Pacific Gas and Electric Company

Yvonne J. Meeks
Topock Project Manager
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Gas Transmission & Distribution

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December 19, 2006

Mr. Aaron Yue
Project Manager
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: Addendum to Work Plan for Hydraulic Testing in Bedrock Wells
PG&E Topock Compressor Station, Needles, California

Dear Mr. Yue:

This letter transmits an addendum to the *Work Plan for Hydraulic Testing in Bedrock Wells*, submitted to DTSC on November 10, 2006. This addendum describes proposed changes to the scope of planned activities due to the presence of injection piping inside well PGE-8.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 234-2257.

Sincerely,

Julie Eakins for Yvonne Meeks

cc. Karen Baker/DTSC
Chris Guerre/ DTSC
John Earle/HNWR
Casey Padgett/DOI

Enclosure

Technical Addendum: Work Plan for Hydraulic Testing in Bedrock Wells

PG&E Topock Compressor Station, Needles, California

DATE: December 19, 2006

Introduction

On November 10, 2006, Pacific Gas and Electric Company (PG&E) submitted the *Work Plan for Hydraulic Testing in Bedrock Wells* (work plan)(CH2M HILL 2006) to the California Department of Toxic Substances Control (DTSC). The work plan described the rationale and methods for hydraulic testing at the PG&E Topock Compressor Station near Needles, California. This work plan was submitted in response to the November 3, 2006 DTSC letter entitled "Additional Bedrock Investigation Based Upon Review of Bedrock Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California" to PG&E (DTSC 2006). The letter required that PG&E prepare a work plan to conduct hydraulic tests at three bedrock wells at the Topock site, including former injection well PGE-8. This work plan is currently pending DTSC approval.

As part of well maintenance activities in preparation for the upcoming testing, PG&E conducted a well bore video, natural gamma, and cement bond geophysical logging at well PGE-8 on November 17, 2006. During the well bore video, a length of 3-inch injection piping was found in the well starting at approximately 360 feet below ground surface (bgs). This piping is located approximately 45 feet above the beginning of the well screen/steel liner and is open to the screened interval below. This piping is believed to be attached to the packer originally installed in the well when it was used as an injection well. Notations on a "Hazardous Waste Injection Well Statement" submitted to the California Department of Health Services in 1987 indicate that the packer and a section of injection tubing were left in the well when it was taken out of service in December 1973 (PG&E 1987). The manufacturer of the packer, Baker Hughes Inc., was contacted regarding removal options for this packer. They reported that several models of packers were in production in the late 1960's. Some models are removable and some are not. Different combinations of pushing, pulling, and twisting are required to release different models of removable packers. Without knowledge of the model number of the packer in PGE-8 we cannot determine whether or not it is removable, and if so, what sequence of forces would need to be applied to release it. Because of this uncertainty, any attempt to remove this packer would present a significant risk of damage to the well casing or pinching off of the 3-inch injection piping. If the injection piping were pinched off, flow from the screened interval of the well below the packer could be impeded, preventing the planned hydraulic testing of the well.

So long as the 3-inch piping and packer remain undamaged, a pump can be installed above the packer and water from the well screen can flow upward through the open injection piping allowing the planned hydraulic testing of the well to be completed. There are, however, certain activities identified in the work plan will not be possible to perform at this well while the piping and packer remain in place.

This addendum to the *Work Plan for Hydraulic Testing in Bedrock Wells* describes proposed changes to the scope of planned activities at PGE-8.

Changes in Scope for Activities Planned at PGE-8

Activities described in the hydraulic testing work plan at well PGE-8, which will not be feasible with the 3-inch piping and packer in the well, are:

- Well bore videoing below the piping.
- Geophysical logging below the piping.
- Well redevelopment.

Well Bore Videoing

Video survey below the piping (360 feet bgs) is not possible using conventional well bore video methods. There are small diameter cameras that could pass through the 3-inch piping, however there is no way to insure that the camera would drop through the 3-inch pipe rather than run alongside it. The casing in this well is in relatively good condition until at least the 360-foot-bgs point (221 feet below water level). The well bore video report with pictures of the casing and piping encountered can be found in Attachment A. Cement bond logging on November 17, 2006 also confirmed that there is a good seal between the cement/grout and the casing (up to 360 feet bgs). The cement bond geophysical log is included as Attachment B. Video survey of the screened intervals would have provided an assessment of the condition of the screen and would have been useful in selecting methods and intervals for redevelopment. Without the possibility of redeveloping the well, video survey of the interval below the packer would provide marginal value.

Geophysical Logging

Geophysical logging was previously conducted at PGE-8 in April 1969 after the initial completion of this boring to 530 feet bgs (Dames and Moore, 1969). Natural gamma, spontaneous potential, and resistivity logs were run in well PGE-8. The April 1969 logs are provided as Attachment C of this addendum. Natural gamma logs run on November 2006 (up to 360 feet bgs) are included as Attachment D of this addendum.

Although it is theoretically possible to fit a geophysical logging tool through the injection piping in order to log on the downhole side of the tubing, this task likely would prove to be very difficult, if not impossible. The piping appears offset in the well (Attachment A), so maneuvering a tool through this pipe may not be possible. Alternatively, the tool could be caught between the pipe and the casing and become wedged before it made it through the pipe, resulting in a lost tool and a plugged pipe. Since additional geophysical log

information exists for this well, the benefits of trying to perform limited access logging are outweighed by the risks of damaging or plugging the access pipe; as such, the logging will not be performed.

Well Redevelopment

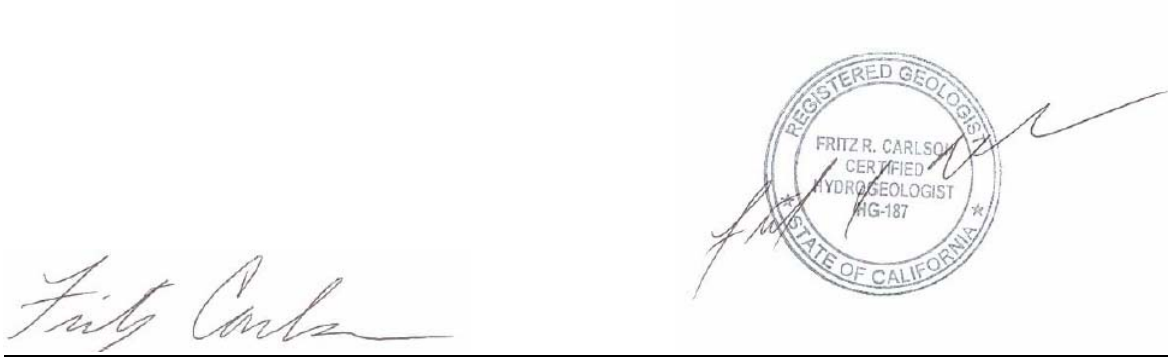
Redevelopment of this well with the piping and packer in place will not be possible. As discussed previously, the presence of the piping and packer should not have an adverse effect on the yield of this well during hydraulic testing, since the pipe is unrestricted and approximately 3 inches in diameter. Prior to conducting the video and geophysical logs, site sampling crew technicians performed a brief pump test on November 14, 2007. Goals of this short test were to confirm that the casing and drop-pipe were in satisfactory condition and to get a preliminary understanding of what this well may yield.

Two-hundred gallons of water were pumped using the sampling pump currently installed in this well (located at approximately 290 feet bgs) over an 80-minute test. The flow rate was variable during the first 10 minutes of pumping (1.7 to 4.2 gallons per minute [gpm]), then the flow rate stabilized at about 2 gpm over the next 70 minutes. During this 70-minute period, drawdown was steady at about 10 feet, resulting in a specific capacity of approximately 0.2 gpm/foot. Full recovery took approximately 75 minutes once the pump was shut off.

Depth to water is about 140 feet bgs and, during testing, the pump will be set at approximately 350 feet bgs. This allows an approximate 200-foot column of water above the pump available for drawdown during hydraulic testing. Historically, the best flow rate this well could sustain was 20 gpm. The specific capacity of 0.2 gpm/foot was obtained at a flow rate of approximately 2 gpm, and higher flow rates will most likely result in lower specific capacities due to the increasing effects of well inefficiency. Due to the presence of the 3-inch pipe, it is not possible to redevelop the screened zone, which limits the specific capacity of the well to that of the current condition of the well. The target rate of 20 gpm would result in 100 feet of drawdown at the measured specific capacity, but would likely result in drawdown close to the pump intake if specific capacity was significantly lower than 0.2 gpm/foot. The current sustainable pumping rate for PGE-8 is unknown, but the limitation of pumping with a 200-foot water column above the pump may have an effect on the maximum discharge rate for the constant rate portion of the test.

Certification

This addendum to the work plan was prepared by CH2M HILL under the supervision of the professional whose seal and signature appears herein in accordance with currently accepted professional practices. No warranty, expressed or implied, is made.



Fritz Carlson
Certified Hydrogeologist

References

California Department of Toxic Substances Control (DTSC). 2006. Letter. "Additional Bedrock Investigation Based Upon Review of Bedrock Technical Memorandum at Pacific Gas and Electric Company, Topock Compressor Station, Needles, California." November 3.

CH2M HILL. 2006. *Work Plan for Hydraulic Testing in Bedrock Wells. PG&E Topock Compressor Station, Needles, California*. November 10.

Dames & Moore. 1969. *Proposed System for Waste Water Disposal, Topock Compressor Station Near Needles, California.* Prepared for Pacific Gas and Electric Company. August 19.

Pacific Gas and Electric Company (PG&E). 1987. *Hazardous Waste Injection Statement*. November 16.

Attachment A
PGE-8 Well Bore Video Report November 2006

Vid-Pac — Wellbore Video Report

welenco (800) 445-9914

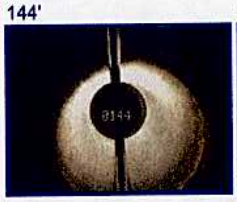
Company: Ch2MHILL
Address: 33 New Mongomery Street Suite 2000
City: San Francisco State: CA Zip: 94105
Requested By: Isaac Woods P.O.:
Copy To:
Reason For Survey: General Inspection
Operator: Larry Hock Lat.: 34° 42' 50.3" Long. 114° 29' 39.6" Sec: 8 Twp: 7N Rge: 24E Meridian: San Bernardino
Location: PG & E Facility (Topock)
Casing I.D. At Surface: 6" I.D. Reference: Estimate from Video Casing Corrosion: Light

Job Ticket: 6819 Run No.: 1
Well Number: PGE-8
Survey Date: November 17, 2006
Well Owner: PG & E
Camera: CCV S.S. Color Camera - Long L.H.
Zero Datum: Top of Casing
Well Depth: 560' Van: L-18

(NOTE: Latitude and Longitude values determined using a recreational GPS accurate to +/- 45'. The SEC, TWP, RGE and Meridian then determined using the TRS conversion program, accuracy not guaranteed.

SELECTED WELLBORE SNAPSHOTS

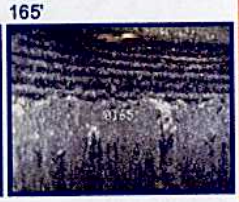
144'



145' (See Other Side)

152' (See Other Side)

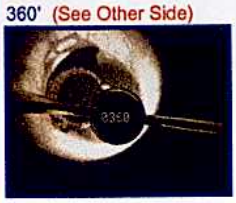
165'



203' (See Other Side)

305' (See Other Side)

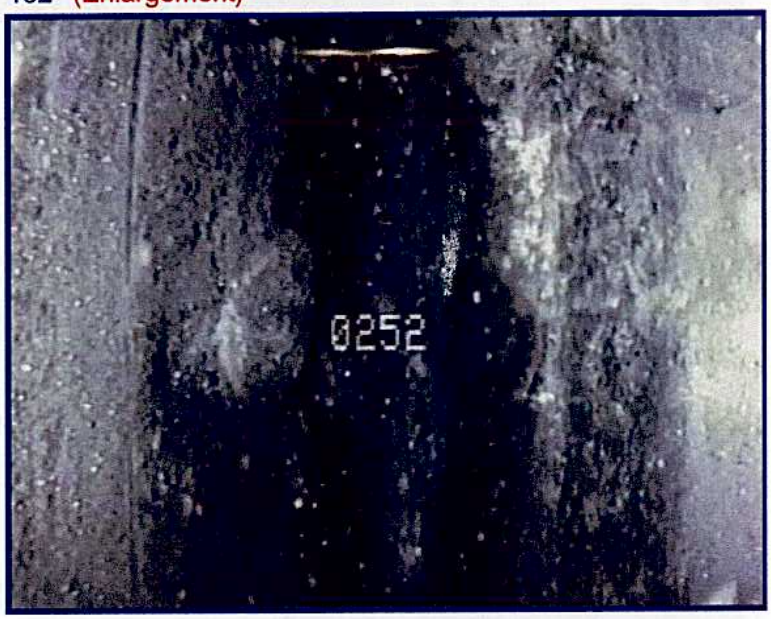
360' (See Other Side)



TRUE DEPTHS (SideScan - Feet)	WELLBORE / CASING INFORMATION
	Downview Depths are 22" deeper than SideScan Depths
0'	Recording Starts - Zeroed on Sideview Lens at top of casing
39'	Stop recording, pull out of well, clean lens
35'	Resume survey
139'	Static water level
144'	Downview of casing @ 145'
145'	Casing joint
165'	Casing joint
203'	Nodule on casing wall
252'	Marks on casing wall
305'	Casing joint
360'	Fish in hole, possible pipe in well, unable to get camera past this point
359'	Stop recording and survey

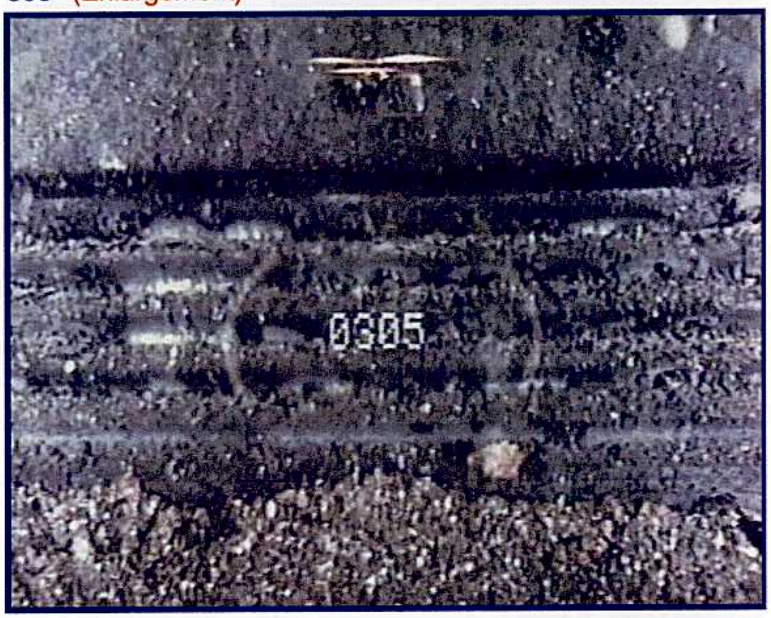
145' (Enlargement)

152' (Enlargement)

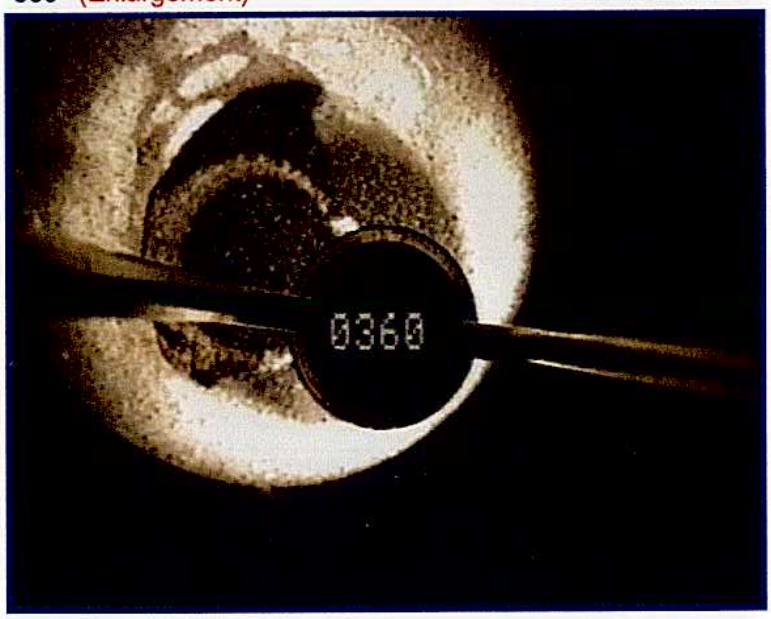


203' (Enlargement)

305' (Enlargement)



360' (Enlargement)



Attachment B
PGE-8 Cement Bond Geophysical Logs from November 2006

welenco

CEMENT BOND \ VDL LOG

FILING NO.

JOB NO.
6819

COMPANY Ch2M HILL
WELL PGE-8
FIELD TOPOCK
COUNTY SAN BERNARDINO STATE ARIZONA

LOCATION: PG&E Facility Topock

SEC 8 TWP 7N RGE 24E

OTHER SERV:
Gamma Ray

PERMANENT DATUM: Ground Level ELEV:

LOG MEASURED FROM G.L. 0 FT ABOVE PERM DATUM

DRILLING MEASURED FROM Ground Level

ELEVATION:
KB.
DF.
GL.

DATE	11/17/2006		
TYPE OF LOG	Cement Bond		
RUN NO.	One		
DEPTH - DRILLER	560		
DEPTH - LOGGER	360		
BOTTOM LOGGED INT	357		
TOP LOGGED INT	140		
TYPE FLUID IN HOLE	Water		
FLUID LEVEL	140		
MAX TEMP DEG F			
OPERATING RIG TIME	N/A		
EQUIP. / LOCATION	L-18 / BFL		
OPERATOR	L. HOCK		
WITNESSED BY	R. DeLaParra		

RUN NO.	BORE HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	TYPE	FROM	TO
				6"	Steel	0	405
				4"	Steel	405	550

EQUIPMENT DATA

LOG TYPE	CEMENT BOND		
RUN NO.	ONE		
TOOL MODEL NO.	SIE		
TOOL SERIAL NO.	T-116		
DIAMETER	2.125		
DETECTOR TYPE	PIEZO		
DETECTOR LENGTH	3'		
UNITS/DIV.	N/A		
SENSITIVITY	1.0		
TIME CONSTANT	N/A		
ZERO DIV L OR R	0-L		
SPEED-FPM	18		
FLUID LEVEL	139		
FORMATION FACTOR	N/A		
PUMP RATE-GPM	N/A		
PUMP RATE-GPM	N/A		
PUMP RATE-GPM	N/A		

SOURCE TYPE	STRENGTH	SPACING	MODEL NO	SERIAL NO.

PERFORATIONS:

REMARKS:

NOTICE:
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and

DEPTHS

200 Microseconds 1200

VARIABLE DENSITY LOG

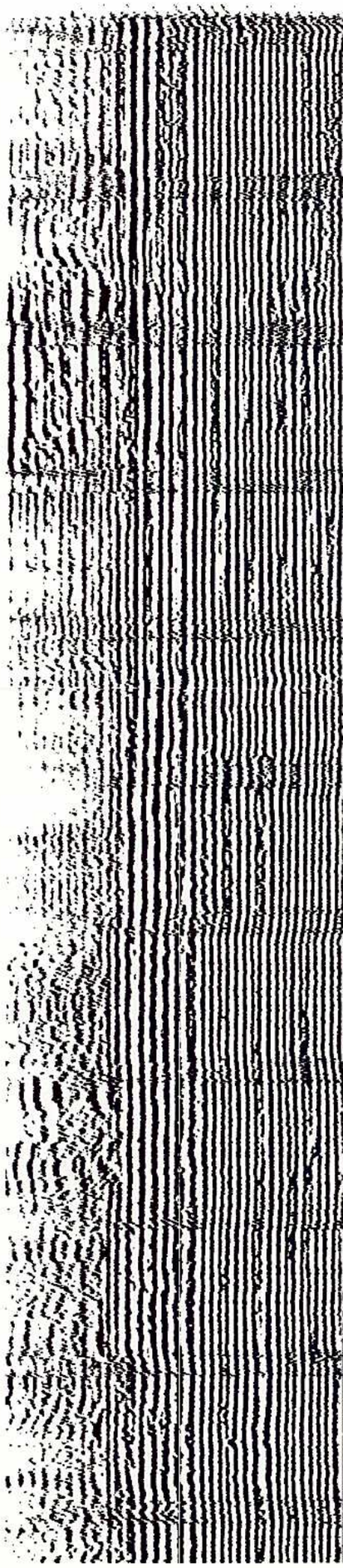
150

200

250

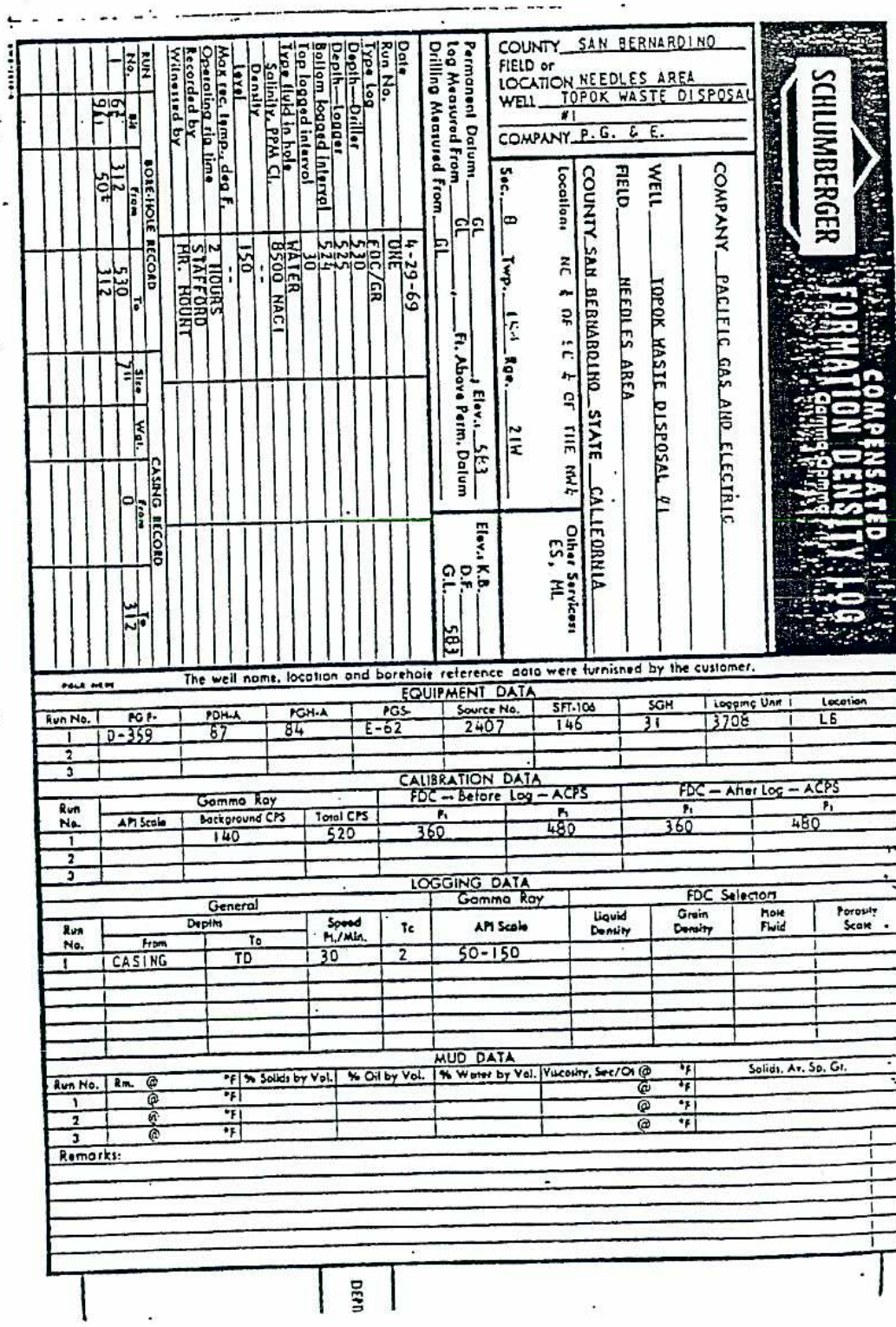
300

350



Attachment C
PGE-8 Geophysical Logs from April 1969

PGE-8 April 1969
Geophysical Log #2



SCHLUMBERGER

COMPENSATED FORMATION DENSITY LOG

COMPANY PACIFIC GAS AND ELECTRIC

WELL TOPOK WASTE DISPOSAL #1

FIELD NEEDLES AREA

COUNTY SAN BERNARDINO STATE CALIFORNIA

Location: NE ¼ NE ¼ SE ¼ OF THE NW ¼

Sec. 8 Twp. 11N Rge. 21W

Other Services: ES, ML

Elev.: K.B. —
D.F. —
G.L. 583

COUNTY SAN BERNARDINO
FIELD or LOCATION NEEDLES AREA
WELL TOPOK WASTE DISPOSAL #1
COMPANY P. G. & E.

Permanent Datum GL
Log Measured From GL, Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: 583

Date	4-29-69
Run No.	ONE
Type Log	FDC/GR
Depth—Driller	530
Depth—Logger	525
Bottom logged interval	524
Top logged interval	30
Type fluid in hole	WATER
Salinity, PPM Cl.	8500 NACl
Density	150
Level	--
Max rec. temp., deg F.	2 HOURS
Operating rig time	STAFFORD
Recorded by	MR. HOURT
Witnessed by	

BOREHOLE RECORD

Run No.	Bit From	Bit To	Size
1	312	530	7⅞
1	50±	312	

CASING RECORD

Run No.	Wgt.	From	To
1		0	312

The well name, location and borehole reference data were furnished by the customer.

EQUIPMENT DATA

Run No.	PG P-	PDM-A	PGM-A	PGS-	Source No.	SFT-106	SGH	Logging Unit	Location
1	D-359	67	84	E-62	2407	146	31	3708	LB
2									
3									

CALIBRATION DATA

Run No.	Gamma Ray			FDC — Before Log — ACPS		FDC — After Log — ACPS	
	API Scale	Background CPS	Total CPS	P1	P2	P1	P2
1		140	520	360	480	360	480
2							
3							

LOGGING DATA

Run No.	General Depths From	To	Speed Ft./Min.	Tc	Gamma Ray API Scale	FDC Selectors Liquid Density	Grain Density	Hole Fluid	Porosity Scale
1	CASING	TD	30	2	50-150				

MUD DATA

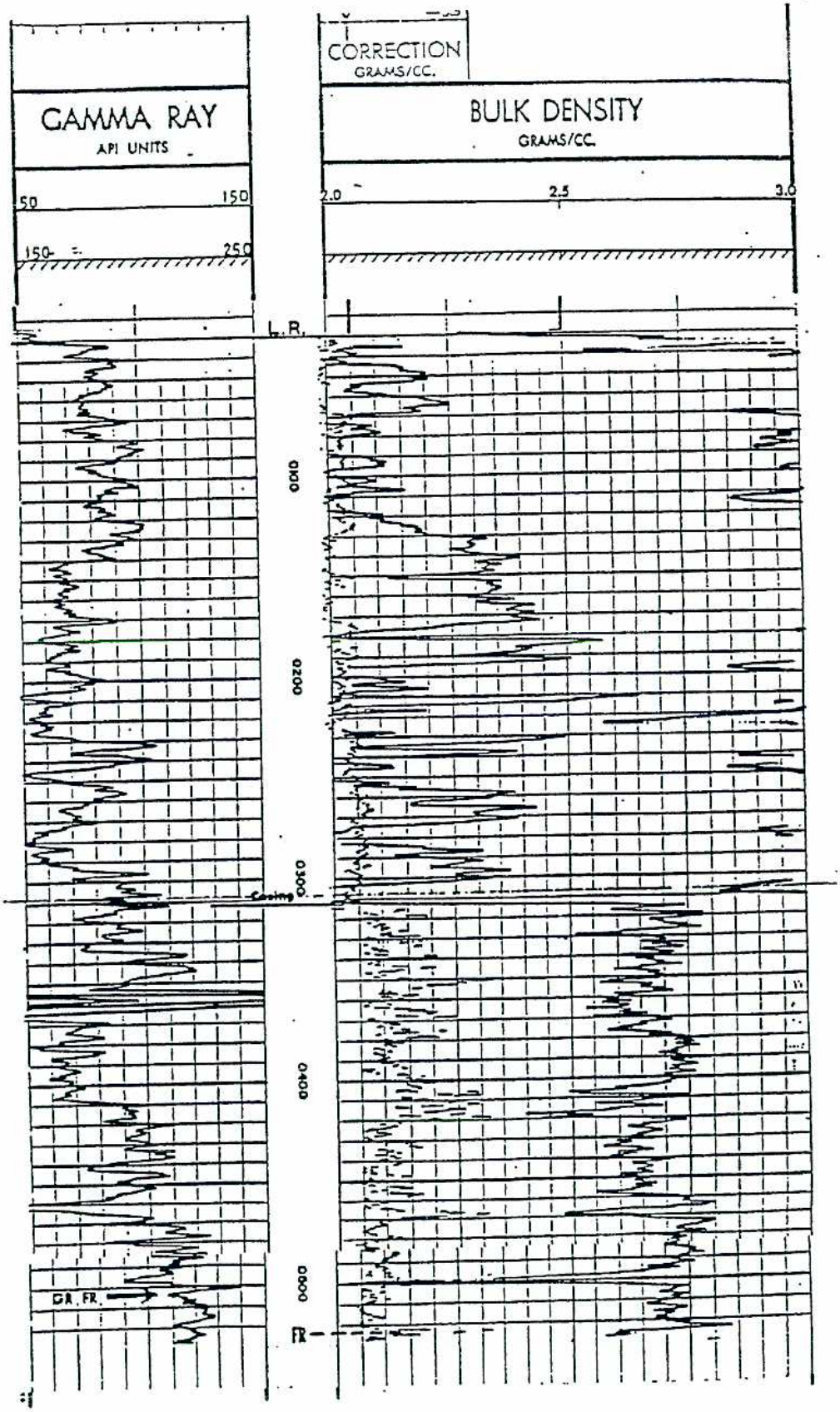
Run No.	Rm. @ °F	% Solids by Vol.	% Oil by Vol.	% Water by Vol.	Viscosity, Sec/Qt @ °F	Solids, Av. Sp. Gr.
1	@ °F				@ °F	
2	@ °F				@ °F	
3	@ °F				@ °F	

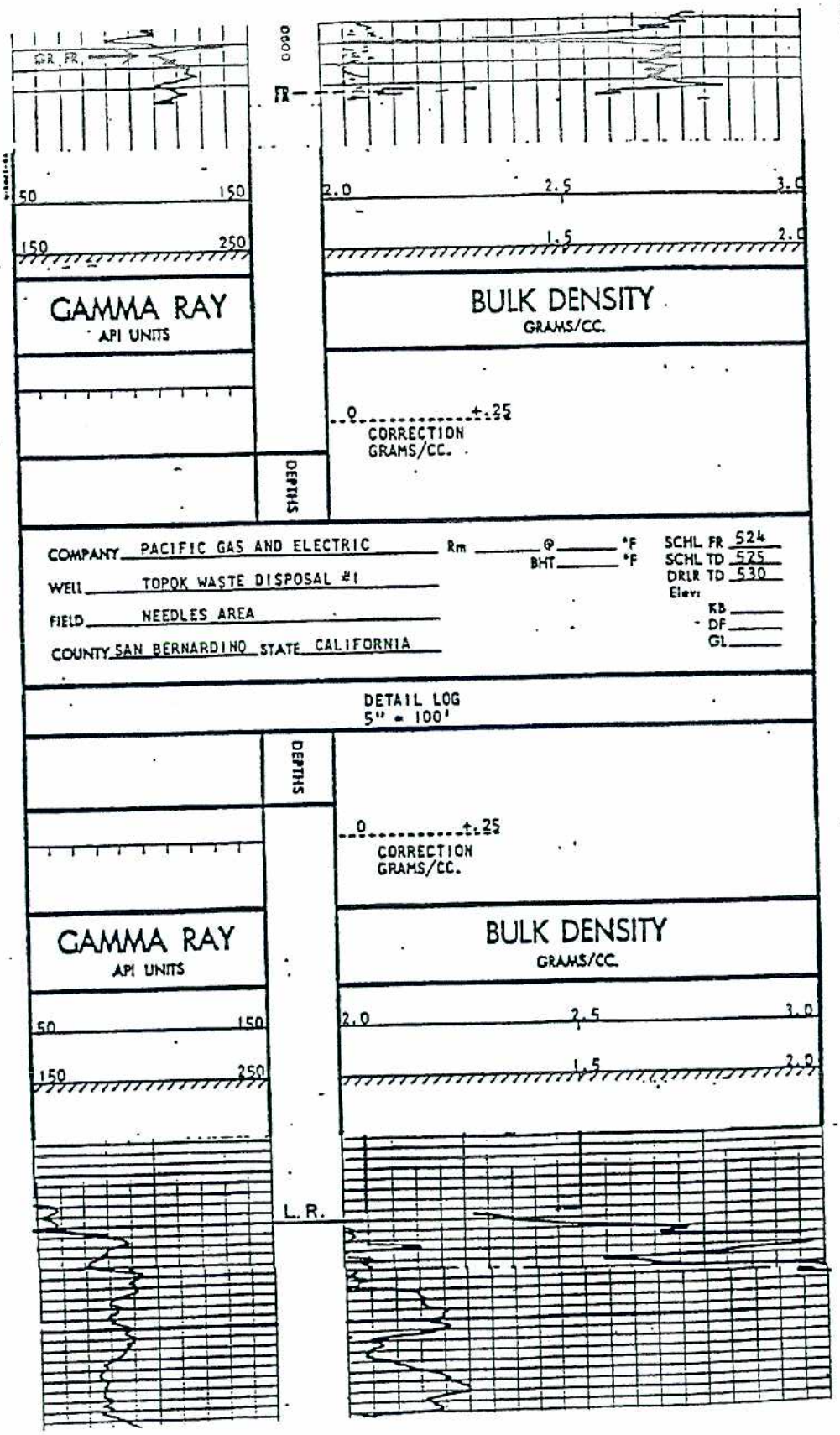
Remarks:

DEPTH

POOR QUALITY ORIGINAL

PG40323921

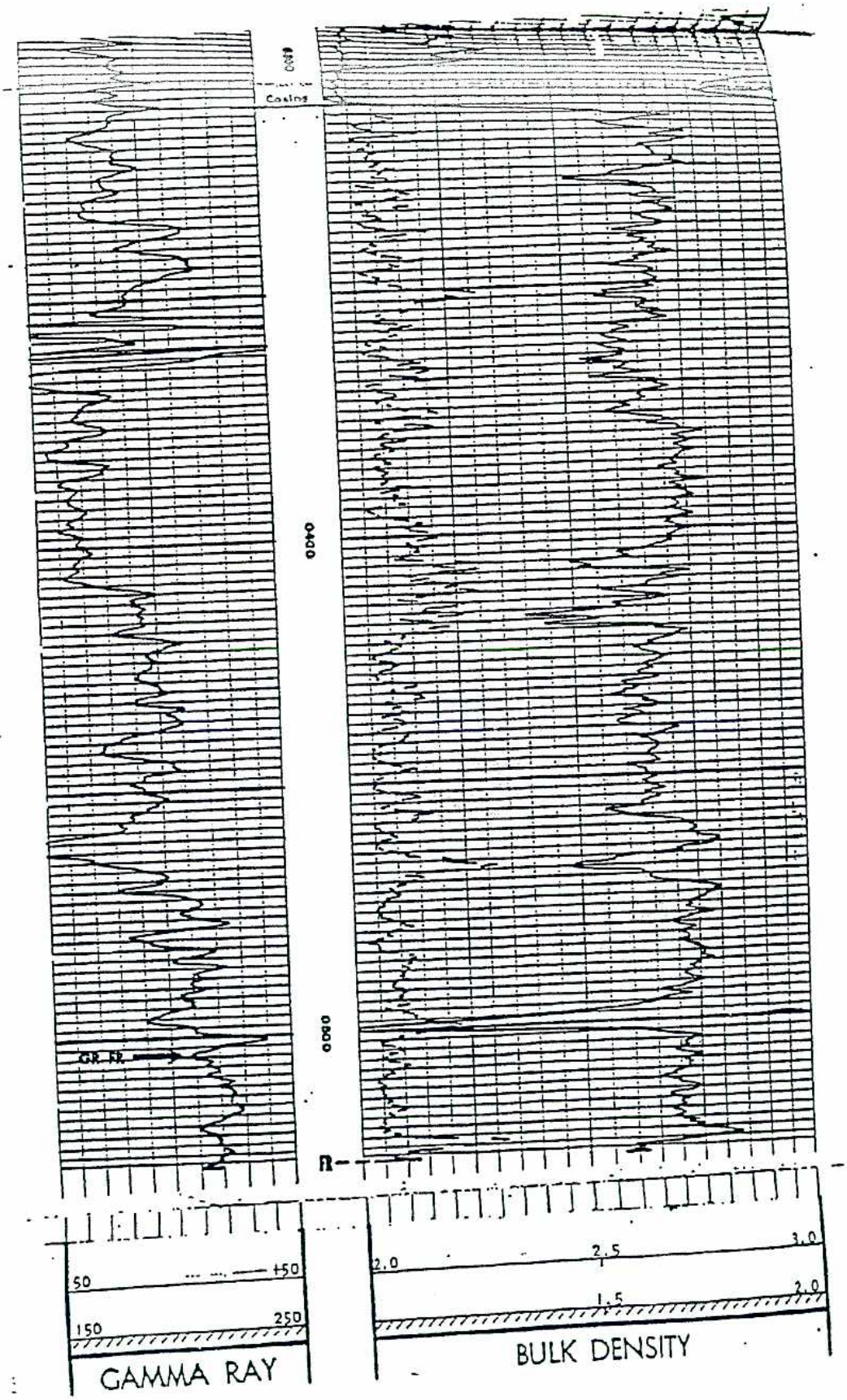




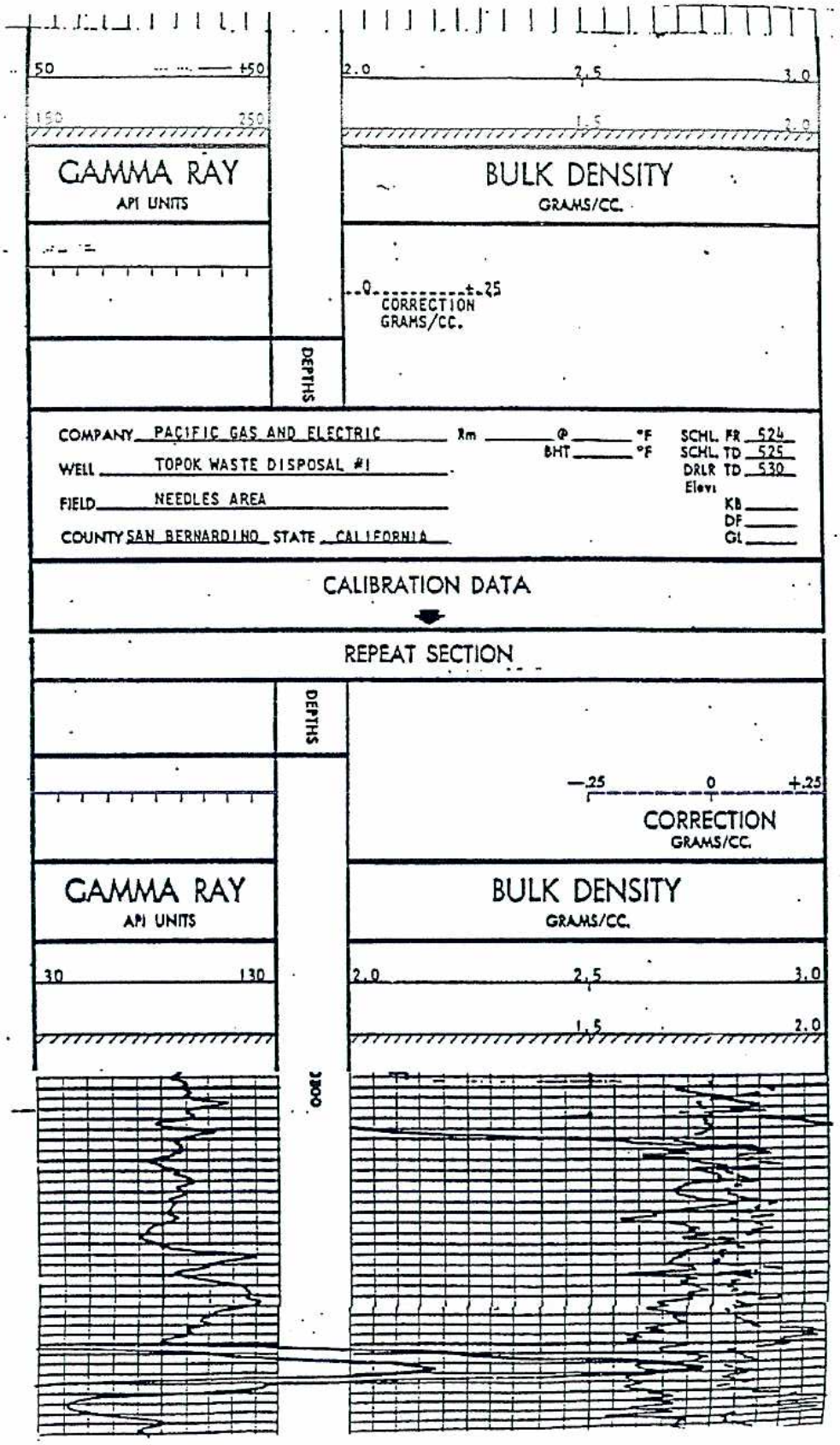
POOR QUALITY
ORIGINAL

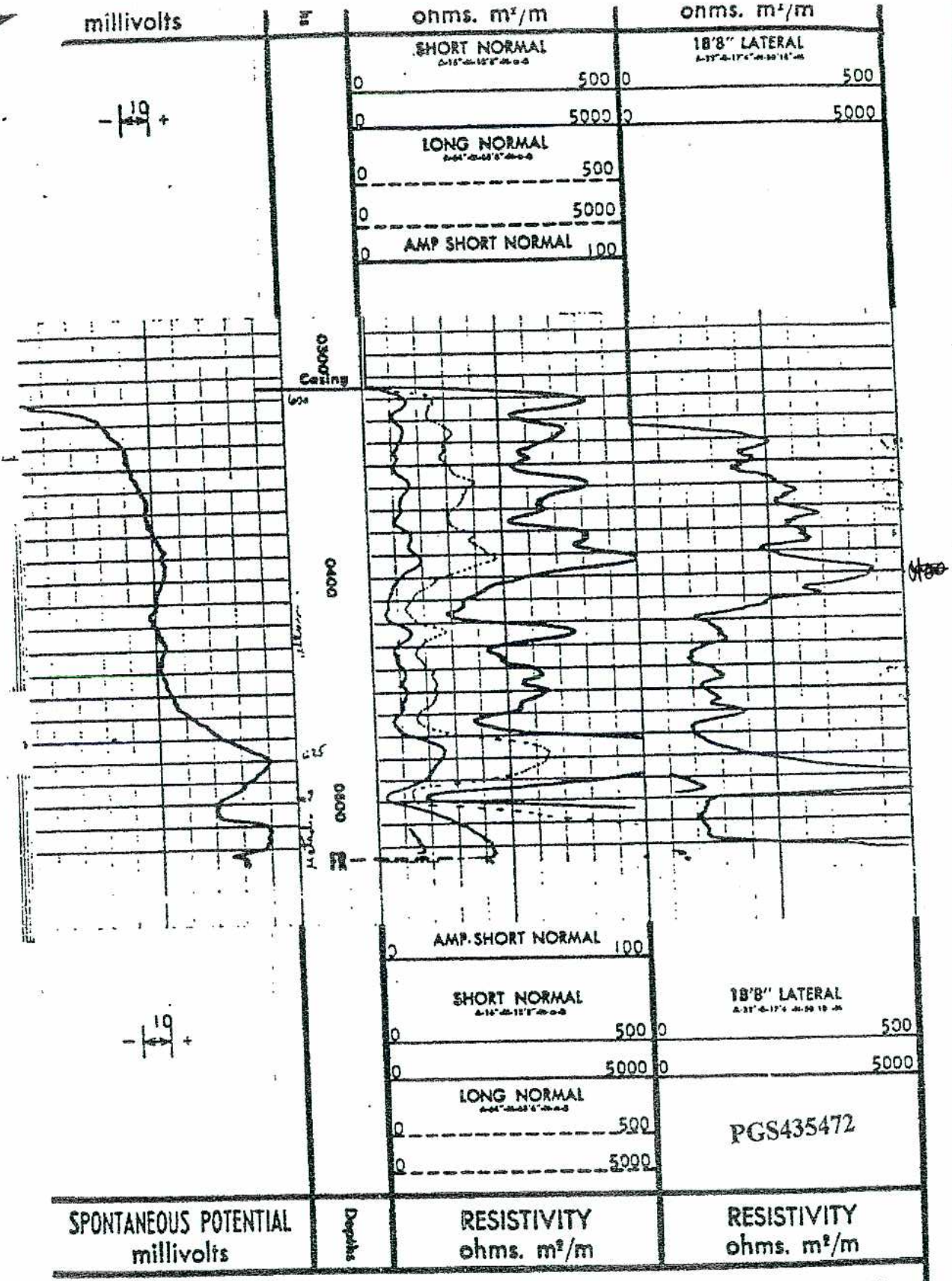
PG40323923

POOR QUALITY
ORIGINAL



POOR QUALITY ORIGINAL





PGS435472

COMPANY PACIFIC GAS AND ELECTRIC

WELL TOPOK WASTE DISPOSAL #1

FIELD NEEDLES AREA

COUNTY SAN BERNARDINO STATE CALIFORNIA

Rm 0.58 @ 85 °F

Rmf 0.58 @ 85 °F

Rmc @ °F

BHT 85 °F

SCHL. FR 524

SCHL. TD 525

DRLR TD 530

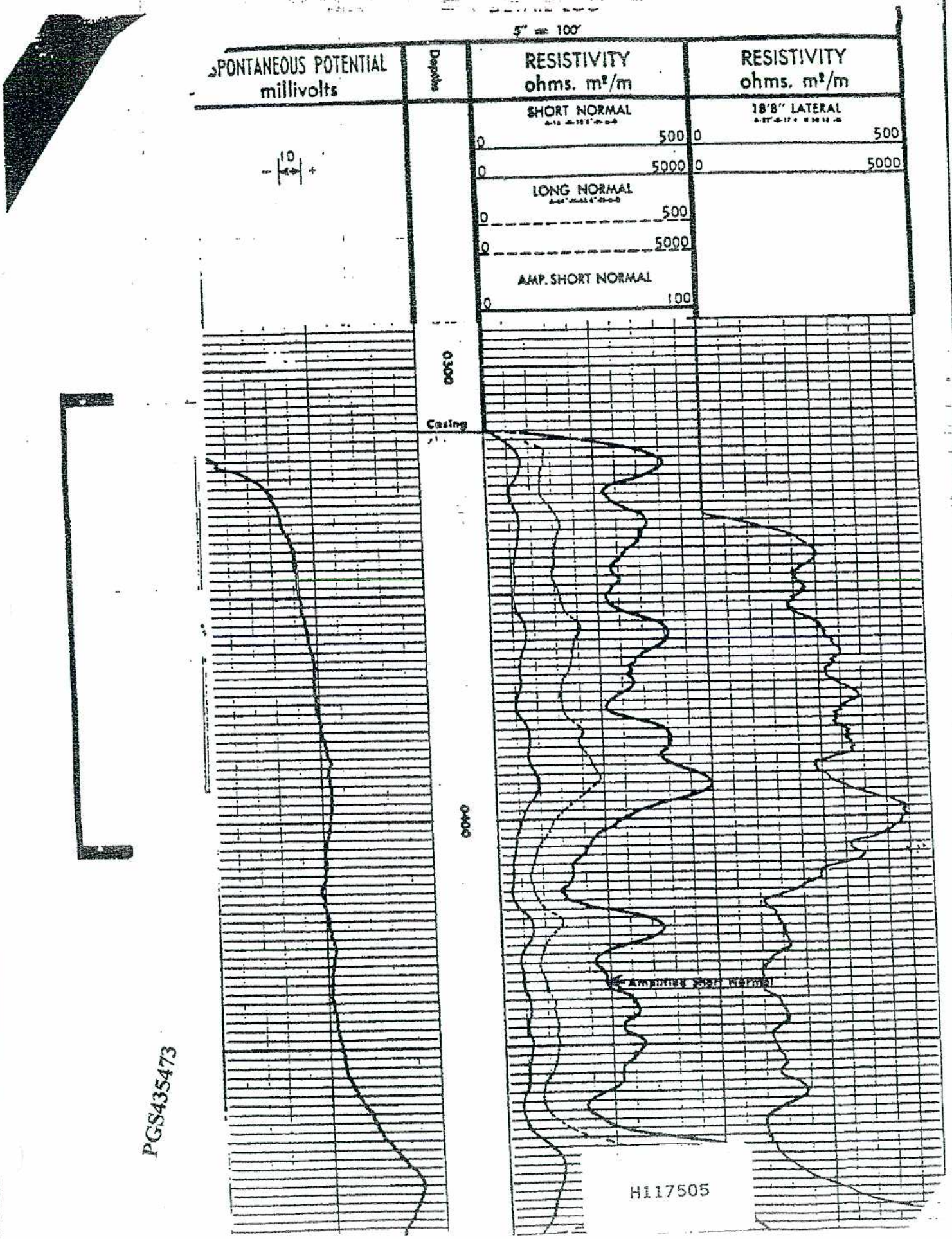
Elev:

KB

DF

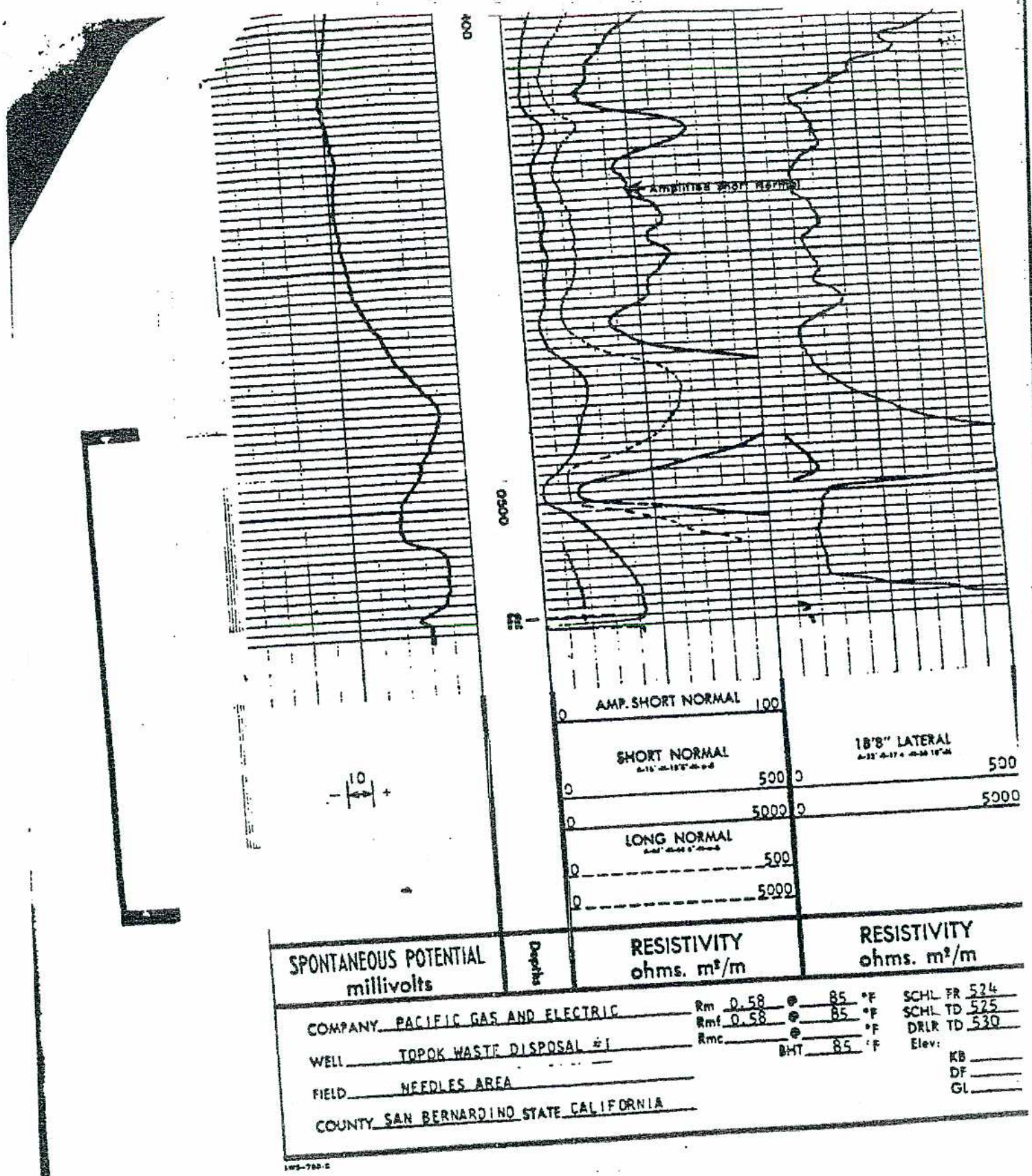
GL

H117504



PGS435473

H117505



H117506

PGS435474

Attachment D
PGE-8 Natural Gamma Log from November 2006

welenco

5201 Woodmere Drive, Bakersfield, CA 93313– www.welenco.com–(800) 445-9914
California Contractor's License No. 722373

GAMMA RAY LOG

FILING NO.

COMPANY Ch2M HILL

WELL PGE-8

FIELD Topock

STATE Arizona COUNTY San Bernardino

LOCATION: PG & E Facility (Topock)

OTHER SERVICES: CBL/Video

JOB NO. 6819

SEC: 8 TWP: 7N RGE: 24E LAT.: 34° 42' 50.4" LONG.: 114° 29' 39.6" MERIDIAN: San Bernardino

Permanent Datum: Ground Level, Elev. _____ Ft. Elev.: K.B. _____ Ft.
Log Measured From: Ground Level, 0 Ft. Above Perm. Datum D.F. _____ Ft.
Drilling Measured From: Ground Level G.L. _____ Ft.

Date	Nov. 17, 2006			
Type Of Log	Gamma Ray			
Run	One			
Depth-Driller	560 Ft	Ft	Ft	Ft
Depth-Logger	360 Ft	Ft	Ft	Ft
Top Logged Interval	0 Ft	Ft	Ft	Ft
Btm. Logged Interval	353 Ft	Ft	Ft	Ft
Type Fluid In Hole	Water			
Fluid Level	139 Ft	Ft	Ft	Ft
Max Temp	°F	°F	°F	°F
Operating Rig Time	Hr	Hr	Hr	Hr
Van No. / Location	L-18 / Bfld			
Recorded By	Larry Hock			
Witnessed By	R. De La Parra			

RUN NO.	BOREHOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	TYPE	FROM	TO
1	In	Ft	Ft	6 In	Steel	0 Ft	405 Ft
2	In	Ft	Ft	4 In	Steel	405 Ft	550 Ft
3	In	Ft	Ft	In		Ft	Ft

Miscellaneous Information

Remarks:

A recreational GPS accurate to +/- 45 feet set for Datum NAD27 was used to calculate Latitude, Longitude & Elevation values. The Section, Township, and Range then determined using the TRS program (TRS accuracy is not guaranteed). The TRS program converts Latitude and Longitude to Section, Township, and Range. The NOTICE at the bottom of this heading also applies.

Perforated Intervals:

Line Speed:

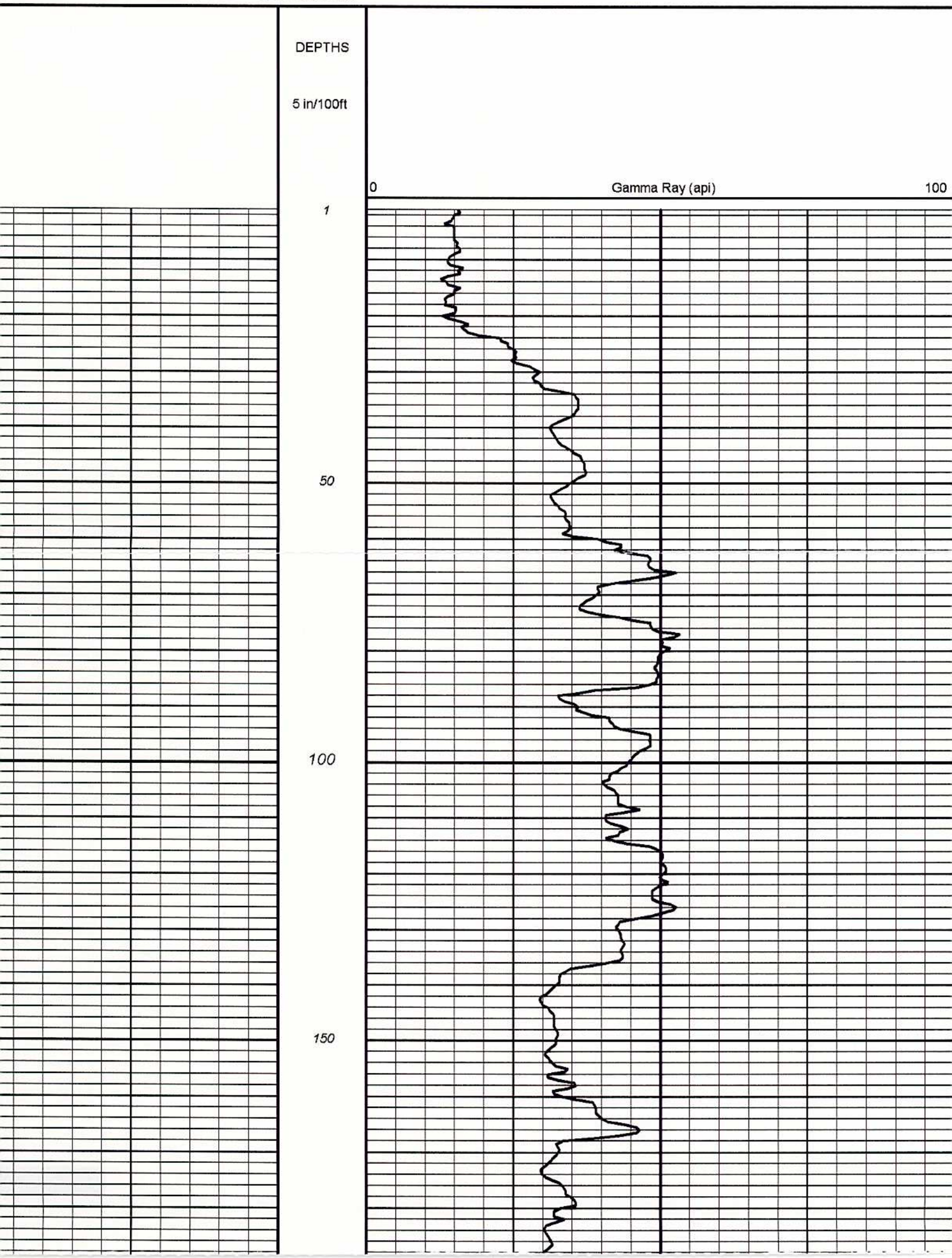
Borehole/Annular Volume Calculations:

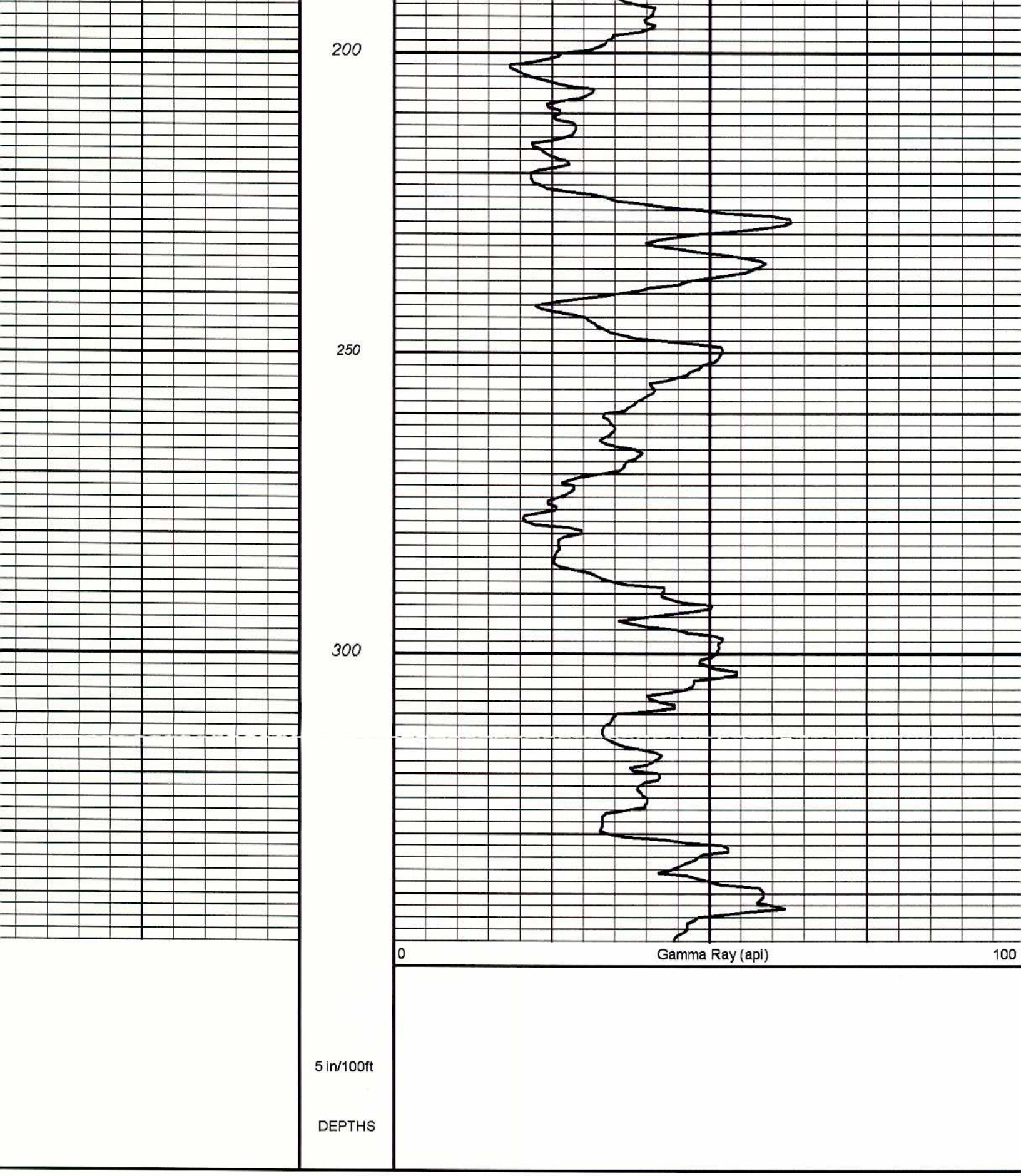
Other Information:

NOTICE: All interpretations are opinions based on inferences from electrical and other measurements and we do not guarantee the accuracy or correctness of any verbal or written interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule. ***welenco, inc. November 21, 2006***

Geophysical Well Log

Ch2M HILL PGE-8 Nov 17, 2006 C:\.....6819.lhf




200
250
300
0
Gamma Ray (api)
100
5 in/100ft
DEPTHS