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09-AFC-6
DATE MAR 11 2010
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March 11, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Blythe Solar Power Project, Docket No. 09-AFC-6**
Responses to January 14, 2010 CEC Workshop Queries (Groundwater)
Technical Areas: Soil & Water Resources

Dear Mr. Solomon:

During the January 14, 2010, CEC Workshop staff requested additional information and clarification on several matters in the technical area of Soil and Water Resources and specific to local groundwater issues. Attached please find our responses to those specific questions.

If you have any questions on these data responses to the staff's workshop queries, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

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Responses to CEC Workshop, January 14, 2010

Soil and Water Resources (Groundwater)

Blythe Solar Power Project

Docket No. 09-AFC-6

Alice Harron
Senior Director of Project Development
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Berkeley, CA 94709-1161

Groundwater Data Responses to January 14, 2010 CEC Workshop Queries – Blythe Solar Power Project

Is RO permissible for dust control?

In an email to Paul Marshall of the CEC on February 11, 2010, Jennie Snyder of the Colorado River Regional Water Quality Control Board (RWQCB) indicated that the discharge of RO brine for dust control would not be allowed. Solar Millennium is planning to have additional discussion of the decision with the RWQCB, though for the time being alternative options for brine management are being considered. In the event that the brine is managed using an evaporation pond or for any discharge of brine to land, the Board will require a Report of Waste Discharge (ROWD). Further, the RWQCB will also require a ROWD for the discharge to the septic and leach field even though the County of Riverside will permit the septic systems for the Project. This is because the proposed discharge is in excess of 5,000 gallons per day, and as per protocol the County would refer the project to the RWQCB who would require a ROWD. The ROWD for the septic system/leach field will be prepared in conjunction with the RO brine discharge and will be submitted upon determination by Solar Millennium of the brine management option.

Further discussion of where the LTU leachate/runoff will be discharged/disposed and analysis required prior to discharge (DR-S&W-199).

Excess water from watering of the biopiles or rain fall may occasionally accumulate in the land treatment unit (LTU). The LTU has been constructed with 2-foot high berms such that storm water will not drain into or from the LTU. Based on the frequency of storms in the area, it is anticipated that accumulation of rainwater within the containment would occur on a yearly basis. Each LTU is designed with a sump which will contain storm water runoff and/or leachate within bermed area. Any storm water that accumulates within the LTU will be sampled for HTF (biphenyl and diphenyl ether) and amendment constituents (i.e., nitrate, phosphate, TDS). Sampling of the storm water will be conducted within 24 hours of the storm event and laboratory analyses will be run on a 24-hour turn-around-time. Standing water will be removed from the LTU within 48 hours. Following analytical results, free liquids will either be used as raw water feed in the process supply or removed using a vacuum truck. If HTF is not detected above the practical quantitation limit (PQL) and amendment concentrations are at or near background groundwater concentrations and below State of California primary or secondary maximum contaminant levels the water may be used as raw water feed in the plant process. If HTF is detected and amendment concentrations exceed background or drinking water standards the waste will be properly disposed of at a licensed treatment storage and disposal facility.

Update the runoff recharge estimates (DR-S&W-194) to reflect 2, 5, and 10% of total calculated runoff value. Use Basin inflow/outflow example from Genesis.

A revision of the water balance provided in the response to Data Request (DR)-S&W-179 for the Palo Verde Mesa Groundwater Basin (Basin) was made to reflect changes requested during the January 14, 2010 Workshop held by the California Energy Commission (CEC). There were two changes: 1) a change to the estimate of infiltration from precipitation after Hely and Peck (1964); and 2) a change to the eastern boundary of the Palo Verde Groundwater Basin (Basin Number 7-39) to include only the area of the Palo Verde Mesa (PV Mesa). The eastern Basin boundary, as depicted by the Department of Water Resources (DWR) was revised to follow the change in elevation between the Palo Verde Valley floor and the PV Mesa. Although the revised water balance for the Palo Verde Groundwater Basin only includes the PV Mesa, it is important to understand that the PV Mesa and Palo Verde Valley remain hydraulically connected, as understood by the DWR (2004) and to be cognizant of the notion of

the accounting surface by the US Geologic Survey (2008) allowing groundwater to flow into and out of the PV Mesa area.

The revised PV Mesa boundary has an area of approximately 184,056 acres and is shown on Figure DR-S&W-179-1(rev1). The other significant changes to the water balance from what was provided in the January 6, 2010 response to DR-S&W-179 was the addition of agricultural recharge rates and the addition of discharge rates for municipal, private and agricultural uses on the PV Mesa.

RECHARGE

Recharge from Runoff

In revising the infiltration estimate, the first step was to overlay the average annual isoheytal contours shown on Figure 6 from Hely and Peck (1964) onto the topography of the Basin, Figure DR-S&W-179-1(rev 1). The second step was to multiply the average annual precipitation within each contour times the area of the contour to derive an estimate of total precipitation in acre-feet for the Basin. Lastly, the total within each contour is multiplied by percentages of 3%, 5% and 10% representing an estimate of infiltration from precipitation within the contour and summing the individual areas to a total annual infiltration volume (acre-feet) for the Basin. Table DR-S&W-179-1(rev 1) presents the estimate of total annual infiltration for the Palo Verde Valley Groundwater Basin for these estimates of infiltration. The infiltration estimates range from 2,058 acre-feet (3%) to 10,288 acre-feet (10%).

Recharge from Groundwater Underflow into the PV Mesa

As provided in the August 2009 AFC for the Blythe Solar Power Project (BSPP), geochemical and water level data indicate that groundwater from outside the PV Mesa is flowing into the area. The US Bureau of Reclamation (USBR) in their analysis of the accounting surface has concluded that groundwater below the BSPP site is in communication with the Colorado River. Geochemical data show that there is a gradual mixing of water from the river to the west and into the PV Mesa as TDS concentrations progressively increase away from the River. An estimate of groundwater flux into the PV Mesa was made using a simple underflow calculation across a cross sectional area at the upper portion of the Mesa (Figure DR-S&W-179-2). The aquifer was assumed to extend a distance of 19,000 feet perpendicular to flow and at a depth of 600 feet below the water table at this location. Using the average transmissivity of 26,000 ft^2/day from Leake et al. (2008) and a groundwater gradient of 0.0003 ft/ft from measurements taken in 2000 (Figure DR-S&W-179-2), the groundwater flux across this area is approximated at 1,241 acre-feet per year (Table DR-S&W-179-2 [rev1]).

Recharge from Irrigation Return

There are a total of approximately 2,683 acres of irrigated agricultural, municipal, and domestic land on the PV Mesa. Of the 2,683 acres, approximately 1,862 acres are irrigated with surface water from the Colorado River through the Palo Verde Irrigation District (PVID). The remaining 724 acres are irrigated with groundwater from the PV Mesa. Return from irrigation of 97 acres at the Blythe Municipal Golf Course is also included in this estimate. Agricultural return was calculated for the total agricultural acreage of 2,683, using the California Department of Water Resources (DWR) Water Use Estimates for 2001 (Table DR-Soil and Water-179-3).

To determine agricultural return from irrigation, the water use and consumed fraction of water by crop values for the Colorado River (PA Number 1004) (Department of Water Resources, 2001) were applied to a total of 2,683 acres of irrigated agricultural land on the PV Mesa. Citrus is the primary crop on the PV Mesa, therefore, values for the “subtrop” category were used for the calculations. The amount of water used per crop was multiplied by the number of agricultural acres on the PV Mesa. The

percentage of the total amount of water applied by irrigation that is retained within the root zone and that is available for crop evapotranspiration (consumed fraction) was deducted from the amount of water applied to 2,683 acres, resulting in the amount of water that is recharged to the aquifer. The amount of recharge to the PV Basin on the Mesa from irrigation return is estimated to be 3,561 acre-feet per year (Table DR-S&W-179-2 [rev1]).

DISCHARGE

Discharge from Groundwater Underflow out of the PV Mesa

Based on available groundwater data for the PV Mesa (USGS 2000), it appears that there is groundwater flux into and out of the PV Mesa. Although the amount of groundwater discharged from the PV Mesa is unknown, it is conservatively assumed to be similar to the amount of groundwater that is recharged to the PV Mesa through underflow. Groundwater flux out of the area is approximated at 1,241 acre-feet per year (Table DR-S&W-179-2 [rev1]).

Discharge from Agricultural Irrigation

There are 724 acres of agricultural (predominantly citrus) and municipal land on the PV Mesa that rely on groundwater from private wells for irrigation (PVID 2010). To determine agricultural diversions on the PV Mesa, the water requirement ("applied water") for "subtrop" crops in the Colorado River (PA Number 1004) area was multiplied by 724 acres. This calculation yielded an estimate of approximately 3,584 acre-feet per year diverted on the PV Mesa by private wells (Table DR-S&W-179-2 [rev1]).

Discharge from Municipal, Domestic, and Private Groundwater Use

The City of Blythe pumps three wells on the PV Mesa for domestic and municipal use. Mesa Ranch Well #3 is pumped for domestic use and PVC Well #2 is pumped for water use at the Palo Verde College (PVID 2010). An estimate of 260 acre-feet per year of diversions from these two wells was provided by the City of Blythe Department of Public Works (2010). A third well (Mesa Ranch Well #2) is pumped for the Blythe Municipal Golf Course. Estimated diversions from this well are approximately 560 acre-feet per year (City of Blythe DPW 2010).

The County of Riverside operates one well (Airport Well #7) at the Blythe Airport that serves the Mesa Verde Community. Approximately 47 acre-feet per year of groundwater is pumped from this well (Riverside County – CSA 62, 2010).

The Blythe Energy Project I (BEP I) is a 520 mega watt natural gas fired power plant located on the PV Mesa, approximately one mile east of the Blythe Airport. BEP I pumps 3,300 acre-feet per year of groundwater (Table DR-S&W-179-2 [rev1]).

Discharge from Export of Groundwater

The PVID/Metropolitan Water District fallowing program applies only to agricultural crops on the valley floor; therefore, none of the groundwater from "fallowed" land on the PV Mesa is being exported or diverted from the basin (PVID 2010).

Blythe Solar Power Project

The proposed BSPP project will use approximately 600 acre-feet per year for operational requirements.

Water Balance

From the changes discussed above an updated water balance for the PV Mesa was developed (Table DR-S&W-179-2 (rev1)). The results of the update, under an assumption that mountain front recharge would be about 3% to 5% of precipitation within the Basin, shows that there is a range from a net deficit of water of about 1,732 acre-feet (assuming recharge of 3% of precipitation) to a net surplus of water of about 1,354 acre-feet (assuming recharge of 5% of precipitation) in the PV Mesa water balance without the BSPP. Hydrographs shown on Figure DR-S&W-179-2, show varying conditions within the PV Mesa as some water level trends are slightly down in some cases over the last 20 years, although most are stable or show an increasing trend since 1990 (Attachment A). These data would suggest that there are local changes in groundwater levels and a variable response within a heterogeneous aquifer system as a function of variable and localized pumping. The relatively stable or slightly increasing groundwater levels that have been measured over the last 20 years suggest that groundwater withdrawal has been reduced due to reductions in agriculture. In general, it would appear that that in the last few decades the PV Mesa has experienced a period of slight recovery owing to changes in agricultural pumping.

Given the changes in water balance, the forecast water budget for the Basin as shown in AFC Table 5.17-10 (rev1) was revised using the balance from Table DR-S&W-179-2 (rev1) and an assumption that the infiltration would be about 5% of precipitation as the baseline for year 2010. The base year assumption using this estimate provides a slight surplus in water supply which appears to better approximate conditions in the area of the BSPP, as the PV Mesa does not appear to be in an overdraft condition which would be indicated under a lower assumption of infiltration. In the forecast, the recharge and discharge elements were not changed over the baseline year. This provides a conservative estimate in the forecast in that water use in parts of the Basin may decline through reduction in agricultural pumping, which along with pumping in support of the Blythe I power plant represents the largest water demand on the PV Mesa. The forecast shows that during construction the BSPP will account for between 15% and 73% of the total water use by renewable energy projects proposed in the PV Mesa for a five-year period starting in 2011. Upon completion of Project construction, the Project's operational water supply of 600 acre-feet/year will represent 13% of the total renewable project water use. During operation, BSPP represents about a 4% to 7% increase in the total water use within the PV Mesa under an assumption of no change in the base year groundwater demand.

The water forecast from all the current and future sources result in a net annual and cumulative water budget deficit for the Basin through 2043. The maximum annual deficit from all the foreseeable renewable projects in the PV Mesa is about 3,717 acre-feet. Depending on the assumption of aquifer storativity, the cumulative decline in the average water level across the PV Mesa after 30 years would be between about 4 and 15 feet. It is anticipated that the water level decline would be greater in the areas of higher water demand both adjacent to current pumping centers and in the area of the renewable projects, and the decline would be less further away from the pumping. Additionally, as the PV Mesa is subset of the larger Palo Verde Mesa Groundwater Basin, which includes a portion of the valley west of the Colorado River, it would be anticipated the cumulative effects would be less when considering the larger groundwater basin . As noted in the AFC, the proposed water use for the BSPP represents about 0.3% of the available water in storage in the Palo Verde Mesa Groundwater Basin.

Given its small contribution to the total water use in the Project vicinity, the BSPP does not represent a cumulatively considerable contribution to water resource impacts to the Basin.

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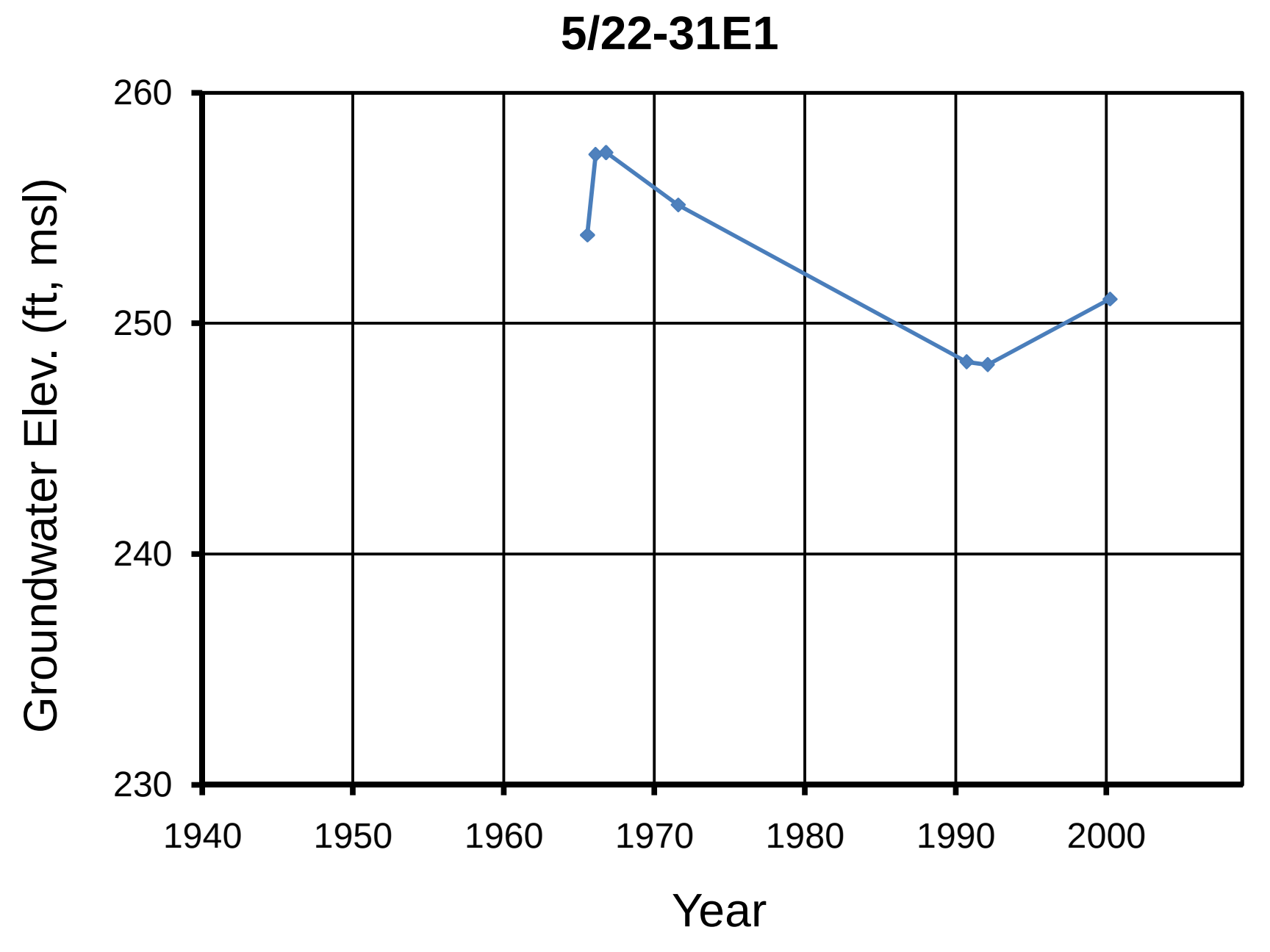
ATTACHMENT A

Selected Hydrographs from the Palo Verde Mesa Groundwater Basin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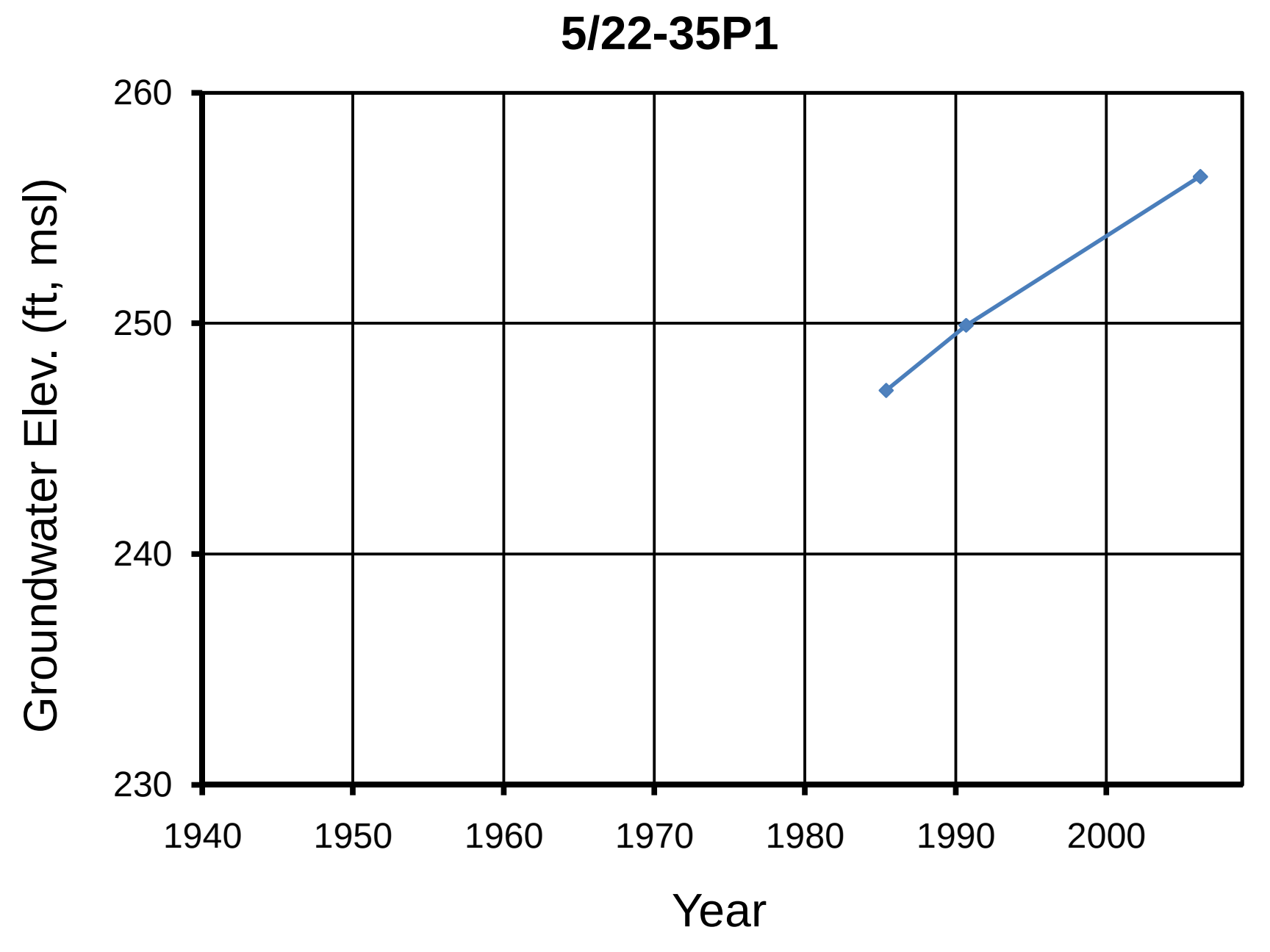
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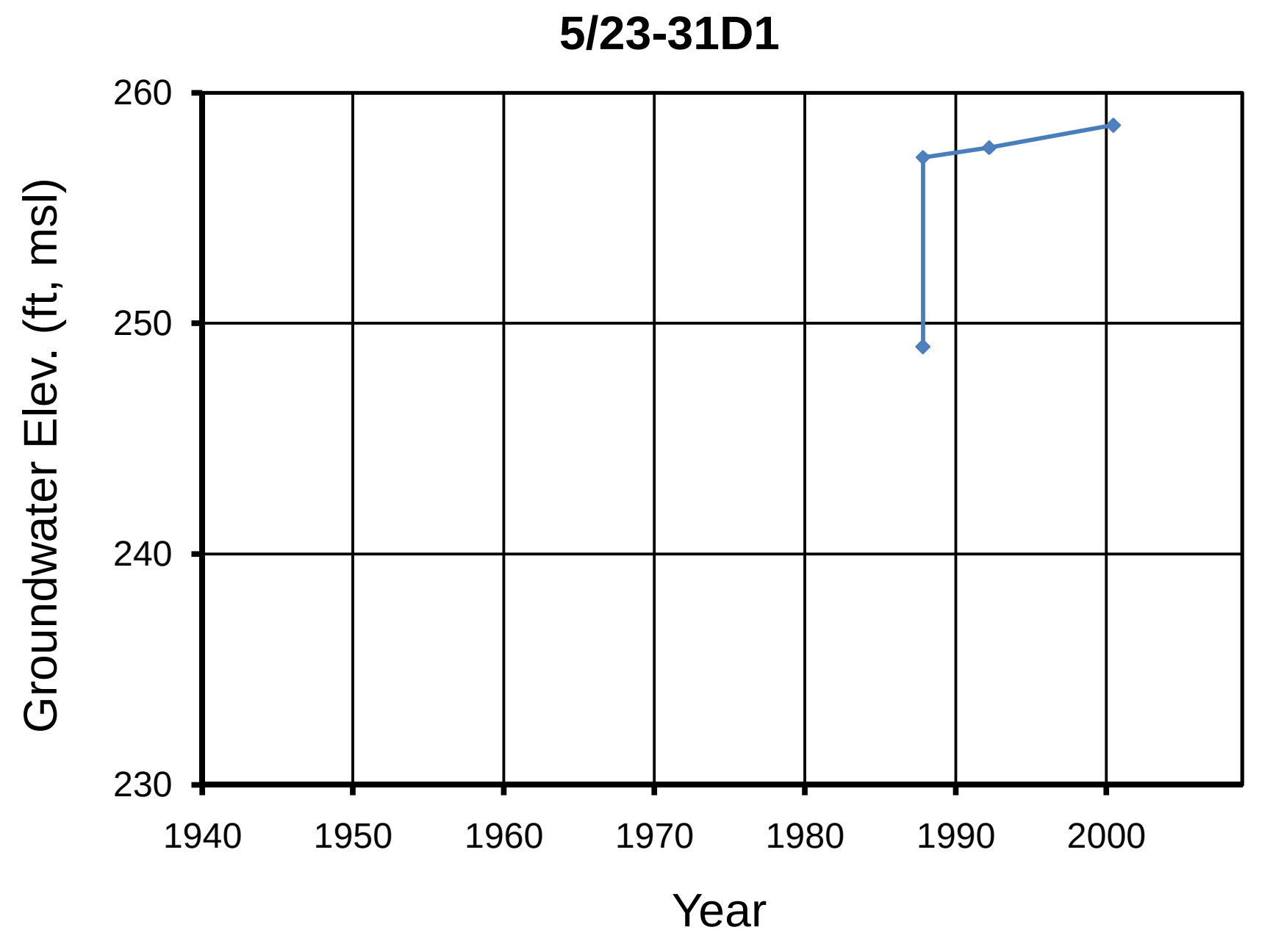
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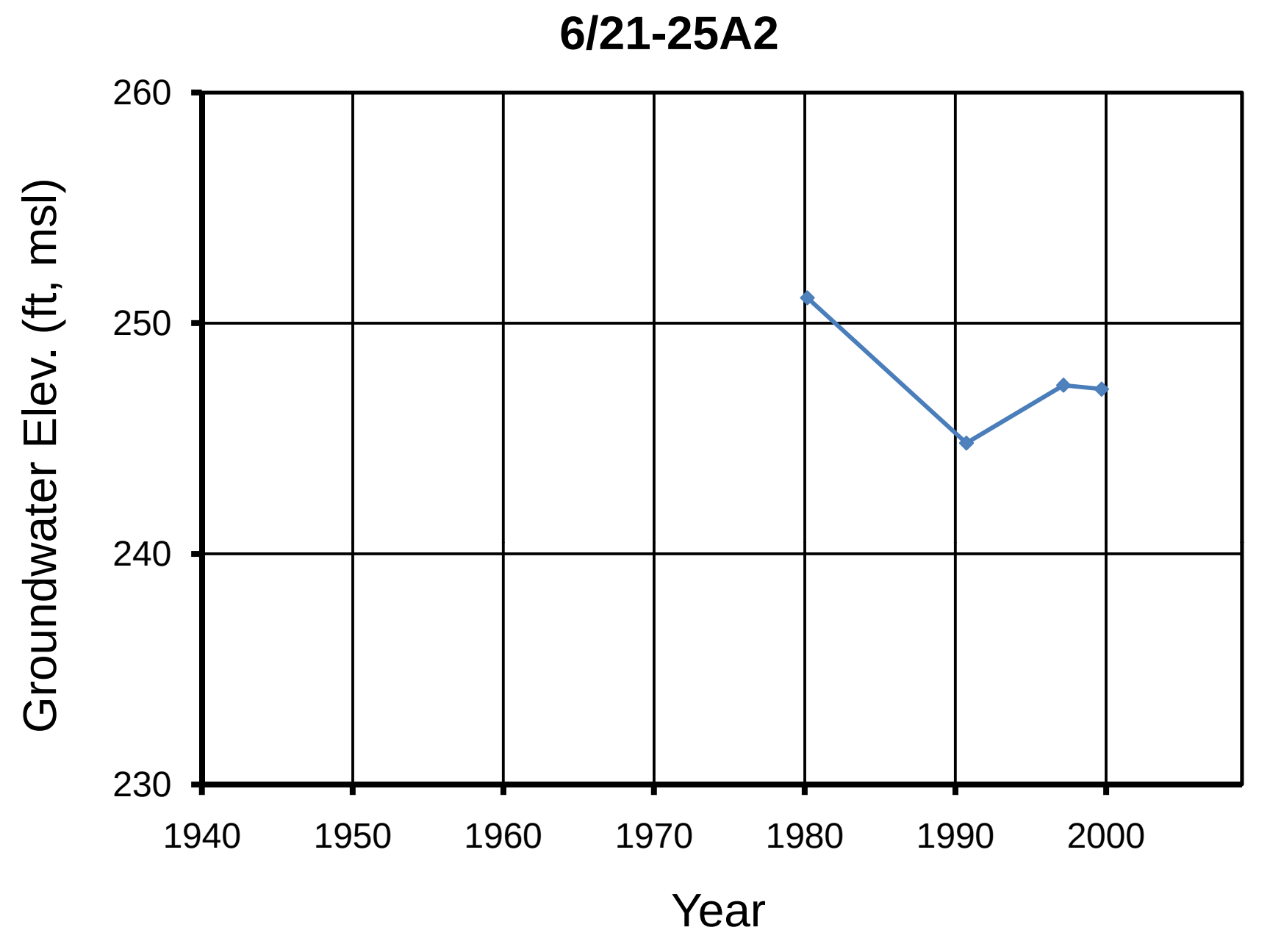
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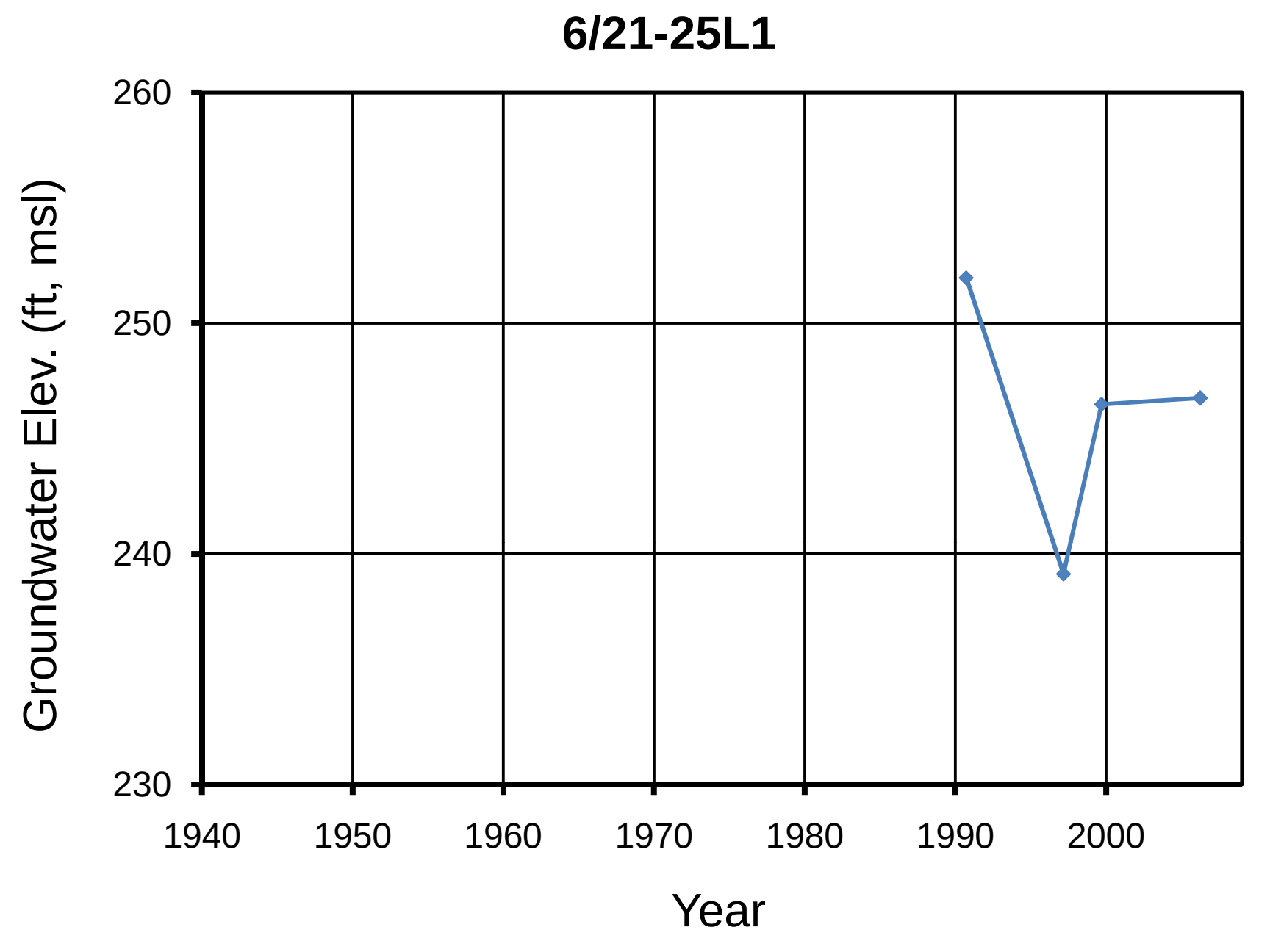
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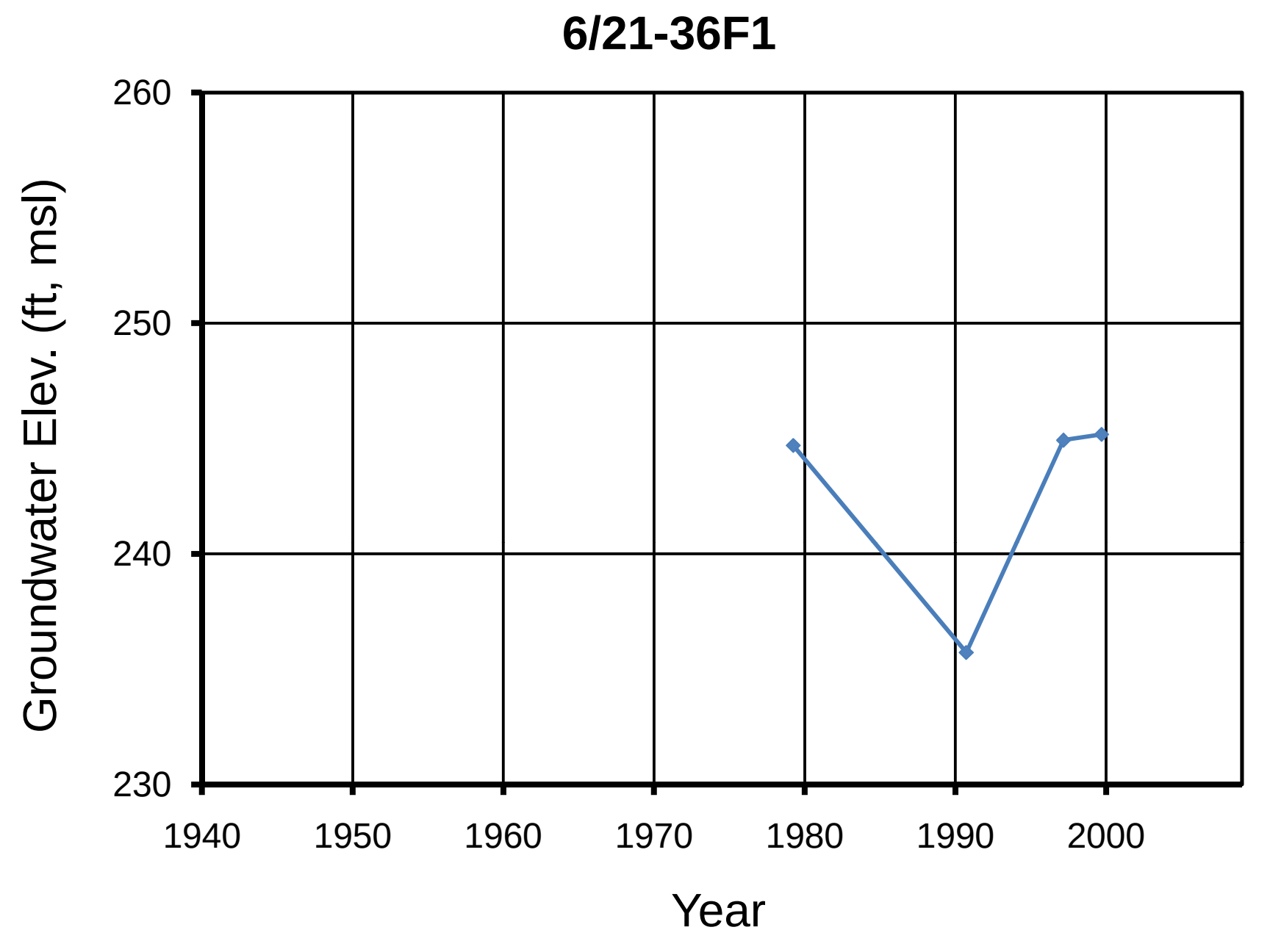
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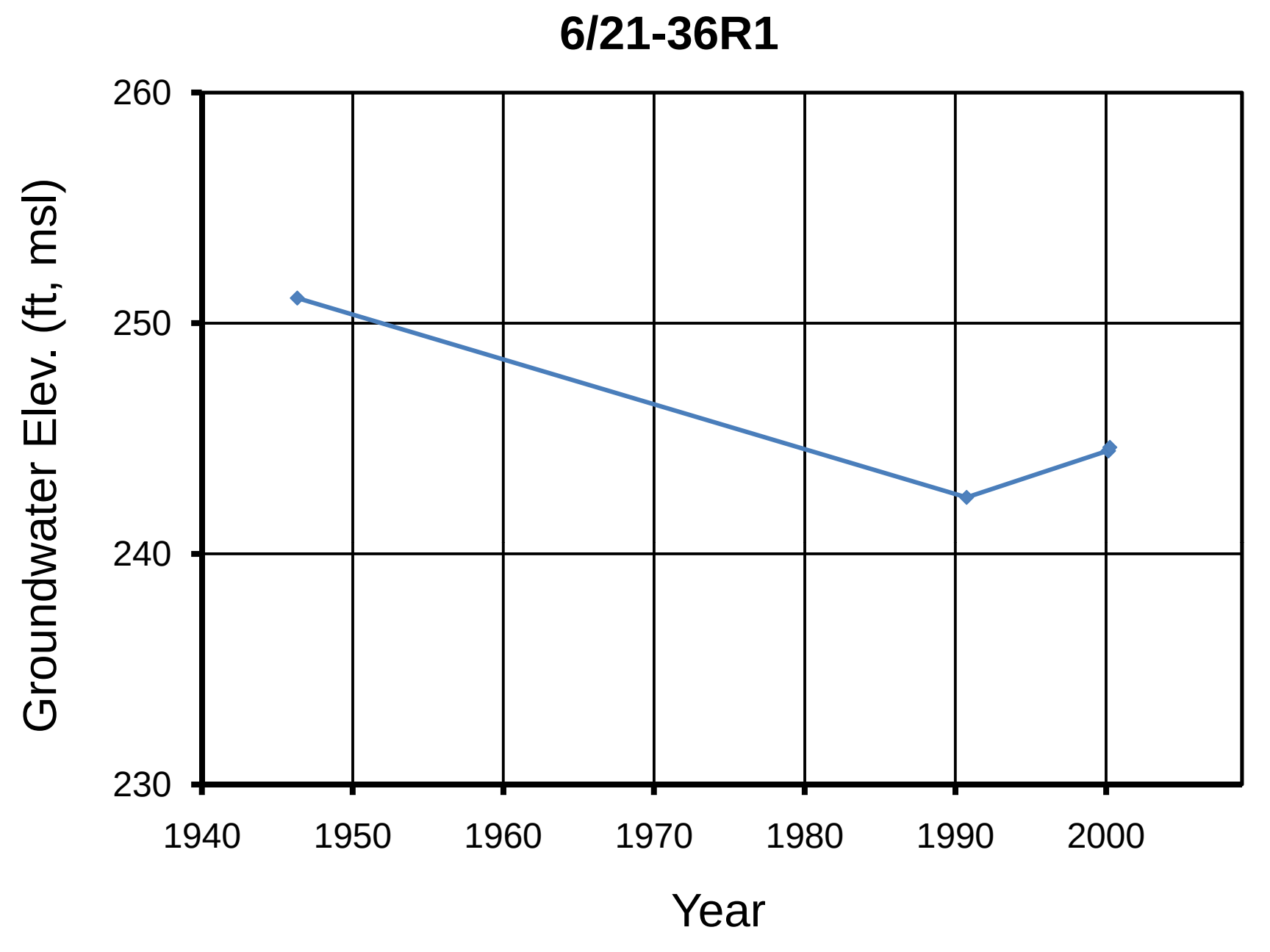
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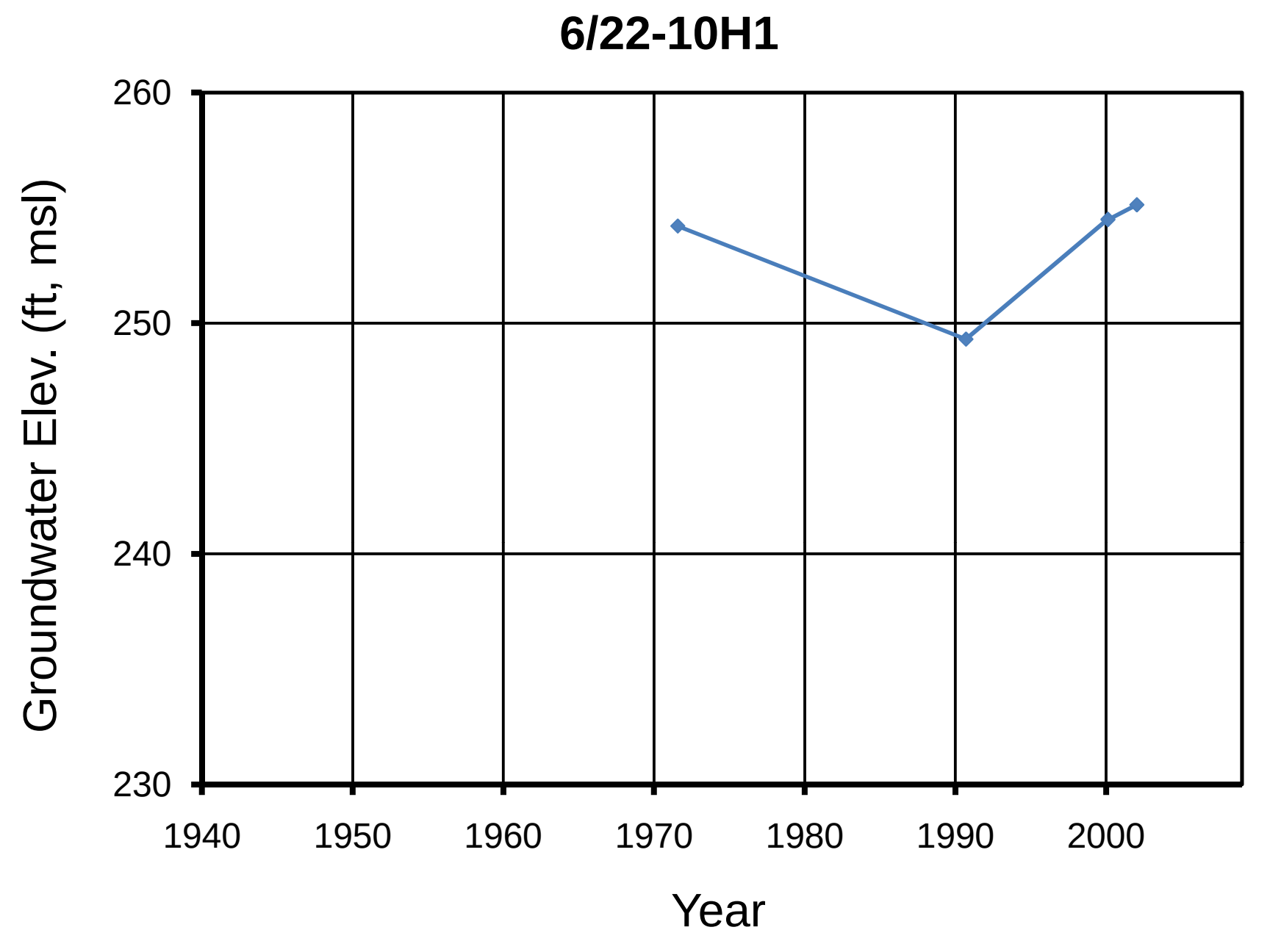
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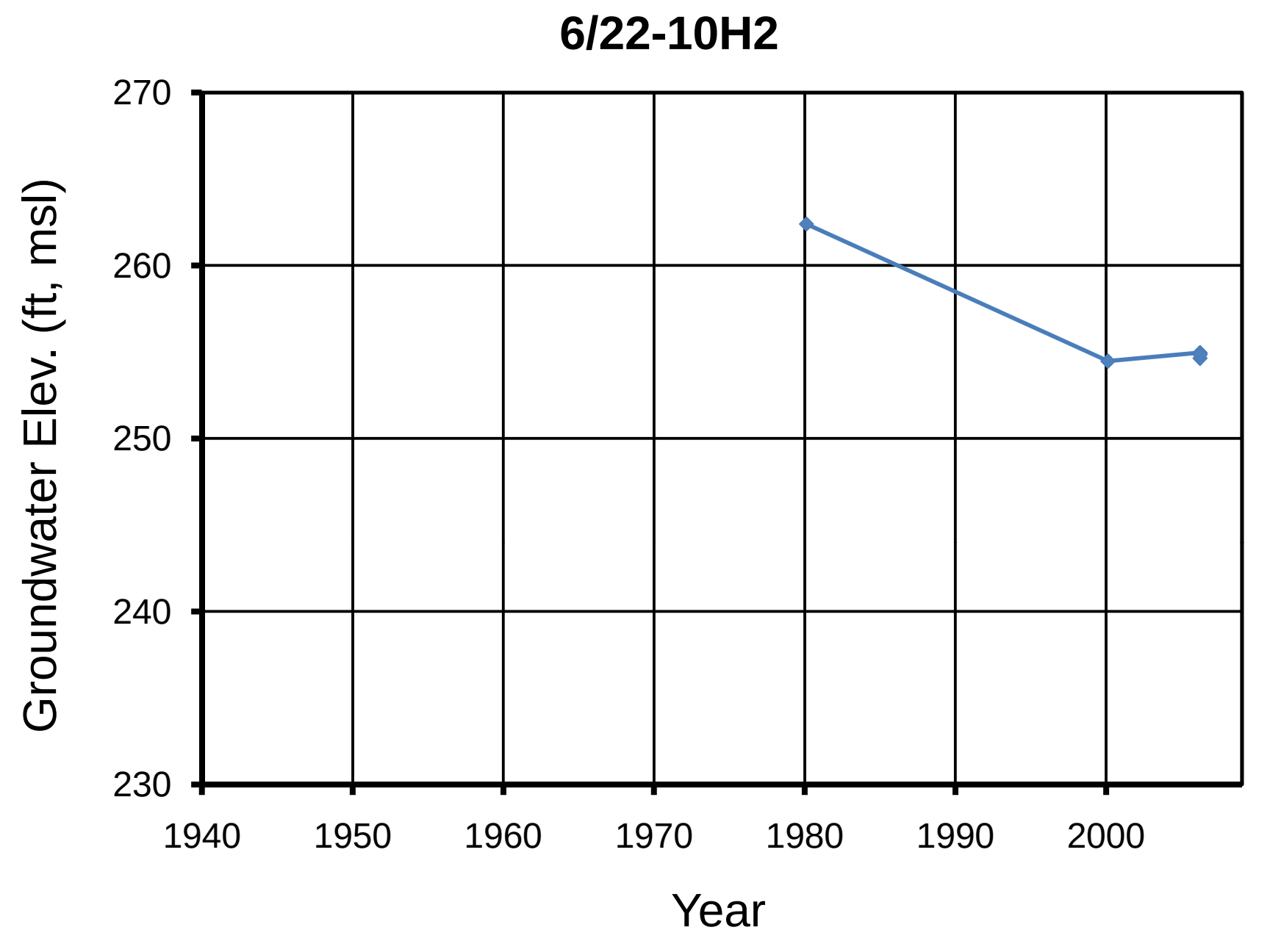
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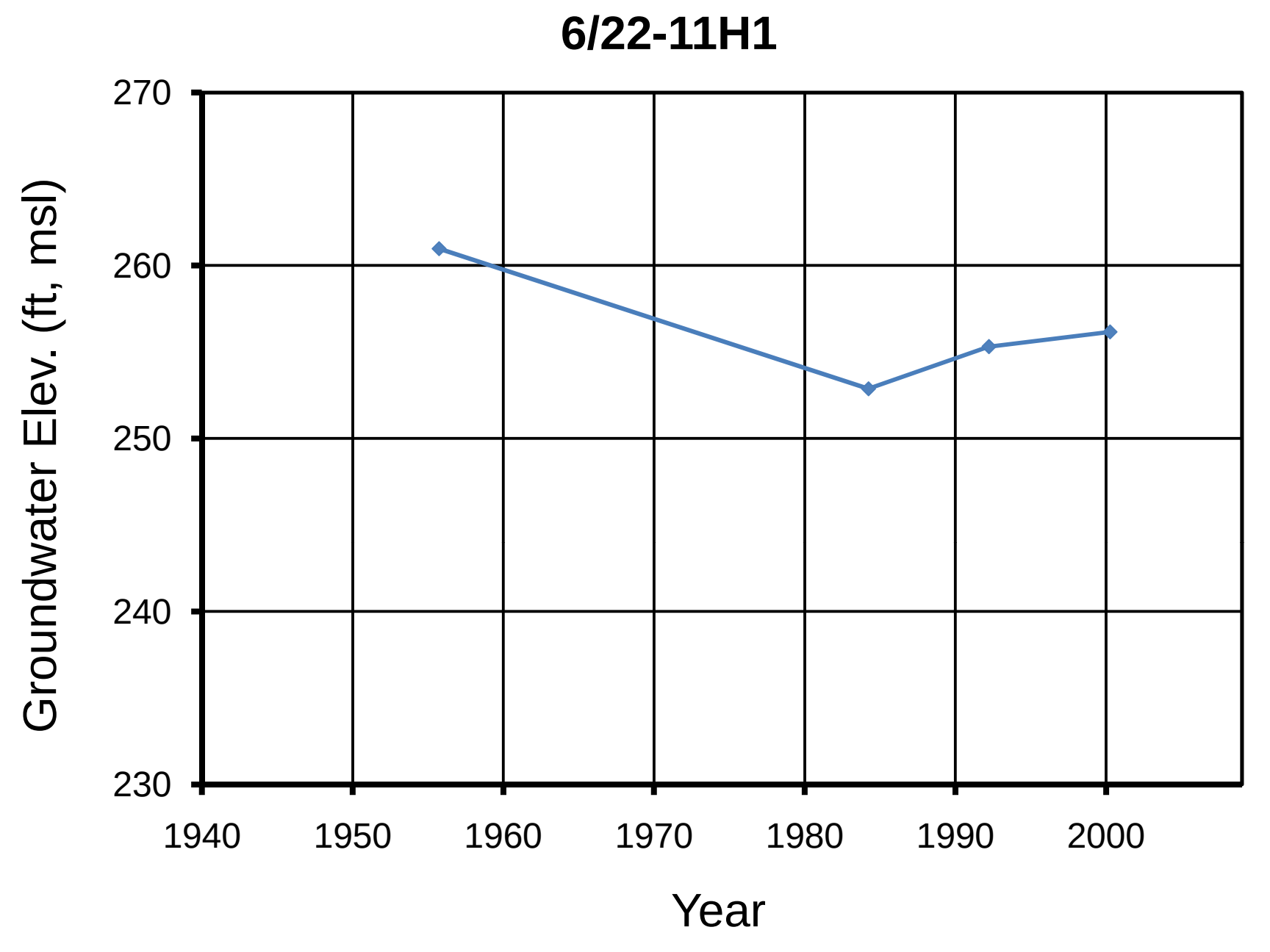
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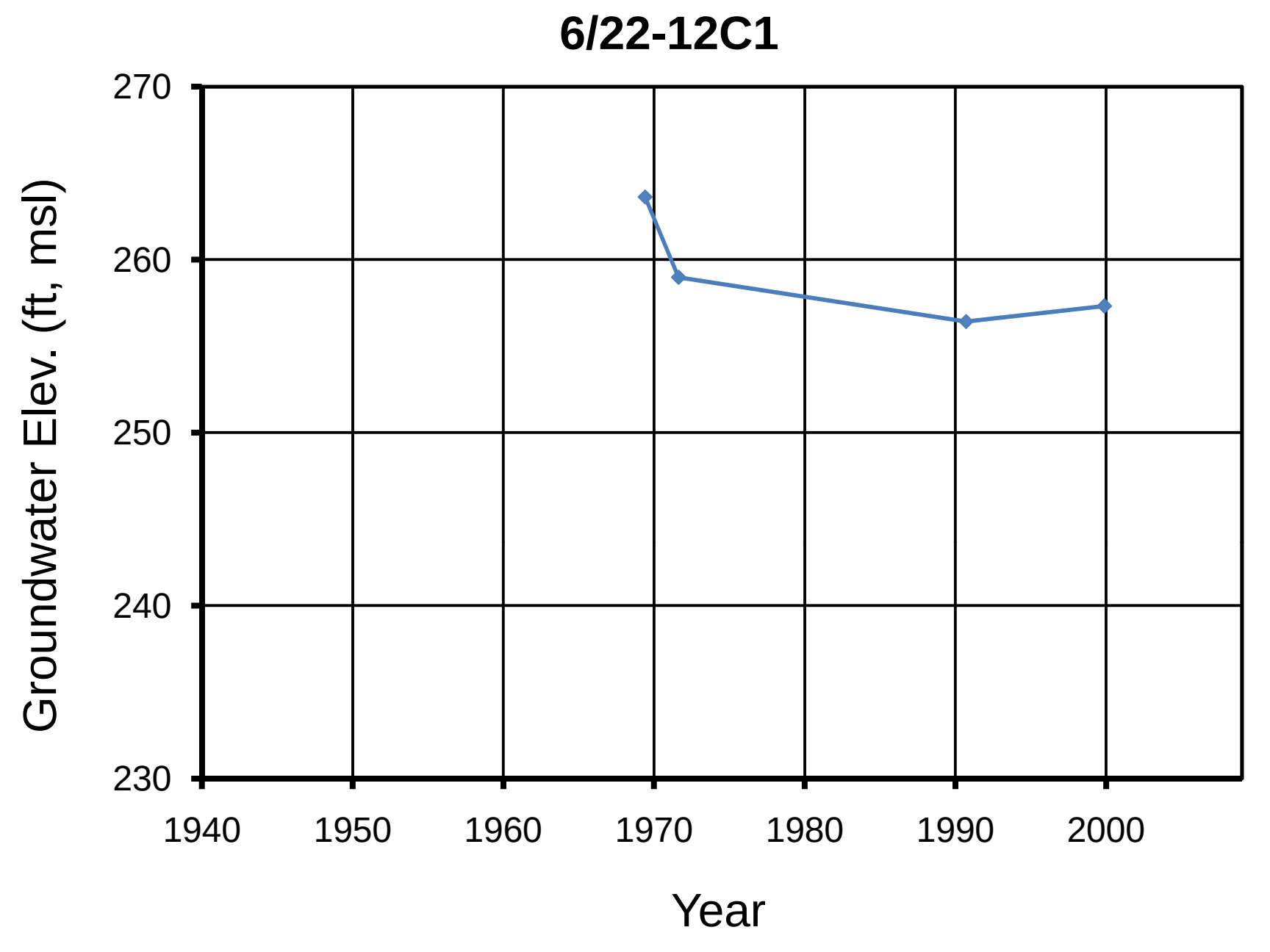
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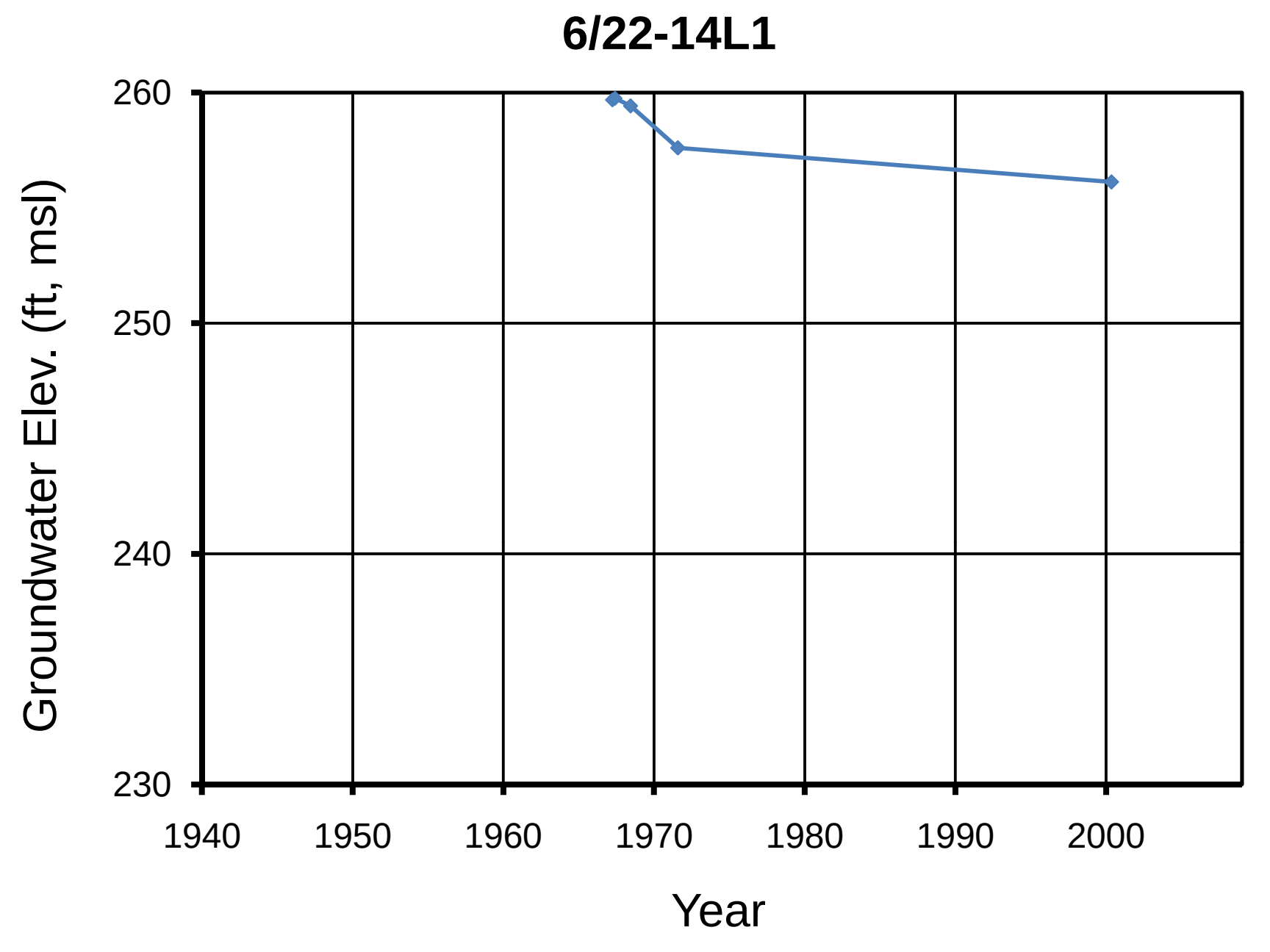
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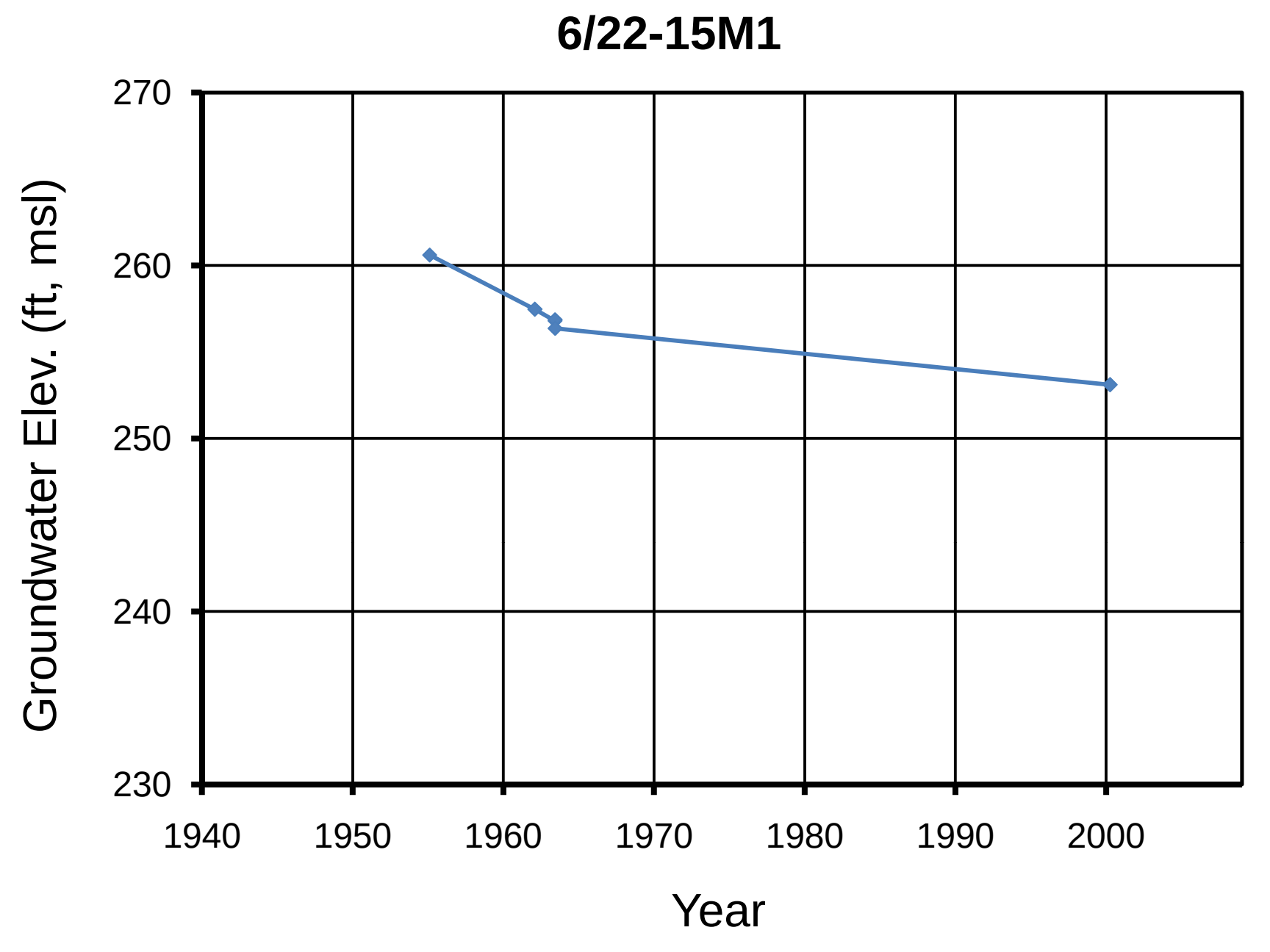
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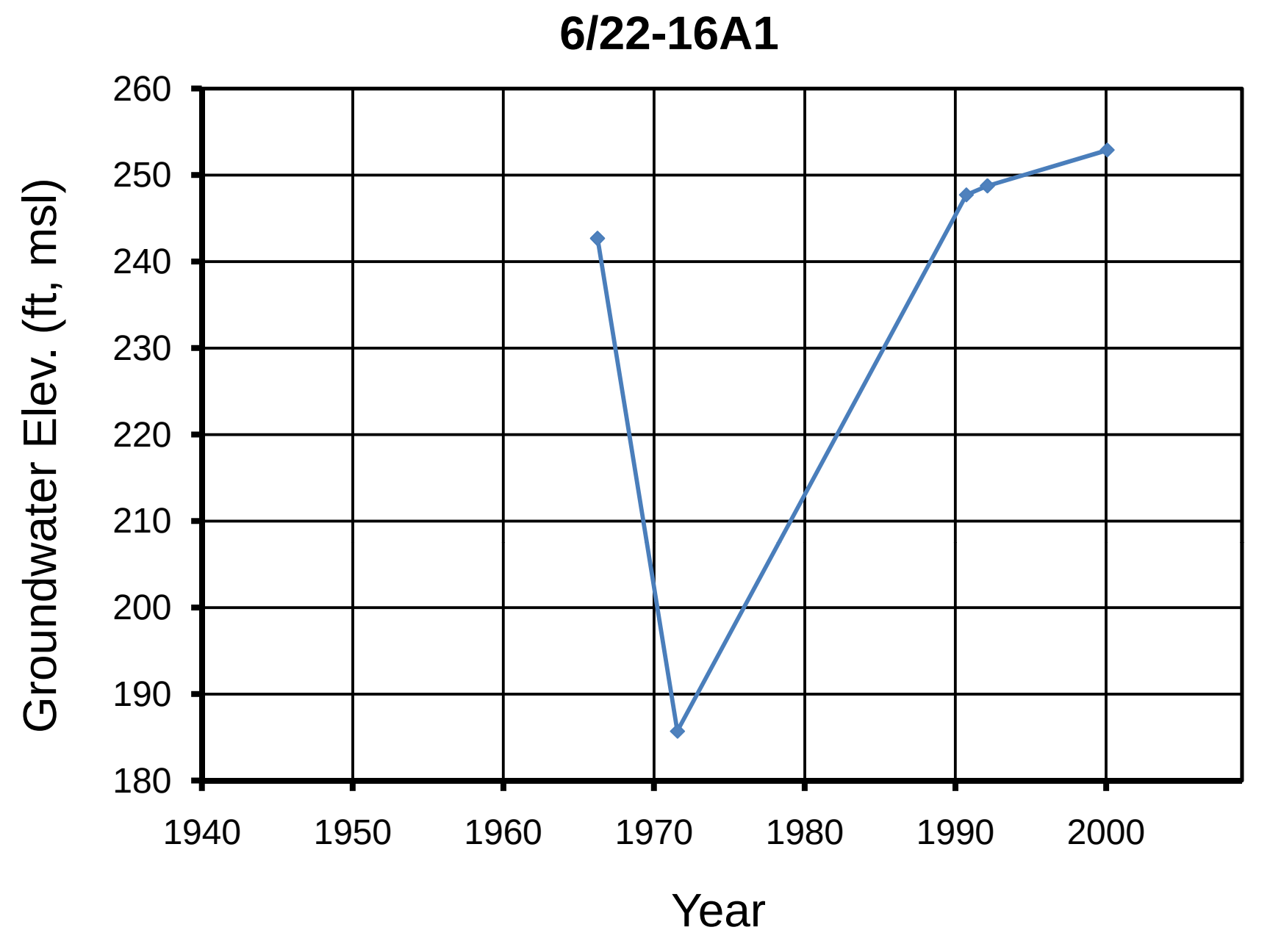
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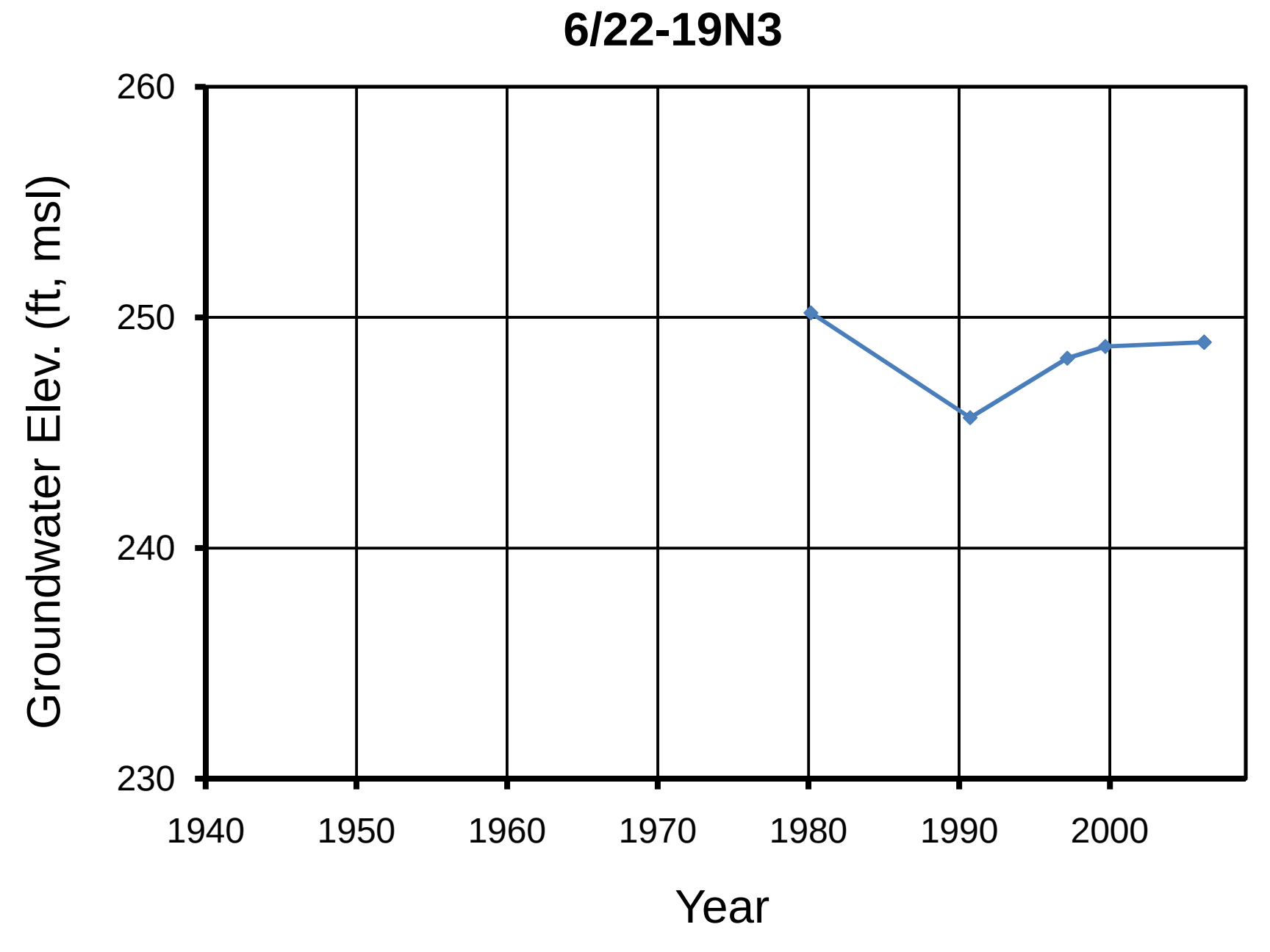
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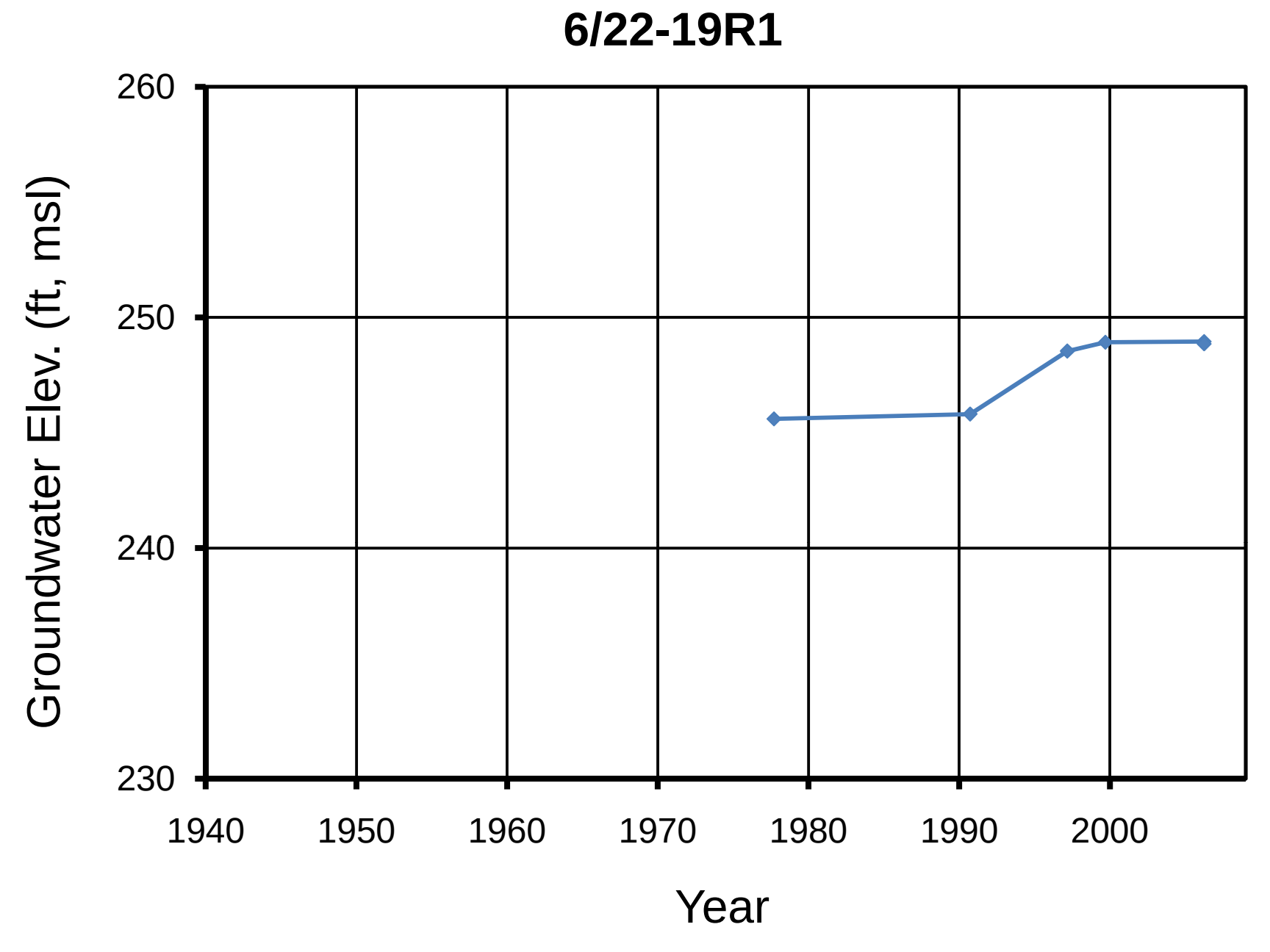
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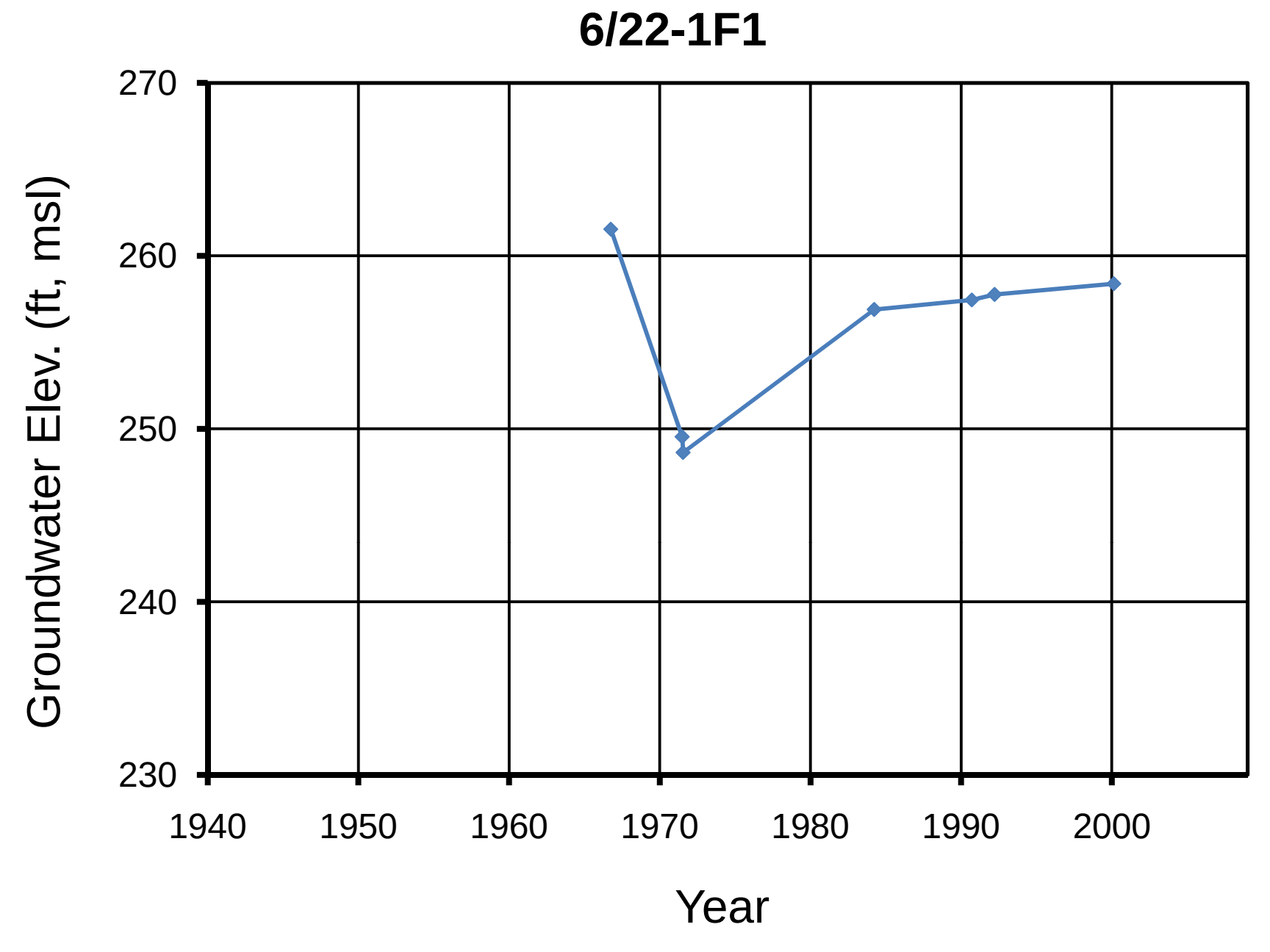
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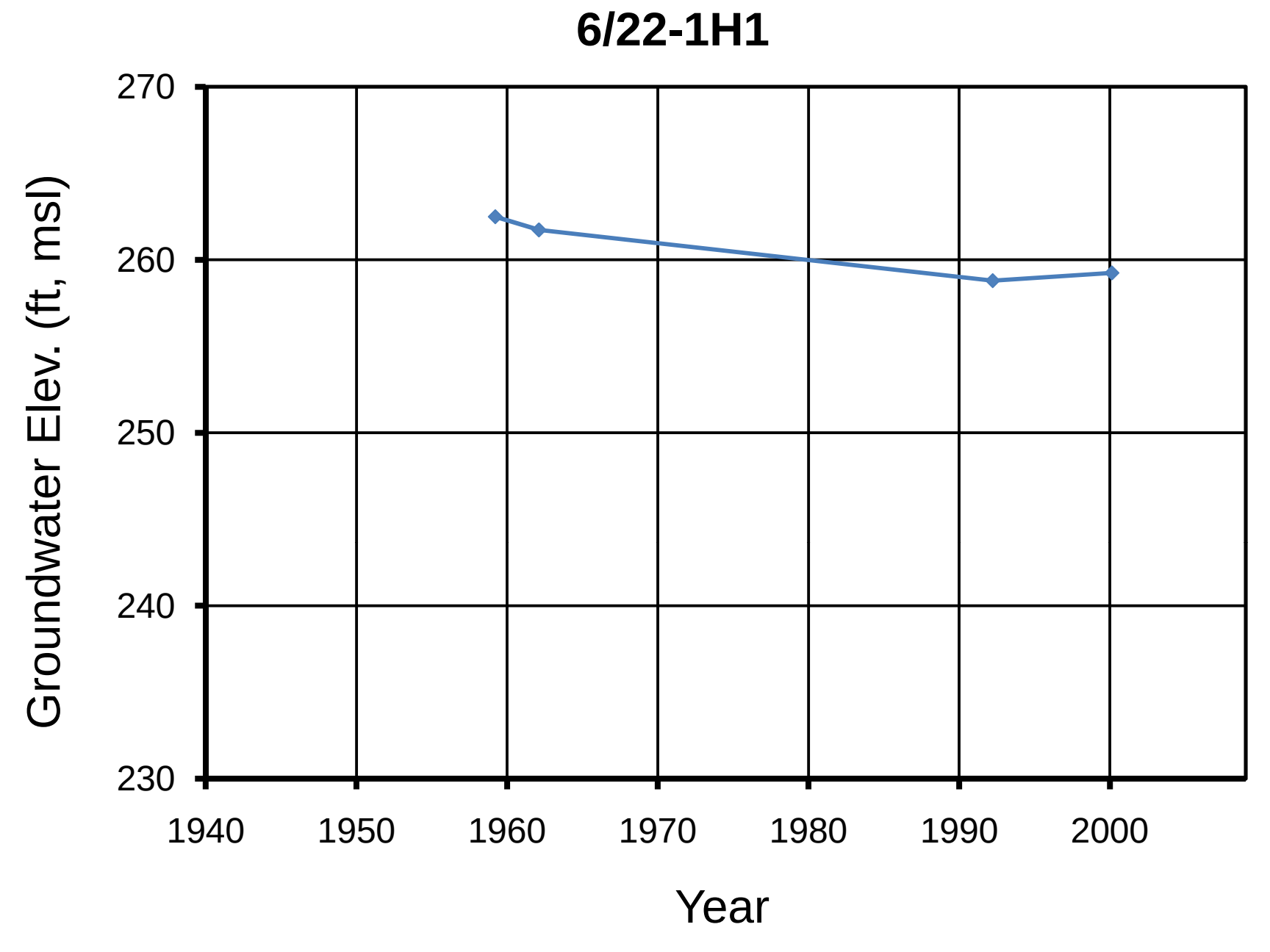
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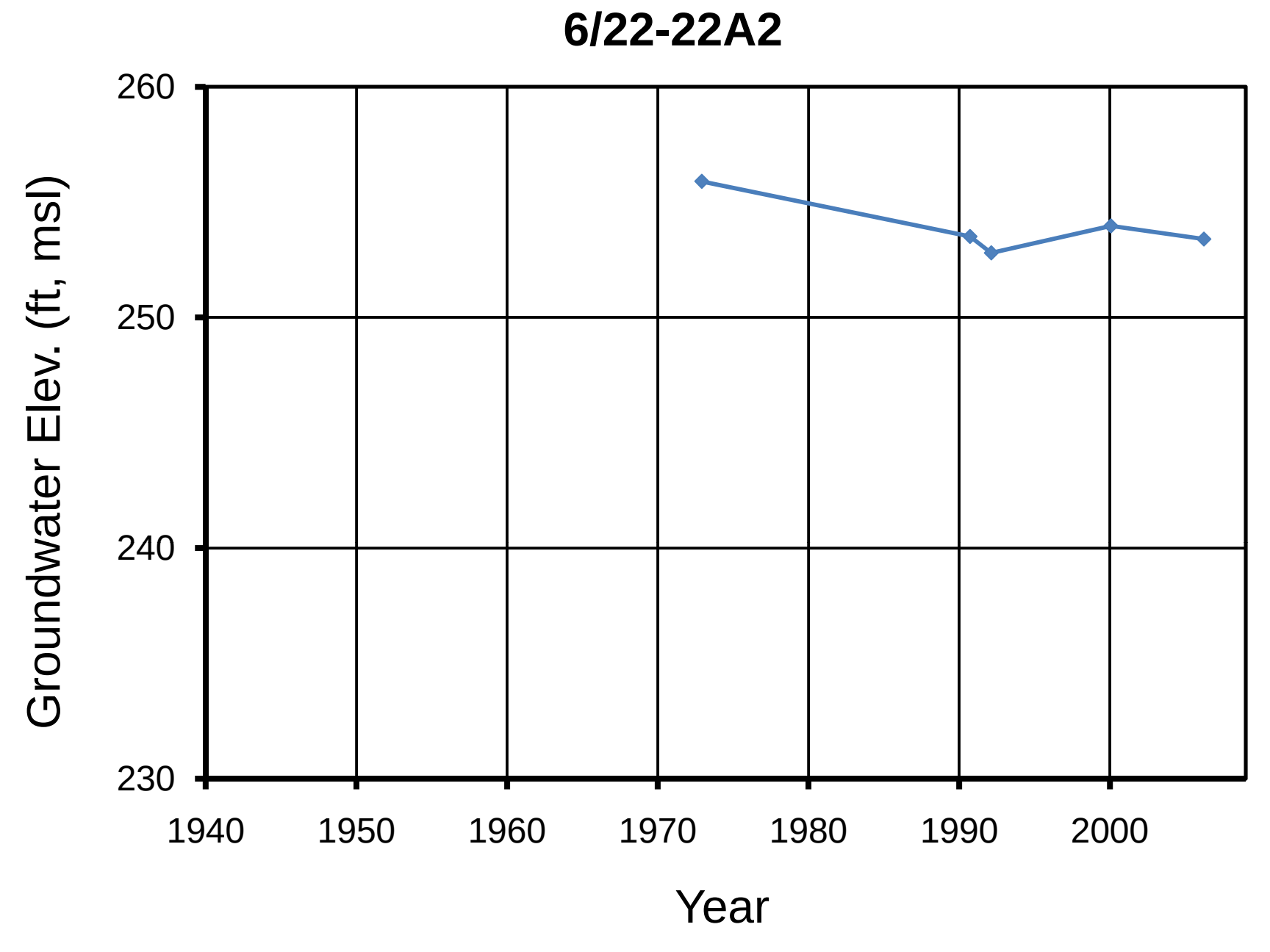
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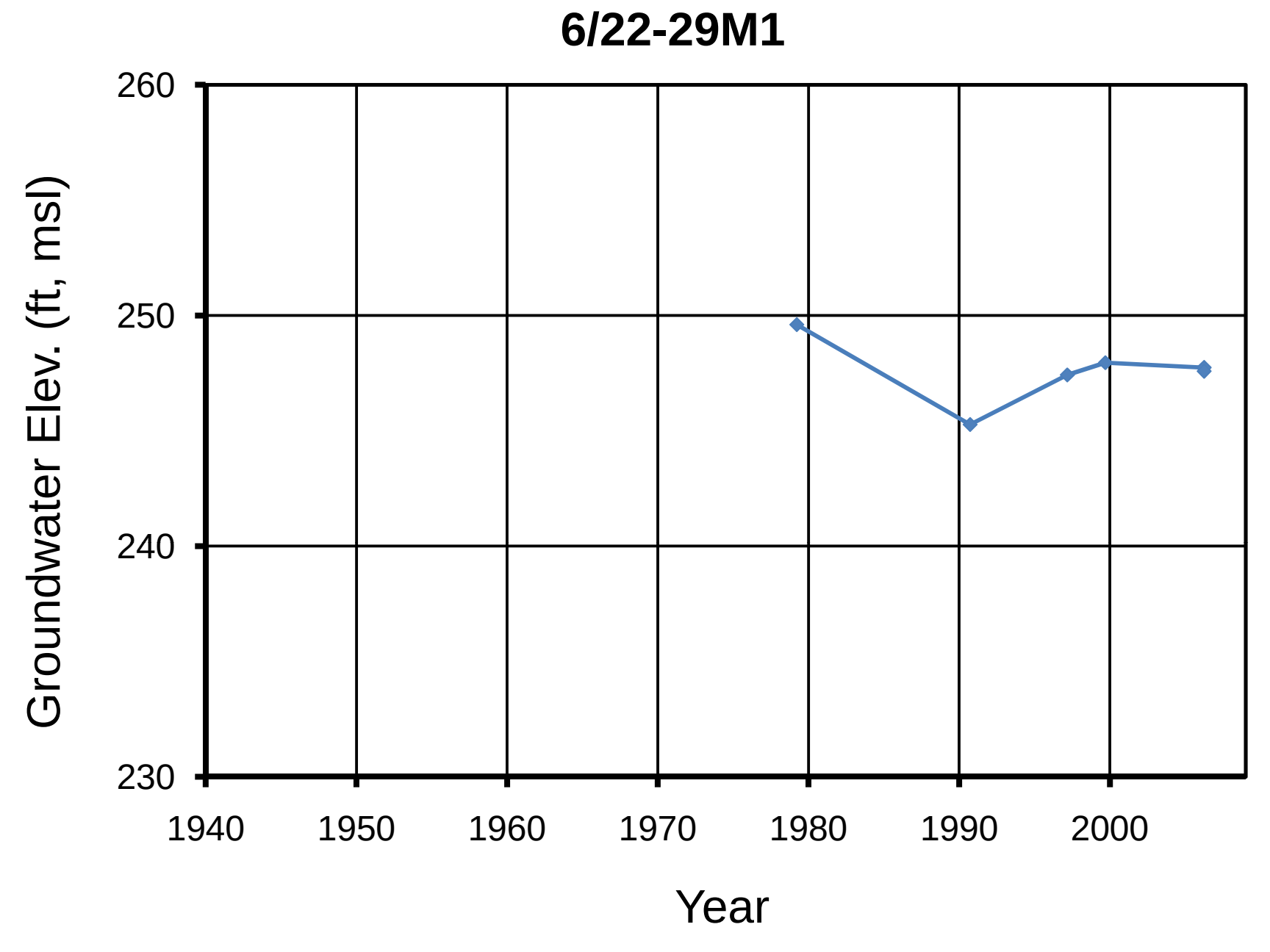
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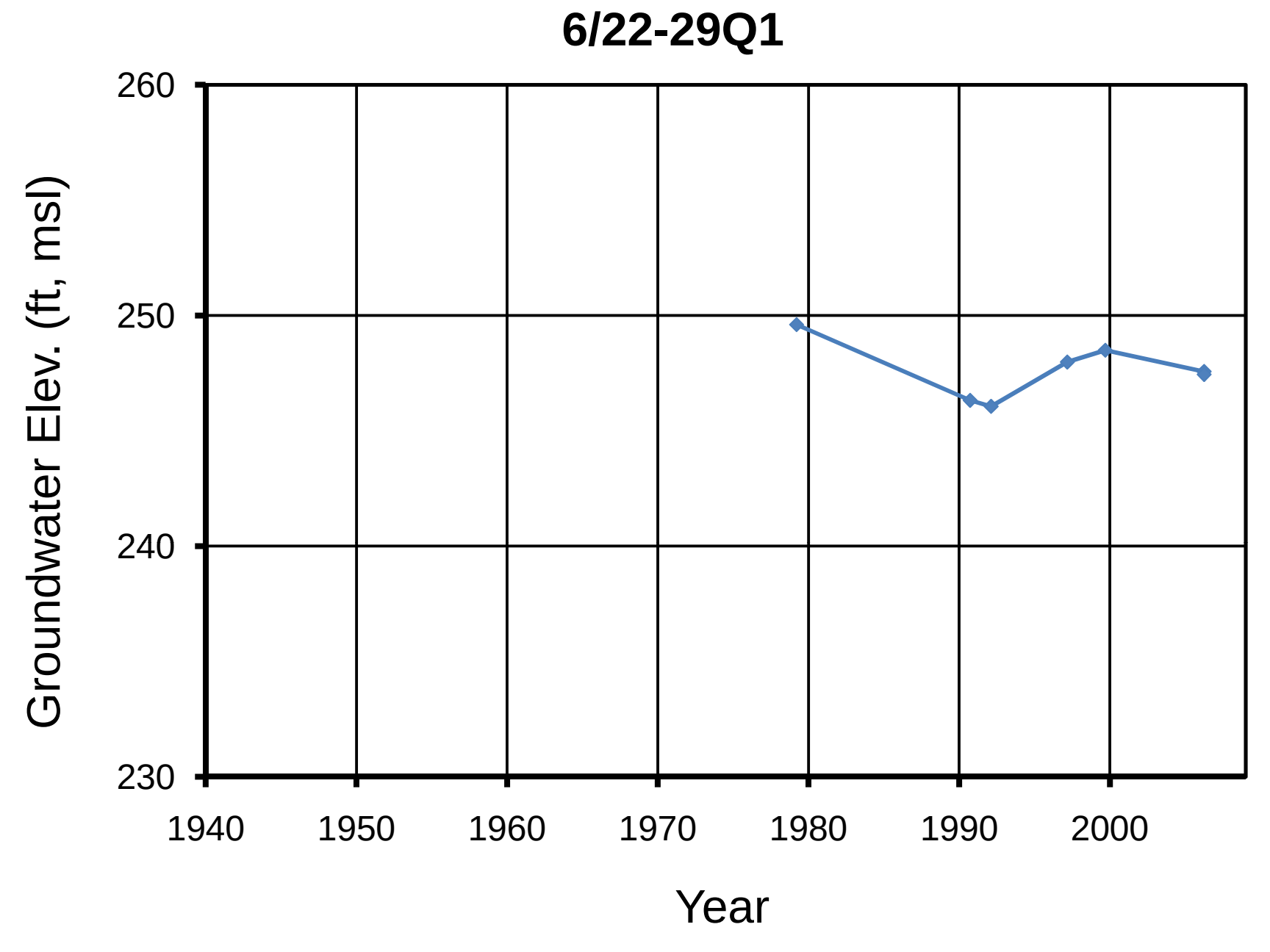
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Groundwater Elev. (ft, msl)
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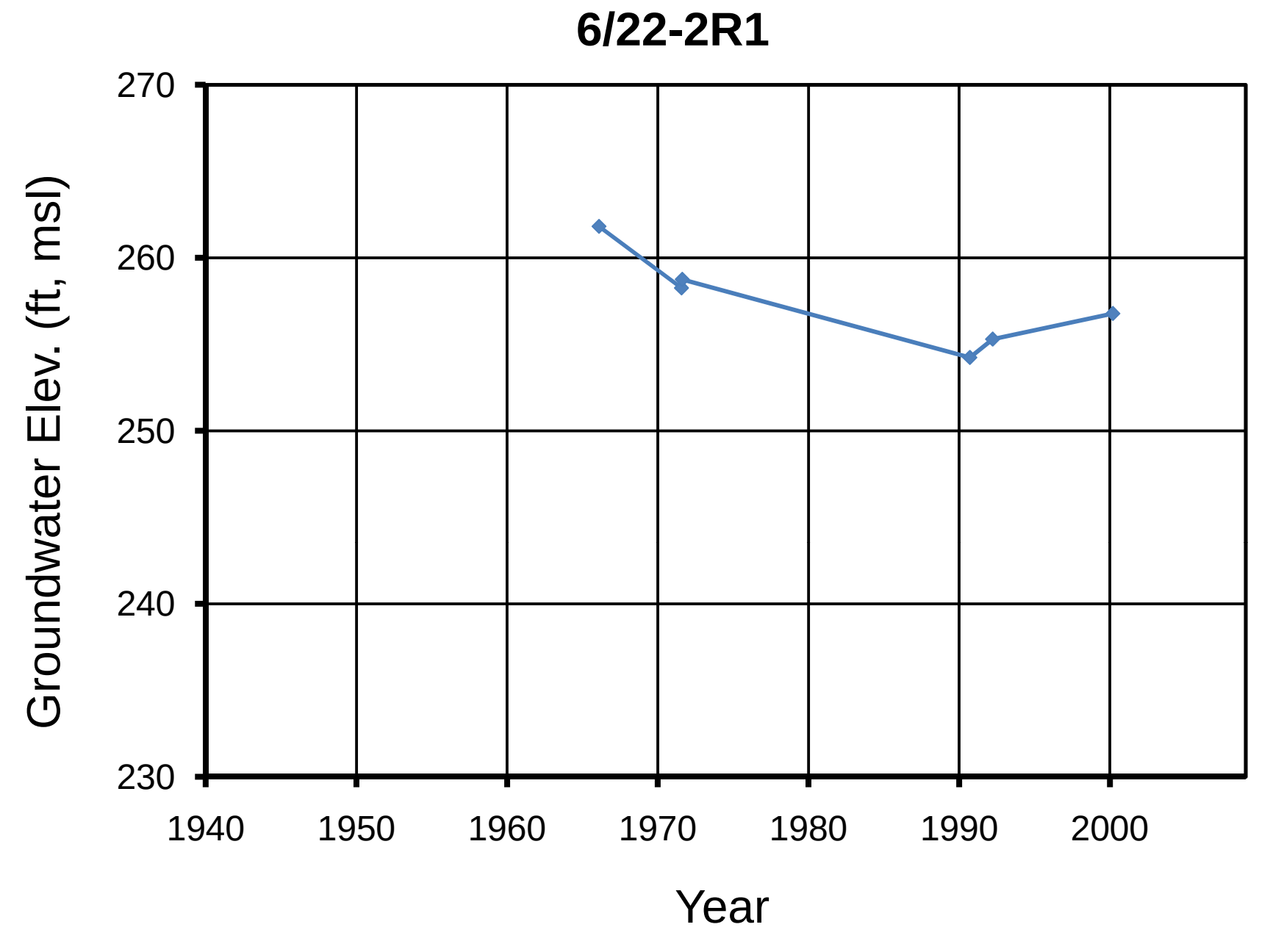
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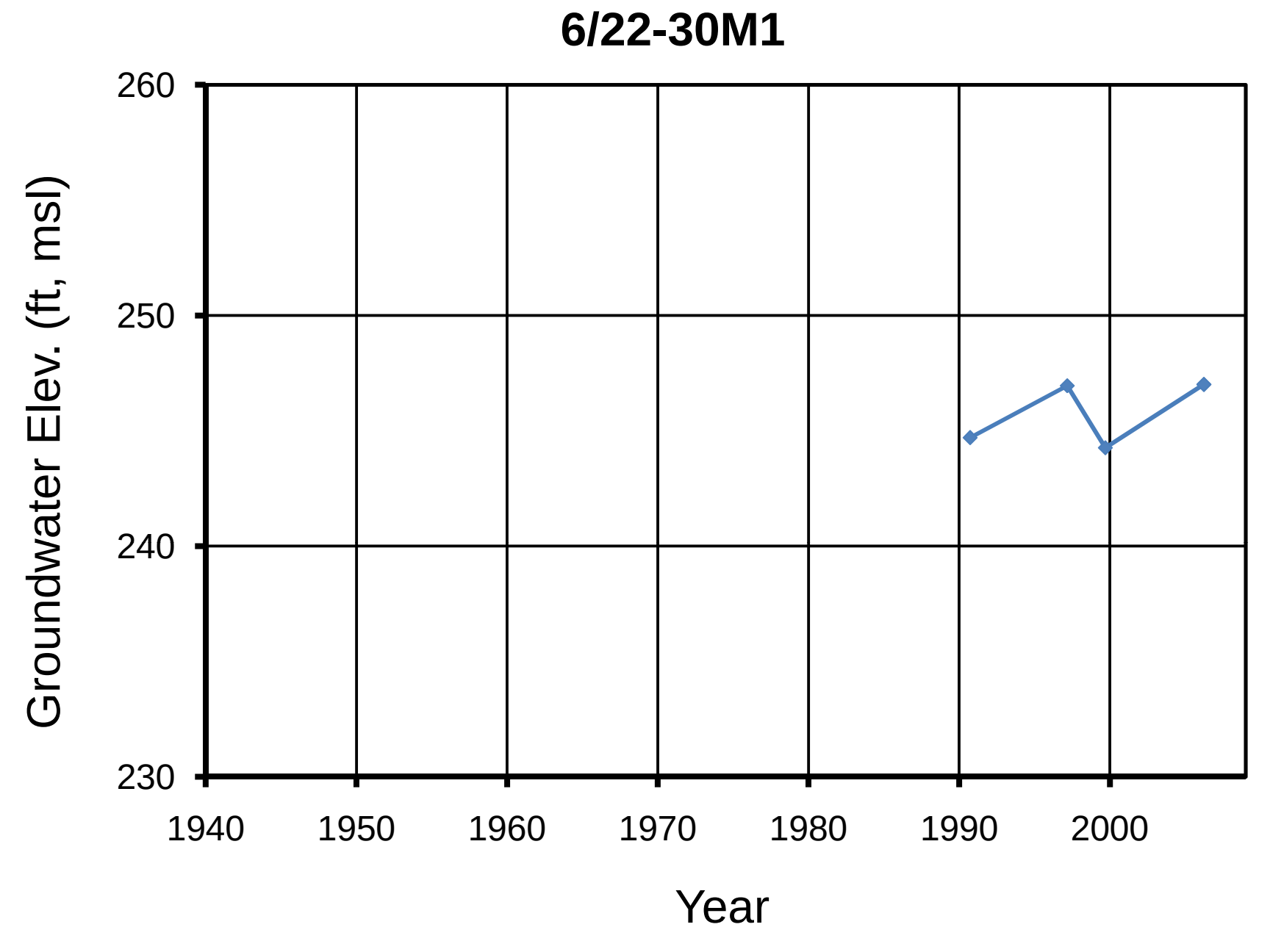
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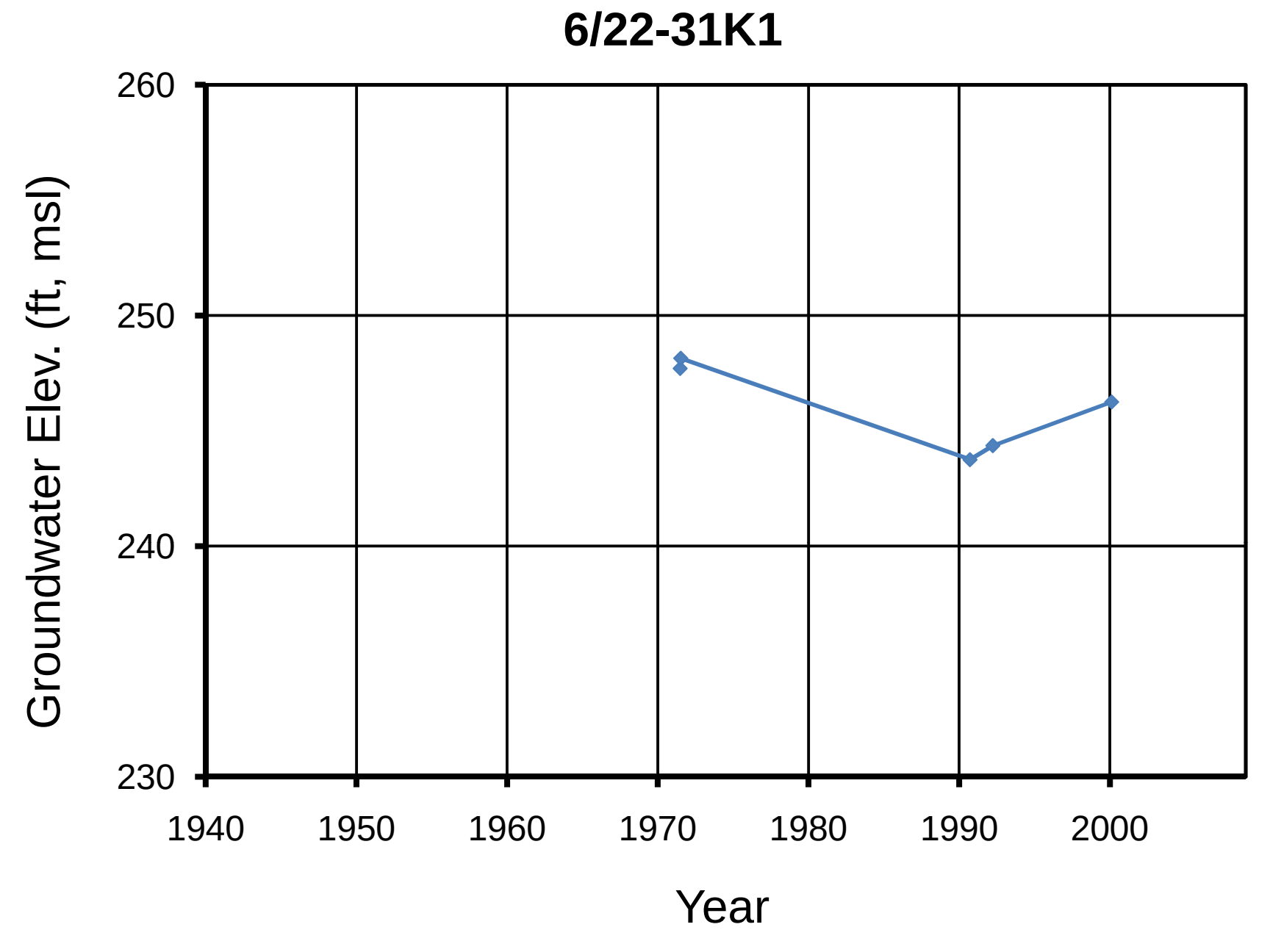
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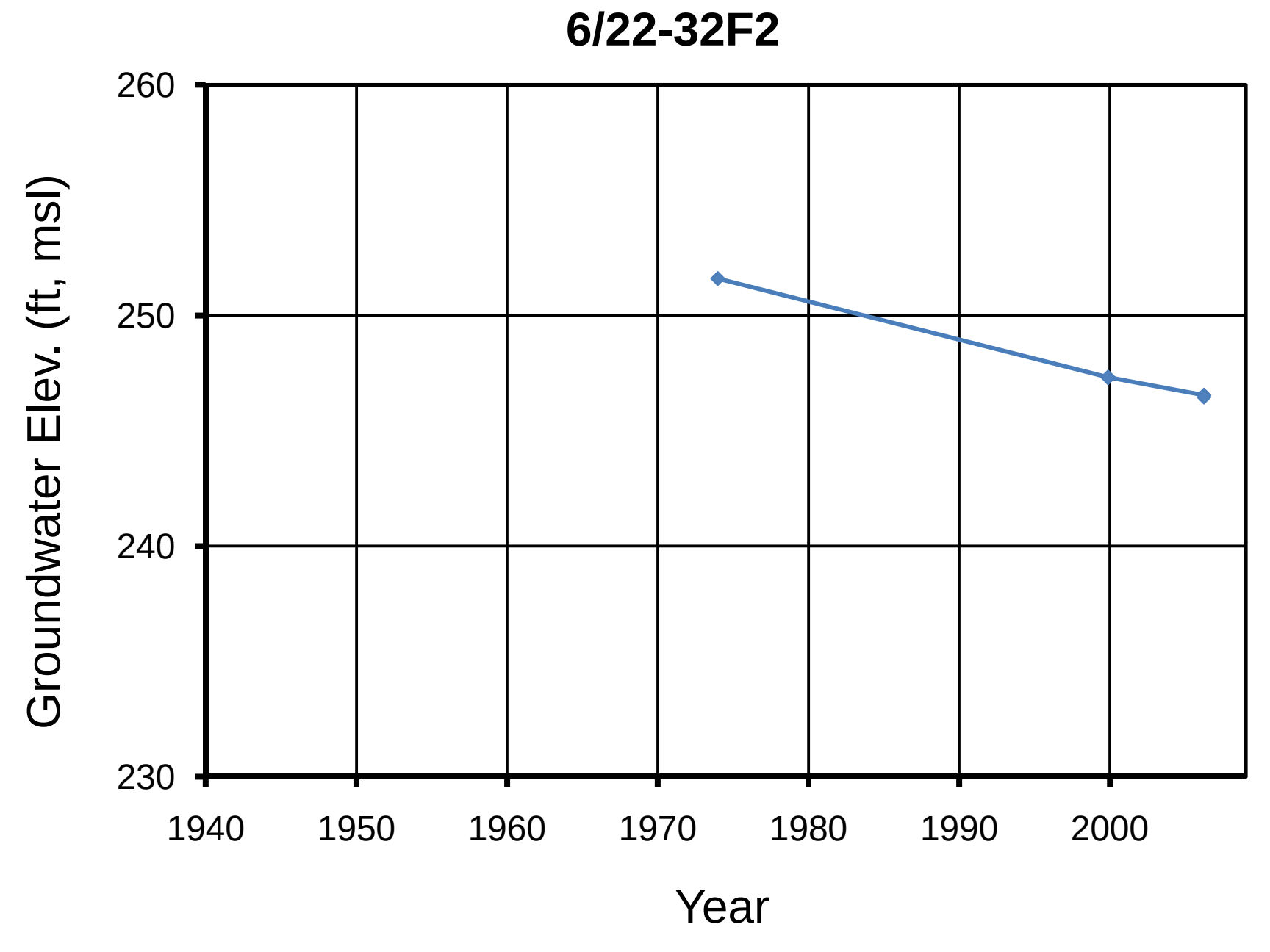
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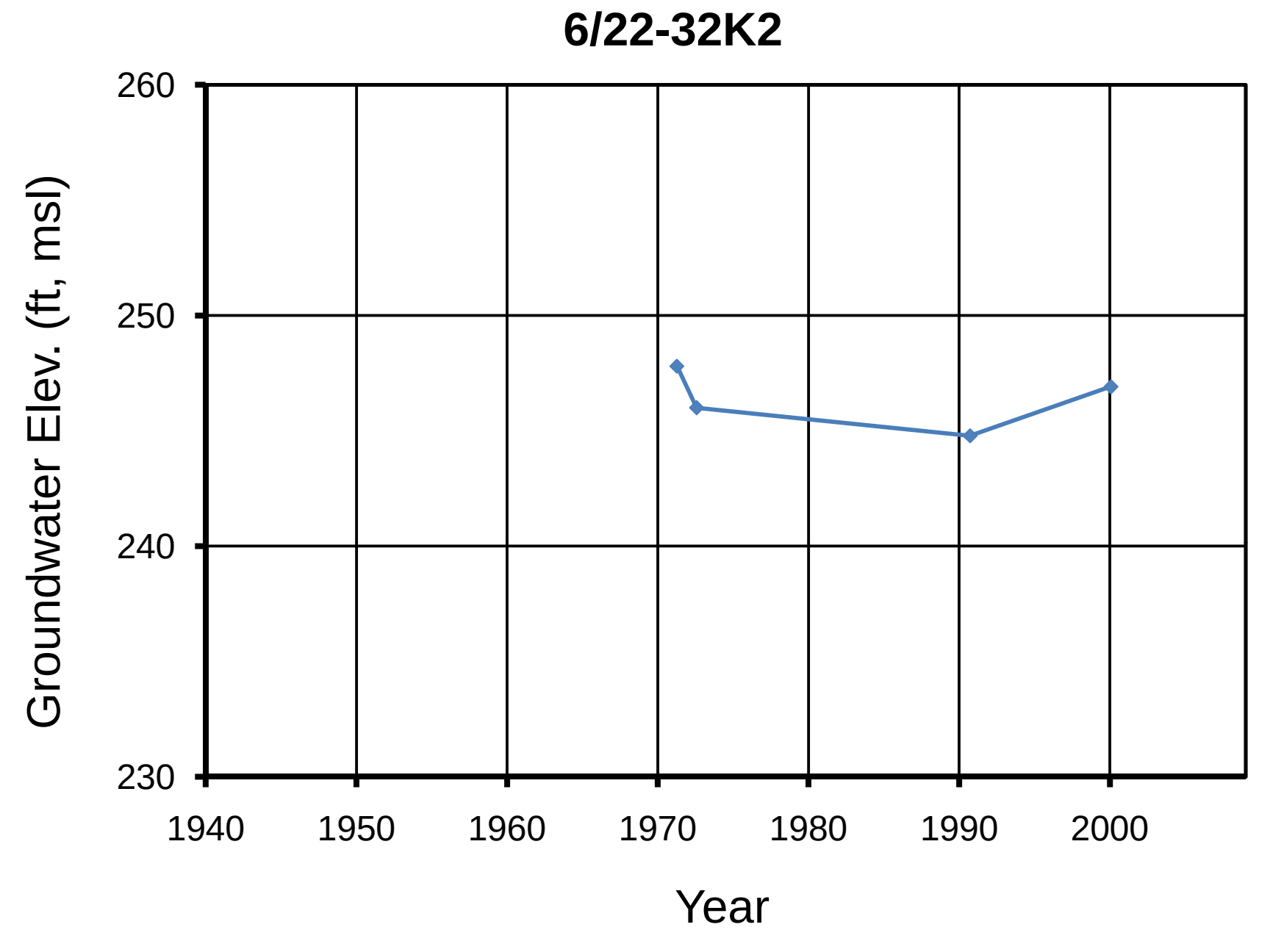
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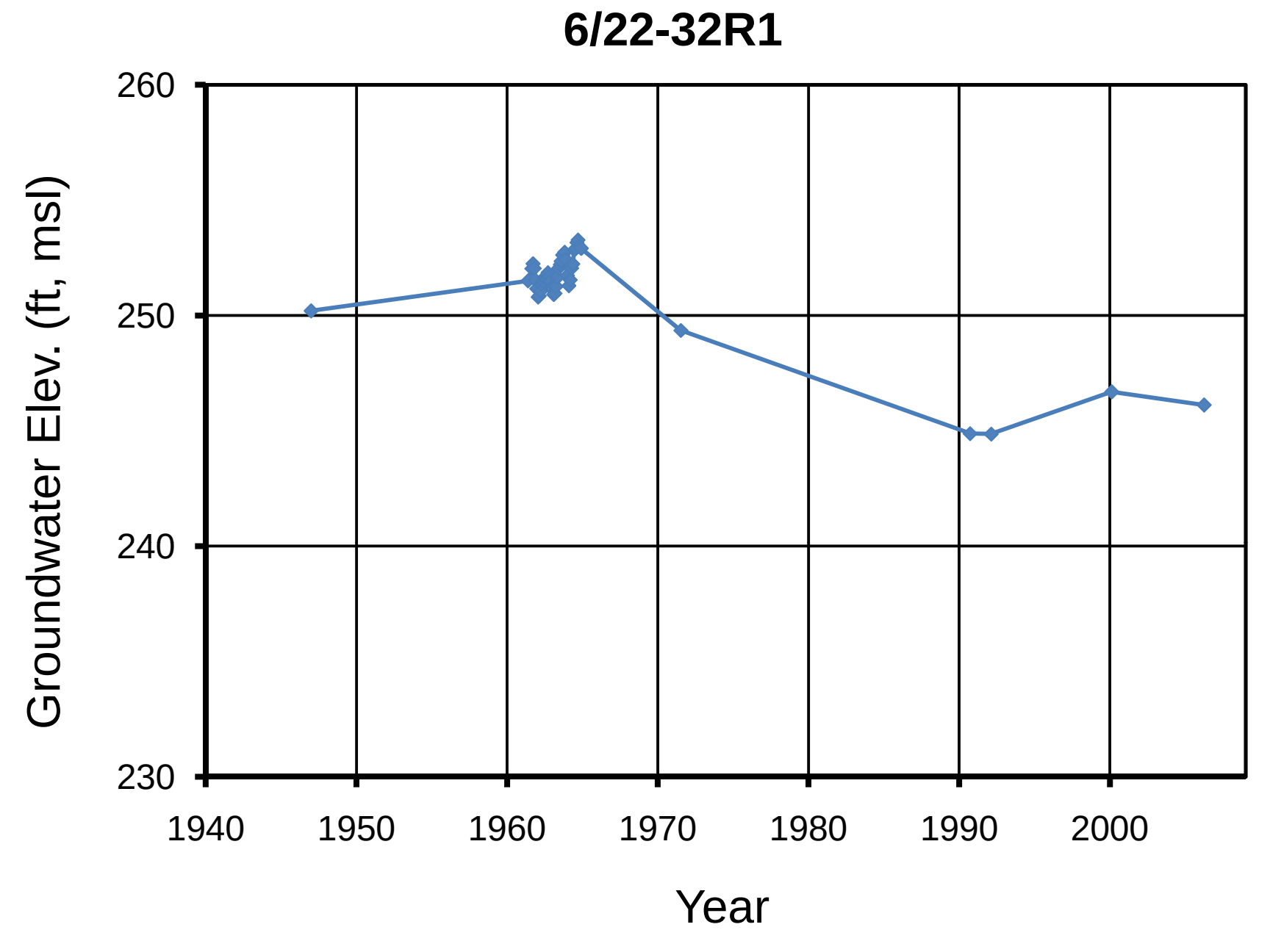
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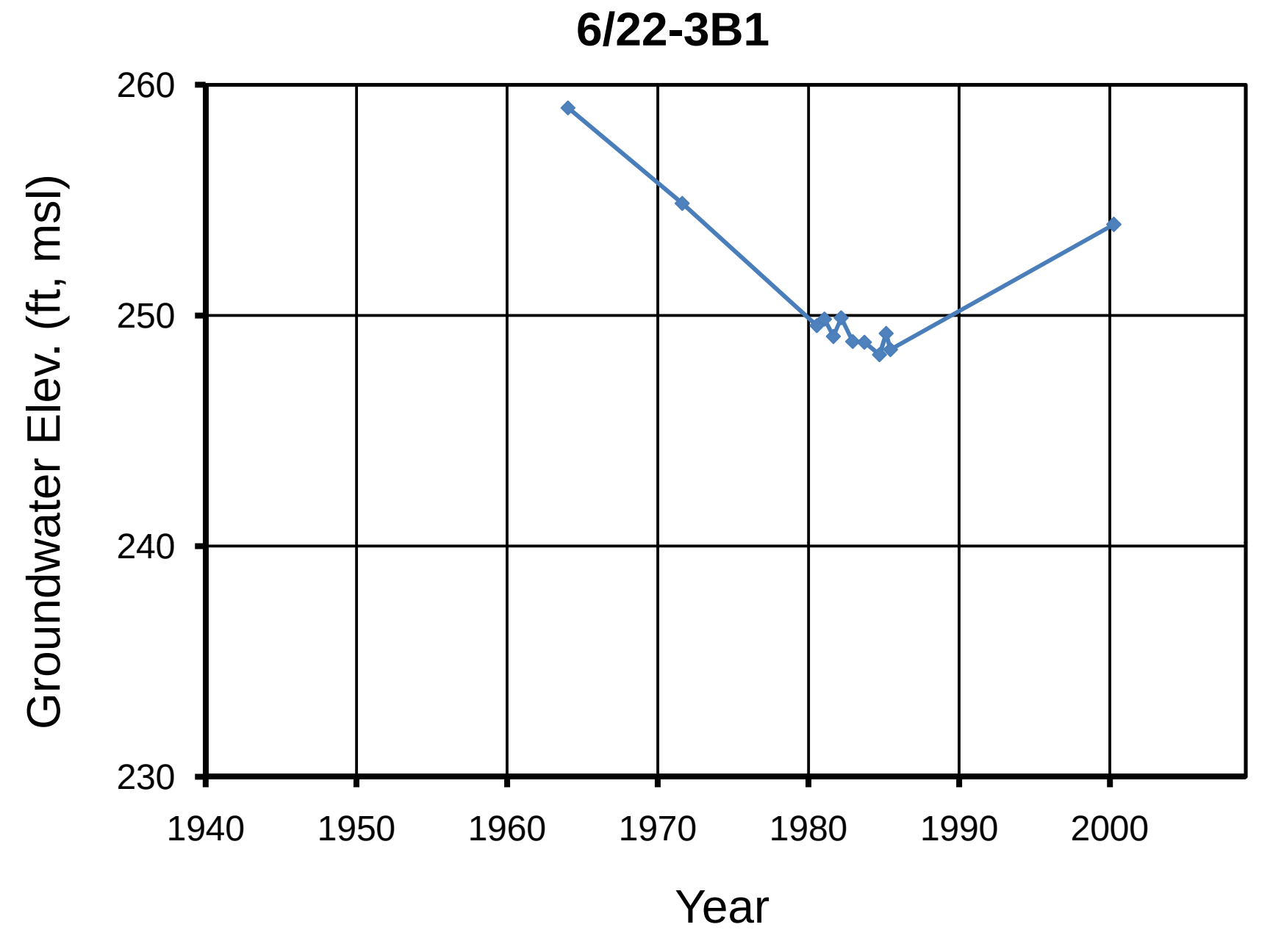
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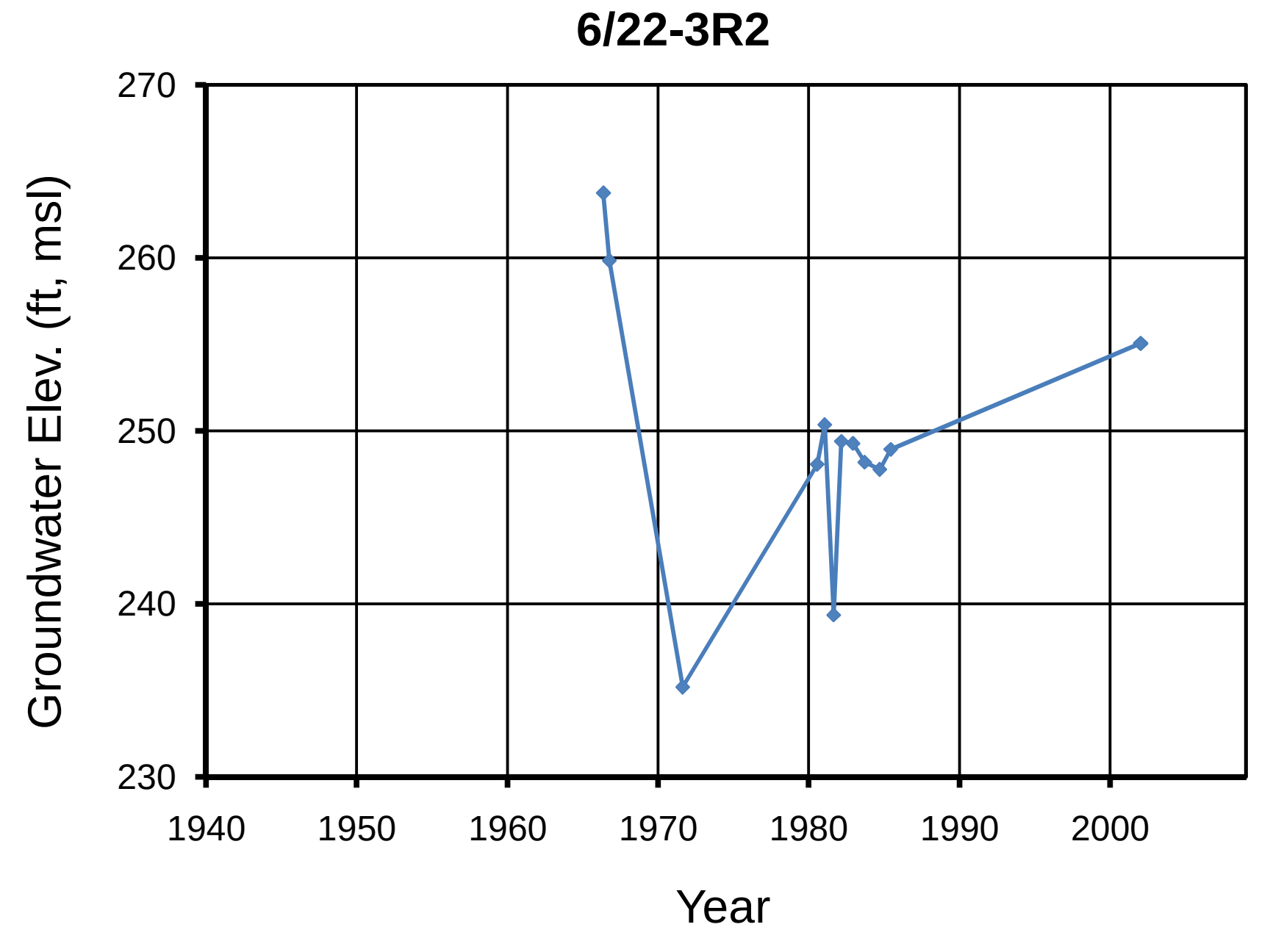
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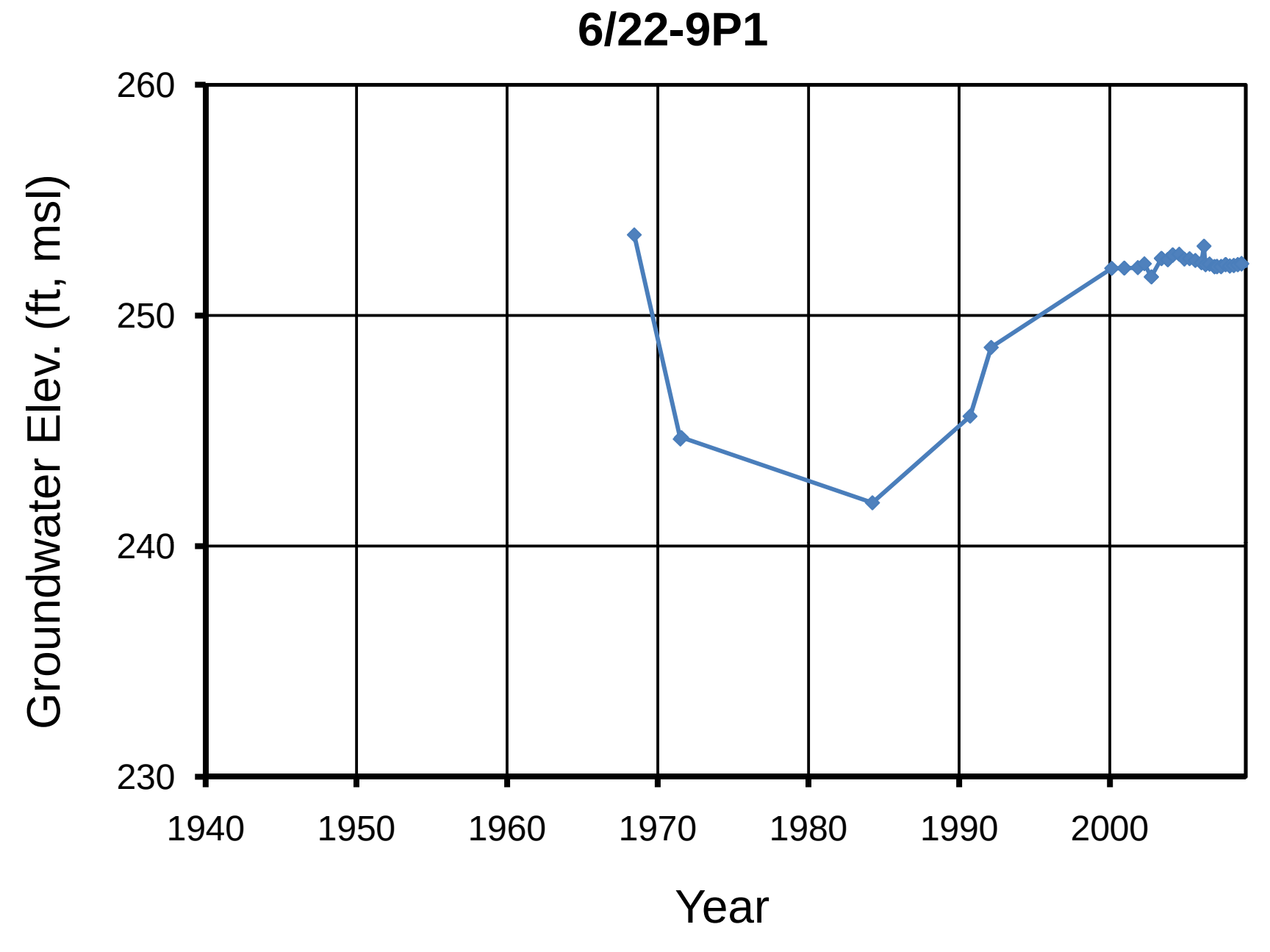
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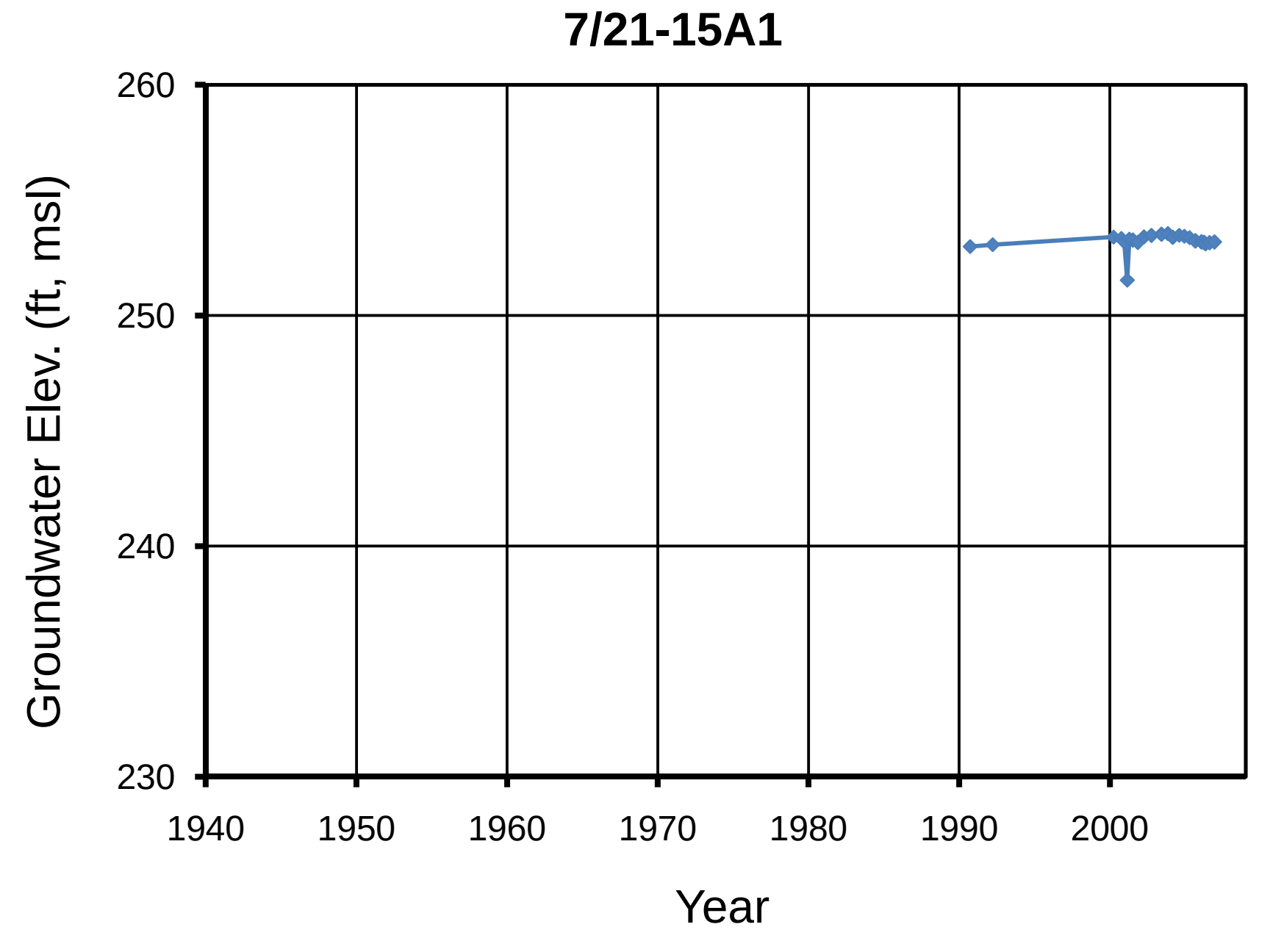
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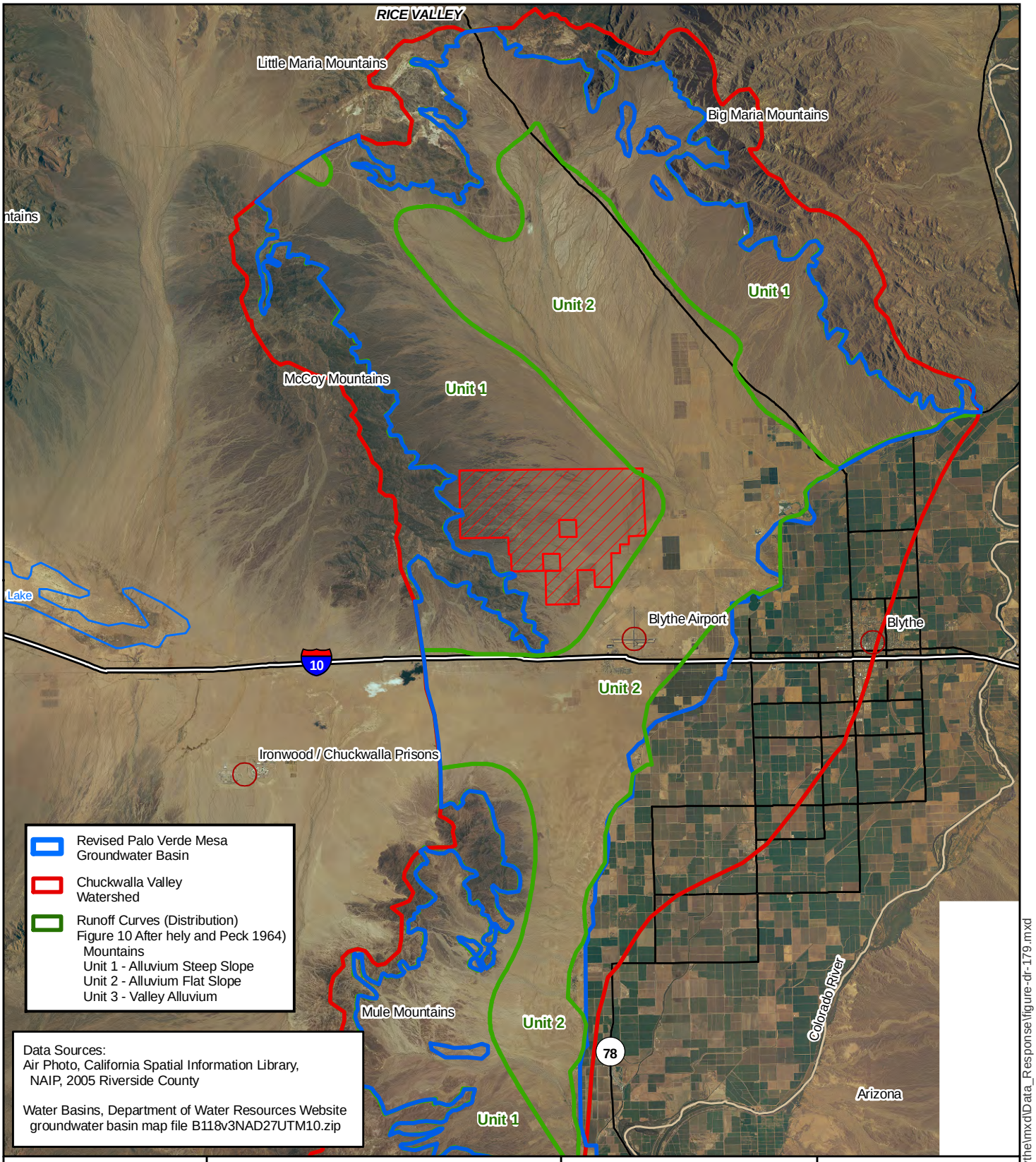
Figures



Map Location

Legend

- Project Right-of-Way
- Geographic/Cultural Area of Interest
- Freeway
- Highway / Major Road

1 in = 4 miles

0 4 8 Miles

Blythe Solar Power Project

Figure DR-S&W-179-1 (Rev. 1)
Distribution of Runoff "Type" After Hely and Peck (1964)
Palo Verde Meas Groundwater Basin

Solar Millennium

AECOM

Project: 60139695
Date: February 2010

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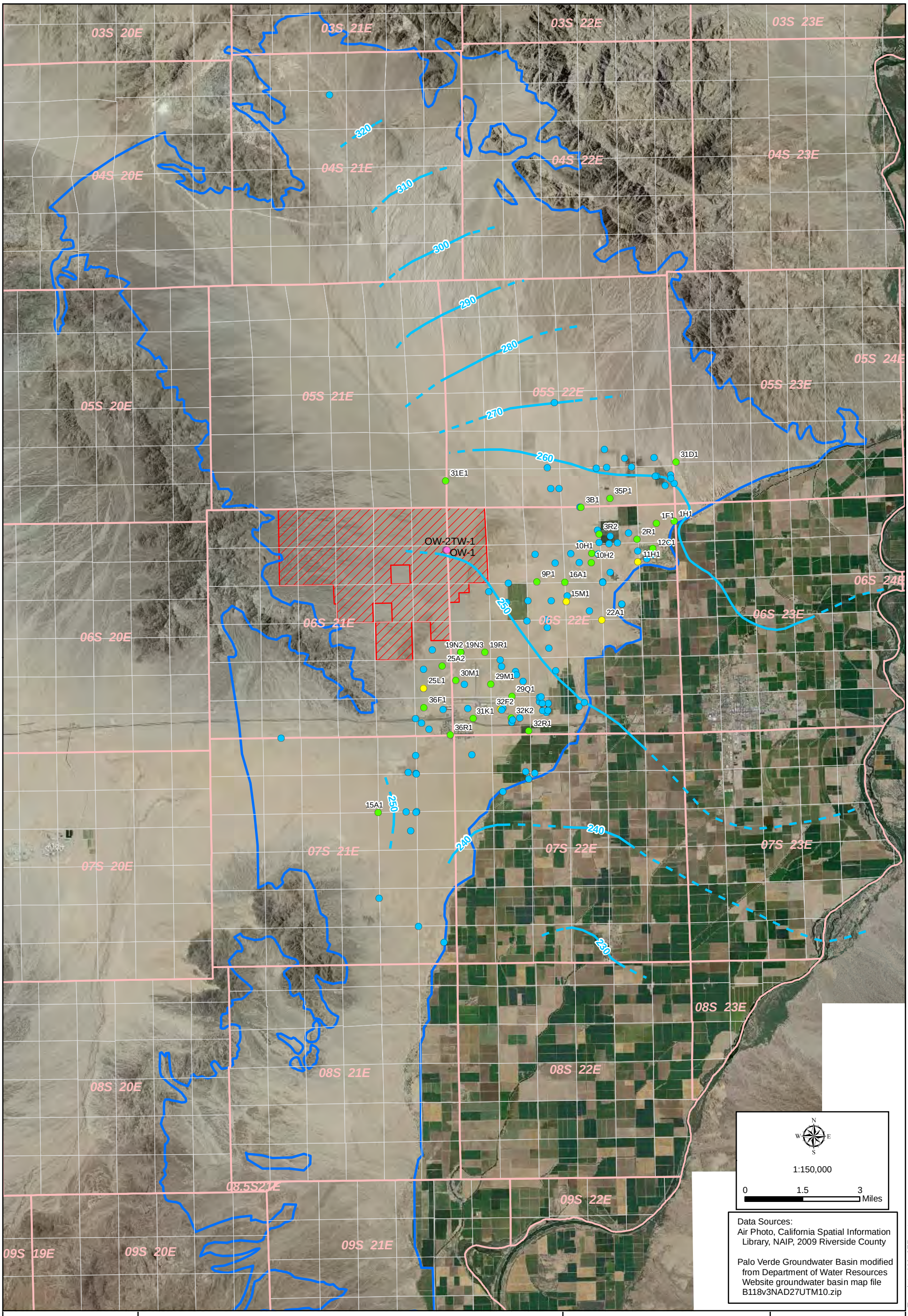
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3R2
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10H1
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11H1
9P1
16A1
15M1
22A1
19N2
19N3
19R1
25A2
30M1
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31K1
32K2
32R1
36R1
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Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2009 Riverside County
Palo Verde Groundwater Basin modified from Department of Water Resources Website groundwater basin map file B118v3NAD27UTM10.zip
Map Location
OR
ID
NV
UT
CA
AZ
Legend
Groundwater Wells with Insufficient Data to Determine Trend
Groundwater Wells with Decreasing Water Level Trends Since 1990
Groundwater Wells with Increasing or Stable Water Level Trends Since 1990
Onsite Test Wells
19K1
State Well Number
2000 Groundwater Elevation Contour (Dashed Where Inferred)
Project Right-of-Way
Freeway
Highway / Major Road
Revised Palo Verde Mesa Groundwater Basin
Blythe Solar Power Project
Figure DR-S&W-179-2
Basin Wide Hydrographs
Palo Verde I, LLC
AECOM
Project: 60139695
Date: February 2010
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Tables

Table DR-S&W-179-1 (rev.1)
Revised Estimate of Infiltration to the Palo Verde Mesa
Blythe Solar Power Project
Riverside California

Layer	Area (acres)	Mean Annual Precipitation (inches)	Total Volume of Rainwater from Mean Annual Precip (AcFt)	Runoff Curve Classification	Total Volume of Infiltration (AcFt) Based on 2% of Annual Precip	Total Volume of Infiltration (AcFt) Based on 3% of Annual Precip	Total Volume of Infiltration (AcFt) Based on 5% of Annual Precip	Total Volume of Infiltration (AcFt) Based on 10% of Annual Precip
unit1-cw	30,303	5	12,626	Alluvium, Steep Slope	253	379	631	1,263
unit1-cw	211,498	4	70,499	Alluvium, Flat Slope	1,410	2,115	3,525	7,050
unit1-cw	41,073	3.5	11,980	Alluvium, Steep Slope	240	359	599	1,198
unit1-cw	12,077	4	4,026	Alluvium, Steep Slope	81	121	201	403
unit1-cw	910	4	303	Alluvium, Steep Slope	6	9	15	30
unit1-cw	194	4	65	Alluvium, Steep Slope	1	2	3	6
unit1-cw	81,233	5	33,847	Alluvium, Steep Slope	677	1,015	1,692	3,385
bedrock-chuckwalla	32,001	5	13,334	Mountains	267	400	667	1,333
bedrock-chuckwalla	21,456	5	8,940	Mountains	179	268	447	894
bedrock-chuckwalla	11,050	5	4,604	Mountains	92	138	230	460
bedrock-chuckwalla	109	5	46	Mountains	1	1	2	5
bedrock-chuckwalla	9,246	4	3,082	Mountains	62	92	154	308
bedrock-chuckwalla	10,042	4	3,347	Mountains	67	100	167	335
bedrock-chuckwalla	282	4	94	Mountains	2	3	5	9
bedrock-chuckwalla	3,480	4	1,160	Mountains	23	35	58	116
bedrock-chuckwalla	275	4	92	Mountains	2	3	5	9
bedrock-chuckwalla	90	4	30	Mountains	1	1	1	3
bedrock-chuckwalla	398	4	133	Mountains	3	4	7	13
bedrock-chuckwalla	316	4	105	Mountains	2	3	5	11
bedrock-chuckwalla	39,340	5	16,392	Mountains	328	492	820	1,639
bedrock-chuckwalla	194	5	81	Mountains	2	2	4	8
unit3-cw	28,973	3	7,243	Alluvium, Flat Slope	145	217	362	724
unit2-cw	198,558	3	49,640	Alluvium, Steep Slope	993	1,489	2,482	4,964
bedrock-chuckwalla	89,161	6	44,581	Mountains	892	1,337	2,229	4,458
Totals	**822,257**		**286,248**		**5,725**	**8,587**	**14,312**	**28,625**

TABLE DR-S&W-179-2 (rev 1)

WATER BALANCE
PALO VERDE MESA GROUNDWATER BASIN
BLYTHE SOLAR POWER PROJECT
RIVERSIDE COUNTY, CALIFORINA

RECHARGE AND DISCHARGE		MOUNTAIN FRONT RECHARGE 10% OF PRECIPITATION	MOUNTAIN FRONT RECHARGE 5% OF PRECIPITATION	MOUNTAIN FRONT RECHARGE 3% OF PRECIPITATION	BASIS FOR ESTIMATE	WATER BALANCE ESTIMATES REPORTED BY OTHERS (acre-feet pre year)	
						Metzger, et al., 1973 USGS Professional Paper 486-G	Owen-Joyce, 1987 USGS Water-Resources Investigation 87-4078
		acre-feet per year	acre-feet per year	acre-feet per year			
RECHARGE (INFLOW)							
UNDERFLOW from the CHUCKWALLA [1.]		400	400	400	Inflow estimated as 400 AFY (Metzger et.al., 1973) and adopted by Owen-Joyce et.al. (1987).		400
UNDERFLOW from RICE VALLEY		0	0	0	Rice Valley is a closed basin - no underflow into Palo Verde Mesa Groundwater Basin (Metzger et.al., 1973; DWR, 2004).	0	0
UNDERFLOW from the COLORADO RIVER [2.]		1,241	1,241	1,241	Estimated assuming underflow from the Colorado River.	--	--
PERCOLATION from						--	--
	AGRICULTURE RETURN [3.]	3,561	3,561	3,561	There are a total of approximately 2,683 acres of irrigated agricultural land on the PV Mesa. Of the 2,683 acres, approximately 1,862 acres are irrigated with surface water from PVID and the remaining 724 acres are irrigated with groundwater. Agricultural return was calculated for the total agricultural acreage of 2,683, using the Department of Water Resources Water Use Estimates for 2001 (see attached Table DR-Soil and Water-179-3. The amount of water used per crop was multiplied by the number of agricultural acres on the Palo Verde Mesa. The percentage of the total amount of water applied by irrigation that is retained within the root zone and that is available for crop ET (consumed fraction) was deducted from the water applied, resulting in the amount of water recharged to the aquifer.	--	--
	PRECIPITATION	0	0	0	Precipitation recharge onto the Palo Verde Mesa floor assumed to be negligible - all water transpired or evaporates.	--	--
	MOUNTAIN FRONT	10,288	5,144	2,058	After Hely and Peck (1964) - See Table DR Soil & Water - 179-1	--	800
	LEACHFIELD RETURN	0	0	0	Assumed to be negligible.	--	--
BEDROCK		0	0	0	Although recharge from the bedrock is possible there is insufficient well data to determine flux.	--	--
	TOTAL (INFLOW)	15,490	10,346	7,260		0	1,200
DISCHARGE (OUTFLOW)							
UNDERFLOW out of the GROUNDWATER BASIN		1,241	1,241	1,241	Estimated assuming underflow out of the Groundwater Basin along the Colorado River.	--	--
DIVERSION						--	--
	AGRICULTURE [3.]	3,584	3,584	3,584	There are approximately 364 acres of agricultural land inside the PVID boundary that use private wells and approximately 360 acres of agricultural land outside of the PVID boundaries that use groundwater for irrigation. To determine agricultural diversions on the PV Mesa, the "Estimated Water Use" values from DWR were applied to a total of 724 acres of agricultural land that uses groundwater for irrigation.		--
	MUNICIPAL and DOMESTIC [4.]	260	260	260	The City of Blythe pumps the Mesa Ranch Well #3 for domestic use and PVC Well #2 for municipal use at the Palo Verde College. Both wells are located on the Palo Verde Mesa.	--	--
	BLYTHE MUNICIPAL GOLF COURSE [4.]	560	560	560	One well (Mesa Ranch Well #2) is pumped for irrigation of the Blythe Municipal Golf Course.		
	BLYTHE AIRPORT [5.]	47	47	47	The County of Riverside operates one well (Airport Well #7) at the Blythe Airport that serves the Mesa Verde Community. Approximately 47 AFY is pumped from Airport Well #7.		
	BLYTHE ENERGY PROJECT [6.]	3,300	3,300	3,300	Blythe Energy Project I (BEP I) is a 520 mega watt natural gas fired power plant located on the Mesa. BEP I pumps 3,300 acre-feet per year of groundwater.		
EXPORT	FALLOWED LAND ON THE MESA [7.]	0	0	0	The PVID/MWD fallowing program only applies to agricultural crops on the valley floor outside of the PV Mesa; therefore, none of the groundwater from "fallowed" land on the PV Mesa is being exported.	--	--
	TOTAL (OUTFLOW)	8,992	8,992	8,992		0	0
BLYTHE SOLAR POWER PROJECT		600	600	600	Operational requirements (mirror, process and domestic supply)/Dry Cooled Project.		
	NET WITHOUT BSPP	6,498	1,354	-1,732		0	1,200
	NET WITH BSPP WATER USE	5,898	754	-2,332			

NOTES

1. Underflow calculated by Metz, et. al (1973). using transmissivity of 30,000 gpd/ft (for Bouse Formation), gradient of 3 feet/mile, and a 4-mile width and 1,500 foot depth for the saturated section.
2. Underflow calculated using transmissivity of 26,000 ft^2/d (from Leake, 2008), gradient of 0.0003 ft/ft, a 19,000-foot width, and 600-foot depth (from Metzger et.al.,1973) for the saturated section.
   Underflow from/to Colorado River is based on available water level data from USGS/DWR database for 2000 as shown on AFC Figure 5.17-7 and available hydrograph data as shown in Figure DR-S&W-179-2.
3. Agricultural acreages were provided by Palo Verde Irrigation District's Chief Engineer, Roger Henning (February 16, 2010). DWR Estimate Water Use values for the Colorado River Region were applied to calculate the agricultural return.
4. Well information for Airport Well #7, Mesa Ranch Well #2 and #3, and PVC Well #2, and water use at the golf course was provided by the City of Blythe Department of Public Works.
5. Information on Airport Well #7 was provided by Riverside County CSA 62.
6. BEP II proposes to install one additional well and would use 3,300 acre-feet per year for a combined water use with BEP I of 6,600 acre-feet per year. BEP II was approved by the California Energy Commission in 2005 but the project is currently on hold.
7. Approximately 1,354 acres of agricultural land are fallowed on the Mesa Based on a 2009 aerial photo.

REFERENCES

Application for Certification for the Blythe Solar Power Project, September 2009.
City of Blythe Department of Public Works, Kevin Nelson, February 2010.
Department of Water Resources, 2004, Bulletin 118: California's Groundwater - Rice Valley Groundwater Basin: California Department of Water Resources, Sacramento, California.
Department of Water Resources, 2001. Colorado River Planning Area, accessed at http://www.water.ca.gov/landwateruse/anaglwu.cfm#
Department of Water Resources GIS data for 2000 Riverside County - Land Use Survey accessed at http://www.water.ca.gov/landwateruse/lusrvymain.cfm
Hely and Peck, 1964, Precipitation, Runoff and Water Loss in the Lower Colorado River - Salton Sea Area, Geological Survey Professional Paper 486-B (prepared in cooperation with the US Weather Bureau.
Metzger and others, 1973, Geohydrology of the Needles area, Arizona, California and Nevada: U.S. Geological Survey Professional Paper 486-J.
Palo Verde Irrigation District 2010, Chief Engineer, Roger Henning, February 16, 2010.
Palo Verde Irrigation District 2010, PVID History, accessed at http://www.pvid.or/history.html
Riverside County - CSA 62, Airport Well #7, information provided by Alfredo Hernandez, Water Plant Operator, February 2010.

TABLE DR-S&W-179-3
Return and Discharge from Agricultural Land on the Palo Verde Mesa

Crop	Acreage [1.]	Applied Water (acre-ft/acre) [2.]	Total Water Applied (Diversions) (acre-ft)	Consumed Fraction by Crop Type (% of Efficiency)	Consumed Fraction by Total Acreage (acre-ft)	Total Water Applied - Consumed Fraction = Recharge (acre-ft)
Total Diversions from PV Mesa						
(Info from PVID - Roger Henning)						
Citrus & Dates Outside District.	360	4.95	1,782	0.74	1,319	463
Privat Wells pumping GW in Dist.	364	4.95	1,802	0.74	1,333	468
Total 724			**3,584**			932
Total Return for all Ag on PV Mesa						
Ag Irrigated with PVID Surface Water						
Citurs and Grapes (in dist.)	1,414	4.95	6,999	0.74	5,179	1,820
Alfalfa (in dist.)	448	5.85	2,621	0.75	1,966	655
Private Wells Pumping GW in Dist.	364	4.95	1,802	0.74	1,333	468
Outside Dist.	360	4.95	1,782	0.74	1,319	463
Pasture (golf course)	97	5.30	514	0.70	360	154
	2,683					**3,561**

1. Acreages of agricultrual land on the PV Mesa were provided by Palo Verde Irrigation District, Roger Henning, Chief Engineer, on February 16, 2010.
2. DWR 2001, Colorado River Planning Area, accessed at http://www.water.ca.gov/landwateruse/anaglwu.cfm#

TABLE 5.17-10
CUMULATIVE IMPACTS ASSESSMENT
ESTIMATE OF BASINWIDE WATER LEVEL CHANGE
PALO VERDE GROUNDWATER BASIN
RIVERSIDE COUNTY, CALIFORNIA

PROJECT[1]	PROPONENT	BLM SERIAL ID	TECHNOLOGY	SOURCE	USE	WATER USE - SOLAR and OTHER RENEWABLE PROJECTS (af)														COMMENTS
						2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2043	
Big Maria Vista Solar Project	Bullfrog Green Energy, LLC	CA 49702	Photovoltaic (500MW)	Assumed to be Groundwater	Construction	--	8	7	7	--	--	--	--	--	--	--	--	--	--	**--**	Operation water use given as 6,000 gal/month (0.22 afy). No construction water use provided in POD; assume total 22 af over three years construction.
					Operational	--	--	--	--	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	**0.22**	
Blythe Airport Solar 1	US Solar	--	Photovoltaic (100MW)	Though not stated, assumed either groundwater or water trucked in from an offsite source	Construction	--	1.6	1.6	--	--	--	--	--	--	--	--	--	--	--	**--**	No water usage given in POD. Assume water usage to be 20% of water usage for similar PV project (Big Maria Vista).
					Operational	--	--	--	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	**0.04**	
Blythe Energy Project II	Blythe Energy, LLC	--	Combined/Cycle (520MW)	Groundwater	Construction	--	60	60	--	--	--	--	--	--	--	--	--	--	--	**--**	AFC (2004) indicates construction to last up to 22 months (76 acres) - no volume specified; Operational usage of 3,300 afy. Assume construction water usage 60 gal/cy. Further, assume grading encompasses entire site (76 acres) to an average depth of 5 feet (~620,000 cy).
					Operational	--	--	--	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	**3,300**	
Blythe PV Project	First Solar	--	Photovoltaic (7.5 MW)	Though not stated, assumed either groundwater or water trucked in from an offsite source	Construction	--	0.1	0.1	--	--	--	--	--	--	--	--	--	--	--	**--**	Assumes 24 month construction period. No water amount specified. Given small output, assume minimal water usage for construction and operational use.
					Operational	--	--	--	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.01**	
Blythe Solar Power Project	Solar Millennium LLC	CA 48811	Parabolic Trough (484MW)	Groundwater	Construction		717	717	717	717	717		--	--	--	--	--	--	--	**--**	POD assumes 69 month (5.75 years) construction period with total water usage during construction to be 3,100 af and 600 afy usage during operational phase. Construction water usage averaged over a period of 5 years starting in 2011 (proposed construction start is 4th quarter 2011).
					Operational	--	--	--	150	300	450	600	600	600	600	600	600	600	600	**600**	
Desert Quartzite Solar Farm	First Solar (formerly OptiSolar)	CA 49377	Photovoltaic (601MW)	Though not stated, assumed either groundwater or water trucked in from an offsite source	Construction	2	7	7	7	4	--	--	--	--	--	--	--	--	--	**--**	POD assumes construction period beginning mid-2010 with facility startup in 2013 or 2014. Assumes 27 af total water for construction and 3.8 afy for operational use thereafter.
					Operational	--	--	--	--	3	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	**3.8**	
McCoy Soleil Project	enXco	CA 49490	Photo Tower (136MW)	Groundwater	Construction	--	1000	150	75	--	--	--	--	--	--	--	--	--	--	**--**	POD assumes 30-month construction period with facility startup at end of 2013. Assumes water use of 1,225 af over total construction period and 600 afy for operational use thereafter.
					Operational	--	--	--	75	600	600	600	600	600	600	600	600	600	600	**600**	
Mule Mountain Solar Project	Bullfrog Green Energy, LLC (acquired by Altera)	CA 49097	Photovoltaic (500MW)	Though not stated, assumed either groundwater or water trucked in from an offsite source	Construction	--	8	7	7	--	--	--	--	--	--	--	--	--	--		Construction & operational supply not specified in the POD. Assumed to be same as other proposed PV projects. Three phases - operational water use estimated at 6,000 gal/mo/phase.
					Operational	--	--	--	--	0..22	0..22	0..22	0..22	0..22	0..22	0..22	0..22	0..22	0..22	**0.22**	
TOTAL WATER USE - RENEWABLE PROJECTS (af)[2]						**2**	**1,802**	**950**	**4,338**	**4,924**	**5,071**	**4,504**	**4,504**	**4,504**	**4,504**	**4,504**	**4,504**	**4,504**	**4,504**	**4,504**	
CUMULATIVE CHANGE (af)[3]						**2**	**1,804**	**2,753**	**7,091**	**12,016**	**17,087**	**21,591**	**26,095**	**30,599**	**35,103**	**39,607**	**44,111**	**48,615**	**53,119**	**143,201**	
MESA INFLOW						**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	**7,260**	
MESA OUTFLOW						**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	**8,992**	
MESA WATER BALANCE						**-1,734**	**-3,534**	**-2,682**	**-6,070**	**-6,656**	**-6,803**	**-6,236**	**-6,236**	**-6,236**	**-6,236**	**-6,236**	**-6,236**	**-6,236**	**-6,236**	**-6,236**	
CHANGE IN REGIONAL WATER LEVEL ON THE MESA (assuming a storage coefficient of 0.20)(inches)[4]						**-0.0007**	**-1**	**-1**	**-2**	**-4**	**-6**	**-7**	**-9**	**-10**	**-11**	**-13**	**-14**	**-16**	**-17**	**-47**	
CHANGE IN REGIONAL WATER LEVEL ON THE MESA (assuming a storage coefficient of 0.05)(inches)[4]						**-0.0026**	**-2**	**-4**	**-9**	**-16**	**-22**	**-28**	**-34**	**-40**	**-46**	**-52**	**-58**	**-63**	**-69**	**-187**	
PERCENTAGE RENEWABLE PROJECT CUMULATIVE WATER USE BY COMPARISON TO ESTIMATED TOTAL STORAGE (5M af - DWR 2004)						**--**	**0.04%**	**0.06%**	**0.14%**	**0.24%**	**0.34%**	**0.43%**	**0.52%**	**0.61%**	**0.70%**	**0.79%**	**0.88%**	**0.97%**	**1.06%**	**2.86%**	
PERCENT BSPP USAGE BY COMPARISON TO YEARLY TOTAL RENEWABLE WATER USAGE						**--**	**40%**	**75%**	**17%**	**15%**	**14%**	**13%**	**13%**	**13%**	**13%**	**13%**	**13%**	**13%**	**13%**	**13%**	

NOTES

1	Project descriptions provided in Section 5.1 (Table 5.1.2) of the AFC.
2	Sum of renewable projected water use by year for the identified renewable energy projects.
3	Cumulative change is a sum adding the prior years water use to the current water year for each year beginning in 2010 and ending in 2043.
4	Estimated change in the regional water level following the equation shown below (Fetter 1988). Negative values indicate a decline in water levels.

DEFINITIONS

afy	acre feet per year
af	acre feet - (325,829 gallons)
LLC	Limited Liability Corporation
MW	Megawatts
POD	Plan of Development
--	No information available in referenced doucmnet

ESTIMATE OF BASINWIDE WATER LEVEL CHANGE

V = A*S*dh

V - volume of water released or taken into storage (acre-feet)
A - area of the aquifer (226,000 acres)
S- aquifer storage (assumed to be 0.10)
dh - change in water level (inches)

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of:
APPLICATION FOR CERTIFICATION
for the *BLYTHE SOLAR POWER PROJECT*

Docket No. 09-AFC-6
PROOF OF SERVICE
(Revised 1/26/2010)

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DECLARATION OF SERVICE

I, Carl Lindner, declare that on, March 11, 2010, I served and filed copies of the attached Blythe Solar Power Project Materials:

Responses to January 14, 2010 CEC Workshop Queries (Groundwater)
Technical Area: Soil & Water Resources

The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solar_millennium_blythe].

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

For service to all other parties:

__X___ sent electronically to all email addresses on the Proof of Service list;

_____ by personal delivery or by overnight delivery service or depositing in the United States mail at Camarillo, California with postage or fees thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

__X_ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);

OR

_____ depositing in the mail an original and 12 paper copies, along with 13 CDs, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.