Appendix C

Geophysical Logs for Wells in the Vicinity of the Subsurface Disposal Area

Appendix C

Geophysical Logs for Wells in the Vicinity of the Subsurface Disposal Area

Appendix C shows graphically the depth and thickness selections for the A-B, B-C, and C-D interbeds for wells in the vicinity of the Subsurface Disposal Area that were evaluated in this analysis. The data used to select the interbeds were obtained from INEEL and USGS logs dating from 1963 to 2003. Logs were recorded by different borehole geophysical tools. Natural gamma, neutron, caliper and density data were evaluated for selection of interbed depth and thickness.

Primarily natural gamma and caliper data are presented with the top and bottom selections for the A-B, B-C, and C-D interbeds. In some instances, only the top of the interbed is selected because of an absence in data (e.g., well not drilled deep enough). Smoothed natural gamma data, as well as natural gamma 21-point and/or 41-point average data, are included for a select number of wells. The date that the specific variable was recorded via log is included in the graph legend.

Morrison Knudsen Corporation logs were used in the depth and thickness selections for RWMC-GAS-V-081 (10V).

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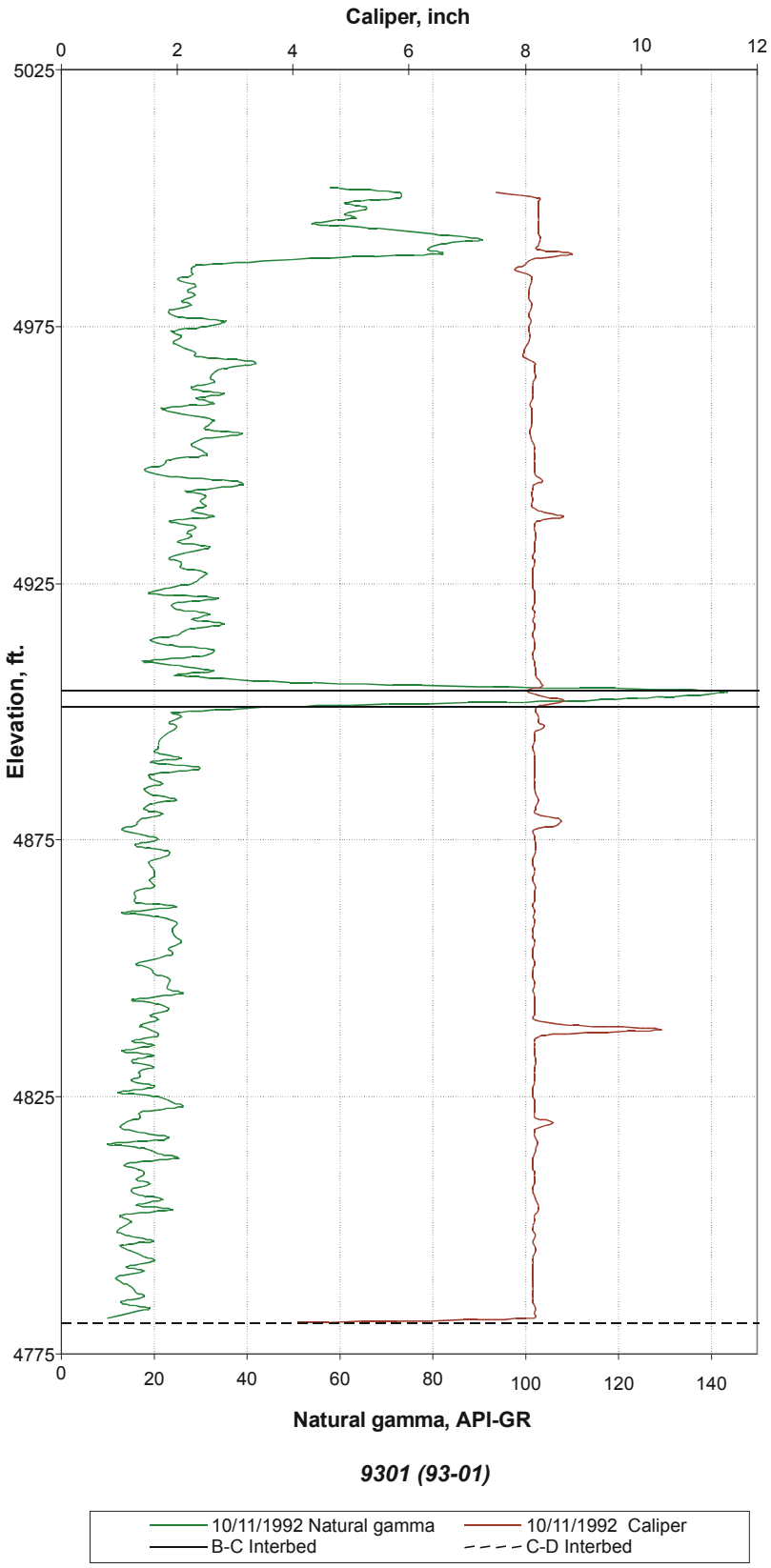
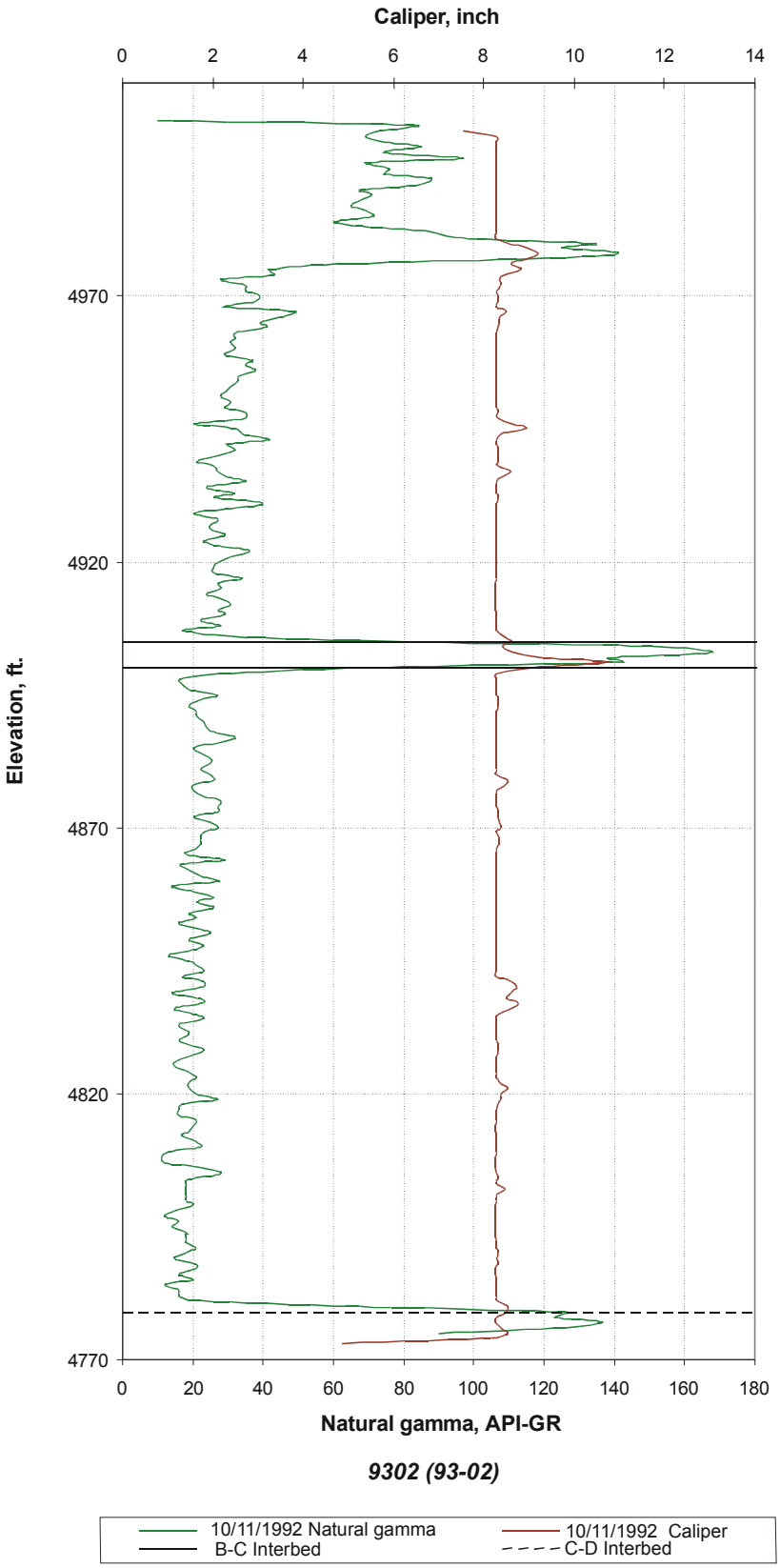


Figure C-1. Well 93-01.



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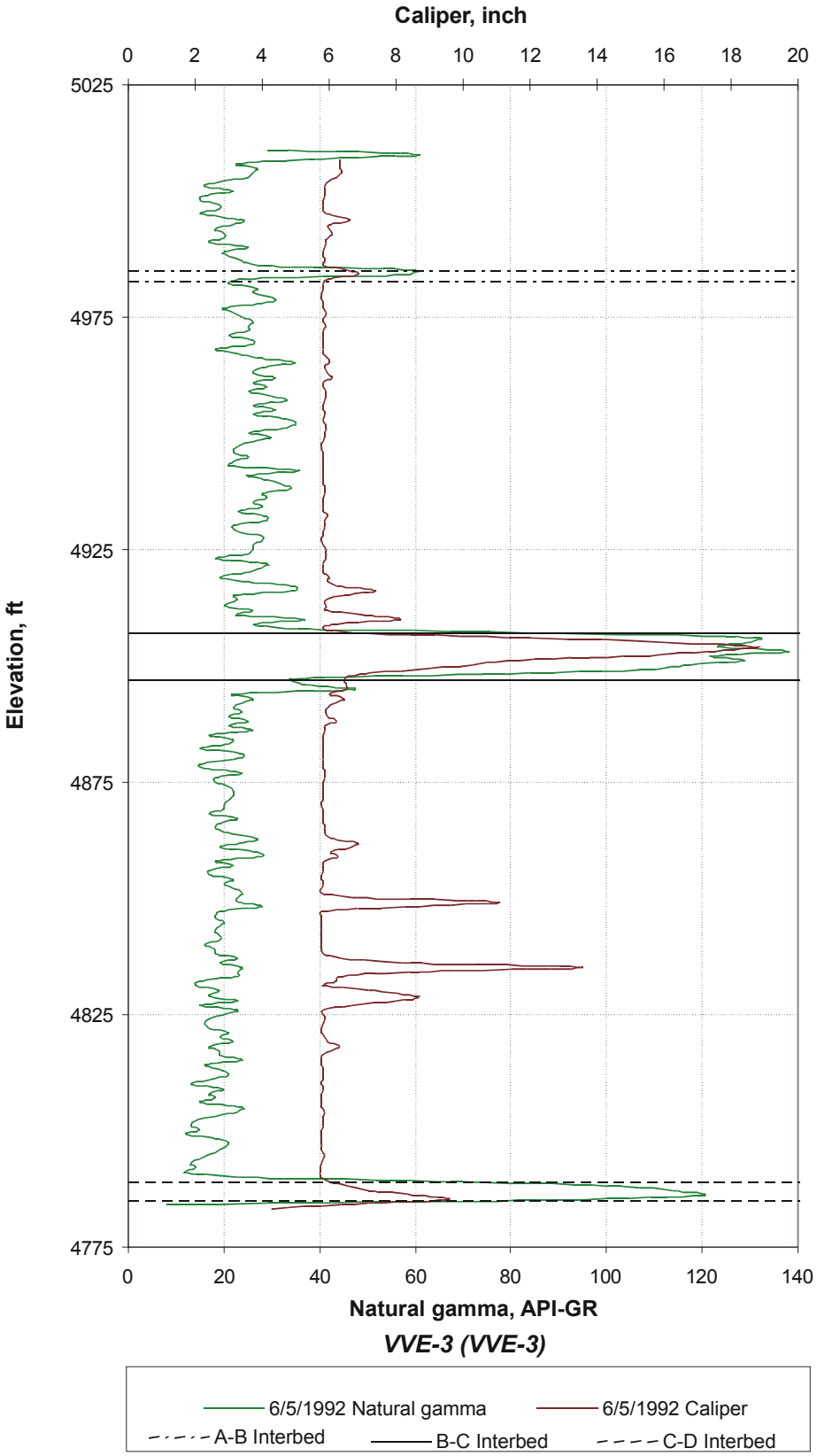
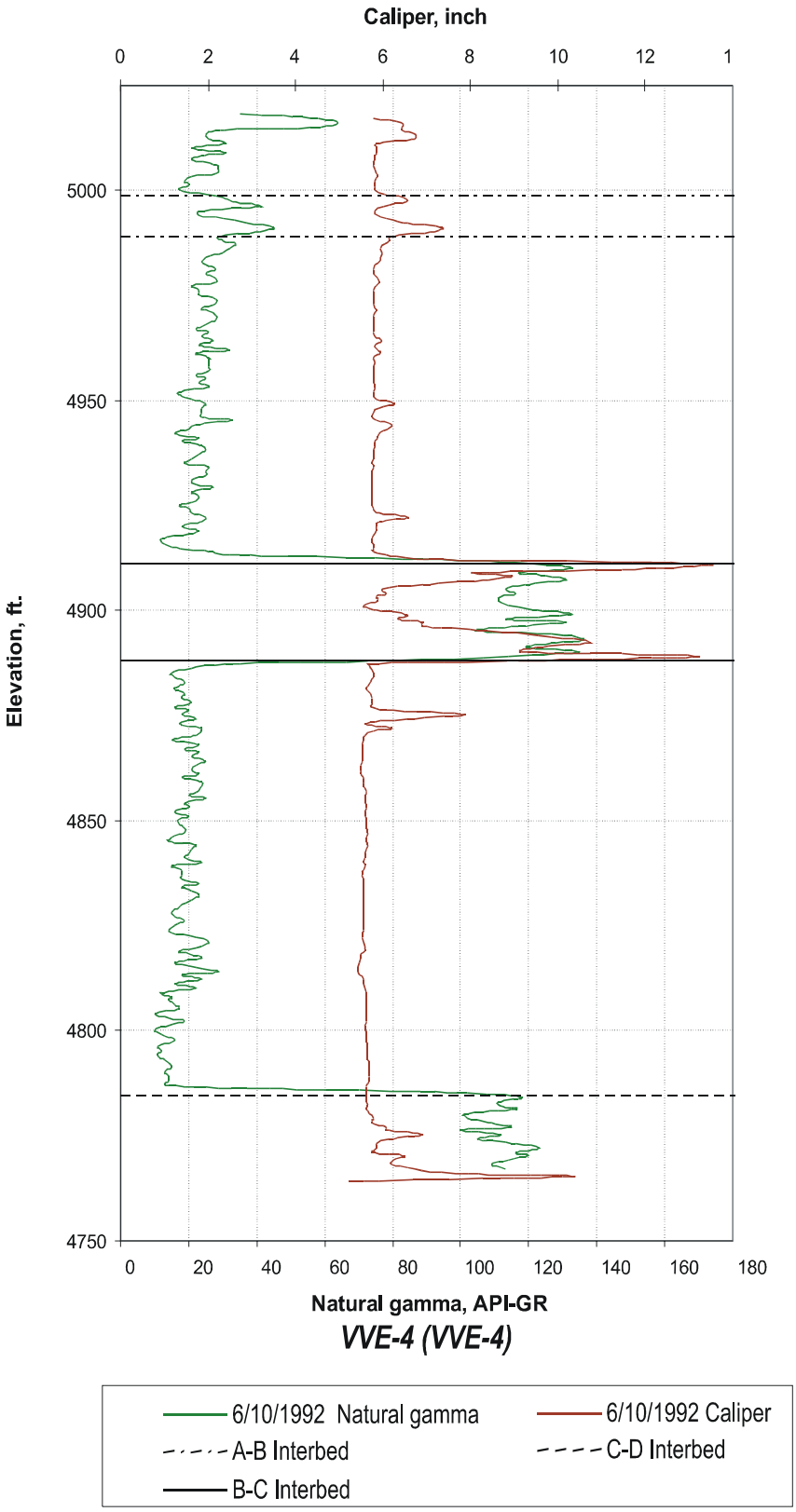


Figure C-3. Well VVE-3.



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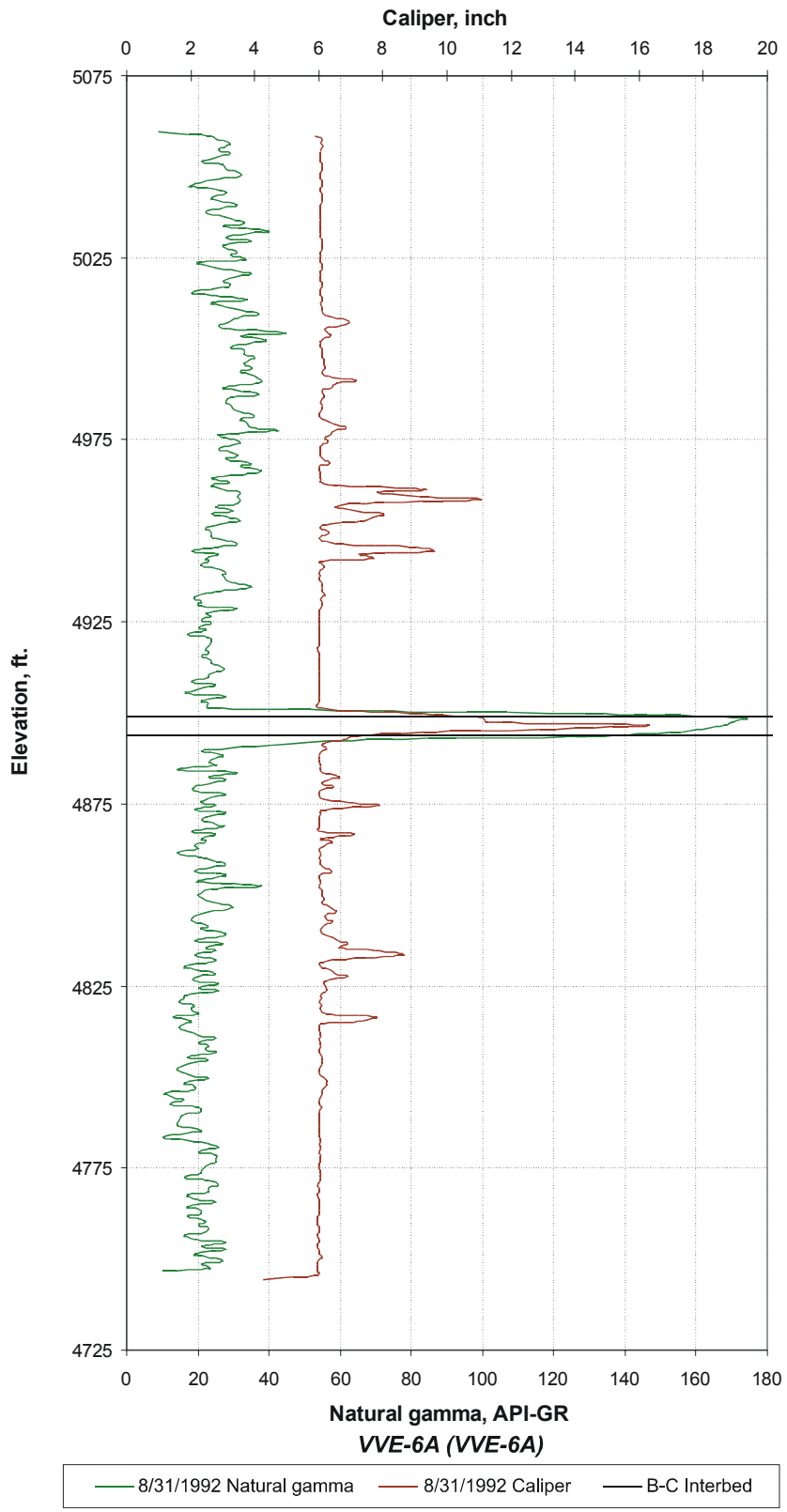
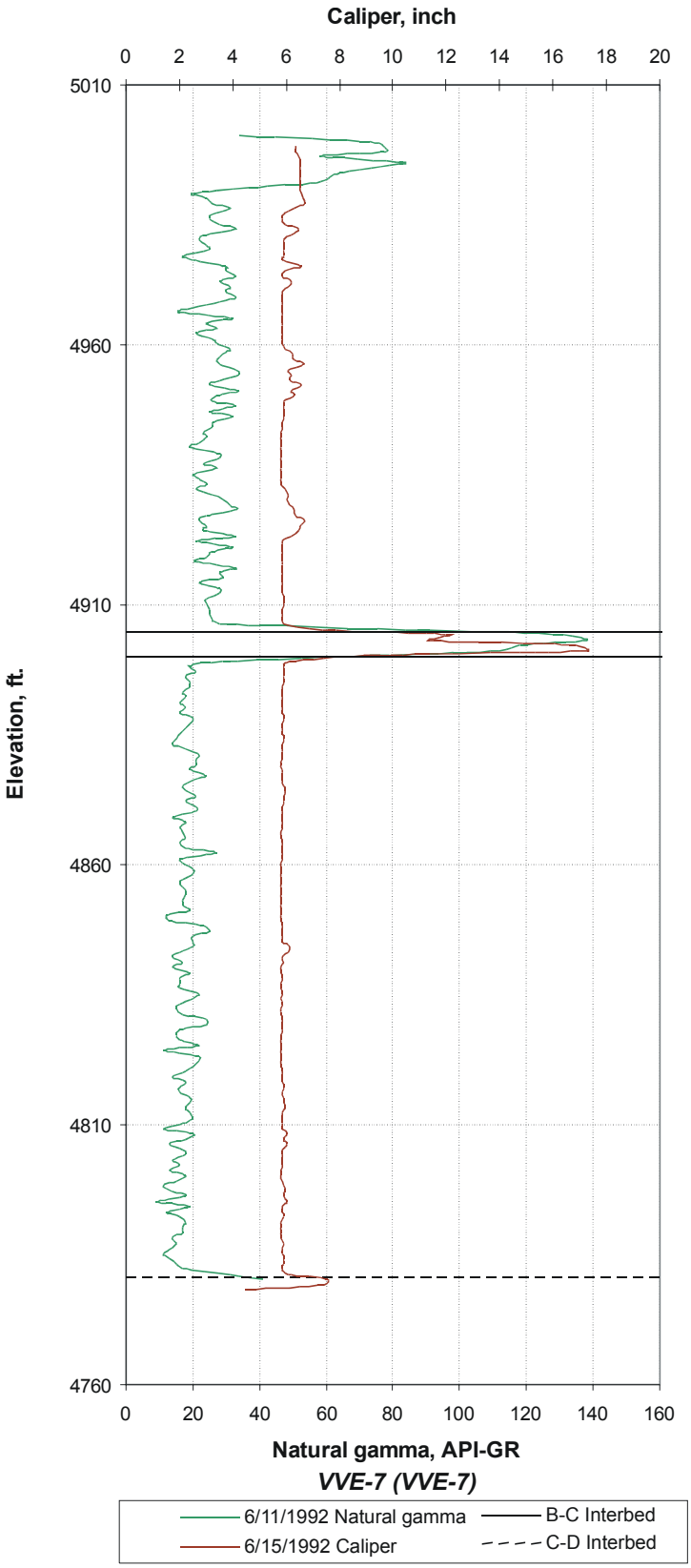


NOTE: C-D Interbed not selected because well not deep enough. Co-located well M6S has a C-D Interbed at 4746 feet elevation.

Figure C-5. Well VVE-6A.



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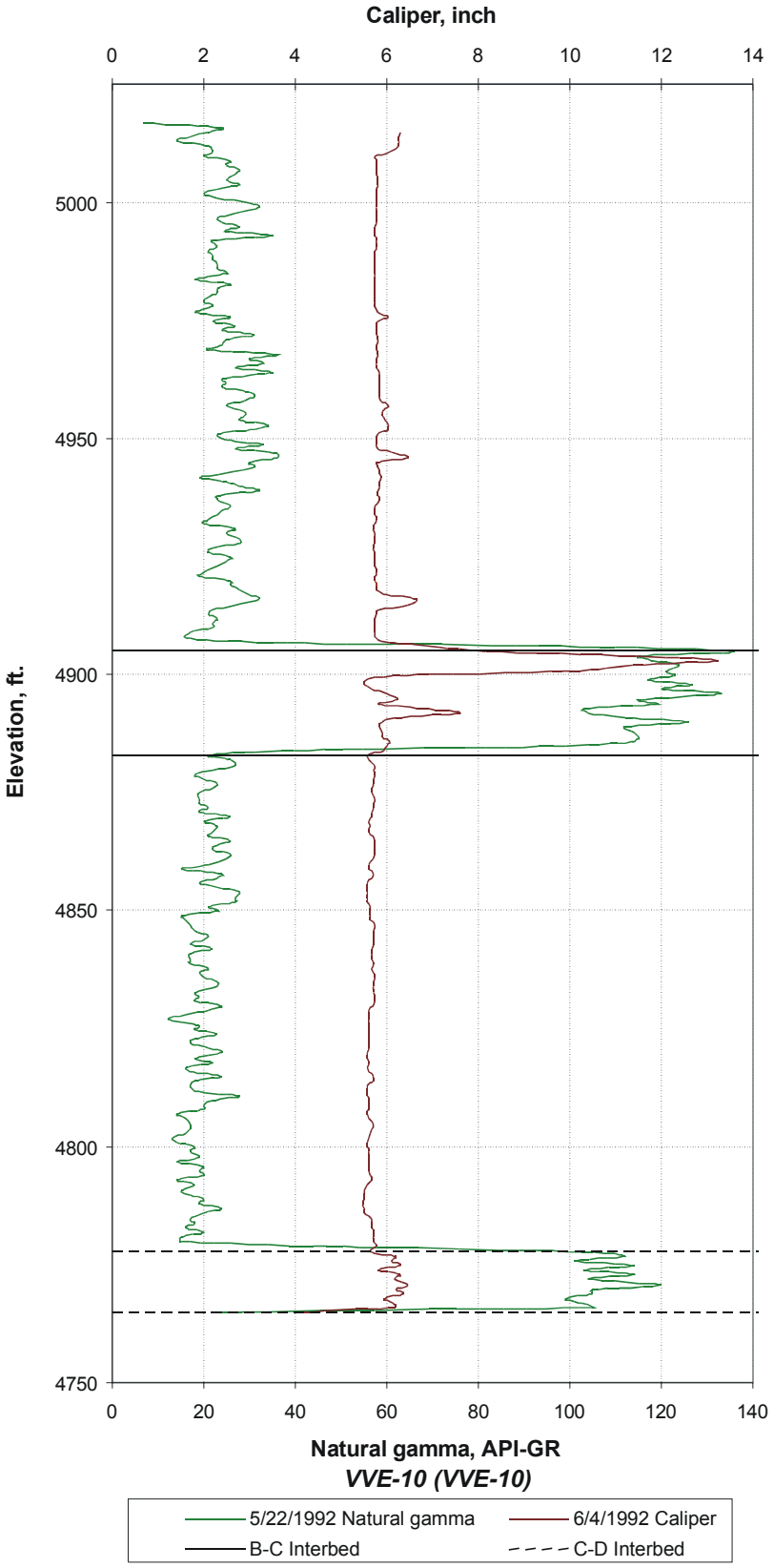


Figure C-7. Well VVE-10.

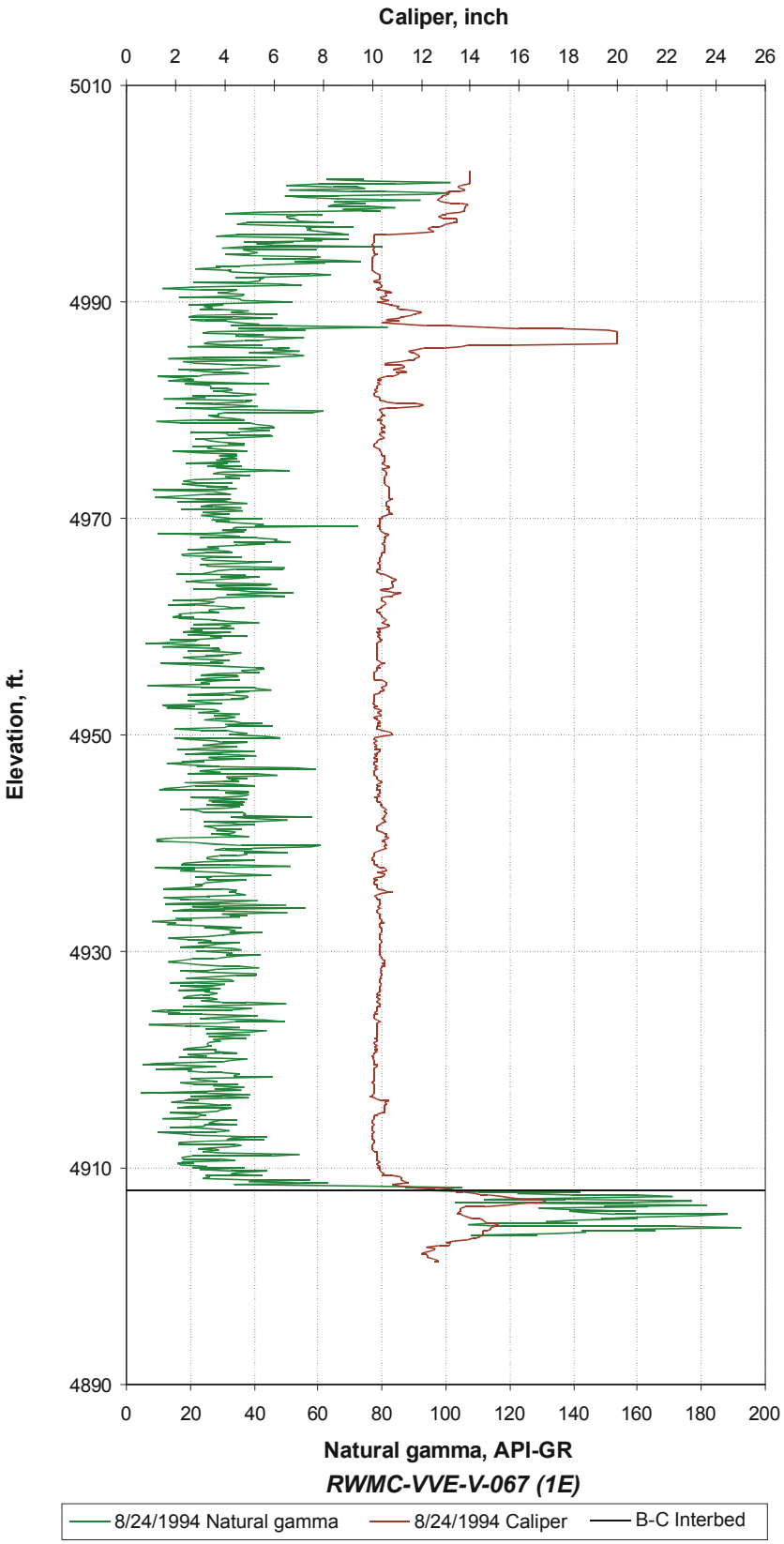


Figure C-8. Well RWMC-VVE-V-067 (1E).

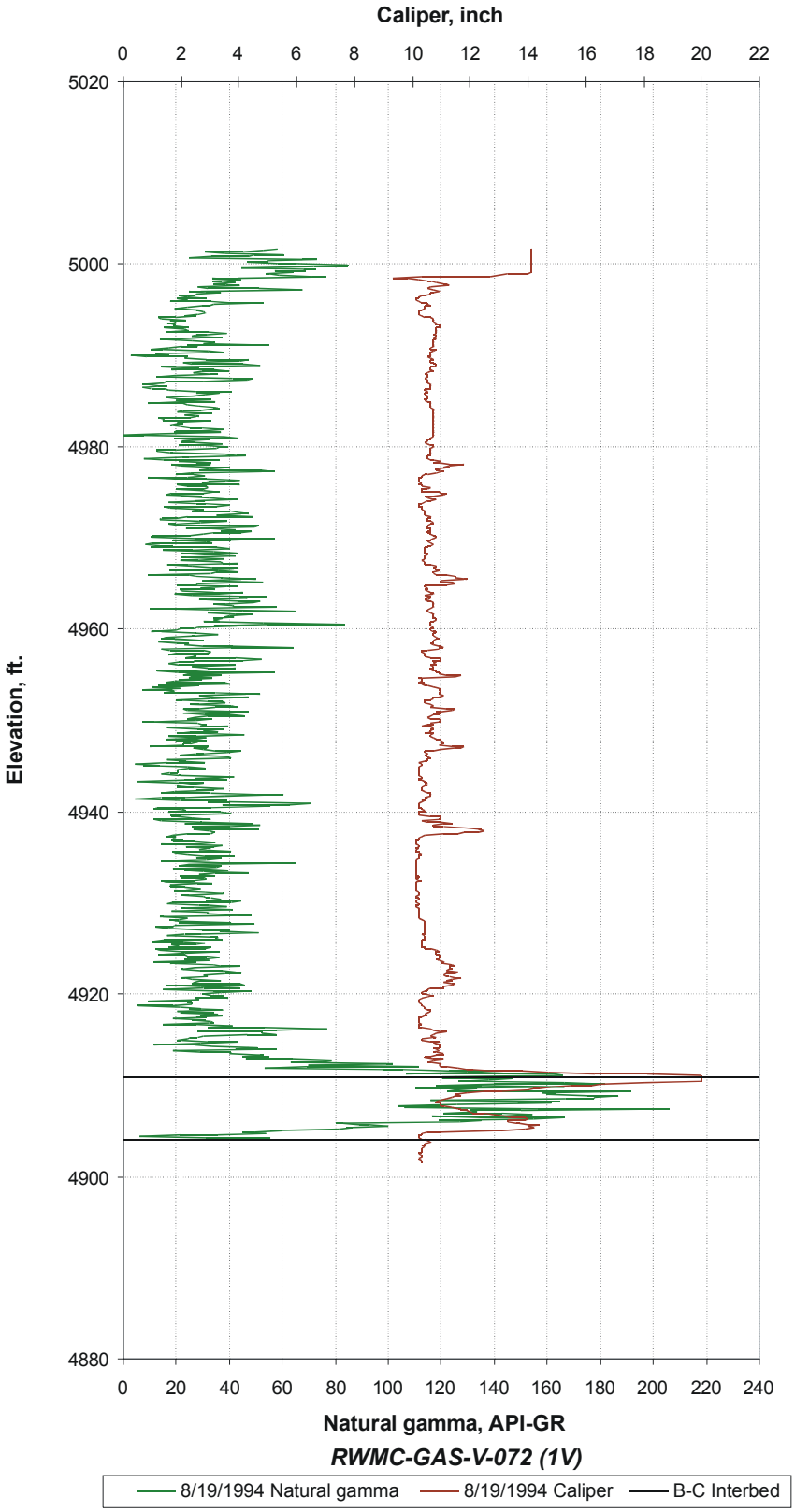


Figure C-9. Well RWMC-GAS-V-072 (1V).

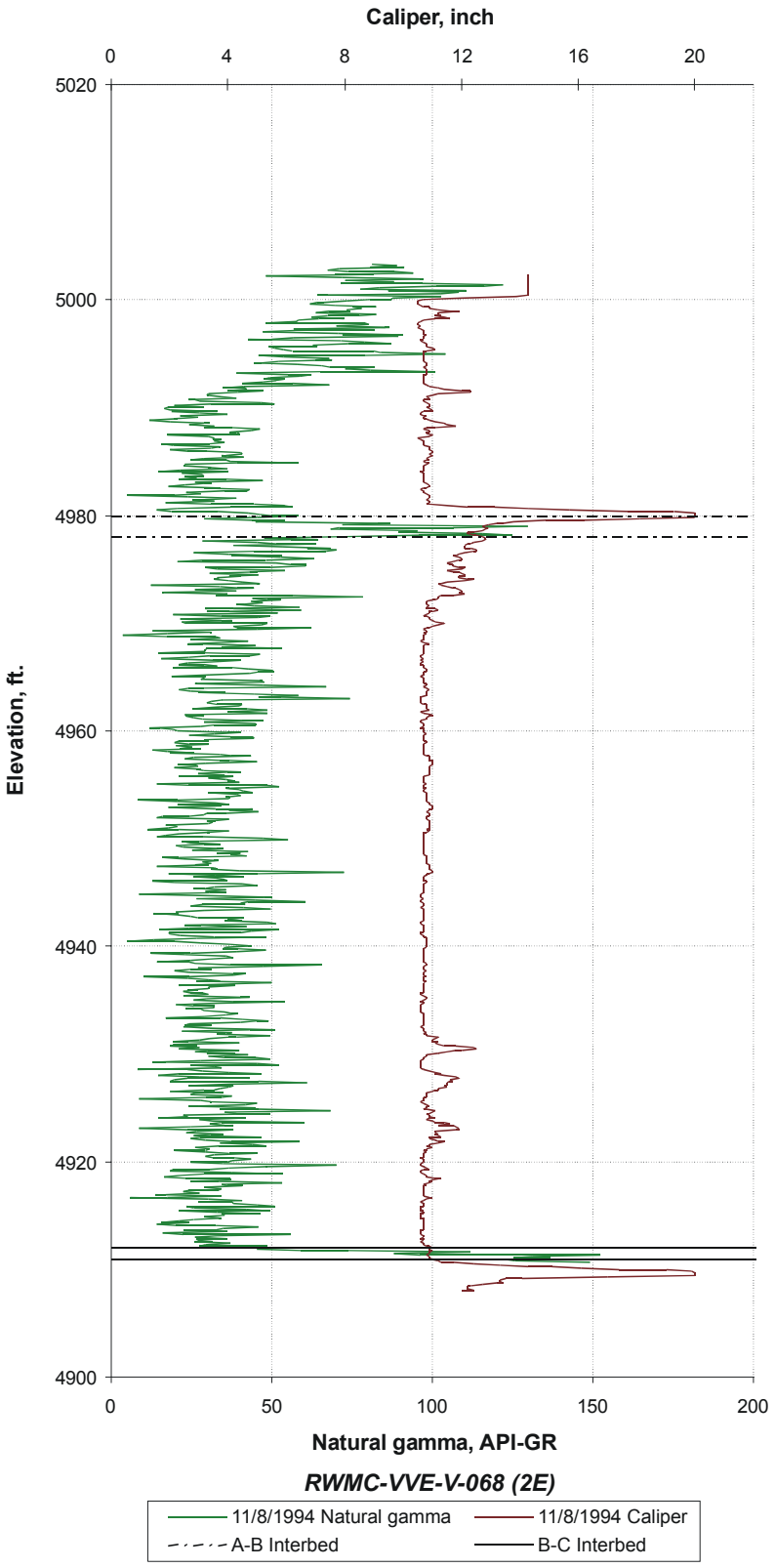


Figure C-10. Well RWMC-VVE-V-068 (2E).

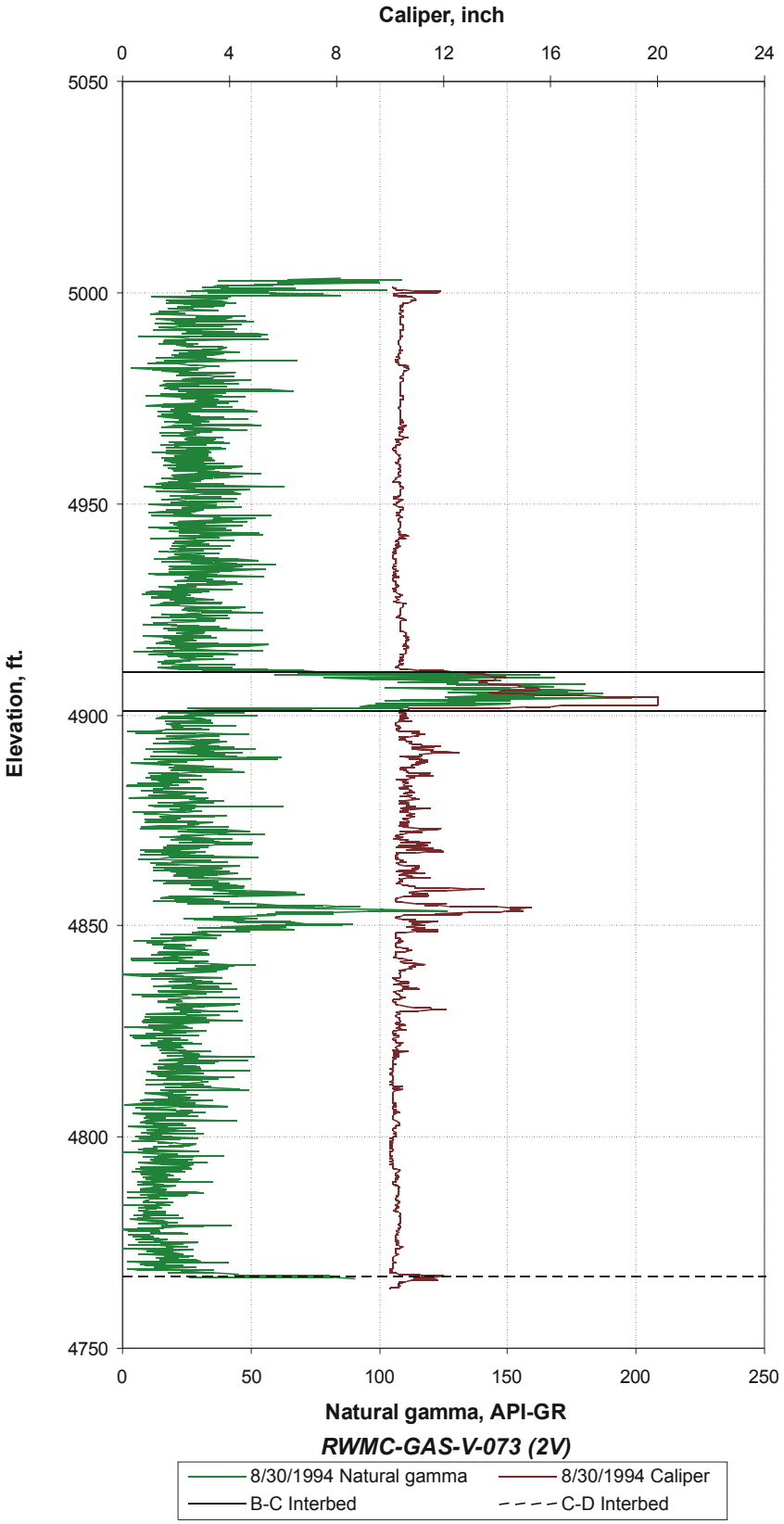


Figure C-11. Well RWMC-GAS-V-073 (2V).

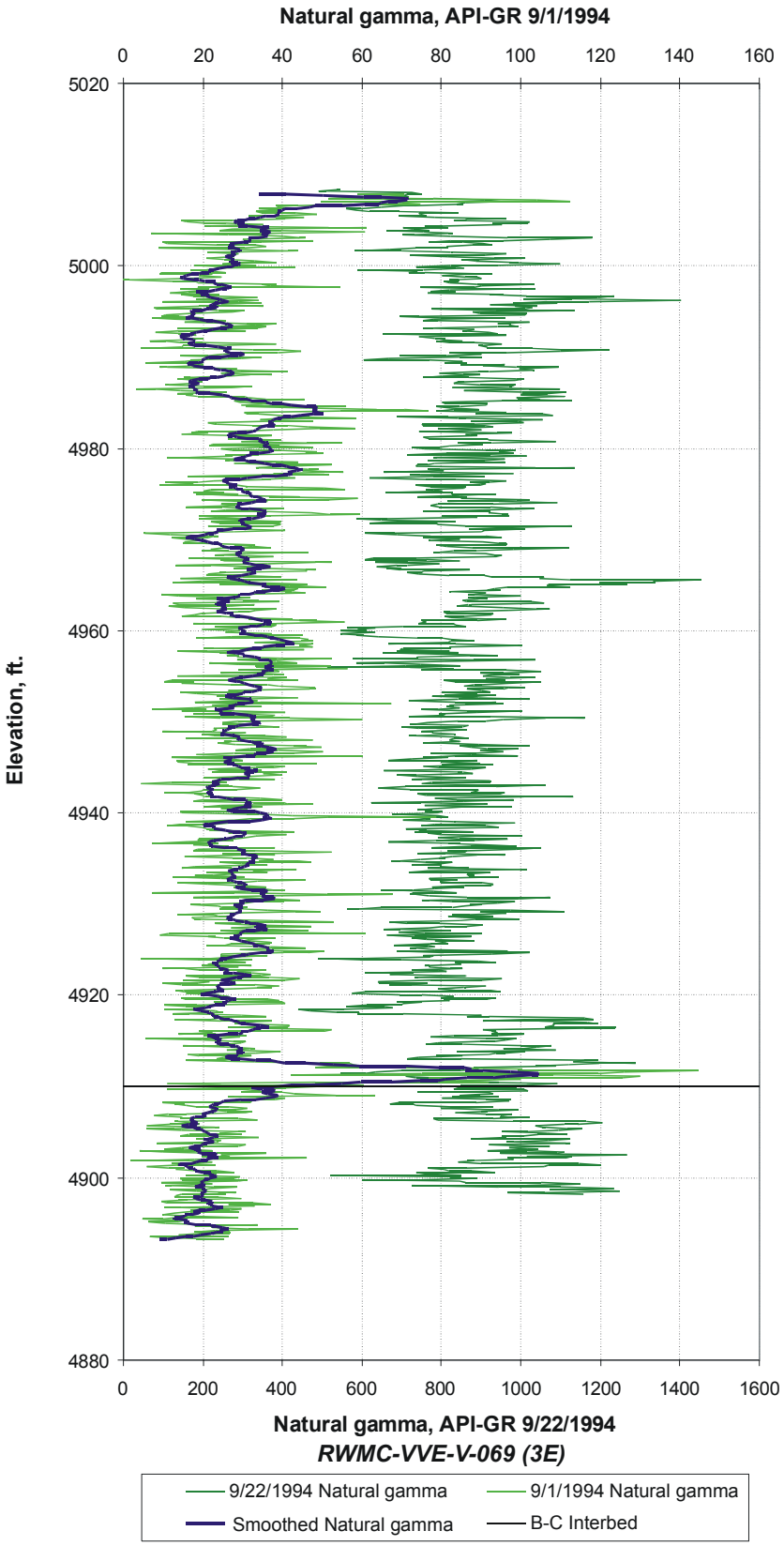


Figure C-12. Well RWMC-VVE-V-069 (3E).

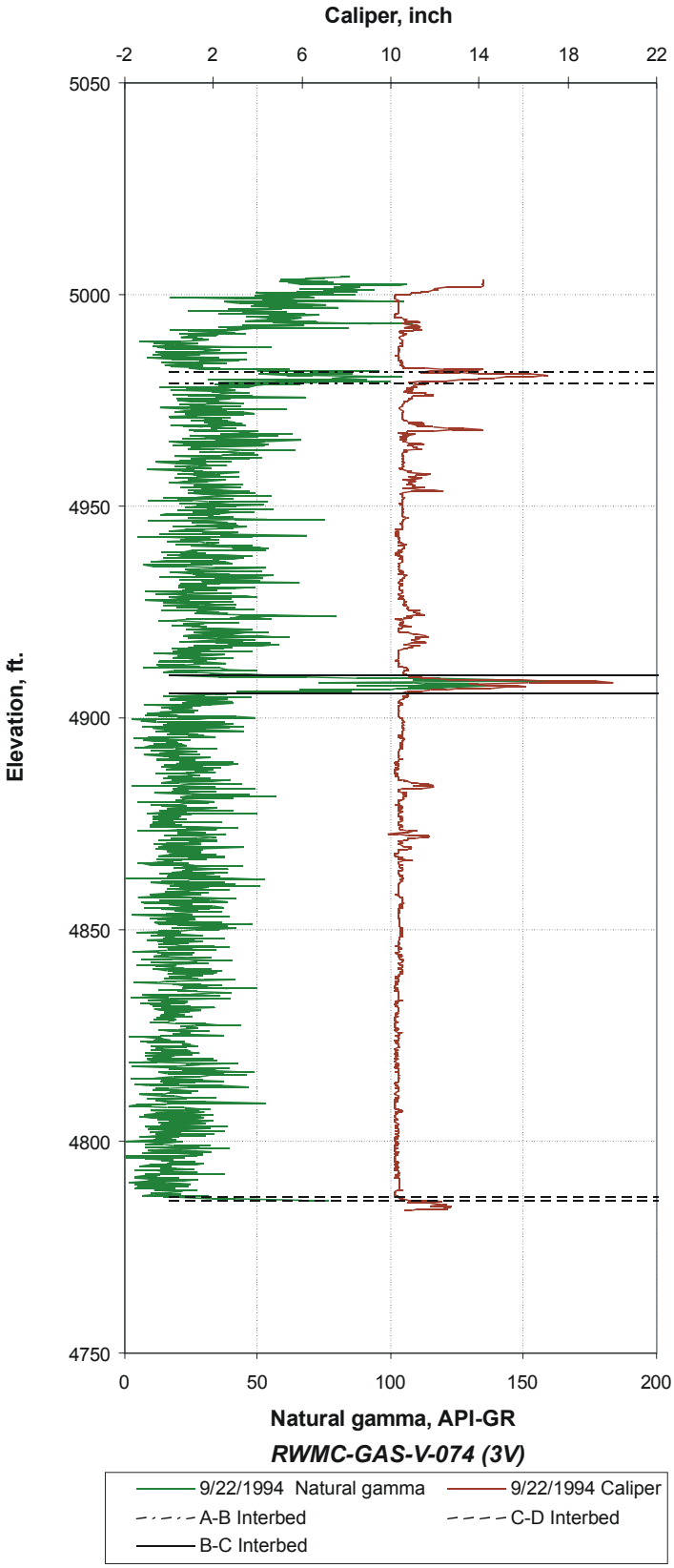


Figure C-13. Well RWMC-GAS-V-074 (3V).

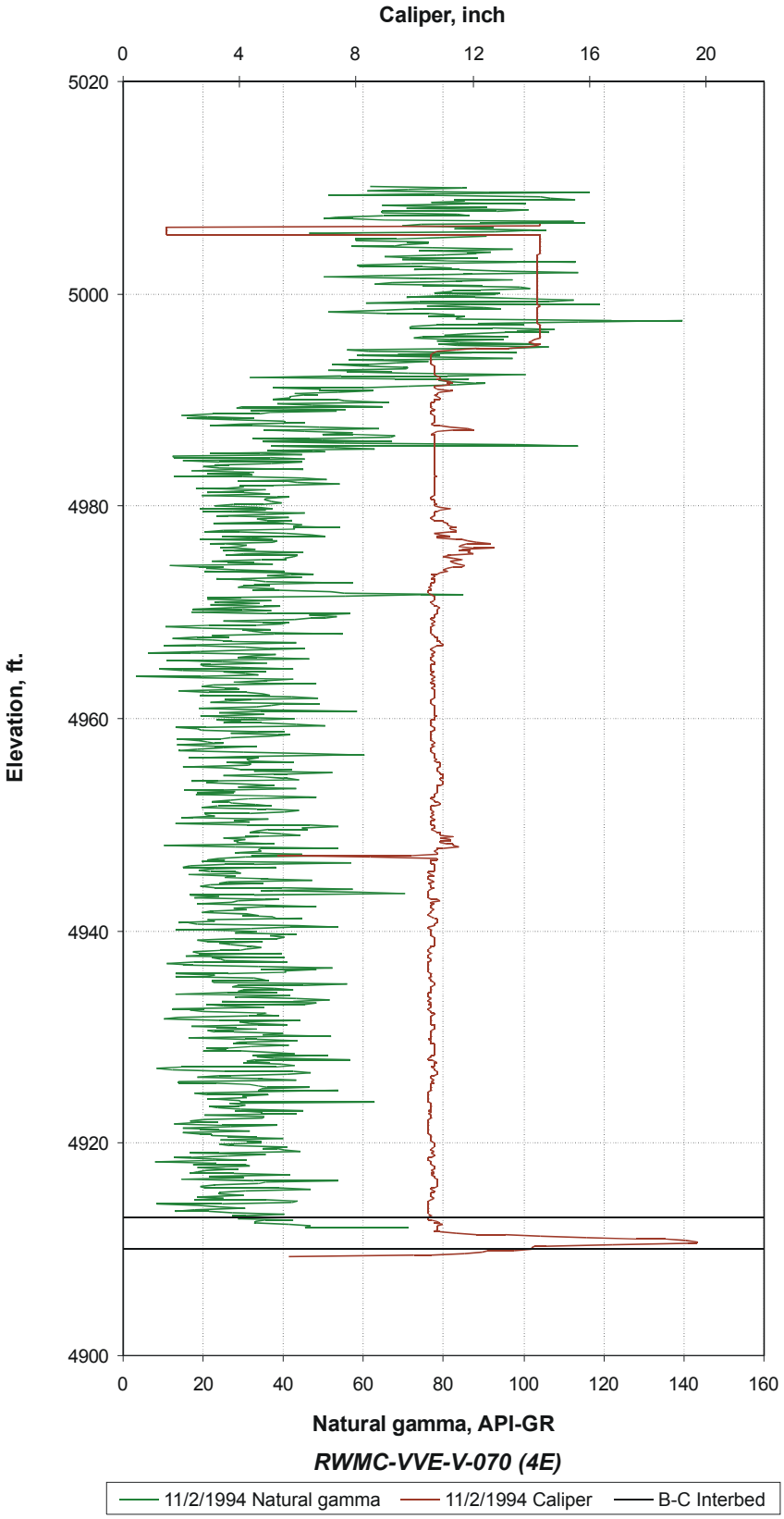


Figure C-14. Well RWMC-VVE-V-070 (4E).

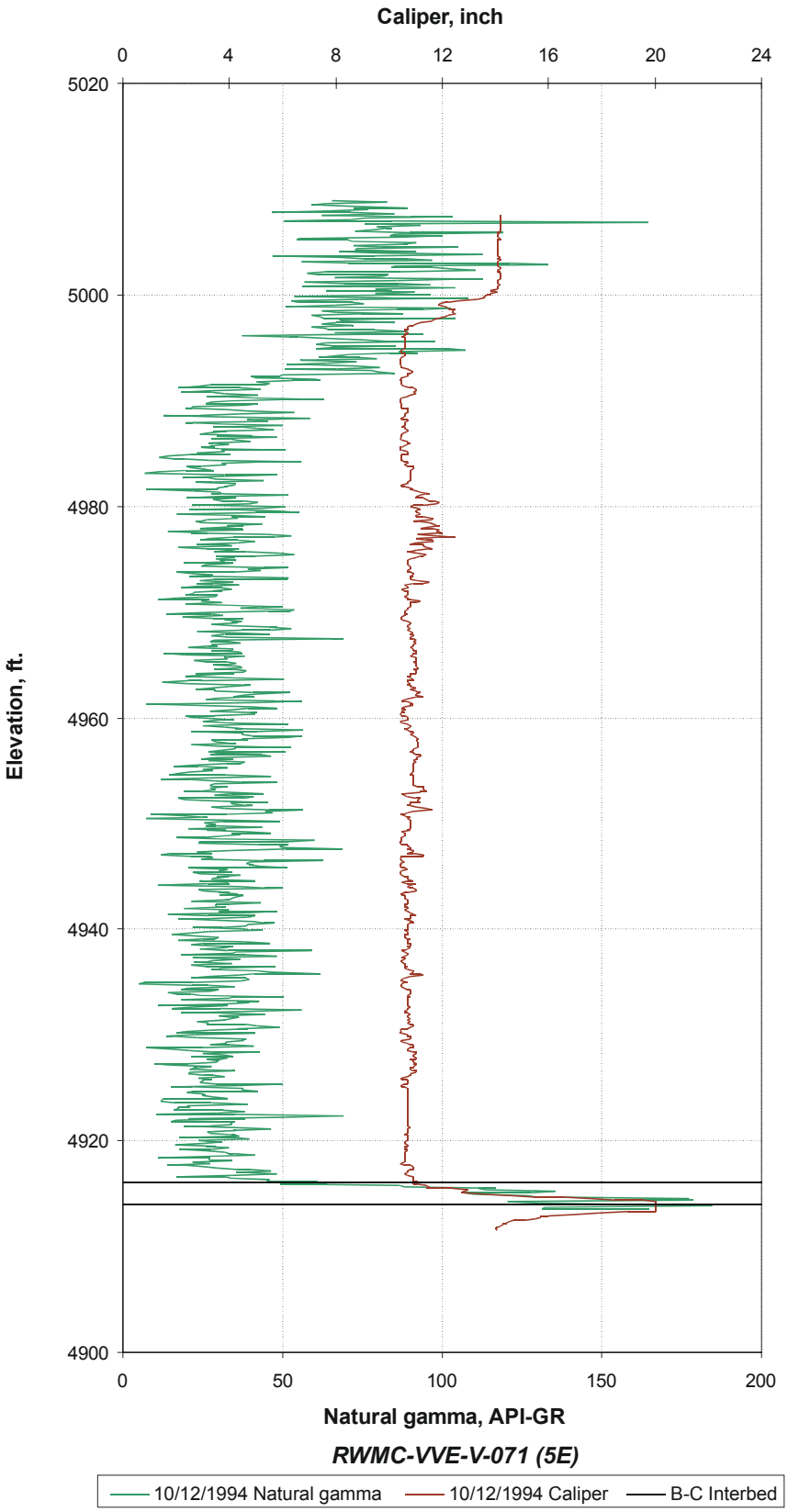


Figure C-15. Well RWMC-VVE-V-071 (5E).

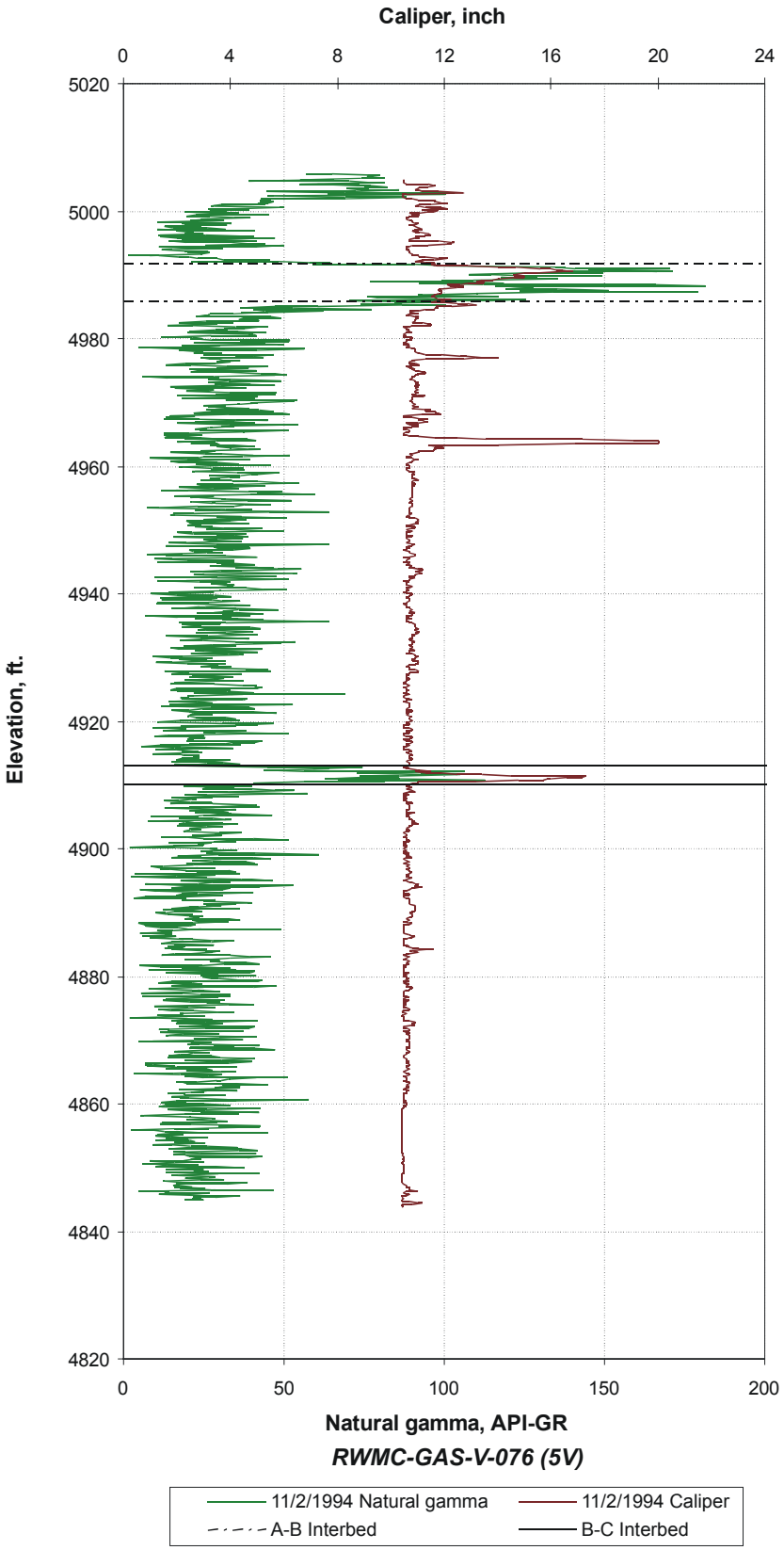


Figure C-16. Well RWMC-GAS-V-076 (5V).

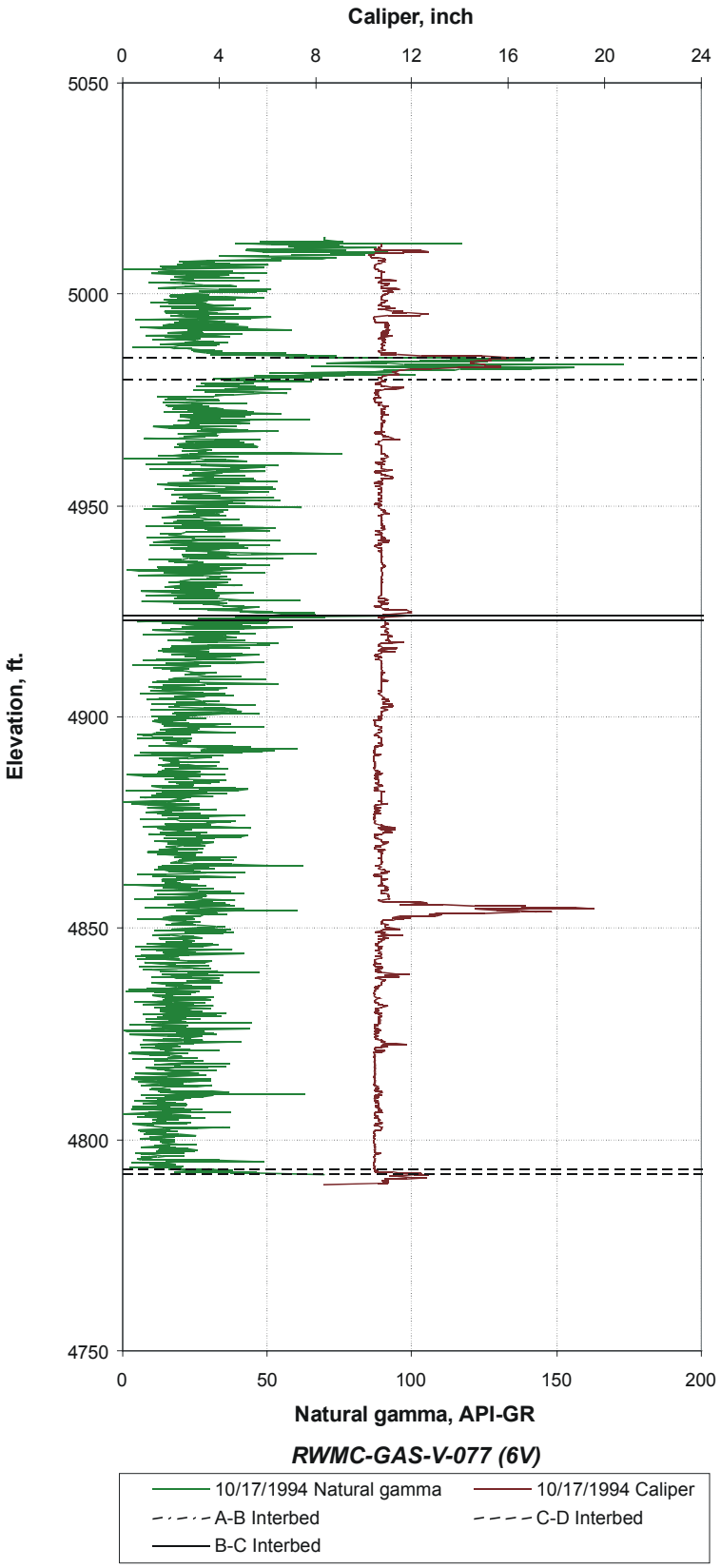


Figure C-17. Well RWMC-GAS-V-077 (6V).

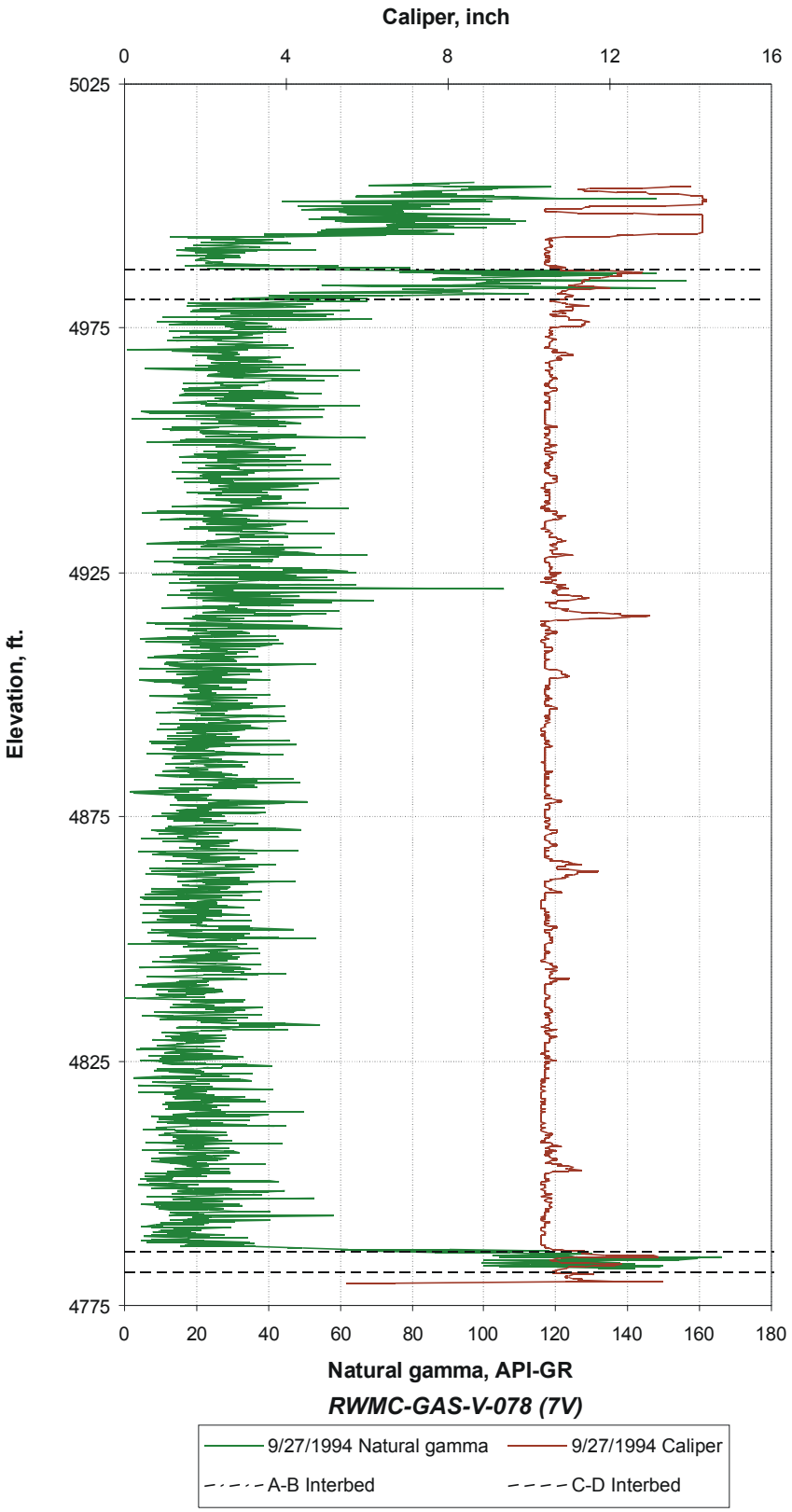


Figure C-18. Well RWMC-GAS-V-078 (7V).

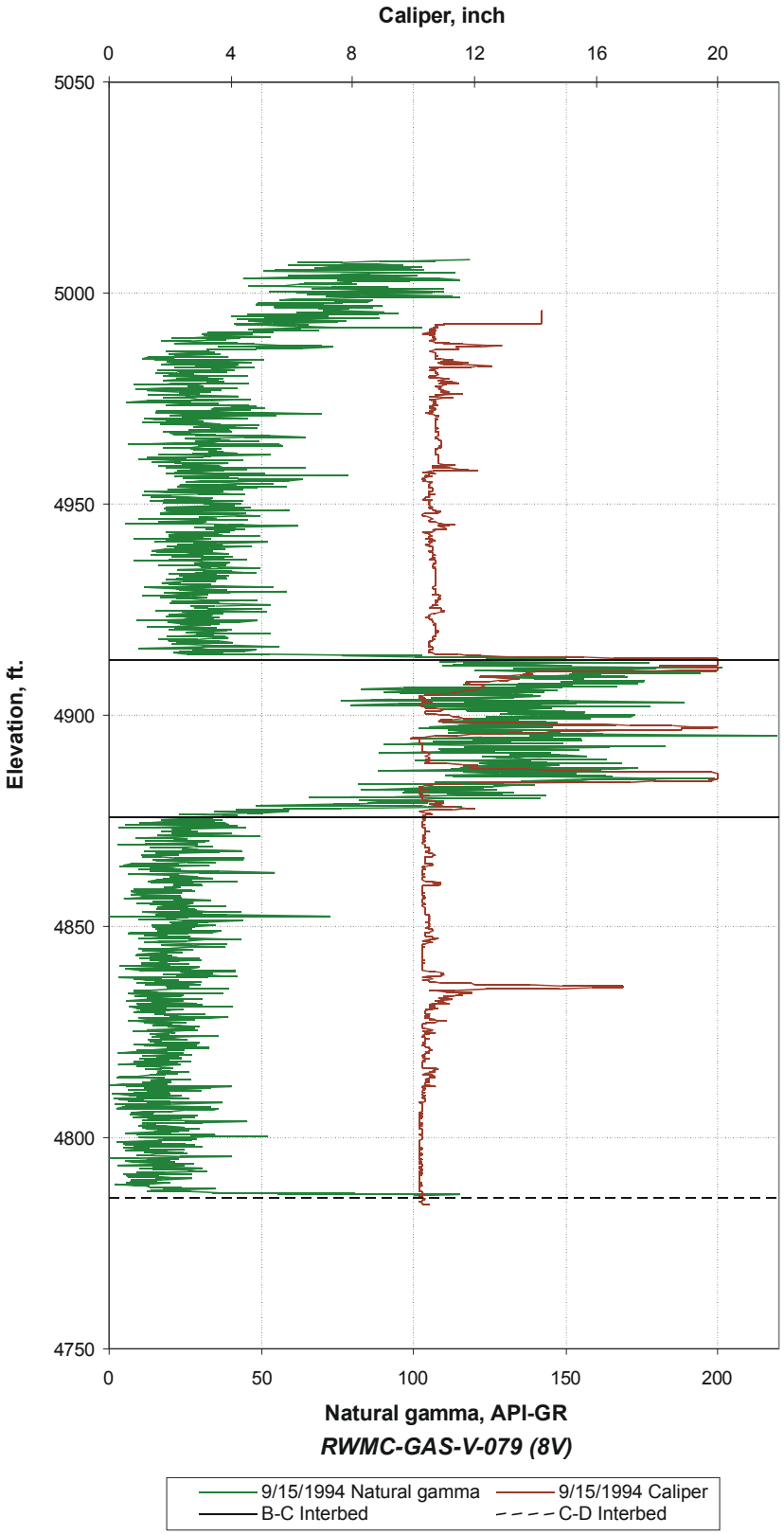


Figure C-19. Well RWMC-GAS-V-079 (8V).

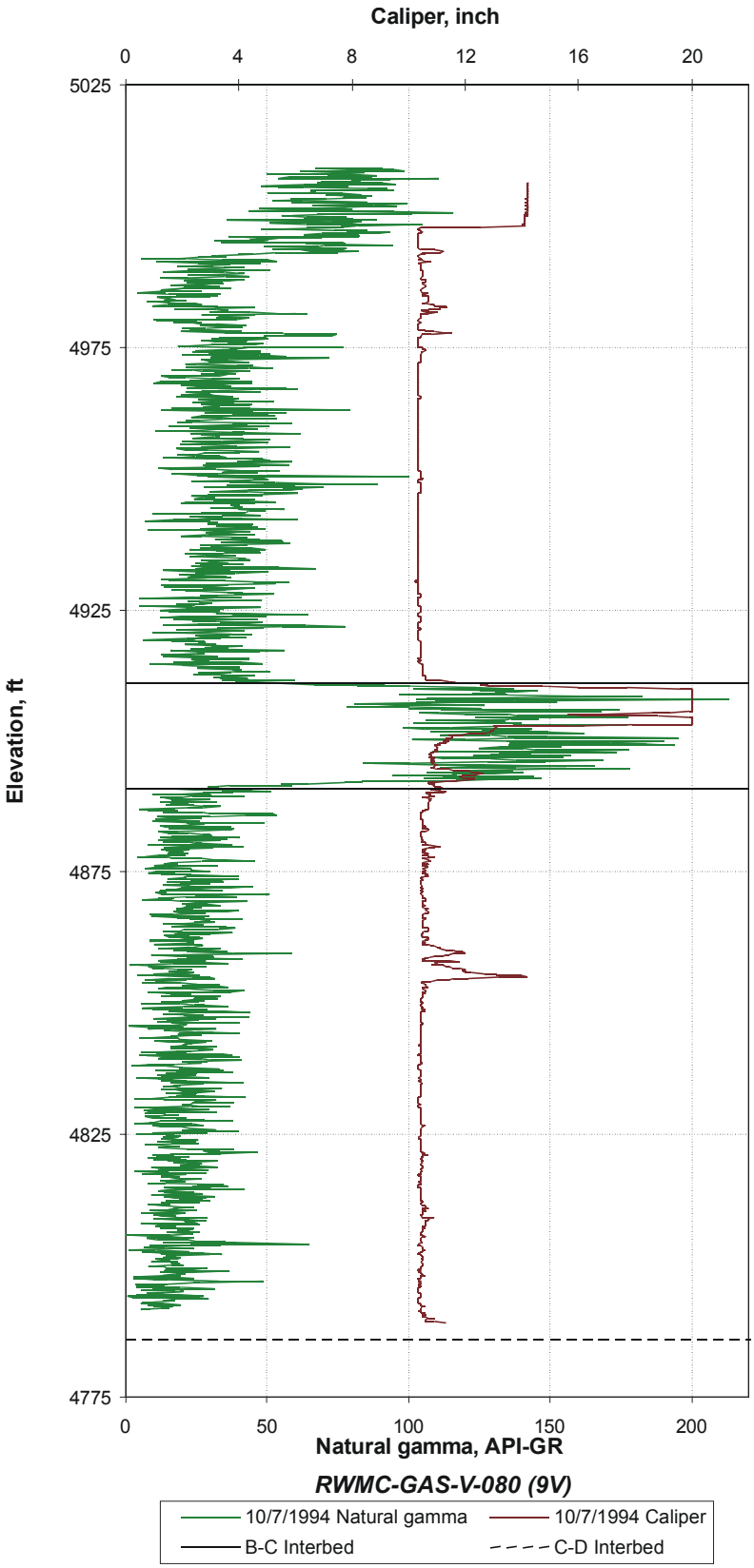


Figure C-20. Well RWMC-GAS-V-080 (9V).

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION
& ENVIRONMENTAL GROUP

HOLE ID: 10V

Sheet 1 of 7

SUBCONTRACT: 607080

BOREHOLE LOG

PROJECT: OCVZ - RWMC OU 7-08

NUMBER: 0527

LOCATION: SDA NW CORNER, RWMC

STAKED COORDINATES: 669,572.13N, 265,021.84E

DRILLING CONTRACTOR: PC EXPLORATION

GEOPHYSICAL LOGGER: USGS

DRILL METHOD -- MODEL: MOBILE B-53/CME-850/REICH:DRILL T-650-W

DEPTH TOP OF ROCK: 10.0'

DEPTH CASING AND SIZES: 14" to 9.5"

G.S. ELEV.:

TOC ELEV.: + 3'

BOREHOLE ANGLE: VERTICAL

TOTAL DEPTH: 232.0'

HOLE SIZE: 4" / 18" / 9 7/8"

WATER DEPTH/DATE: --

FLUID AND ADDITIVES: AUGER/AIR

DATE START: 9/1/94

DATE FINISH: 10/13/94

GEOLOGIST (S): J. CERCONE/A. BENFER

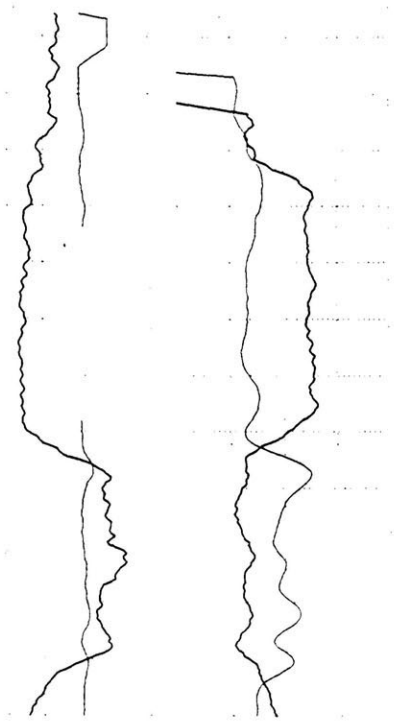
GEOPHYSICAL LOGS

Caliper (in): 0 — 20

Density (cps): 50,000 — 100,000

Nat. Gamma (API-GR): 0 — 200

Neutron (API-N): 1,000 — 5,000



SAMPLE	ELEVATION	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION (LITHOLOGY, Color, Grain Size, Textures, Structures, Weathering, Alteration, Cementation, Hardness, or Minerology.)	COMMENTS (Penetration rates, lost circulation zones, cementing zones, test zones, or tool changes.)
				SILT, light brown, dry, soft, loose. ML	Auger-drilled 0-10.0 feet.
				GRAVELLY SILT, brown, slightly moist, dense, ~10% gravels, poorly sorted. ML	4" Auger-pilot hole. At this site 3-pilot holes drilled.
	-5	5		SILT, brown, slightly moist, medium stiff. ML	Top of bedrock at 10'. 14" steel surface casing grouted to 9.5'. Begin 9 7/8" rev. circ. air rotary drilling at 10'. No returns 10'-14'. Cuttings samples collected every 5 feet to T.D.
	-10	10		SILT-CLAY, brown, moist, medium dense, low plasticity. ML-CL	
				BASALT, gray to dark gray, upper 1.5 feet weathered, basalt improves with depth, very fine grained.	
	-15	15		Basalt, dark gray, moderate weathering, generally fresh olivene, relatively dense, cuttings fine to medium (~ 1/8").	3:30 - Moderate return. Dense.
	-20	20		Finely vesicular, clear plagioclase, dense, olivene fresh and weathered, no oxidation, cuttings 1/8"-1/2".	3:47 - Good return. Hard.
				~50% silty fine sand, gray-brown, 50% dense basalt, fresh olivene.	Soft, hammer not firing.
	-25	25		SANDY SILT TO SILTY SAND, fine grain silt orange, sand gray, brown, slightly moist, 30-foot interbed, exceptionally thick.	3:53 - Soft. 26'-27' - Void.
	-30	30			

Figure C-21. Boreholl Log 10 V, Sheet 1.

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION
& ENVIRONMENTAL GROUP

HOLE ID: 10V

Sheet 2 of 7

SUBCONTRACT:

BOREHOLE LOG

PROJECT: OCVZ - RWMC OU 7-08

NUMBER: 0527

LOCATION: SDA NW CORNER, RWMC

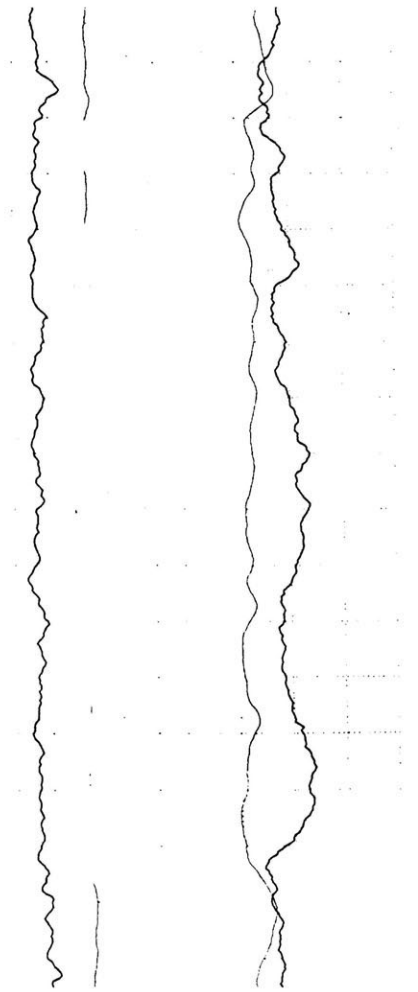
GEOPHYSICAL LOGS

Caliper (in) 0 20

Density (cps) 50,000 100,000

Nat. Gamma (API-GR) 0 200

Neutron (API-N) 1,000 5,000



SAMPLE	ELEVATION	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION	COMMENTS
				LITHOLOGY, Color, Grain Size, Textures, Structures, Weathering, Alteration, Cementation, Hardness, or Minerology.	Penetration rates, lost circulation zones, cementing zones, test zones, or tool changes.
					7:50 - Good return. Caving.
		35		~25% BASALT.	8:06 - Good return. Broken, alternating hard and soft.
		40		Sediments are likely slough, ~50% basalt, coarsely vesicular, fresh, no oxidation.	
		45		Basalt as above, olivene, mostly weathered, mostly coarse cuttings.	8:33 - Good return, made a connection. Hard drilling.
		50		Predominantly finely vesicular, fine cuttings are fresh, larger cuttings have large vesicles, ~10% oxidized.	8:55 - Good return.
		55		Cuttings fine to coarse (up to 3/4"), rosy tint.	9:05 - Good return.
		60			9:20 - Good return.
		65			

Figure C-22. Boreholl Log 10 V, Sheet 2.

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION & ENVIRONMENTAL GROUP

HOLE ID: 10V

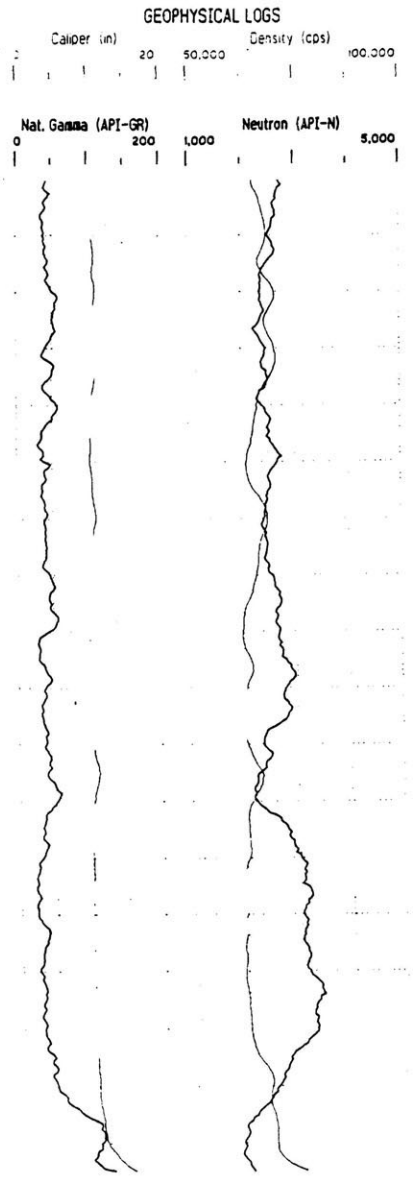
Sheet 3 of 7

SUBCONTRACT: 607080

BOREHOLE LOG

PROJECT: OCVZ - RWMC OU 7-08

NUMBER: 0527 LOCATION: SDA NW CORNER, RWMC



SAMPLE	ELEVATION	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION: LITHOLOGY, Color, Grain Size, Textures, Structures, Weathering, Alteration, Cementation, Hardness, or Mineralogy.	COMMENTS: Penetration rates, lost circulation zones, cementing zones, test zones, or tool changes.
				Coarse cuttings, large vesicles, minor fine sand and clay coating fragments, likely fracture zone, thin interbed.	9:30 - Good return, made a connection.
	-70	70		Minor fine sand and silt at 72', very coarse basalt cuttings up to 1", large vesicles, broken zone, clay/silt coating.	9:47 - Good return. Hose plugging up - soft drilling, hole sloughing.
	-75	75		Increase in fine sand and silt, dark gray, minor orange, 50% of sample.	10:08 - Poor return. Hose plugging.
	-80	80		Less fine sand and silt, ~20% tan clay, large vesicles, cuttings fine to coarse, fractured zone, clay is moist.	10:28 - Moderate return. Hose plugging, some sloughing.
	-85	85		~10% oxidized.	10:47 - Moderate return.
	-90	90		~20% fine gray sand and tan clay, maybe sloughing, basalt as above, fresh olivene.	11:10 - Good return.
	-95	95			11:25 - Good return.
	-100	100	98 100	SAND, SILT and CLAY, large cuttings up to 3/4", fractured at 97', cuttings fine and finely vesicular. 110-foot interbed at ~98', fine sand and silt, minor fine gravel, moist.	

Figure C-23. Boreholl Log 10 V, Sheet 3.

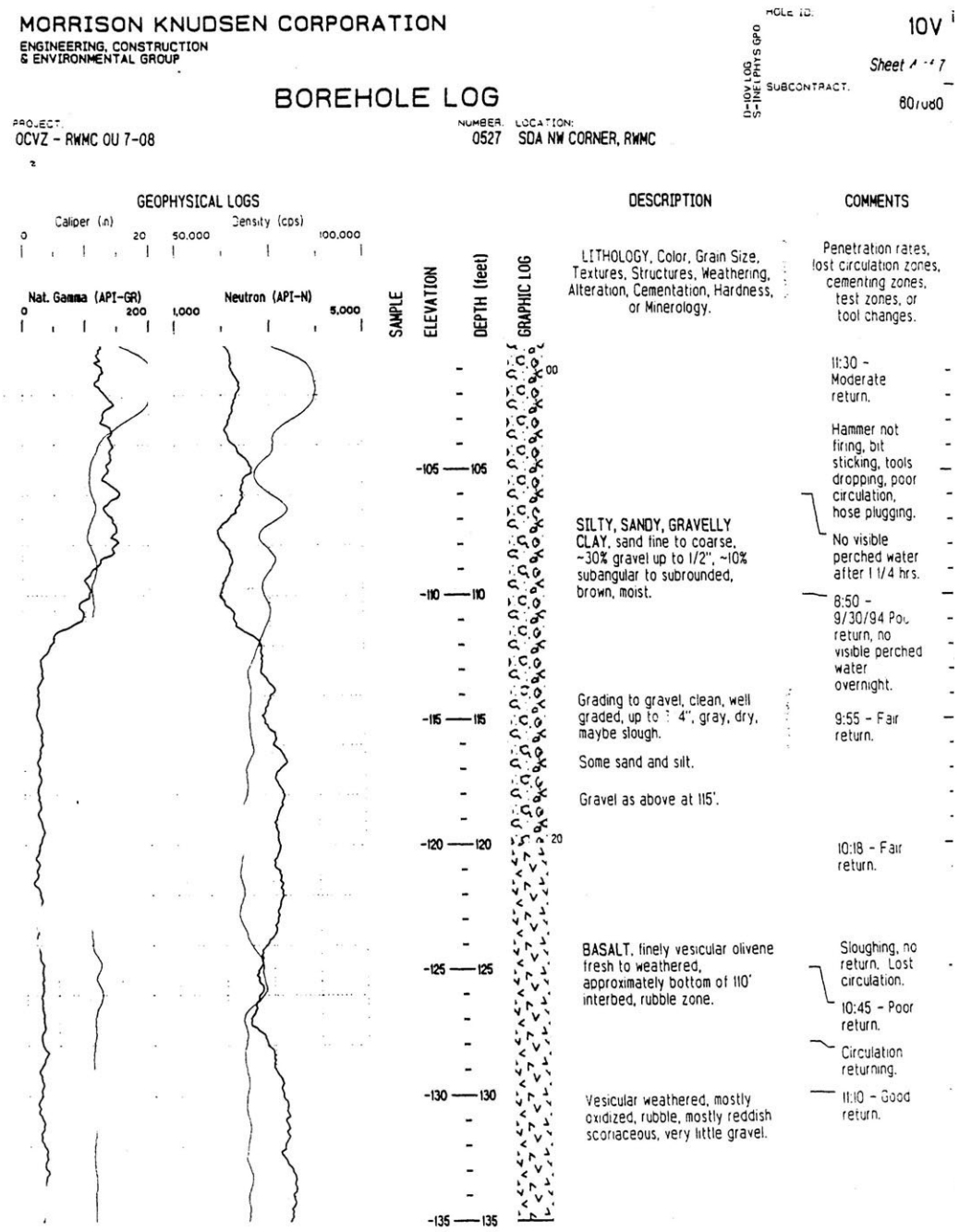


Figure C-24. Boreholl Log 10 V, Sheet 4.

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION
& ENVIRONMENTAL GROUP

HOLE ID: 10V

Sheet 5 of 7

SUBCONTRACT 807080

BOREHOLE LOG

PROJECT: OCVZ - RWMC OU 7-08

NUMBER: 0527 LOCATION: SDA NW CORNER, RWMC

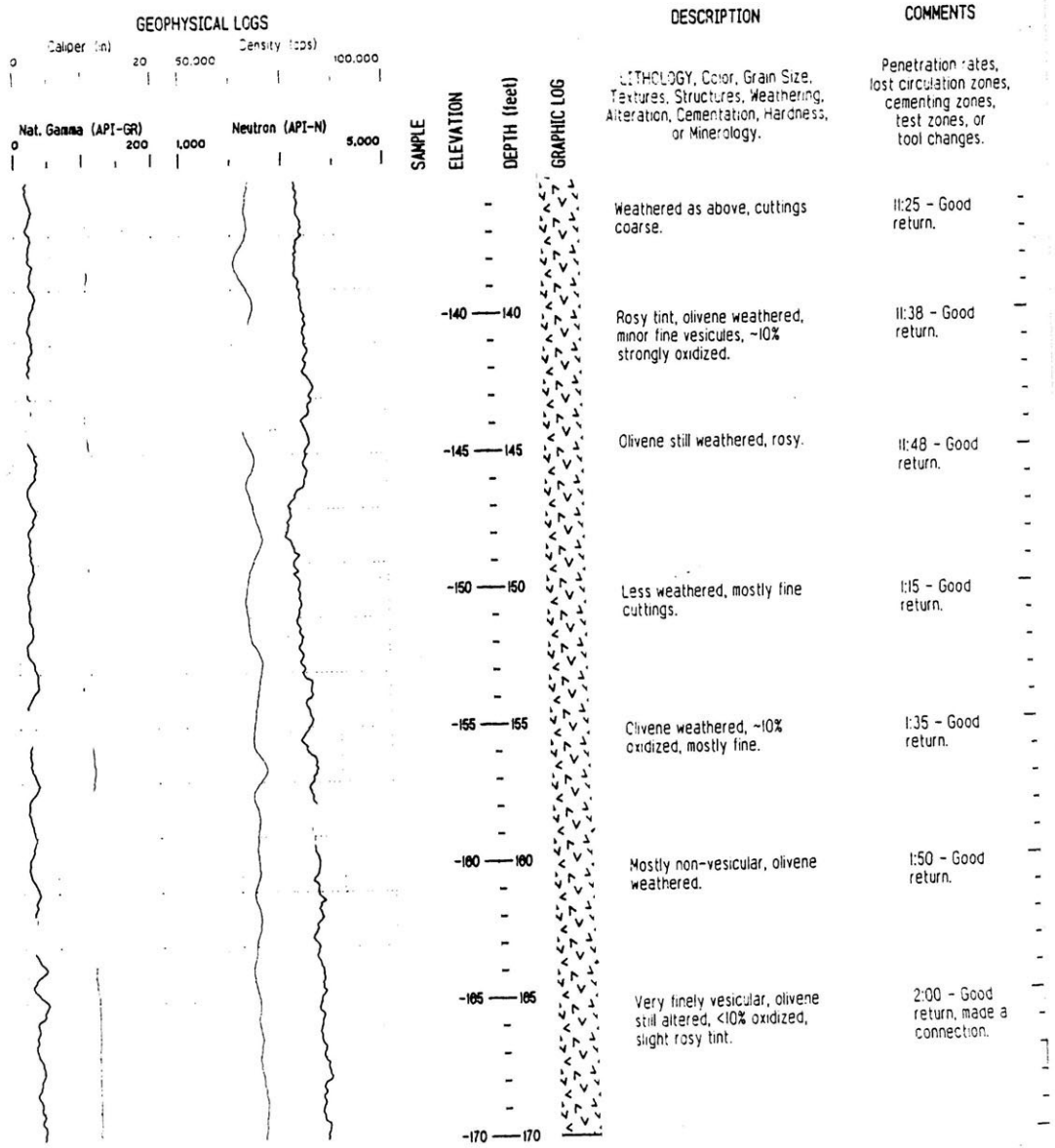


Figure C-25. Boreholl Log 10 V, Sheet 5.

MORRISON KNUDSEN CORPORATION
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& ENVIRONMENTAL GROUP

HOLE ID: 10V

D-10V LOG
S-INELPHYS.GPO

Sheet 6 of 7

SUBCONTRACT: 807080

BOREHOLE LOG

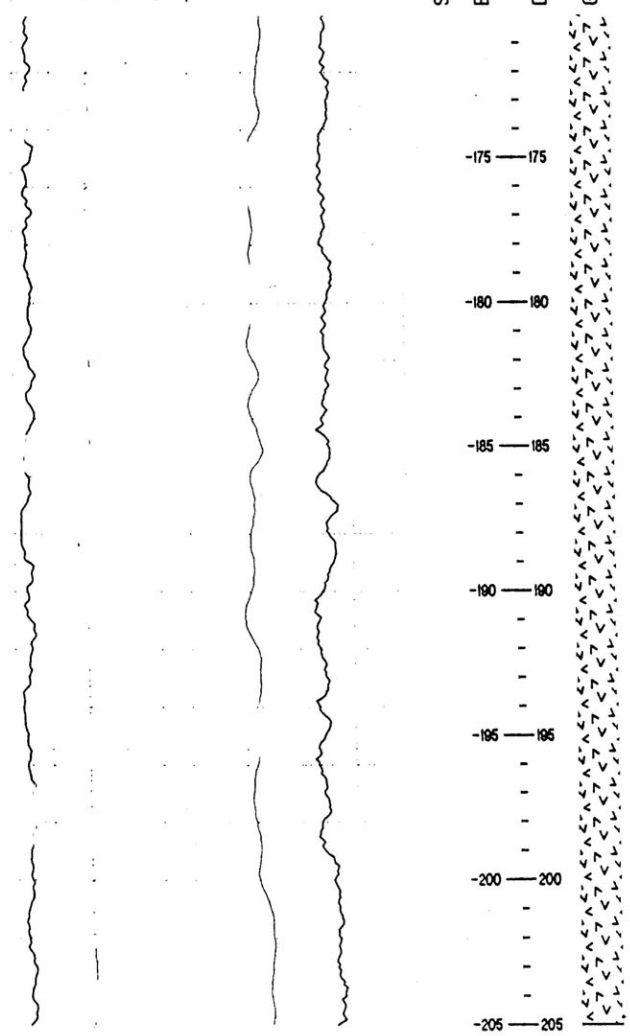
PROJECT: OCVZ - RWMC OU 7-08

NUMBER: 0527 LOCATION: SDA NW CORNER, RWMC

GEOPHYSICAL LOGS

Caliper (in) 0 20 | Density (cps) 50,000 100,000

Nat. Gamma (API-GR) 0 200 | Neutron (API-N) 1,000 5,000



SAMPLE	ELEVATION	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION: LITHOLOGY, Color, Grain Size, Textures, Structures, Weathering, Alteration, Cementation, Hardness, or Minerology.	COMMENTS: Penetration rates, lost circulation zones, cementing zones, test zones, or tool changes.
				Olivene fresh to altered, finely vesicular, less oxidation.	2:20 - Good return.
	-175	175		Clear plagioclase, some fine gray sand.	2:35 - Good return.
	-180	180		Maybe slightly more fine sand.	2:45 - Good return.
	-185	185		Olivene-rich, fresh, some fragments light colored, trace fine sand, light colored plagioclase, phaneritic.	2:55 - Good return.
	-190	190		Mostly light colored as above.	3:15 - Good return.
	-195	195		Cuttings fine, dense, some rock flour.	3:25 - Good return.
	-200	200		Still olivene and light colored, plagioclase rich, more rock flour.	3:40 - Good return.
	-205	205		Dense.	

Figure C-26. Boreholl Log 10 V, Sheet 6.

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HOLE ID. 10V

Sheet 7 of 7

SUBCONTRACT. 607080

BOREHOLE LOG

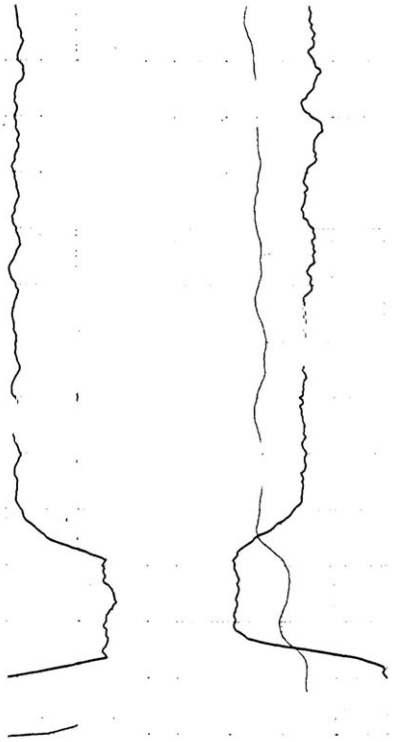
PROJECT OCVZ - RWMC OU 7-08

NUMBER 0527 LOCATION SDA NW CORNER, RWMC

GEOPHYSICAL LOGS

Caliper (in) 0 20 Density (cps) 50,000 100,000

Nat. Gamma (API-GR) 0 200 Neutron (API-N) 1,000 5,000



SAMPLE	ELEVATION	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION	COMMENTS
					3:52 - Good return.
	-210	210		Light colored, contains dark minerals (hornblende), fresh olivene, lots of flour, unweathered, no oxidation, dense, only slightly vesicular.	8:07 - Good return, driller says hard.
	-215	215		Generally darker than above, slightly rosy tint, olivene slightly weathered, trace of tan clay.	8:20 - Good return.
	-220	220	223	Rosy tint, ~5% clay, ~30% light colored as at 210'.	8:32 - Good return.
	-225	225		At ~226', SILTY SANDY (well graded) fine gravel up to 3/8", dry, orange. 110-foot interbed.	8:45 - Good return.
	-230	230	232	Total Depth @ 232', 9:17 10/3/94.	9:15 - Good return.
	-235	235			
	-240	240			

Figure C-27. Boreholl Log 10 V, Sheet 7.

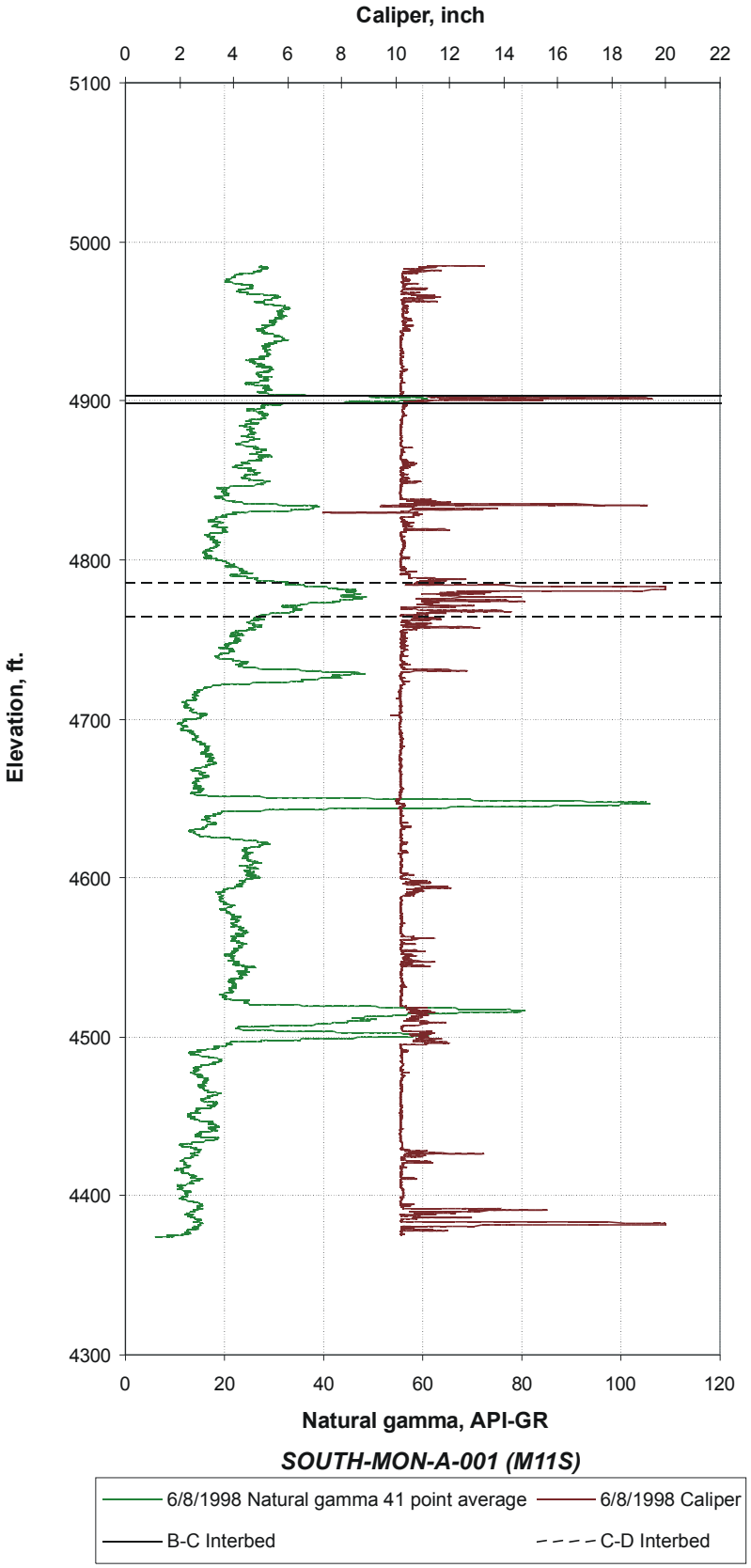


Figure C-28. Well SOUTH-MON-A-001 (M11S).

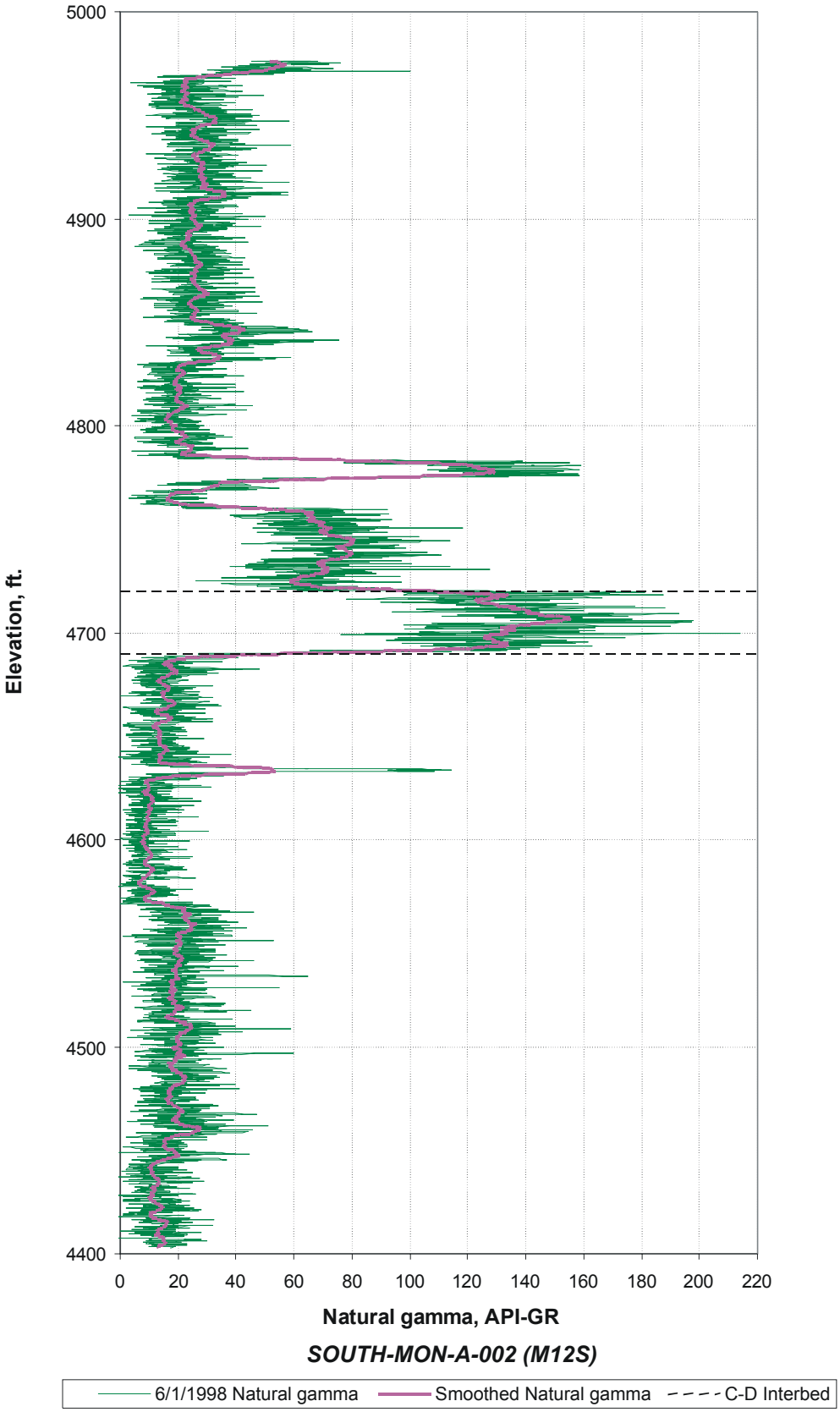


Figure C-29. Well SOUTH-MON-A-002 (M12S).