KERR-McGEE CHEMICAL CORPORATION
POST OFFICE BOX 55 • HENDERSON, NEVADA 89015

February 1, 1984

Mr. Verne Rosse
State of Nevada
Division of Environmental Protection
Capitol Complex
201 South Fall Street
Carson City, NV 89710

Re: Groundwater Monitoring
KMCC, Henderson, NV Facility

Out of service since Sept 82
Removed Jan 83

Dear Mr. Rosse:

As we discussed at our December 5 meeting with you, elevated chromium concentrations were found in upgradient and downgradient monitor wells that were installed around surface impoundments S-1 and P-1. We initiated a groundwater assessment program to determine possible sources of this chromium contamination, since it was apparent, from upgradient well data, the source was not from the regulated units. During the months May to October, 1983, we installed a total of 15 additional groundwater monitoring wells. These wells are shown on the attached map. Wells previously installed around the landfill for compliance with RCRA are not shown. Well completion data and chromium analyses are attached.

Sources of Contamination

The source of chrome contamination has been traced to the basements of Units 4 and 5. These basements have been used for many years as sumps to collect sodium chlorate process liquor, spillage, wash water, and storm water runoff. These comingled liquids are pumped back to the process. These concrete basements were constructed as part of the original buildings in the early 1940's. As one would expect, over the years, deterioration and cracking has occurred.

Sodium dichromate is added in concentrations up to 4-5 grams per liter to the sodium chlorate process cell liquor as a pH buffer and a corrosion inhibitor. This is the only source of chromium at the KMCC Henderson facility.

As we also explained to you, a new sodium chlorate plant, now in the early design phase, will eliminate the use of these basements. The new plant will be operational August 1, 1988.

In the interim, areas of structural deterioration and cracking in the basements have been or are being repaired with sealants to alleviate leakage. In addition, we have instituted the following procedures:

a. Pumping liquid back to the process from the basement sumps as soon as possible rather than allowing it to accumulate.

b. Pumping the two monitor wells directly north of the basements back to the process as continuously as practicable.

Plume Movement

Groundwater under the KMCC Henderson facility moves to the north, northwest (see attached map). The eastern extent of the chromium plume has been located on KMCC property just west of the KMCC-Timet property line. The western boundary extends north from Unit 3 and west of the steam plant between wells M-3 and M-4. The chromium concentration decreases to the north with increasing distance from Units 4 and 5.

Chromium Concentrations

As the attached data indicate, chromium concentrations in a number of our groundwater monitoring wells have dropped significantly over the past months. This reduction in chromium is thought to have resulted from our efforts to:

a. Repair cracks and structural deterioration in the Unit 4 and Unit 5 basements,

b. Pump various groundwater monitoring wells back to the process as practicable, and

c. Implement procedures to return liquid which accumulates in the basement sumps back to the process as soon as possible.

Summary

KMCC has an active program to identify and control the chromium plume that appears in groundwater under our Henderson facility. It appears that our efforts have been successful in reducing chromium values in a number of wells. These efforts will continue and we will keep the NDEP informed of our progress by periodic reports to your office.

If there are any questions regarding the above, please contact me or Kay Brothers.

Sincerely,

KERR-McGEE CHEMICAL CORPORATION

R. B. Chase, Jr.
Plant Manager

RBC:jc
Attachments

WELL DATA

Well M-1

Total Depth - 45'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,792.68'

Chromium Concentrations

Date	ppm
1/14/82	12.2
6/1/82	12.9
10/5/82	12.7
1/28/83	9.9
12/14/83	9.5

The 25% reduction in chromium may reflect revised procedures for handling basement liquors (i.e., returning liquor from the basements to the process as soon as possible).

Well M-2

Total Depth - 40'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,780.02'

Chromium Concentrations

Date	ppm
1/14/82	9.0
6/1/82	10.0
10/5/82	9.15
1/7/83	10.7
12/15/83	5.6

This approximate 50% reduction in chromium content may be due to extended pumping of M-3, a well near M-2.

Well M-3

Total Depth - 40'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,780.46'

Chromium Concentrations

Date	ppm
1/14/82	31.1
6/1/82	46.7
9/12/83	37.5
10/83 Avg.	30.0
11/83 Avg.	25.0
12/83 Avg.	20.0

This approximate 40% reduction in chromium is thought to be a result of pumping M-3 (rate approximately 15 gpm) for an extended period of time.

Well M-4

Total Depth - 40'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,781.45'

Chromium Concentrations

Date	ppm
1/14/82	0.18
6/1/82	0.01
8/24/82	<0.02

Well M-4 indicates the western extent of the chromium plume.

Well M-8

Total Depth - 40'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,780.00'

Chromium Concentrations

Date	ppm
10/5/82	5.1
1/7/83	6.0
3/10/83	0.67
6/22/83	2.96
12/14/83	6.7

Additional samples will be collected and analyzed during the month of February.

Well M-9

Total Depth - 40'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,778.92'

Chromium Concentrations

Date	ppm
10/5/82	16.3
1/7/83	18.5
3/10/83	24.5
6/22/83	26.0
12/14/83	29.7

M-9 is located approximately 75' east of M-3; however, it only makes approximately 1-2 gpm. Between the two wells there appears to be a "sink" as indicated on the attached map. It is thought that the extended pumping of M-3 has essentially equalized the chromium concentration in this "sink" area.

Well M-10

Total Depth - 63'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,834.76'

Chromium Concentrations

Date	ppm
6/20/83	<0.02
8/24/83	<0.02

As shown on the attached map, this well is located upgradient of the Unit 4 and Unit 5 basements.

Well M-11

Total Depth - 53'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,814.45'

Chromium Concentrations

Date	ppm
6/14/83	72
8/24/83	92
10/83	44

The approximate 50% drop in chromium concentration in this well, located north of Unit 5, is a result of pumping M-11 and repairing cracks in the Unit 5 basement.

Well M-12

Total Depth - 52'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,814.90'

Chromium Concentrations

Date	ppm
6/14/83	44
8/24/83	42

Additional samples will be collected and analyzed during the month of February.

Well M-13

Total Depth - 48'

I.D. - 5"

Casing - Steel

Casing Elevation - 1,814.23'

Chromium Concentrations

Date	ppm
6/20/83	0.14
8/24/83	1.1

Well M-13 indicates the western extent of the chromium plume.

Well M-14

Total Depth - 38'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,759.43'

Chromium Concentrations

Date	ppm
6/20/83	0.34
8/24/83	0.41

Well M-14 indicates the western extent of the chromium plume.

Well M-15

Total Depth - 41'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,750.31'

Chromium Concentrations

Date	ppm
6/20/83	6.5
8/24/83	6.3

Additional samples will be collected and analyzed for chromium during the month of February.

Well M-16

Total Depth - 38'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,762.20

Chromium Concentrations

Date	ppm
6/20/83	9.0
8/24/83	7.0

Additional samples will be collected and analyzed for chromium during the month of February.

Well M-17

Total Depth - 42'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,770.22'

Chromium Concentrations

Date	ppm
6/20/83	7.0
8/24/83	6.7

Additional samples will be collected and analyzed for chromium during the month of February.

Well M-18

Total Depth - 28'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,738.93'

Chromium Concentrations

Date	ppm
8/24/83	0.73

Well M-18 indicates the eastern extent of the chromium plume.

Well M-19

Total Depth - 40'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,766.93'

Chromium Concentrations

Date	ppm
8/24/83	0.03

Well M-19 indicates the eastern extent of the chromium plume.

Well M-20

Total Depth - 44'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,798.21

Chromium Concentrations

Date	ppm
8/24/83	0.02

Well M-20 indicates the eastern extent of the chromium plume.

Well M-21

Total Depth - 43'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,790.50'

Silted In

Well M-22

Total Depth - 35'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,758.91

Chromium Concentrations

Date	ppm
8/24/83	1.5

Well M-22 indicates the eastern edge of the chromium plume.

Well M-23

Total Depth - 43'

I.D. - 2"

Casing - PVC

Casing Elevation - 1,717.61'

Chromium Concentrations

Date	ppm
8/24/83	3.5

Additional samples will be collected and analyzed for chromium during the month of February.

FIGURE 2

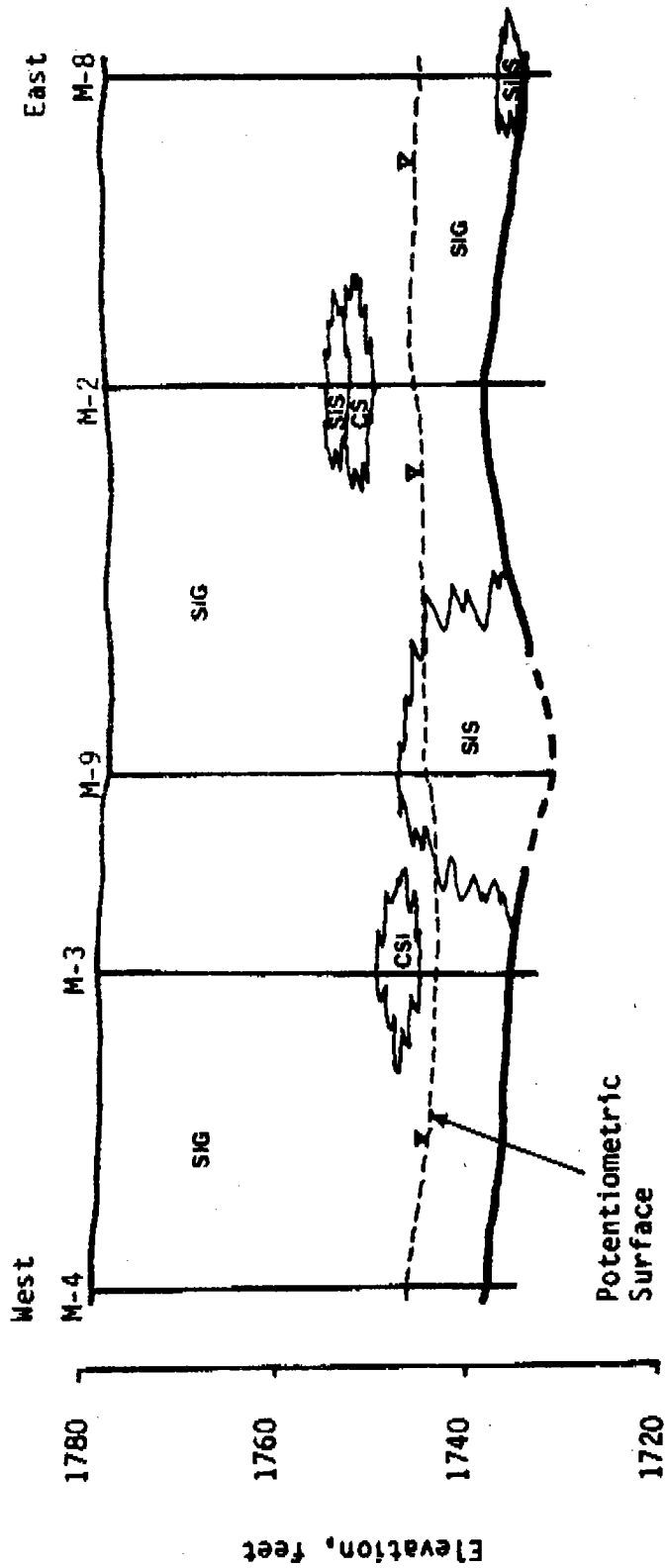


FIGURE 2: Generalized East-West Geological Cross-Section through the Kerr-McGee Henderson Facility.

FIGURE 3

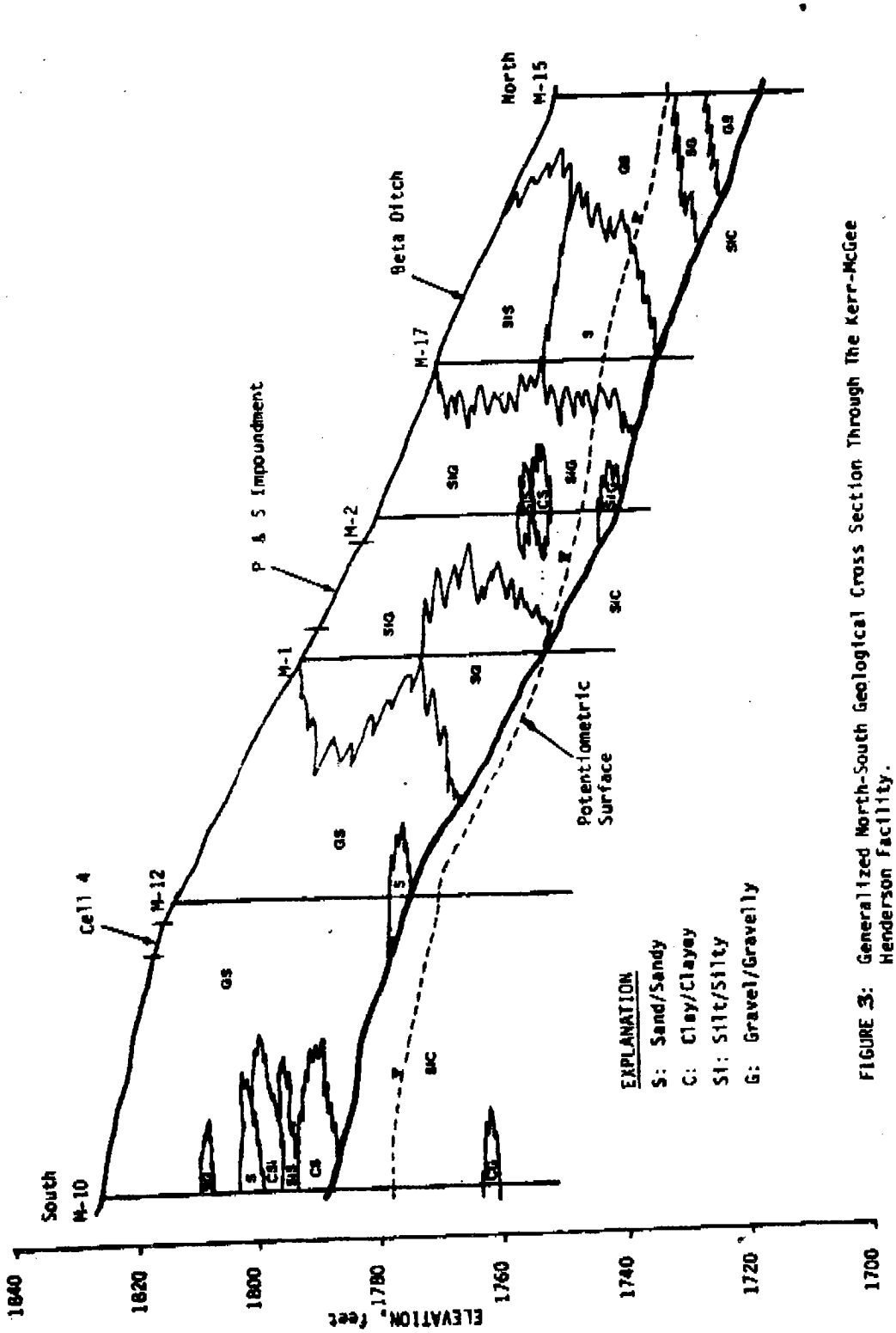


FIGURE 3: Generalized North-South Geological Cross Section Through The Kerr-McGee Henderson Facility.

FIGURE 4

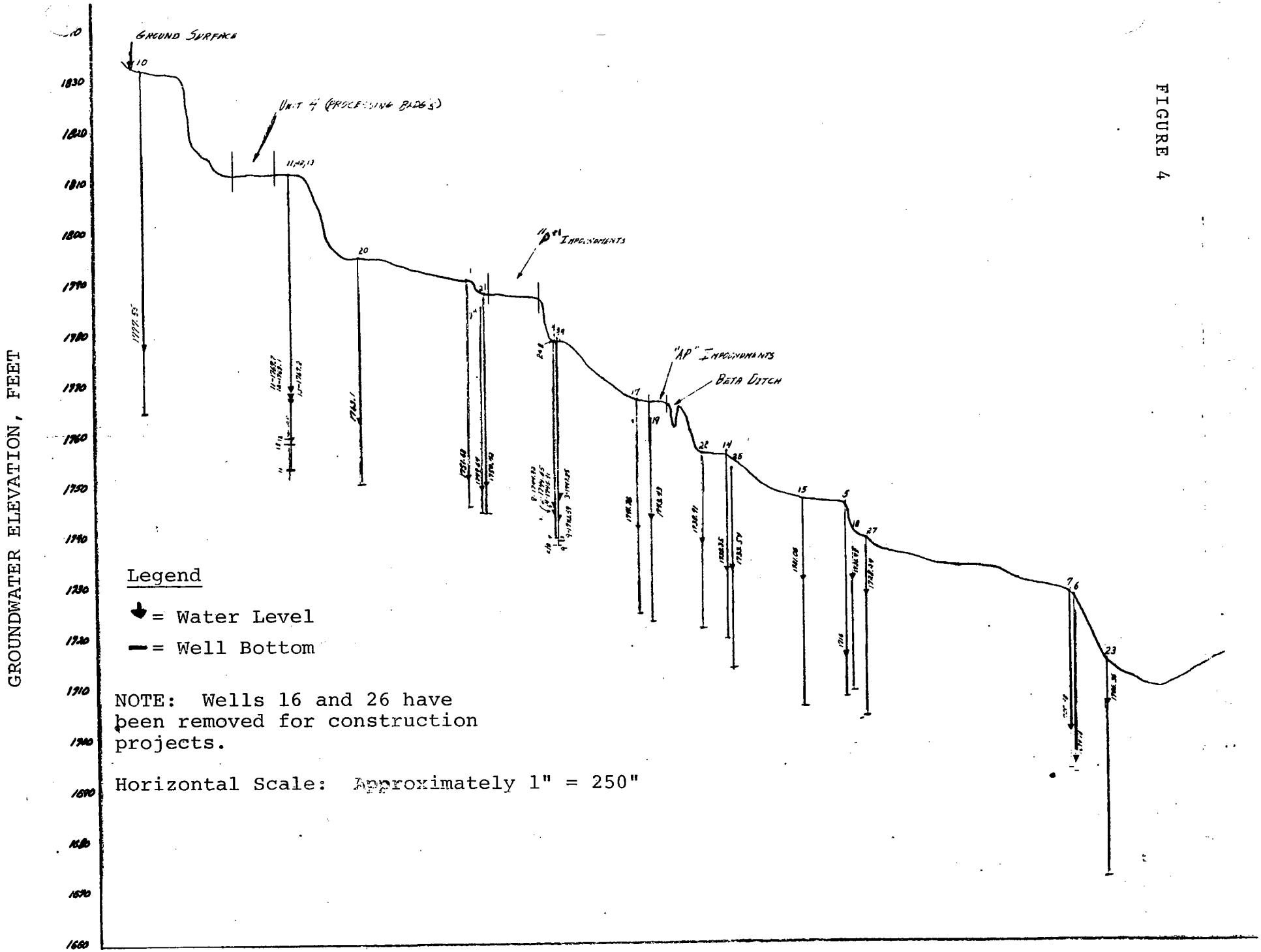


FIGURE 4: North-South Cross-Section Through KMCC Henderson Facility Showing Groundwater Elevation

FIGURE 5: Well M-1, Henderson Facility, KMCC

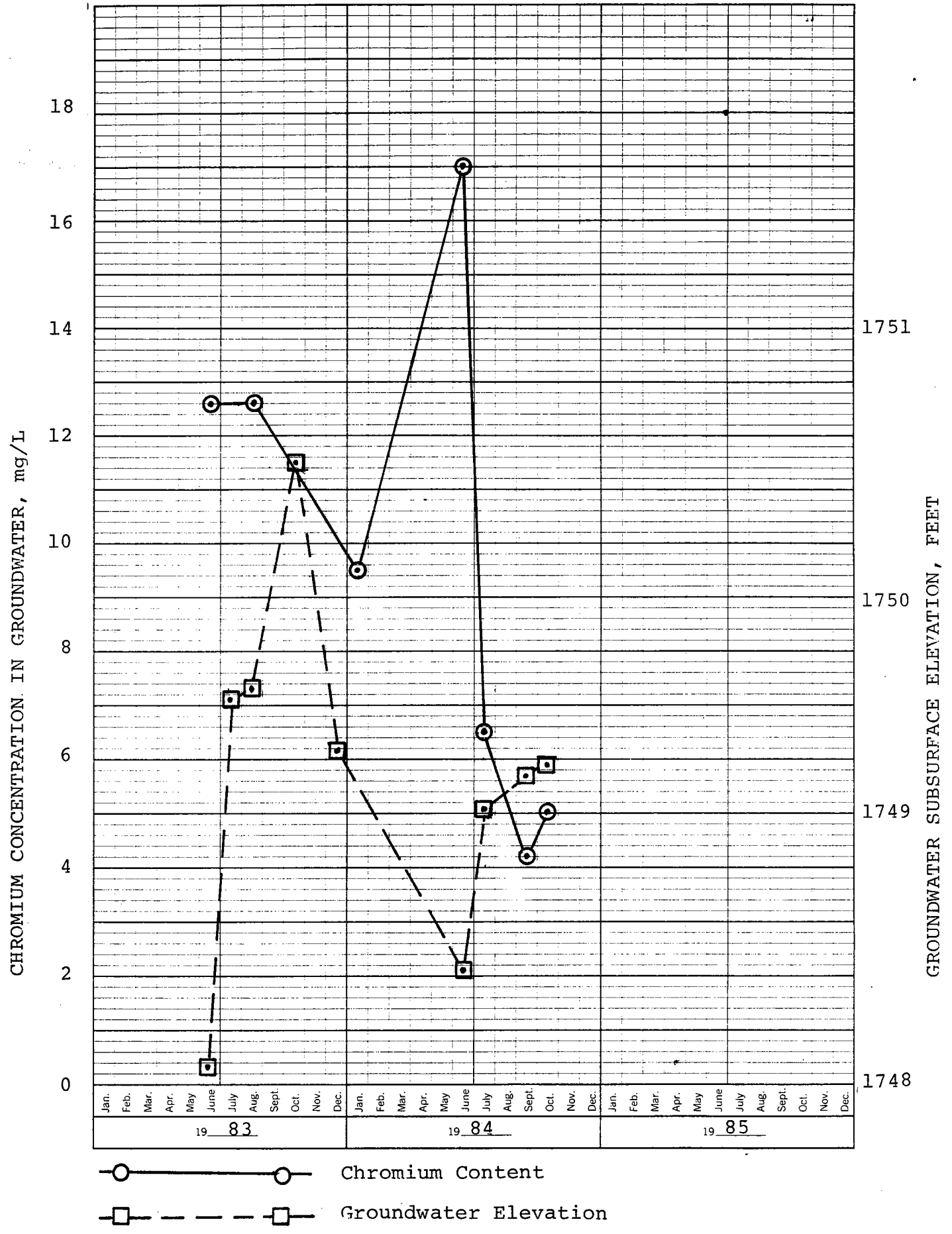


FIGURE 6: Well M-2, Henderson Facility, KMCC

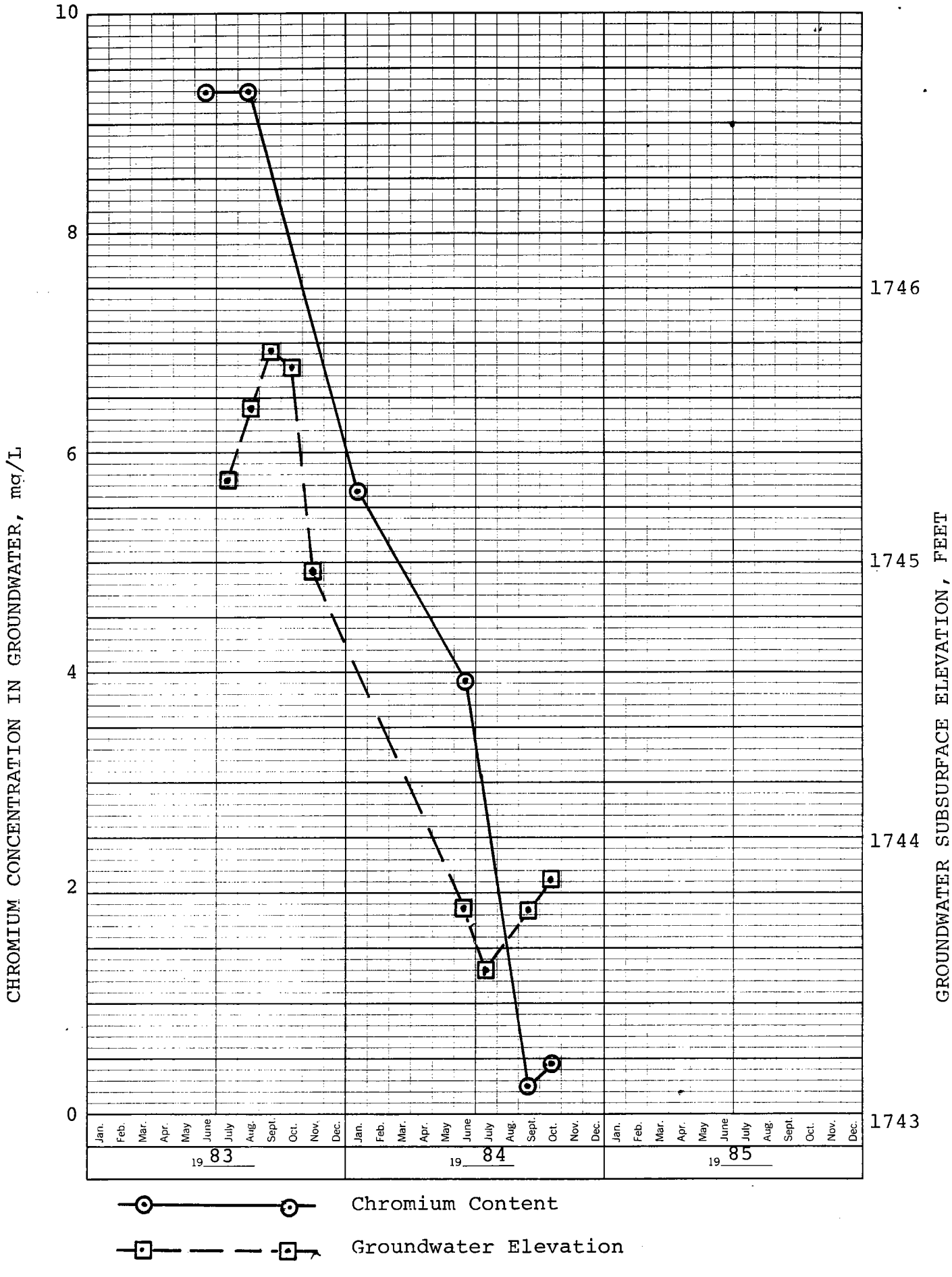


FIGURE 7: Well M-3, Henderson Facility, KMCC

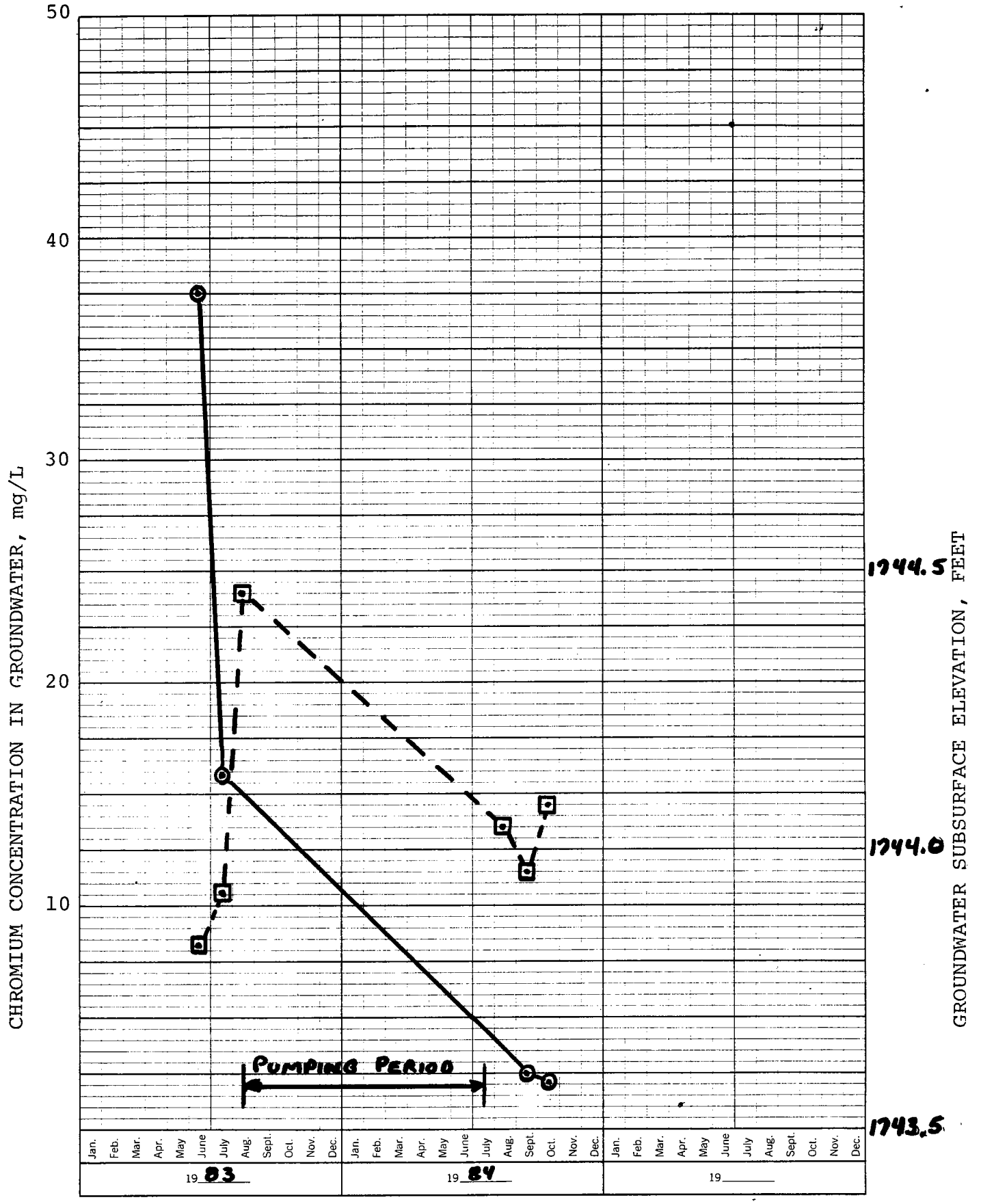


FIGURE 8: Well M-8, Henderson Facility, KMCC

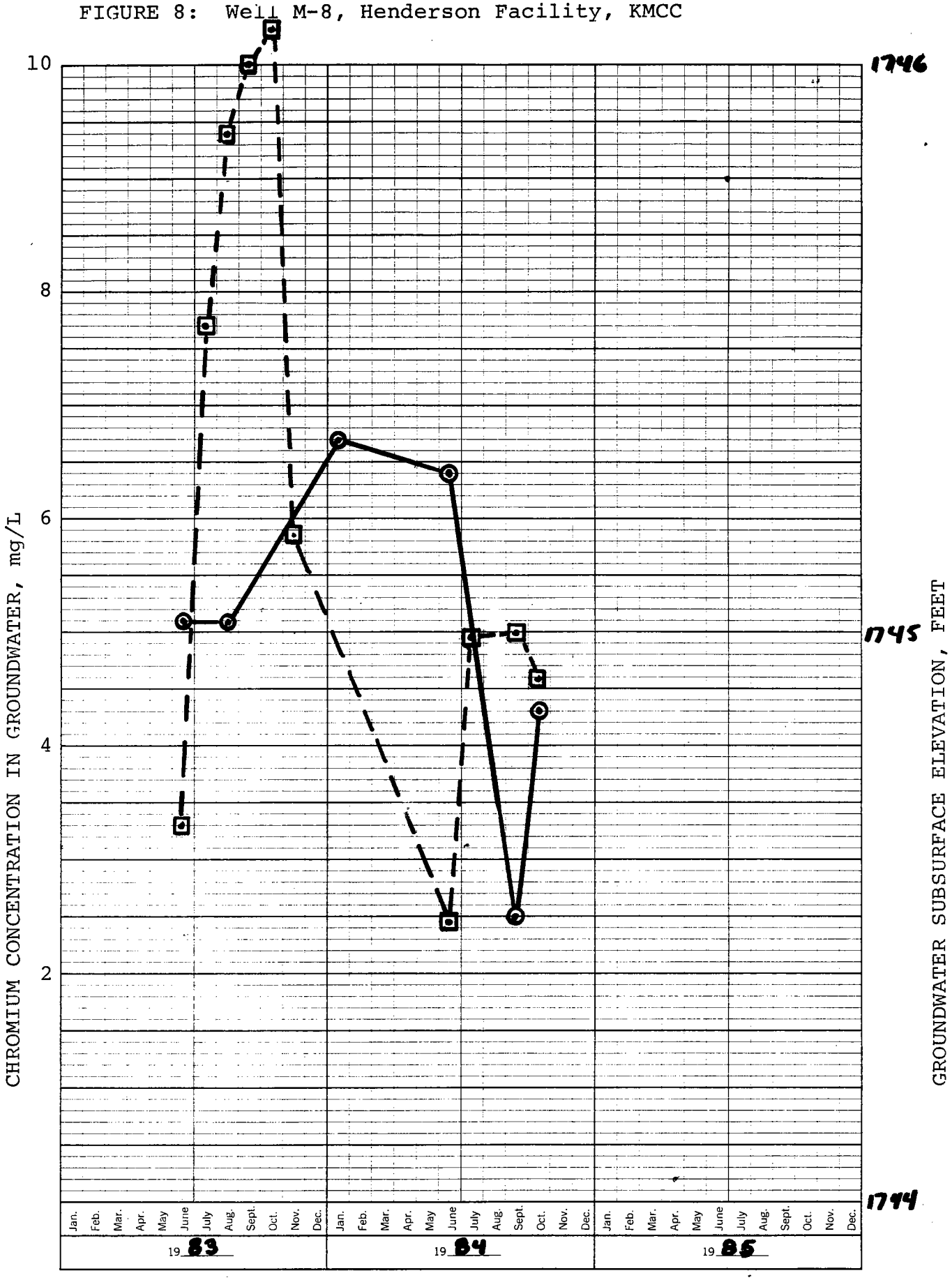


FIGURE 9: Well M-9, Henderson Facility, KMCC

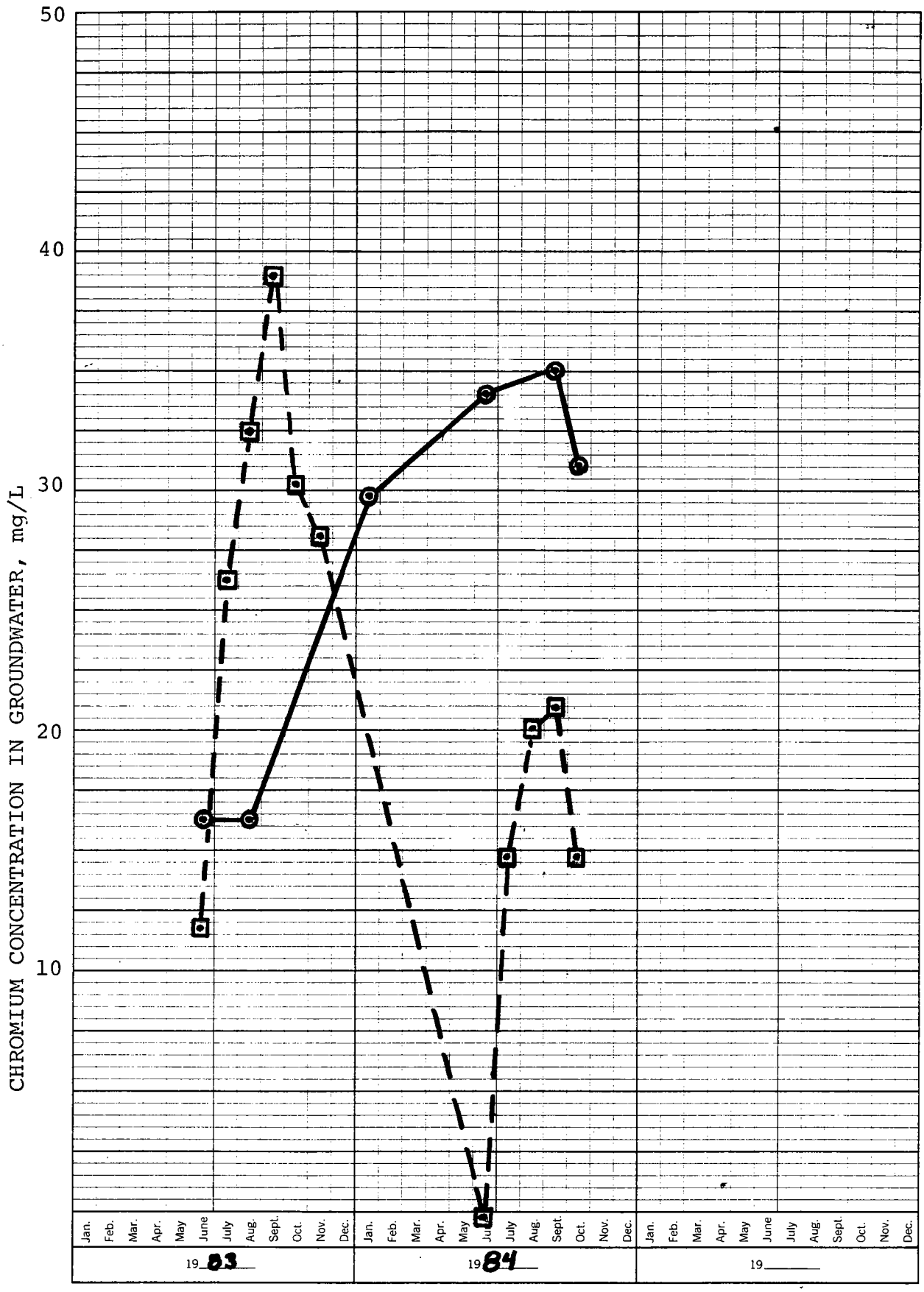


FIGURE 10: Well M-11, Henderson Facility, KMCC

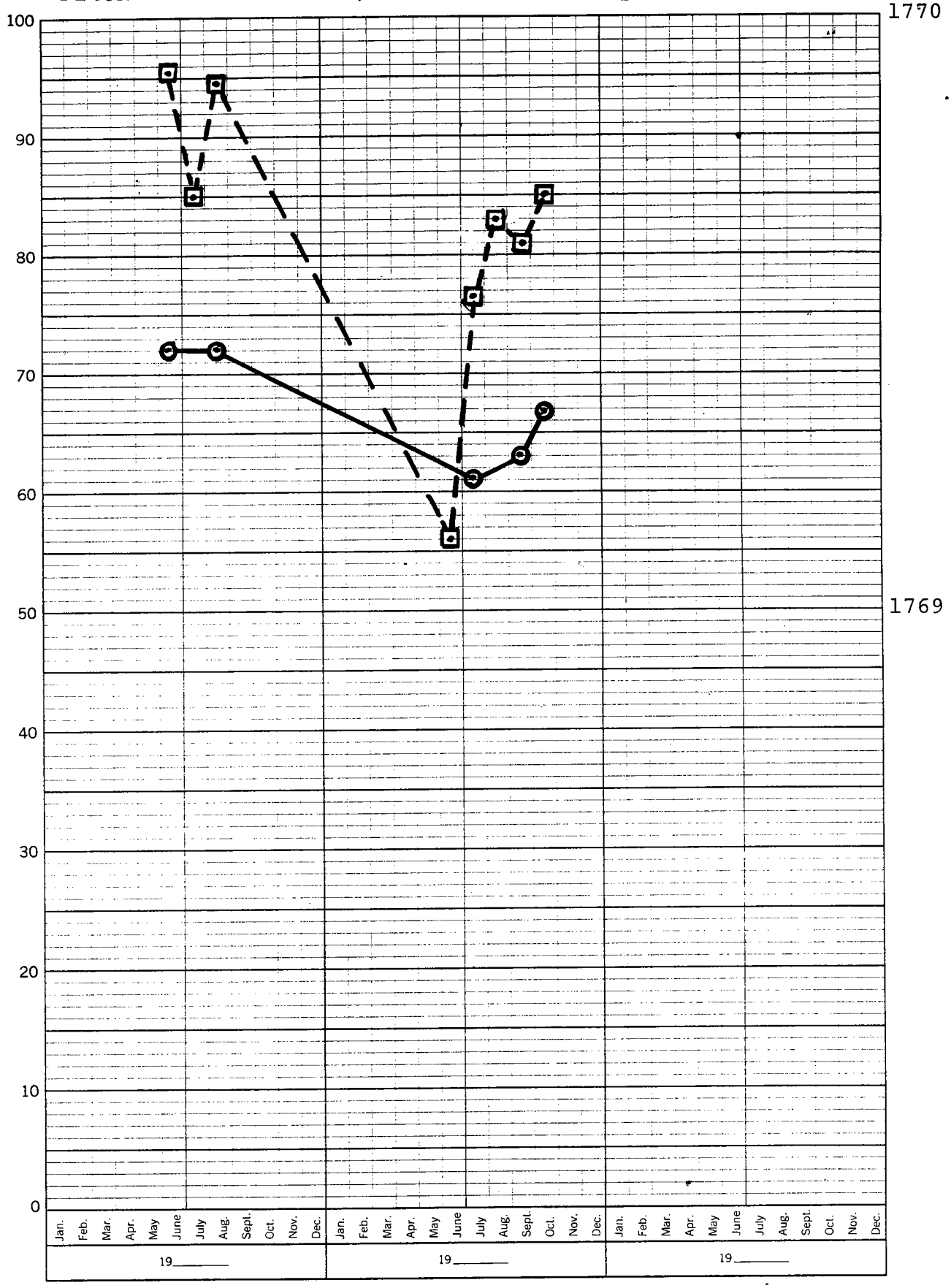


FIGURE 11: Well M-12, Henderson Facility, KMCC

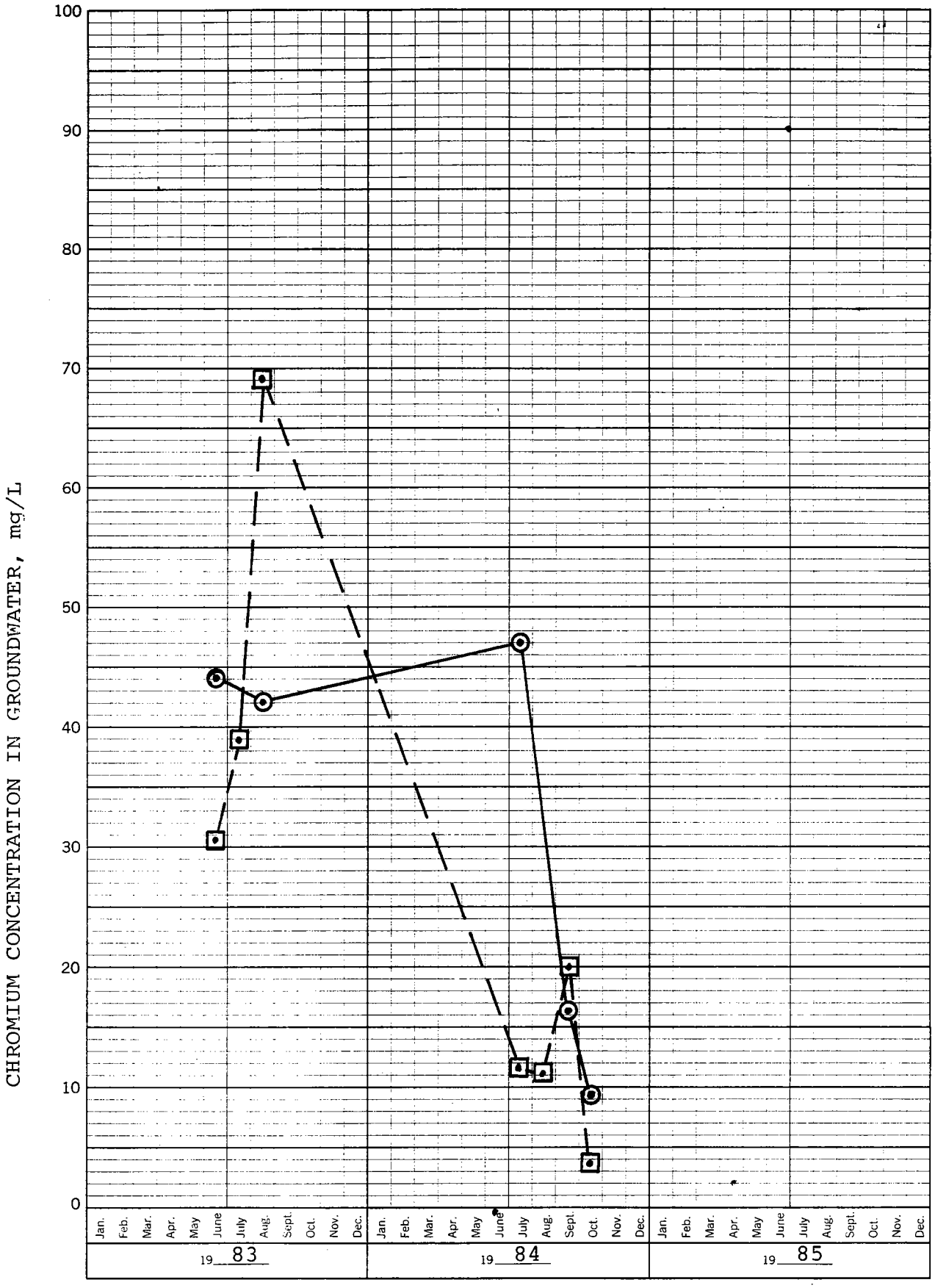


FIGURE 12: Well M-15, Henderson Facility, KMCC

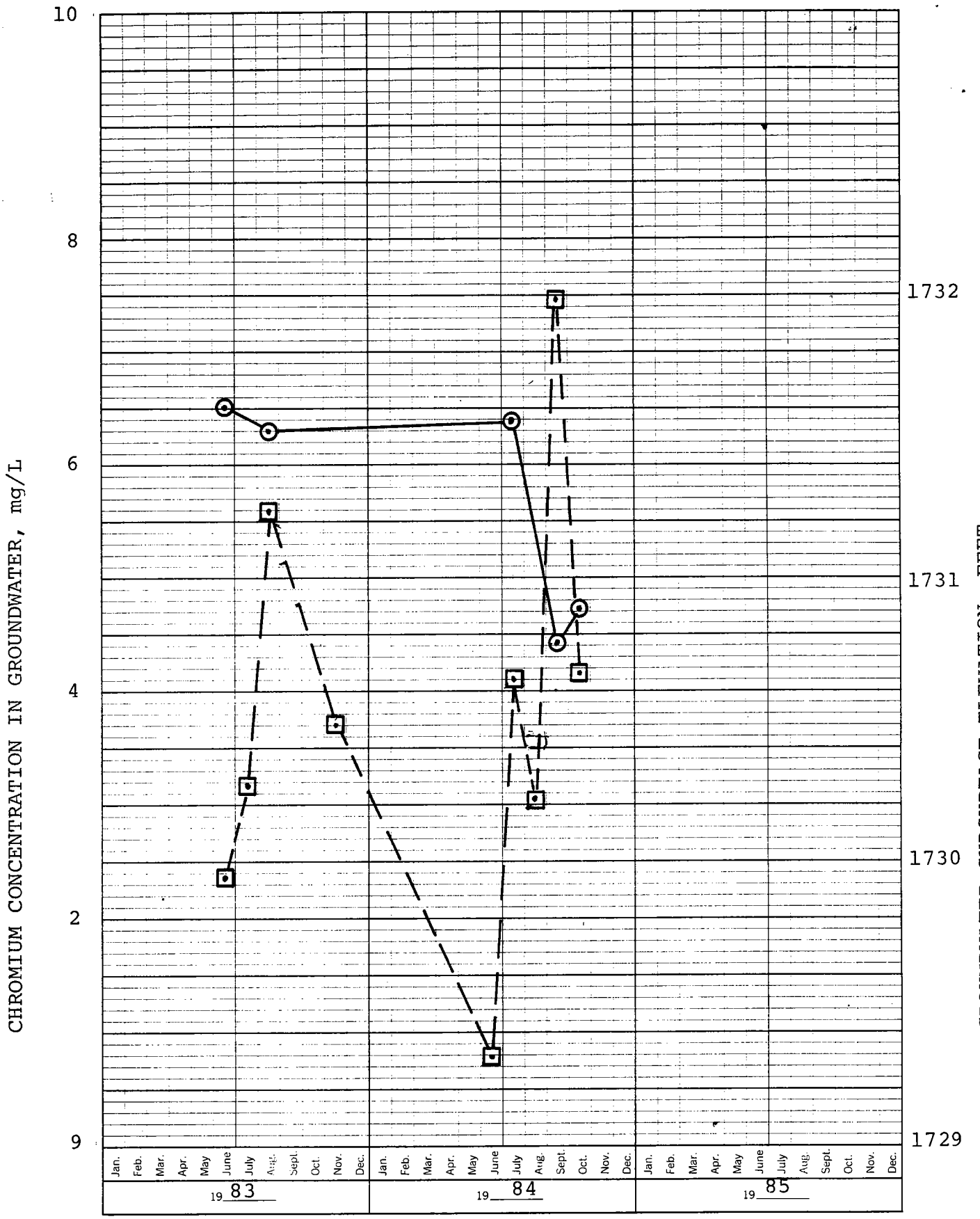


FIGURE 13: Well M-17, Henderson Facility, KMCC

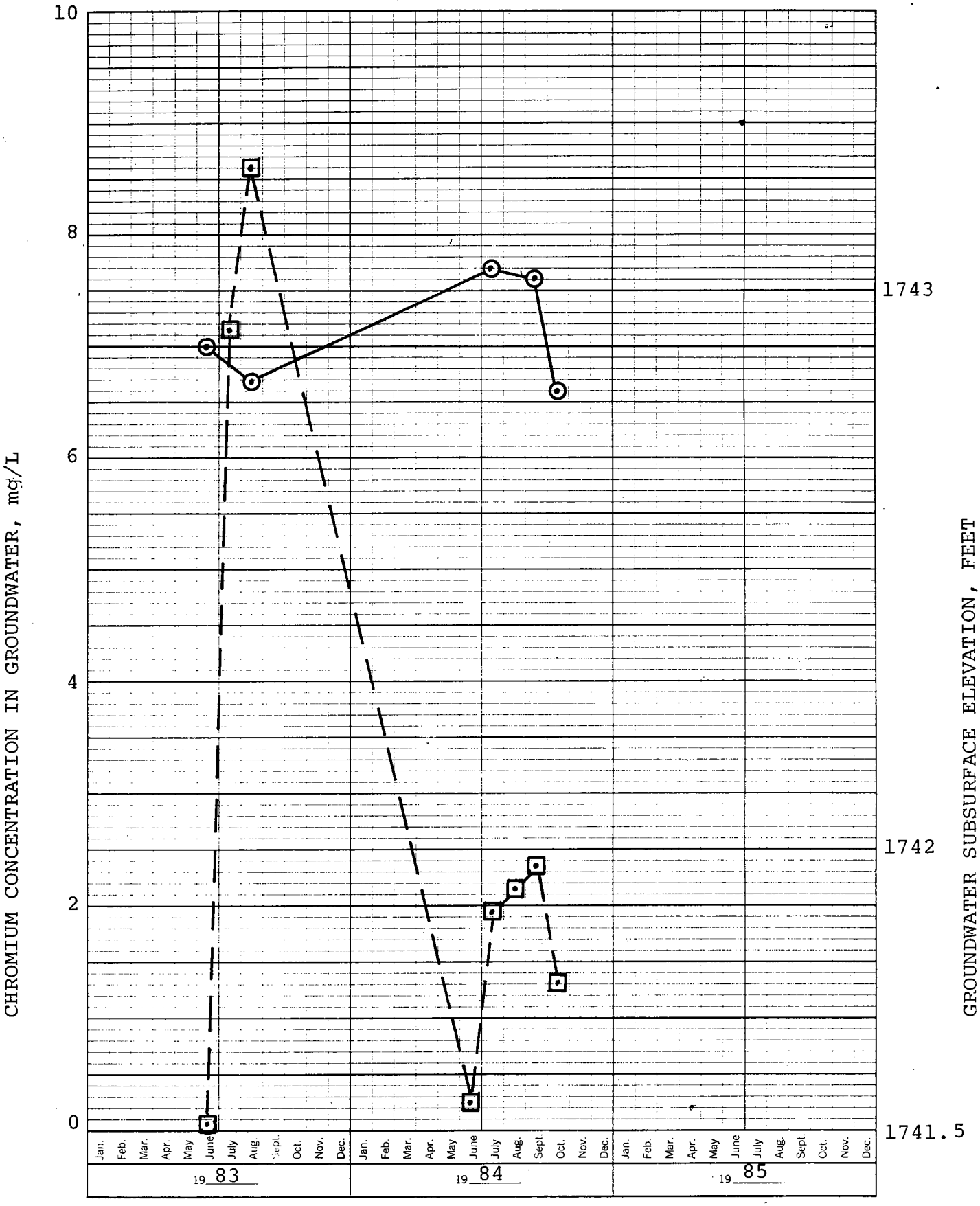


FIGURE 14: Well M-23, Henderson Facility, KMCC

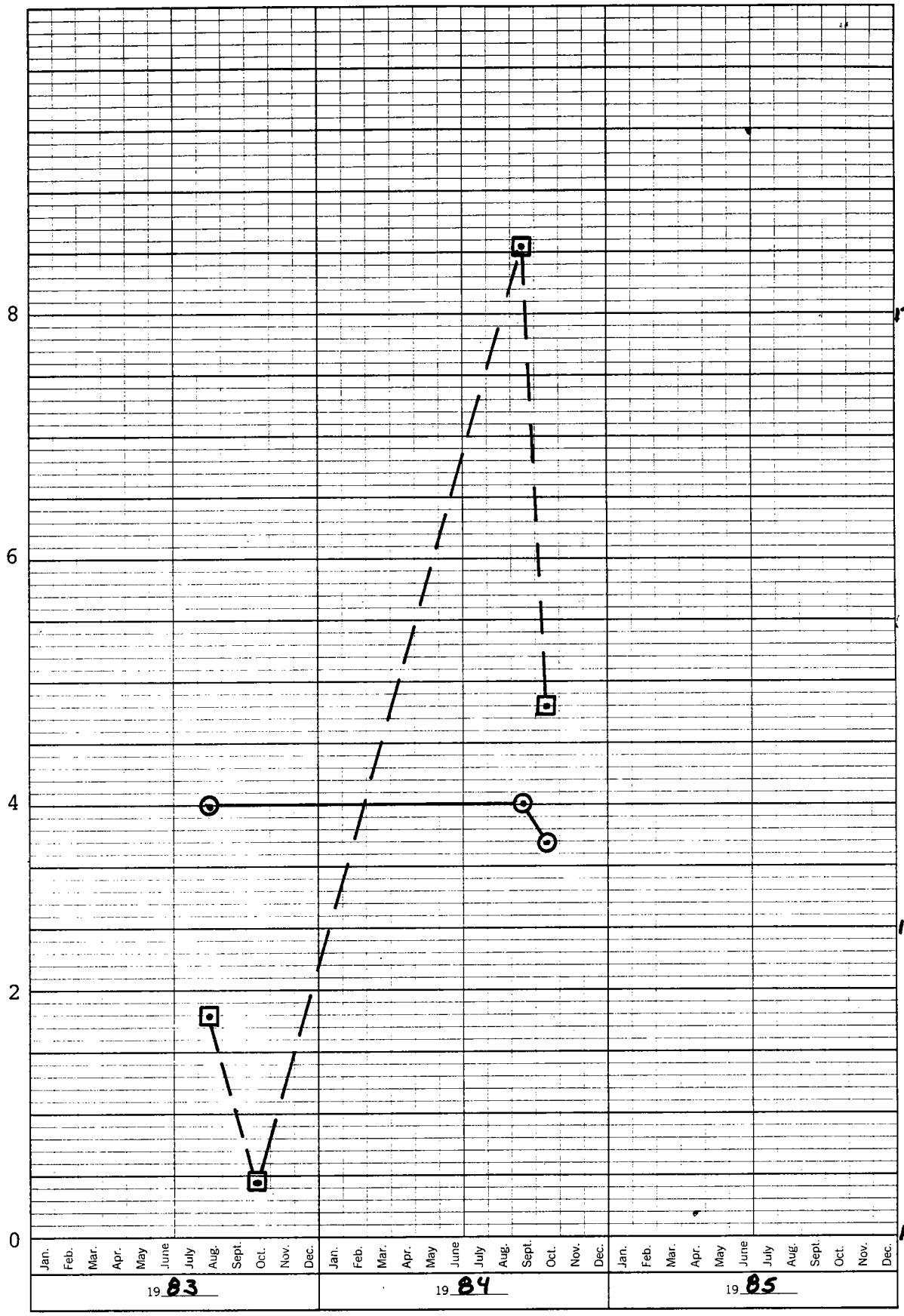


FIGURE 15: Well M-25, Henderson Facility, KMCC

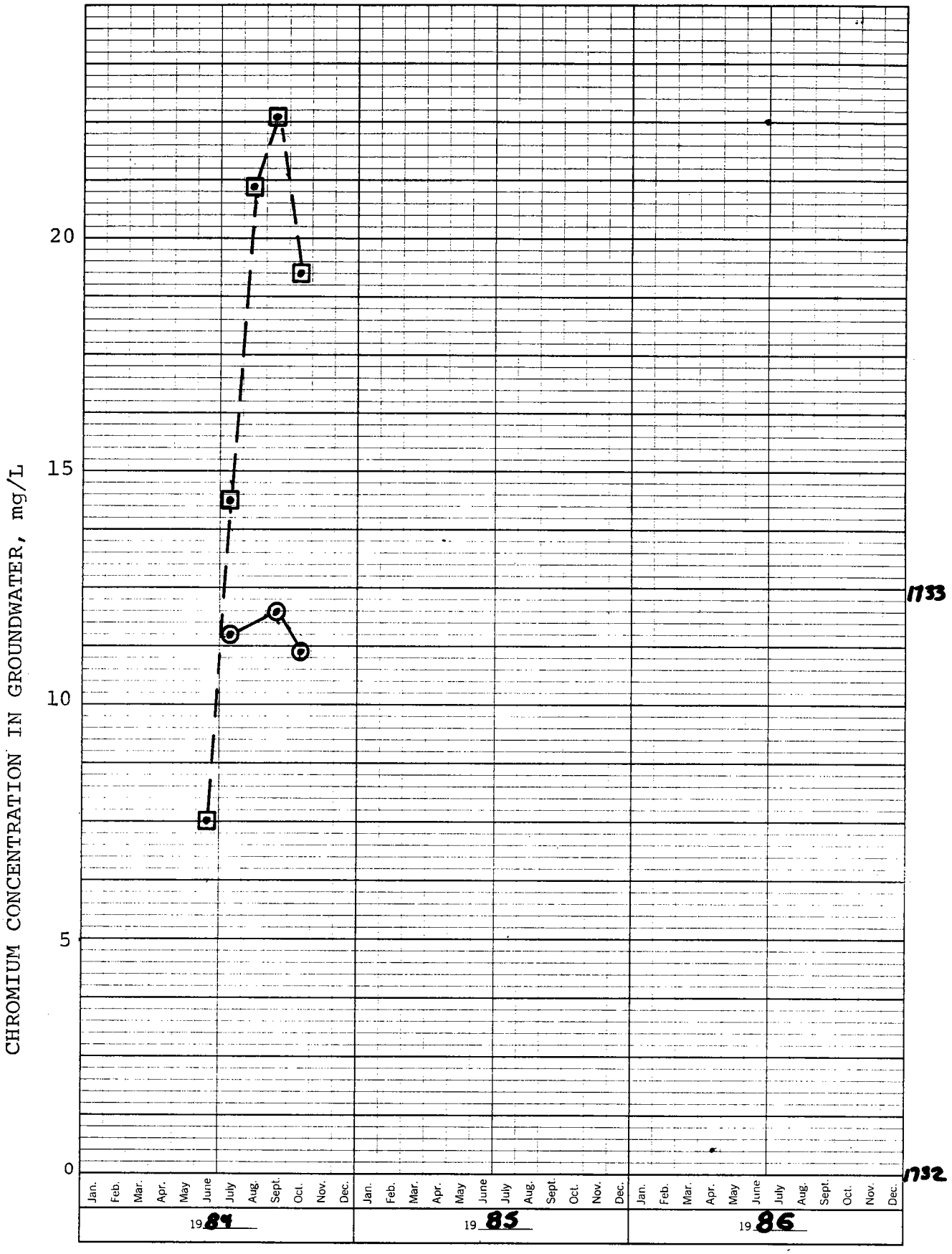
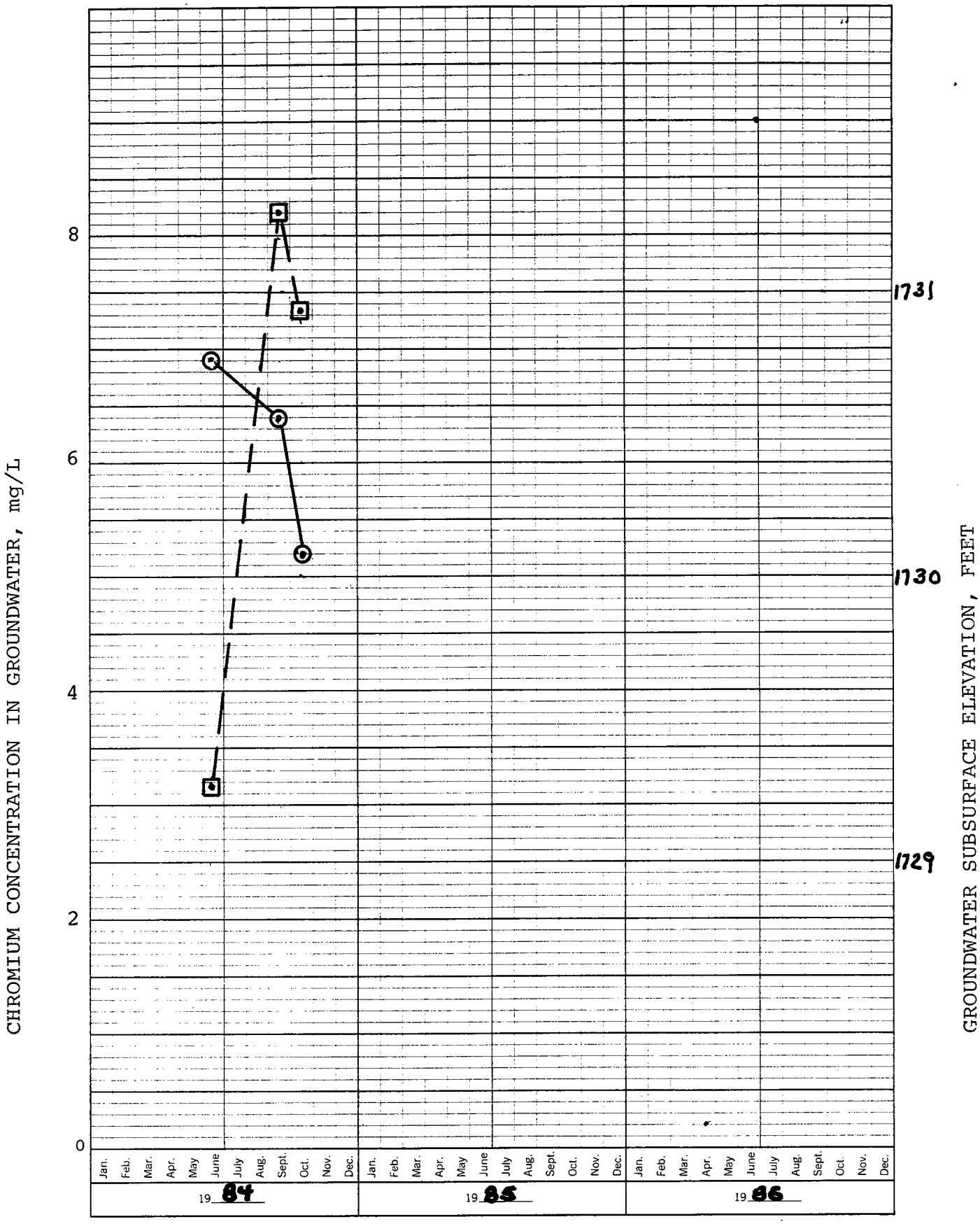


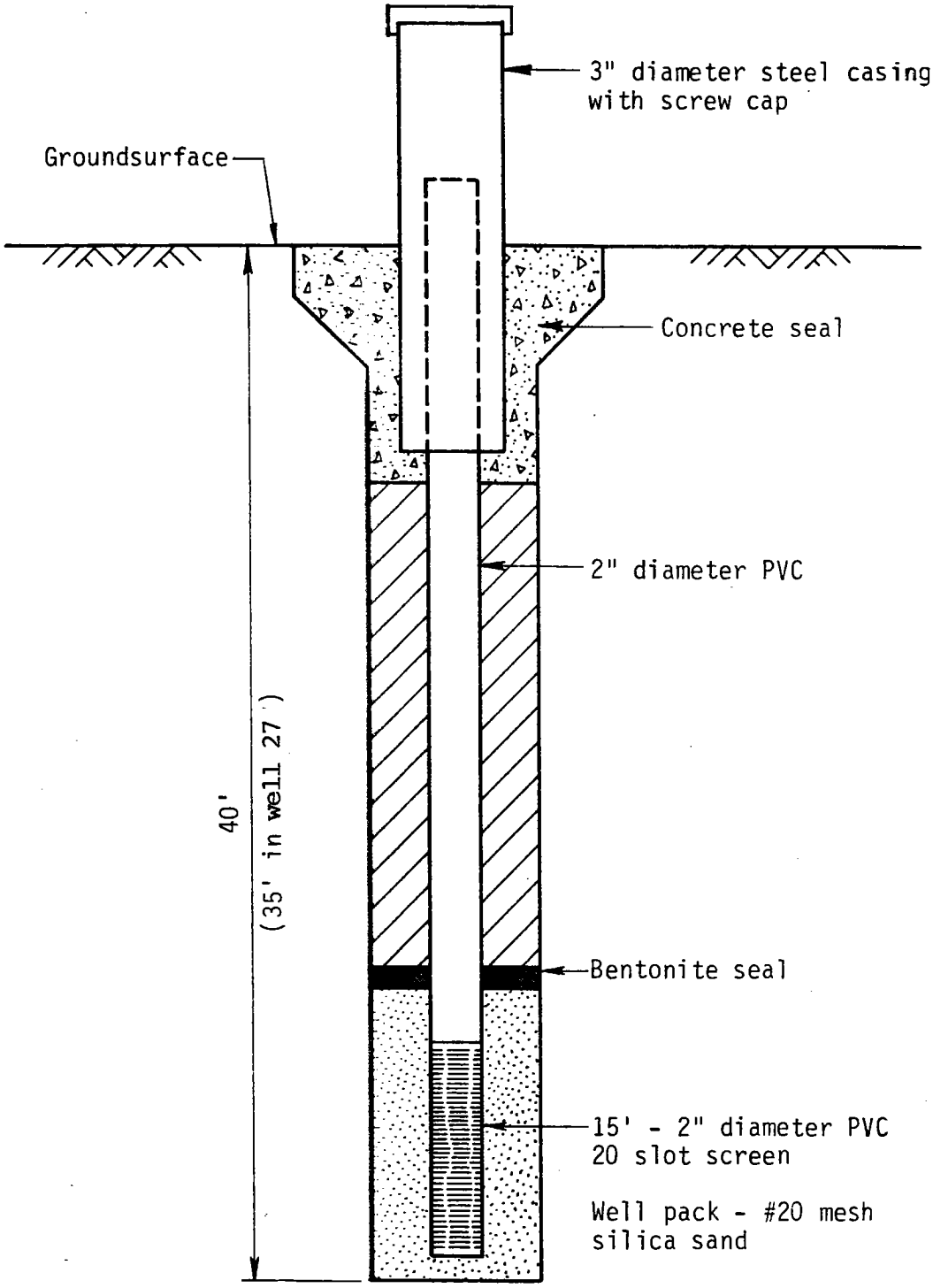
FIGURE 16: Well M-26, Henderson Facility, KMCC



A P P E N D I X A

WELL CONSTRUCTION DRAWING

LITHOLOGICAL LOGS



WATER SAMPLE WELL CONSTRUCTION

Project No.

84-3223

Figure No.

1

Converse Consultants Geotechnical Engineering and Applied Sciences

Approved for publication _____ by _____

LOG OF WATER SAMPLE WELL 24

DATE: 5/14/84

LOCATION: KMCC, Henderson, NV

ELEVATION:

DEPTH IN FEET	SAMPLES	SYMBOL	SOIL DESCRIPTION	COLOR	MOISTURE	CONSISTENCY	REMARKS
0–16		SW	GRAVELLY SAND with silt	light brown	dry / slightly moist		
16–18		GW	SANDY GRAVEL				
18–24		SW/GW	SAND & GRAVEL				
24–34		SW	GRAVELLY SAND				
34–36		SM	SILTY SAND				
36–40		ML	SILT				

End of well at 40.0 ft.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DRAWING NO 4

Converse Consultants — Consulting Engineers and Geologists

PROJ. NO. 84-3223-01

APPROVED FOR PUBLICATION ____ BY ____

FORM NO D

LOG OF \TER SAMPLE WELL 25

DATE: 5/14/84

LOCATION: KMCC, Henderson, NV

ELEVATION:

DEPTH IN FEET	SAMPLES	SYMBOL	SOIL DESCRIPTION	COLOR	MOISTURE	CONSISTENCY	REMARKS
0		SW	GRAVELLY SAND	light brown			
18		SW/ GW	SAND & GRAVEL	light brown & dark brown			
28		CL	SILT & CLAY				
40			End of well at 40.0 ft.				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DRAWING NO. 5

Converse Consultants *Consulting Engineers and Geologists*

PROJ. NO. 84-3223-01

APPROVED FOR PUBLICATION _____ BY _____

FORM NO. D

LOG OF WATER SAMPLE WELL 26

DATE 5/15/84

LOCATION KMCC, Henderson, NV

ELEVATION:

DEPTH IN FEET	SAMPLES SYMBOL	SOIL DESCRIPTION	COLOR	MOISTURE	CONSISTENCY	REMARKS
0	SW	GRAVELLY SAND with silt	light brown	dry		
2				slightly moist to moist		
4						
6						
8	GW	SANDY GRAVEL				
10	SW	GRAVELLY SAND				
12						
14						
16						
18						
20		---with trace silt, gravel varies, 15%-30% below 20'		moist		
22						
24						
26						
28				wet		
30						
32						
34						
36	CL	SILTY CLAY		very moist		
38						
40						

End of well at 40.0 ft.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DRAWING NO 6

Converse Consultants — Consulting Engineers and Geologists

PROJ. NO. 84-3223-01

APPROVED FOR PUBLICATION ____ BY ____

FORM NO D

L OF WATER SAMPLE WELL 27

DATE: 5/14/84

LOCATION: KMCC, Henderson, NV

ELEVATION:

DEPTH IN FEET	SAMPLES SYMBOL	SOIL DESCRIPTION	COLOR	MOISTURE	CONSISTENCY	REMARKS
0	SW	GRAVELLY SAND with trace silt	light brown	dry	v.loose	
2				slightly moist to moist	loose to medium dense	
4						
6						
8						
10	SW/GW	SAND & GRAVEL 40%-60% gravel				
12						
14						
16						
18						
20	SW	GRAVELLY SAND				
22						
24						
26						
28		CALICHE	light tan			
30						
32	SW	GRAVELLY SAND	light brown			
34						*See Note.
36						
38						
40						

End of well at 40.0 ft.

Note: Hole caved to 35' when PVC was installed. Okay per Kay Brothers.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DRAWING NO: 7

Converse Consultants — Consulting Engineers and Geologists

PROJ NO: 84-3223-01

APPROVED FOR PUBLICATION

BY

FORM NO D