWSI
10N.08E.35.33112	188	110AVMB	19850219	6134.76	115.24	350230106035401	555375.41	1470463.49	USGS GWSI
10N.09E.01.331			19860721	6227.02	66.98	350658105563701	591627.16	1497646.10	USGS GWSI
10N.09E.03.313			19860721	6142.76	127.24	350705105583801	581573.62	1498324.54	USGS GWSI
10N.09E.05.1113	325	110BLSN	19850219	6136.65	123.35	350737106004801	570766.96	1501531.94	USGS GWSI
10N.09E.07.323			19870414	6138.58	128.42	350613106013801	566632.95	1493030.44	USGS GWSI
10N.09E.08.111			19870414	6138.49	116.51	350643106005001	570613.78	1496072.45	USGS GWSI
10N.09E.19.121		310GLRT	19860528	6125.87	117.13	350500106012801	567064.74	1485752.62	USGS GWSI
10N.09E.22.1311	500	110BLSN	19820115	6144.02	95.98	350451105584101	581361.38	1484777.25	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

MSL = Mean sea level
LSD = Land surface datum

Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
10N.09E.26.2223		110BLSN	19870421	6139.93	92.07	350407105564101	591347.83	1480358.00	USGS GWSI
10N.09E.26.442	120	310GLRT	19870421	6133.11	86.89	350329105564201	591276.45	1476516.19	USGS GWSI
10N.09E.28.131			19860716	6127.2	97.8	350356105594501	576056.72	1479203.07	USGS GWSI
10N.09E.29.1334	140	110BLSN	19890221	6138.5	105.5	350344106004601	570988.91	1478078.55	USGS GWSI
10N.09E.33.11213	200	110BLSN	19850219	6136.15	103.85	350308105593501	576648.44	1475363.01	USGS GWSI
10N.10E.07.2314			19830223	6138.74	222.26	350631105545101	600441.90	1494944.94	USGS GWSI
10N.11E.14.3242			19830307	6808.23	127.77	350524105442701	652317.88	1488391.44	USGS GWSI
10N.11E.26.4444	110		19830307	6786.72	63.28	350324105435201	655289.46	1476275.08	USGS GWSI
11N.07E.02.224	620		19840924	6398.3	401.7	351243106092101	528127.97	1532396.20	USGS GWSI
11N.07E.13.122			19870818	6274	360	351103106085201	530544.59	1522289.04	USGS GWSI
11N.07E.19.211	370	110AVMB	19841001	6700.01	299.99	351008106135701	505230.08	1516713.58	USGS GWSI
11N.07E.21.144	160	110BLSN	19840821	6693.3	108.7	350947106120301	514611.71	1515301.38	USGS GWSI
11N.07E.22.11134	610	325MDERL	19840924	6537.5	242.5	351010106112501	517765.48	1517021.71	USGS GWSI
11N.07E.24.224	180		19850507	6293	172	350454106082001	533242.27	1484988.08	USGS GWSI
11N.07E.28.442	567	325MDER	19840410	6326.91	316.09	350843106112801	517604.72	1508125.28	USGS GWSI
11N.07E.29.211	252		19841001	6569.94	237.06	350921106125901	510046.68	1511963.36	USGS GWSI
11N.07E.29.242	625	325MDER	19841001	6304.38	437.62	350908106123201	512289.04	1510649.97	USGS GWSI
11N.07E.33.424			19860702	6368.85	266.15	350754106113201	517275.43	1503171.46	USGS GWSI
11N.07E.33.442	400		19811231	6311	312	350749106112901	517524.89	1502666.13	USGS GWSI
11N.08E.16.2434			19830303	6175.85	234.15	351043106051401	548642.26	1520291.25	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
11N.08E.27.2124			19880401	6173.59	158.41	350918106041901	553223.05	1511706.00	USGS GWSI
11N.08E.30.211			19860718	6267.28	255.72	350923106074501	536117.98	1512185.78	USGS GWSI
11N.08E.33.444			19860630	6142.4	211.6	350740106050701	549253.94	1501791.87	USGS GWSI
11N.09E.14.34434	430	231DCKM	19850219	6233.44	169.56	351017105571201	588659.71	1517755.19	USGS GWSI
11N.09E.29.143			19890221	6146.9	127.1	350859106002901	572324.95	1509825.49	USGS GWSI
11N.09E.35.2221	306		19880330	6181.9	156.1	350832105564401	591016.60	1507147.22	USGS GWSI
11N.10E.16.311			19880330	6266.02	287.98	351044105532401	607577.26	1520547.25	USGS GWSI
11N.11E.09.1112			19880330	6769.67	45.33	351202105470301	639166.24	1528564.08	USGS GWSI
11N.11E.32.22221			19880330	6701.42	55.58	350831105471201	638518.73	1507229.32	USGS GWSI
11N.11E.36.3411			19830208	6805.78	69.22	350752105433601	656477.30	1503375.50	USGS GWSI
12N.07E.04.421	219		19880316	6475.63	206.37	351747106114001	516577.47	1563120.80	USGS GWSI
12N.07E.34.224	600	318ABOU	19840924	6513.18	466.82	351332106102801	522232.99	1537547.09	USGS GWSI
12N.08E.35.4433	271		19880330	6188.5	246.5	351255106031201	558742.76	1533654.16	USGS GWSI
12N.09E.17.3332	256		19830307	6483.23	115.77	351534106004601	570818.01	1549754.92	USGS GWSI
12N.09E.26.1232	60		19880330	6496.61	55.39	351427105571601	588252.48	1543028.18	USGS GWSI
12N.10E.21.1114	200		19880331	6264.95	119.05	351525105531601	608137.75	1548957.74	USGS GWSI
12N.11E.07.121	136		19880331	6513.3	69.7	351718105485501	629731.95	1560468.66	USGS GWSI
13N.07E.02.31		211MVRD	19830305	6385	55				Madrid Water Coop., 1983
13N.07E.02.432		211MVRD	19830305	6338.5	12.5				Madrid Water Coop., 1983
13N.07E.10.1323	165		19880329	6469.35	26.65	352217106113401	517059.03	1590417.45	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
13N.07E.14.3333			19880316	6768.47	31.53	352051106103701	521785.66	1581726.12	USGS GWSI
13N.08E.07.13	104	211MVRD	19830305	6429.5	70.5				Madrid Water Coop., 1983
13N.09E.26.44432			19830209	6026.36	78.64	351912105565001	590321.09	1571847.39	USGS GWSI
13N.10E.14.4444			19830322	6227.01	84.99	352106105503901	621016.34	1583482.54	USGS GWSI
13N.10E.17.443			19830329	6305.2	154.8	352057105534901	605281.59	1582512.34	USGS GWSI
14N.07E.13.2241	50		19880329	5603.47	36.53	352653106083701	531686.52	1618332.89	USGS GWSI
14N.07E.17.3312	208		19830223	5541.5	188.5	352624106133501	507032.96	1615384.78	USGS GWSI
14N.07E.25.122	150		19880329	5971.11	28.89	352518106085801	529958.91	1608726.63	USGS GWSI
14N.07E.35.322	153	211MVRD	19830305	6092	48				Madrid Water Coop., 1983
14N.07E.36.1314	135	211MVRD	19820909	6039	66				Madrid Water Coop., 1983
14N.07E.36.3311	212	211MVRD	19821107	5828	212				Madrid Water Coop., 1983
14N.08E.01.333			19880316	6066.52	53.48	352754106030701	558975.89	1624542.06	USGS GWSI
14N.08E.02.3243	115	112ANCH	19880316	6032.9	87.1	352805106035201	555251.61	1625646.93	USGS GWSI
14N.08E.13.1241	130	123GLST	19890218	6031.77	73.23	352647106024801	560643.74	1617973.92	USGS GWSI
14N.08E.20.130	565		19800606	5790	60	352545106072001	538065.81	1611465.68	USGS GWSI
14N.08E.29.111	210	123GLST	19820518	5911	89				Madrid Water Coop., 1983
14N.09E.04.3	320		19820721	6040	120				VeneKlasen, Oct. 1984
14N.09E.06.223			19880316	6174.65	145.35	352833106011601	568148.14	1628504.81	USGS GWSI
14N.09E.25.333	125		19821218	6046	24				VeneKlasen, Oct. 1984
14N.09E.26.4224			19830208	6080.72	26.28	352443105565201	590053.20	1605310.55	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

MSL = Mean sea level
LSD = Land surface datum

Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
14N.09E.35.444	40		19810414	6004	26				VeneKlasen, Oct. 1984
14N.09E.36.31343 A	80		19820118	6029.36	20.64	352344105564302	590816.51	1599347.97	USGS GWSI
14N.10E.04.1241			19880330	6400.38	40.62	352836105531201	608175.93	1628928.18	USGS GWSI
14N.10E.07.31312	205	110AVMB	19820114	6226.96	32.04	352718105554301	595713.35	1620999.04	USGS GWSI
14N.10E.15.3133	103		19820118	6295.98	74.02	352620105523301	611453.46	1615190.56	USGS GWSI
14N.10E.34.42241	1654		19880330	6141.55	88.45	352349105513701	616147.22	1599942.39	USGS GWSI
14N.11E.27.3141			19880326	6639.57	0.43	352438105460301	643773.40	1605018.21	USGS GWSI
14N.11E.27.3212			19880326	6642.67	17.33	352445105455301	644597.65	1605729.96	USGS GWSI
14N.11E.29.4232	470		19880331	6372.46	425.54	352437105472701	636821.05	1604884.00	USGS GWSI
15N.07E.26.21312 WALDO	300		19830223	5934.66	144.34	353024106100201	524636.38	1639658.29	USGS GWSI
15N.07E.34.4221			19880329	5774.27	25.73	352914106104001	521500.00	1632578.79	USGS GWSI
15N.08E.22.24221 PEACH T	96		19890211	6129.37	85.63	353108106042001	552902.34	1644144.06	USGS GWSI
15N.08E.25.1141	86		19890216	6113.25	71.75	353022106030201	559359.23	1639505.75	USGS GWSI
15N.09E.01.3314	350		19820118	6531.92	153.08	353313105563901	590969.45	1656875.19	USGS GWSI
15N.09E.14.11413 A	74		19860210	6467.97	59.03	353205105574501	585536.28	1649983.86	USGS GWSI
15N.09E.14.11413 B	300		19890218	6467.84	59.16	353205105574502	585536.28	1649983.86	USGS GWSI
15N.09E.33.3443	200		19890218	6271.62	53.38	352846105593301	576663.25	1629840.10	USGS GWSI
15N.10E.03.3313	180	400PCMB	19890218	7119.27	50.73	353314105523501	611377.37	1657046.74	USGS GWSI
15N.10E.09.2412	220		19880326	7056.92	33.08	353251105524201	610559.90	1654718.27	USGS GWSI
15N.10E.11.3142	70		19880326	7088.11	21.89	353231105511501	617756.93	1652724.22	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

MSL = Mean sea level
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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
15N.10E.11.4342	70		19880326	6909.66	10.34	353218105504401	620324.06	1651420.29	USGS GWSI
15N.10E.16.4112	210		19880326	6926.62	58.38	353146105525801	609262.28	1648141.69	USGS GWSI
15N.10E.16.4422	435		19880326	6849.67	40.33	353132105523401	611251.24	1646733.72	USGS GWSI
16N.08E.01.32444	311		19880323	6167.96	282.04	353830106024101	560992.53	1688847.06	USGS GWSI
16N.08E.12.13114	400		19860204	6170.77	252.23	353803106031001	558604.52	1686112.38	USGS GWSI
16N.08E.13.444	337	121TSUQ	19890211	6132.9	262.1	353636106021001	563576.15	1677326.79	USGS GWSI
16N.08E.14.444	181		19800118	6149.7	160.3	353637106031701	558043.99	1677416.39	USGS GWSI
16N.08E.17.2122	244		19890211	6152.73	65.27	353725106064401	540945.99	1682240.39	USGS GWSI
16N.08E.26.32112	395	121TSUQ	19890211	6155.72	129.28	353516106035801	554674.07	1669220.58	USGS GWSI
16N.08E.26.44334	200		19880316	6140.06	99.94	353449106032401	557487.47	1666496.21	USGS GWSI
16N.08E.26.4443	250		19880316	6139.43	127.57	353449106031901	557900.45	1666497.02	USGS GWSI
16N.08E.33.4343	108	112ANCH	19890211	6114.11	40.89	353358106054301	546014.58	1661319.72	USGS GWSI
16N.09E.01.211	300		19830302	7021.7	18.3	353903105561501	592840.08	1692267.36	USGS GWSI
16N.09E.01.31121	290		19890211	6823.11	121.89	353838105564301	590537.22	1689732.52	USGS GWSI
16N.09E.02.121	291		19820119	6640.1	249.9	353908105573201	586484.18	1692753.37	USGS GWSI
16N.09E.02.31212	393	121TSUQ	19820119	6636.74	198.26	353845105574101	585748.30	1690425.80	USGS GWSI
16N.09E.02.432			19880318	6680.51	219.49	353825105570401	588808.05	1688412.85	USGS GWSI
16N.09E.03.1213 A	130	112ANCH	19890216	6683.97	58.03	353906105583801	581038.20	1692535.54	USGS GWSI
16N.09E.06.4333 GONZALES	415		19880317	6133.76	386.24	353822106043601	566359.08	1688049.93	USGS GWSI
16N.09E.06.44414	308		19830303	6306.65	243.35	353822106010801	568670.09	1688055.27	USGS GWSI

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
16N.09E.08.21123			19880317	6519.37	24.63	353810106002701	572057.07	1686850.18	USGS GWSI
16N.09E.08.22212	195		19830228	6508.15	96.85	353818106000501	573870.90	1687663.54	USGS GWSI
16N.09E.10.42114	244	112ANCH	19890211	6595.57	224.43	353735105581201	583782.65	1685162.68	USGS GWSI
16N.09E.13.141 (new)	708	123GLST	19850100	6869	151				Lazarus, June 1985
16N.09E.13.141 (old)	375	123GLST	19850100	6855	165				Lazarus, June 1985
16N.09E.15.143			19830302	6604.48	115.52	353656105583901	580992.10	1679391.90	USGS GWSI
16N.09E.19.2212			19880317	6292.53	167.47	353629106011301	568284.09	1676629.68	USGS GWSI
16N.09E.24.111	400		19830828	6640	320				VeneKlasen, Dec. 1984
16N.09E.24.213	348		19820527	6769	216				VeneKlasen, Dec. 1984
16N.09E.24.340	360		19800917	6612	293				VeneKlasen, Dec. 1984
16N.09E.25.422	290	121TSUQ	19850100	6903	89				Lazarus, June 1985
16N.10E.06.23341	205		19880328	7153.89	66.11	353846105550701	598457.56	1690566.98	USGS GWSI
16N.10E.07.21321			19830210	7160.04	64.96	353810105550701	598469.83	1686927.25	USGS GWSI
16N.10E.08.313			19880328	7289.25	30.75	353738105544001	600709.56	1683699.54	USGS GWSI
16N.10E.17.42234	127	400PCMB	19890218	7429.96	50.04	353654105534301	605513.10	1679369.00	USGS GWSI
16N.10E.20.344	320	400PCMB	19850100	7200	40				Lazarus, June 1985
16N.10E.30.144	160	400PCMB	19850100	6854	168				Lazarus, June 1985
16N.10E.33.121	510	400PCMB	19850100	7176	164				Lazarus, June 1985
16N.11E.22.324	380		19830321	7383.13	136.87	353559105454201	645170.80	1673877.05	USGS GWSI
16N.11E.27.1141	313		19880331	7379.75	80.25	353538105460501	643281.90	1671744.52	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

MSL = Mean sea level
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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
17N.09E.24.343	180		19890216	6954.92	35.08	354100105562701	591812.57	1704093.37	USGS GWSI
17N.09E.27.441	989		19890225	6631.76	213.24	354013105580601	583659.55	1699316.93	USGS GWSI
17N.09E.28.32443	285		19830208	6497.9	257.1	354011105593201	576564.68	1699095.24	USGS GWSI
17N.09E.28.423 B	58	110AVMB	19890216	6701.31	16.69	354019105590801	578542.63	1699909.33	USGS GWSI
17N.09E.29.43433	259		19880323	6561.32	148.68	353958106002401	572277.67	1697769.96	USGS GWSI
17N.09E.30.43424			19830127	6272.44	337.56	354009106012101	567572.08	1698870.83	USGS GWSI
17N.09E.31.324	600		19880323	6161.69	428.31	353918106013701	566263.69	1693711.52	USGS GWSI
17N.09E.32.312442	50		19880323	6567.51	27.49	353933106004901	570221.02	1695237.33	USGS GWSI
17N.09E.32.41234	137		19830126	6560.54	74.46	353925106002101	572533.48	1694434.15	USGS GWSI
17N.09E.32.44321	250	112ANCH	19810112	6518.29	126.71	353917106001101	573360.70	1693627.39	USGS GWSI
17N.09E.33.2112	290		19880323	6507.66	202.34	354002105592101	577474.65	1698187.70	USGS GWSI
17N.09E.33.32142	240	112ANCH	19880323	6506.54	178.46	353934105593501	576326.95	1695353.76	USGS GWSI
17N.09E.33.43212	251		19870319	6504.59	225.41	353923105591501	577980.23	1694245.98	USGS GWSI
17N.09E.34.4224	820		19830224	6626.11	224.89	353925105575201	584828.72	1694467.29	USGS GWSI
17N.09E.35.1314A	1952	121TSUQ	19880225	6799.06	80.94	353945105574501	585400.43	1696491.04	USGS GWSI
17N.09E.35.1314B	1060	121TSUQ	19880225	6690.49	189.51	353945105574502	585400.43	1696491.04	USGS GWSI
17N.09E.35.1314C	780	121TSUQ	19880228	6557.5	322.5	353945105574503	585400.43	1696491.04	USGS GWSI
17N.09E.35.2422			19830303	6768.85	231.15	353943105564801	590104.28	1696302.97	USGS GWSI
17N.09E.36.4332	170		19880328	7001.25	28.75	353910105560801	593415.49	1692976.93	USGS GWSI
17N.10E.29.412	124	400PCMB	19850100	7437	53				Lazarus, June 1985

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
17N.10E.29.441	390	400PCMB	19850100	7526	64				Lazarus, June 1985
17N.10E.30.121			19880328	7093.68	66.32	354053105552601	596846.89	1703401.91	USGS GWSI
17N.10E.31.134	150		19890225	7089.91	45.09	353936105552701	596790.21	1695616.64	USGS GWSI
17N.10E.32.414	340	400PCMB	19850100	7527	43				Lazarus, June 1985
18N.07E.01.22424	1410		19850321	5707.34	2.66	354931106083301	531867.36	1755630.93	USGS GWSI
18N.08E.17.21314	310		19830324	5813.12	236.88	354744106065201	540199.15	1744822.93	USGS GWSI
18N.09E.10.24211	164	121TSUQ	19890204	6359.79	50.21	354830105575801	584174.16	1749567.98	USGS GWSI
18N.09E.24.2424	206		19880328	6738.13	71.87	354640105554501	595164.79	1738480.15	USGS GWSI
18N.09E.24.4341	136	121TSUQ	19880328	6681.05	48.95	354612105560401	593608.42	1735644.11	USGS GWSI
18N.09E.25.13111	269		19890225	6633.2	231.8	354555105564501	590235.27	1733914.64	USGS GWSI
18N.09E.31.42424	695		19800115	6229.79	490.21	354443106011001	568414.59	1726575.51	USGS GWSI
18N.09E.35.2214	308		19890225	6691.12	283.88	354512105565801	589177.31	1729563.80	USGS GWSI
18N.10E.06.24312	22		19880328	6841.23	8.77	354917105545001	599642.00	1754369.00	USGS GWSI
18N.10E.06.24314	75	110AVMB	19860213	6824.81	25.19	354916105544901	599724.69	1754268.18	USGS GWSI
18N.10E.07.2441	597	121TSUQ	19830111	6778.06	301.94	354823105544401	600154.93	1748910.96	USGS GWSI
18N.10E.07.342	315		19880328	6678.16	231.84	354800105551601	597527.07	1746576.54	USGS GWSI
18N.10E.18.13112	211	121TSUQ	19890204	6720.16	99.84	354738105553901	595639.86	1744345.91	USGS GWSI
18N.10E.18.132	350		19830110	6715.31	142.69	354736105552801	596546.68	1744146.70	USGS GWSI
18N.10E.20.1443	217	121TSUQ	19830118	7167.71	152.29	354636105541301	602746.48	1738101.53	USGS GWSI
19N.07E.35.4122A	300	121TSUQ	19880115	5436.72	18.28	355006106094801	525688.38	1759163.52	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
19N.07E.35.4122C	69	110AVMB	19880115	5450.15	4.85	355006106094803	525688.38	1759163.52	USGS GWSI
19N.07E.35.4212A	280	121TSUQ	19880115	5443.14	26.86	355003106094301	526100.33	1758860.57	USGS GWSI
19N.07E.35.4212B	130	110AVMB	19880115	5470.28	-0.28	355003106094302	526100.33	1758860.57	USGS GWSI
19N.07E.35.4212C	60	110AVMB	19880115	5458.69	11.31	355003106094303	526100.33	1758860.57	USGS GWSI
19N.07E.35.4222A	294	121TSUQ	19880115	5441.04	38.96	355002106093701	526594.43	1758759.91	USGS GWSI
19N.07E.35.4222B	169	110AVMB	19880115	5474.96	5.04	355002106093702	526594.43	1758759.91	USGS GWSI
19N.07E.35.4222C	60	110AVMB	19880115	5464.3	15.7	355002106093703	526594.43	1758759.91	USGS GWSI
19N.07E.36.3113 SF-2A	1863	112SNTF	19880705	5568.28	-28.28	355000106092801	527335.65	1758558.39	USGS GWSI
19N.07E.36.3113 SF-2B	824	112SNTF	19880505	5360.1	179.9	355000106092802	527335.65	1758558.39	USGS GWSI
19N.07E.36.3113 SF-2C	346	112SNTF	19880505	5374.4	165.6	355000106092803	527335.65	1758558.39	USGS GWSI
19N.08E.04.44242	125		19830113	5638.5	46.5	355408106052301	547466.95	1783658.91	USGS GWSI
19N.08E.06.4224	40	110AVMB	19880325	5514.09	8.91	355411106074001	536196.25	1783945.94	USGS GWSI
19N.08E.08.42121	70	110TURT	19880325	5555.72	14.28	355337106063701	541383.81	1780515.24	USGS GWSI
19N.08E.09.2114	85	110AVMB	19880325	5565.9	44.1	355355106054701	545494.65	1782341.34	USGS GWSI
19N.08E.10.12322	84		19880325	5624.15	35.85	355353106045501	549772.98	1782146.17	USGS GWSI
19N.08E.10.32434	150		19830113	5644.32	55.68	355322106045301	549942.93	1779012.13	USGS GWSI
19N.08E.11.3341	120	121TSUQ	19880325	5641.37	73.63	355313106040701	553729.42	1778108.94	USGS GWSI
19N.08E.12.3332	125		19880325	5688.87	51.13	355313106030801	558584.00	1778118.36	USGS GWSI
19N.08E.12.3414	95		19830113	5725.58	39.42	355315106025201	559900.08	1778323.26	USGS GWSI
19N.08E.12.3421	52		19880325	5739.07	0.93	355319106024801	560228.36	1778728.38	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet) X Location	State Plane Coordinates (feet) Y Location	Information Source
19N.08E.12.4122	53		19890225	5744.21	10.79	355333106022601	562035.47	1780147.70	USGS GWSI
19N.08E.12.4323	179		19880325	5737.42	32.58	355317106023101	561627.54	1778529.10	USGS GWSI
19N.08E.13.133	59	112SNTF	19830406	5734.5	50.5	355257106023701	561138.13	1776505.91	USGS GWSI
19N.08E.18.2311	60	121TSUQ	19880325	5508.78	6.22	355253106080001	534560.38	1776057.57	USGS GWSI
19N.09E.04.2212	97		19880324	5985.43	49.57	355448105590401	578634.48	1787771.17	USGS GWSI
19N.09E.05.300			19830105	5846.06	33.94	355356106003201	571409.12	1782494.79	USGS GWSI
19N.09E.05.3232	68		19830105	5857.15	32.85	355413106004201	570582.24	1784211.60	USGS GWSI
19N.09E.05.4113	150		19830105	5866.33	38.67	355417106003001	571568.40	1784618.46	USGS GWSI
19N.09E.06.2311	100		19880324	5849.59	20.41	355433106013201	566464.40	1786224.02	USGS GWSI
19N.09E.06.2333	180		19880324	5843.98	26.02	355422106013601	566137.91	1785111.08	USGS GWSI
19N.09E.06.4133	78	121TSUQ	19880324	5835.06	14.94	355410106013201	566469.74	1783898.54	USGS GWSI
19N.09E.07.1333	60		19880324	5777.08	12.92	355332106020701	563598.92	1780049.99	USGS GWSI
19N.09E.07.1414	55		19880324	5793.24	16.76	355339106014701	565242.84	1780761.40	USGS GWSI
19N.09E.07.2214	54		19880324	5823.83	6.17	355352106011201	568119.32	1782082.43	USGS GWSI
19N.09E.07.2221	100	110AVMB	19830107	5833.53	6.47	355355106011001	568283.15	1782386.14	USGS GWSI
19N.09E.08.1224	36	110AVMB	19880324	5874.69	5.31	355352106003601	571081.04	1782089.55	USGS GWSI
19N.09E.08.2131	78		19880324	5869.59	0.41	355350106003001	571575.16	1781888.55	USGS GWSI
19N.09E.09.1444	75		19880322	5926.67	13.33	355332105592701	576763.02	1780081.90	USGS GWSI
19N.09E.09.21211	180		19880324	5945.08	59.92	355356105591701	577579.27	1782510.68	USGS GWSI
19N.09E.09.2311			19880322	5956.04	53.96	355342105592701	576760.34	1781092.98	USGS GWSI

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Summary of Water Level Elevation Data

Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
19N.09E.09.2423	75		19880324	5973.47	21.53	355339105590001	578982.53	1780795.63	USGS GWSI
19N.09E.09.3213	63	110AVMB	19880324	5918.44	31.56	355327105594001	575694.76	1779573.55	USGS GWSI
19N.09E.10.22344	300		19880324	6053.7	56.3	355345105580001	583917.19	1781416.17	USGS GWSI
19N.09E.10.3233	200		19880324	5993.07	26.93	355320105583601	580962.47	1778880.04	USGS GWSI
19N.09E.10.4112	75	110AVMB	19880316	6029.68	25.32	355328105581701	582523.47	1779693.32	USGS GWSI
19N.09E.21.34343	100	121TSUQ	19890204	6012.18	47.82	355120105595201	574740.56	1766730.38	USGS GWSI
19N.10E.32.3433	180		19830117	6960.31	69.69	354937105542201	601940.67	1756399.14	USGS GWSI
20N.08E.12.23412	80		19890204	5668.59	31.41	355854106023001	561637.11	1812602.71	USGS GWSI
20N.09E.01.2223	50		19830103	6141.67	13.33	355957105554801	594653.78	1819062.09	USGS GWSI
20N.09E.01.4444	50	110AVMB	19880321	6114.32	45.68	355911105554301	595079.94	1814412.41	USGS GWSI
20N.09E.04.2234	105		19880321	5827.11	32.89	355948105590501	578469.76	1818103.51	USGS GWSI
20N.09E.05.2443	50		19880321	5793.07	6.93	355938106000501	573542.29	1817079.42	USGS GWSI
20N.09E.05.3224	104		19880321	5753.32	36.68	355931106003501	571078.93	1816365.48	USGS GWSI
20N.09E.06.4422	75	110AVMB	19880321	5746.91	28.09	355922106010601	568533.75	1815449.33	USGS GWSI
20N.09E.07.1414	89	110OPTOD	19880322	5718.36	16.64	355852106014601	565253.61	1812408.44	USGS GWSI
20N.09E.17.1234			19830103	6526.7	53.3	355803106004101	570607.66	1807466.68	USGS GWSI
20N.09E.18.32221			19880322	5714.1	45.9	355750106014001	565761.00	1806140.82	USGS GWSI
20N.09E.18.4243	150		19880322	5724.32	15.68	355737106011301	567983.53	1804831.55	USGS GWSI
20N.09E.18.4421	200		19880322	5742.42	58.58	355736106011101	568148.18	1804730.82	USGS GWSI
20N.09E.19.4244	212		19880322	5723.2	96.8	355649106010701	568488.27	1799979.50	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

MSL = Mean sea level
LSD = Land surface datum

Summary of Water Level Elevation Data

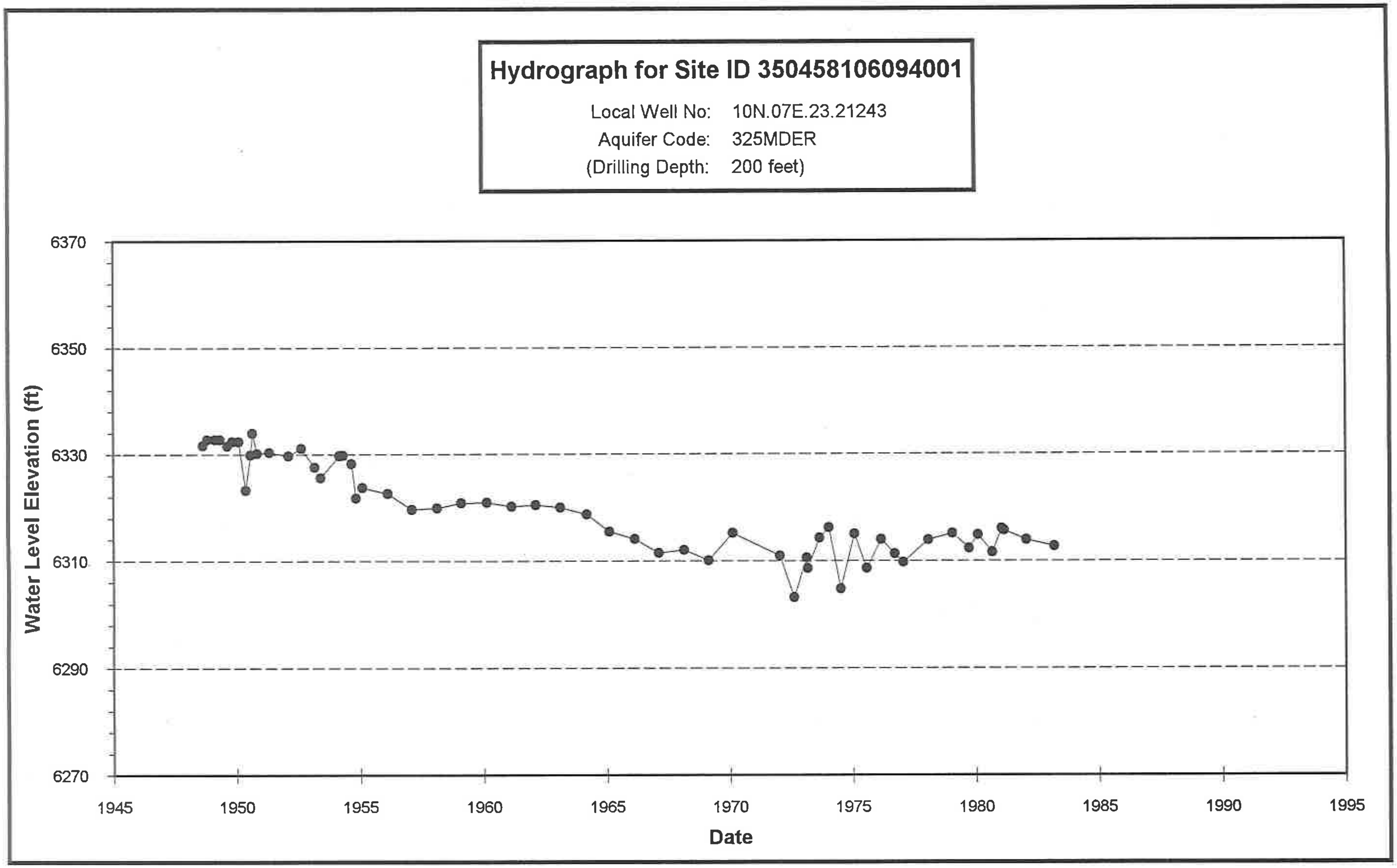
Local Well Number	Well Depth (feet below LSD)	Aquifer Code	Depth to Water Date	Water Level Elevation (feet above MSL)	Depth to Water (feet below LSD)	Site ID	State Plane Coordinates (feet)		Information Source
							X Location	Y Location	
20N.09E.24.24343	225	121TSUQ	19830103	6360.79	119.21	355700105555301	594301.42	1801164.44	USGS GWSI
20N.09E.30.4241	300	110OPTOD	19880322	5763.53	136.47	355558106010901	568336.02	1794822.60	USGS GWSI
20N.09E.32.31233	212	121TSUQ	19880322	5835.93	144.07	355509106005501	569499.20	1789871.05	USGS GWSI
20N.10E.07.1111	76		19880321	6117.06	47.94	355907105554201	595163.45	1814008.24	USGS GWSI
20N.10E.17.1412	48	110AVMB	19880321	6521.29	23.71	355802105541401	602418.56	1807460.91	USGS GWSI
20N.10E.17.44312	123		19880321	6575.82	89.18	355730105534601	604731.85	1804233.68	USGS GWSI

Note: Fields explained in Documentation of Database (Appendix C)

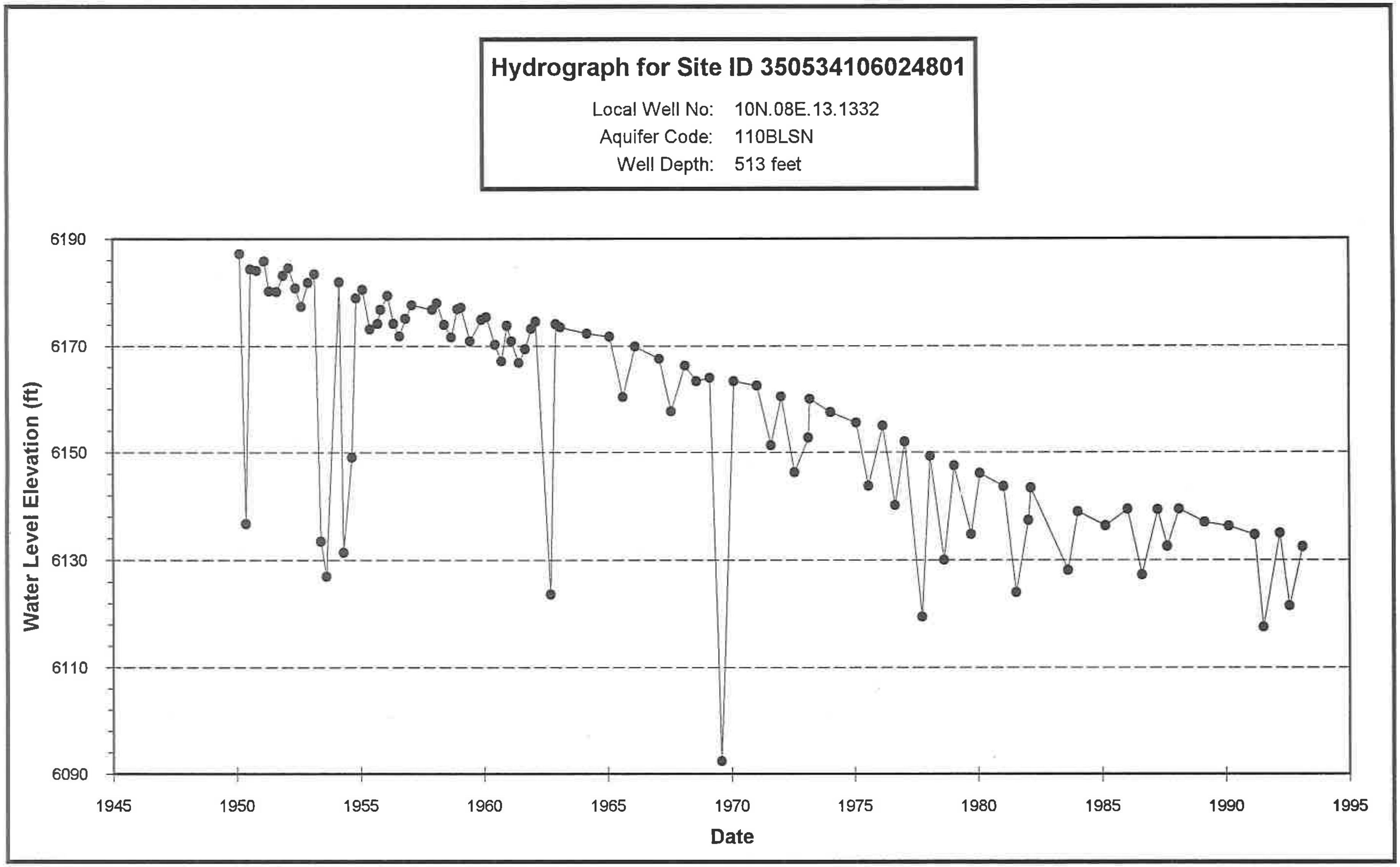
MSL = Mean sea level
LSD = Land surface datum

APPENDIX E

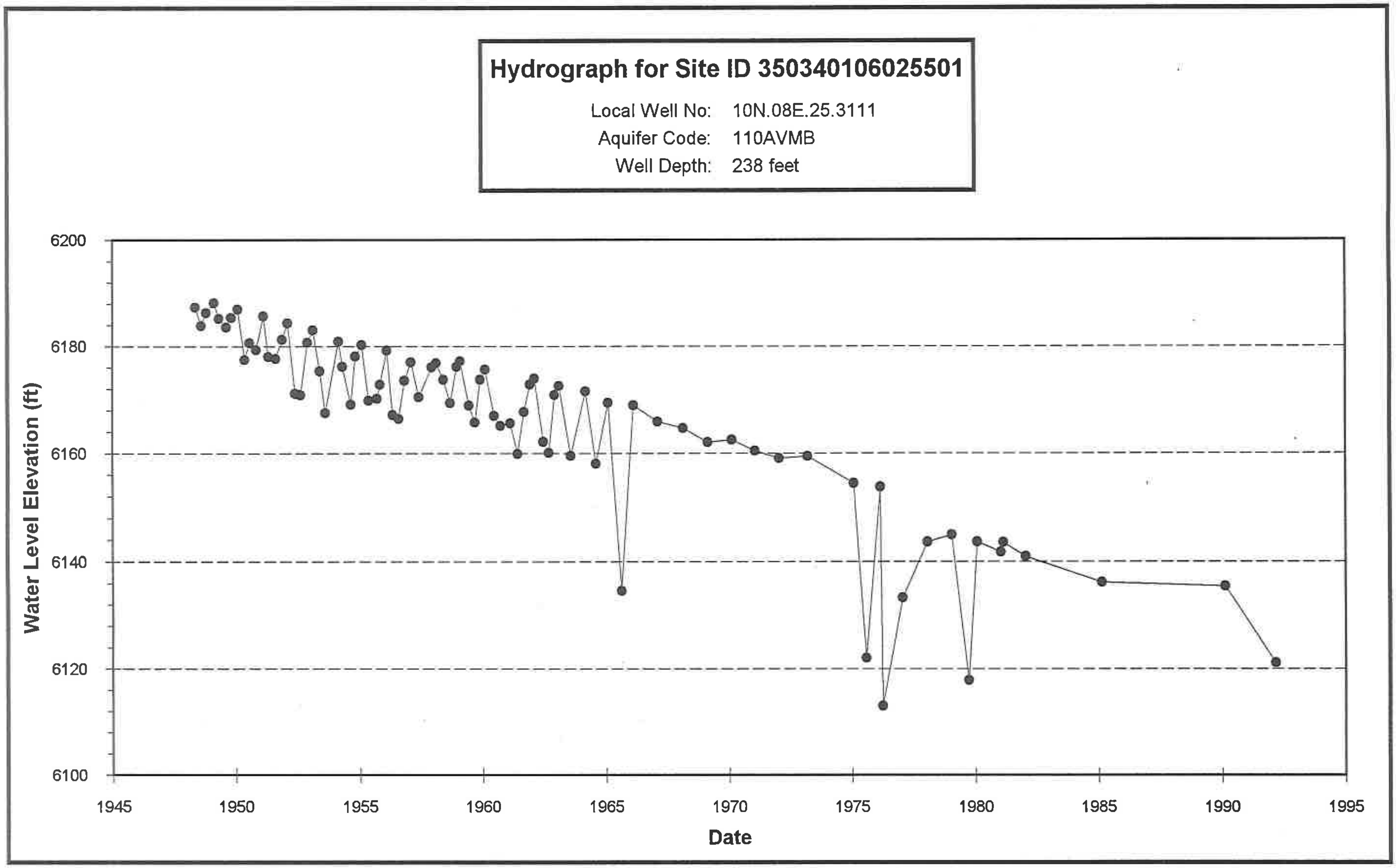
HYDROGRAPHS FOR WELLS THROUGHOUT SANTA FE COUNTY INCLUDING LIST OF WELL DATA USED TO PREPARE HYDROGRAPHS



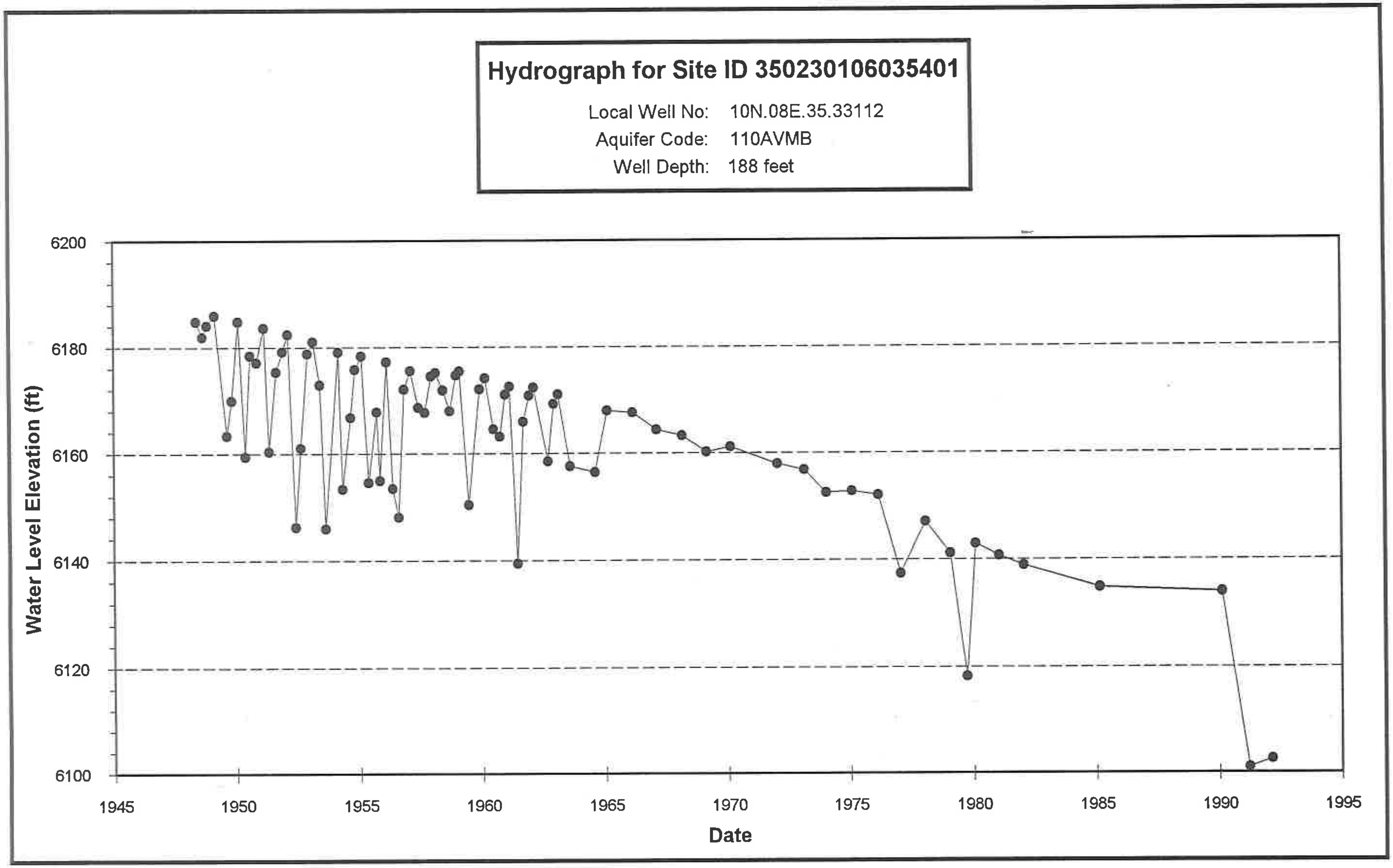
Hydrograph for Site ID 350458106094001
Local Well No: 10N.07E.23.21243
Aquifer Code: 325MDER
(Drilling Depth: 200 feet)
Water Level Elevation (ft)
6370
6350
6330
6310
6290
6270
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



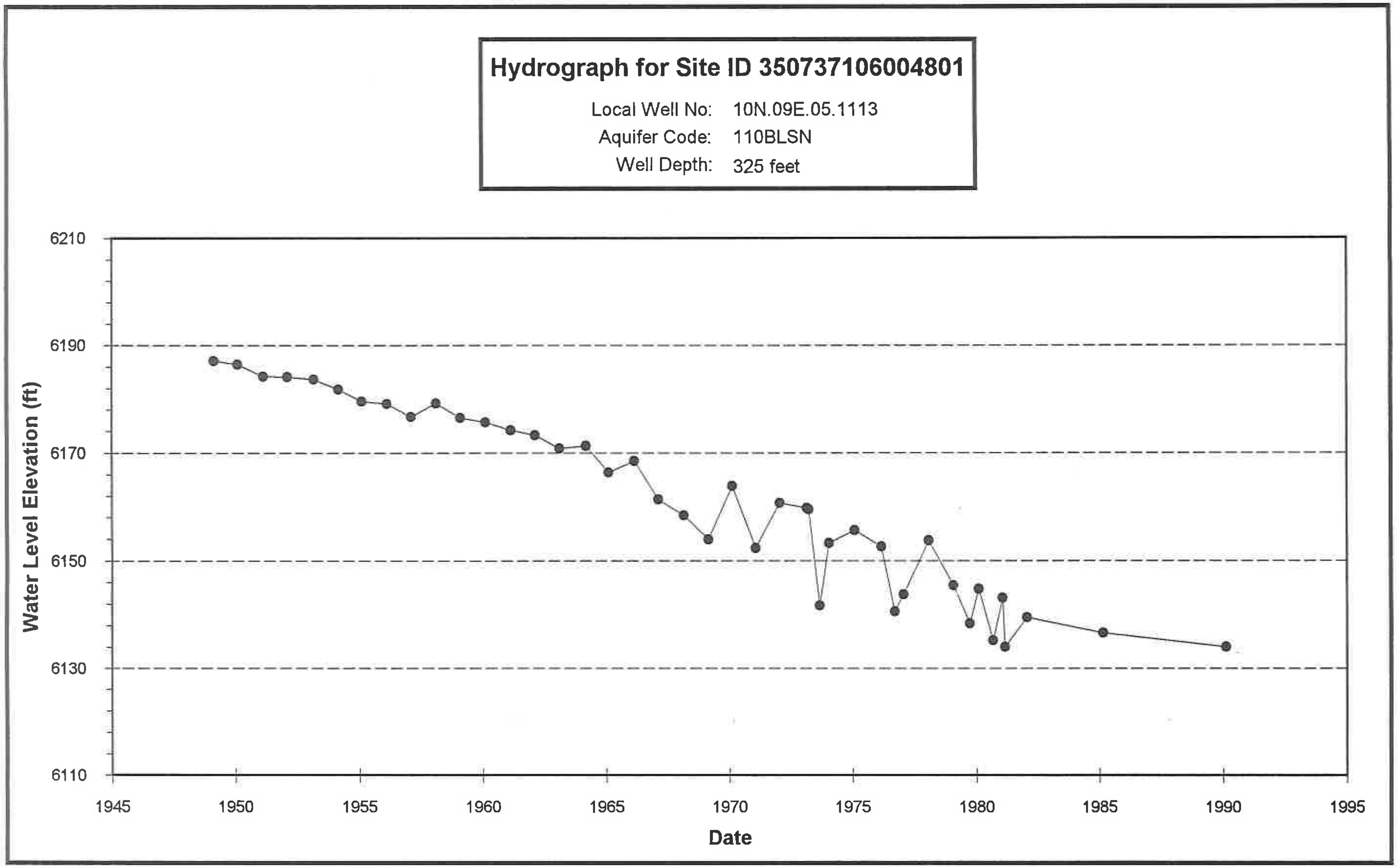
Hydrograph for Site ID 350534106024801
Local Well No: 10N.08E.13.1332
Aquifer Code: 110BLSN
Well Depth: 513 feet
Water Level Elevation (ft)
6190
6170
6150
6130
6110
6090
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

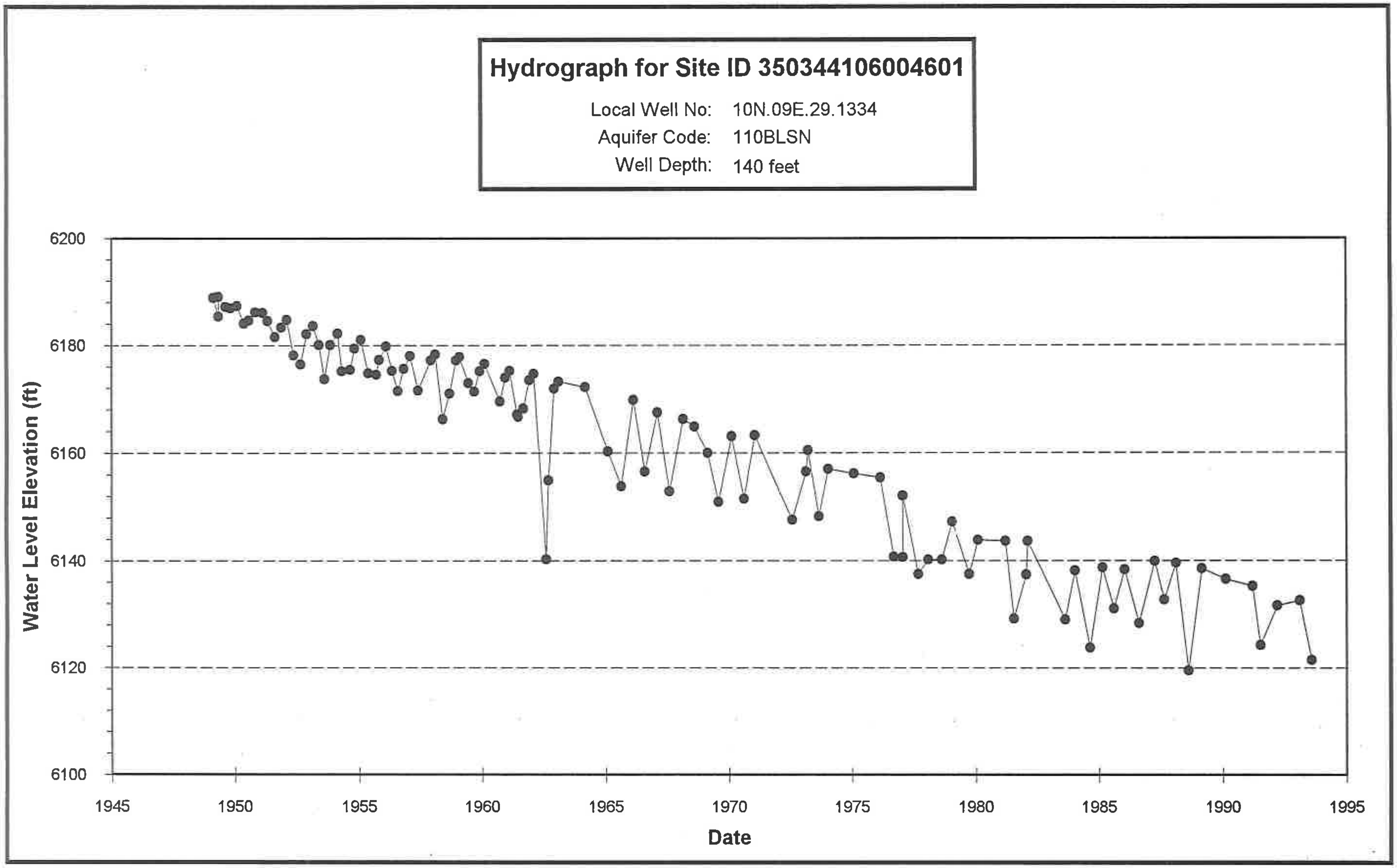


Hydrograph for Site ID 350340106025501
Local Well No: 10N.08E.25.3111
Aquifer Code: 110AVMB
Well Depth: 238 feet
Water Level Elevation (ft)
6200
6180
6160
6140
6120
6100
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

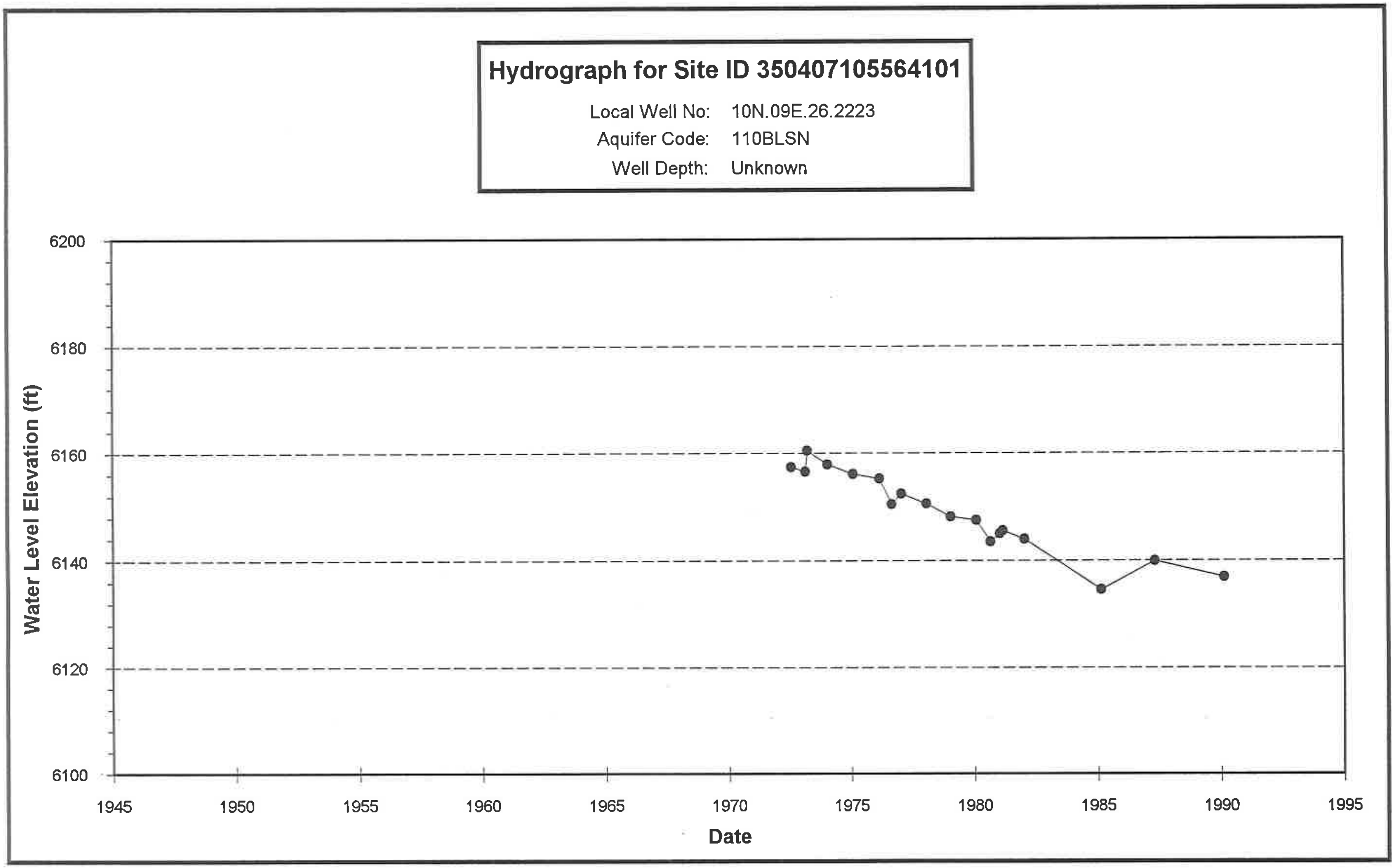


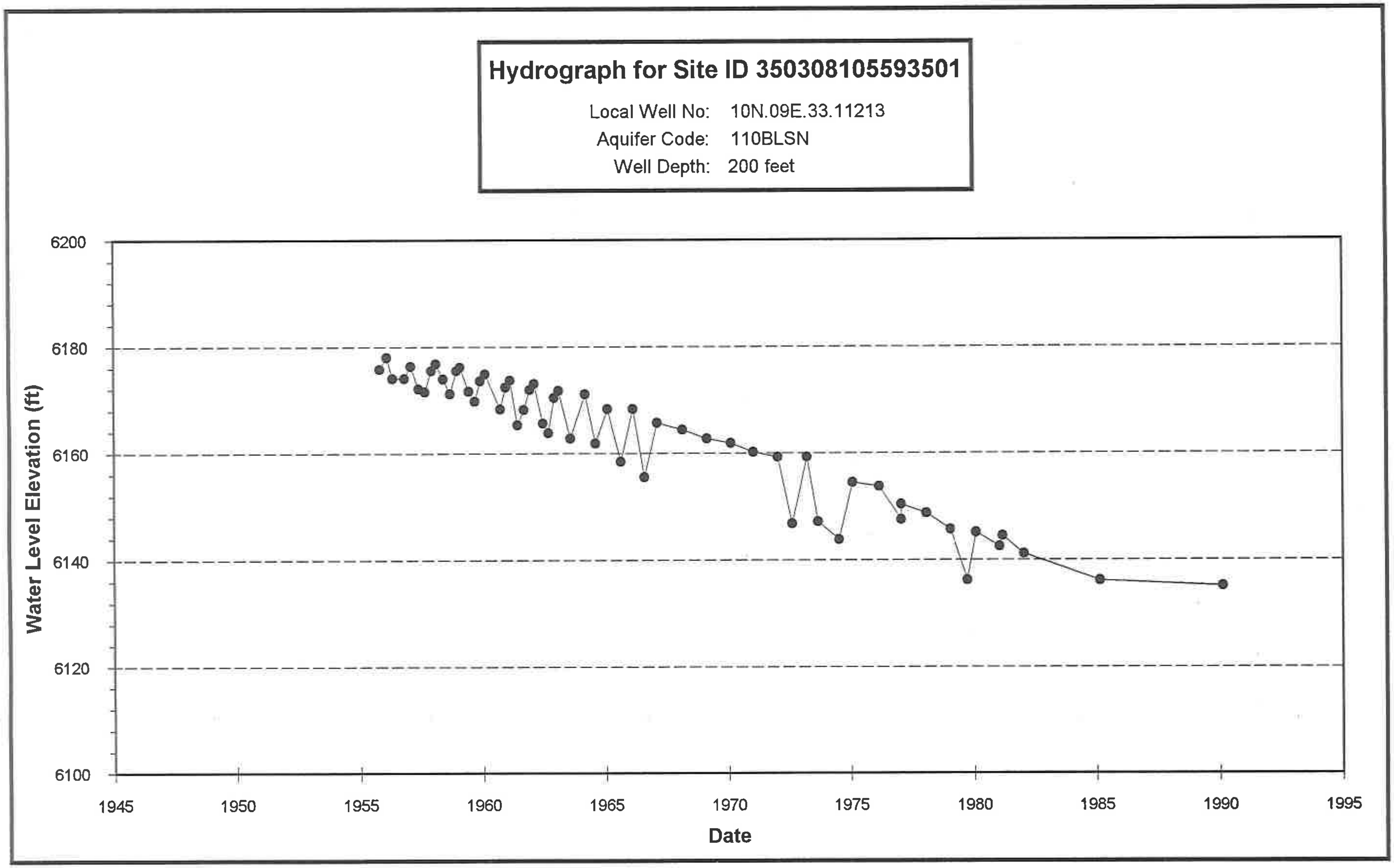
Hydrograph for Site ID 350230106035401
Local Well No: 10N.08E.35.33112
Aquifer Code: 110AVMB
Well Depth: 188 feet
Water Level Elevation (ft)
6200
6180
6160
6140
6120
6100
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

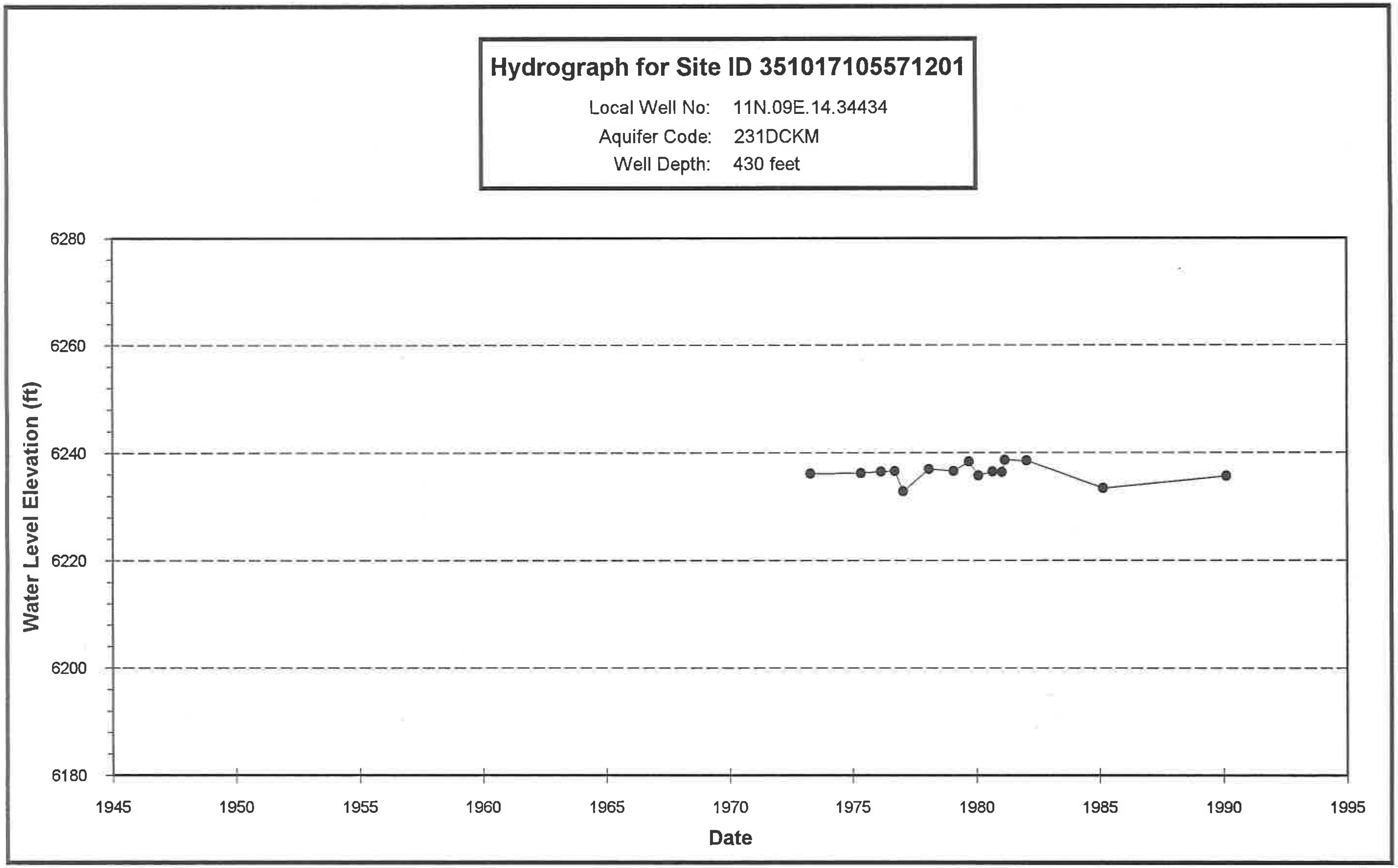

Hydrograph for Site ID 350737106004801
Local Well No: 10N.09E.05.1113
Aquifer Code: 110BLSN
Well Depth: 325 feet
Water Level Elevation (ft)
6210
6190
6170
6150
6130
6110
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



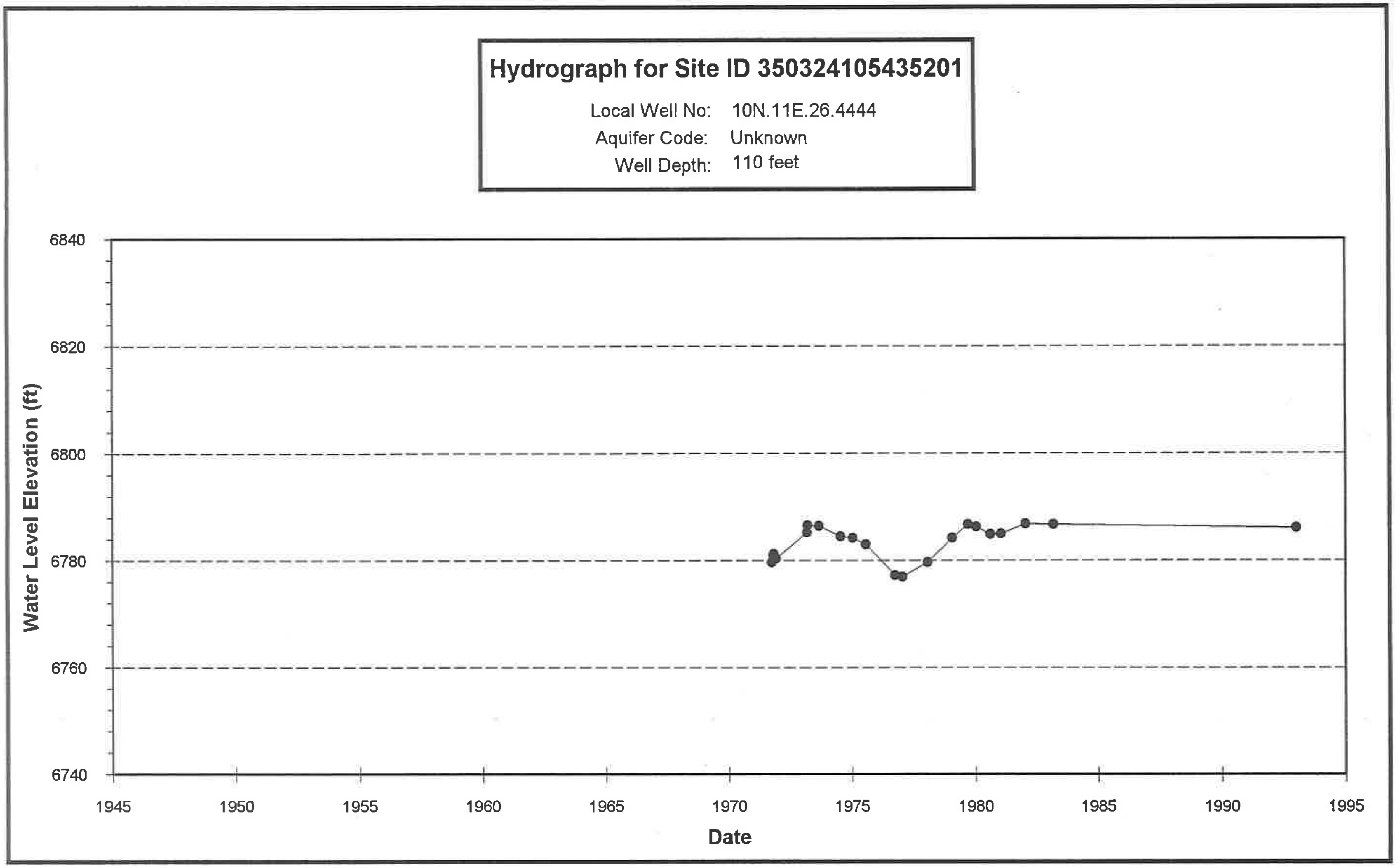
Hydrograph for Site ID 350344106004601
Local Well No: 10N.09E.29.1334
Aquifer Code: 110BLSN
Well Depth: 140 feet
6200
6180
6160
6140
6120
6100
Water Level Elevation (ft)
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date


Hydrograph for Site ID 350407105564101
Local Well No: 10N.09E.26.2223
Aquifer Code: 110BLSN
Well Depth: Unknown
Water Level Elevation (ft)
6200
6180
6160
6140
6120
6100
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date


Hydrograph for Site ID 350308105593501
Local Well No: 10N.09E.33.11213
Aquifer Code: 110BLSN
Well Depth: 200 feet
Water Level Elevation (ft)
6200
6180
6160
6140
6120
6100
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



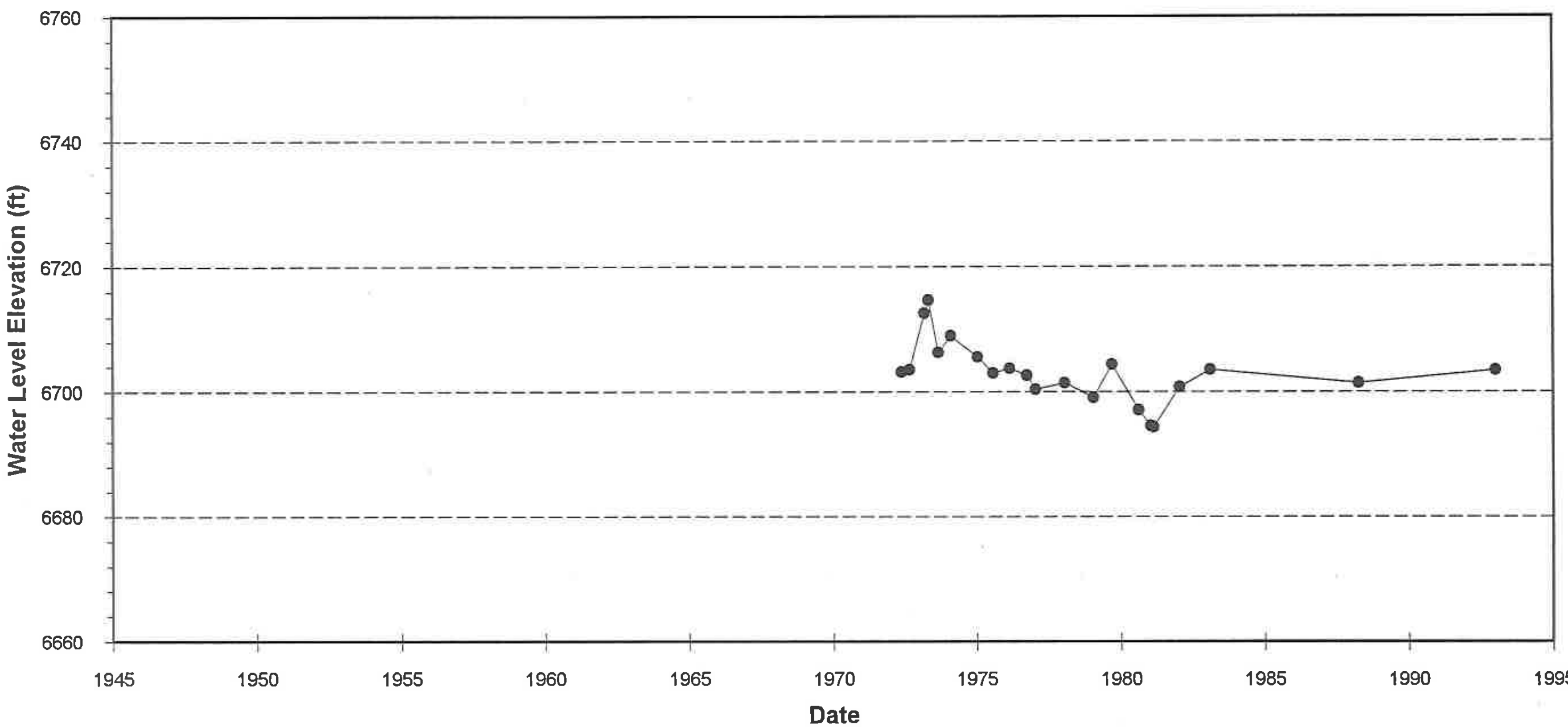
Hydrograph for Site ID 351017105571201
Local Well No: 11N.09E.14.34434
Aquifer Code: 231DCKM
Well Depth: 430 feet
Water Level Elevation (ft)
6280
6260
6240
6220
6200
6180
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

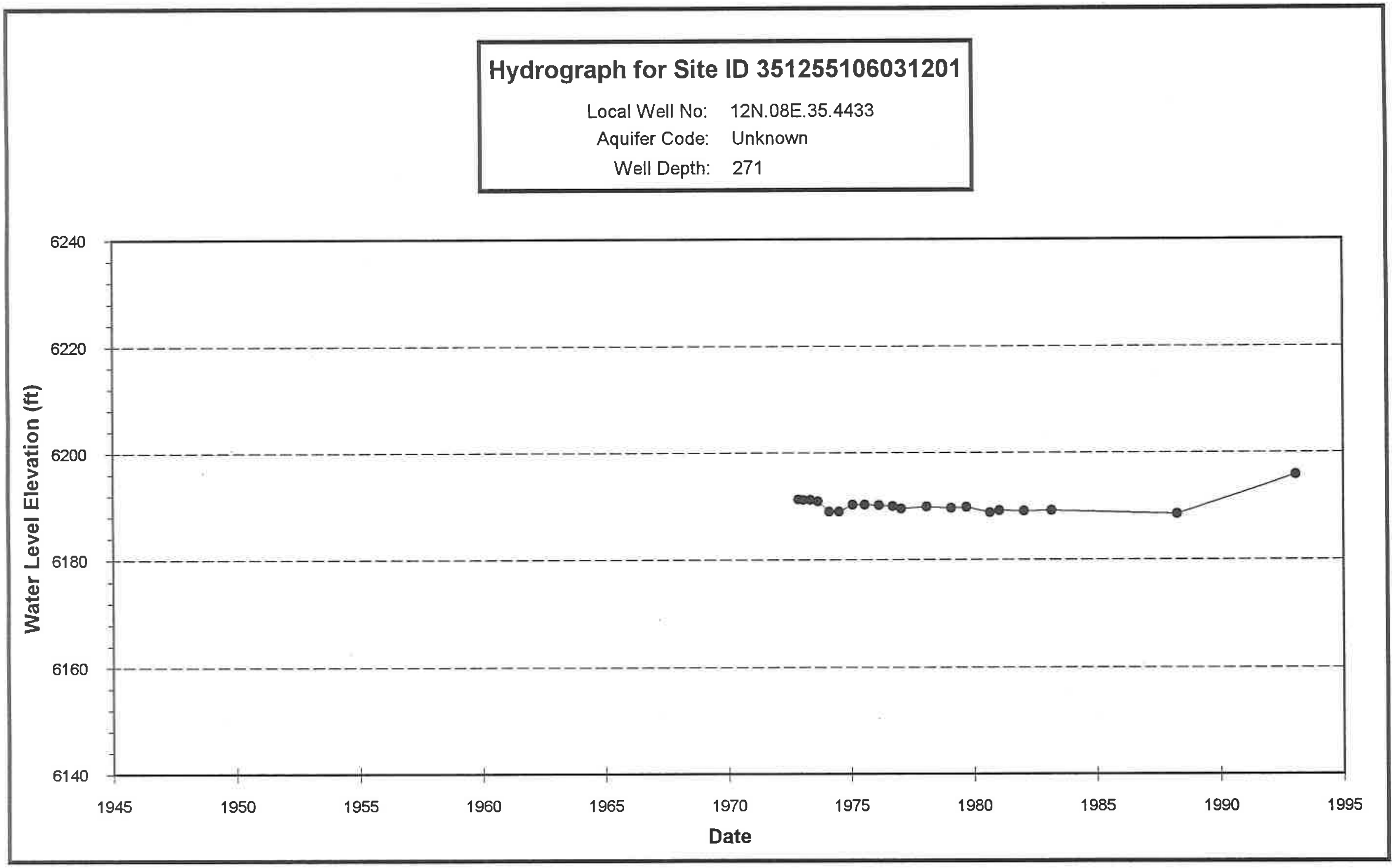


Hydrograph for Site ID 350324105435201
Local Well No: 10N.11E.26.4444
Aquifer Code: Unknown
Well Depth: 110 feet
Water Level Elevation (ft)
6840
6820
6800
6780
6760
6740
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

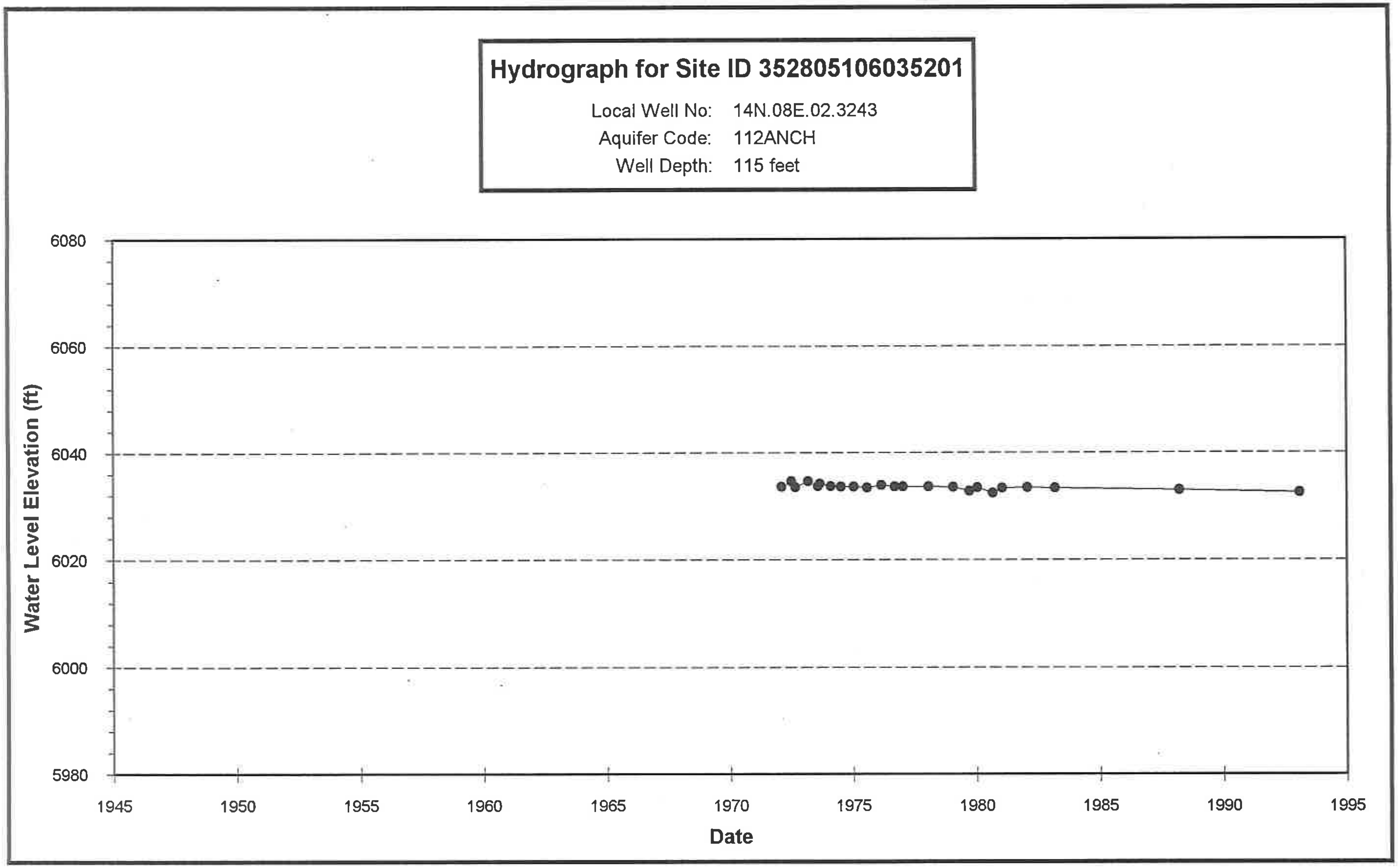
Hydrograph for Site ID 350831105471201

Local Well No: 11N.11E.32.22221
Aquifer Code: Unknown
Well Depth: Unknown

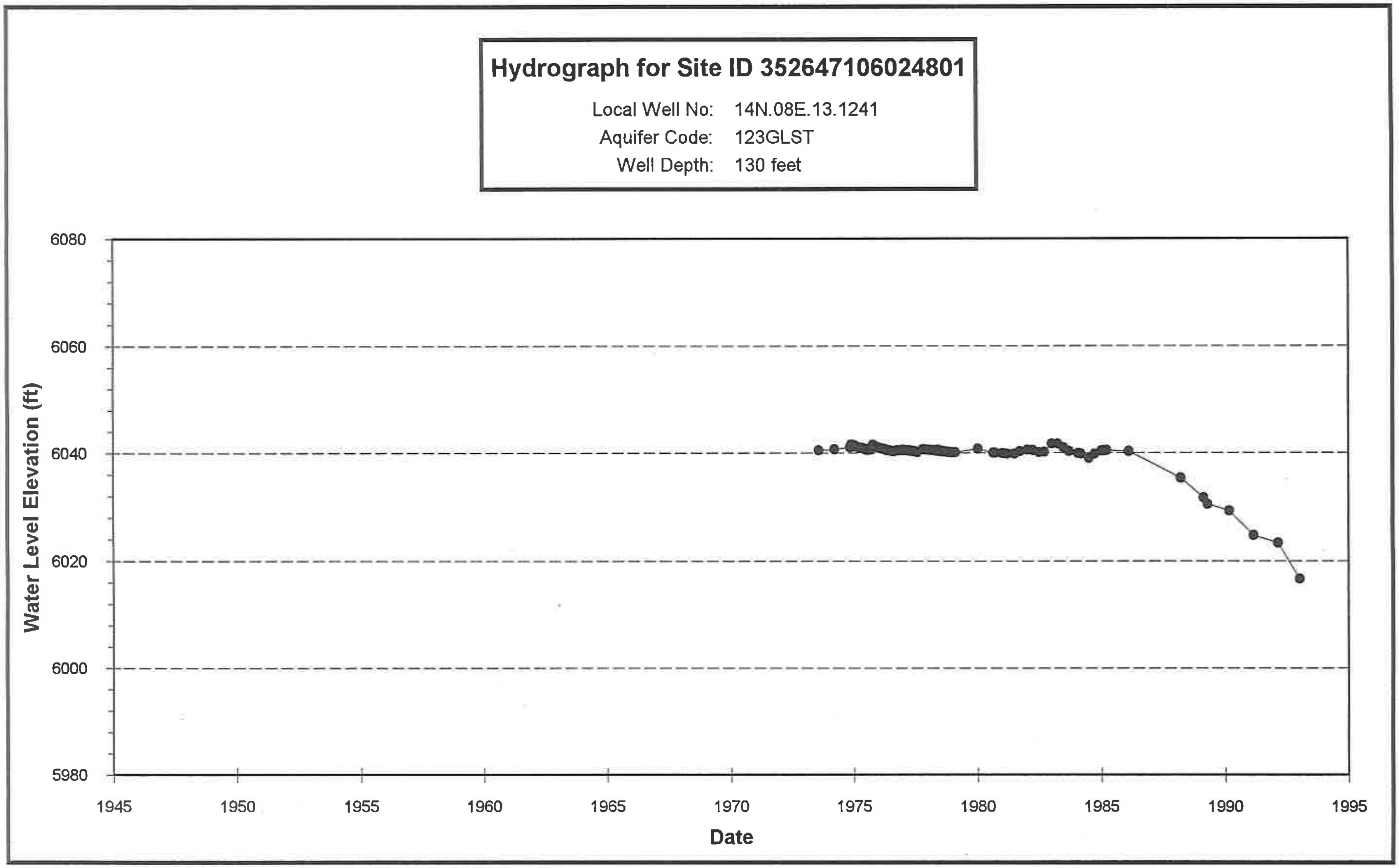




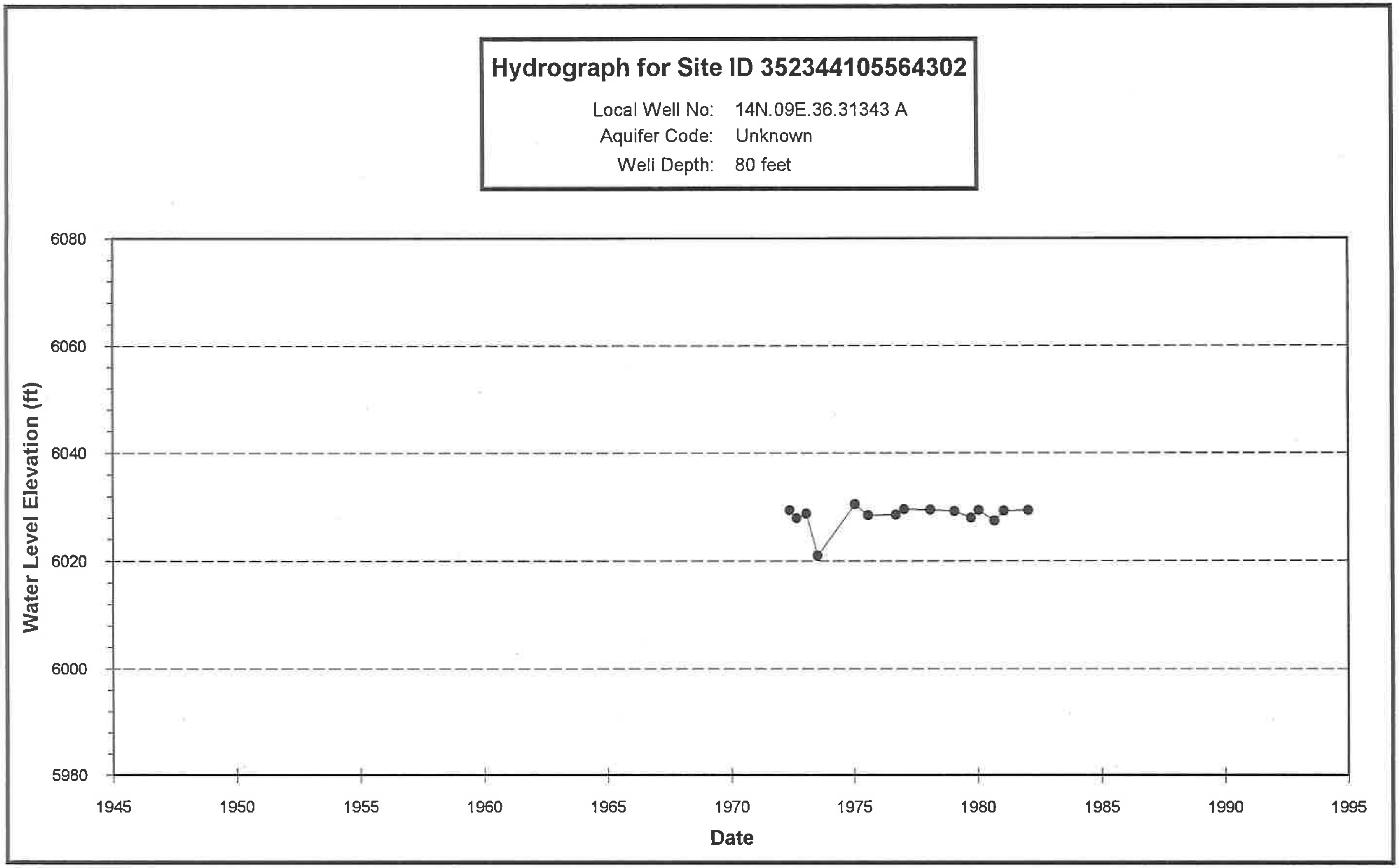
Hydrograph for Site ID 351255106031201
Local Well No: 12N.08E.35.4433
Aquifer Code: Unknown
Well Depth: 271
Water Level Elevation (ft)
6240
6220
6200
6180
6160
6140
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



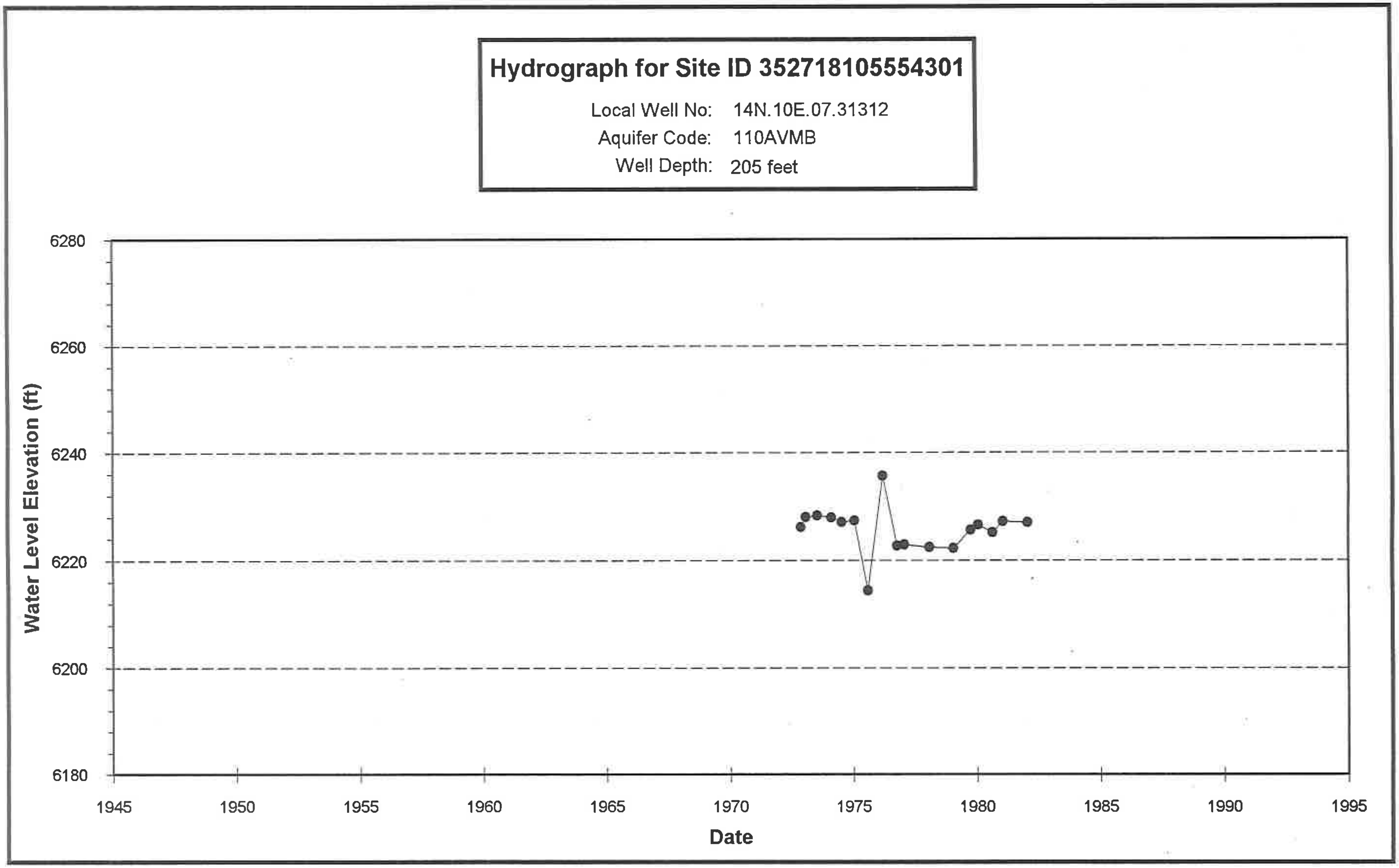
Hydrograph for Site ID 352805106035201
Local Well No: 14N.08E.02.3243
Aquifer Code: 112ANCH
Well Depth: 115 feet
Water Level Elevation (ft)
6080
6060
6040
6020
6000
5980
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

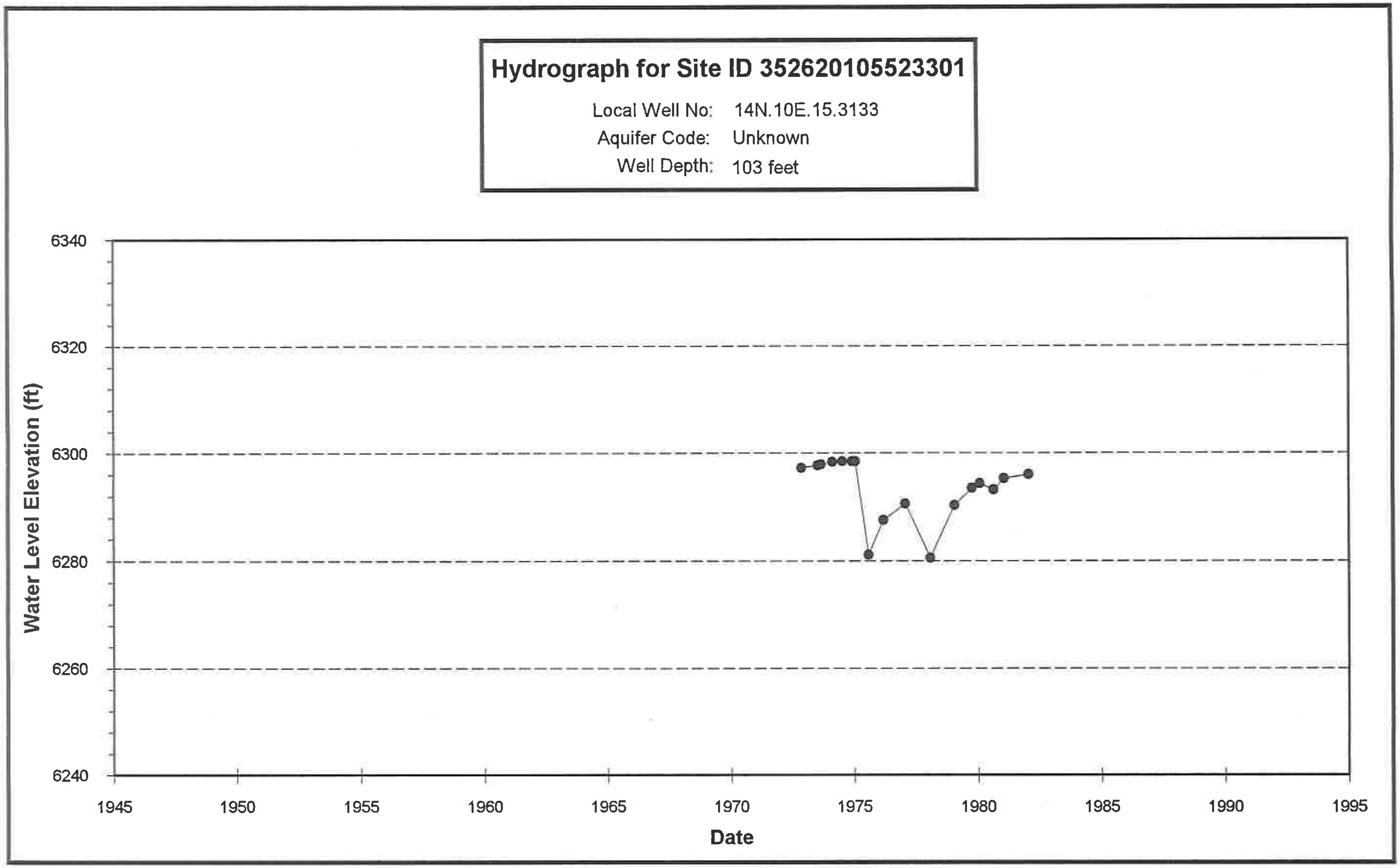


Hydrograph for Site ID 352647106024801
Local Well No: 14N.08E.13.1241
Aquifer Code: 123GLST
Well Depth: 130 feet
Water Level Elevation (ft)
6080
6060
6040
6020
6000
5980
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

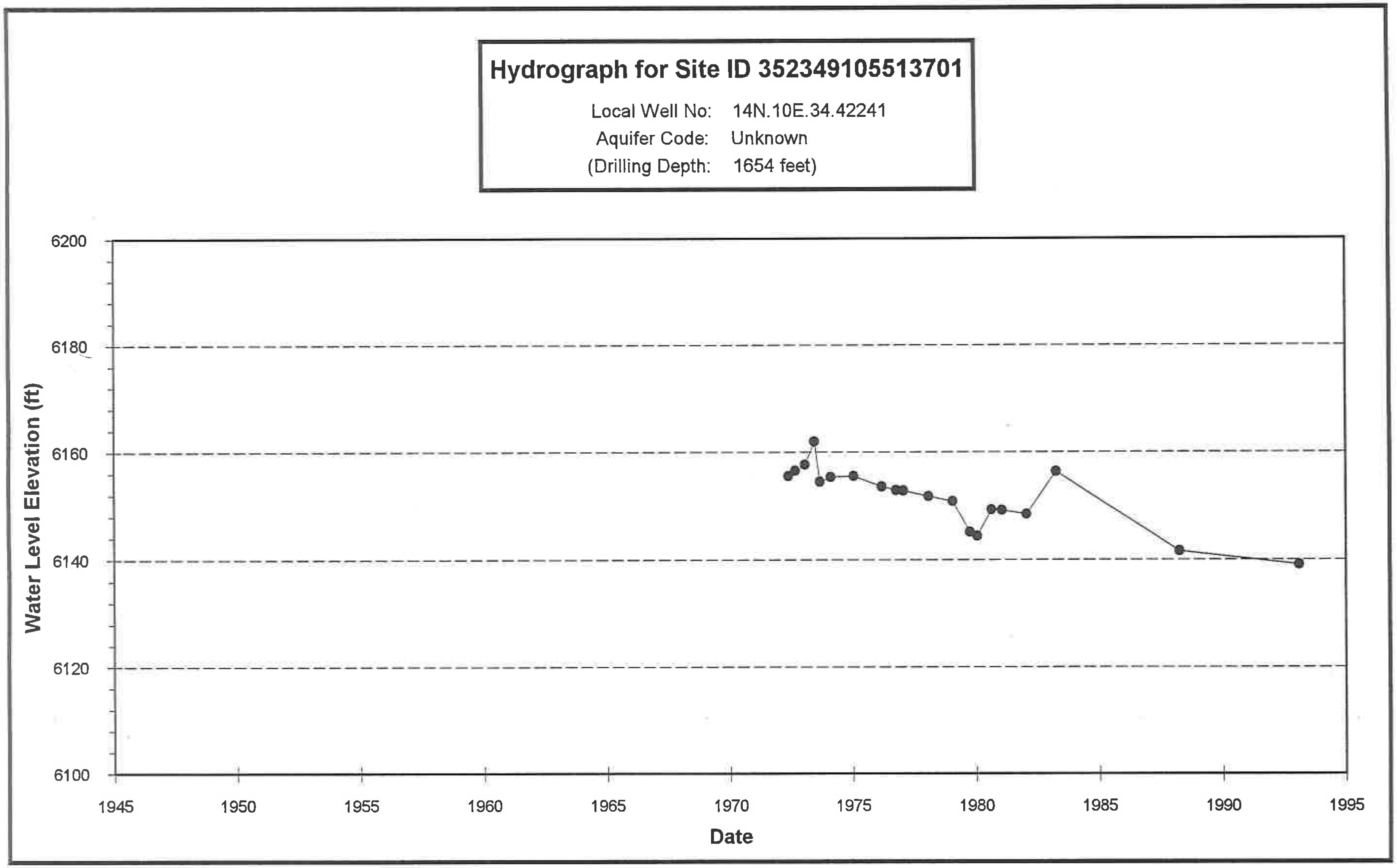


Hydrograph for Site ID 352344105564302
Local Well No: 14N.09E.36.31343 A
Aquifer Code: Unknown
Well Depth: 80 feet
6080
6060
6040
6020
6000
5980
Water Level Elevation (ft)
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

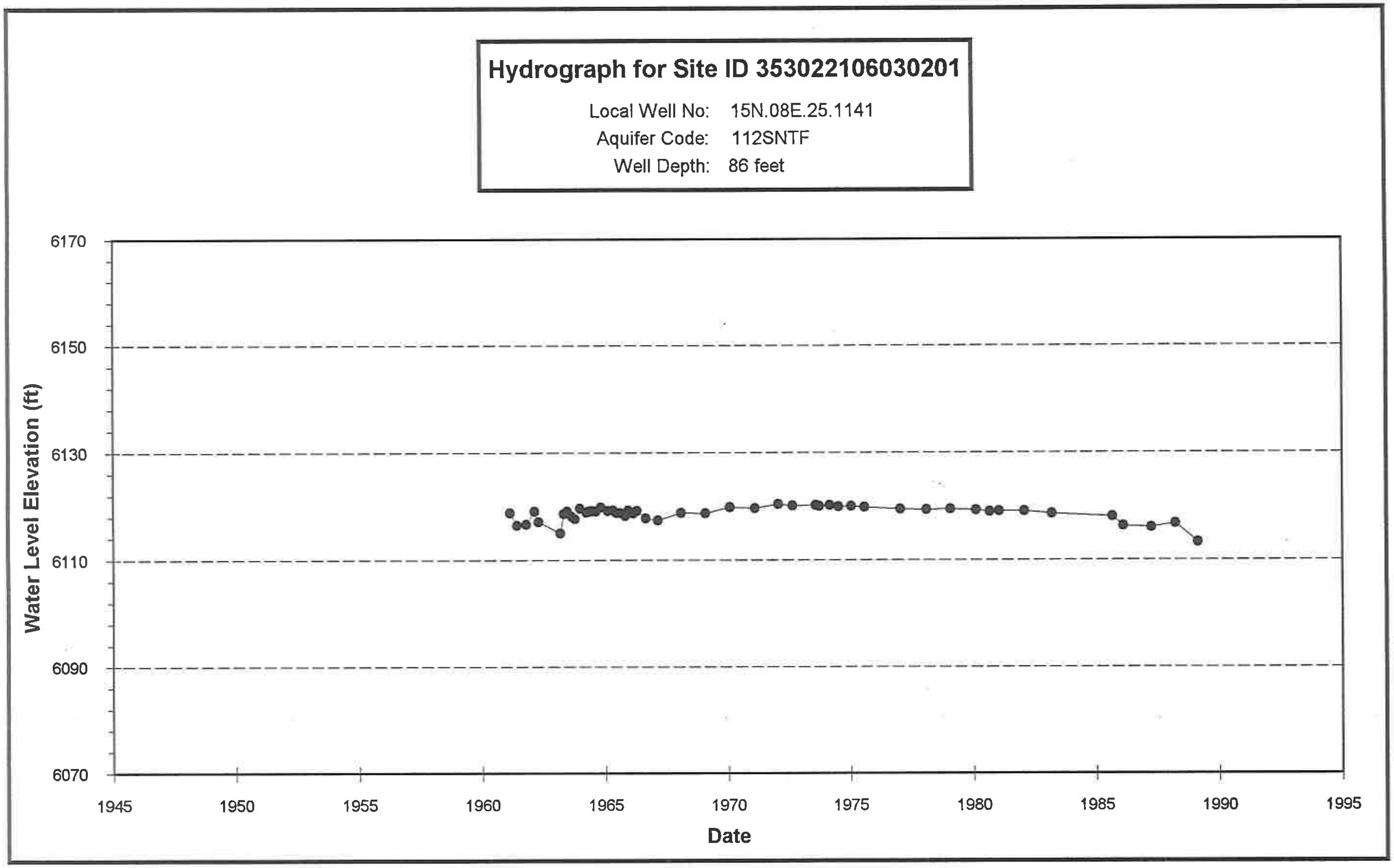

Hydrograph for Site ID 352718105554301
Local Well No: 14N.10E.07.31312
Aquifer Code: 110AVMB
Well Depth: 205 feet
Water Level Elevation (ft)
6280
6260
6240
6220
6200
6180
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



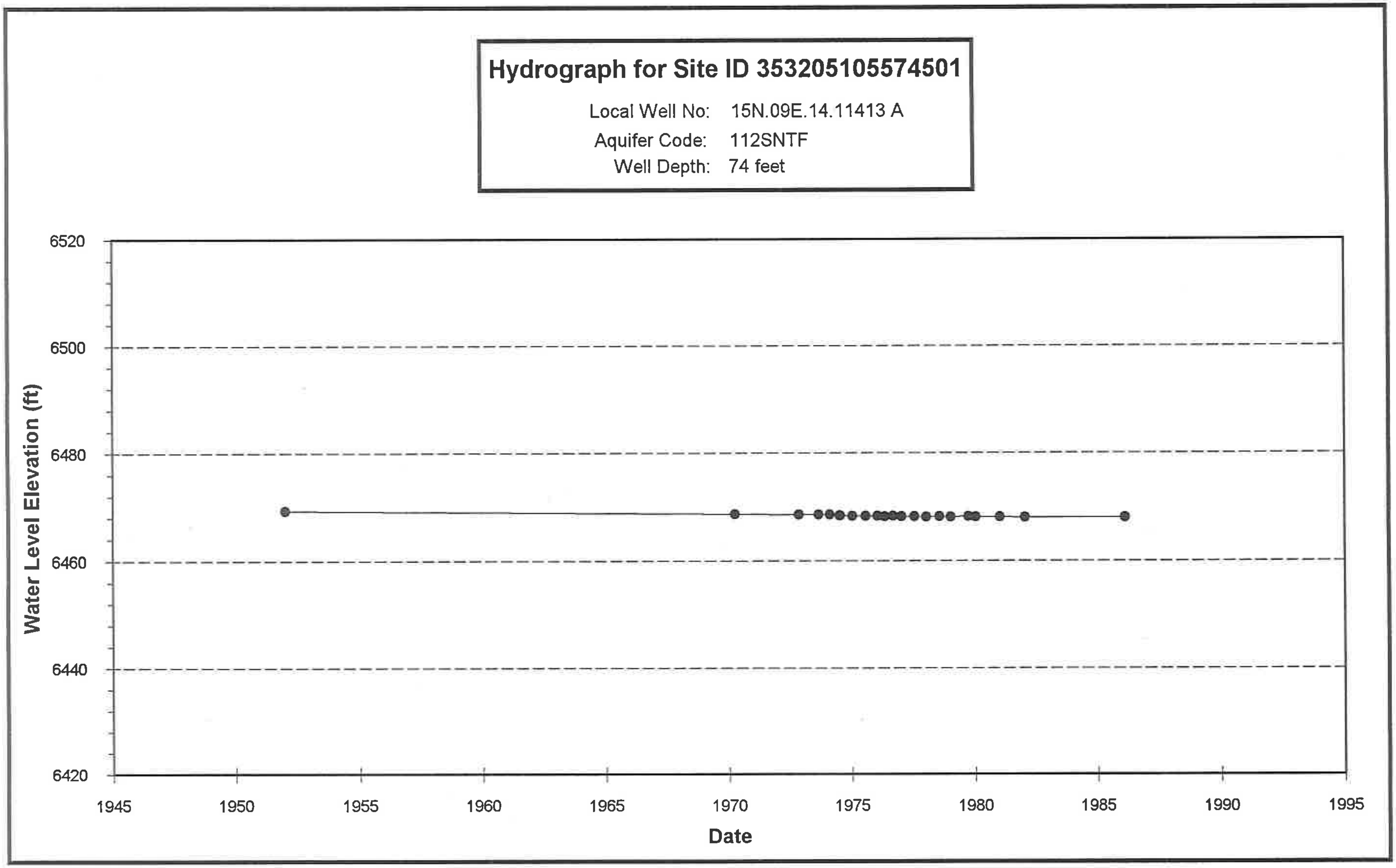
Hydrograph for Site ID 352620105523301
Local Well No: 14N.10E.15.3133
Aquifer Code: Unknown
Well Depth: 103 feet
Water Level Elevation (ft)
6340
6320
6300
6280
6260
6240
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



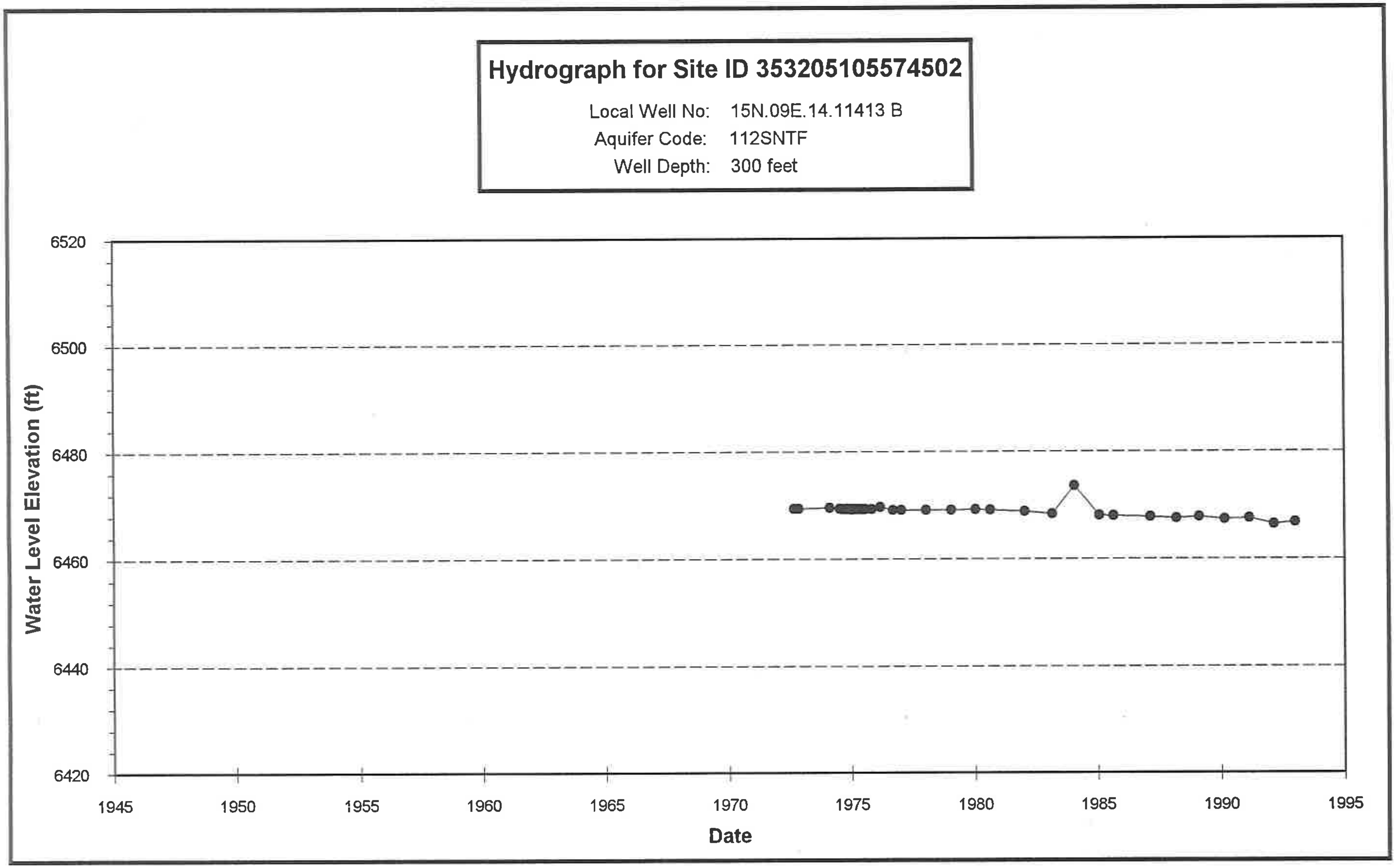
Hydrograph for Site ID 352349105513701
Local Well No: 14N.10E.34.42241
Aquifer Code: Unknown
(Drilling Depth: 1654 feet)
6200
6180
6160
6140
6120
6100
Water Level Elevation (ft)
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



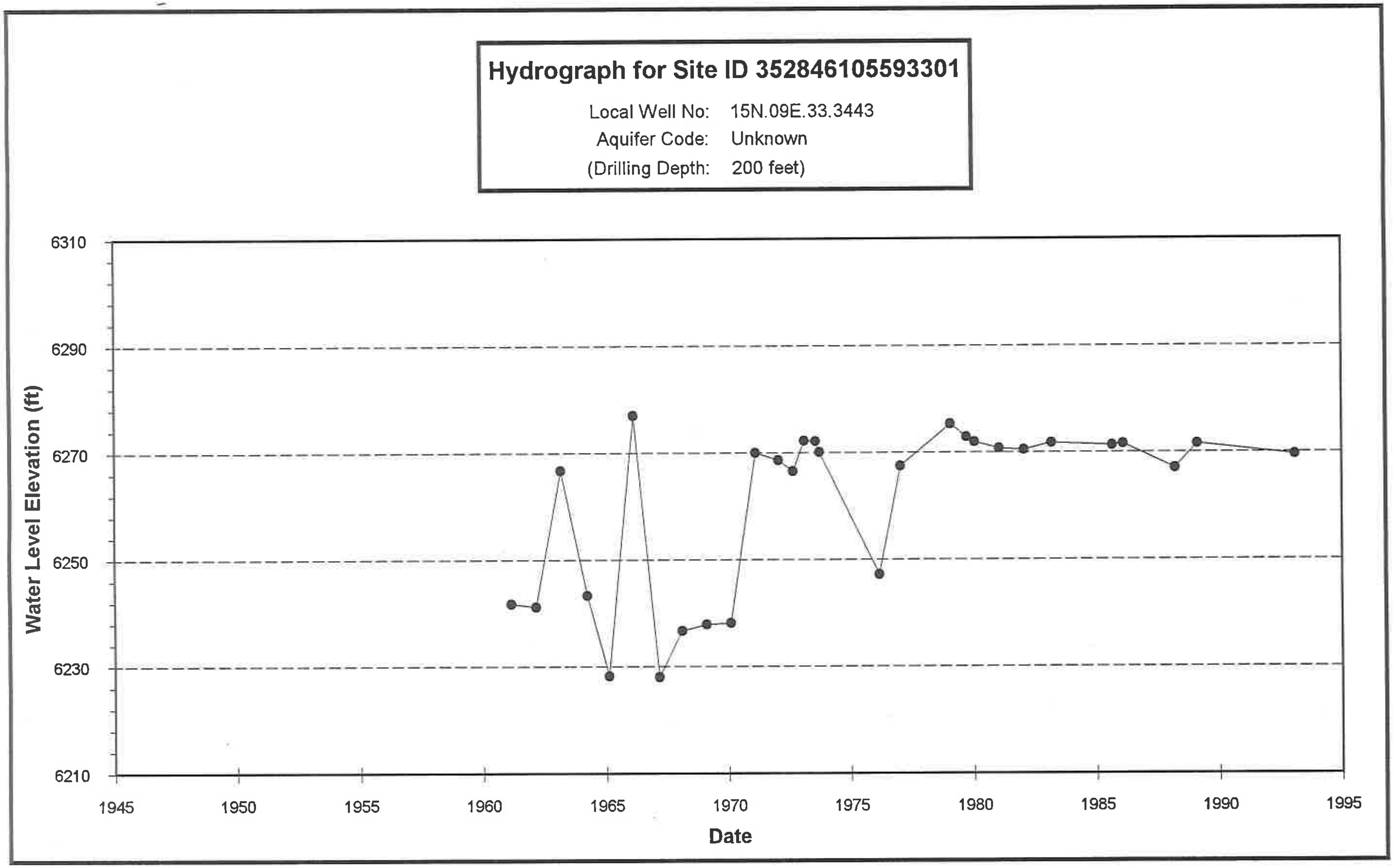
Hydrograph for Site ID 353022106030201
Local Well No: 15N.08E.25.1141
Aquifer Code: 112SNTF
Well Depth: 86 feet
Water Level Elevation (ft)
6170
6150
6130
6110
6090
6070
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

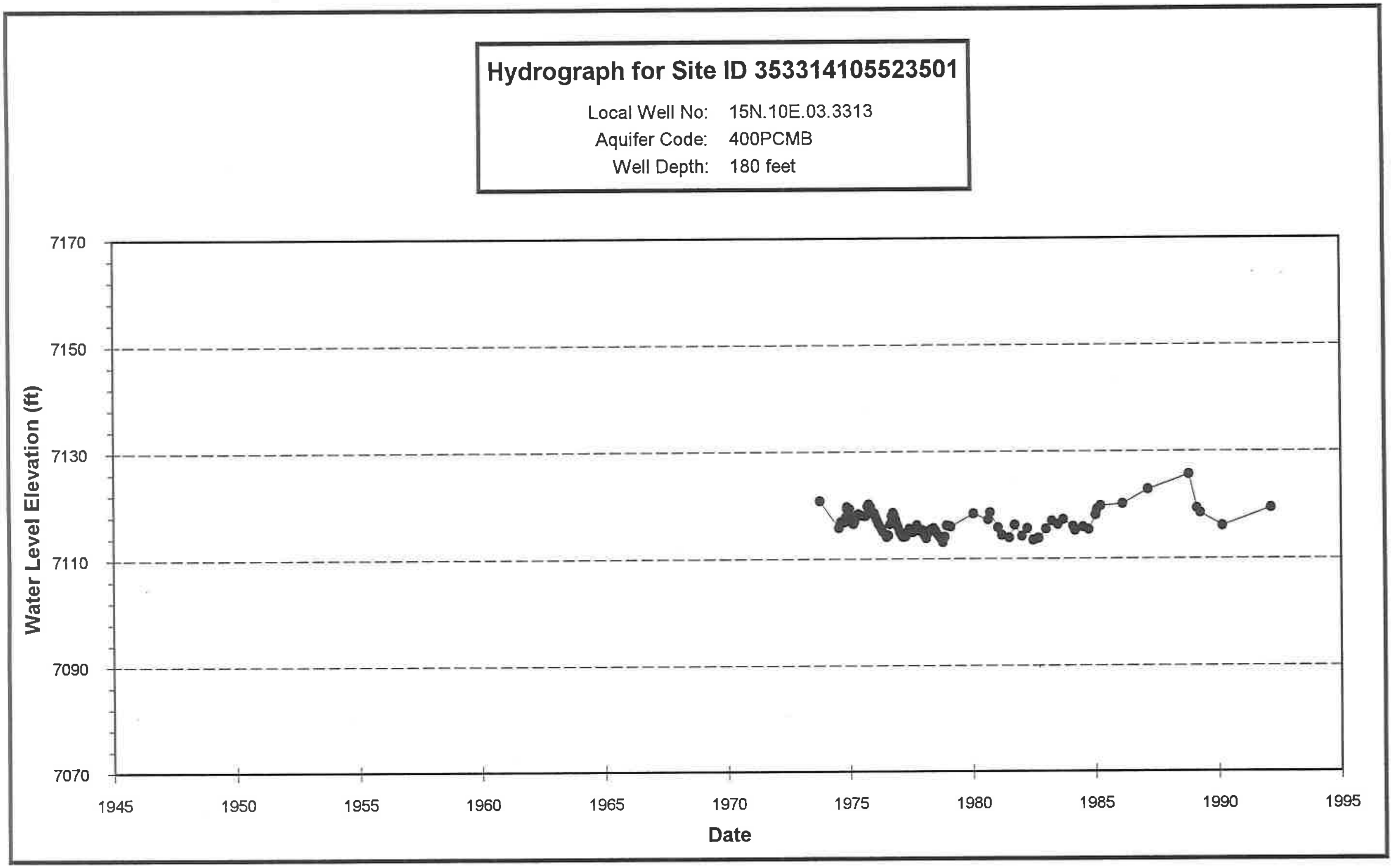


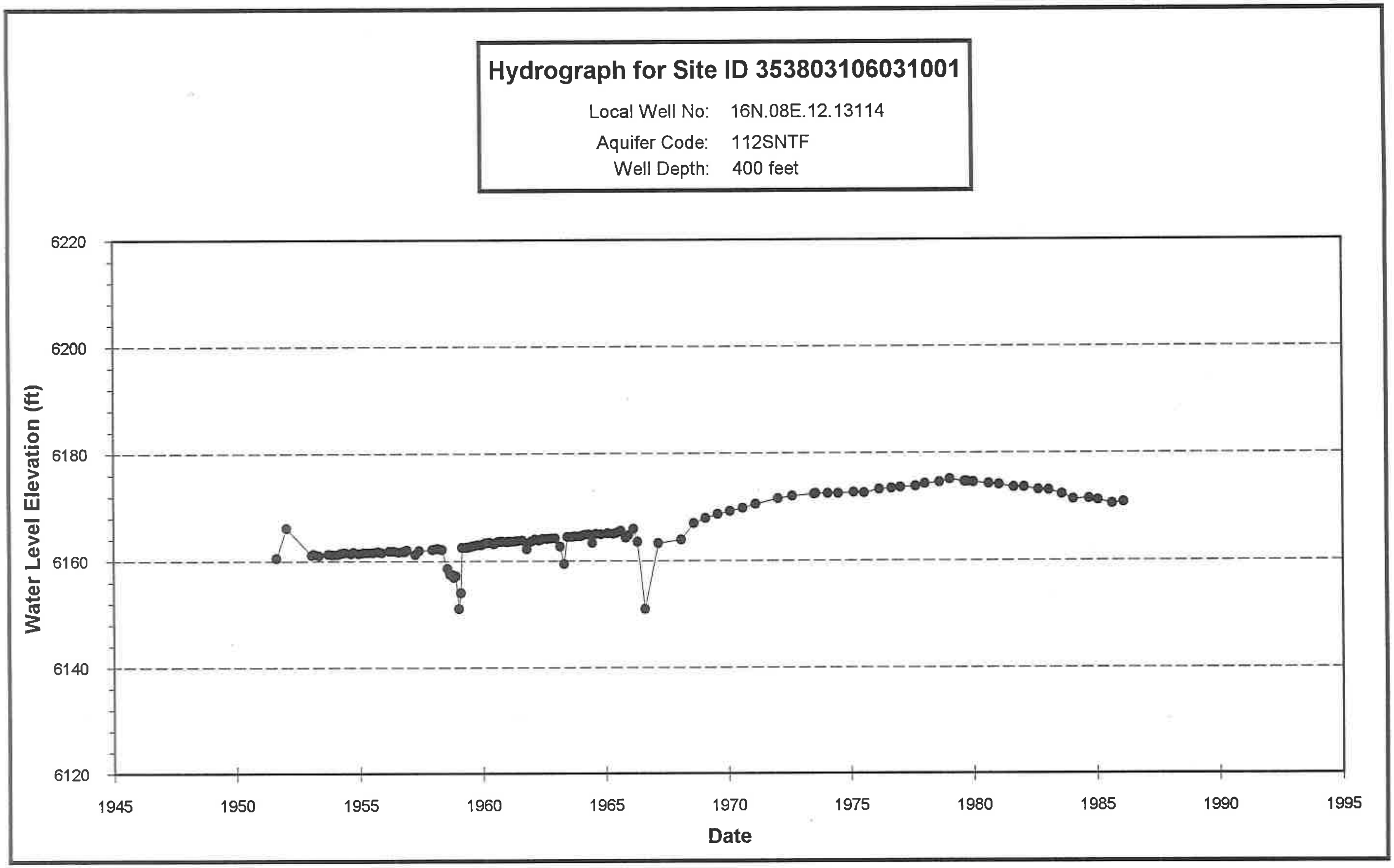
Hydrograph for Site ID 353205105574501
Local Well No: 15N.09E.14.11413 A
Aquifer Code: 112SNTF
Well Depth: 74 feet
Water Level Elevation (ft)
6520
6500
6480
6460
6440
6420
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

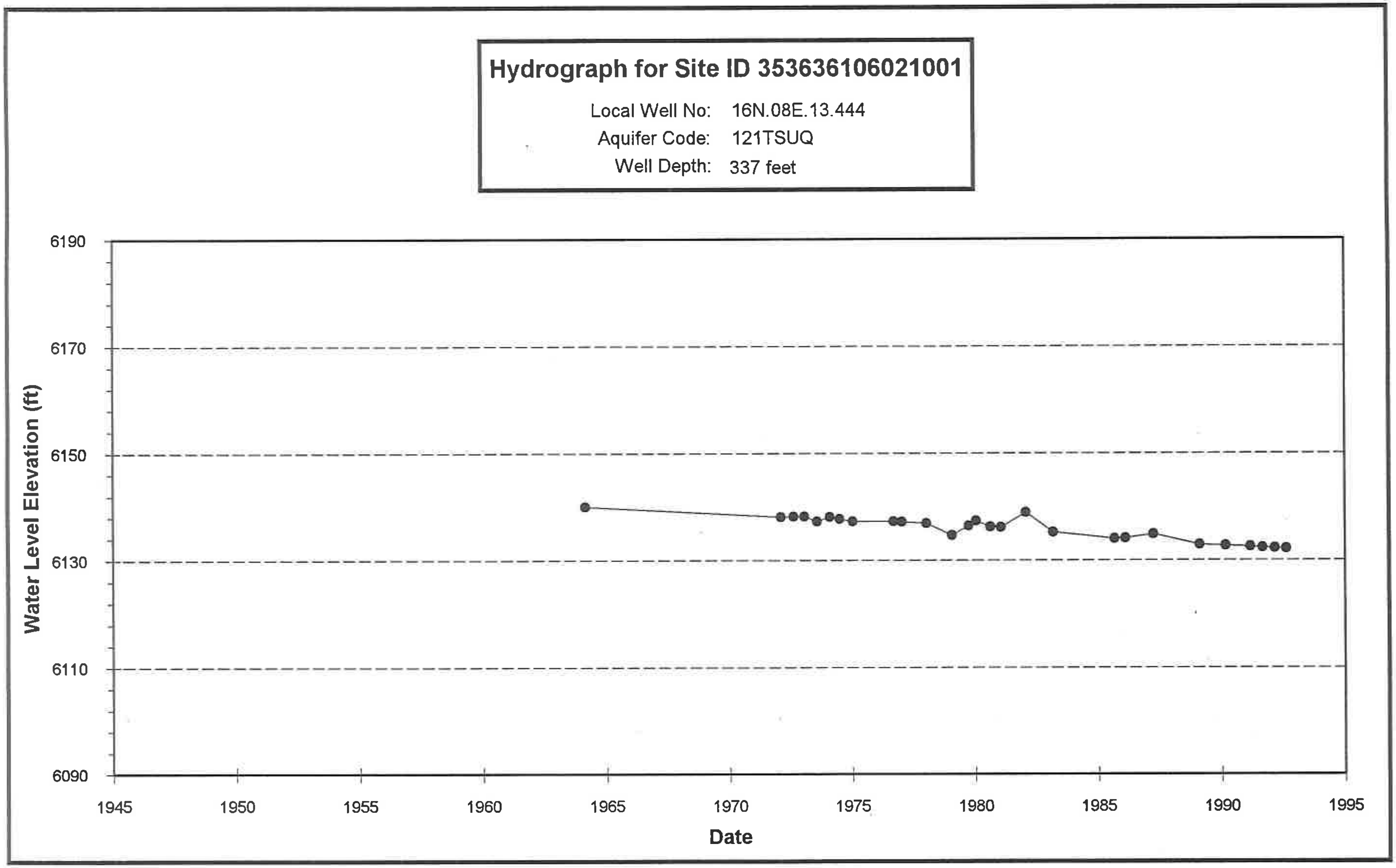


Hydrograph for Site ID 353205105574502
Local Well No: 15N.09E.14.11413 B
Aquifer Code: 112SNTF
Well Depth: 300 feet
Water Level Elevation (ft)
6520
6500
6480
6460
6440
6420
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

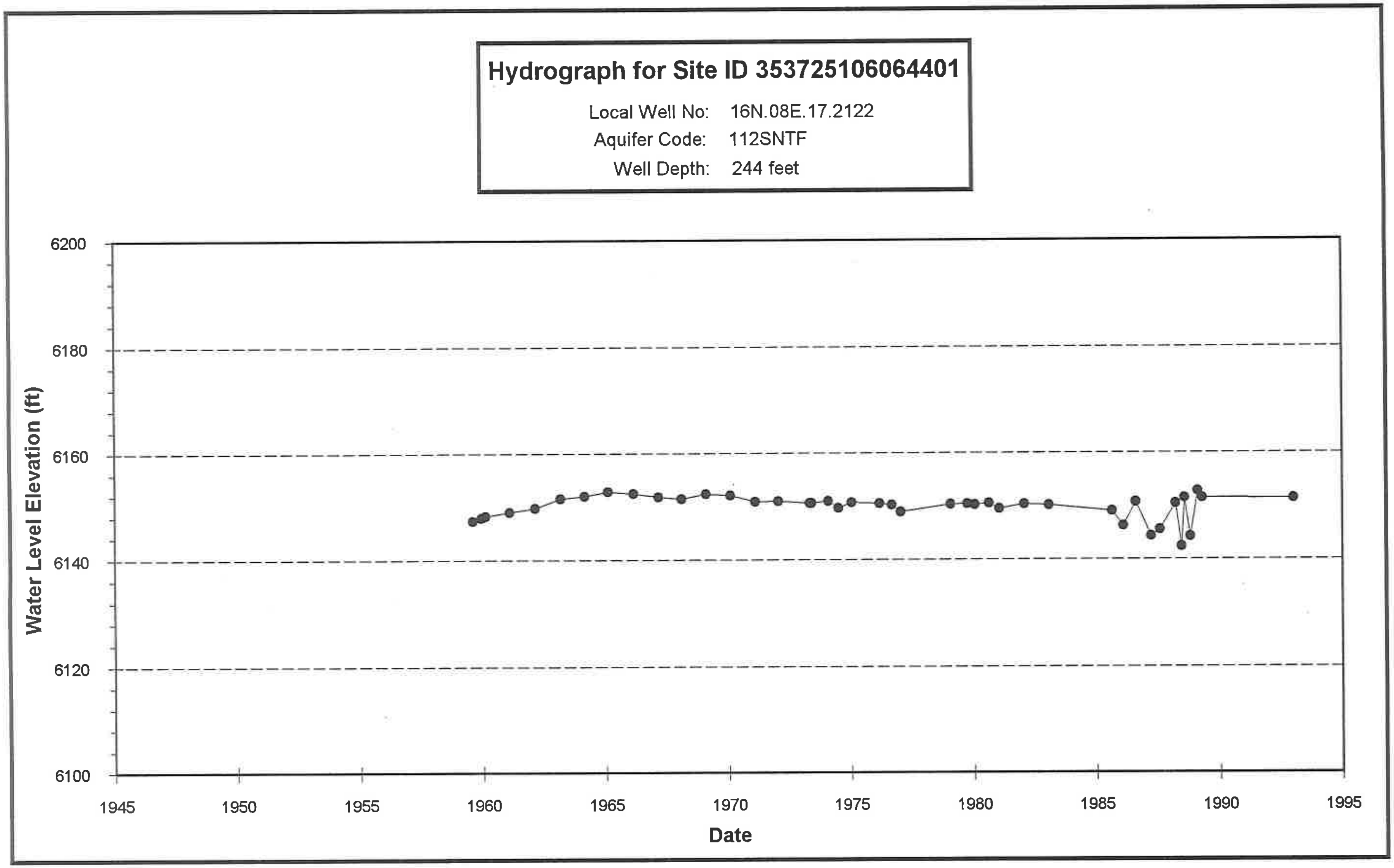

Hydrograph for Site ID 352846105593301
Local Well No: 15N.09E.33.3443
Aquifer Code: Unknown
(Drilling Depth: 200 feet)
Water Level Elevation (ft)
6310
6290
6270
6250
6230
6210
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

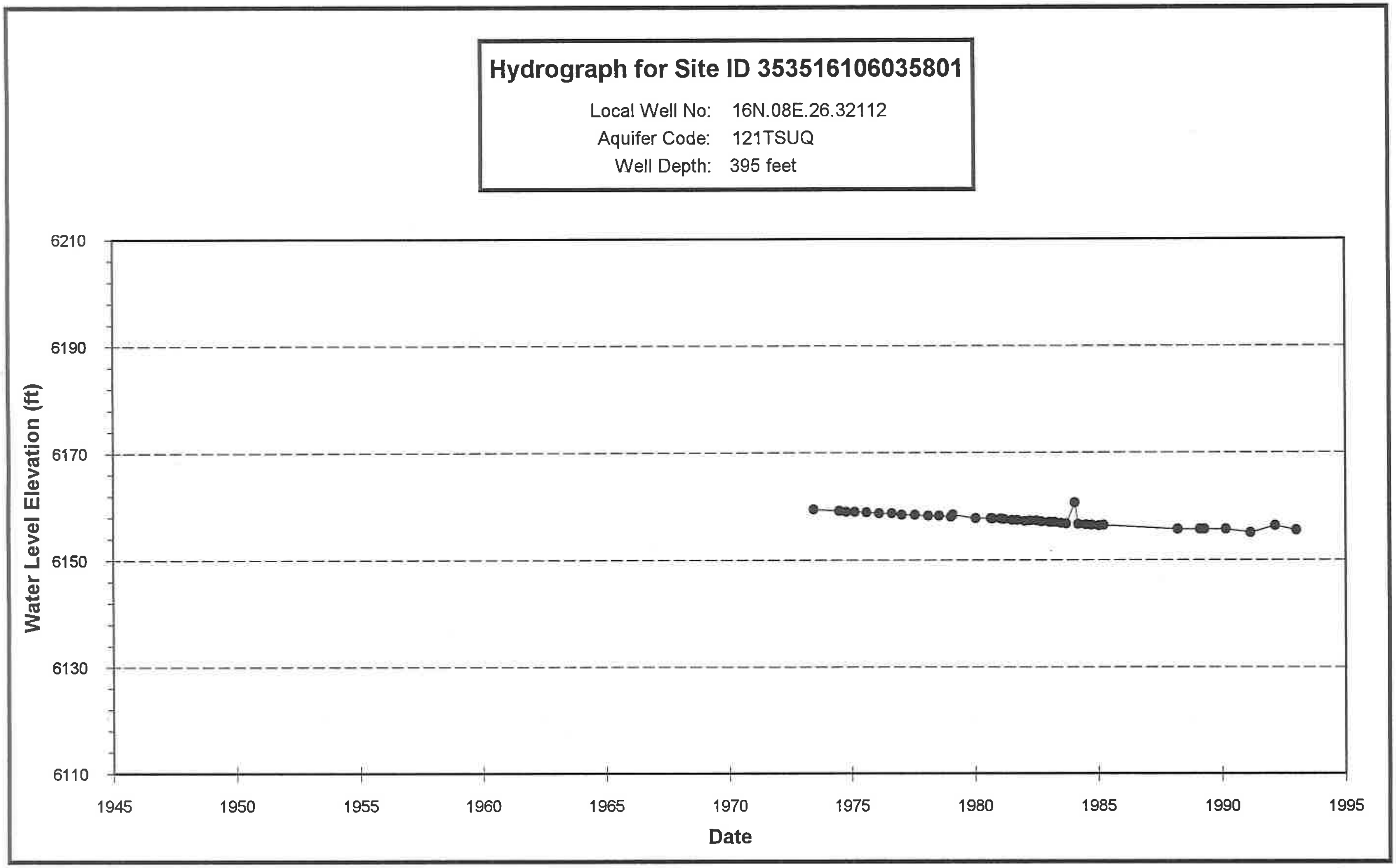

Hydrograph for Site ID 353314105523501
Local Well No: 15N.10E.03.3313
Aquifer Code: 400PCMB
Well Depth: 180 feet
Water Level Elevation (ft)
7170
7150
7130
7110
7090
7070
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date


Hydrograph for Site ID 353803106031001
Local Well No: 16N.08E.12.13114
Aquifer Code: 112SNTF
Well Depth: 400 feet
Water Level Elevation (ft)
6220
6200
6180
6160
6140
6120
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

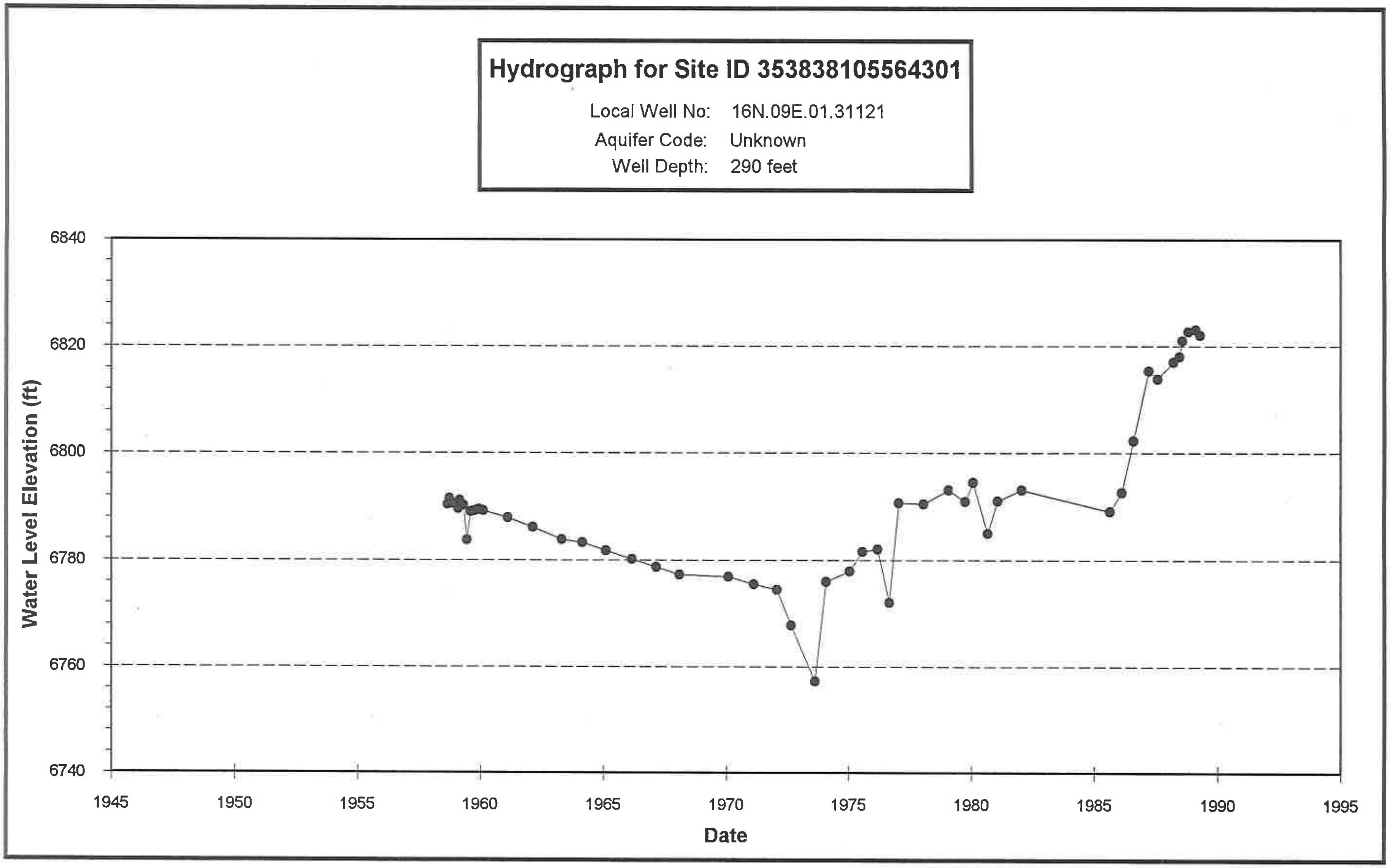


Hydrograph for Site ID 353636106021001
Local Well No: 16N.08E.13.444
Aquifer Code: 121TSUQ
Well Depth: 337 feet
Water Level Elevation (ft)
6190
6170
6150
6130
6110
6090
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

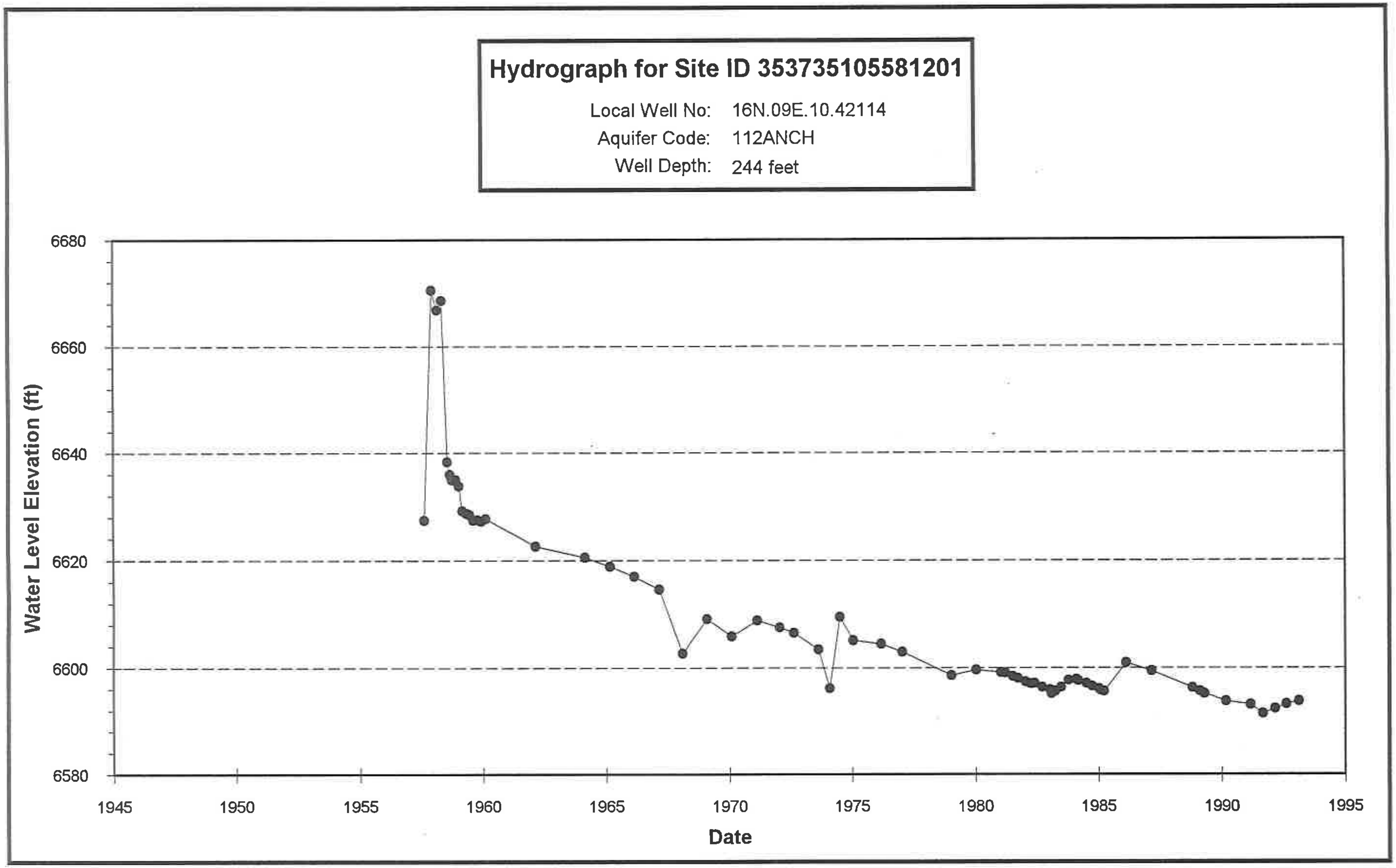

Hydrograph for Site ID 353725106064401
Local Well No: 16N.08E.17.2122
Aquifer Code: 112SNTF
Well Depth: 244 feet
Water Level Elevation (ft)
6200
6180
6160
6140
6120
6100
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



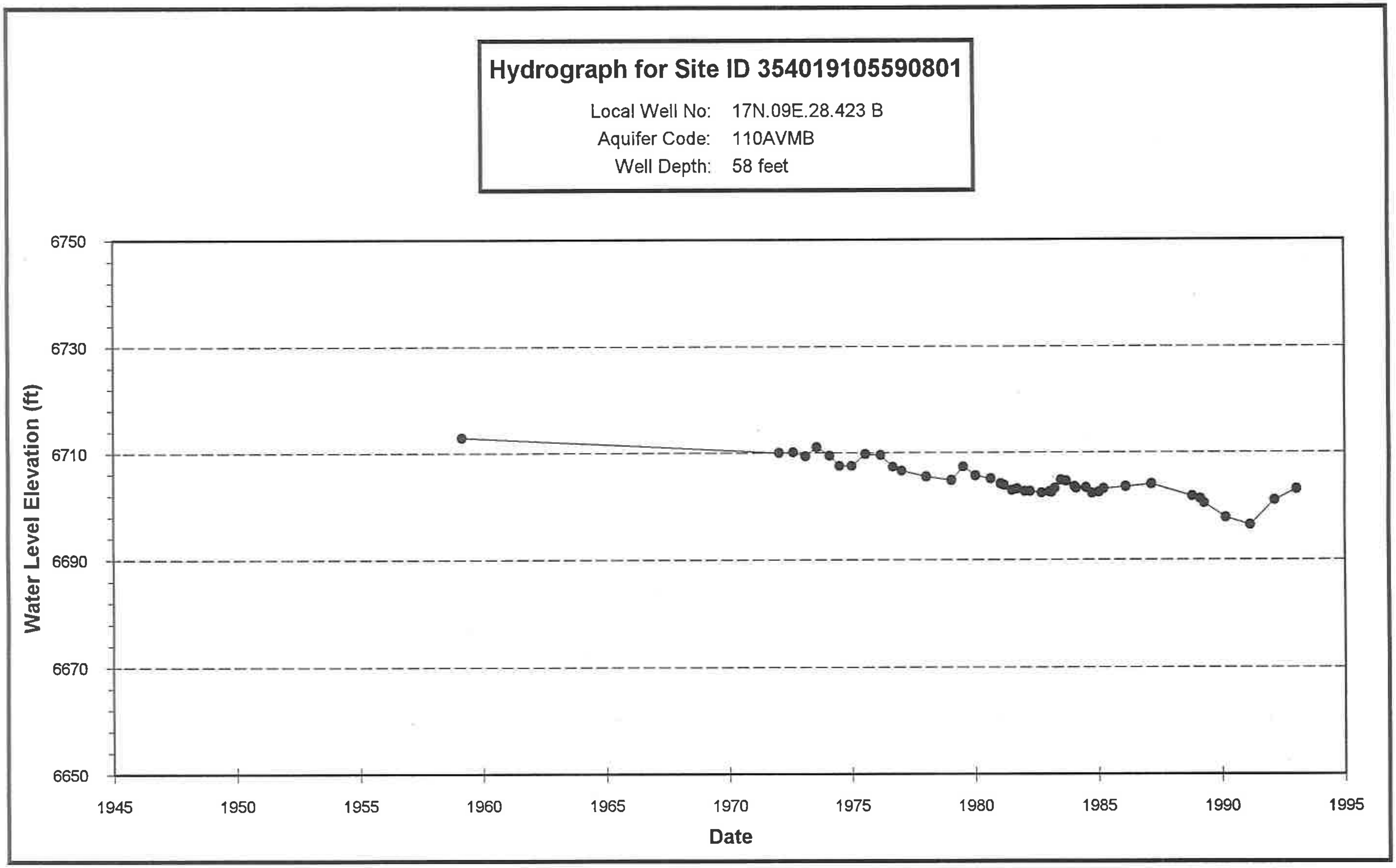
Hydrograph for Site ID 353516106035801
Local Well No: 16N.08E.26.32112
Aquifer Code: 121TSUQ
Well Depth: 395 feet
Water Level Elevation (ft)
6210
6190
6170
6150
6130
6110
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

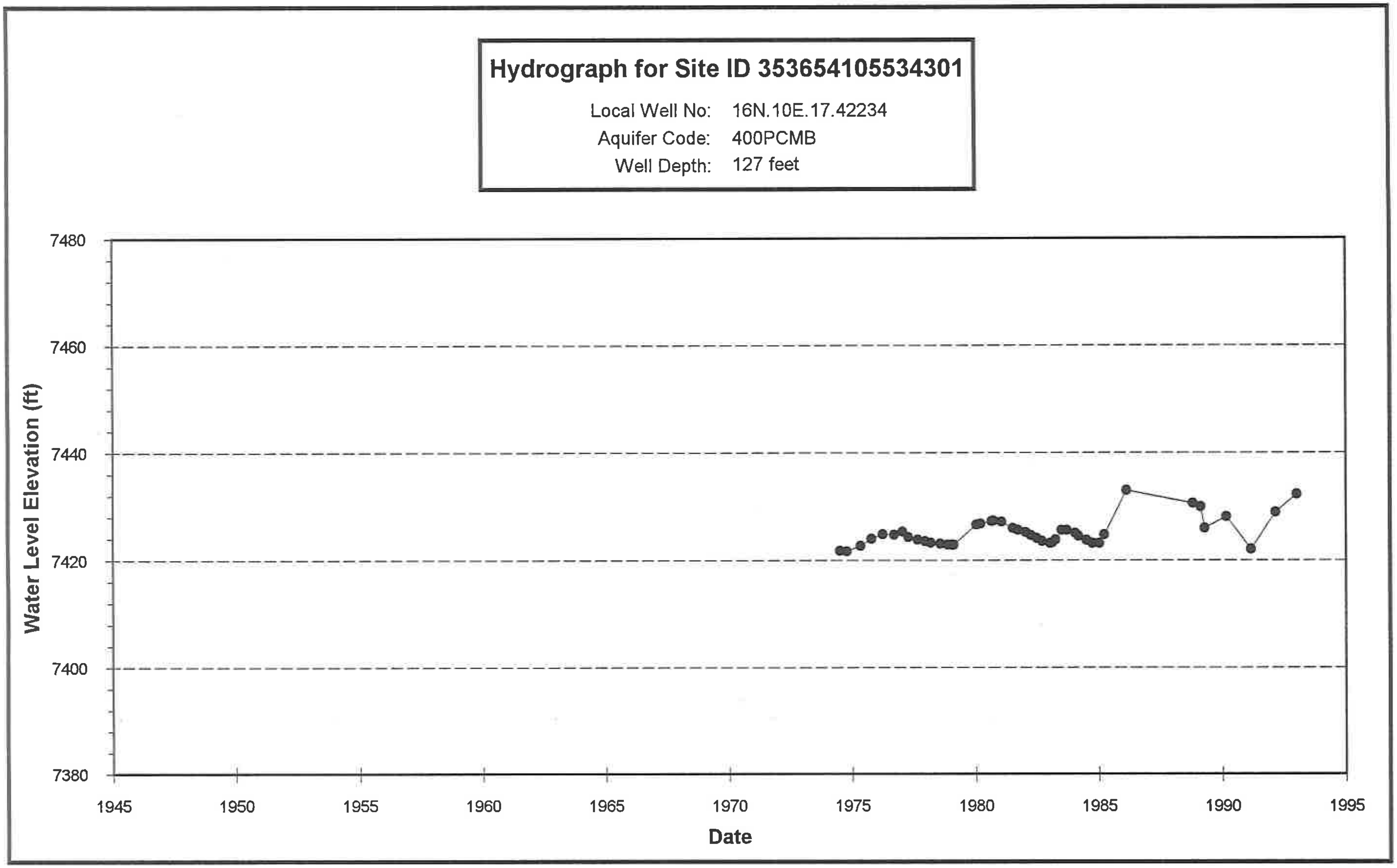


Hydrograph for Site ID 353838105564301
Local Well No: 16N.09E.01.31121
Aquifer Code: Unknown
Well Depth: 290 feet
6840
6820
6800
6780
6760
6740
Water Level Elevation (ft)
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

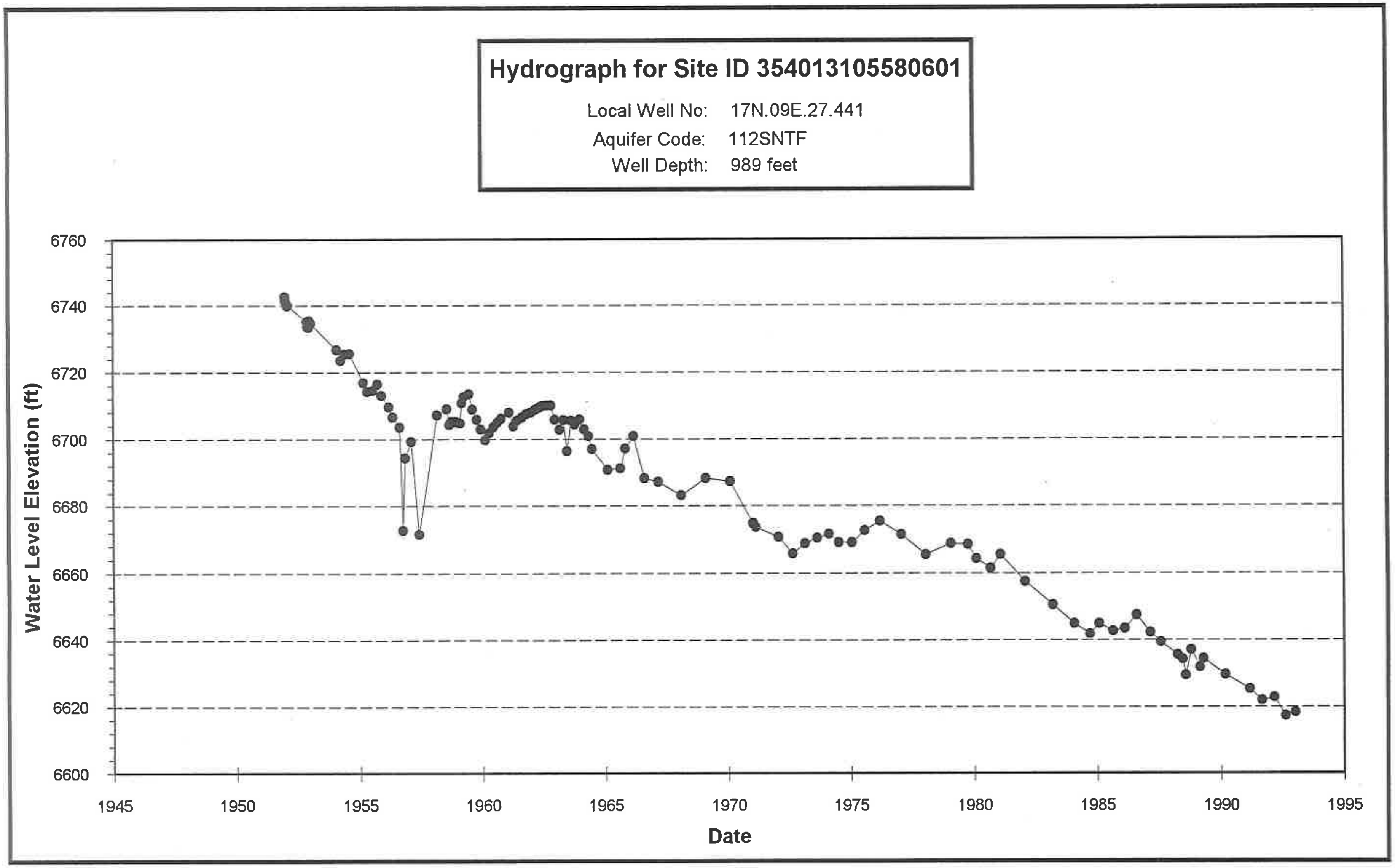


Hydrograph for Site ID 353735105581201
Local Well No: 16N.09E.10.42114
Aquifer Code: 112ANCH
Well Depth: 244 feet
Water Level Elevation (ft)
6680
6660
6640
6620
6600
6580
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

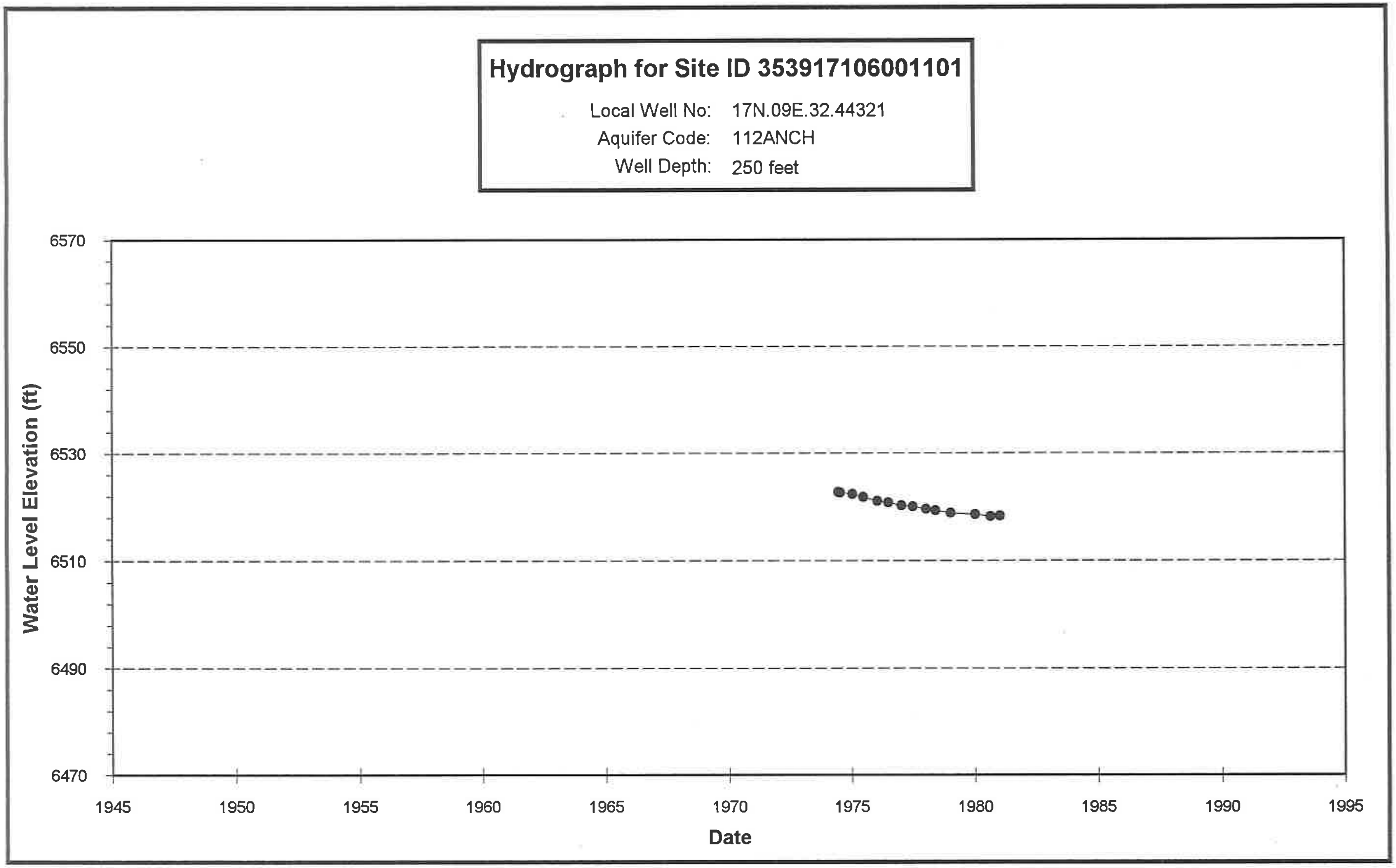

Hydrograph for Site ID 354019105590801
Local Well No: 17N.09E.28.423 B
Aquifer Code: 110AVMB
Well Depth: 58 feet
Water Level Elevation (ft)
6750
6730
6710
6690
6670
6650
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



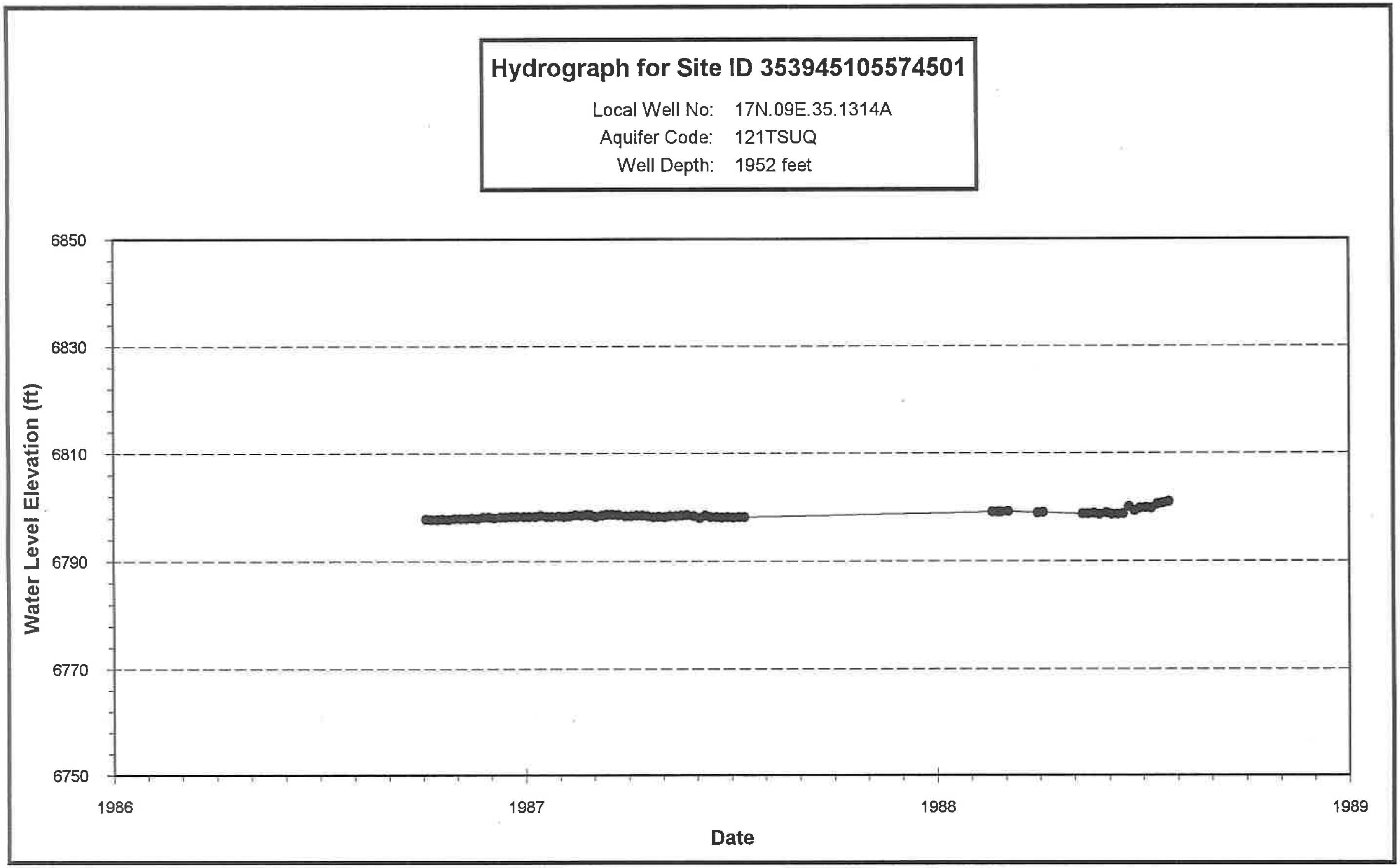
Hydrograph for Site ID 353654105534301
Local Well No: 16N.10E.17.42234
Aquifer Code: 400PCMB
Well Depth: 127 feet
Water Level Elevation (ft)
7480
7460
7440
7420
7400
7380
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

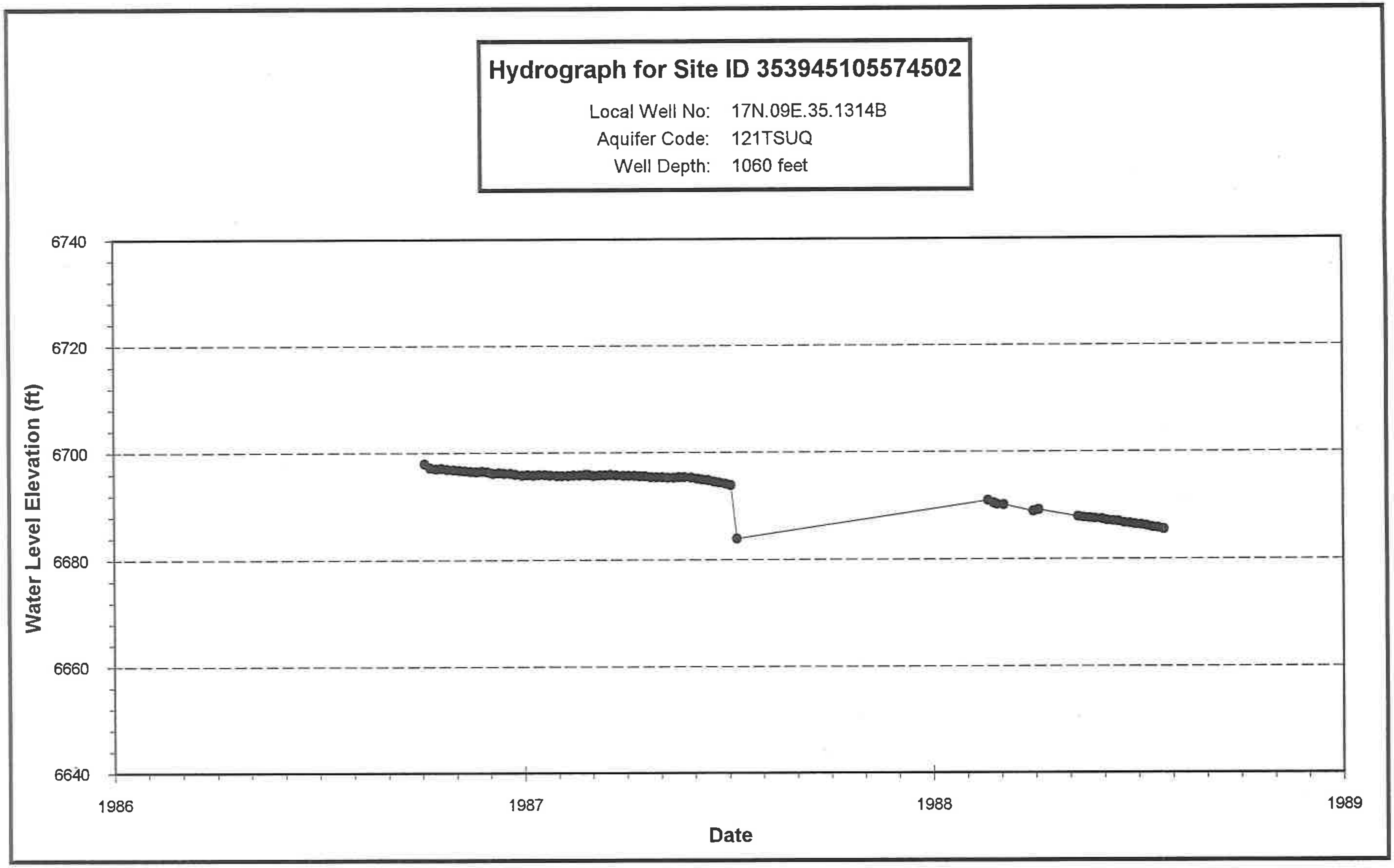


Hydrograph for Site ID 354013105580601
Local Well No: 17N.09E.27.441
Aquifer Code: 112SNTF
Well Depth: 989 feet
6760
6740
6720
6700
6680
6660
6640
6620
6600
Water Level Elevation (ft)
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

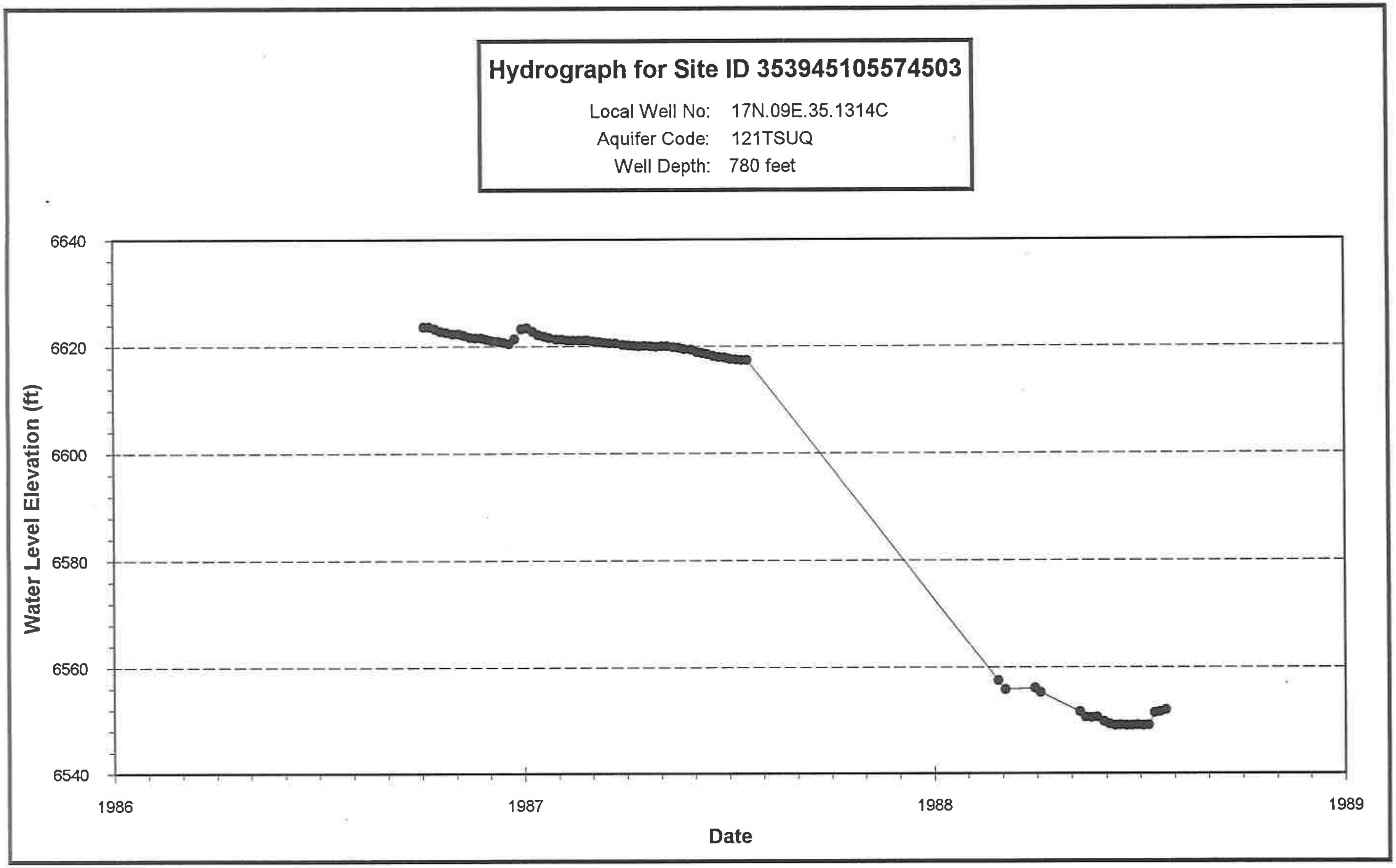


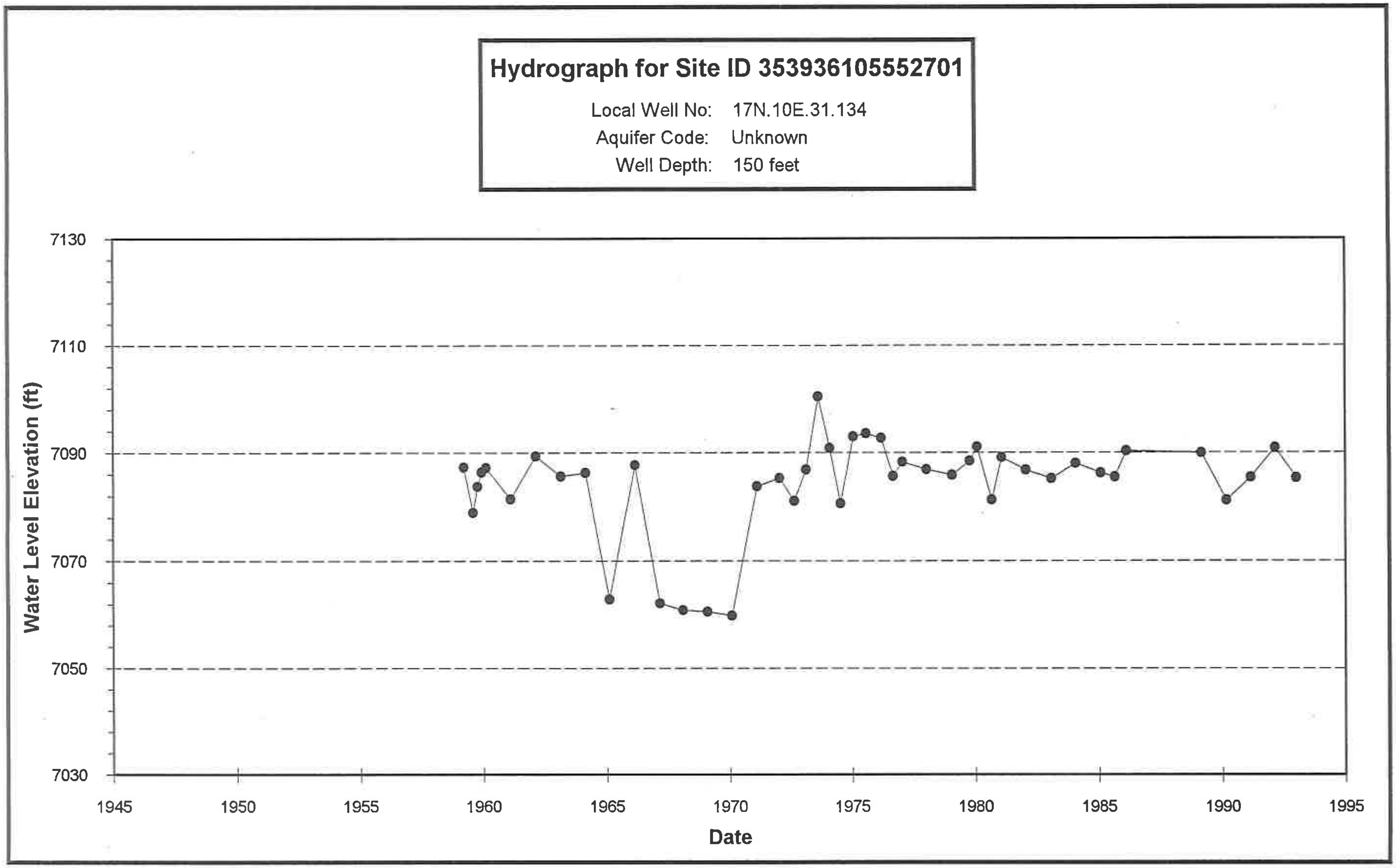
Hydrograph for Site ID 353917106001101
Local Well No: 17N.09E.32.44321
Aquifer Code: 112ANCH
Well Depth: 250 feet
Water Level Elevation (ft)
6570
6550
6530
6510
6490
6470
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date


Hydrograph for Site ID 353945105574501
Local Well No: 17N.09E.35.1314A
Aquifer Code: 121TSUQ
Well Depth: 1952 feet
Water Level Elevation (ft)
6850
6830
6810
6790
6770
6750
1986
1987
1988
1989
Date

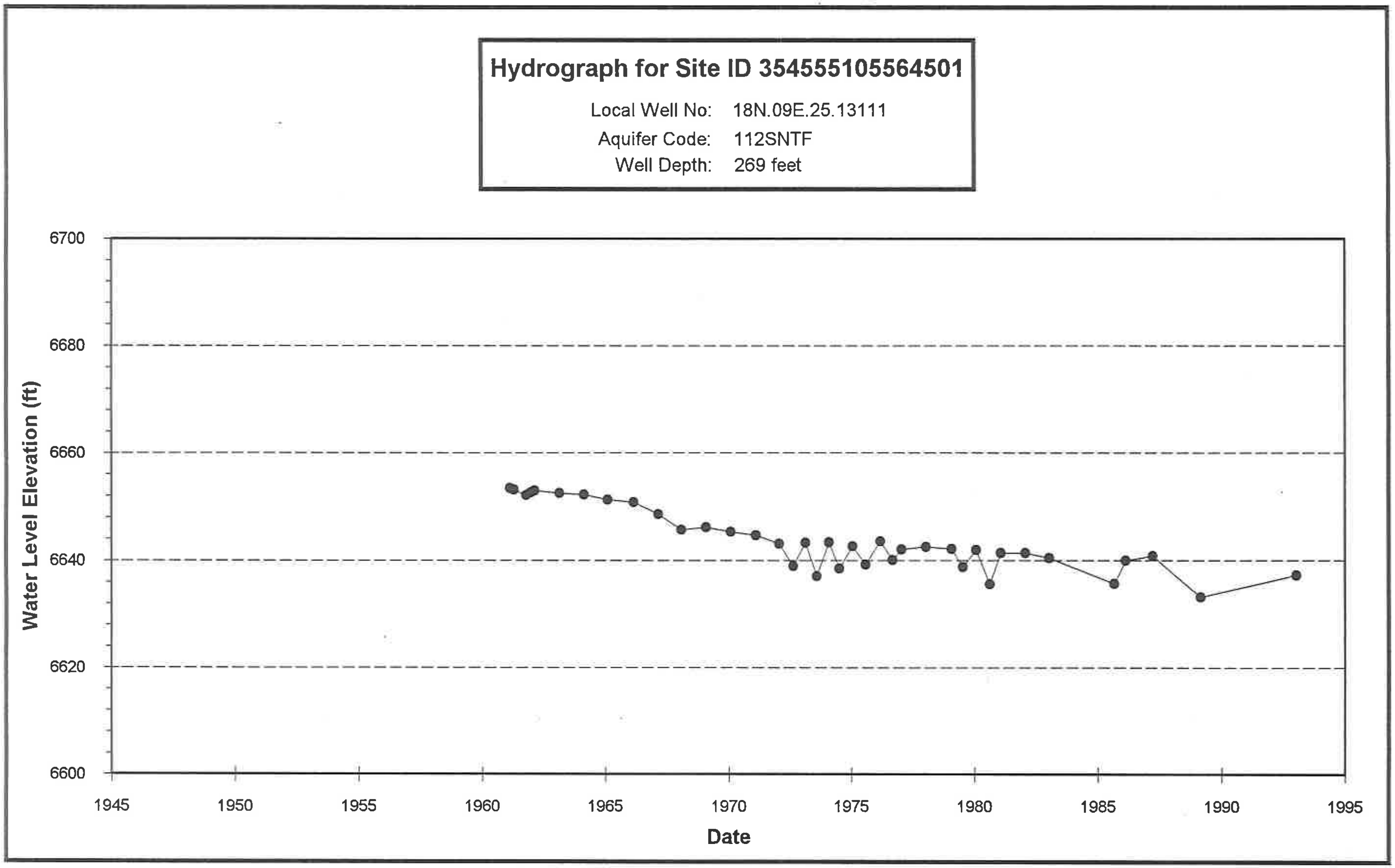


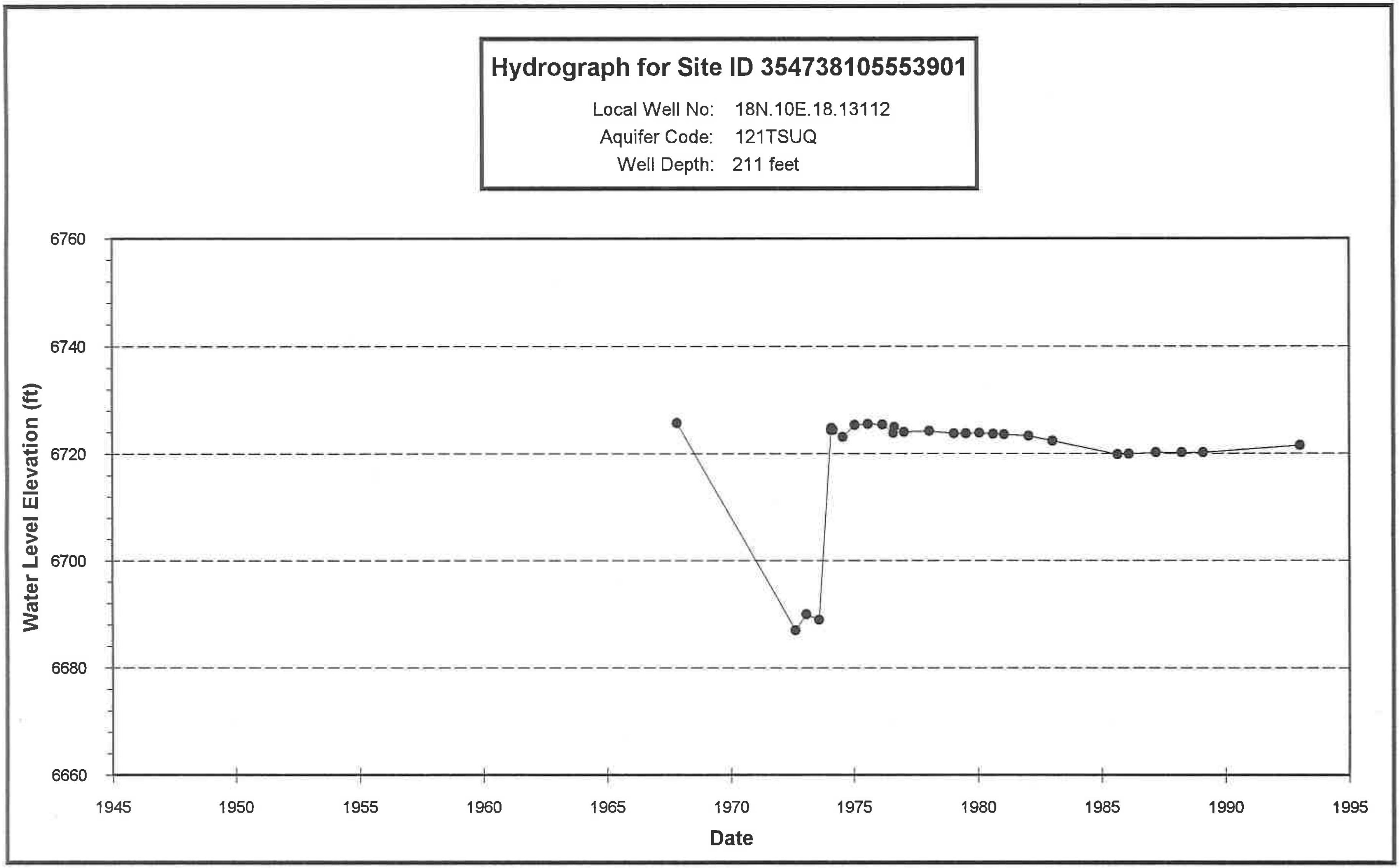
Hydrograph for Site ID 353945105574502
Local Well No: 17N.09E.35.1314B
Aquifer Code: 121TSUQ
Well Depth: 1060 feet
6740
6720
6700
6680
6660
6640
Water Level Elevation (ft)
1986
1987
1988
1989
Date


Hydrograph for Site ID 353945105574503
Local Well No: 17N.09E.35.1314C
Aquifer Code: 121TSUQ
Well Depth: 780 feet
6640
6620
6600
6580
6560
6540
Water Level Elevation (ft)
1986
1987
1988
1989
Date

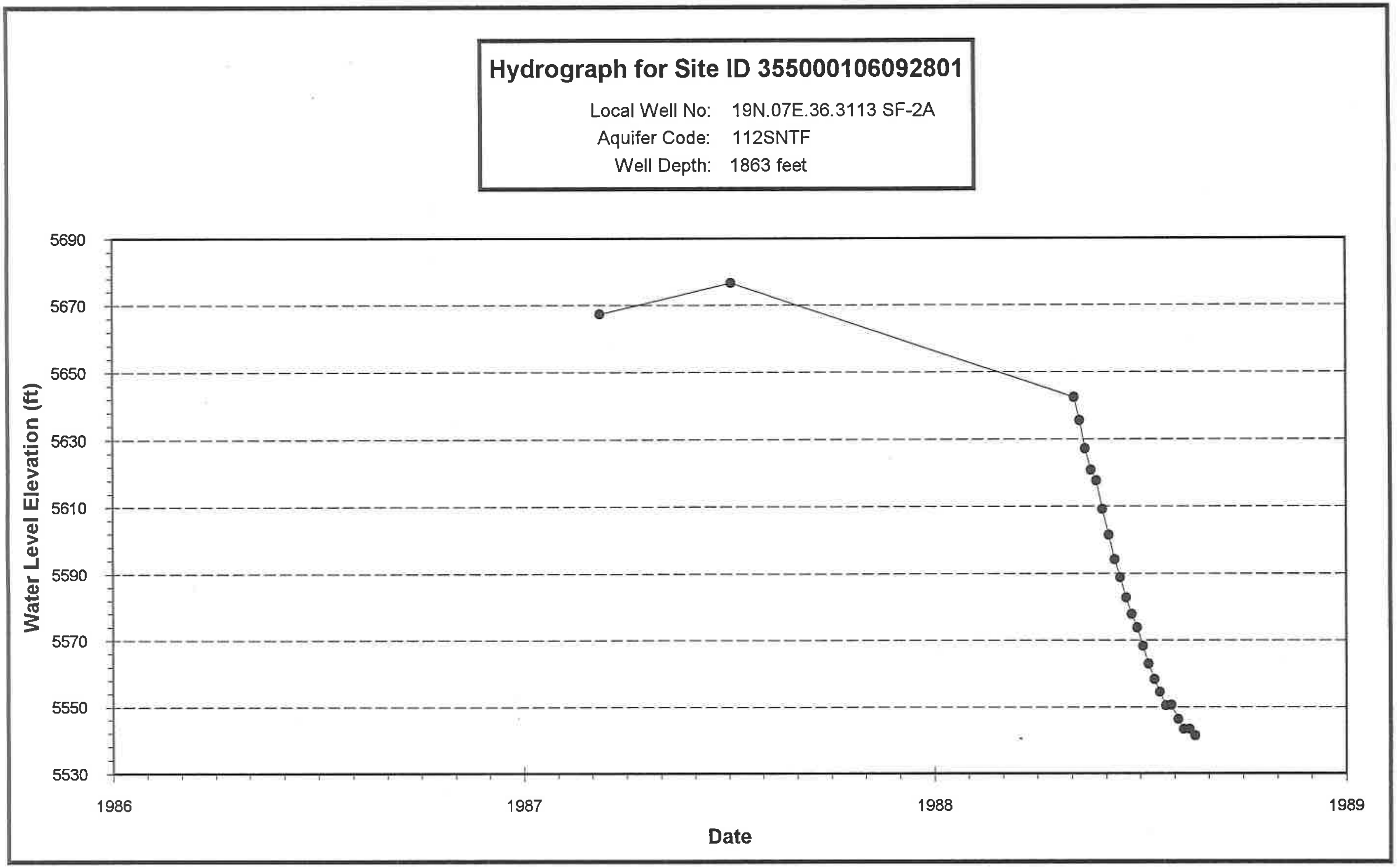


Hydrograph for Site ID 353936105552701
Local Well No: 17N.10E.31.134
Aquifer Code: Unknown
Well Depth: 150 feet
Water Level Elevation (ft)
7130
7110
7090
7070
7050
7030
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

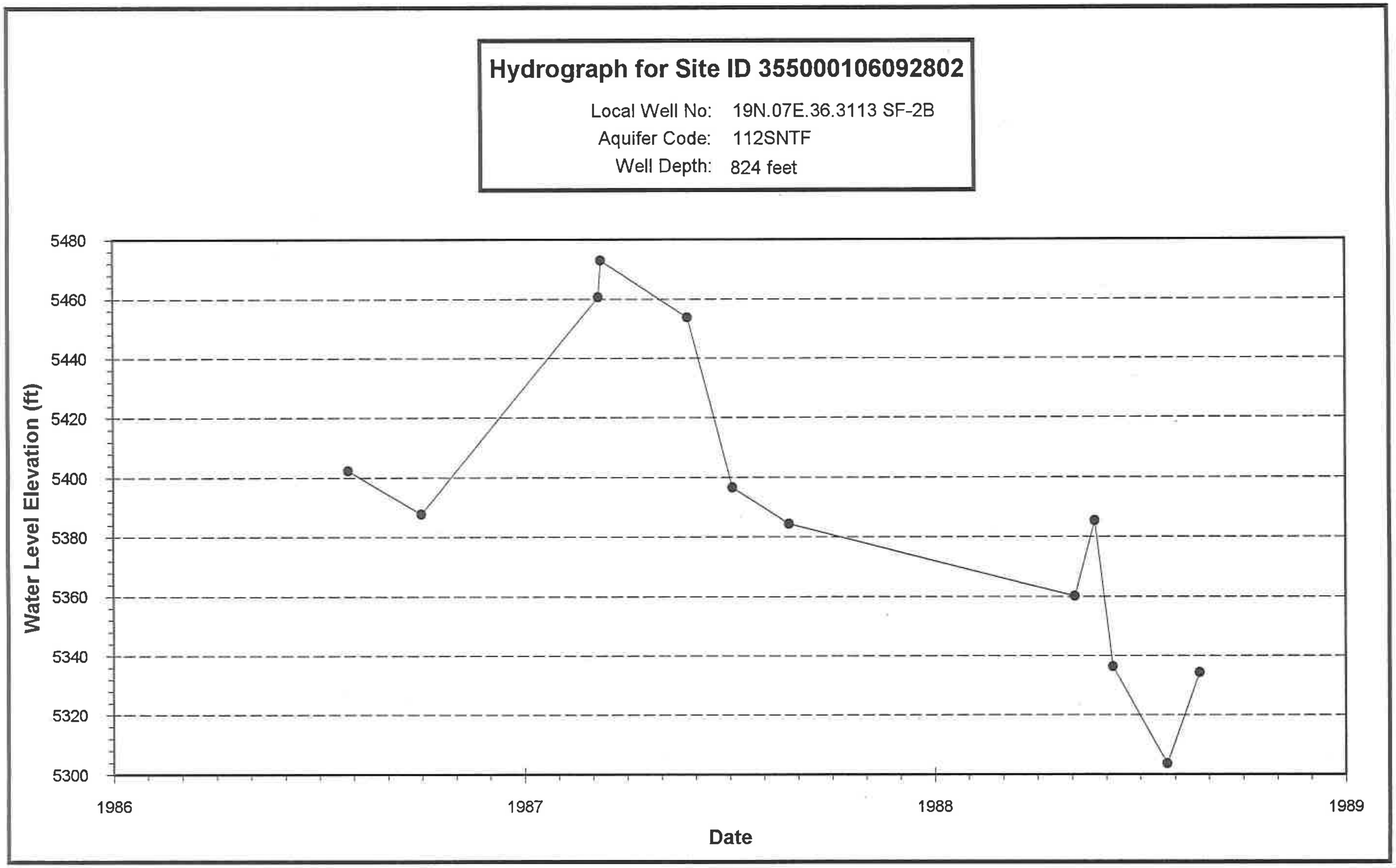

Hydrograph for Site ID 354555105564501
Local Well No: 18N.09E.25.13111
Aquifer Code: 112SNTF
Well Depth: 269 feet
Water Level Elevation (ft)
6700
6680
6660
6640
6620
6600
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



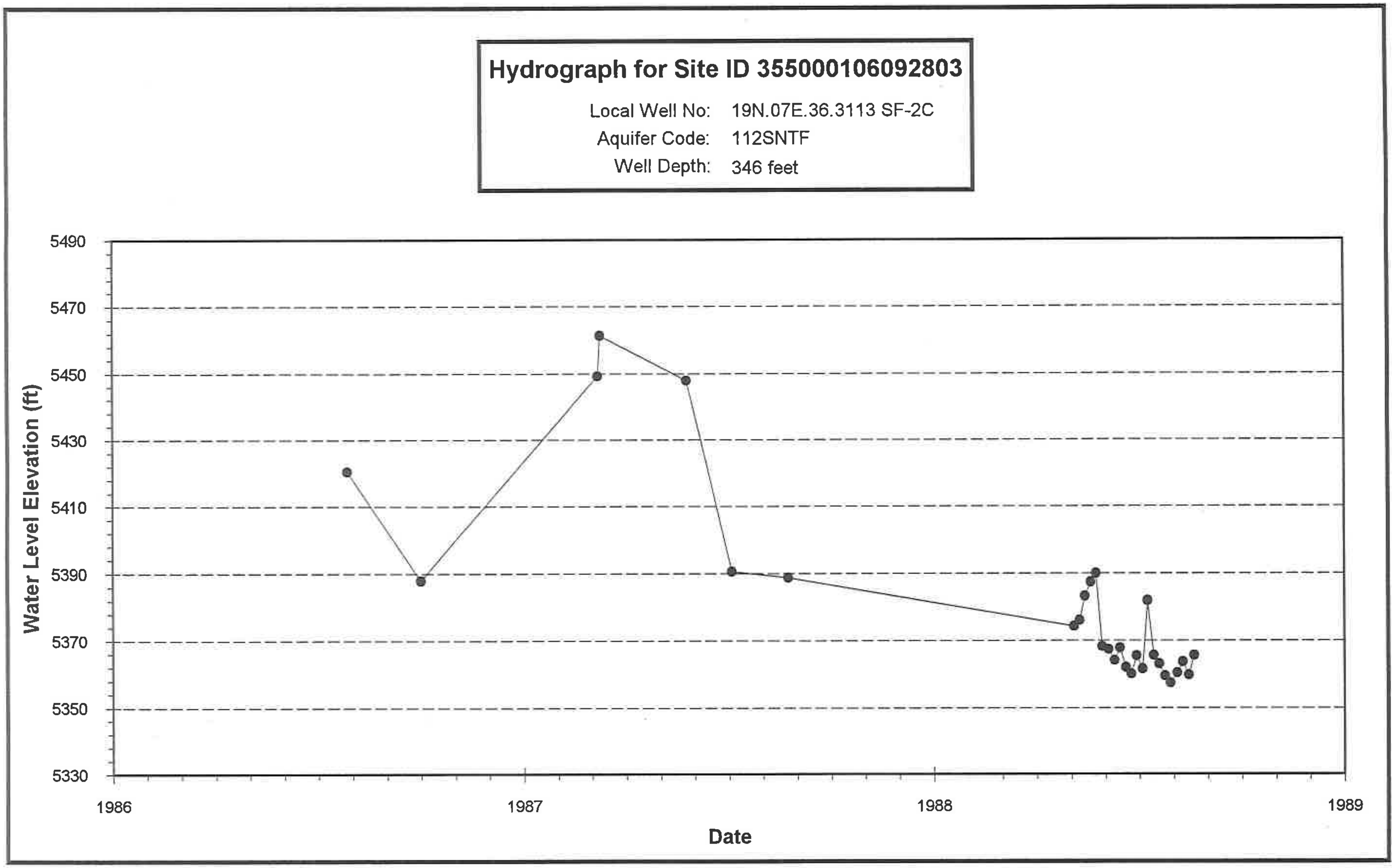
Hydrograph for Site ID 354738105553901
Local Well No: 18N.10E.18.13112
Aquifer Code: 121TSUQ
Well Depth: 211 feet
Water Level Elevation (ft)
6760
6740
6720
6700
6680
6660
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



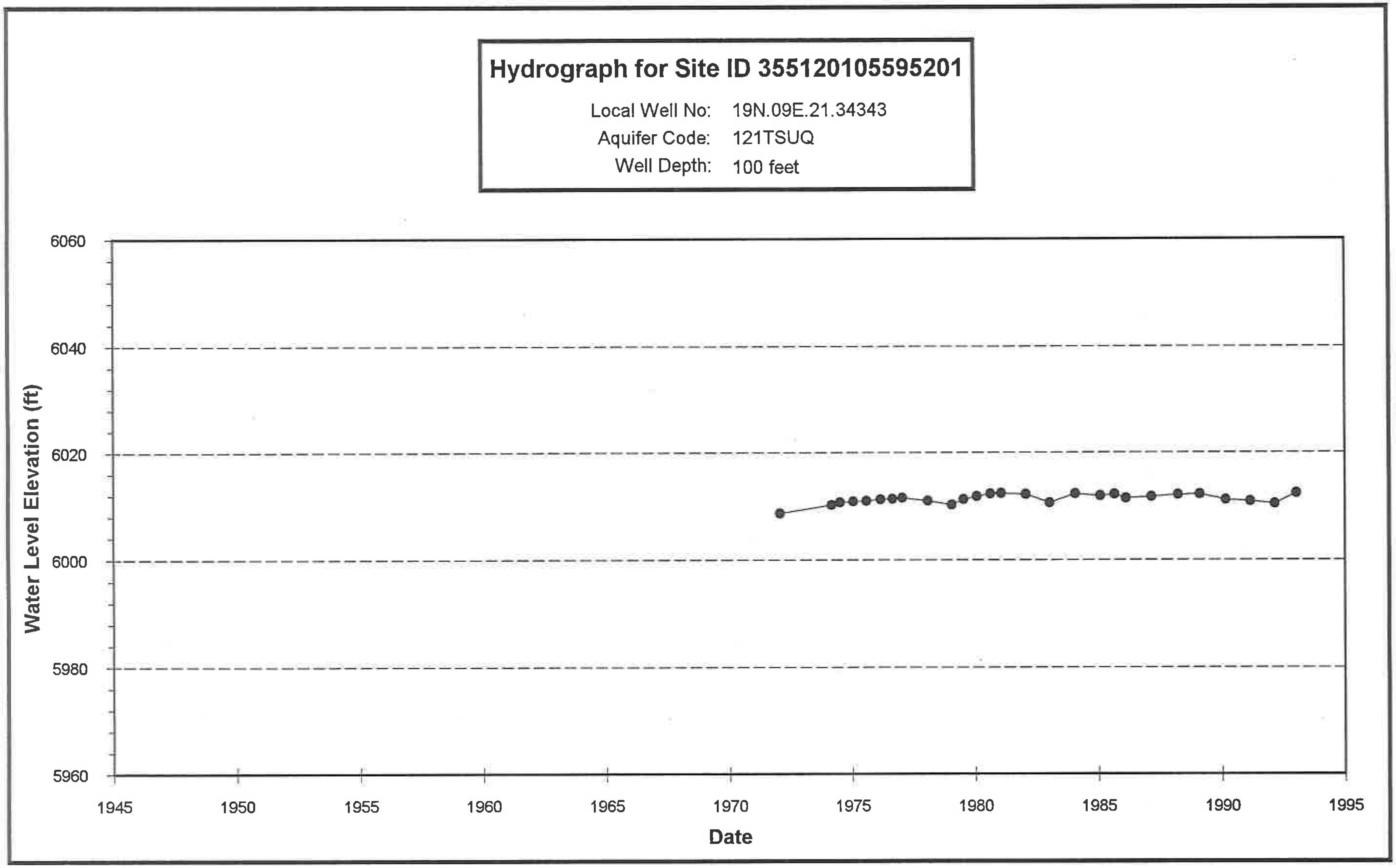
Hydrograph for Site ID 355000106092801
Local Well No: 19N.07E.36.3113 SF-2A
Aquifer Code: 112SNTF
Well Depth: 1863 feet
Water Level Elevation (ft)
5690
5670
5650
5630
5610
5590
5570
5550
5530
1986
1987
1988
1989
Date

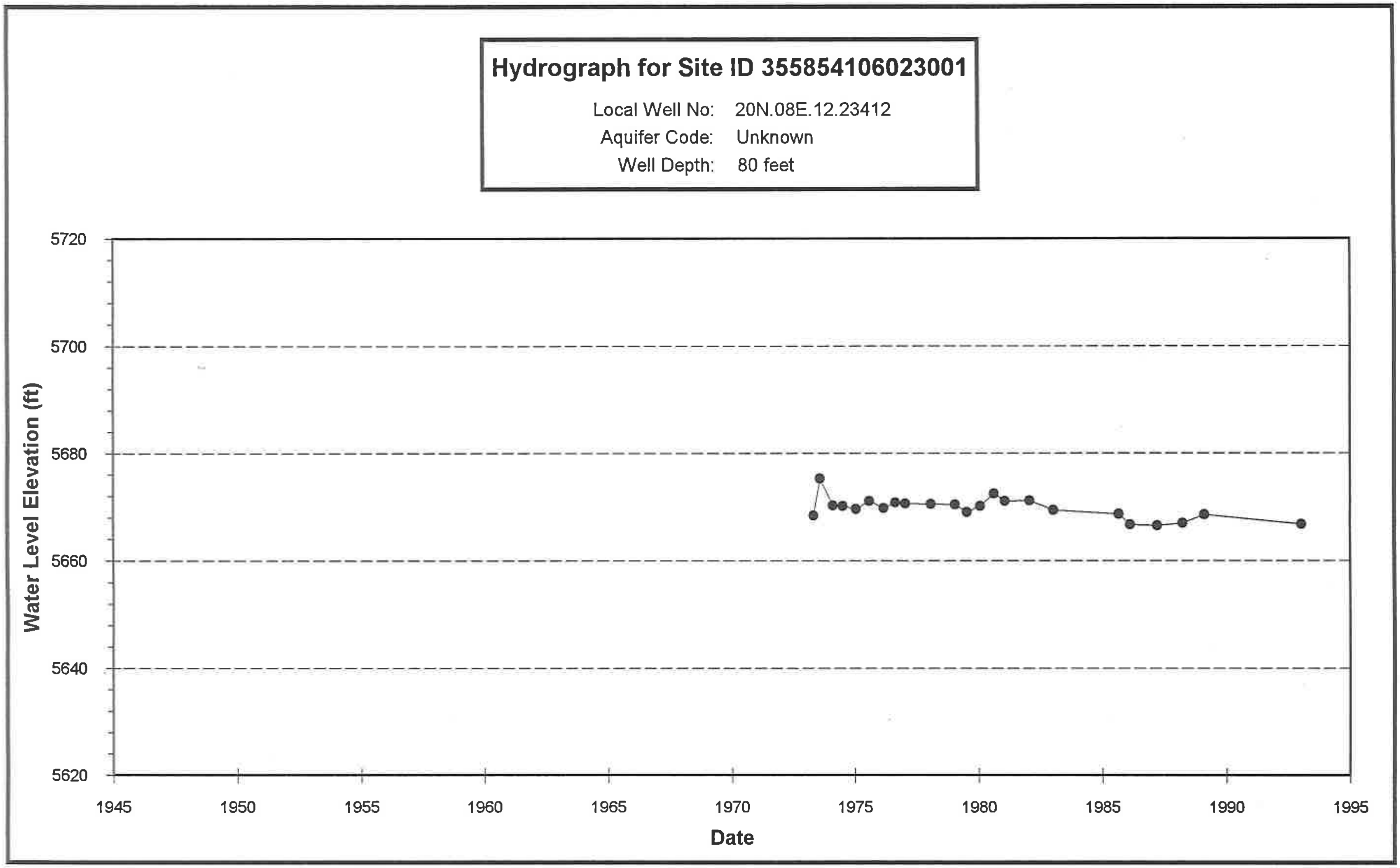


Hydrograph for Site ID 355000106092802
Local Well No: 19N.07E.36.3113 SF-2B
Aquifer Code: 112SNTF
Well Depth: 824 feet
Water Level Elevation (ft)
5480
5460
5440
5420
5400
5380
5360
5340
5320
5300
1986
1987
1988
1989
Date



Note: Vertical scale is increased to 160 feet


Hydrograph for Site ID 355120105595201
Local Well No: 19N.09E.21.34343
Aquifer Code: 121TSUQ
Well Depth: 100 feet
Water Level Elevation (ft)
6060
6040
6020
6000
5980
5960
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date



Hydrograph for Site ID 355854106023001
Local Well No: 20N.08E.12.23412
Aquifer Code: Unknown
Well Depth: 80 feet
Water Level Elevation (ft)
5720
5700
5680
5660
5640
5620
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
Date

APPENDIX F

LIST OF WELLS AND WATER QUALITY DATA USED TO PREPARE STIFF DIAGRAMS

Location and Data for Wells Used to Prepare Stiff Diagrams

	Concentrations (ppm)															State Plane Coordinates (feet)	
Local Well Number	Sample	Aquifer Code	Sample Date	Ca	Mg	Na	K	Cl	SO_4	F	SiO_2	HCO_3	CO_3	Fe (diss.)	Site ID	X	Y
14N.08E.08.12411	I1	000IRSV	03/01/75	260	45	45	4.5	17	670	0.5	28	220	0	420	352730106070701	539127.5	1622083
14N.09E.36.31343B	AL1	110AVMB	03/26/74	90	18	24	1.6	10	100	0.9	13	280	0	0	352343105564403	590734	1599247
14N.08E.09.2434 CER	AL2	110AVMB	07/27/77	73	14	38	2.7	16	67	0.6	28	280	0	1	352752106053401	546817.1	1624318
15N.10E.33.4344	AL3	110AVMB	03/30/77	87	12	19	1.2	26	86	0.8	15	230	0	20	352845105524501	610405.5	1629846
15N.08E.07.32334	AL4	110AVMB	07/14/76	88	30	60	7.1	25	55	1.5	40	500	0	1600	353229106081001	533881.1	1652305
18N.09E.24.413	AL5	110AVMB	12/15/64	72	10	5.2	1.2	2.5	10	0.5	21	260	0	80	354623105561001	593110.4	1736755
18N.09E.10.32444	AL6	110AVMB	06/07/74	87	8.7	14	2.4	15	18	0.3	20	290	0	50	354805105582501	581957.5	1747034
19N.08E.05.34423	AL7	110AVMB	06/03/74	53	4.3	28	2.8	6.9	22	0.3	21	220	0	30	355404106070001	539487.8	1783242
20N.09E.01.4444	AL8	110AVMB	03/09/77	39	3.1	11	1.2	6.5	14	0.8	13	140	0	20	355911105554301	595079.9	1814412
20N.09E.01.223	AL9	110AVMB	07/27/77	92	12	18	3	7.4	14	0.3	15	370	0	220	355954105555601	593997.4	1818757
10N.08E.20.2241	B1	110BLSN	08/17/77	65	22	14	3	6.1	16	0.8	23	310	0	0	350454106061201	543879.8	1485002
11N.09E.28.41421	B2	110BLSN	07/21/77	45	16	55	2.3	13	120	1.4	25	200	0	20	350850105585801	579883.7	1508935
11N.07E.26.24231	B3	110BLSN	06/17/76	34	16	29	1.9	13	16	0.4	25	210	0	70	350906106092501	527816.6	1510458
14N.08E.02.3243	AN1	112ANCH	06/07/76	36	7.7	24	3.3	9.1	26	0.6	25	160	0	40	352805106035201	555251.6	1625647
15N.09E.33.3444	AN2	112ANCH	03/30/77	51	9.8	25	1.6	17	33	0.5	24	170	0	20	352846105593001	576911.4	1629841
16N.08E.26.43123	AN3	112ANCH	06/14/77	30	2.9	21	1.7	2.9	13	0.3	25	130	0	0	353501106033101	556906.9	1667708
16N.10E.27.24234	AN4	112ANCH	03/22/74	42	15	10	1.4	21	47	0.4	14	120	0	0	353522105513301	616200.9	1670007
16N.08E.20.3234	AN5	112ANCH	04/18/77	29	4	8.4	1.1	3.3	10	0.2	23	110	0	0	353556106071901	538068.4	1673238
LA MAJADA GRANT	C1	112CURB	05/06/74	67	15	67	5	27	63	0.8	13	330	0	30	353258106115301	515451.5	1655222
16N.08E.32.3413	C2	112CURB	02/14/77	32	11	67	4	5.4	67	0.6	28	240	0	30	353406106071101	538743.7	1662118
15N.10E.05.3434	TE1	121TSUQ	03/21/74	82	16	20	3.9	37	40	1.1	22	270	0	0	353306105542001	602456.8	1656205

Note: See Appendix C for explanation of fields

Location and Data for Wells Used to Prepare Stiff Diagrams

Local Well Number	Sample	Aquifer Code	Sample Date	Concentrations (ppm) Ca	Mg	Na	K	Cl	SO_4	F	SiO_2	HCO_3	CO_3	Fe (diss.)	Site ID	State Plane Coordinates (feet) X	Y
15N.08E.02.21223	TE2	121TSUQ	02/14/77	37	4.5	16	1.4	6.5	30	0.3	22	130	0	0	353355106033101	556919.9	1661036
16N.07E.33.4424	TE3	121TSUQ	06/09/76	39	6.9	77	5.1	11	57	0.3	46	280	0	110	353407106114901	515778.3	1662198
16N.09E.12.11222	TE4	121TSUQ	04/11/74	57	17	30	2.4	19	47	1.3	37	230	0	30	353819105563501	591203.5	1687814
17N.07E.34.242	TE5	121TSUQ	06/09/76	18	2	50	4.5	4.4	15	0.2	21	180	0	140	353946106104401	521123.1	1696475
17N.08E.25.32431	TE6	121TSUQ	04/26/77	42	5.4	12	2.8	2.6	14	0.2	19	140	0	20	354019106024001	561052	1699868
17N.09E.26.133	TE7	121TSUQ	06/07/51	56	5.1	5.7	1.2	11	21	0.1	16	150	0	20	354034105574301	585550.9	1701446
17N.09E.22.441	TE8	121TSUQ	06/07/51	46	7	4.8	1.2	12	5.5	0	15	130	0	0	354105105580401	583809.5	1704575
17N.08E.05.3231	TE9	121TSUQ	07/18/77	64	7.2	67	5.4	4.2	12	0.2	37	390	0	20	354352106071401	538417.9	1721364
17N.08E.01.2124	TE10	121TSUQ	12/20/73	51	6.6	23	2.6	8.2	22	0.5	23	160	0	20	354419106022601	562155.3	1724135
18N.07E.35.442	TE11	121TSUQ	07/18/77	66	4.3	62	5.5	3.8	30	0.2	45	350	0	30	354438106093301	526954.1	1726002
18N.09E.31.14121	TE12	121TSUQ	07/18/77	46	5.8	20	2.6	7.1	14	0.2	23	170	0	0	354503106014701	565360.2	1728591
18N.09E.25.24211	TE13	121TSUQ	04/11/74	77	14	18	1.9	13	28	0.5	27	270	0	120	354555105554901	594850.1	1733929
18N.10E.07.2412	TE14	121TSUQ	07/28/77	24	2	73	2.5	6	34	0.3	20	220	0	100	354832105544901	599740	1749819
18N.07E.01.42244	TE15	121TSUQ	04/18/74	50	6.6	77	4.6	4.7	22	0.5	43	350	0	0	354908106083401	531787.6	1753305
18N.07E.01.422	TE16	121TSUQ	05/02/70	36	3.9	53	3.6	3.4	16	0.4	33	240	0	0	354912106083801	531457.7	1753709
18N.10E.05.2113	TE17	121TSUQ	07/28/77	50	9.6	10	1.8	4.1	7.3	0.5	23	200	0	0	354931105540501	603342.7	1755797
18N.07E.01.21231	TE18	121TSUQ	02/29/72	43	6.5	190	8.7	12	34	0.3	42	510	0	0	354935106085501	530055.4	1756033
18N.07E.01.21231	TE19	121TSUQ	04/18/74	46	6.5	92	5.1	4.5	25	0.4	45	380	0	20	354935106085501	530055.4	1756033
19N.09E.21.34343	TE20	121TSUQ	04/18/77	58	9.3	41	6.1	18	49	0.8	50	240	0	30	355120105595201	574740.6	1766730
RAMON VIGIL GRANT S	TE21	121TSUQ	10/20/70	24	1.5	42	1.9	2.7	10	0.8	32	170	0	70	355121106093101	527081	1766748
19N.09E.08.13314B	TE22	121TSUQ	06/12/74	41	8.6	120	7.3	22	180	0.7	29	240	0	30	355335106010102	569028.4	1780366

Note: See Appendix C for explanation of fields

Location and Data for Wells Used to Prepare Stiff Diagrams

Local Well Number	Sample	Aquifer Code	Sample Date	Ca	Mg	Na	K	Cl	SO_4	F	SiO_2	HCO_3	CO_3	Fe (diss.)	Site ID	State Plane Coordinates (feet) X	Y
				Concentrations (ppm)													
19N.07E.04.444	TE23	121TSUQ	07/21/50	10	1.1	42	3.8	5	9	1.2	64	120	7	20	355407106114701	515877.2	1783523
20N.08E.01.4232	TE24	121TSUQ	05/31/74	48	5.1	33	4	5.2	20	1.3	26	220	0	20	355931106021701	562697.4	1816346
20N.09E.04.41212	TE25	121TSUQ	04/30/74	24	2	110	8.6	41	90	1	52	210	0	20	355935105591501	577651.6	1816787
20N.10E.05.12211	TE26	121TSUQ	04/13/74	76	3.8	23	2.4	8.3	15	1.6	27	270	0	20	360006105541101	602620.6	1819999
14N.07E.36.1314	MV1	211MVRD	03/26/74	220	66	110	2.9	60	700	0.9	24	360	0	240	352405106092401	527814.1	1601344
10N.11E.25.3333	D1	231DCKM	07/13/76	80	17	59	2.3	30	110	0.6	18	270	0	40	350322105435301	655207.4	1476072
11N.11E.09.133	D2	231DCKM	08/24/77	43	17	100	1.6	72	97	1.3	17	210	0	60	351140105470001	639425.6	1526341
10N.09E.29.1334	GL1	310GLRT	08/17/77	260	80	200	5.6	300	750	0.6	21	180	0	0	350344106004601	570989.1	1477977
10N.09E.24.332	GL2	310GLRT	08/17/77	190	41	260	5.7	250	680	1.9	21	180	0	70	350418105563201	592092.5	1481472
11N.10E.23.3113	GL3	310GLRT	08/22/77	400	86	110	3.6	180	1200	0.7	16	120	0	0	350948105512101	617809.6	1514925
15N.11E.02.211	SC1	310SGRC	03/21/74	95	18	56	1.8	52	100	0.4	14	300	0	0	353352105443701	650604.4	1661064
16N.11E.27.3313	SC2	310SGRC	03/20/74	150	57	74	4.2	110	140	0.3	22	530	0	0	353457105461101	642806.6	1667597
16N.11E.28.2442	SC3	310SGRC	03/20/74	55	14	75	2.3	14	81	0.4	18	310	0	0	353520105461401	642547.5	1669921
16N.11E.25.13132	SC4	310SGRC	04/06/74	23	5.1	84	1.6	4.9	33	0.8	18	260	0	200	353526105440401	653280.9	1670582
11N.10E.32.1424	Y1	310YESO	08/16/77	47	21	59	3.4	24	72	1.1	20	250	0	0	350815105535801	604808.1	1505474
13N.11E.34.4423	SA1	313SADR	08/18/77	540	130	28	4.8	16	1800	1.5	11	210	0	20	351824105451301	648101.6	1567228
11N.07E.20.11411A	ABL1	318ABOL	06/23/77	23	14	78	1.4	3.9	33	0.5	22	280	0	0	351008106132502	507886.6	1516714
12N.07E.34.224	ABU1	318ABOU	06/17/76	60	21	18	1.3	9.3	33	0.4	23	290	0	70	351332106102801	522565	1537345
10N.07E.27.12113	MA1	325MDER	05/21/74	150	18	17	2.1	32	45	0.8	14	460	0	20	350408106111101	519034.2	1480325
10N.07E.07.323	MA2	325MDER	08/22/77	82	22	19	2.7	8.6	6.8	0.8	10	390	0	0	350610106143101	502409.4	1492653
11N.07E.22.11134	MA3	325MDER	03/09/77	18	7.5	210	2.2	12	46	6.2	11	580	0	0	351010106112501	517848.6	1516921

Note: See Appendix C for explanation of fields

Location and Data for Wells Used to Prepare Stiff Diagrams

	Concentrations (ppm)															State Plane Coordinates (feet)	
Local Well Number	Sample	Aquifer Code	Sample Date	Ca	Mg	Na	K	Cl	SO_4	F	SiO_2	HCO_3	CO_3	Fe (diss.)	Site ID	X	Y
17N.10E.09.32244A	MA4	325MDER	07/06/77	57	25	23	2.2	16	31	0.6	19	300	0	0	354300105530502	608430.7	1716283
12N.07E.34.1232	PR1	400PCMB	07/02/72	140	26	16	1.4	13	280	0.2	20	230	0	0	351336106110301	519661.1	1537747
15N.10E.23.100	PR2	400PCMB	09/15/70	87	12	22	1.6	44	74	0.7	14	230	0	20	353104105510801	618370.9	1643931
16N.10E.30.14442	PR3	400PCMB	03/22/74	77	14	17	3.2	20	39	1.3	25	250	0	0	353518105551301	598032.9	1669536
13N.08E.32.341	UN1	UNKNOWN	11/26/75	120	31	31	3	21	300	0.9	13	200	0	200	351828106070901	539034.5	1567287
13N.08E.30.424	UN2	UNKNOWN	11/25/75	240	47	43	3	55	550	1.3	10	290	0	100	351922106072801	537452.9	1572744
13N.08E.19.142	UN3	UNKNOWN	11/14/75	160	18	29	3	9	270	1.1	12	280	0	400	352037106080001	534792.5	1580323
13N.08E.19.122	UN4	UNKNOWN	11/16/75	160	21	29	2	6	280	1.1	11	280	0	700	352050106080001	534790.9	1581637
13N.08E.18.433	UN5	UNKNOWN	11/16/75	220	32	48	2	25	390	1.4	12	390	0	100	352056106075201	535452.9	1582245
13N.08E.18.433A	UN6	UNKNOWN	11/13/75	180	41	47	2	25	380	1.3	12	350	0	10	352056106075202	535452.9	1582245
13N.08E.14.324	UN7	UNKNOWN	11/12/75	84	13	22	2	27	97	0.4	9	300	0	100	352112106034701	555744.1	1583894
14N.08E.33.422	UN8	UNKNOWN	11/14/75	83	15	40	3	15	140	0.6	9	230	0	100	352356106052101	547931.2	1600460
14N.08E.32.214	UN9	UNKNOWN	11/13/75	190	32	50	3	25	460	0.8	12	260	0	100	352412106064401	541058	1602067
14N.08E.28.412	UN10	UNKNOWN	11/16/75	190	43	67	4	25	540	0.8	12	220	0	100	352444106054101	546267.9	1605310
16N.08E.26.44221	UN11	UNKNOWN	03/13/73	32	3.9	10	2	5	41	0.5	-999999	110	0	60	353504106031501	558227.8	1668014
19N.07E.20.221 TEST	UN12	UNKNOWN	08/09/51	29	9.1	48	7.8	28	29	0.5	48	170	0	20	355214106125301	510451.8	1772096

Note: See Appendix C for explanation of fields

APPENDIX G

SUMMARY OF REPORTED AQUIFER PARAMETERS FOR SANTA FE COUNTY

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
1	T10N.R07E.7.242					11000			0.01		Jenkins, March 1980
2	T10N.R07E.4.112					114000			0.01	322	Geohydrology Ass., Jan. 1989
3	T10N.R07E.4.212					58000			0.00038	305	Geohydrology Ass., Jan. 1989
4	T10N.R07E.4.242		448			74000				306	Geohydrology Ass., Jan. 1989
5	T10N.R07E.14.343					640000			0.05		Geohydrology Ass., Jan. 1989
6	T10N.R07E.23.111		304			610000		165		176	Geohydrology Ass., Jan. 1989
7	T10N.R07E.23.113					61000			0.0038		Geohydrology Ass., Jan. 1989
8	T11N.R07E.20.114		360			1800				310	Geohydrology Ass., Jan. 1989
9	T11N.R07E.28.442		420			120				283	Geohydrology Ass., Jan. 1989
10	T11N.R07E.29.211		252			63000				239	Geohydrology Ass., Jan. 1989
11	T11N.R07E.29.242		630			4000		10.7		440	Geohydrology Ass., Jan. 1989
12	T11N.R07E.33.434		451			13500		36.4		317	Geohydrology Ass., Jan. 1989
13	T11N.R07E.33.442		501			130000		19.4	0.011	326	Geohydrology Ass., Jan. 1989
14	T12N.R07E.5.4	San Andres					428				AGW, March 1993
15	T12N.R07E.11.422	Triassic SS					0.4				AGW, March 1993
16	T12N.R08E.8.224	Morrison Fm					0.01				AGW, March 1993
17	T13N.R07E.21.222	Mancos Shale (?)					1.3				AGW, March 1993
18	T13N.R08E.	Galisteo & Mesaverde Fm	360			2.7		0.0018		74	AGW, March 1993
19	T13N.R08E.	Lithic tuff					10				AGW, March 1993
20	T13N.R08E.	Mesaverde Fm					0.4				AGW, March 1993
21	T13N.R08E.	Mesaverde Fm					1.1				AGW, March 1993
22	T13N.R08E.	Mesaverde Fm					0.092				AGW, March 1993

DTW = Depth to water

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
23	T13N.R08E.	Mesaverde Fm and latite					40				AGW, March 1993
24	T13N.R08E.	Mesaverde Fm					0.09				AGW, March 1993
25	T13N.R08E.	Granodiorite					0.63				AGW, March 1993
26	T13N.R08E.	Mesaverde Fm					0.2				AGW, March 1993
27	T13N.R08E.	Mesaverde Fm					6.8				AGW, March 1993
28	T13N.R08E.11.133	Lithic tuff					0.18				AGW, March 1993
29	T13N.R08E.19	Breccia					45				AGW, March 1993
30	T13N.R08E.19	Mesaverde Fm					27				AGW, March 1993
31	T13N.R08E.19.134	Lithic tuff					0.18				AGW, March 1993
32	T13N.R08E.19.431	Mononite and baked shale					0.4				AGW, March 1993
33	T13N.R08E.30.424	Monzonite (?)					2				AGW, March 1993
34	T13N.R08E.32.332	Morrison Fm (?)					4.1				AGW, March 1993
35	T13N.R08E.32.332	Morrison Fm (?)					0.47				AGW, March 1993
36	T13N.R08E.11.433b	Mesaverde Fm					1				AGW, March 1993
37	T13N.R08E.19.323a	Ore body					40				AGW, March 1993
38	T13N.R08E.19.323c	Ore body					40				AGW, March 1993
39	T13N.R08E.31.322	Mancos					0.2				AGW, March 1993
40	T14N.R08E.3	Ancha/alluvium				77					Tymkowych, undated
41	T14N.R08E.3	Ancha/alluvium				60					Tymkowych, undated
42	T14N.R08E.3	Ancha/alluvium				69					Tymkowych, undated
43	T14N.R08E.3	Ancha/alluvium				3					Tymkowych, undated

DTW = Depth to water

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
44	T14N.R09E.25				101				0.02		Hagerman, April 1987
45	T14N.R10E.4.131	?	300			10300		13.33		45	VeneKlasen, 1987
46	T14N.R11E.9				85				0.015		Turner, Jan. 1985
47	T14N.R11E.9.4311		350			110					AGW, Jan. 1985
48	T15&16N.R08&09E.	Tesuque Fm				1120			0.000085		Coons, Feb. 1983
49	T15N.R08E.25	Ancha			200				0.05		Cooper, undated
50	T15N.R08E.26.2	Ancha				2200					Jenkins, July 1977
51	T15N.R08E.34.1321	Tertiary Intrusives	500			110				208.8	AGW, Nov. 1983
52	T15N.R08E.13 & 24				350	75					AGWC, Dec. 1985
53	T15N.R08E.2.21132		715		550	2800				135	Fleming, 1991
54	T15N.R08E.2.22213		795		527	4200				153	Fleming, 1991
55	T15N.R08E.26.224		-		80	2200				72	Fleming, 1991
56	T15N.R08E.34&35	Ancha & Espinosa			200	26					Lazarus, May 1988
57	T15N.R09E.1.3314		350	197.7		101000	510.9				VeneKlasen, 1987
58	T15N.R09E.3	Precambrian			448	10					Lazarus, Oct. 1989
59	T15N.R09E.25.331		345		60	37				58	Fleming, 1991
60	T15N.R09E.3.13		560		276	1130				234	Fleming, 1991
61	T15N.R10E.2	Precambrian			2.5						Hagerman, Sept. 1984
62	T15N.R10E.2.14314	Precambrian			180	900			0.02		VeneKlasen & Ass., May 1986
63	T15N.R10E.3	Precambrian	240			74				88.07	Geohydrology Ass., Sept. 1993
64	T15N.R10E.3	Precambrian				1280					Geohydrology Ass., Sept. 1993
65	T15N.R10E.3	Precambrian	300			2500			0.00044	84.05	Geohydrology Ass., Sept. 1993

DTW = Depth to water

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
66	T15N.R10E.3	Precambrian	300			500			0.0013	90.54	Geohydrology Ass., Sept. 1993
67	T15N.R10E.5.341		374			500					VeneKlasen, 1987
68	T15N.R10E.5.343		324			90					VeneKlasen, 1987
69	T15N.R10E.8.122	Precambrian	239			13				120	VeneKlasen, 1987
70	T15N.R10E.8.123	Precambrian	280	161.6		50				120	VeneKlasen, 1987
71	T15N.R10E.8.124	Precambrian	250			16				120	VeneKlasen, 1987
72	T15N.R10E.8.211	Precambrian	244			1800				120	VeneKlasen, 1987
73	T15N.R10E.8.212		192			1300					VeneKlasen, 1987
74	T15N.R10E.10.4122	Precambrian				1				70	VeneKlasen, 1987
75	T15N.R10E.10.4122	Precambrian				550		0.86		70	VeneKlasen, 1987
76	T15N.R10E.11	Precambrian			200				0.01		Souder, Miller & Ass., Aug. 1993
77	T15N.R10E.11	Precambrian			40				0.1		Souder, Miller & Ass., Aug. 1993
78	T15N.R10E.12	Sangre De Cristo			126	190			0.05		Cooper, 1990
79	T15N.R10E.16.4221	Precambrian	620			5.3 - 370				74	VeneKlasen, 1987
80	T15N.R10E.18	Ancha		40		16000				218	VeneKlasen, 1987
81	T15N.R10E.18		280		42	16000				218	Fleming, 1991
82	T15N.R10E.19		268		100	4200				168	Fleming, 1991
83	T15N.R10E.19	Ancha	250	44		4200				169	VeneKlasen, 1987
84	T15N.R10E.21.124	Galisteo						0.18			VeneKlasen, 1987
85	T15N.R10E.33.434		102			12000		2.7		41.62	VeneKlasen, 1987
86	T15N.R10E.11&12&13	Sangre de Cristo			315	210			0.02		Cooper, July 1991
87	T15N.R10E.15&16					.4-150					Jenkins, May 1983
88	T15N.R10E.2&3	Precambrian			336	170-1100			0.02		VeneKlasen, May 1986

DTW = Depth to water

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
89	T15N.R10E.8.122		239		100	13				125	Fleming, 1991
90	T15N.R10E.8.124		250		100	16				125	Fleming, 1991
91	T15N.R10E.8.213		280		100	46				130	Fleming, 1991
92	T15N.R11E.2,3,10,11	Sangre de Cristo			160?	195					Dawson, June 1993
93	T16N.R08E.	Santa Fe Group			450	400			0.018		Geohydrology Ass., May 1988
94	T16N.R08E.22.3423	Santa Fe Group	310		182	3500				128	Fleming, 1991
95	T16N.R08E.25	Santa Fe Group			215	1100					Lazarus, July 1985
96	T16N.R08E.27	Santa Fe Group				750-82000					Jenkins, 1979
97	T16N.R08E.28	Santa Fe Group				1200					AGWC, April 1986
98	T16N.R08E.26&27	Santa Fe Group		740	572	1900					Lazarus, Oct. 1987
99	T16N.R09E.1	Santa Fe Group			180	120					Lazarus, Aug. 1983
100	T16N.R09E.15	Santa Fe Group			369	1400					VeneKlasen & Ass., Feb. 1986
101	T16N.R09E.23	Santa Fe Group			50	1700					VeneKlasen & Ass., Dec. 1984
102	T16N.R09E.25.1	Santa Fe Group	280		143	300				137	Fleming, 1991
103	T16N.R09E.25.3	Santa Fe Group	250		108	300				142	Fleming, 1991
104	T16N.R09E.34.134	Santa Fe Group	760		218	1107				218	Fleming, 1991
105	T16N.R10E.	Santa Fe Group	250			1500			0.17	128.56	Hydrotechnics, Feb. 1973
106	T16N.R10E.	Santa Fe Group	250			125			0.002778	78.05	Hydrotechnics, Feb. 1973
107	T16N.R10E.	Santa Fe Group	250			300			0.00363	127.62	Hydrotechnics, Feb. 1973
108	T16N.R10E.	Santa Fe Group	325			1500		0.47		152.94	Hydrotechnics, Feb. 1973
109	T16N.R10E.	Santa Fe Group	250			2000			0.000322	84.24	Hydrotechnics, Feb. 1973
110	T16N.R10E.	Santa Fe Group	250			300			0.00862	127.59	Hydrotechnics, Feb. 1973
111	T16N.R10E.	Santa Fe Group	250			2000			0.000472	80.16	Hydrotechnics, Feb. 1973

DTW = Depth to water

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
112	T16N.R10E.	Santa Fe Group	250			125			0.000498	91.17	Hydrotechnics, Feb. 1973
113	T16N.R10E.	Precambrian	300			10000		8.8		171.38	Hydrotechnics, Feb. 1973
114	T16N.R10E.	Precambrian	360			20		0.04		91.21	Hydrotechnics, Feb. 1973
115	T16N.R10E.	Santa Fe Group	250			1500			0.0525	124.43	Hydrotechnics, Feb. 1973
116	T16N.R10E.	Precambrian	160			10000		5		114.11	Hydrotechnics, Feb. 1973
117	T16N.R10E.	Santa Fe Group	277			300		0.17		126.28	Hydrotechnics, Feb. 1973
118	T16N.R10E.	Santa Fe Group	250			2000			0.00267	79.86	Hydrotechnics, Feb. 1973
119	T16N.R10E.	Santa Fe Group	250			200			0.00398	94.37	Hydrotechnics, Feb. 1973
120	T16N.R10E.5	Precambrian			288	15-30					Lazarus and Drake, Dec. 1990
121	T16N.R10E.5.34	Precambrian				100-2800					Lazarus and Drake, Dec. 1991
122	T16N.R10E.7.211	Precambrian			100	300					AGWC, Oct. 1983
123	T16N.R10E.8.1	Precambrian				15					Jenkins, June 1980
124	T16N.R10E.18	Precambrian			196	53000					Lazarus, Jan. 1989
125	T16N.R10E.19	Tesuque Fm				100-24100					Hydrotechnics, Feb. 1973
126	T16N.R10E.20	Precambrian				3500					Cooper, Sept. 1993
127	T16N.R10E.20&29	Precambrian			200	700					VeneKlasen & Ass., Oct. 1981
128	T16N.R10E.25&26	Precambrian			157	110					Glorieta Geoscience, Aug. 1992
129	T16N.R11E.32.4	Sangre de Cristo				80					Cooper, March 1992
130	T16N.R11E.33	Sangre de Cristo			276	900					VeneKlasen & Ass., April 1993
131	T16N.R11E.8&17	Santa Fe Group			440	1120					VeneKlasen & Ass., Aug. 1993
132	T16N.T08E.22					700					Fleming, 1991
133	T16N.T08E.25.144		420		213	1200				207	Fleming, 1991
134	T16N .R09E.23	Santa Fe Group			290	1400					Drake and Lazarus, March 1991

DTW = Depth to water

Summary of Reported Aquifer Parameters for Santa Fe County

Well No.	Location	Reported Aquifer	Well Depth (ft)	Screen Thickness (ft)	Estimated Saturated Thickness (ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Specific Capacity (gpm/ft)	Storage	Reported Static DTW (ft)	Reference
135	T17N.R09E.2	Tesuque				1100					Cooper, Sept. 1986
136	T17N.R09E.28	Tesuque		340		14000					Lazarus, Jan. 1989
137	T17N.R10E.6.334	Santa Fe Group			455	400					Lazarus, May 1991
138	T17N.R10E.9	Precambrian			408	30					Lazarus, May 1991
139	T17N.R10E.9	Precambrian				[illegible]			0.015		Updegraff, Aug. 1978
140	T17N.R10E.33	Precambrian			455	90					Lazarus, Aug. 1990, Souder review
141	T18N.R09E.26	Santa Fe Group			288	5200-31000					Jenkins, April 1982
142	T18N.R09E.33				202				0.15		Cooper, July 1992
143	T18N.R09E.33				105				0.08		Cooper, July 1992
144	T18N.R09E.33.344	Santa Fe Group			381	2600					Drake and Lazarus, April 1992
145	T18N.R09E.18&19	Santa Fe Group				2400					Cooper, Jan 1993
146	T18N.R09E.28,29,33	Tesuque Fm			166	100-150					Cooper, undated
147	T18N.R10E.7	Santa Fe Group			502.5	500					VeneKlasen & Ass., Aug. 1986
148	T18N.R10E.17.3242		743		427	30			0.01	316	LWA, Aug. 1988
149	T18N.R10E.18.214		500		353	110			0.01	147	LWA, Aug. 1988
150	T18N.R10E.18.321		649		465	110			0.01	184	LWA, Aug. 1988

DTW = Depth to water

APPENDIX H

DOCUMENT REVIEW OF EXISTING MANAGEMENT REPORTS

DOCUMENT REVIEW OF EXISTING MANAGEMENT REPORTS

The reports and documents reviewed that are of direct interest to the management of water resources in Santa Fe County are presented here. Reports of direct interest are listed herein in chronological order along with notes that are relevant to understanding the basis of the development of land and water use policies and regulations. Reports of purely technical nature are not presented here. All reviewed reports are listed in the Bibliography section at the end of the report.

The scope of the reports varies widely. Where possible, comments relevant to water resource management were taken directly from reports, but at times it was necessary to paraphrase comments. This document review is intended primarily as a reference of management reports. The reader is directed to Section 3.5 for the review and analysis of these reports.

Reynolds, S. E. 1958. Rio Grande Underground Water Basin, 23rd Biennial Report. State Engineer N.M., 227 p.

This report describes the development of water-resource administration in the Rio Grande Underground Water Basin, the largest of the State's declared underground water basins, which was created on November 29, 1956.

During the early months of its existence, the Rio Grande Underground Water Basin was a source of controversy, much of which stemmed from a general lack of knowledge of the valley's hydrology and of the basic concepts of the New Mexico Water Code. However, the basin and the reasons for its declaration were widely discussed by the State Engineer and his staff in press conferences and in talks before civic and municipal groups, and by the biennium's end a better understanding of the valley's water problems and reasons for the basin's declaration had been achieved.

The State Engineer order creating the basin recognizes that the surface waters of the Rio Grande system in New Mexico are fully appropriated and that surface and ground waters of the basin are intimately interrelated parts of a single supply. As the order further recognizes, a consequence of this interrelationship is that any ground-water appropriation in the Rio Grande drainage results ultimately in an equivalent diminution of the surface-water flows. However, the full effect of the ground-water withdrawal may not be reflected in the river for many years, as the time required for the reduction to show up in the surface flow increases greatly as the distance of a well from the river is increased. Conversely, studies also show that if ground-water withdrawals are made over a period of time and then terminated, effects on the surface flow continue to slowly diminish for many years.

With these facts in mind, administrative procedures were designed to provide for the utilization of the valley's abundant ground-water resources to the fullest extent that can be attained without impairing existing rights. Appropriation of ground water is still permitted, provided that the immediate and potential effect on the flow of the river is offset by the retirement of usage under existing rights. In compensating for ground-water appropriations, retirement of existing surface-water rights is scaled not to the size of the initial diversion but to the cumulative effect of such diversion on the river. In this way, the availability of water to the remaining surface-water rights will remain unchanged.

The pro-rata schedule of retirement of use now permitted under surface rights allows municipalities and industries to appropriate ground water without infringing upon existing rights and with the smallest possible disturbance to the agricultural economy of the valley. Also, total water usage in the valley can be materially increased for a number of decades by mining a portion of the vast amount of ground water that is in storage in the aquifers, assuming that the rate of usage eventually stabilizes at approximately the present rate of consumption of both surface and ground water. This increased usage can be accomplished without damage to existing rights.

One of the most important aspects of declaring the Rio Grande Underground Water Basin is that it will encourage industrial development in the valley by providing procedures whereby industries can acquire valid and protected water rights upon which to base their investments.

American Society of Civil Engineers. 1961. Ground Water Basin Management, Manual of Engineering Practice. No. 40, 160 p.

This manual describes commonly used terms and concepts that relate to ground-water management.

Evaluation of mining yield is primarily a matter of determining the amount of extractable, but nonrenewable, water in a ground-water reservoir. The maximum mining yield is the total quantity of nonreplenishable water stored in the ground-water reservoir. The permissive mining yield is that part of the maximum mining yield that is of economic quality, within economic pumping lifts, obtainable through economic pumping patterns, and legally available.

Ground-water hydrology is not an exact science, not so much because of a present lack of scientific or technical knowledge concerning the principles in regard to the behavior of ground water as because of the lack, in any estimates made, of basic data of a quality and a quantity which will allow results to be achieved of a precision attained in other engineering or scientific computations. If ground water had a value (per unit of quantity) approaching that of petroleum, it would be entirely feasible to make such field investigations and studies as would be necessary to allow the determination of safe yield or other phenomena in a fairly precise manner. Under present conditions, however, the ground-water hydrologist usually must accept the basic data that he finds available (much of it of poor or uncertain quality) and must endeavor to supplement this with such additional data as it is feasibly and financially possible for him to secure. To such data as he ultimately secures, he must apply sound and mature judgment and, through utilization of all of these, arrive at his preliminary estimate. To this estimate must be applied a factor of safety which should vary inversely with the quality and quantity of basic data that has been used. With time, more data of better quality usually becomes available, and subsequent estimates of greater accuracy can be made.

When an estimate of ground-water yield has been made, therefore, it should be recognized that the likelihood of the estimate being superseded by a more accurate figure in future years is fairly great, because of more abundant and detailed basic data and improved methods of analysis. This will be particularly true if the estimate applies only to a ground-water reservoir where subsequent development modifies the interrelations of ground water to surface water to precipitation. By the same token, a calculation of the perennial yield of water from all sources replenished from precipitation, including ground water, soil water, and surface water, is likely to stand unchallenged for long. However, even here the basic meteorological data may well necessitate some revision with time.

Consulting Professionals Inc. undated. Santa Fe Well Field, 9p.

This report discusses the future of the Santa Fe Well Field.

This report concludes that water levels, the specific capacity of each well, and pumping rates have rapidly declined since 1950. Little hope for an extended supply of water can be expected to be produced from the Santa Fe area. At best, the Santa Fe well field or any extension of it is only a temporary unsatisfactory solution to the City's need for additional sources of water.

Consulting Professionals Inc. November 1974. Santa Fe County Current Water Use and Availability-Phase III-Santa Fe County Water Study. 44p.

This report describes, for each drainage basin in Santa Fe County, the population, water use, irrigation, and water supply. The overall outlook of Santa Fe's future water supply is discussed.

Several points were made in this report:

- Historically the per capita withdrawal and depletion requirements for both rural and urban use in Santa Fe County has increased with time.

- The County water supply is limited to the existing surface- and ground-water use. State Engineer regulations, state laws, and the interstate stream compacts make it practically impossible for additional water to be drawn from underground storage.

- In the Nambe-Pojoaque drainage basin, Indian water rights are under litigation; however, the total water use will not be subject to change. The courts cannot make more water.

- Water for municipal, industrial, and commercial needs must come from the retirement of irrigated lands.

Hagerman, Charles de B. 1974. Geologic Units and Hydrologic Conditions, Santa Fe County New Mexico, 34p.

This report describes the availability of ground water in Santa Fe County and recommends development densities for zones throughout Santa Fe County. The ground-water availability of Santa Fe County was delineated by geologic units.

Based on "areas" of relative water availability, the County was broken down into five classes of allowable development densities. Recommended densities of developments ranged from 2.5 acres per lot to no development by lots.

The hydrologic characteristics of the various geologic units were discussed and the quantity of water estimated for each drainage. The storage values were obtained by multiplying the areal extent times the saturated thickness, storage coefficient, and the specific yield. After ground-water resources were considered and found to be overdeveloped in part of the Santa Fe area, it was concluded that the only permanent source of water is the Rio Grande.

Consulting Professionals Inc. March 1975. Water Use and Availability, 91p.

The current use and availability of water in Santa Fe County is described in this report.

Santa Fe County contains eight surface-water drainage basins. Some basins lie entirely within the boundaries of the County, whereas only a small portion of others are within the County boundaries. Most of the County is within either the Rio Grande, Upper Pecos, or Estancia Valley Underground Water Basins as declared by the State Engineer.

All major water supplies, surface and underground, are fully appropriated. Because of State Engineer administrative policies, drainages must be considered separate entities and treated as such. Buckman area wells are not as productive as those in the Los Alamos well field and cannot produce sufficient water for the projected needs of Santa Fe.

Santa Fe County Staff. August 1975. Land Use Policies Related to Water Availability, 6 p.

The importance of water availability and water rights is discussed in this report as most critical determinants of any land-use policy in Santa Fe County.

This report made the following recommendations:

- Rural growth should be restrained to conserve ground water and to plan for the use of regional water sources.

- Land-use policies should be broken down into the four categories: (1) rural areas, (2) new subdivisions with community systems, (3) existing villages, and (4) metropolitan areas. In addition, a hypothetical fifth category of new community water systems supplied by a regional water system was suggested.

- Rural lot sizes should be based on sustained yield, and well density should be one well per 80 to 160 acres so as to avoid ground-water mining in the Homestead Zone.

- The Basin Zone should be based on a 100-year lifetime or, alternatively, on a regional water supply.

- Community water systems should be based on water rights transfers approved by the State Engineer.

- Lots on agricultural lands should be sized in a manner that would deter the transfer of water rights from the lands.

The report noted that water supplies are more likely to be limited by cost and legal factors than by the physical availability of water itself. Stated in another way, inexpensive water is in short supply as the City of Santa Fe has increasingly discovered. If money were no problem, then the potential water resources available in Santa Fe County are large enough to support considerable development.

Wilson, Lee. August 1975. Water Availability and Land-Use Policy in Santa Fe County, 89 p.

This is a comprehensive report on the water resources of Santa Fe County with recommendations for management of the resource.

The water in storage, the runoff per year, and the recharge per year in acre-feet are listed by drainage basin. The total water in storage in the county is 3,623,200 acre-feet, and runoff totals 76,800 acre-feet per year while recharge is 26,300 acre-feet per year. The present water use was estimated to be 47,500 acre-feet per year, of which 22,700 was from surface water and 24,800 was from ground water. Probably about half the water withdrawn is not consumptively used but is returned as wastewater. A change of use from agriculture to domestic could provide for 120,000 new inhabitants.

The basic source of "new" water in Santa Fe County is precipitation, which averages about 10 inches at the lower elevations to 30 inches or more at higher elevations. In theory, water yield can be used as a renewable resource to provide a perpetual supply of water. Of course precipitation varies from year to year, and in dry years, depletion of storage water is almost inevitable.

It is assumed that 75 to 85 percent of the water will be recovered through fairly expensive and efficient municipal wells; if domestic wells are used, only 50 percent of the water will be recovered.

The following conclusions were made in the report:

- Substantial development will require the use of (1) extensive fields of deep wells, (2) construction of reservoirs, and (3) imported water from the Rio Grande. Water supplies are more likely to be limited by cost and legal factors than by physical availability of water itself. The Santa Fe and Estancia areas have developed beyond the long-term carrying capacity of the local water supplies.

- Three alternative futures exist for water resource management: (1) balancing development with local water resources, (2) exploiting water resources regardless of consequences to allow maximum growth, and (3) bearing the cost of some economic and environmental resources to allow moderate growth. The projected population increase and total population under alternative 3 was tabulated by basin and community. New community water systems will be based on water right transfers.

- Any policy on permitted lot size should recognize that although large lots would have more water resources available, such large lot sizes would at the same time work against any service by a regional system. Small lot sizes would result in the converse situation. Intermediate lot sizes would have both problems, but neither as severely.

- Qualitatively, it seems evident that local ground water is the least expensive water source on which to base new development. But it is equally evident that this source will not last forever and that, in fact, ultimately the main source of water supply of Santa Fe County must be surface water. In that all future water use will become increasingly expensive, a policy decision is appropriate as to who will bear the costs as they occur. These costs include increased pumping, development, maintenance, and water right acquisition if community or regional systems become involved or necessary.

- Dense settlement brings with it the high probability that the local ground-water resources will be exhausted within a few generations, necessitating obtaining water from surface sources, sewage recycling, and importation. Hence, dense settlement by its nature must eventually be served by a county system.

- Zoning districts are recommended based on water availability and the assumed use of 1 acre-foot of water per household. Lot sizes in the districts ranged from 10 acres to 160 acres. Variances to lot size might be granted if units are clustered around one well which has its withdrawal restricted to 1 acre-foot. Subdivisions with 25 or more lots having a size of less than 10 acres should be required to have a community supply system. With the hauling of water, proposed lot sizes could be smaller than allowed by a particular district.

- In the Homestead Zone, a combination of recharge and water collection measures (such as roof systems to collect water) offer the potential to support one household per 160 acres. One purpose of the large-lot zoning is to limit the number of people jeopardized by the hazard of running out of water, so that small-scale water hauling might be a feasible solution to long-term water needs. The system would need a proven short-term water supply (probably local ground water) plus probable access to a long-term source such as river diversion, importation, and/or recycling. Also the system would have to have water rights.

Spiegel, Zane. 1977. Water Resource Aspects of Santa Fe County General Plan, 31 p.

This report provides a review of the Santa Fe County General Plan. Some of the major criticisms of the Plan are listed below:

- The Santa Fe County General Plan relies heavily on certain erroneous concepts in hydrology which invalidate many of the Plan's conclusions and recommendations.

- The Plan should be revised to incorporate concise and correct hydrologic definitions for terms such as steady-state, equilibrium, natural discharge, diverted natural discharge, storage depletion, drawdown cones, etc.

- Comparison of increased pumpage is misleading. It is impossible to pump any ground water without partially depleting ground-water storage.

- Santa Fe County communities have been occupied by the Spanish for nearly 370 years and by Indians for more than twice that time. A 100-year "mining" period is historically ridiculous.

- The "steady-state" policy for the Mountain and Homestead Zones is based on a false concept of steady-state.

- The amount of recharge is not relevant to the problem of water availability, except to the extent that original natural discharge can be diverted.

Lee Wilson and Associates, Inc. 1978. Santa Fe County Water Plan, 682 p.

This report provides an extensive overview of all aspects of water resources in Santa Fe County. The report discusses the availability and demand of water, rural water problems, and an overview of management strategies.

In discussing water availability, the report states that the total amount of ground water in storage in the County is estimated conservatively at 3.6 million acre-feet. Wilson explains that his estimates for "Water in Storage by Geologic Aquifer" are often higher than those reported by Consulting Professionals, Inc., because he uses a higher reliability factor. It is expected that the estimates are conservative and that there is the reasonable possibility that more water is available. It is important to recognize that this water is not uniformly available.

The maximum for the average storage coefficient in the Tesuque aquifer is probably less than 0.1. If the average storage coefficient occurs toward the middle of the range, an estimate of storage using 0.01 should give an approximation of the recoverable water.

Recharge can be estimated in a number of ways. A conservative value for general use would be about ¼ inch per year.

Some of the reports conclusions are outlined below:

- As 75-11-1 (domestic) wells increase, the consequent withdrawal of ground water will lead to aquifer mining, reductions in surface water flows, increased impairment problems, and greater pumping and drilling costs. The wells themselves will be subject to impairment, making transfer of bona fide water rights extremely difficult. Therefore, the legal conflicts and economic costs associated with other water supplies will increase. What makes the issue of 75-11-1 wells so serious is the fact that they lie outside the domain of existing water management procedures. Until measures are available that limit 75-11-1 wells to where they are needed, instead of where they are wanted, there will be no prospect for comprehensive, cost-effective management of water resources in Santa Fe County.

- Available local options include ordinances that restrict, prohibit, tax or license the wells or alternatively use stringent land-use zoning codes and subdivision regulations. Of importance is the intention to limit densities in rural areas to a level that can be supported by steady-state or long-term mining of ground water. In effect, this policy significantly reduces the potential that the 75-11-1 wells will appropriate excessive amounts of ground water.

- Outside the historical basis of water management has been steady-state, with demand limited to the annual supply. However, there is evidence that steady-state has been replaced by water resource depletion in at least some areas due to the natural decline in water availability related to climate shifts, the increased utilization of water in forested watersheds, and appropriation of ground water associated with 75-11-1 wells.

- The impact of 75-11-1 (domestic) wells to date appears to be moderate, due mainly to the low water use and high return flow typical of rural areas. However, a reduction in future demands through control of 75-11-1 (domestic) wells is essential.

- State Engineer Office policies have allowed extensive development of water systems outside the City through use of water rights that are not adequate to support long-term supply needs of the systems.

- Prior to urbanization of Santa Fe, the surface flows from the Santa Fe River recharged the aquifer through channel and irrigation seepage and the water table was high. The pre-urban hydrologic conditions of the ground reservoir have been altered by a net decrease in recharge, a net increase in withdrawals, and a shift of the main recharge point from near the mountains to southwest of the built-up area.

- A trend toward less precipitation and greater temperature is apparent, leading to a net decline in available moisture. Prospects of future climate change need to be addressed in long-term water management plans.

Two recommendations in the Plan are

- That the State Engineer Office or other agency investigate the cause of declining runoff and develop means to predict the future effects of climate change and watershed management practices.

- That the Metropolitan Water Board investigate the potential for an artificial recharge project using the Santa Fe River.

Hearne, G. A. 1980. Mathematical Model of the Tesuque Aquifer System Underlying Pojoaque River Basin and Vicinity, New Mexico. U. S. Geol. Survey Open-File Report 80-1023, 181 p.

This report describes a mathematical model of the Tesuque aquifer system that is relevant to stream-aquifer interaction on Indian lands.

The plan for tribal irrigation development includes surface-water diversions to canals from the major tributaries of the Pojoaque River. During periods of low surface-water flow, the flow of the canals would be augmented by ground water. A total of 11,337 acres are proposed to be irrigated with 37.45 cubic feet per second withdrawn from ground water and 10.68 cubic feet per second diverted from tributaries of the Pojoaque River.

In 2030, after 50 years of irrigation development, storage is the source of 86 percent of the total withdrawal. As withdrawals continue, the percentage of water obtained from streamflow captures will gradually increase. Because all streams are tributary to the Rio Grande, all streamflow capture and diversion will deplete the flow of the Rio Grande.

The maximum decline in water levels after 50 years of project withdrawals will be 334 feet.

Wilson, Lee. 1980. Procedures for Determination of Water Availability (A) Pursuant to Section 6.4.1d, Article VII of the Santa Fe County Development Code, 24 p.

This report describes procedures for demonstrating the water availability for development permits.

Criteria stated in the report that relate to water resource management are listed below:

- In the Basin Zone, recharge from ground water is already fully committed as the ultimate source of surface water (spring flows) and is not considered available to subdivisions that use 72-12-1 wells (domestic wells previously identified as 75-11-1).

- The policies for demonstrating water availability in the Basin Zone can be used in the Homestead Zone, or the minimum lot size may be based upon recharge of ground water.

- Recovery potential (a term required for demonstrating water availability) is an estimate of how much of the water in storage might be economically recovered by a properly designed well field.

- Exploitation of water in storage implies mining.

- Recharge is very difficult to quantify. Estimates made for conditions that do not exist at the development site are not acceptable.

- The geohydrologic report should demonstrate that the drawdowns in individual wells will not be excessive (will not cause the well to go dry) over the period of use (40 or 100 years).

- The distinction between the Basin and Basin Fringe Zones is based on saturated thickness, which normally exceeds 200 feet in the Basin Zone and is less than 200 feet in the Basin Fringe Zone.

Woodward-Clyde Consultants. 1980. Planning Study- Santa Fe Water Resources for Public Service Company, 172 p.

This report describes the possibilities for meeting the long-term water supply requirements for the City of Santa Fe.

The present sources for the Santa Fe municipal supply are (1) reservoirs in Santa Fe Canyon, (2) the Santa Fe well field, and (3) the Buckman well field. Three cases were studied as to the adequacy of supply to meet demand.

Estimating the reliable yield of the ground-water sources that are used to supply the city of Santa Fe is a complex task that involves not only the physical quantities of water that can be produced from existing wells, but also legal, political, and socioeconomic issues. An issue that complicates management of ground-water resources in the Santa Fe Area is the statutory right of citizens to drill private wells. The statutes allow a landowner to obtain essential water without any undue legal or water right obstacles, and thus provide a loophole in the management of ground water. Small-capacity wells distributed across the basin are the best method for recovering a large quantity of ground water without excessive lowering of the potentiometric water surface.

Variations in aquifer characteristics, even over relatively short distances, are evident from results of pumping tests in wells. Quantitative information on values of transmissivity and storage coefficient is generally lacking for the basins. Values of transmissivity range from approximately 500 to 18,000 gallons per day per foot, and only one published value of storage coefficient of 0.018 was found in the course of the study. The estimated mean value of transmissivity of the Tesuque formation is 10,000 gallons per day per foot.

How the Tesuque formations functions as a hydrologic system and how it responds to external influences, such as increases in pumping, is vaguely understood.

A conservative estimate of the saturated thickness of the Tesuque Formation in the Santa Fe area is 500 feet. Assuming that the potentiometric surface declines 4 feet per year and two-thirds of the aquifer can be depleted before pumping becomes uneconomical, the economic life of the aquifer is conservatively estimated to be about 80 years.

A conservative estimate of the saturated thickness of the Tesuque Formation in the Buckman well field area is 1,100 feet. The economic life of the aquifer at Buckman is conservatively estimated at about 90 years. At the present the State Engineer requirement to offset depletions on the tributaries to the Rio Grande places a more severe limitation on pumping than hydrogeologic factors do. Buckman Well No. 5 produces poor quality water so it is not used at present.

A significant rise in the potentiometric surface has occurred between Agua Fria and the Santa Fe Municipal Airport. This change is probably due to local recharge by treated sewage effluent. The firm yield of the Santa Fe well field is 4,345 acre-feet per year, and that of the Buckman well field is 8,275 acre-feet per year; this does not reflect the State Engineer permit conditions of 2,800 acre feet per year.

The report makes the following conclusions:

- Since the Rio Grande Underground Water Basin is essentially closed to new appropriations, expansion of permitted diversion from the Santa Fe well field can only occur by purchase of existing water rights, and purchase of large quantities of water rights in the Santa Fe area is unlikely.

- If expansion of the Buckman well field is not possible because of water right constraints, then direct diversion is the largest and most dependable potential source.

- In theory, from a hydrogeologic standpoint without regard to economics, ground-water supply in Santa Fe, particularly from the Tesuque aquifer, is plentiful and probably could sustain demands in Santa Fe for hundreds of years. However, in practice the State Engineer has imposed legal constraints limiting the quantities of water that may be made available for use in Santa Fe.

Reynolds, S. E. 1983. Letter to C. T. Dumars, Chairman N. M. Legislative Water Law Study Committee, State Engineer Office, 6 p.

In this letter, the New Mexico State Engineer describes the process for offsetting rights on the Rio Grande. Calculations are presented for the amount of ground water that can be withdrawn, based on the amount of total surface water available for retirement, aside from considerations of the amount of ground water in storage.

Inasmuch as the Rio Grande is fully appropriated, any withdrawal of ground water from storage requires a concomitant offsetting of the effect on the streams by the retirement of surface water rights. To determine the amount of unappropriated ground water, it is assumed that the 1980 surface water depletions are representative of the amount of surface water available for retirement.

Wilson, Lee. 1984. Water Supplies for the Santa Fe Area, New Mexico, A Status Report. A Hydrologic Support Document prepared for the Santa Fe Metropolitan Water Board. Lee Wilson and Assoc. Inc., 121 p.

This report summarizes the best available information about three sources that provide water for the Santa Fe municipal system: the Santa Fe River, ground water in the Santa Fe Basin, and water from the Buckman well field (which obtains water from the Rio Grande and ground water). A complete annotated bibliography is provided in the appendix of the report. The purpose of the report is to update the Plan to include new information that has become available.

Some statements made in the report pertaining to water resource management are provided here:

- The total thickness of the Santa Fe Group is not known for certain. Most estimates indicate the sediments are at least 4,000 feet thick.

- One way of avoiding dewatering is to operate the basin on a steady-state basis, in which withdrawals equal the "safe yield," a value which in turn equals or is less than recharge.

- The current policy of protecting the basin aquifer appears to serve primarily the interest of those who tap the aquifer on their own and who, consequently, do not share the rate burdens of most citizens.

Santa Fe Metropolitan Water Board. 1984. Santa Fe Regional Water Supply System (Includes Lee Wilson & Assoc., 1984, Hydrological Support Document), 304 p.

This report describes the Santa Fe regional water supply system.

The following statements and observations relating to water resource management are presented in the report:

- The Metropolitan Water Board is required to do the planning, technical studies, and managerial evaluation to provide reliable sources of sufficient water of good quality at "least cost" to serve the projected regional demands through the year 2025 and beyond.

- It should be noted that Article V of the Water Franchise requires that each suggested MWB policy recommendation concerning the operation or the order of use of the three major water sources must be adopted by formal MWB resolution, as MWB policy has significant impact on land-use planning, the present source of supply, and water management as it is related to offsetting tributary water rights, water rights transfers or domestic wells.

- Housing development and ever increasing well construction in the granite along the foothills are severely limiting basin recharge.

- Many parts of the (Land Use Development) Code are based on steady-state water availability. The State Engineer Office has assessed a lifetime of as little as 40 years for aquifers in portions of the Santa Fe Basin southeast of the City. Ground-water mining increases costs. Finally, when the decision is made to import water which will permanently correct the situation, there is a possibility that there may not be any reasonably priced water available.

The report concludes the following:

- The safe yield for the Basin has been set at 3,600 acre-feet per year (afy). Safe yield is defined as the amount of water that can initially be taken annually without excessive mining and which in time would permit the natural recharging of the aquifer. Both the Santa Fe River and the Santa Fe wells are at safe yield levels. For all practical purposes, the present safe yields of water from the Santa Fe River and the Santa Fe wells are dedicated to City users. Therefore, development outside the urban area must be served by imported waters.

- It is hydrologically unwise to permit the construction of additional well-supplied community water systems.

- It is not advisable to increase the production of the Santa Fe well field up to the permitted diversion of 4,865 afy, as it would exceed the reliable basin yield of 3,540 afy. In addition, (1) it would create a serious mining condition in the basin, (2) it would cause concern among other well owners in the Santa Fe area, and (3) it would be difficult for PNM to clearly demonstrate that rights of existing well owners will not be impaired.

- The County should exercise care in the approval of any large development, particularly with respect to its site-specific water supply studies. The County has not adequately accounted for the cumulative effects of previously approved projects or the need for reserves for dry years.

- No rational water management plan is possible unless procedures and rules are in place to permit the distribution and bulk sale of imported water at a reasonable cost to areas outside the urban area.

The following recommendations are presented in the report:

- Decrease dependence on ground water and increase the use of San Juan/Chama Project (SJCP) Water.

- Initially dedicate the water from the Santa Fe River and the Santa Fe wells to the urban area, augmented by SJCP water as needed. As soon as possible, the Santa Fe River and SJCP water should be used as the base supply for the urban area, with the City wells reserved for peak and emergency purposes.

- Implement measures to reduce the number of new wells located in areas underlain with marginally productive aquifers or areas that are adversely affected by pumping City wells.

- As part of the subdivision approval process, consider prohibiting and/or restricting the consideration of well-supplied central water systems.

- The City should develop a policy with respect to 72-12-1 wells. The legal implications are very complex, and the political problems may make any solution difficult to apply.

Santa Fe Basin Water Users Association. 1988. Report to the City Council and Staff County Commission and Staff Area Planners, 20 p.

This report by a local citizens group provides comments to City and County planners regarding the management of water resources in Santa Fe County.

Some of the comments are provided here.

- Although the Metropolitan Water Board since its inception has proceeded with its tasks of studies and recommendations concerning water costs, availability, distribution and management, the controversy continues. To date few recommendations have been accepted or adopted except for the passing of the Santa Fe County Land Development Code. The no action policy of the governing bodies has effectively vetoed the policy recommendations of the Metropolitan Water Board.

- It has long been the position of the Santa Fe Basin Water Users Association that all development above the densities stipulated in the present County Code should use imported water.

- The report recommended no transfers of rights or offsetting rights that create a new diversion or point of diversion to be permitted in the extraterritorial area.

- The need for imported water for new development should be distinguished from a future need for replacement water. Replacement water would be that which serves existing development when present supplies become depleted. A study of an equitable method to serve this segment of the population should be undertaken as soon as possible.

- The zones of the basin's recharge (Mountain and Basin Fringe Zones) should be protected from further overuse.

- There are 234 square miles in the Santa Fe drainage area. In this area there is a total estimated 346,072 acre-feet of water.

Harza Engineering Co., Browne, Bortz and Coddington, and John Shomaker Inc. 1988. Long Range Water Planning Study for the Santa Fe Area-Phase I, 126 p.

This is a comprehensive report on possible management strategies for the Santa Fe metropolitan area. The report discusses possibilities for balancing the three sources of water for the Santa Fe area: (1) the Santa Fe River, (2) ground water, and (3) imported water.

Some observations presented in the report are:

- A key water management issue in the Santa Fe area involves the utilization of ground water. Serious concerns exist regarding declining water levels in individual wells, the cessation of spring flow, and approval of multiple water right transfers. There is a difference of opinion on present circumstances with respect to ground water, and there is clearly a divergence of views about ground water's role in Santa Fe's water supplies.

- Near the city well field, model results showed that additional drawdowns, below 1983 ground-water levels, would be fairly substantial if well field pumpage were continued even at present rates.

- "Safe yield" of a ground-water basin can be defined as the amount of water which can be withdrawn from it annually without producing an undesired result (Todd, 1967). The problem in defining safe yield this way is that there can be more than one "undesired result" from pumping, as well as major disagreement over whether a result is, in fact, undesirable. These difficulties are evident in the Santa Fe area. The term "optimum utilization" of ground water relates to considerations of economics or overall water production costs, impacts on other water users and water rights, and considerations of long-term resource conservation.

Some of the report's conclusions and recommendations are:

- Management of ground-water resources in the Santa Fe area to avoid declining water levels may not be legally or economically justified. In economic terms, ground water is a less costly source of supply than SJCP water. As long as declining water levels do not cause ground water to become more expensive due to increased pumping costs, it makes economic sense to continue pumping provided that legal conditions are met.

- The Santa Fe area needs to reach a consensus on the best policy for long-term management of the ground-water resources. A forum needs to be established to give credence to this consensus. This policy should consider cost implications, water rights and other legal constraints, resource conservation, management philosophy, and other factors. This policy should suggest working definitions of "safe yield" and "optimum ground water utilization." Basin water users who have experienced declining water levels, producing "dry holes" and reduced flows in springs, perceive that safe yields have already been exceeded.

- The amount of water in storage is not too significant from the standpoint of water supply because of legal limitations on the potential effects of pumping on flows in the Rio Grande and its tributaries. If the higher storage estimates in the table are correct, the quantity of water in storage appears to be adequate to meet water needs in the area for several hundred years provided that water of adequate quality can be obtained in an economical manner, within existing water rights limitations, and that estimates of water availability can be refined.

- While a drought should not cause a reduction in available ground-water resources on a regional basis, increased pumpage can be expected to cause possibly significant local effects and perhaps serious hardships to many water users because of interference effects, increased pumping costs, and the need to deepen existing wells.

- There are two basic water management strategies for the Santa Fe area: (1) continue to rely on all available sources of supply, attempting to combine the use of these sources in the most economical manner, and (2) place increasing reliance on imported SJCP water to reduce the rate of extraction from ground-water resources serving the area.

Harza Engineering Co., Browne, Bortz and Coddington, and John Shomaker Inc. 1989. Long Range Water Planning Study for the Santa Fe Area-Phase II, 126 p.

The purpose of the study was to identify the best plan for meeting water needs in the Santa Fe area over the next 40 years. The report assessed three long-range regional service alternatives and physical service options and costs, and provided economic and financial analysis of those alternatives.

Results of the Phase II study indicated that regionalizing water service would be advantageous as a cost-of-service basis for the region, but major changes in current administrative functions will be needed to move forward with a selected plan.

Browne, Bortz and Coddington, Inc., with J. W. Shomaker and Western Network Inc. 1992. South Santa Fe County Water Resource Assessment, 138 p.

The investigators reviewed available data for the south Santa Fe area.

Conclusions of the report which relate to water resource management are provided below.

- Ground water in storage in most of southern Santa Fe County can be considered nonrenewable.

- A recoverability factor of 60 percent is considered reasonable.

- The following estimates are provided for the amount of ground water in storage:

Area	Acre-Feet of Water
San Marcos	44,000
Canoncito/Glorieta	16,000
San Cristoval Grant	23,000
Ortiz Mine Grant	17,000
Remaining area	82,000

Santa Fe County Ordinance 1992-1, Land Development Code, 373 p.

Objectives and requirements stated in the Land Development Code with regard to water policies are provided here. A summary of the administrative criteria for demonstrating water availability is presented in Section 3.2 of this report.

Code Section 10.1 Relationship of lot size to water policies

The General Plan sets forth the policy that (1) future population growth in the County should be supported by adequate long-term water availability, and (2) population growth should be concentrated in urban and metropolitan areas and traditional communities. Development within these areas will generally be served by one or more regional water systems or community water systems. Development outside the urban, metropolitan areas, and traditional communities using domestic wells (Section 72-12-1) should consider estimated long-term water availability and protect water resources for existing county residents having domestic wells.

Development may also be permitted if the applicant for the development permit demonstrates that he/she has water rights, excluding rights permitted under NMSA §72-12-1 (1978), recognized and permitted by the Director of the Water Resources Department of the Natural Resources Division of the State of New Mexico which are approved for transfer by the Director of Natural Resources Division to the site of development.

Any development permit approved and issued by the County shall be expressly conditioned upon the applicant obtaining final non-appealable order or final non-appealable approval from the Director of the Water Rights Division of the Natural Resources Department.

APPENDIX I

SANTA FE COUNTY LAND USE CODE HYDROGEOLOGY REPORT CHECKLIST

Santa Fe County Land Use Code
Hydrogeology Report Checklist
Page 1 of 2

Article III

Section 10: The property to be subdivided is located in the ______________ zone; therefore recharge or storage at the site must be assessed over a 100-year / 40-year period.

Article VII

Section 6.4.1a:
- Geologic map(s)
- Cross section(s)
- Description of aquifer system(s) including: General description
  Hydrogeologic boundaries
  Intake areas
  Discharge Areas

Section 6.4.1b:
- Maps and cross sections showing: Depth to water
  Water-level contours
  Direction of ground-water flow
  Estimated thickness of saturation

Section 6.4.1c:
- Probable yield of proposed well(s)
- Probable length of time that water in aquifer can meet demand at full development of proposed subdivision.
- Mutual interference of proposed wells; interference of existing wells with proposed well(s).
- Above estimates based on: Pump test analysis
  Hydrologic boundaries
  Aquifer leakage
  Historic water-level changes
  Logs and yields of existing wells
  If required by CDRC: test wells, aquifer performance tests

Section 6.4.1.d: Estimate of water availability.

- *If basing estimate on water in storage,* use the equation:

$$S = AC \times SY \times ST \times RF \times RC$$

where S = water in storage beneath entire property for period of 40 or 100 years, as required under III.10. acre-feet
AC = area of property, acres
SY = specific yield, decimal fraction. Values given for various zones in hydrology appendix, Exhibit 3
ST = saturated thickness, feet
RF = reliability factor, set to 1.0 if full geohydrology report is submitted. Values of RF for other circumstances given in Hydrology Appendix page 7.
RC = recovery potential. Set to 0.8 unless greater efficiency is specifically demonstrated.

Santa Fe County Land Use Code
Hydrogeology Report Checklist

S is then used to calculate minimum lot size (MLS) as follows:

$$\frac{S}{AC \times T} = A, \text{ water available } T \text{ years, af/acre/yr}$$

MLS = U/A, where U = usage rate, between 0.25 and 1.0 afy

- *If basing estimate of availability on recharge,* use the equation:

$$A = R \times RL \times RC$$

where A = water available over T years, af/acre/yr
R = estimated recharge, af/acre/yr
RL = reliability factor: set to 1.0 if full geohydrology report is submitted in support of estimates for SY and ST; set to 0.7 for reconnaissance report including support of estimates of SY and ST. Other RL values provided in Hydrology Appendix for other cases (e.g., SY and ST not fully supported)
RC = recovery potential, set to 1.0

A recharge-based geohydrology report must meet the following criteria:

1. Recharge estimate must take into account the climatic, geologic and topographic setting of the development. Estimates taken from the literature which are not applicable in the setting of the development site will not be acceptable.

2. Any estimate of recharge must be established, independently by at least two different methods. methods are different if they rely on different principles, assumptions and data. Each method used must have been described in the geohydrology literature, and must have been applied with reasonable success in the southwestern U.S., preferably in New Mexico.

Section 6.4.1e:

- Schedule of effects of projected withdrawals over 40 or 100 years, as required under III.10.

Section 6.4.1f:

- Projection of drawdown or flow reductions at adjacent properties.

Section 6.4.1g:

- Pumping test requirements summarized in table in this section in Code.