St Clair Undergro Storage Well No 1-7BDW
State of Michigan rmit Designation: BD 151

Form Approved. OMB No. 2040-0042. Expires 9-30-86

Form 4 UIC	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **UNDERGROUND INJECTION CONTROL PERMIT APPLICATION** *(Collected under the authority of the Safe Drinking Water Act, Sections 1421, 1422, 40 CFR 144)*	I. EPA ID NUMBER MID 065 517 077	T/A	C
		U		

READ ATTACHED INSTRUCTIONS BEFORE STARTING
FOR OFFICIAL USE ONLY

Application approved mo	day	year	Date Received mo	day	year	Permit/Well Number	Comments

II. FACILITY NAME AND ADDRESS

Facility Name: St. Clair Underground Storage
Street Address: 2510 Busha Highway
City: Marysville State: MI ZIP Code: 48040

III. OWNER/OPERATOR AND ADDRESS

Owner/Operator Name: St. Clair Underground Storage/Consumers Power Co.
Street Address: 2510 Busha Highway
City: Marysville State: MI ZIP Code: 48040

IV. OWNERSHIP STATUS *(Mark 'x')*

☐ A. Federal ☐ B. State ☒ C. Private
☐ D. Public ☐ E. Other *(Explain)*

V. SIC CODES

4789

VI. WELL STATUS *(Mark 'x')*

☒ A. Operating — Date Started: mo 10 day 02 year 71
☐ B. Modification/Conversion ☐ C. Proposed

VII. TYPE OF PERMIT REQUESTED *(Mark 'x' and specify if required)*

☒ A. Individual ☐ B. Area

Number of Existing wells	Number of Proposed wells	Name(s) of field(s) or project(s)

VIII. CLASS AND TYPE OF WELL *(see reverse)*

A. Class(es) *(enter code(s))*	B. Type(s) *(enter code(s))*	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
II	D		

IX. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR PROJECT

C	A. Latitude Deg	Min	Sec	B. Longitude Deg	Min	Sec	Township and Range Twsp	Range	Sec	¼ Sec	Feet from	Line	Feet from	Line
I							5N	17E	7	NW	140	N	623	W

X. INDIAN LANDS *(Mark 'x')*

☐ Yes ☒ No

XI. ATTACHMENTS

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

FOR CLASSES I, II, III (and other classes) complete and submit on separate sheet(s) Attachments A — U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application:

XII. CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
Management Committee D E Lutz, General Superintendent/R J Odlevak, Chairman	313-364-8100 517 788-2235
C. Signature: D E Lutz 10/17/89 R J Odlevak	D. Date Signed: 10/17/89

Suggested Format EPA ID No. MID 065 571 077

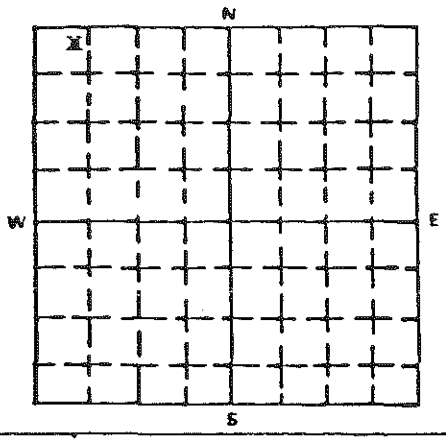
U... D STATES ENVIRONMENTAL PROTECTION ...NCY
WASHINGTON, D.C. 20460

EPA

PLUGGING AND ABANDONMENT PLAN

WELL NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER	NAME, ADDRESS, & PHONE NUMBER OF OWNER/OPERATOR
1-7 BDW	St. Clair Underground Storage/Consumers Power Co. 2510 Busha Hwy, Marysville, MI 48040 313-364-8100

Locate Well And Outline Unit On Section Plat — 640 Acres



STATE	COUNTY	STATE PERMIT NUMBER
MI	St. Clair	BD-151 (Mich)

SURFACE LOCATION DESCRIPTION
NW 1/4 of NW 1/4 of NW 1/4 section 7 Township 5N Range 17E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location 140 ft. From (N/S) N Line Of Quarter Section
And 623 ft From (E/W) W Line Of Quarter Section

TYPE OF AUTHORIZATION
- XX Individual Permit
- ☐ Rule
- ☐ Area Permit

Number of Wells in Area Permit one

U S EPA Permit Number _____

WELL ACTIVITY
- ☐ Class I
  - ☐ Hazardous
  - ☐ Nonhazardous
- XX Class II
  - XX Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☐ Class III
- ☐ Class V

CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	Wt (lb/ft) TBG-CSG	Original Amount (CSG) (ft)	CSG to be Left in Well (ft)	Hole Size (in)	Sacks Cement Used	Type
5-1/2"	15		4731			
8-5/8"	32		500	(already cement filled)		

METHOD OF EMPLACEMENT OF CEMENT PLUGS
- XX The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two Plug Method
- ☐ Other, Explain:

CEMENT TO PLUG AND ABANDON DATA:	Plug # 1	Plug # 2	Plug # 3	Plug # 4	Plug #	Plug #	Plug #
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	5-1/2"	5-1/2"	5-1/2"	5-1/2"			
Calculated Top of Plug (ft) Bridge plug-cast iron	4633	4383	550	3			
Measured Top of Plug (ft)							
Depth to Bottom of Plug (ft)	4638	4633	4383	550			
Sacks of Cement to be Used		29		63			
Slurry Volume to be Used (cu ft)		34		74			
Slurry Weight (lb/gal)		15.6		15.6			
Type of Cement, Spacer or Other Material Used		Class A	Sat Brine	Class A			
Type of Preflush Used	Fresh Water			Fresh Water			

DESCRIPTION OF PLUGGING PROCEDURE

Pull 2-1/2" tubing and packer. Set bridge plug just above perforations. Fill 5-1/2" casing with 250' of cement. Fill with saturated brine to 550' below surface. Fill casing with 547' of cement. Cut and weld-cap 5-1/2" and 8-5/8" casing 3' below ground level.

ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	$ 4000	Cast Iron Bridge Plug	$ 1200
Logging	$ N/A	Cement Retainer	$ N/A
Rig or Pulling Unit	$ 6000	Miscellaneous	$ 2000

CERTIFICATION

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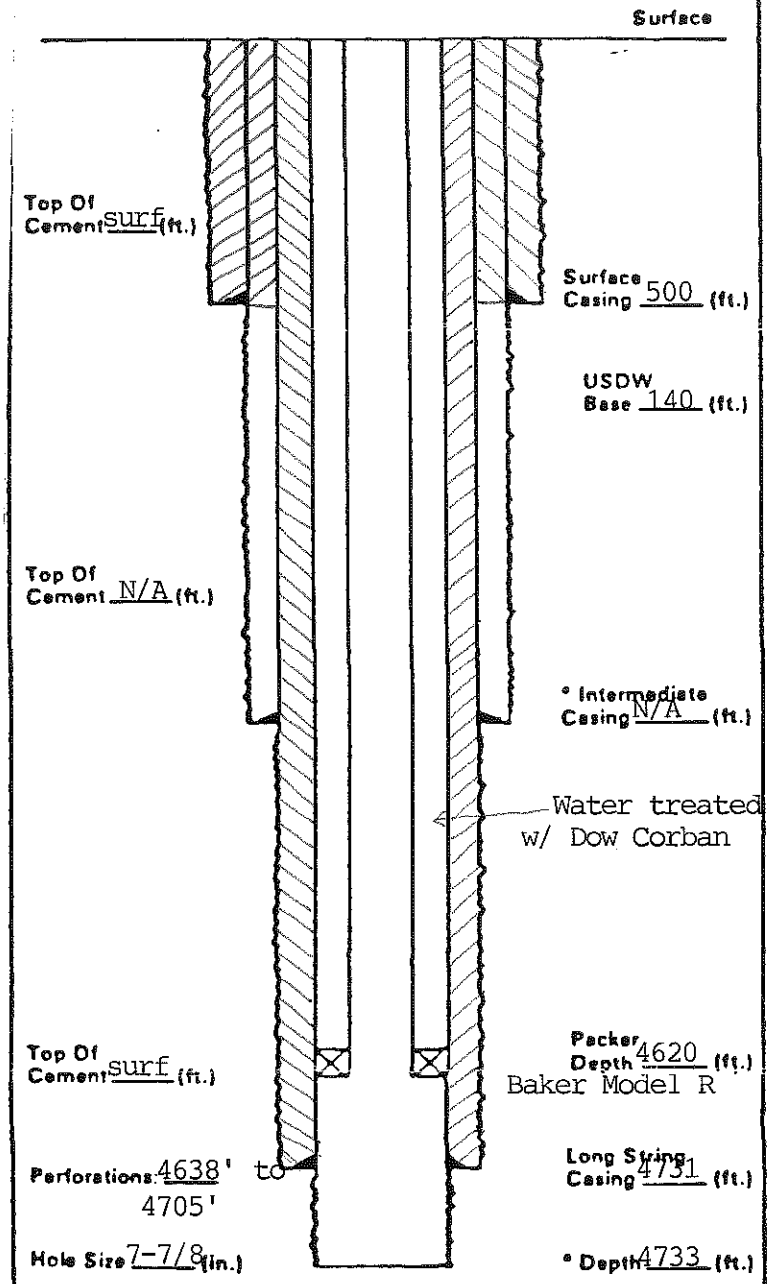
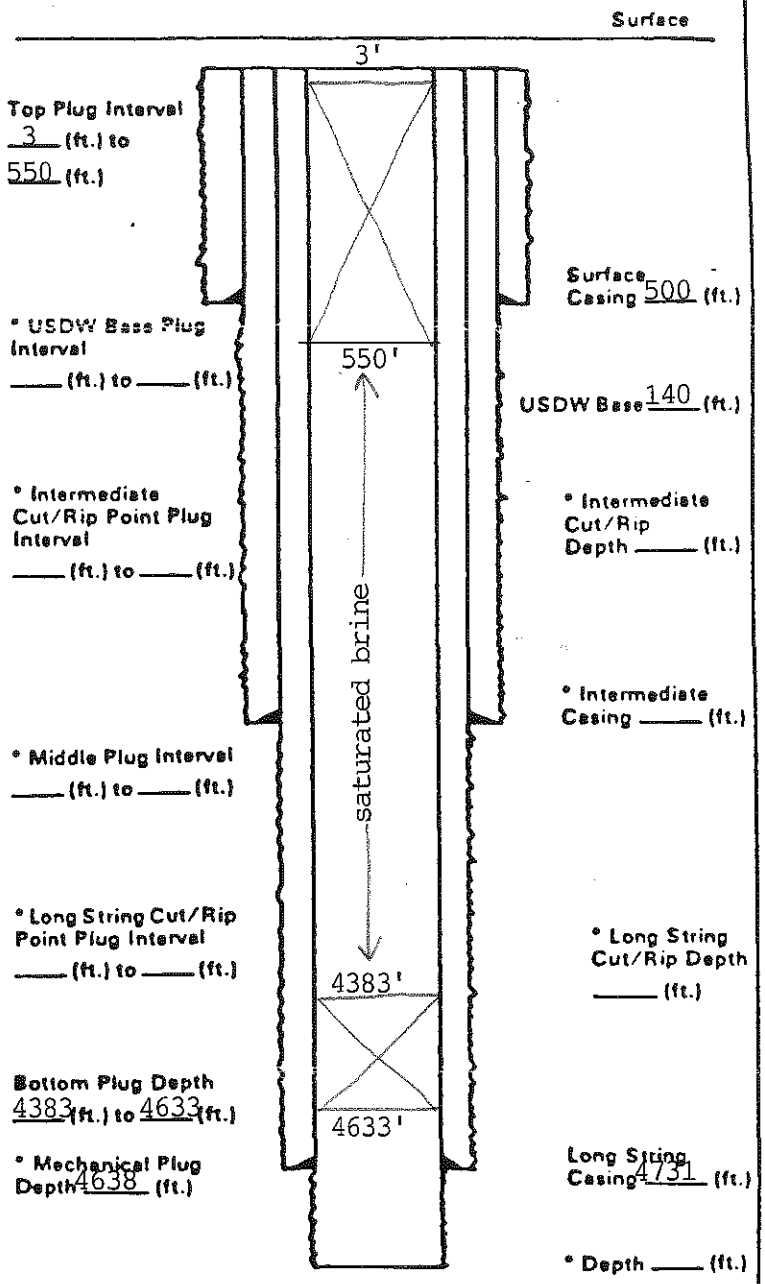
NAME AND OFFICIAL TITLE (Please type or print)	SIGNATURE	DATE SIGNED
D E Lutz, General Superintendent	D E Lutz	10-19-89

ORIGINAL WELL CONSTRUCTION DURING OPERATION



** Add Any Additional Information
* May Not Apply

PLUGGING AND ABANDONMENT CONSTRUCTION



** Add Any Additional Information
* May Not Apply

LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/Perforations/Varied Casing	From	To	Formation Name
Perforations, 40	4638'	4658'	Mount Simon
Perforations, 36	4676'	4694'	Mount Simon
Perforations, 12	4699'	4705'	Mount Simon

Form Approved. OMB No. 2000-0042. Approval expires 9-30-86

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

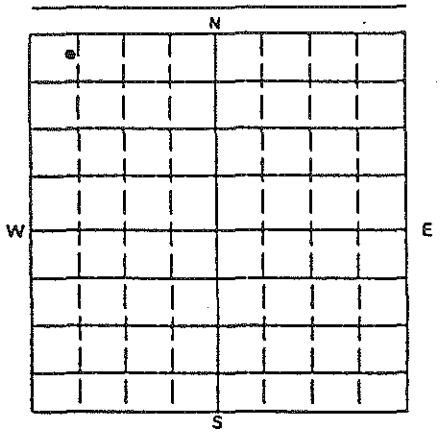
EPA

ANNUAL DISPOSAL/INJECTION WELL MONITORING REPORT

NAME AND ADDRESS OF EXISTING PERMITTEE
St Clair Underground Storage
2510 Busha Highway
Marysville, MI 48040

NAME AND ADDRESS OF SURFACE OWNER
Same

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MI	St Clair	MI-147-1I-0001

SURFACE LOCATION DESCRIPTION
NW ¼ OF NW ¼ OF NW ¼ SECTION 7 TOWNSHIP 5N RANGE 17E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location 140 ft. from (N/S) N Line of quarter section
and 623 ft. from (E/W) W Line of quarter section

WELL ACTIVITY
☒ Brine Disposal
☐ Enhanced Recovery
☐ Hydrocarbon Storage

TYPE OF PERMIT
☒ Individual
☐ Area
Number of Wells 1

Lease Name N/A Well Number 1-7 BDW

* Pressure relieved in preparation for integrity test on May 16, 1989.

	INJECTION PRESSURE		TOTAL VOLUME INJECTED		TUBING — CASING ANNULUS PRESSURE (OPTIONAL MONITORING)	
MONTH YEAR	AVERAGE PSIG	MAXIMUM PSIG	BBL	MCF	MINIMUM PSIG	MAXIMUM PSIG
January 89			0		126	154
February			0		140	151
March			0		138	149
April			0		141	148
May			0		0*	153
June			0		148	155
July			0		148	157
August			0		127	156
September			0		120	156
October			0		111	121
November			0		112	148
December			0		134	145

CERTIFICATION

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NAME AND OFFICIAL TITLE (Please type or print)	SIGNATURE	DATE SIGNED
DELutz, General Superintendent	D E Lutz / JPK	1/18/90

EPA Form 7520-11 (2-84)

REF: EPA MI-147-II-0001

TREATMENT REPORT

DWL-494-1 PRINTED IN U.S.A.

DOWELL DIVISION OF THE DOW CHEMICAL COMPANY

DATE 9/28/71

WELL NAME AND NUMBER: 1-7 BDW	LOCATION: St Clair Twp	CUSTOMER REPRESENTATIVE: B. Kirsky	TREATMENT NUMBER: 1-17-2507
POOL: Marysville	FORMATION: Mt. Simon	JOB DONE DOWN: TUBING A ☑ CASING B ☐ ANNULUS C ☐	ALLOWABLE PRESSURE: TBG: 4000 CSG:
COUNTY: St Clair	STATE: Michigan	TYPE OF WELL: OIL A ☐ GAS B ☐ WATER C ☑ INJ. Disposal	Brine
TYPE OF SERVICE: Mud Acid & CaCl2 Water		AGE OF WELL: NEW WELL A ☑ REWORK B ☐	TOTAL DEPTH: 4709 CIRC. BHT.: ?

CASING SIZE	CASING DEPTH	TUBING SIZE	TUBING DEPTH
5½ 15-E	4750	2½ EUE	4708
LINER SIZE	LINER DEPTH	PACKER TYPE	PACKER DEPTH
—	—	—	—
OPEN HOLE	CSG. OR ANRL. VOL.	TBG VOLUME	STATIC BHT.
?	2 bbls	27	?

CUST. NAME: Consumers Power

ADDRESS: 212 W Michigan

Jackson

CITY, STATE & ZIP CODE: Michigan

REMARKS:

FOR CONVERSION PURPOSES 24 BBLS EQUALS 1000 GALLONS

ARRIVED ON LOCATION: 0830

PERFORATED INTERVALS

DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES
4638-58	✓ 40	4699-4706	✓ 12		
4676-94	✓ 36	Total	88		

TIME	INJECTION RATE	INJECTION BBLS IN	PRESSURE CSG.	PRESSURE TBG.	SERVICE REMARKS
					Hook up Dowell Conn - Tail Gate Meeting
0908				2800	Pressure test Lines
10					Start acid down tubing
15		29			Acid accross perforations
22				1600	Pressure reading - repair swage leak.
31					Start displacing acid
34	—	—	—	2000	Formation broke from 2000 psi to 1800 psi
					Spec pumps.
39	4	53		1800	All acid displaced - flow well back
1020					Spot CaCl2 water.
27		28	-	—	CaCl2 on Spot -
35					Start injection test.
~~1100~~					
36	1.0	29		900	Pumping at 1 BPM slow pump to .5 BPM
1100	.5	41		1100	✓ ✓ .5 ✓ ✓ ✓ ✓ .25 ✓
18	.25	52		1150	All CaCl2 displaced into formation -
					Shut in pressure 1100 psi.

TIME LEFT LOCATION	AVG. LIQUID INJ. RATE	ADJ. INJ. RATE (SOLIDS INC.)	TOTAL FLUID PUMPED: OIL	WATER
1200	—	—	Acid 5.0	.25
MAX. PRESSURE	AVG. PRESSURE	FINAL PUMP IN PRESSURE	SHUT IN PRESSURE: IMMEDIATE	15 MINUTE
2200	1100	1100	1100	NA

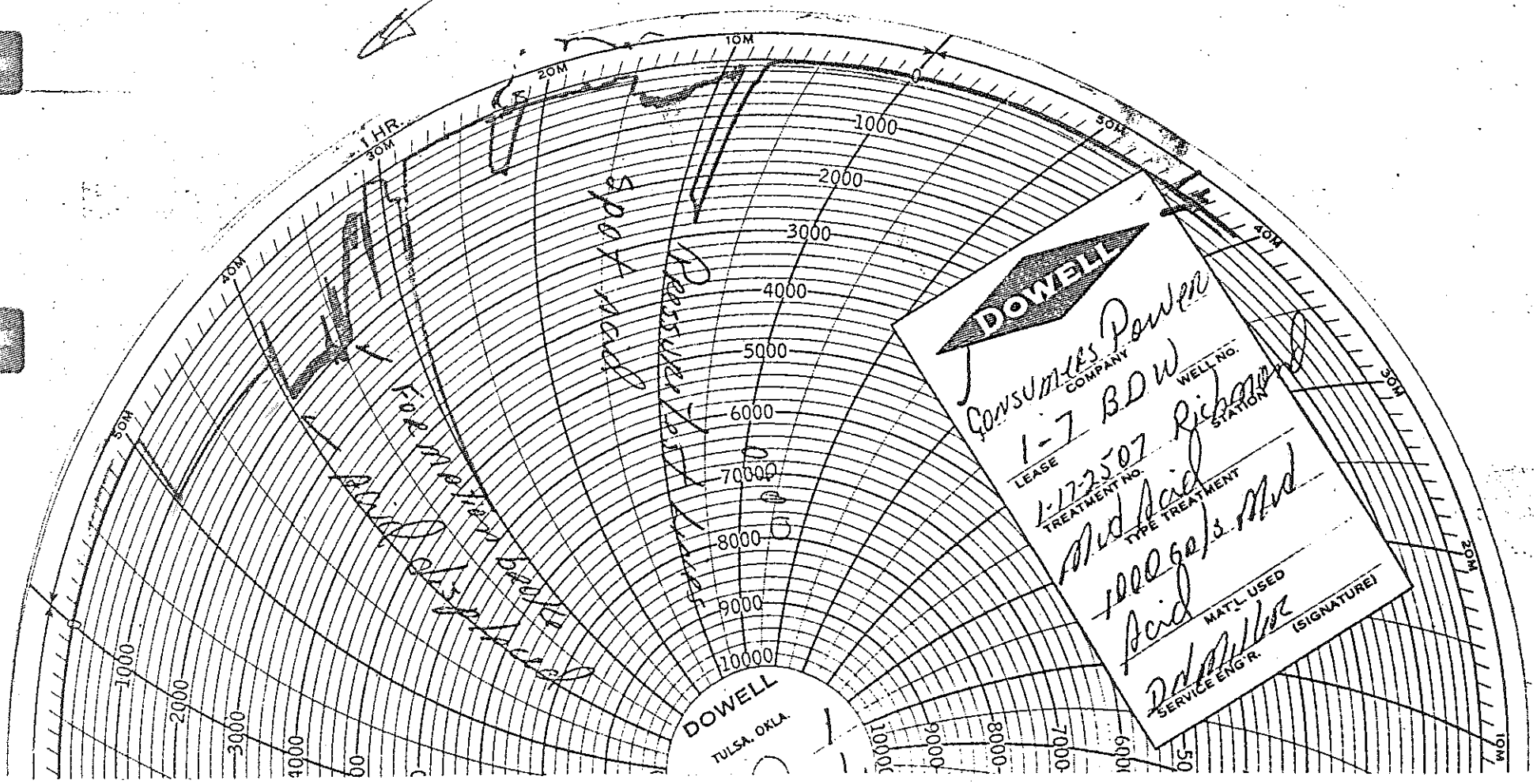
DOWELL LOCATION: Richmond, Mich.

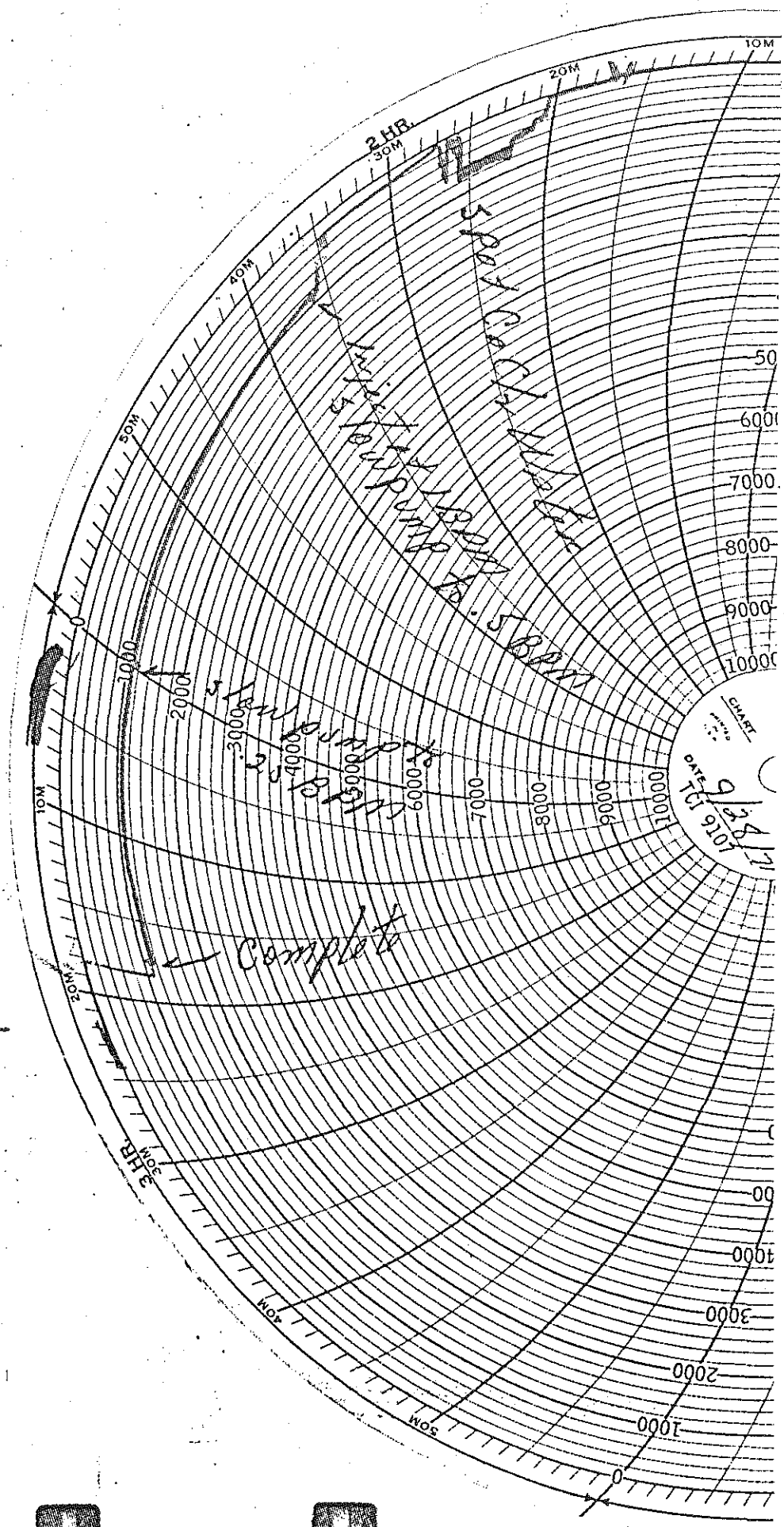
DOWELL ENGINEER: DN Miller

PROPS AND LIQUIDS INJECTED

TYPE	SIZE OR PURPOSE	AMOUNT
Mud Acid		1000
1% CaCl2 Water		1000

CALL BACK	DATE	CUSTOMER REP. CONTACTED	CUSTOMER CONSIDERED SERVICE	PROD. BEFORE TREATMENT	PROD. AFTER TREATMENT
			☐ SATISFACTORY ☐ UNSATISFACTORY ☐ UNKNOWN	☐ TEST ☐ ALLOWABLE	DAYS ☐ TEST ☐ ALLOWABLE


DOWELL
Consumers Power
COMPANY
1-7 BDW
WELL NO.
LEASE
1-17-2507
TREATMENT NO.
Richmond
STATION
Mud Acid
TYPE TREATMENT
1000 gals Mud Acid
MAT'L USED
SERVICE ENG'R.
(SIGNATURE)
DOWELL
TULSA, OKLA.
1HR
10M
20M
30M
40M
50M
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Bond Hands
Pressured
Pumped
Pumped Mud Acid
For Mud Acid



2 HR.
3 HR.
10M
20M
30M
40M
50M
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Complete
CHART
DATE
TCI 9107

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

LOG OF OIL, GAS OR TEST WELL

T FILED WITH SUPERVISOR OF WELLS WITHIN AYS
AFTER COMPLETION OF WELL (ACT 61 P.A. 193
AND ACT 326 P.A. 1937)

SUBMIT IN DUPLICATE

MI-147-1I-0002

NAME OF OWNER OR OPERATOR Consumers Power Company	ADDRESS OF OWNER OR OPERATOR 212 West Michigan Avenue Jackson, Michigan 49201
NAME OF DRILLING CONTRACTOR CEDCO Drilling Company	ADDRESS OF DRILLING CONTRACTOR 301 Orchard Street St. Clair, Michigan

FARM NAME	WELL NO.	PERMIT NO.	D.P. NO.
Fee	2-7 BDW	BD #152	

LOCATION	SECTION	TWP.	RANGE
NE NE NW	7	5N	17E

TOWNSHIP	COUNTY
St. Clair	St. Clair

FOOTAGE: 140 Ft. from North Line and 2473 Ft. from West Line of quarter section

DATE DRILLING BEGUN	DATE DRILLING COMPLETED	DATE WELL COMPLETED	TYPE OF WELL
7/17/71	8/1/71		Brine Disposal

FORMATION COMPLETED IN	TOTAL DEPTH	ELEVATION	KB	RB	RT	RF	GRD
Pre-Cambrian	4700' (Schlumberger)		631.8				619.3

ROTARY TOOLS	CABLE TOOLS
From 0 Feet to 4700 Feet	From Feet to Feet

CASING AND CEMENTING

SIZE	WHERE SET	CEMENT	AMOUNT PULLED
8-5/8"	507	250	-
5-1/2"	4693	1200	-

PERFORATIONS

DATE	NO. HOLES	FROM	TO

DEPTH CORRECTION

DEPTH	CORRECTED TO

OIL OR GAS ZONES

FORMATION	FROM	TO	AMOUNT

WATER ZONES

FORMATION	FROM	TO	AMOUNT

DEVIATION SURVEY

RUN AT	DEGREES

SAND FRAC OR ACID TREATMENT

DATE	FROM	TO	QUANTITY

MECHANICAL LOGS RUN

BRAND	(X)	TYPE LOG	INTERVAL LOGGED
Schlumberger	X	LL-GRN; BHC-GR	4700-50; 4690-506
Shelwell			
Birdwell			
Burgener			
Other			

PRODUCTION DATA

WELL COMPLETED FOR:	BOPD	BWPD	MCF GAS	PRESSURES:	CASING - PSI	TUBING - PSI

- The above information is complete and correct

Signed R J Burgess

- Date 8/25/71

Title Director of Exploration

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

R 7210

FORMATION RECORD

(ATTACH ADDITIONAL SHEETS IF NECESSA...)

ELEVATION USED.	GEOLOGIST NAME: RFBarbour	TOPS TAKEN FROM: ☐ DRILLERS LOG ☐ SAMPLE LOG ☐ ELECTRIC LOG

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		PLEISTOCENE AND MISSISSIPPIAN
		Glacial Drift & Bedford Shale
0	169	Undifferentiated glacial till & soft gry sh
		MISSISSIPPIAN-DEVONIAN
		Antrim
169	364	Sh, blk
		DEVONIAN
		Traverse Limestone
364	500	Lms, gry, v shly
500	641	Sh, soft, gry, muddy, few thin interbeds of gry shly crinoidal lms
		Dundee Limestone
641	718	Lms, tan to lt brn, fine bioclastic, sm scatt zones of fair por
718	763	Lms, tan, corraline, coarsely fragmental
		Detroit River Group
763	836	Dol, buff-wh to lt gry micro-sucrosic, becoming sli anhydritic w/depth
836	936	Dol, tan to gry, ranging from fn to v fn sucrosic, interbedded w/bluish-wh anhy beds up to 12' thick
936	1091	Dol, tan to lt gry, silty, sli anhydritic at top
1091	1128	Lms, tan, mottled, v fn grd, dns
		Bois Blanc
1128	1181	Lms, brn to lt brn, sli mottled, v fn xln, dns, scatt wh speckled and milky chert throughout
1181	1224	Chert, wh to milky, speckled interbedded w/minor amts of brn to buff fn xln lms
		SILURIAN
		Bass Islands Group
1224	1312	Dol, buff to lt gryish-tan, v fn xln, uniform
1312	1326	Anhy, wh interbedded w/gry-tan fn xln dol
		Salina Group
1326	1348	Sh, gry, dolomitic & sli anhydritic
1348	1394	Dol, tan to gry-brn, v fn xln, argill in pt; tr of anhy
1394	1473	Shales ranging from gry-grn to maroon, anhydritic

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		F Salt
1473	1733	Salt w/thin interbedded dolomites and anhydrites
		E Unit
1733	1743	Sh, gry, dolomitic
1743-1808		Dol, tan to gry, argill, v f textured, anhydritic
1808	1818	Sh, gry, dolomitic
		D Salt
1818	1835	Salt, clear
1835	1839	Dol, tan, fn xln
1839	1850	Salt
		C Shale
1850	1908	Sh, lt gry-grn, soft, silty
		B Unit
1908	1917	Dol, tan, fn xln, dns, v anhydritic
1917	1932	Sh, gry, sli grnsh, dolomiti & sli anhydritic
		B Salt
1932	2237	Salt w/numerous thin interbe of anhy & anhydritic dol
		A-2 Carbonate
2237	2286	Dol, tan to buff, fn sucrosi becoming v anhydritic
2286	2366	Lms, tan, micro xln, extremely dns grading downward into gry argill, micro xln lms
2366	2384	Lms, buff to gry, micro xln
2384	2392	Mostly wh anhy w/sm tan & wh dolomitic anhy
		A-2 Salt
2392	2533	Salt, fairly pure w/sev ft o wh anhy at base
		A-1 Carbonate
2533	2568	Dol, tan, carb, v fn sucrosi
2568	2650	Dol, gry-brn, dns, v fn xln
		A-1 Evaporite
2650	2678	Anhy, brn to wh, fairly pure
		Brown Niagaran
2678	2684	Dol, tan to buff-wh, mottled fn granular xln texture; tr fn vug por
		Gray Niagaran
2684	2704	Dol, gry to dk gry, fn to v fn xln, dns, sli argill & pyritic

FORMATION RECORD

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

ELEVATION USED.	GEOLOGIST NAME:	TOPS TAKEN FROM: ☐ DRILLERS LOG ☐ SAMPLE LOG ☐ ELECTRIC LOG

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		White Niagaran
2704	2757	Dol, lt gry to gry-wh, fn xln, traces pinpt vug por
		Clinton
2757	2780	Dol, dk gry, v argill, fn to v fn granular texture
2780	2785	Dol, gry-wh, med xln, sli vuggy
		Cataract Group
2785	2818	Dol, grnsh-buff, fn xln, v argill; interbedded w/silty red & grn shales
2818	2870	Shales, dk red & grn, soft
2870	2896	Shales aa w/minor amts of buff gry dns fn xln dol interbedded
		Manitoulin Dolomite
2896	2954	Dol, buff to grnsh-buff, fn granular xln, interbedded w/ dk grn waxy sh
		ORDOVICIAN
		Cincinnatian Series
2954	2972	Sh, dk red & grn, calc, thin beds of grnsh-buff, argill granular clastic lms
2972	3220	Sh, red & grn aa, silty, sm grnsh buff med-xln, argill dol
3220	3258	Lms, grn-gry, med xln to frag foss, argill, some thin grn shales
		Utica Shale
3258	3450	Shale, gry-grn, calc, firm scatt limy fossil frags throughout
3450	3573	Sh, dk gry-grn, clean
		Trenton Group
3573	3583	Dolomitic lms, gry to buff, fn fragmental foss
3583	3750	Lms, tan to lt brn, fn bioclastic, non-porous
3750	3840	Lms, buff, med-crs, bioclastic few thin scatt dk shaly ptgs
3840	3936	Lms, ranging from buff to brn, v fn bioclastic, dns
3936	4048	Lms, buff-wh, med to coarse, bioclastic; dk argill, ptgs increasing w/depth
4048	4058	Sh, dk gry-brn, flaky w/ numerous small reddish-brn specks

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		Black River Group
4058	4182	Lms, brn to buff, micro-xln w/few small, foss frags, scatt throughout; few inter-bedded zones of buff-wh chalky lms
4182	4561	Lms, brn to gry-brn, micro-xln, v dns, few buff-gry chalky zones scatt throughout
		Glenwood Shale
4561	4564	Sh, pale gry-grn, silty to sandy
		CAMBRIAN
		Eau Claire
4564	4573	Sh, grn & pink, silty dol interbedded
4573	4654	See Core Description
		Mt. Simon Sandstone
4654	4684	See Core Description
		PRE-CAMBRIAN
4684	4690	See Core Description
	4702	TD Driller
	4700	TD Schlumberger

CONSUMERS POWER COMPANY
#2-7 BDW
NE NE NW 7-5N-17E
St. Clair County, Michigan

Diamond Core Description

Core #	Formation	Depth	Description
1		4573-4582	Rec 8.6'
		4573-4574.6	Sh, grn, silty to sandy; some thin pinkish dol lenses
		4574.6-4576.2	Dol, tan, micro xln, silty to sandy; abun wavy sh ptgs
		4576.2-4578.7	Mostly gry-grn shaly siltstone or v fn grd ss, extremely banded w/wavy argill ptgs
		4578.7-4581.6	Interbedded dns brn dol & gry-grn silty to sandy sh
2		4582-4642	Rec 60.3'
		4582-4598	Dol, grnsh-gry to pink, v fn xln, argill, highly banded w/wavy gry-grn argill thin ptgs; v sli por & sweating some wtr from 4590-4592' and 4594.5-4595'; sl por bldg dk brn oil and gas from 4595.7-4596.4'
		4598-4620	Mostly gry-grn dolomitic sh, fnly interlaminated w/thin stringers of brn dns dol up to 2-3" thick; highly disturbed zone from 4606.5-4607.5' w/poss worm burrows
		4620-4633	Ss, dk red & grn, v glauc; coarse grd; sweats salt wtr; best por from 4622-4632'
		4633-4635	Sh, dk, sandy
		4635-4640	Ss, dk grn, med grd; sli sweating wtr less apparent por than above
		4640-4641.8	Ss, dk gry-grn, fn med grd, tight
		4641.8-4642.3	Dolomitic sh, dk gry

Core Description (Contd)
#2-7 BDW

Core #	Formation	Depth	Description
3		4642-4689.5	Rec 46.5'
		4642-4654	Mostly dk gry-grn glauc, dolomitic sh, slaty; abun wavy ptgs of glauc & glauc ss up to 2" thick; no visible fluid saturation
		4654-4667	Ss, dk grn to gry med-crs grd; glauc in pt; abun thin discontinuous wavy argill & glauc ptgs; sli sweating salt wtr throughout
		4667-4668	Ss, lt gry to pink, fn to crs grd (conglomeratic); v tightly cemented; v little salt wtr sweating
		4668-4671.7	Ss, crs grd, fairly clean, med-crs, swtg wtr throughout
		4671.7-4674	Ss, pink arkosic interbedded w/tight gry sandy dol; abun irregular dk argill paper-thin ptgs
		4674-4677	Ss, crs pink arkosic,sweats wtr
		4677-4680	Ss, gry, med grd w/some pink bands; micro-cross-bedding evident; sli swtg wtr throughout
		4680-4686.8	Pink arkosic ss, crs grd; few argill ptgs; sweats wtr
			Contact Pre-Cambrian (v sharp 1/16" thick) angular unconform
		4686.8-4688.5	Granitic material; gneiss; 25°-30° dips or flow structure

Schlumberger

CEMENT BOND LOG

VARIABLE DENSITY

COUNTY
Field or LOCATION
WELL
COMPANY

COMPANY CONSUMERS POWER COMPANY

EPA UIC Permit No MI-147-[redacted]I-0001

WELL CPC - BDW #2-7

FIELD BRINE DISPOSAL

COUNTY ST. CLAIR STATE MICHIGAN

LOCATION PERMIT #152
NE/Q NE/Q NW/Q

Sec. 7 Twp. 5N Rge. 17E

Other Services:
GRN

Permanent Datum: GROUND LEVEL, Elev. -
Log Measured From KB 12.5 Ft. Above Perm. Datum
Drilling Measured From KB

Elev.: K.B. -
D.F. -
G.L. -

Date	10-5-71	Type Drill Fluid	FRESH WATER
Run No.	ONE	Fluid Level	46
Depth — Driller	4697	Max. Rec. Temp.	92° °F
Depth — Logger	4650	Est. Cement Top	90
Btm. Log Interval	4647	Equip. Location	5103 LANSING
Top Log Interval	50	Recorded By	CUTRESS
Open Hole Size	7 7/8"	Witnessed By	KIRSCHKE

CASING REC.	Size	Wt/Ft	Grade	Type Joint	Top	Bottom
Surface String	8 5/8"	32			SURF	508
Prot. String	5 1/2"	15			SURF	4700
Prod. String						
Liner						

PRIMARY CEMENTING DATA

STRING	Surface	Protection	Production	Liner
Vol. of cement			1200 SKS	
Type of cement				
Additive				
Retarder				
Wt. of slurry				
Water loss				
Type fluid in csg.				
Fluid wt.				

SWS-729-F

FOLD HERE

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

PRIMARY CEMENTING PROCEDURE

	Hour — date	Hours from start of operation
Started pumping cement		
Release pressure		
Start Cement Bond Log		
Finish Cement Bond Log		

Equipment Data	
Type centralizers	SPRING
Logging speed	40 FPM
Sonde Type	SLS-D-528
Cartridge Type	SLC-B
Cartridge No.	507

Preceding fluid_____ Volume_____ bbls.
Cement pumped_____ bbls./minute

Pipe reciprocated during Pumping: Yes_____ No_____
Pipe reciprocated after plug down: Yes_____ min., No_____

SQUEEZE JOB DETAIL

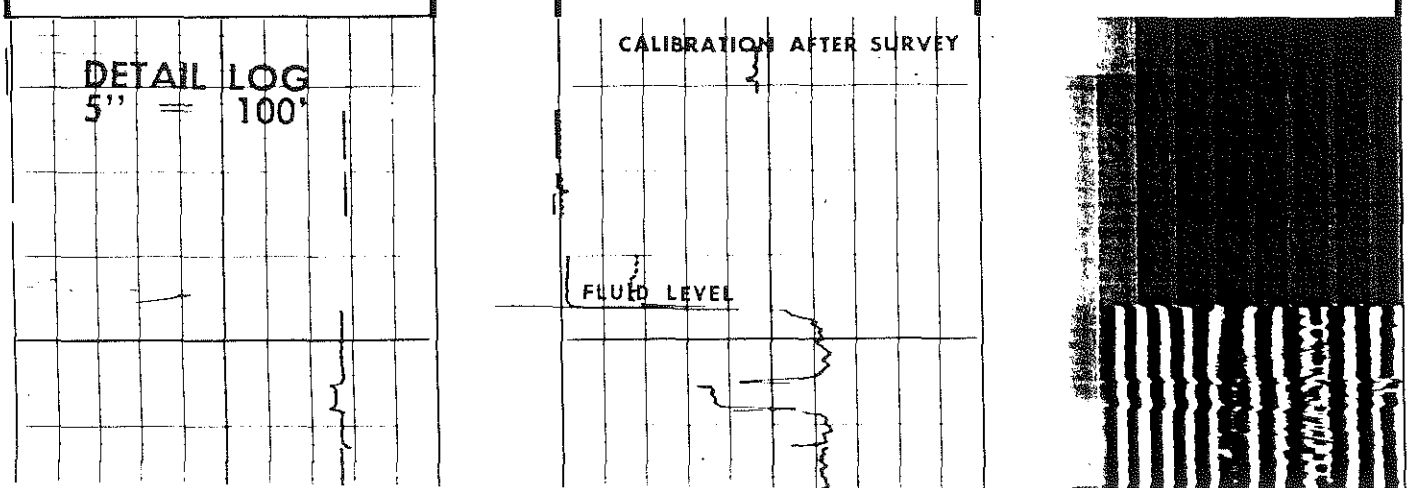
Squeeze number	1	2	3	4
Date				
Depth interval				
Type cement				
Volume of cement				
Additive				
Retarder				
Weight of slurry				
Preceding fluid				
Breakdown pressure				
Max. pressure-stage 1				
" " " 2				
" " " 3				
Final maximum pressure				
Started pumping cement				
Released pressure				
Start CBL				
Finish CBL				

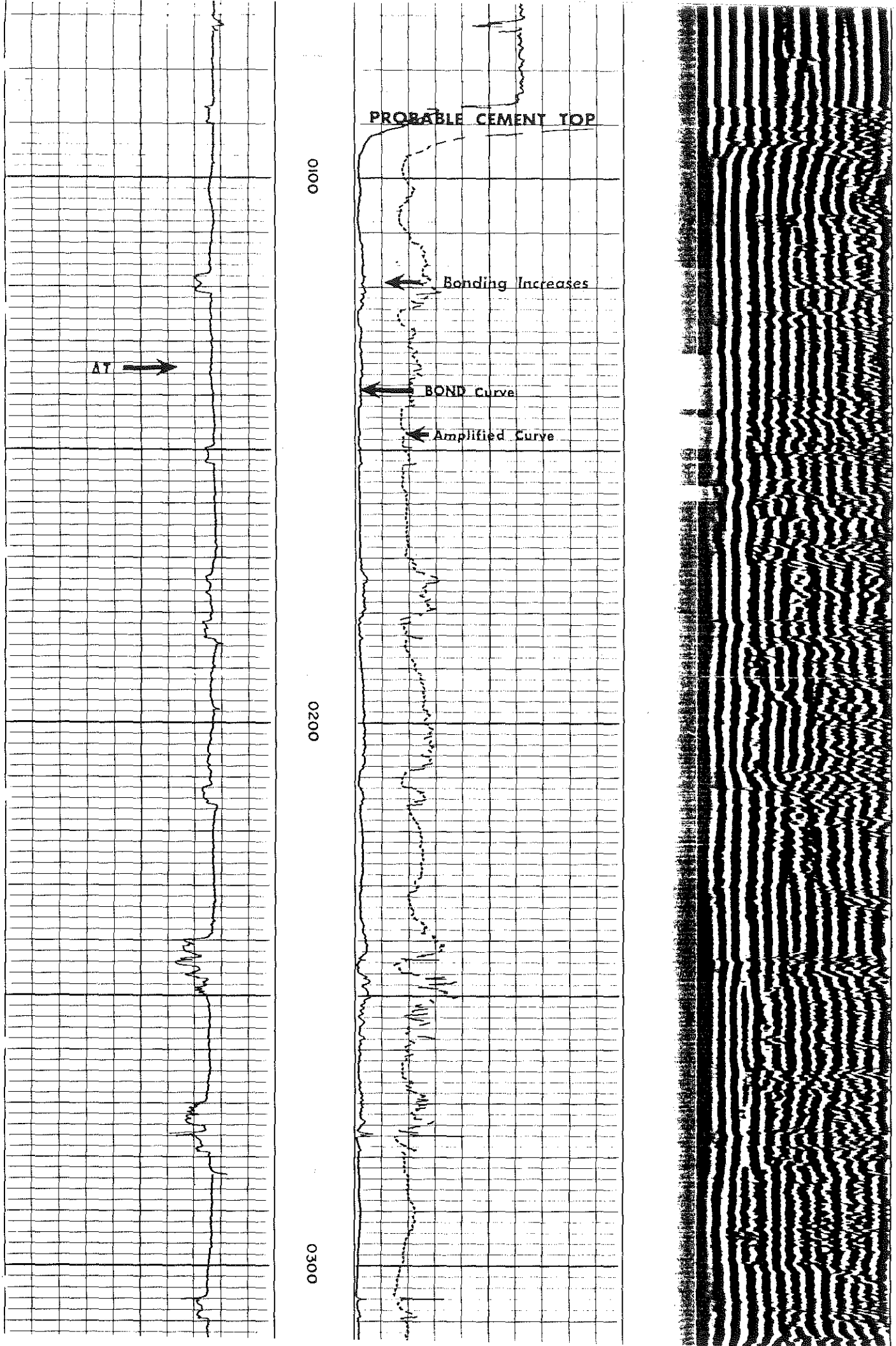
Centralizer Depths	Scratcher Depths

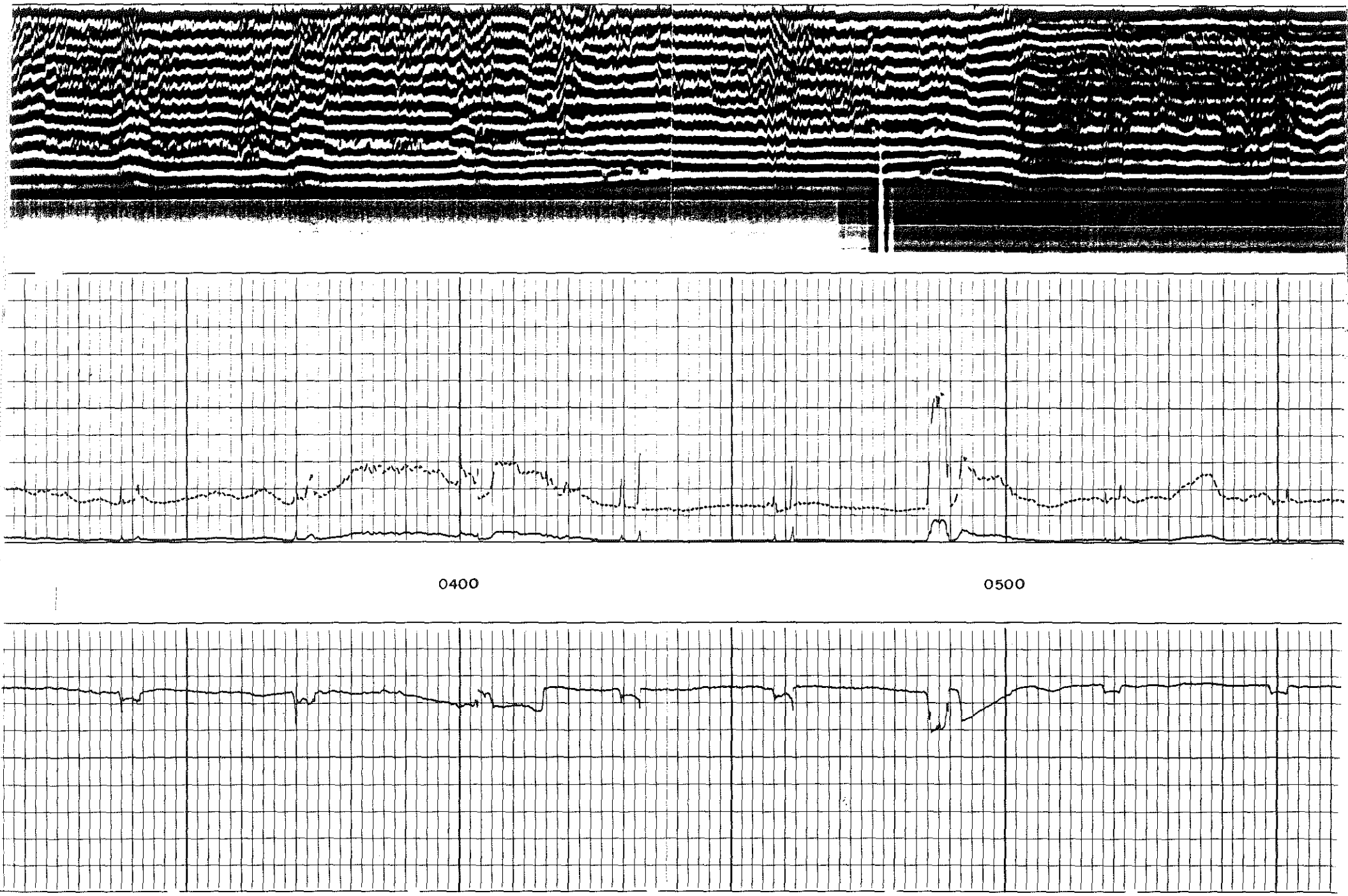
AVERAGE WELL DRIFT:
° from to ; ° from to ; ° from to

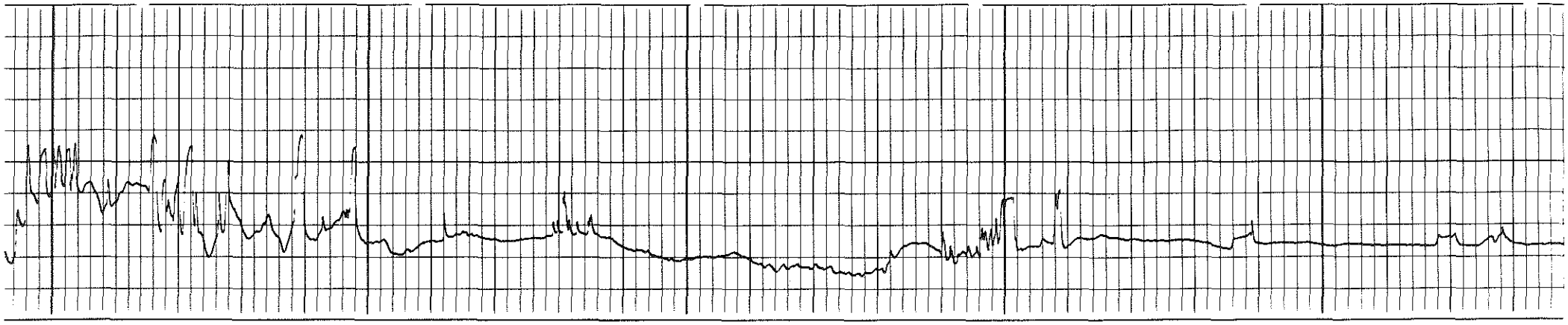
REMARKS_____

SINGLE RECEIVER ΔT microseconds	DEPTHS	BOND LOG millivolts	VARIABLE DENSITY
400 200		BONDING INCREASES ← 0 100	0 1000
		0 AMPLIFIED 20	
		THREE FOOT SPACING	THREE FOOT SPACING

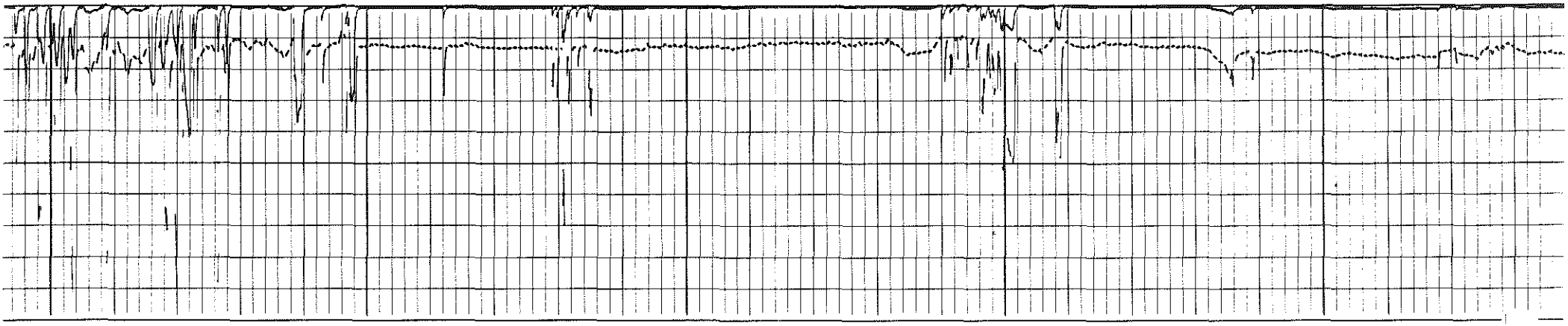


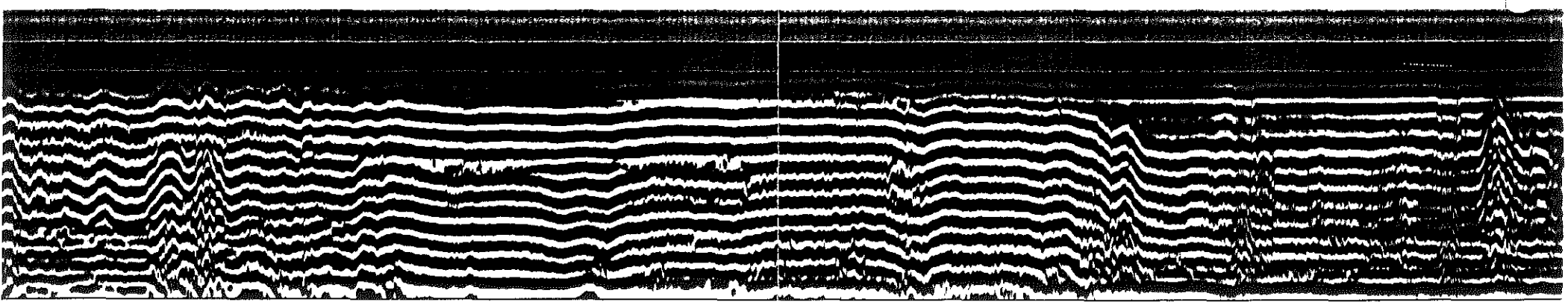

PROBABLE CEMENT TOP
Bonding Increases
BOND Curve
Amplified Curve
AT
0100
0200
0300

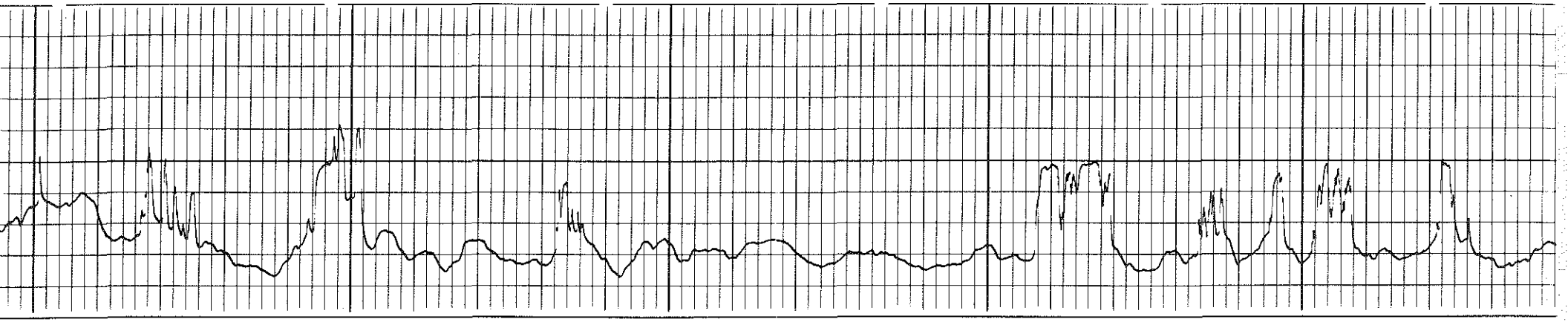

0400
0500



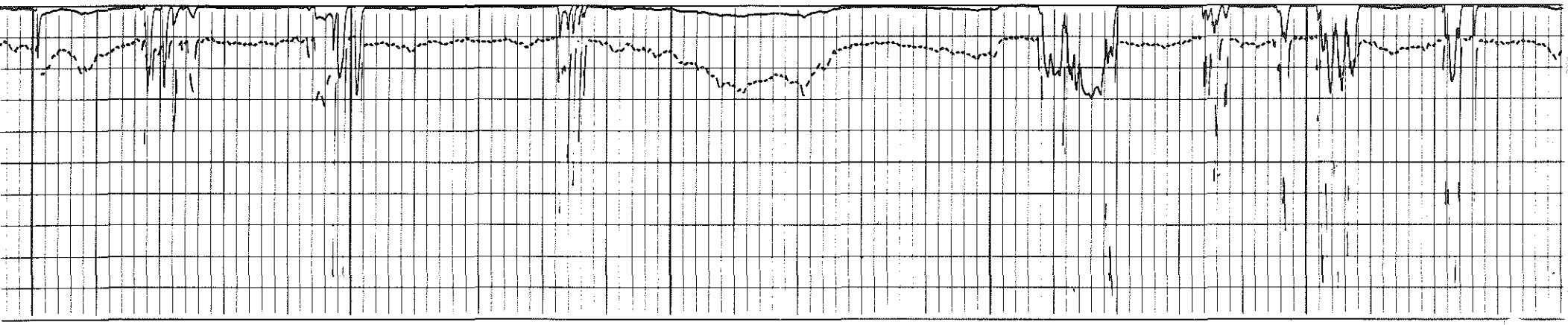
0800 0700 0600

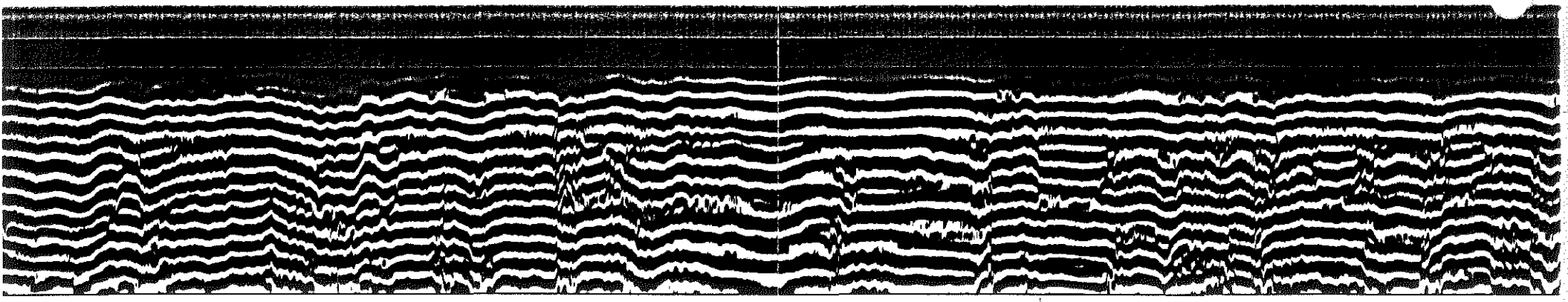


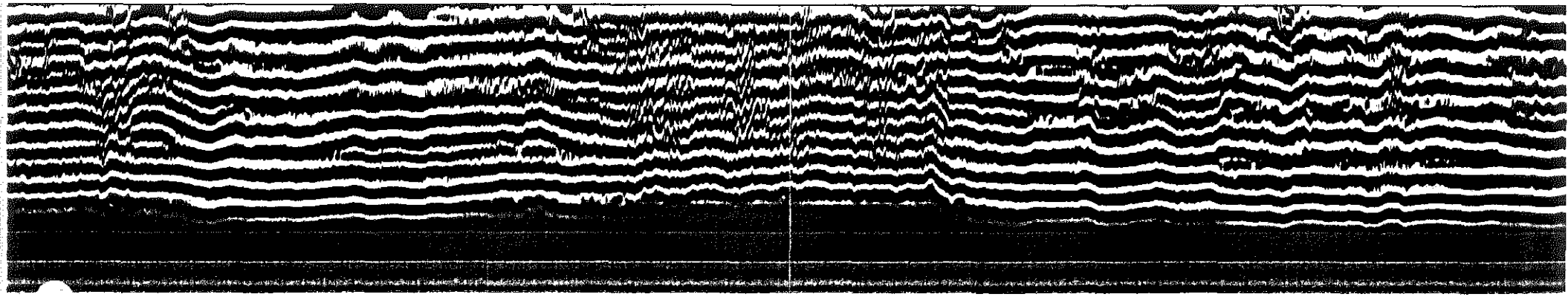


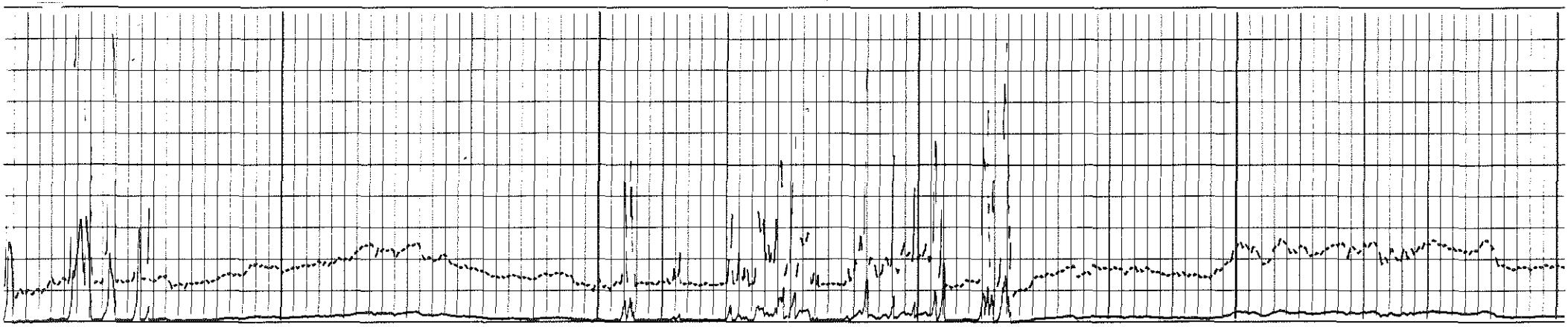


0001 0060

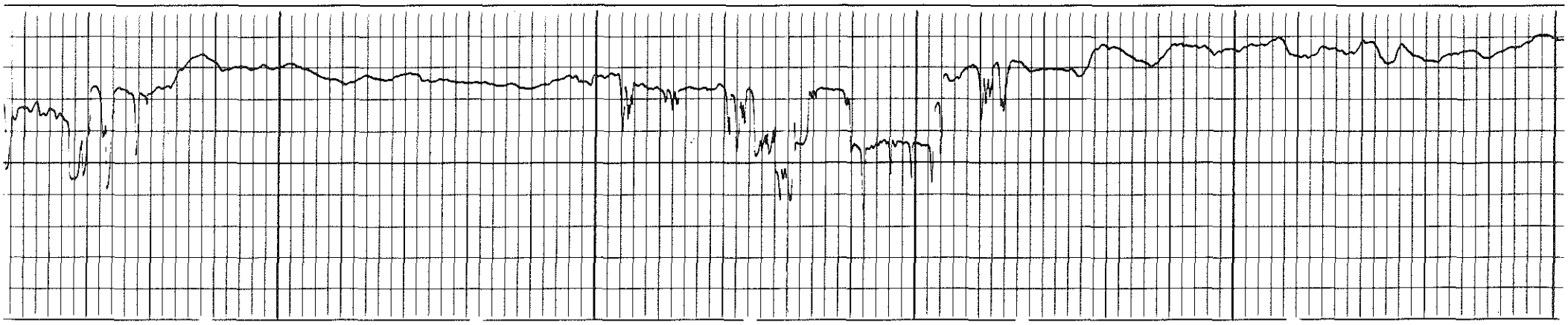






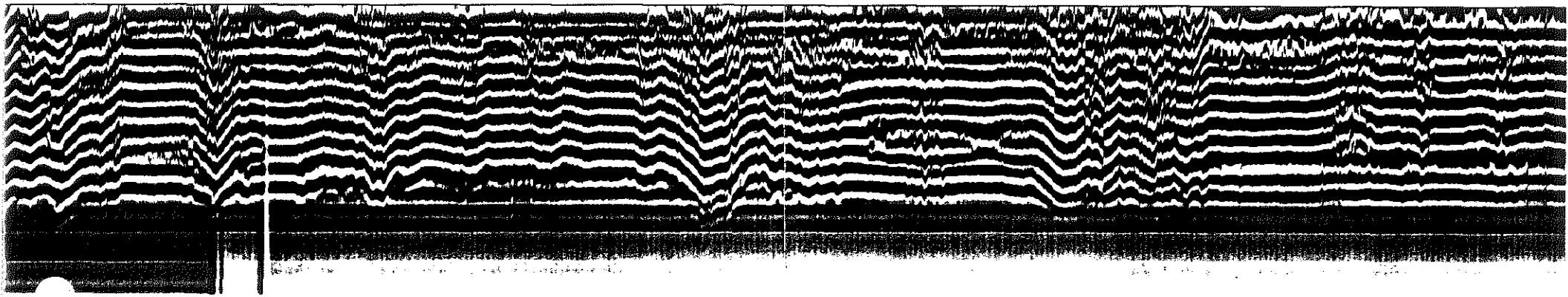


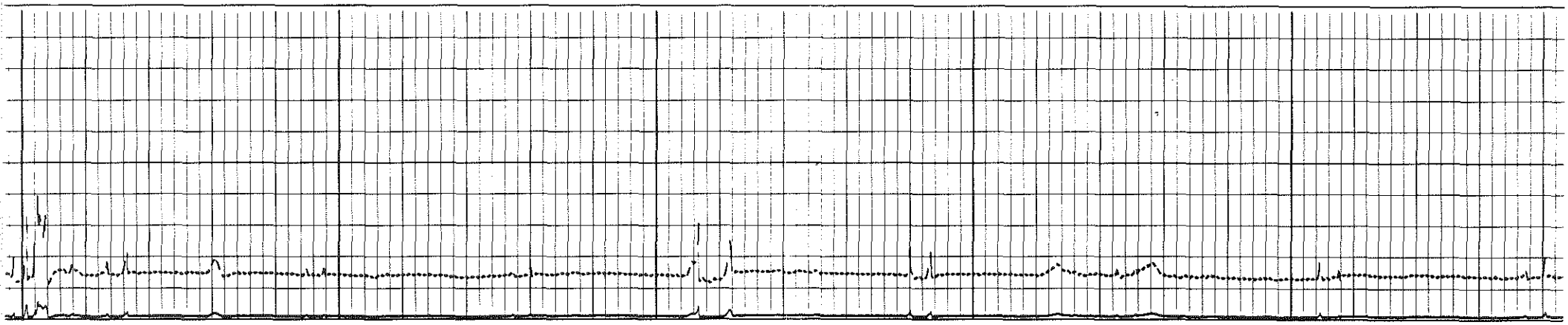
1100 1200 130



1400
1500

1600
1700





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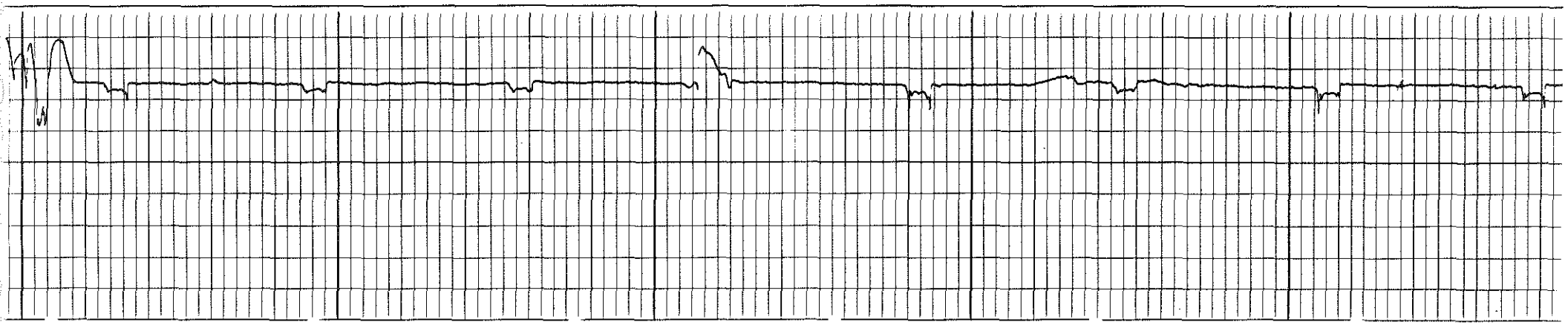
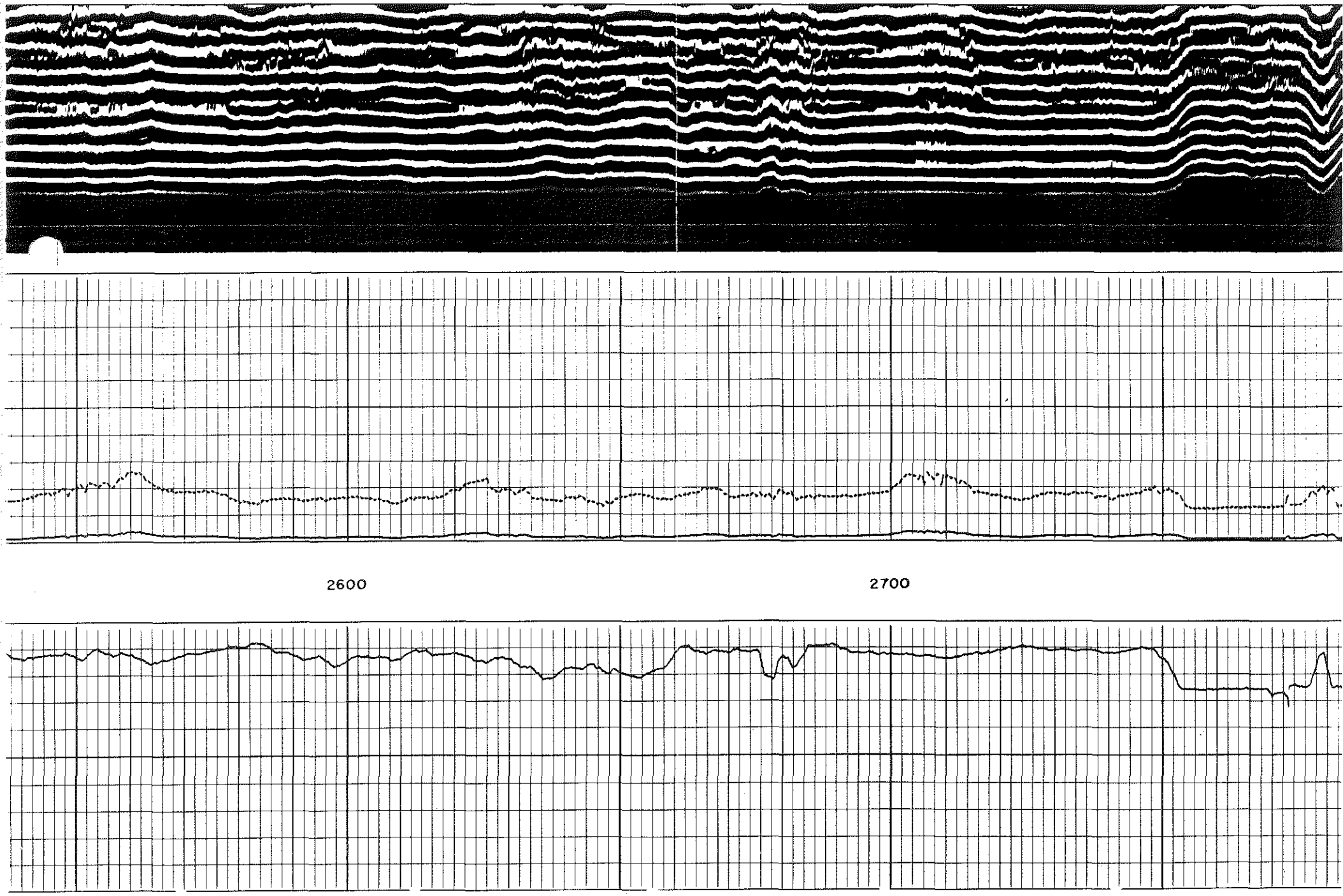
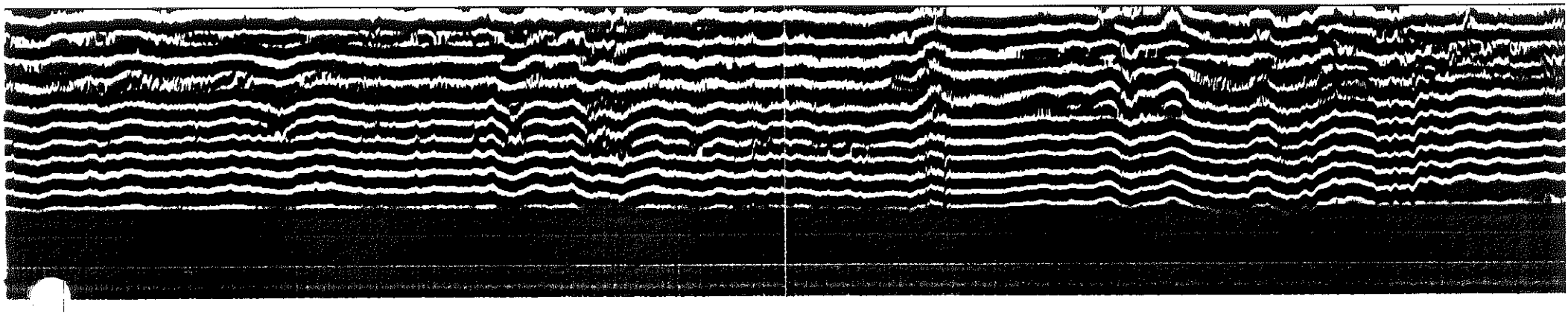


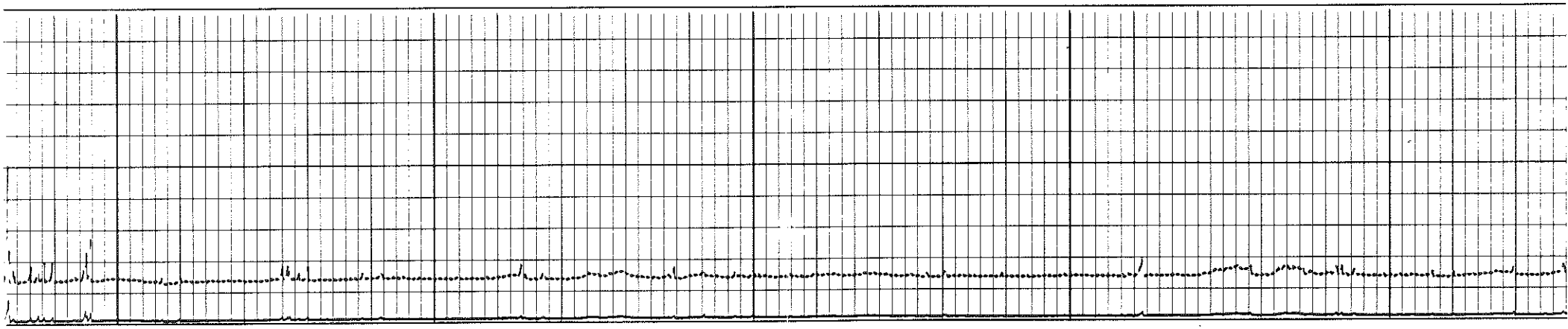
2100
2200

0
2400
2500

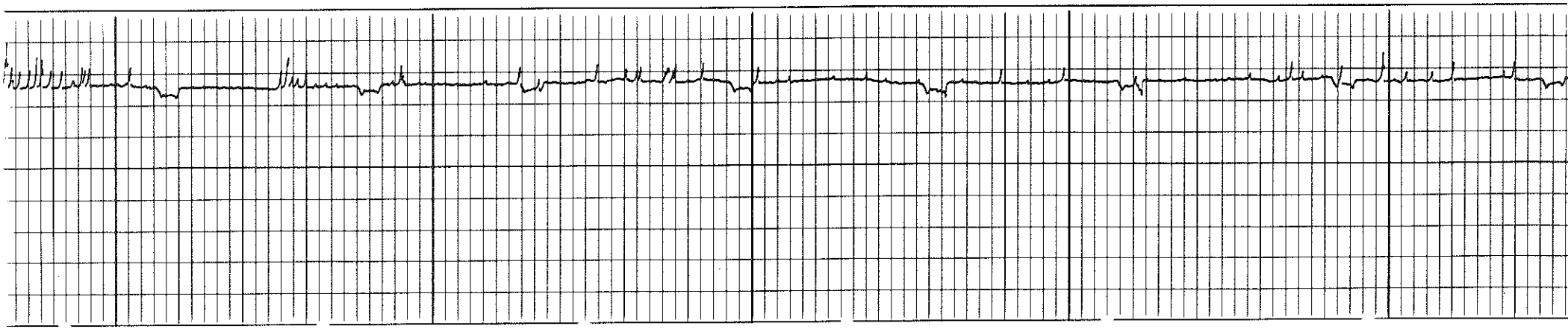

2600
2700

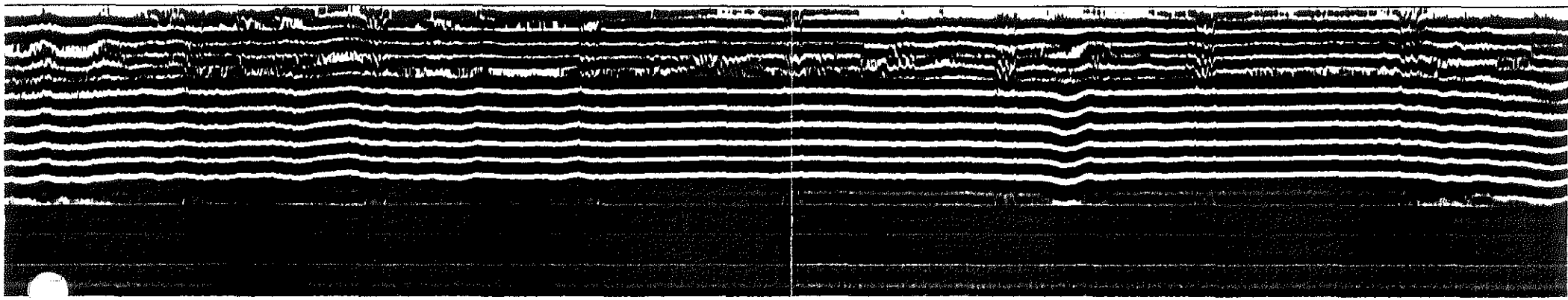
2800
2900
3000

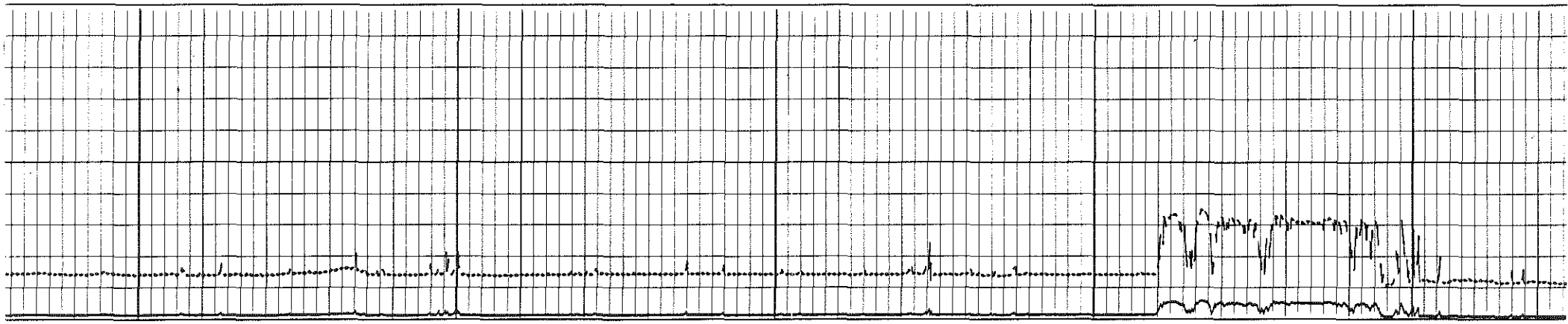




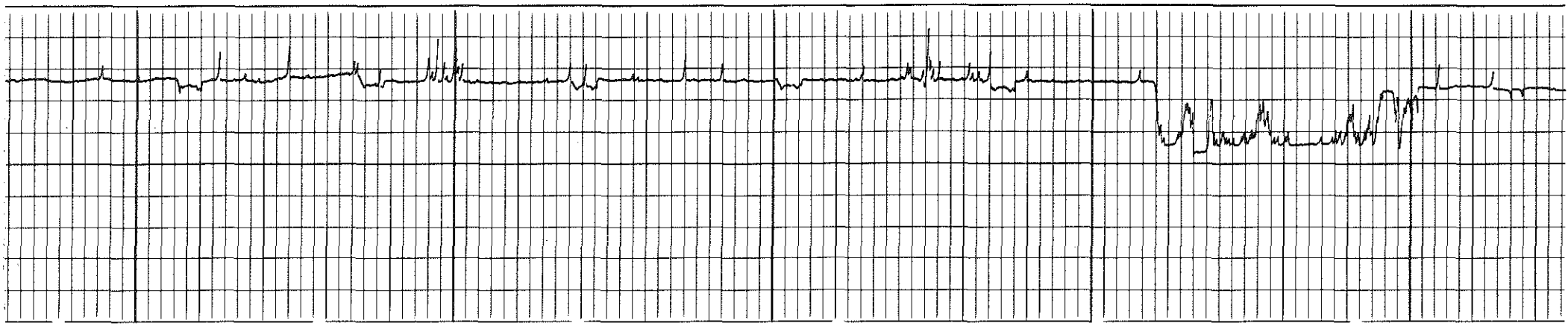
3100 3200

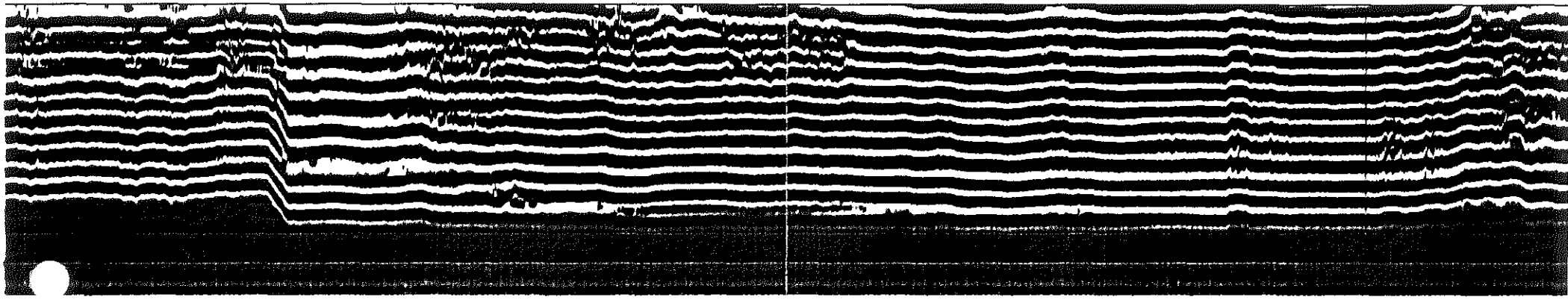


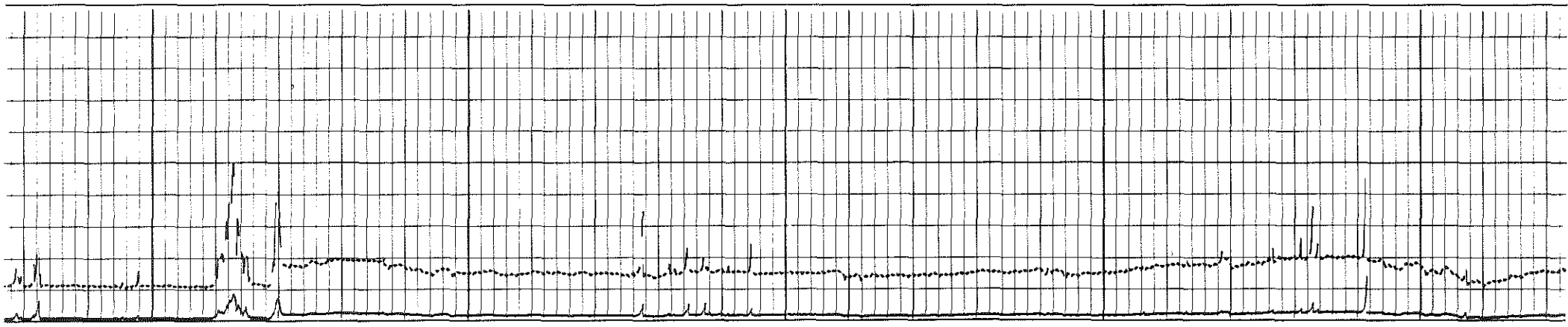




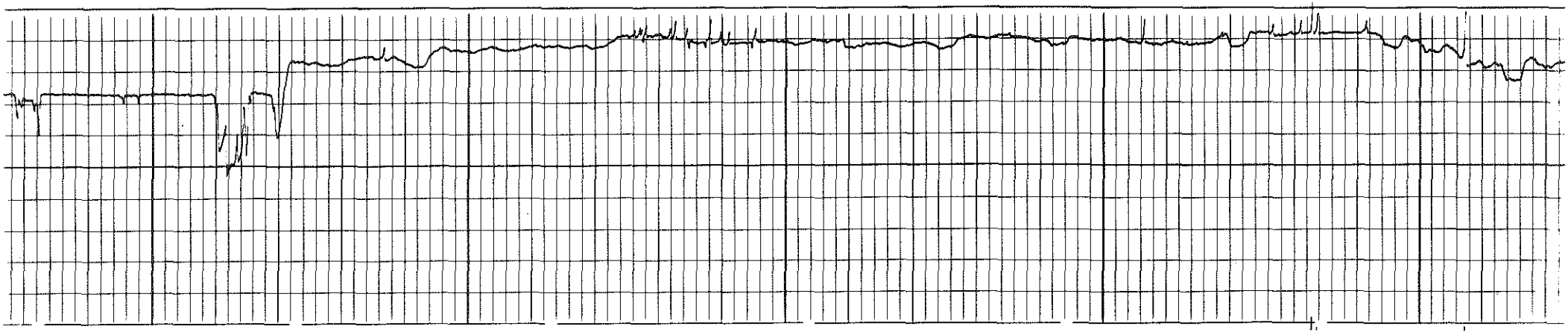
3300 3400 3500

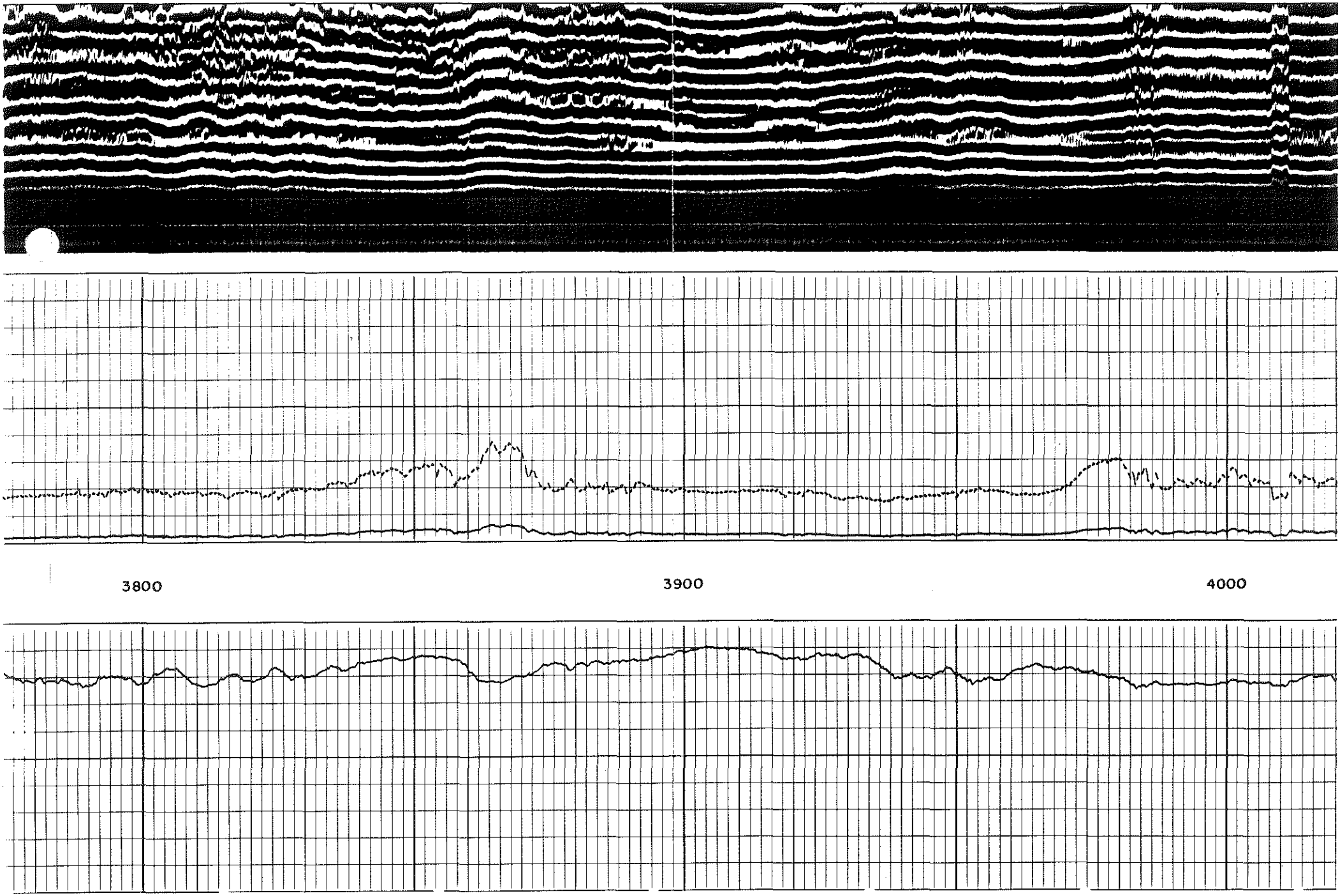


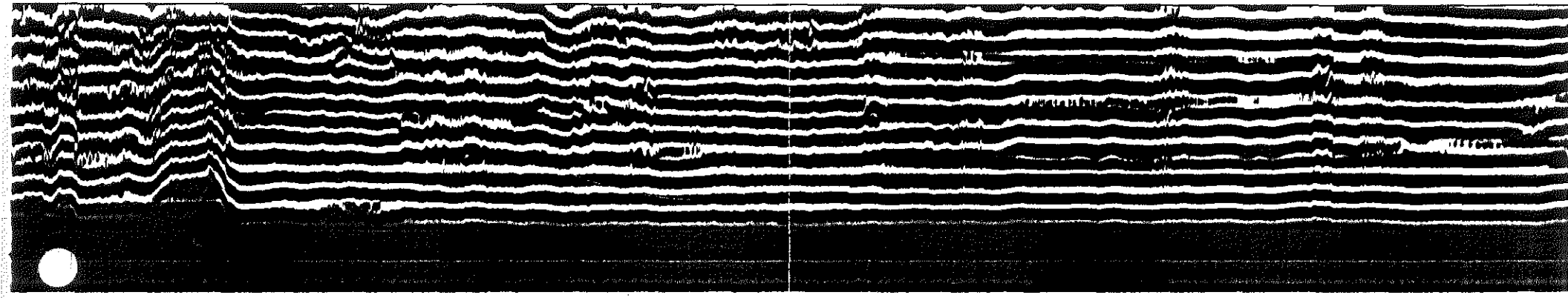


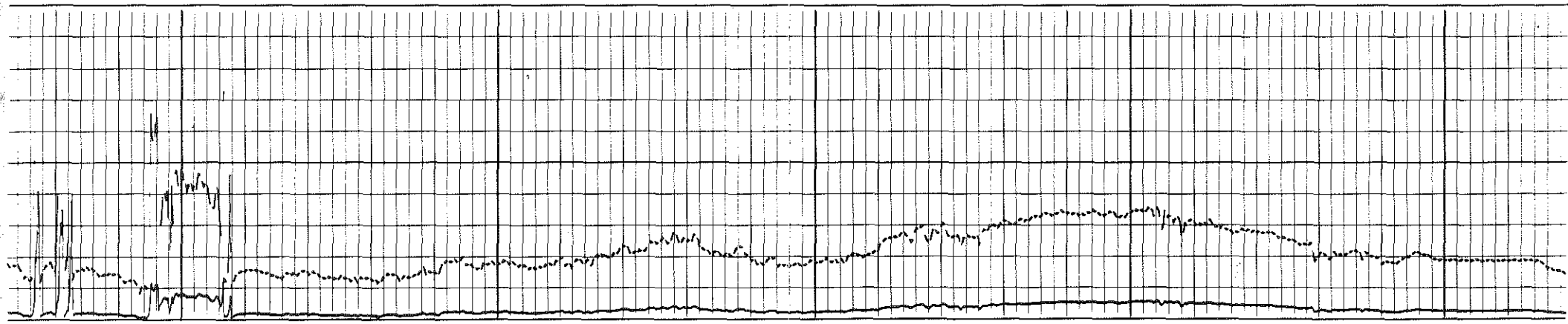


3600 3700




3800
3900
4000





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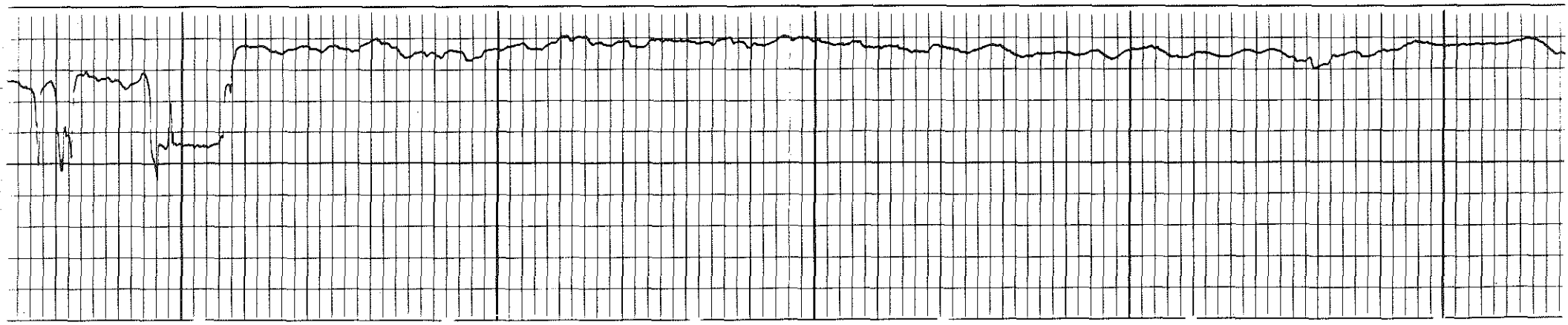
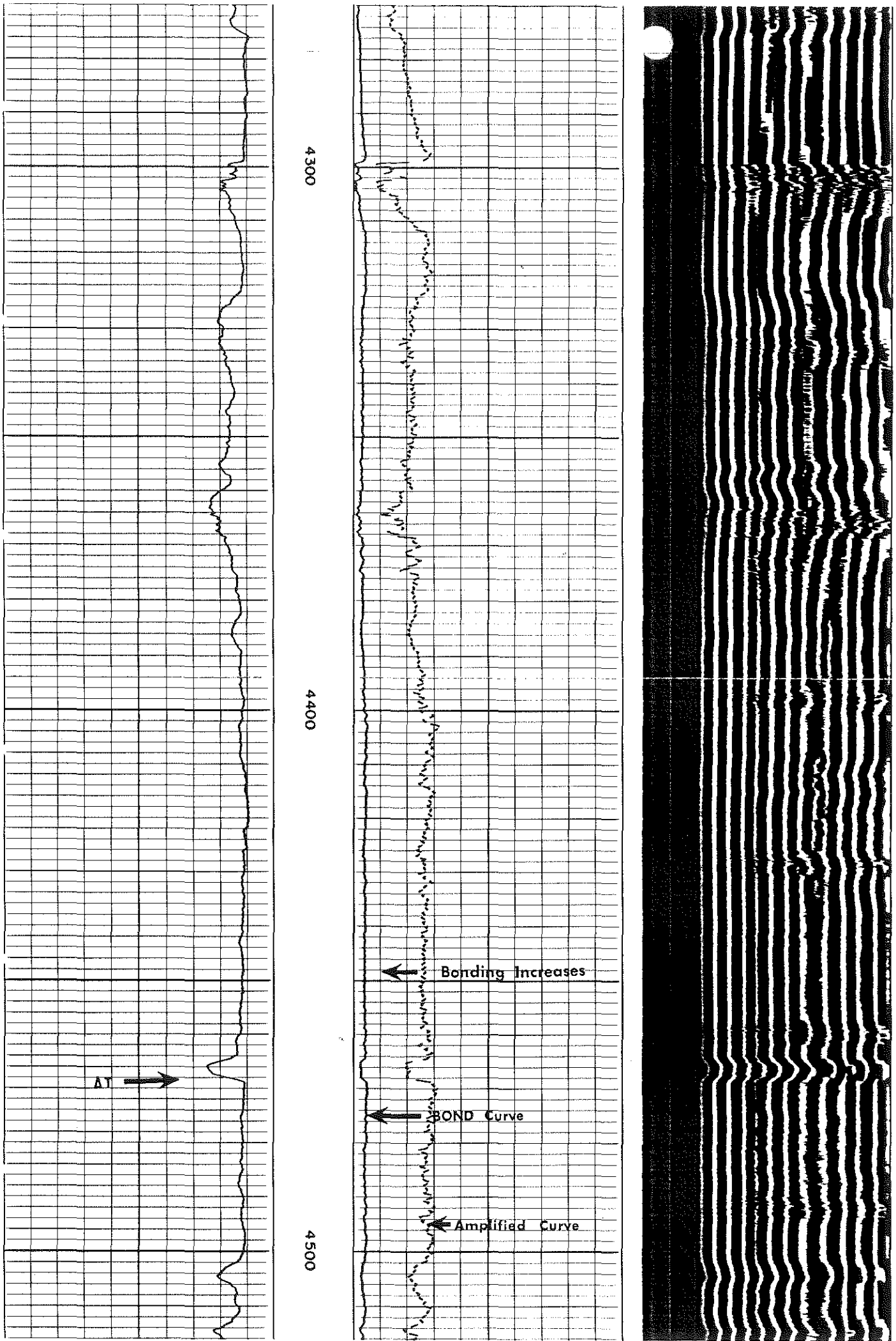
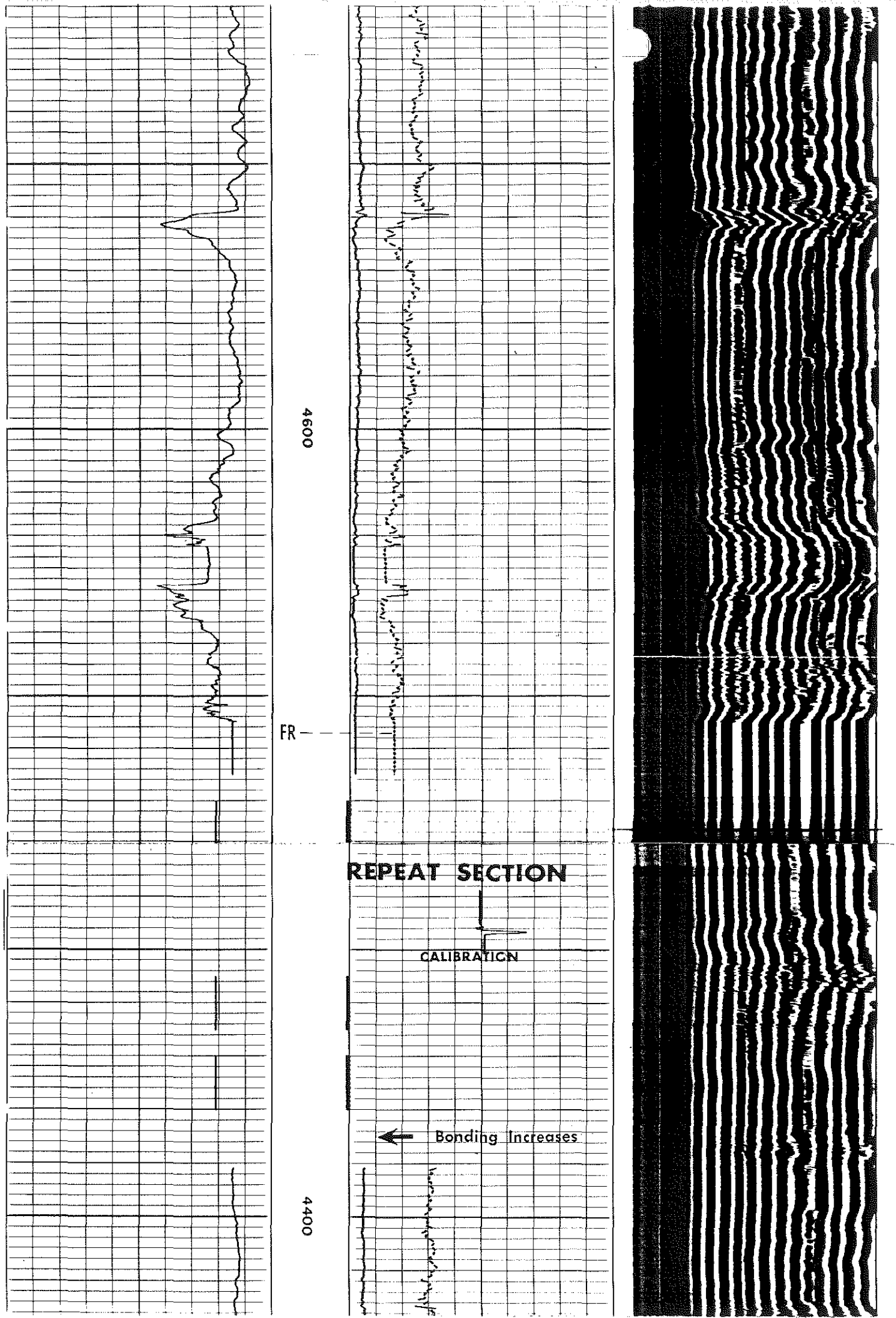
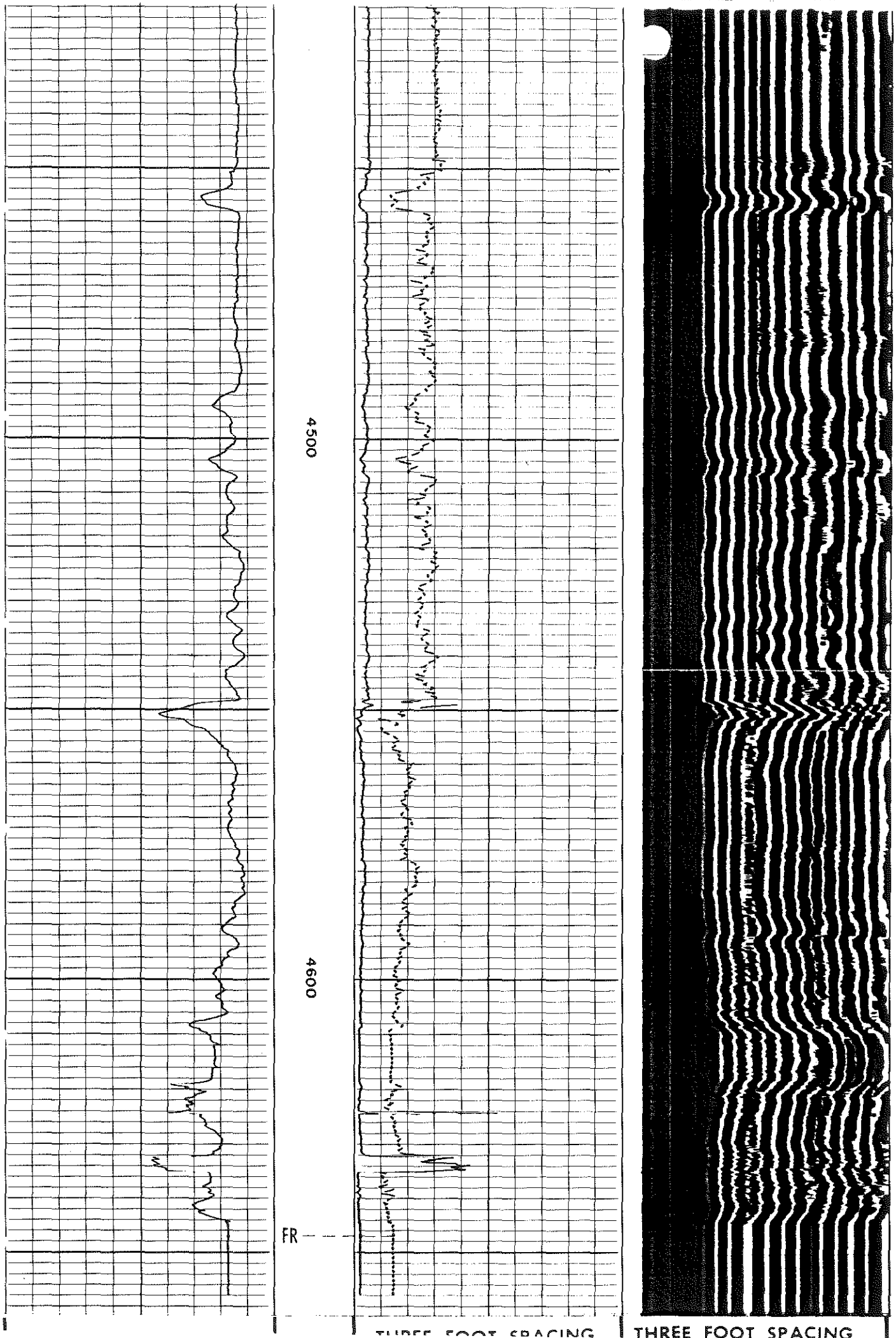



4300
4400
4500
ΔT
Bonding Increases
BOND Curve
Amplified Curve


4600
FR
REPEAT SECTION
CALIBRATION
Bonding Increases
4400


4500
4600
FR
THREE FOOT SPACING
THREE FOOT SPACING

		0 AMPLIFIED 20	
		BONDING INCREASES	
400 200		0 100	0 1000
TRANSIT TIME microseconds	DEPTHS	BOND LOG millivolts	VARIABLE DENSITY

COMPANY CONSUMERS POWER COMPANY

WELL CPC - BDW #2-7

FIELD BRINE DISPOSAL

COUNTY ST. CLAIR STATE MICHIGAN

SCHL FR 4647
SCHL TD 4650
DRLR TD 4697
Elev:
KB -
DF -
GL -

TO PBLatvaitis, P-12-305, Jackson

FROM RGural, Marysville

DATE January 4, 1990

SUBJECT MARYSVILLE UNDERGROUND STORAGE TERMINAL-
BRINE DISPOSAL WELLS -
QUARTERLY REPORT

CC DELutz, Marysville
JCJMunro, Marysville
CJOverbeck, Marysville

Internal Correspondence

In accordance with each Page E-3 of US EPA UIC Permits MI-147-1I-0001 and MI-147-1I-0002, I attest that, as indicated on the attached submitted log sheets, flow into the two brine disposal wells did not take place during this quarterly reporting period. This quarterly period is October through December, 1989.

jam/ems MUST 12

C O N S U M E R S P O W E R C O M P A N Y

MARYSVILLE GAS REFORMING PLANT
BRINE DISPOSAL WELL PRESSURE REPORT
MONTHLY LOG FOR - OCTOBER

	MI-147-1I-0002 <----------BD#2-7 EAST---------->							MI-147-IT-0001 <----------BD#1-7 WEST---------->						
	INJECTION PRESS PSIG		ANNULUS PRESS PSIG SEALING FLUID		CASING		DAILY FLOW	INJECTION PRESS PSIG		ANNULUS PRESS PSIG SEALING FLUID		CASING		DAILY FLOW
DATE	AVG	MAX	MIN	MAX	MIN	MAX	BBLS	AVG	MAX	MIN	MAX	MIN	MAX	BBLS
1	442	442	161	161	0	0	0	435	435	120	120	0	0	0
2	442	442	159	161	0	0	0	435	435	117	121	0	0	0
3	440	440	155	159	0	0	0	433	434	114	117	0	0	0
4	440	442	154	159	0	0	0	433	434	113	118	0	0	0
5	440	441	155	159	0	0	0	433	434	113	118	0	0	0
6	440	440	158	159	0	0	0	434	434	116	118	0	0	0
7	439	440	155	157	0	0	0	433	434	114	116	0	0	0
8	439	439	154	157	0	0	0	433	433	113	116	0	0	0
9	439	441	154	158	0	0	0	432	433	112	117	0	0	0
10	439	440	155	157	0	0	0	433	434	114	116	0	0	0
11	440	441	155	159	0	0	0	433	434	113	117	0	0	0
12	440	442	156	161	0	0	0	433	434	115	120	0	0	0
13	440	442	155	161	0	0	0	433	434	114	120	0	0	0
14	440	442	157	161	0	0	0	433	434	115	120	0	0	0
15	440	442	157	161	0	0	0	433	434	116	120	0	0	0
16	440	441	158	162	0	0	0	433	434	115	120	0	0	0
17	438	439	155	157	0	0	0	432	432	113	115	0	0	0
18	438	438	155	155	0	0	0	432	432	112	113	0	0	0
19	438	438	154	155	0	0	0	432	432	111	113	0	0	0
20	438	438	154	155	0	0	0	432	432	112	113	0	0	0
21	438	438	154	155	0	0	0	432	432	112	113	0	0	0
22	438	440	153	158	0	0	0	432	432	111	115	0	0	0
23	438	440	154	158	0	0	0	432	432	112	116	0	0	0
24	439	440	156	160	0	0	0	432	433	114	117	0	0	0
25	439	442	156	160	0	0	0	432	434	113	118	0	0	0
26	439	441	156	160	0	0	0	432	433	113	118	0	0	0
27	438	440	155	160	0	0	0	432	433	112	117	0	0	0
28	439	441	155	159	0	0	0	432	432	112	117	0	0	0
29	438	440	155	159	0	0	0	432	433	112	117	0	0	0
30	439	440	156	160	0	0	0	432	432	114	118	0	0	0
31	438	438	156	157	0	0	0	431	432	112	114	0	0	0
SUMMARY	439	442	153	162	0	0	0	433	435	111	121	0	0	0

12-06-1989

C O N S U M E R S P O W E R C O M P A N Y

MARYSVILLE GAS REFORMING PLANT
BRINE DISPOSAL WELL PRESSURE REPORT
MONTHLY LOG FOR - NOVEMBER

	MI-147-1I-0002 <----------BD#2-7 EAST---------->							MI-147-IT-0001 <----------BD#1-7 WEST---------->						
	INJECTION PRESS PSIG		ANNULUS PRESS PSIG SEALING FLUID		CASING		DAILY FLOW	INJECTION PRESS PSIG		ANNULUS PRESS PSIG SEALING FLUID		CASING		DAILY FLOW
DATE	AVG	MAX	MIN	MAX	MIN	MAX	BBLS	AVG	MAX	MIN	MAX	MIN	MAX	BBLS
1	438	439	155	156	0	0	0	430	430	112	112	0	0	0
2	439	439	155	156	0	0	0	430	430	112	112	0	0	0
3	439	439	155	155	0	0	0	430	430	112	112	0	0	0
4	439	439	155	155	0	0	0	430	430	112	112	0	0	0
5	439	439	155	155	0	0	0	430	430	112	112	0	0	0
6	439	439	155	155	0	0	0	430	430	112	112	0	0	0
7	439	439	155	155	0	0	0	430	430	112	112	0	0	0
8	438	439	155	155	0	0	0	430	430	112	112	0	0	0
9	438	438	154	155	0	0	0	430	430	112	112	0	0	0
10	438	438	154	155	0	0	0	430	430	112	148*	0	0	0
11	438	438	155	155	0	0	0	430	430	148	148	0	0	0
12	438	438	154	155	0	0	0	430	430	148	148	0	0	0
13	438	438	154	157	0	0	0	430	430	148	148	0	0	0
14	438	438	153	157	0	0	0	430	430	148	148	0	0	0
15	438	438	153	153	0	0	0	430	430	148	148	0	0	0
16	438	438	153	153	0	0	0	429	429	148	148	0	0	0
17	438	438	153	153	0	0	0	429	429	148	148	0	0	0
18	437	438	153	153	0	0	0	429	429	145	148	0	0	0
19	436	436	153	153	0	0	0	429	429	145	145	0	0	0
20	436	436	153	153	0	0	0	429	429	145	145	0	0	0
21	436	436	153	153	0	0	0	429	429	145	145	0	0	0
22	436	436	153	153	0	0	0	429	429	145	145	0	0	0
23	436	436	153	153	0	0	0	429	429	145	145	0	0	0
24	436	436	153	153	0	0	0	429	429	145	145	0	0	0
25	436	436	153	153	0	0	0	428	428	145	145	0	0	0
26	436	436	153	153	0	0	0	428	428	145	145	0	0	0
27	436	437	153	153	0	0	0	428	428	145	145	0	0	0
28	435	435	153	153	0	0	0	428	428	145	145	0	0	0
29	435	435	153	153	0	0	0	428	428	145	145	0	0	0
30	435	435	153	153	0	0	0	428	428	145	145	0	0	0
SUMMARY	437	439	153	157	0	0	0	429	430	112	148	0	0	0

* slow leak at gauge repaired (leaking nitrogen cushioning gas); pressure restored with nitrogen.

C O N S U M E R S P O W E R C O M P A N Y

MARYSVILLE GAS REFORMING PLANT
BRINE DISPOSAL WELL PRESSURE REPORT
MONTHLY LOG FOR - DECEMBER

	MI-147-1I-0002 <----------BD#2-7 EAST---------->							MI-147-IT-0001 <----------BD#1-7 WEST---------->						
	INJECTION PRESS PSIG		ANNULUS PRESS PSIG SEALING FLUID		CASING		DAILY FLOW	INJECTION PRESS PSIG		ANNULUS PRESS PSIG SEALING FLUID		CASING		DAILY FLOW
DATE	AVG	MAX	MIN	MAX	MIN	MAX	BBLS	AVG	MAX	MIN	MAX	MIN	MAX	BBLS
1	434	435	152	155	0	0	0	428	428	143	145	0	0	0
2	433	434	152	155	0	0	0	428	428	143	145	0	0	0
3	432	432	149	152	0	0	0	427	428	140	143	0	0	0
4	432	432	149	151	0	0	0	428	428	140	142	0	0	0
5	432	433	150	154	0	0	0	428	428	140	143	0	0	0
6	432	433	151	154	0	0	0	428	428	141	144	0	0	0
7	431	432	149	154	0	0	0	427	427	139	142	0	0	0
8	432	433	149	155	0	0	0	427	427	139	143	0	0	0
9	431	432	149	155	0	0	0	427	427	138	142	0	0	0
10	432	433	151	156	0	0	0	427	428	141	142	0	0	0
11	432	432	150	154	0	0	0	427	427	140	142	0	0	0
12	431	432	149	152	0	0	0	426	427	137	141	0	0	0
13	431	431	148	155	0	0	0	426	427	136	140	0	0	0
14	431	432	149	152	0	0	0	426	426	139	140	0	0	0
15	431	431	148	150	0	0	0	426	426	136	139	0	0	0
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18	430	431	148	154	0	0	0	426	426	136	139	0	0	0
19	430	431	148	156	0	0	0	426	426	137	139	0	0	0
20	430	430	148	150	0	0	0	426	426	136	138	0	0	0
21	430	430	147	149	0	0	0	426	426	135	137	0	0	0
22	430	430	147	151	0	0	0	426	426	134	139	0	0	0
23	430	430	147	156	0	0	0	426	426	134	139	0	0	0
24	429	430	148	149	0	0	0	426	426	135	137	0	0	0
25	430	430	149	150	0	0	0	426	426	137	139	0	0	0
26	430	430	148	150	0	0	0	426	426	135	139	0	0	0
27	430	430	148	151	0	0	0	426	426	135	138	0	0	0
28	430	430	149	157	0	0	0	426	426	136	139	0	0	0
29	430	430	151	154	0	0	0	426	426	139	139	0	0	0
30	430	430	151	158	0	0	0	426	426	138	140	0	0	0
31	430	430	153	156	0	0	0	426	426	140	141	0	0	0
SUMMARY	431	435	147	158	0	0	0	427	428	134	145	0	0	0

WASTE ANALYSIS PLAN

A. Facility Description

St Clair Underground Storage located in Marysville, Michigan provides a LPG and NGL hydrocarbon storage service with access to several pipelines. The hydrocarbons are stored in nine solution-mined, sodium chloride salt caverns located in the Silurian B salt layer approximately 2,000 feet below ground level. Incidently, this salt layer, pervasive throughtout southeastern Michigan, also serves as a source of food grade table salt. In seven of the caverns, hydrocarbons are injected and withdrawn by saturated brine displacement. The displaced brine is stored in two surface storage ponds. Combined, these ponds have a capacity of 160,000,000 gallons and a surface area of 1,250,000 square feet.

Significant volumes of rain and snow fall on the surface of the brine storage ponds. Through the year precipitation generally exceeds evaporation; therefore, this precipitation adds to the brine inventory beyond that required for operation. Eventually, this accumulation threatens the pond capacities and must be disposed.

Disposal is accomplished by injection into our two permitted, brine disposal wells. These wells are used solely for this purpose.

St Clair Underground Storage is a partnership owned 51% by Huron Hydrocarbons, 36.75% by Diamond Energy and 12.75% by CanStates Energy, Inc. Huron Hydrocarbons is 100% owned by Consumers Power Company. Consumers Power Company is the operator of the storage facility.

B. Process Tolerance Limits

Only sodium chloride brine is injected into the disposal wells. This brine may vary in concentration from 10% to 100% saturation. However, generally the concentration will be greater than 80% saturation.

This operation is intended to be active for several decades. The disposal capacity of the well in the Mt Simon geological sandstone layer is considered unlimited. This layer is bounded beneath by metamorphosed rock and above by limestone. There is a flow rate limitation, however, which causes a gradual buildup of injection back-pressure. When an injection pressure of just below 1850 psig is reached the injection pump is automatically shut down. The pressure then gradually relaxes as the fluid in the injection zone flows locally throughout the formation.

The waste brine alters the injection zone by an increase in salinity only. There is no chemical reactivity with the zone itself. Since only sodium chloride brine is to be injected, no incompatibility of wastes is anticipated. Sodium chloride brine, solution mined from the Silurian B salt layer, is consistent in composition. It is characterized by associated constituents of calcium and magnesium with sulfates and carbonates. The concentration of non-sodium chloride constituents is less than 3% of the total dissolved solids.

C. Waste Parameters to be Monitored

1. Percent saturation of the sodium chloride brine
2. pH

Comment: As was indicated in Section A, the brine contacts the hydrocarbon at an interface in the cavern. Therefore, some migration of water soluble components can be transferred from the hydrocarbons to the brine. The solubility of light hydrocarbons in water is very limited and is even less soluble in nearly saturated brine. Thus total organic extractible material in the brine is negligible. The other constituents which may transfer to the brine are sulfides and mercaptans. These exist in ppm amounts in the original hydrocarbons, and at worst the mercaptans only give a threshold odor to the brine. In ordinary routine operation the interface layer where these exchanges take place is not expelled from the caverns to the surface storage ponds. Therefore, analysis of sulfides (and mercaptans) along with determination of total organic extractibles does nothing significant in characterizing the waste brine.

D. Waste Sampling, Analysis and Quality Assurance/Quality Control Procedures

1. Waste Sampling Procedure.

a. The brine pumped to the disposal wells comes from the surface storage ponds. A sample can be taken at the north end of the storage pond; this is the end where the pond effluent piping is located. A sample is obtained by using a "point source bailer" (see Attachment A: a description copy from the supplier's catalog). This "bailer", in principle is like the EPA Coliwasa.

b. The sample shall be taken with the top of the bailer three feet below the brine surface. (This will avoid any recent, incompletely-mixed precipitation at the surface. A surface sample may give an erroneously lower salt concentration as compared to the brine nearer the bottom where the pond effluent piping is located.) The contents of the bailer shall be transferred to a pint sample container.

c. Alternatively, a sample may be taken at the wellhead through a sample valve. In this case the sample tap shall be flushed with running sample until one to two gallons have flowed. Without interrupting the flow a one pint container shall be filled for analysis.

d. In both instances, the sample container may be a glass polyethylene or propylene bottle.

2. Waste Analysis Methods

a. Percent Saturation of Sodium Chloride Brine

The percent saturation of sodium chloride brine is determined by a calibrated hydrometer. Two parameters must be measured; the density, using a Salometer calibrated for 60° F, and the temperature of the brine at the time of measurement. (A salometer is an hydrometer calibrated in percent saturation). The Salometer used is a Fisher Scientific Catalog No. 11605, "Hydrometer Salt Sol" or equivalent.

The thermometer shall read in °F and shall be accurate to ±1°F.

1) Procedure

a) Pour the sample to be tested into a dry, clean, straight-walled, 500 ml capacity cylinder of clear glass set solidly on a level surface.

b) Make sure that the Salometer and thermometer are dry, clean, and free from grease or caked salt crystals.

c) Insert the thermometer, suspended from its clip hanger.

d) Insert the Salometer.

e) Allow a few minutes for the thermometer, Salometer and the brine to all achieve equilibrium temperature.

f) Read the percent saturation indicated on the Salometer at the bottom of the meniscus. Make sure that when the reading is taken that the Salometer is freely floating and does not contact the sides of the cylinder.

g) Read the temperature.

h) Correct the Salometer reading to 60° F by using the temperature correction table.

i) Report result as percent saturation at 60° F.

2) See Attachment B for example copy of a "Brinemaster dial-a-brine".

b. pH

pH shall be determined using a glass electrode according to EPA method 9040, Test Methods For Evaluating Solid Waste, SW-846, 2d Ed, rev.

E. Quality Assurance/Quality Control Procedures

1. Analytical procedures include the standardization controls. For percent sodium chloride brine, new Salometers are checked by placing in deionized water at 60°F to check 0% saturation, and in saturated sodium chloride solution prepared from reagent grade NaCl to check 100% saturation. Alternatively, a supply of Salometers can be checked against a single Salometer determined accurate by the above means.

   For the purposes of waste characterization an accuracy range of ±2% saturation is sufficient.

2. Sampling is done by the laboratory technician who analyzes the sample. Since the analyses are simple and quick, they are performed almost immediately upon return to the laboratory. Data is recorded in the assigned technician's personal laboratory notebook. Data recorded is: sample name, sampling time and date, location (north end of pond or wellhead tap) and analytical readings.

3. The laboratory technician reports the results on a written laboratory report form which is maintained in the laboratory files.

4. Analytical data required for the quarterly reports required by Permit No MI-147-1I-0001 and Permit No MI-147-1I-0002 are taken from the written laboratory report form.

ATTACHMENT

Well sampling equipment

a) Well sampler kit

Kit includes Kemmerer type sample bottle, 200-ft nylon line, messenger, and rugged plywood carrying case.

Designed to meet the most difficult field conditions, this stainless steel sampler overcomes problems of taking samples in close quarters, in restricted space, and under long messenger air drop situations. Sampler bottle is only 1⅝" in diameter and has a 600 ml capacity. Polyurethane stopper seals decrease the risk of organic contamination.

J-5484-00 Well sampler kit. Shpg wt 17.0 lbs (7.7 kg) **$381.00**

J-5484-01 Well sampler only. Shpg wt 7.0 lbs (3.2 kg) **$246.00**

b) Bailers of Teflon®

Continuous length bailers are made of Teflon PFA with a Teflon TFE ball valve. Their jointless construction cuts down on cross-contamination problems. Molded ends are easily removed for quick, easy cleaning. Maximum continuous service temperature is 500°F (260°C). Nonporous, chemically inert. One, two, or three feet long. Models 5484-80, -82, and -84 are designed for a 2" monitoring well. All models have a 1.66" OD, 1.53" ID, and a 0.90" inlet diameter.

J-5484-80 Teflon bailer. 1 ft **$86.75**

J-5484-82 Teflon bailer. 2 ft **$117.50**

J-5484-84 Teflon bailer. 3 ft **$148.00**

J-5484-90 Teflon cord. 25 ft **$28.75**

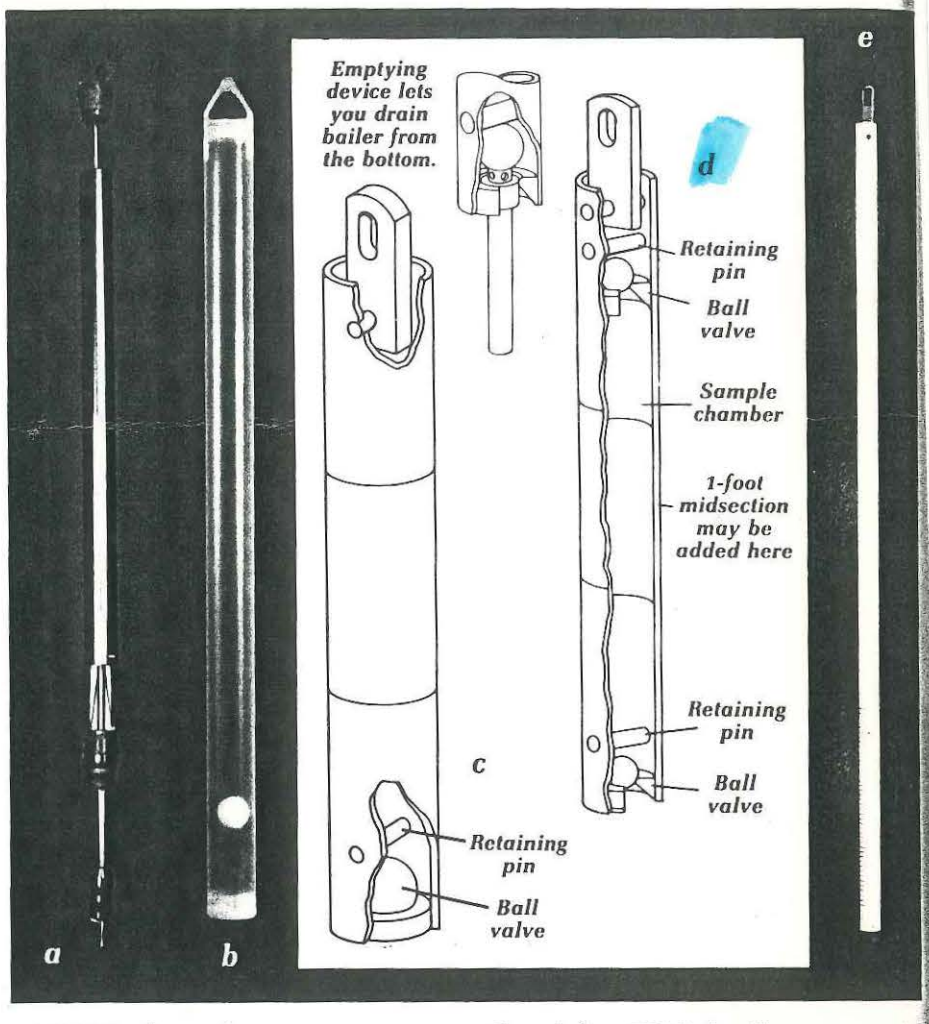
J-5484-92 Teflon cord. 50 ft **$57.50**

c) PVC Standard bailers

Retrieve samples using basic bailing methods. A ball valve at the bottom of the shaft opens as bailer descends in water and closes as you pull the cord. Three-ft long bailers separate in one-ft segments. Optional bottom emptying device (see table below) permits sample retrieval from the bottom of the bailer.

d) PVC point source bailers

Variable capacity bailers allow sampling at a specific point within a well. With two ball valves, one at the top of their shaft and one at the bottom, they trap samples at chosen depth. Threaded, press-fitted construction facilitates decontamination. Three-ft long bailers separate in one-ft segments.



e) PVC slotted bottom bailers

One-foot bottom section has narrow slits to admit water, but screen large debris from the ball valve. Three-ft long variable capacity bailers separate in one-ft segments. Ball check can be fitted in either the top of the bottom section or the bottom of the mid section. Extra one-ft sections extend length and volume. All-threaded construction provides for easy decontamination. Extra sections sold separately below.

Cord for PVC bailers

J-5484-60 Cord. 25-ft polypropylene ... **$5.00**

J-5484-61 Cord. 50-ft polypropylene ... **$9.50**

J-5484-62 Cord. 75-ft polypropylene .. **$13.50**

J-5484-63 Cord. 100-ft polypropylene **$18.00**

Teflon—Reg TM E.I. du Pont de Nemours & Co.

Cat. no.	OD	ID	Length	Volume/ft	Price	Extension	Length	Volume	Price	Emptying device	Price
c) Standard bailers											
J-5484-10	1.05"	0.75"	3 feet	2.77 oz	$22.81	J-5484-40	1 foot	2.77 oz	$4.98	J-5484-70	$10.08
J-5484-12	1.66"	1.25"	3 feet	8.52 oz	27.92	J-5484-42	1 foot	8.52 oz	5.86	J-5484-72	14.70
J-5484-14	2.375"	2.00"	3 feet	19.65 oz	31.36	J-5484-44	1 foot	19.61 oz	8.51	J-5484-74	21.22
d) Point source bailers											
J-5484-20	1.05"	0.75"	3 feet	2.77 oz	$30.10	J-5484-40	1 foot	2.77 oz	$4.98	J-5484-70	$10.08
J-5484-22	1.66"	1.25"	3 feet	8.52 oz	35.88	J-5484-42	1 foot	8.52 oz	5.86	J-5484-72	14.70
J-5484-24	2.375"	2.00"	3 feet	19.65 oz	40.01	J-5484-44	1 foot	19.61 oz	8.51	J-5484-74	21.22
e) Slotted bottom bailers (cannot be used with emptying device)											
J-5484-30	1.05"	0.75"	3 feet	2.77 oz	$33.49	J-5484-50	1 foot	2.77 oz	$4.98	—	—
J-5484-32	1.66"	1.25"	3 feet	8.52 oz	36.58	J-5484-52	1 foot	8.52 oz	5.86	—	—
J-5484-34	2.375"	2.00"	3 feet	19.65 oz	46.89	J-5484-54	1 foot	19.61 oz	8.51	—	—

ATTACHMENT B

BRINEMASTER dial-a-brine

Sodium Chloride Brine Table for Brine at 60 F.*

*Temperature at which freezing begins. Ice forms, brine concentrates, and freezing point lowers to eutectic.

**Eutectic point. For brines stronger than eutectic, the temperatures shown are the saturation temperatures for sodium chloride dihydrate. Brines stronger than eutectic deposit excess sodium chloride as dihydrate when cooled, and freeze at eutectic.

†Transition temperature from anhydrous salt to dihydrate.

‡Saturated brine at 60°F.

SALOMETER DEGREES, 60°F.

SPECIFIC GRAVITY	1.193	60°F.
BAUME DEGREES	23.5	60°F.
SODIUM CHLORIDE	25.078	% by weight
WEIGHT OF 1 GAL. OF BRINE	9.935	Pounds
POUNDS PER GALLON OF BRINE NaCl	2.491	
POUNDS PER GALLON OF BRINE WATER	7.444	
WEIGHT OF 1 CU. FT. OF BRINE	74.323	Pounds
POUNDS PER 1 CU. FT. OF BRINE NaCl	18.637	
POUNDS PER 1 CU. FT. OF BRINE WATER	55.686	
GALLONS OF WATER PER GAL. OF BRINE	.894	
POUNDS OF SALT PER GAL. OF WATER	2.787	
*FREEZING POINT	+14.4	°F.

*CONVERSION TABLE

(for readings other than 60°F)

OBSERVED SALOMETER READING DEGREES S	ADD PER DEGREE F. ABOVE 60° F.	SUBTRACT PER DEGREE F. BELOW 60° F.
8 to 15	0.074	0.053
16 to 30	0.089	0.065
31 to 45	0.114	0.082
46 to 60	0.121	0.097
61 to 75	0.128	0.110
76 to 90	0.136	0.116
91 to 100	0.137	0.116

Diamond Crystal Salt Company

ST. CLAIR, MICHIGAN 48079-1999 PHONE (313) 329-2211

Slide-Chart Copr. 1962, PERRYGRAF Corp.

WAIVER DEMONSTRATION
For
Exemption of Groundwater Monitoring Requirements
for St Clair Underground Storage, Class 1, Brine Injection Wells
Nos MI-147-1I-0001 and MI-147-1I-0002

A. Facility Description

St Clair Underground Storage located in Marysville, Michigan provides a LPG and NGL hydrocarbon storage service with access to several pipelines. The hydrocarbons are stored in nine solution-mined, sodium chloride salt caverns located in the Silurian B salt layer approximately 2,000 feet below ground level. Incidentally, this salt layer, pervasive throughout southeastern Michigan, also serves as a source of food grade table salt. In seven of the caverns, hydrocarbons are injected and withdrawn by saturated brine displacement. The displaced brine is stored in two surface storage ponds. Combined, these ponds have a capacity of 160,000,000 gallons and a surface area of 1,250,000 square feet.

Significant volumes of rain and snow fall on the surface of the brine storage ponds. Through the year, precipitation generally exceeds evaporation; therefore, this precipitation adds to the brine inventory beyond that required for operation. Eventually, this accumulation threatens the pond capacities and must be disposed.

Disposal is accomplished by injection into our two permitted, brine disposal wells. These wells are used solely for this purpose.

St Clair Underground Storage is a partnership owned 51% by Huron Hydrocarbons, 36.75% by Diamond Energy and 12.75% by CanStates Energy, Inc. Huron Hydrocarbons is 100% owned by Consumers Power Company. Consumers Power Company is the operator of the storage facility.

B. Geologic Structure of the Area

The unconsolidated deposits at the site consist of glacio-lacustrine soils deposited during the Wisconsian stage of the Pleistocene glaciation. The deposits consist of three distinctly different soil groups. The stratigraphy of the soils at the site vicinity is shown in Figures 1 and 1A.

The surface topography consists of a series of nearly parallel northeast to southwest trending sand bars. The bars consist of fine-grained sand, occasionally mixed with organic matter. The thickness of sand varies from less than 1 foot to as much as 13 feet with an average thickness of approximately 4 feet.

The deposit immediately below the surficial and sand is an impermeable silty clay which is very stiff near the clay-sand interface and becomes softer with depth. The clay deposit varies in thickness from approximately 125 feet to 140 feet at the site. The upper 15 to 20 feet is

grayish-brown from desiccation and is characterized by low water content, high strength, and low compressibility.

An accumulation of perched groundwater within the surficial sand overlying the silty clay is due to the impervious nature of the clay. Information obtained from the monitoring wells installed by Canonie in December 1983 indicates that the perched water flows from the northwest portion of the site to the southeast. The top of the clay contours shown on Figure 1 also indicates that the perched groundwater will flow from the northwest to the southeast.

The third deposit, which is at a depth of 125 feet to 140 feet, is a glacial outwash composed primarily of silt, sand and gravel. The outwash is the "uppermost aquifer" in the area of the site. Private domestic water wells in the Marysville area are all located in this "uppermost aquifer".

The Hydrogeologic Atlas of Michigan reports the bedrock surface at a depth of approximately 450 feet. The bedrock is a shale formation and is not a water-producing stratum (Figure 2).

C. Confining Formations and Wells in the Area of Review

The uppermost aquifer at this site is located approximately 125-140 feet below the surface (Figure 3). The vertical limits of the aquifer range from 77 to 168 feet below ground surface. This uppermost aquifer is an artesian aquifer with a piezometric level varying from 40 to 50 feet below ground surface. Injections are made into the Cambrian formation at a depth of 4800 feet (Figure 2), which are confined above by limestone and impermeable silty clays (Section B).

To further describe the confining formations above the injection zone, the Core Description Logs for both wells (0001 and 0002) are provided in Attachment A.

There are 37 recorded private domestic water wells in the vicinity of the Marysville Plant (Figure 4). The static water levels in the domestic supply wells in the uppermost aquifer indicate that groundwater flows from south to north.

We are not aware of any unplugged, abandoned, or improperly plugged wells within the area of review.

D. Injection Zone: Lowest USDW Interface

The geology of the area (Section B), the associated confining formations (Section C), and the depth of injection all help prevent the potentiometric surface of the injection zone from ever exceeding that of the lowest USDW during the operating life of the facility.

E. Injection Well Construction, Operation and Monitoring

Potential movement of injection fluids into the confining formations is also prevented by the complete cementing of well casings all the way into the injection zone (Attachment B). Additionally, they have double lined cementing down to a depth of 500 feet.

Injection of sodium chloride brine is done through a tubing and packer process, the mechanical integrity of which is verified annually.

This operation is intended to be active for several decades. The disposal capacity of the well in the Mt Simon geological sandstone layer is considered unlimited. This layer is bounded beneath by metamorphosed rock and above by limestone. There is a flow rate limitation, however, which caused a gradual buildup of injection back-pressure. When an injection pressure of just below 1850 psig is reached, the injection pump is automatically shut down. The pressure then gradually relaxes as the fluid in the injection zone flows locally throughout the formation.

Injection pumps of each well are equipped with high and low pressure shutoffs to prevent a well failure and to cease injection in the event of a well failure.

Continuous recording devices are used to monitor injection and annulus pressure, and flow rates and cumulative volume are monitored daily.

F. Injection Fluid

Only sodium chloride brine is injected into the disposal wells. This brine may vary in concentration from 10% to 100% saturation. However, generally the concentration will be greater than 80% saturation.

The waste brine alters the injection zone by an increase in salinity only. There is no chemical reactivity with the zone itself. Since only sodium chloride brine is to be injected, no incompatibility of wastes is anticipated. Sodium chloride brine, solution mined from the Silurian B salt layer, is consistent in composition. It is characterized by associated constituents of calcium and magnesium with sulfates and carbonates. The concentration of non-sodium chloride constituents is less than 3% of the total dissolved solids.

G. Summary

1. Complex geologic structures, such as faults, are absent in the area of injection.

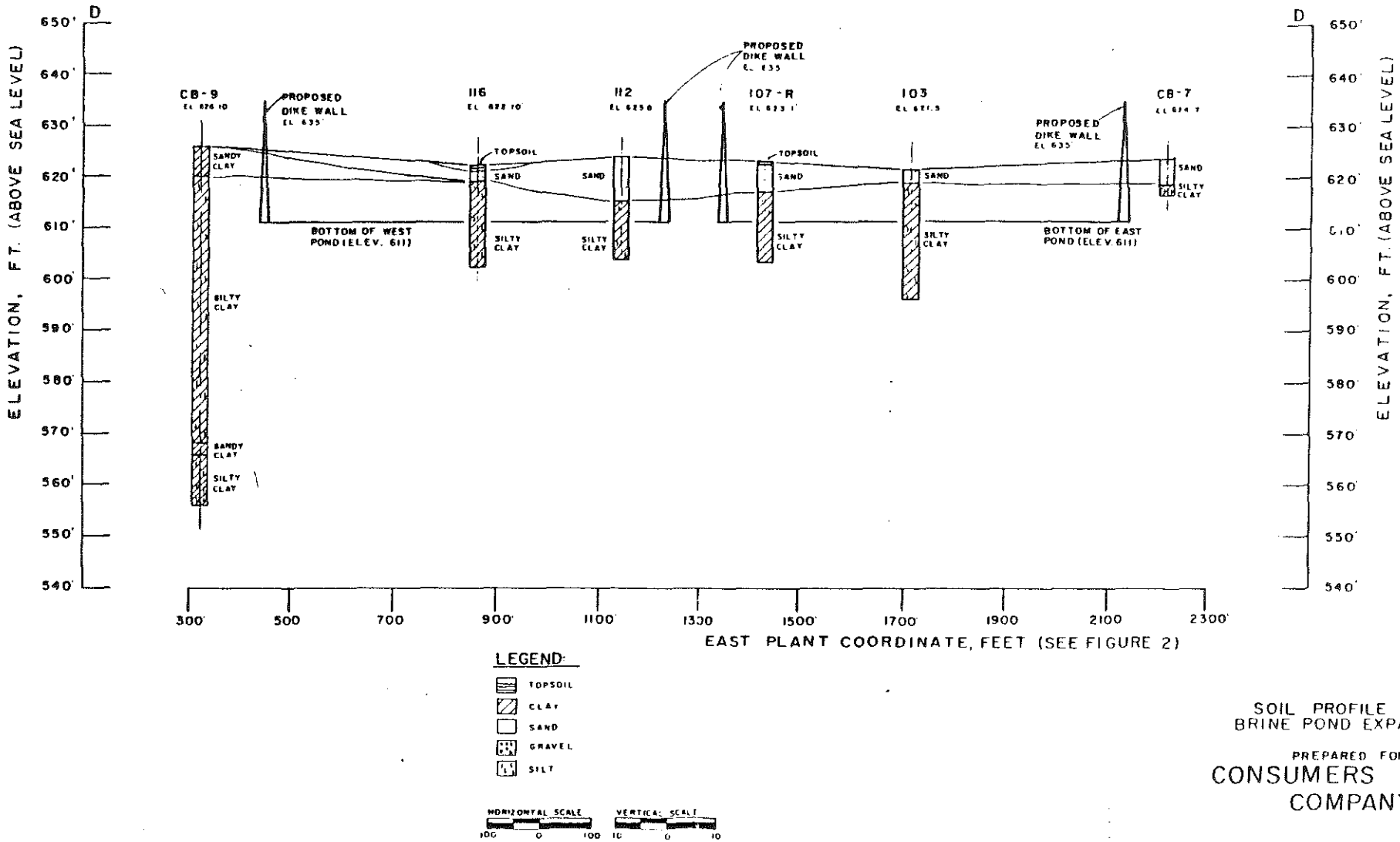
2. The confining formations of clay and limestone above the injection zone are sufficiently thick and dense to prevent any injection fluid movement above the confining zone.

3. The confining formations in conjunction with the depth of injection assure that the potentiometric surface of the injection zone will not exceed that of the lowest USDW at any time during the operating life of the facility.

4. The construction and operation of these injection wells and associated monitoring of injection pressures further assures against the potential of any fluid movement above the confining zone.

5. The injection fluid is sodium chloride brine only which is solution mined from the Silurian B salt layer above the injection zone. The only potential effects of the injected waste brine is an increase of salinity in the injection zone only.

Figure 1.



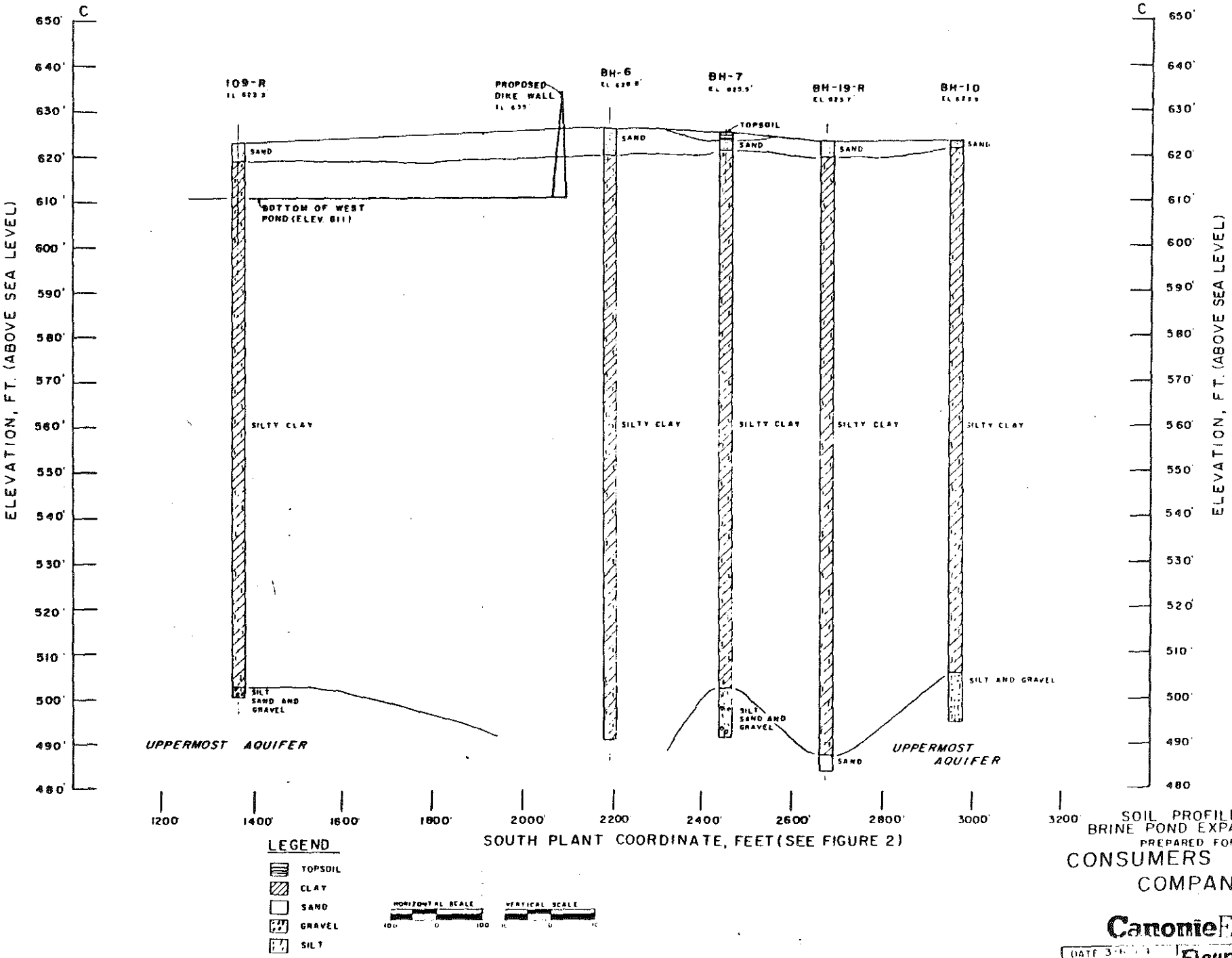
SOIL PROFILE D-D
BRINE POND EXPANSION

PREPARED FOR
CONSUMERS POWER COMPANY

Canonie Engineers

DATE 3-5-84 SCALE AS SHOWN	FIGURE 7a	DRAWING NUM 83 177 E2

Figure 1A



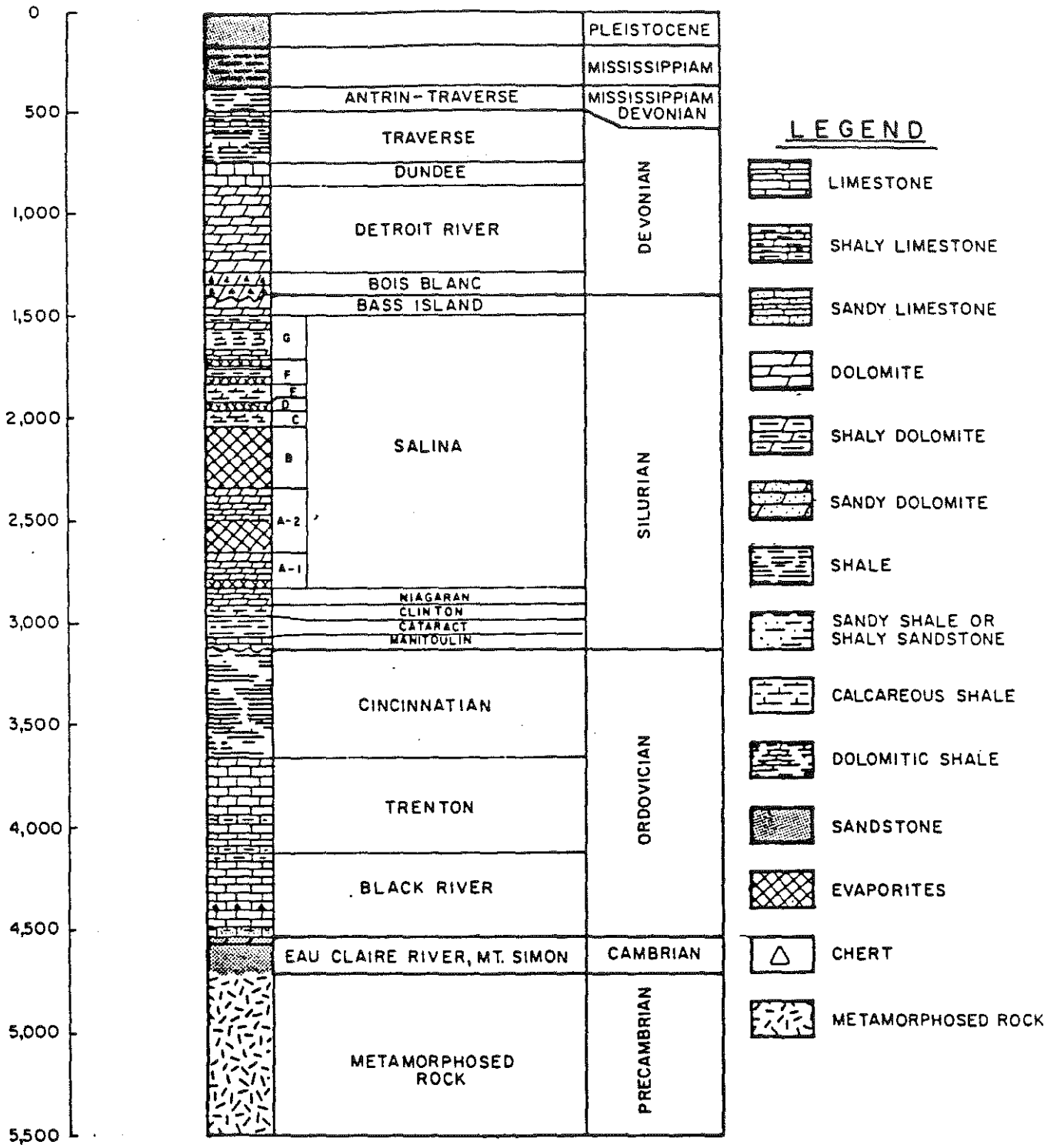
SOIL PROFILE C-C
BRINE POND EXPANSION
PREPARED FOR
CONSUMERS POWER COMPANY

Canonie Engineers

DATE 3-

Figure 6a

FIGURE 2

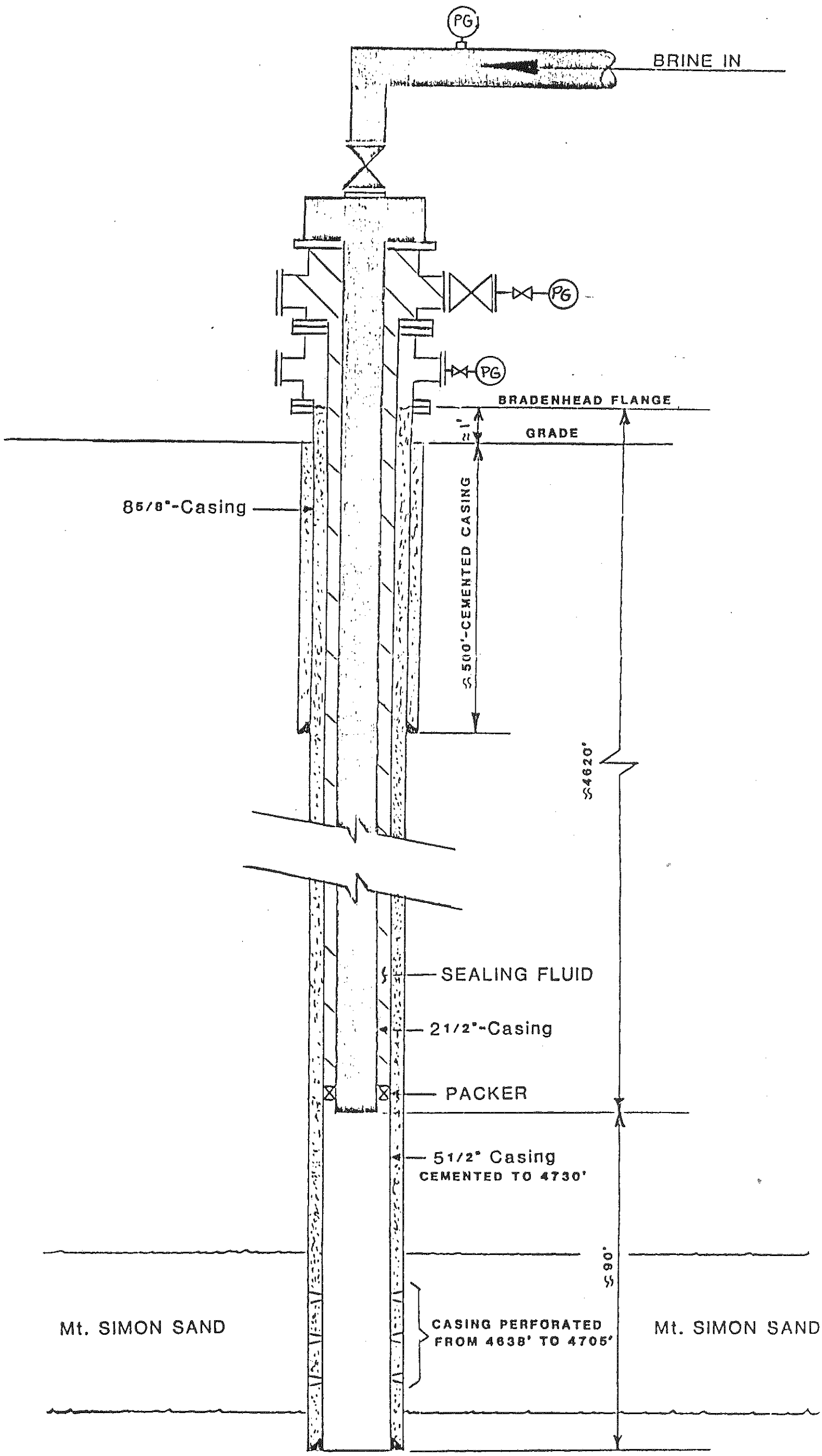


PREPARED BY	FOR
FENIX & SCISSON, INC. ENGINEERS & CONTRACTORS TULSA, OKLAHOMA	CONSUMERS POWER COMPANY JACKSON, MICHIGAN

COLUMNAR GEOLOGICAL SECTION				JOB NO. 192
DRAWN A. G. JR.	CHECKED K. ALLEN	DATE MAY, 1971	SCALE AS NOTED	DRAWING NO. 3

BRUNING 149440

TYPICAL MGRP BRINE DISPOSAL WELL



EST. NO.	ENG. ____ DATE ____	TYPICAL BRINE DISPOSAL WELL FLOW DIAGRAM	CONSUMERS POWER CO.
W. O. NO.	DWG. DMR DATE 10-3-83		MARYSVILLE GAS REFORMING PLANT
	CHK. ____ DATE ____		SCALE ____
	APP. ____ DATE ____		NO. ____

update C

MI. MA underground storage tanks

INVENTORY INFORMATION SHEET

STATE PERMIT NUMBER MI5BD-151

OWNERSHIP DATA

WELL INFORMATION

WELL NAME 1-7 BDW

LAT. ___° ___' ___" .___"
LONG. ___° ___' ___" .___"

CITY/ST/ZIP Marysville, MI 48040

OPERATOR

Environmental Dept.

NAME Consumers Power Co

STREET 212 W Michigan Avenue

CITY/ST/ZIP Jackson, MI 49201

PROJECT/FIELD/UNIT Gas Reforming Plant

TOWNSHIP 5 N, RANGE 17 E, SECTION 7, QTR SECTION N W

140 FEET FROM THE N LINE AND

623 FEET FROM THE W LINE

WELL DATA

WELL STATUS IS X 1. ACTIVE ___ 2. PLUGGED ___ 3. TEMP. ABAND.

SURFACE ELEVATION IS 624 FEET

WELL CLASS/TYPE I/I * Class I, type I

TOTAL DEPTH IS 4733 FEET

DRILLED ON (DATE) 9-29-71 (completed)

PLUGGED BACK TO ___ FEET

CONVERTED ON ___

ABANDONED ON ___ (DATE)

TUBING CASING - see attachment, Figure 8

	SIZE	DEPTH	CEMENT SACKS
SURFACE	___.___ INCHES	___ FEET	___
INTERMEDIATE	___.___ INCHES	___ FEET	___
PRODUCTION	___.___ INCHES	___ FEET	___
TUBING SIZE	___.___ INCHES		

DEPTH OF PACKER IS 4620 FEET

INJECTION DATA

INJECTION FLUID IS Sodium Chloride Brine

INJECTION VOLUME IS variable - see attachment "Brine Disposal Well Data"

WELL HEAD INJECTION PRESSURE IS 1850 psig (max)

INJECTION INTERVAL 1 IS FROM 4638 FEET TO 4705 FEET,

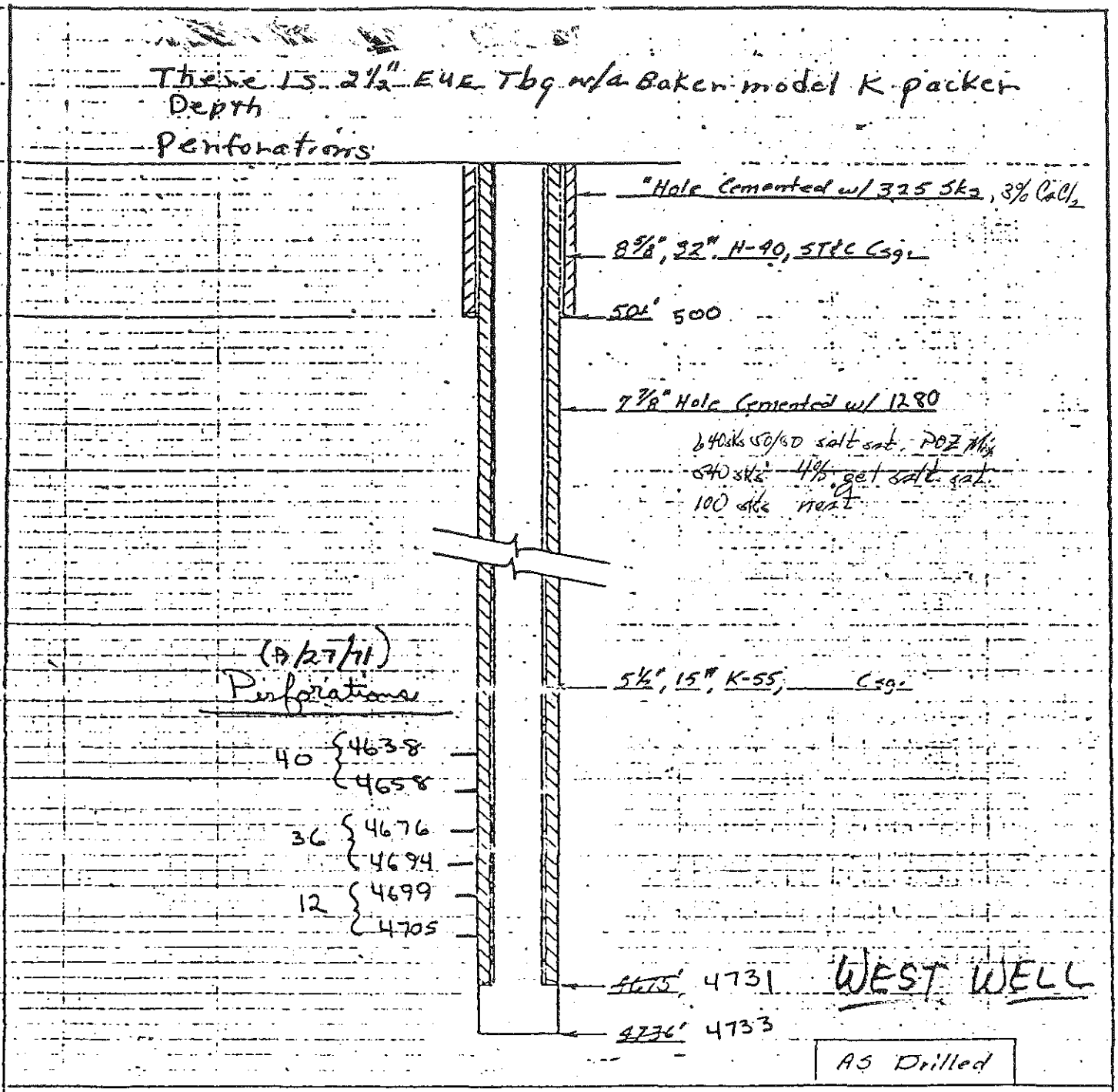
FORMATION IS Eau Claire & Mt. Simon

INJECTION INTERVAL 2 IS FROM ___

FORMATION IS ___

* (Class II EOR) ATTACH DATA ON FORMATION FRACTURE PRESSURES

Exh 8



Consumers Power Company No. 1-7 Brine Disposal Well

All Measurements from Kelly Bushing at ~~633'~~ 637.5 Above Sea Level

Ground Level at 620' A.S.L. 624.5

Located ~~122'~~ 140 from North Line and ~~645'~~ 623 from West Line

N.W. Quarter, Sec. 7, Twp 5N., Range 17E.

Drilled by Calvert Eastern Drilling Co.

Began 7/13/71 Completed 7/29/71 (Drilling)

Well Completed 8/29/71

CONSUMERS POWER COMPANY
MARYSVILLE GAS REFORMING PLANT

BRINE DISPOSAL WELL DATA

CPCo Disposal Well Number	:	1-7 BDW	2-7 BDW
State Disposal Well Number	:	BD-151	BD-152
Tubing			
Size	:	2-1/2"	2-1/2"
Amount	:	4620 feet	4585 feet
Type	:	EUE	EUE
Date Ran	:	September, 1971	September, 1971
Packer			
Depth Set	:	4620 feet	4585 feet
Type	:	Baker Model R	Baker Model R
Date Ran	:	Oct 2, 1971 (approx)	Oct 2, 1971 (approx)
Disposal			
Average Rates*	:	1012 BPD	862 BPD
Maximum Rates	:	2436 BPD	2075 BPD
Pressure	:	1100 - 1850 psig	1100 - 1850 psig

Surface Facilities : 2 - Brine Disposal Pumps, FWI Model #HP-160M, with 150 HP belt drive, electric motors. Pump GA7024A capacity is 106 gpm; pump GA7024B capacity is 66 gpm @ 2000 psig.

2 - Surface brine ponds (lined), each approximately 33,500,000 gal storage capacity. Primarily used for process operations (not for disposal).

* - Disposal operations are intermittent and variable. The rates shown above are the average rates. Reports are submitted monthly to the Michigan Department of Natural Resources whenever brine disposal is done.

The initial disposal pressure is typically 1100 psig and may increase to as much as 1850 psig during the disposal operation.

Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, MI 49201 • (517) 788-0550

June 12, 1985 2GP10.12

Supervisor of Wells
Geological Survey Division
Department of Natural Resources
Box 30028
Lansing, MI 48909

US Environmental Protection Agency
Mary Fitzpatrick 5WD-12
230 South Dearborn
Chicago, IL 60604

BRINE DISPOSAL REPORTS: WELLS BDW #1-7 and 2-7

Brine disposal into disposal wells BDW #1-7 and 2-7 at the Marysville Gas Reforming Plant was as follows:

Disposal Well	April 1985 Bbls Injected	May 1985 Bbls Injected	(Corrected Values For) March 1985 Bbls Injected
BDW #1-7	50,780	27,833	30,451
BDW #2-7	42,610	16,837	29,939

Please call this office should you have any questions.

John A. Gulvas

John A Gulvas
Environmental Department

CC PCHittle, JSC-202A
CJOverbeck, Marysville

OC0685-0015A-EN03

GENERAL
POWER OF
ATTORNEY

THE AMERICAN INSURANCE COMPANY

KNOW ALL MEN BY THESE PRESENTS: That THE AMERICAN INSURANCE COMPANY, a Corporation duly organized and existing under the laws of the State of New Jersey, and having its Home Office in the City and County of San Francisco, California, has made, constituted and appointed, and does by these presents make, constitute and appoint

Eldred Kennedy, Vincent E. Romano, Conrad E. Ludwig, Vera L. Ludwig and Mary B. Smith, all of Jackson, Michigan - EACH

its true and lawful Attorney(s)-in-Fact, with full power and authority hereby conferred in its name, place and stead, to execute, seal, acknowledge and deliver any and all bonds, undertakings, recognizances or other written obligations in the nature thereof,

and to bind the Corporation thereby as fully and to the same extent as if such bonds were signed by the President, sealed with the corporate seal of the Corporation and duly attested by its Secretary, hereby ratifying and confirming all that the said Attorney(s)-in-Fact may do in the premises.

This power of attorney is granted pursuant to Article VIII, Section 30 and 31 of By-laws of THE AMERICAN INSURANCE COMPANY adopted on the 7th day of May, 1963, and now in full force and effect.

"Article VIII, *Appointment and Authority of Resident Assistant Secretaries, and Attorneys-in-Fact and Agents to accept Legal Process and Make Appearances.*

Section 30. *Appointment.* The Chairman of the Board of Directors, the President, any Vice-President or any other person authorized by the Board of Directors, the Chairman of the Board of Directors, the President or any Vice-President, may, from time to time, appoint Resident Assistant Secretaries and Attorneys-in-Fact to represent and act for and on behalf of the Corporation and Agents to accept legal process and make appearances for and on behalf of the Corporation.

Section 31. *Authority.* The Authority of such Resident Assistant Secretaries, Attorneys-in-Fact, and Agents shall be as prescribed in the instrument evidencing their appointment, and any such appointment and all authority granted thereby may be revoked at any time by the Board of Directors or by any person empowered to make such appointment."

This power of attorney is signed and sealed under and by the authority of the following Resolution adopted by the Board of Directors of THE AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 28th day of September, 1966, and that said Resolution has not been amended or repealed:

"RESOLVED, that the signature of any Vice-President, Assistant Secretary, and Resident Assistant Secretary of this Corporation, and the seal of this Corporation may be affixed or printed on any power of attorney, on any revocation of any power of attorney, or on any certificate relating thereto, by facsimile, and any power of attorney, any revocation of any power of attorney, or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Corporation."

IN WITNESS WHEREOF, THE AMERICAN INSURANCE COMPANY has caused these presents to be signed by its Vice-President, and its corporate seal to be hereunto affixed this 8th day of January 19 73.

THE AMERICAN INSURANCE COMPANY

By James H. Wells
JAMES H. WELLS, Vice President

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO } ss.

On this 8th day of January 19 73 before me personally came JAMES H. WELLS, to me known, who, being by me duly sworn, did depose and say: that he is Vice-President of THE AMERICAN INSURANCE COMPANY, the Corporation described in and which executed the above instrument; that he knows the seal of said Corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation and that he signed his name thereto by like order.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year herein first above written.

ETHEL L. WATKINS
NOTARY PUBLIC - CALIFORNIA
CITY AND COUNTY OF
SAN FRANCISCO

Ethel L. Watkins
ETHEL L. WATKINS, Notary Public
My commission expires March 1, 1975

CERTIFICATE

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO } ss.

I, the undersigned, Assistant Secretary of THE AMERICAN INSURANCE COMPANY, a NEW JERSEY Corporation, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked; and furthermore that Article VIII, Sections 30 and 31 of the By-laws of the Corporation, and the Resolution of the Board of Directors, set forth in the Power of Attorney, are now in force.

Signed and sealed at the City and County of San Francisco. Dated the 11th day of July, 19 77.

Winifred H. Browne
WINIFRED H. BROWNE, Assistant Secretary

360257 (TA) — 4-71

Blanket Bond, $50,000.00 Bond Number: SL 342-2164

BOND FOR CONFORMANCE WITH LAWS, RULES AND REGULATIONS
GOVERNING OIL AND GAS OPERATIONS IN THE STATE OF MICHIGAN

Consumers Power Company
(principal)

of 212 West Michigan Avenue, Jackson, in the State of Michigan 49201
(address)

as Principals, and The American Insurance Company, San Francisco, California
(name and address of Surety)

, a corporation organized and existing under the laws of the State of New Jersey and duly authorized to transact business in the State of Michigan, as Surety, are firmly bound unto the State of Michigan and the Supervisor of Wells of the State of Michigan in the sum of Fifty Thousand ($50,000.00) Dollars.

The Principal is about to commence and prosecute to final completion a well or wells for oil or gas, for secondary recovery, for disposal of salt water, brine or other oil field wastes, or for development of reservoirs for the storage of liquid or gaseous hydrocarbons under State of Michigan Permits, and

"Final completion" means the locating, drilling, completing, producing, reworking, plugging, filling of pits, and clean-up of well sites, including the filing of prescribed records and the approval thereof by the Supervisor of Wells.

If the Principal shall comply with the applicable provisions of P.A. 61 1939, and the Rules prescribed by the Supervisor of Wells of the State of Michigan in the final completion of the well or wells, the Surety's obligations are terminated. The Surety's liability herein is co-extensive with that of the Principal and the State of Michigan has the same remedies against the Surety as against the Principal.

This bond is subject to the following conditions:

(1) This bond shall be in force from the date hereof until the Supervisor of Wells has approved transfer of the Permit or Permits which have been granted or transferred to the Principal to a new owner or until the Supervisor of Wells has accepted a replacement bond; or, the Principal has brought the Permit or Permits to "final completion."

NOTICE

(2) The Surety may refuse to accept liability for additional wells under this bond at any time by giving ten (10) days notice by registered mail to the Supervisor of Wells of the State of Michigan. In the event of such notice, the Surety shall not be liable on account of any wells for which Permits may be granted or transferred to the Principal after the effective date of notice, but this bond shall continue in full force for the well or wells on which Permits were granted or transferred to the Principal prior to the effective date of said notice. In no event shall the Surety be liable for the payment of royalties due from the Principal. The Supervisor of Wells shall advise the Surety when its liability under this bond is terminated.

The Surety, by execution of this bond, accepts the liability covered by prior bond(s)
SLR 304-0333 - National Surety Corporation
(number(s) and company)

Signed, sealed and dated the 11th day of July, 19 77.

Francis K. Gietzen
Sue A. Weese
(Witnesses)

APPROVED AS TO FORM
CONSUMERS POWER COMPANY
LEGAL DEPARTMENT

CONSUMERS POWER COMPANY
BY: W R Boris
(Principal)
W R Boris, Executive Vice President

By
(Surety)

Attest Vera L. Ludwig
Vera L. Ludwig - Attorney-in-Fact

POWER-OF-ATTORNEY or evidence of authority of person executing for Surety to be attached

R-7206 Rev. 7/77

Consumers Power Co. #1-7 BDW St. Clair BD#151

CONSUMERS POWER COMPANY

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

LOG OF OIL, GAS OR TEST WELL

TO BE FILED WITH SUPERVISOR OF WELLS WITHIN 30 DAYS AFTER COMPLETION OF WELL (ACT 61 P.A. 1939 AND ACT 326 P.A. 1937)

OEC

SUBMIT IN DUPLICATE

NAME OF OWNER OR OPERATOR: Consumers Power Company

ADDRESS OF OWNER OR OPERATOR: 212 West Michigan Avenue, Jackson, Michigan 49201

NAME OF DRILLING CONTRACTOR: Dowling Company

ADDRESS OF DRILLING CONTRACTOR: 501 Prchard Street, St. Clair, Michigan

WELL NO.: 1-3 HSW

PERMIT NO.: SD 151

S.P. NO.:

SECTION: 3

TWP.: 3N

RANGE: 11E

COUNTY: St. Clair

SEC. 3 T3N R11E

FT. FROM: North

LINE AND: 623

FT. FROM: West

LINE OF QUARTER SECTION

DATE DRILLING COMPLETED: 7/29/71

DATE WELL COMPLETED: 9/29/71

TYPE OF WELL: Brine Disposal

DRILLING COMPLETED IN: St. Clair & Dn. River

TOTAL DEPTH: 4733 (Sohl)

ELEVATION: GR 637.5 KB RT

DF

GL

ROTARY TOOLS: Feet to 4733

CABLE TOOLS: Feet to

CASING AND CEMENTING

DATE	WHERE SET	CEMENT	AMOUNT PULLED
5-5-71	500	325	
5-11-71	4731	1250	

PERFORATIONS

DATE	NO. HOLES	FROM	TO
9/27/71	40	4638	4653
"	36	4676	4694
"	12	4699	4703

DEPTH CORRECTION

DEPTH	CORRECTION

OIL OR GAS ZONES

FORMATION	FROM	TO	AMOUNT

WATER ZONES

FORMATION	FROM	TO	AMOUNT

DEVIATION SURVEY

DEPTH	DEG.

SHOT, FRAC OR ACID TREATMENT

DATE	FROM	TO	QUANTITY	SHOT
9/27/71	4638	4703	1000 gal. acid	Schlumberger
9/29/71	4638	4703	40,000 gal. frac	Halliwell
				Halliwell
				Burgener
				Other

MECHANICAL LOGS RUN

TYPE	TO
X Gr-Ind-Sonic-Gr, Cal.	4733

PRODUCTION DATA

DATE WELL COMPLETED	OIL	GAS	WATER	PRESSURE	GRAVITY OIL	GRAVITY GAS
7/29						

The above information is certified and correct.

Signature: [illegible]

Date: December 14, 1971

Title: Senior Engineer

Address: Jackson, Michigan

NOTE: COMPLETE ALL REPORTS FOR ALL WELLS ON SEPARATE SHEETS.

FORMATION RECORD

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

ELEVATION (KB)	GEOLOGIST NAME	TOPS TAKEN FROM
[illegible]	[illegible]	☐ DRILLERS LOG ☐ SAMPLE LOG ☒ ELECTRIC LOG

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		PLEISTOCENE & MISSISSIPPIAN
[illegible]	170	Glacial drift and Mississippian shale undifferentiated
		MISSISSIPPIAN-DEVONIAN
		Antrim
[illegible]	371	Shale, blk
		DEVONIAN
		Traverse Limestone
[illegible]	510	Lms & shaly lms, undifferentiated
[illegible]	649	Shale, gry, soft & gummy, few thin crinoidal gry lms beds
		Dundee Limestone
[illegible]	726	Ls, tan, frag, foss, tr oil staining w/good oil odor; scatt intergranular por approx 660-690
[illegible]	772	Lms, tan, v coarsely fragmental foss; coralline, tr oil staining
		Detroit River Group
[illegible]	795	Dol, wh to buff, microsucrosic
[illegible]	912	Dol, gry-wh to buff, fn to v fn sucrosic scatt good inter xln and vugular por; numerous thin interbeds of wh anhy
[illegible]	926	Anhy, wh
[illegible]	944	Dol, brn to gry, fn xln & bluish-wh anhy
[illegible]	1110	Dol, tan to lt gry, sl silty in pt; few small scatt anhy inclusions
[illegible]	1142	Lms, brn to tan, mottled, fn xl, dns
		Bois Blanc
[illegible]	1224	Lms, tan to brn, mottled, fn xln, dns, scatt chert, wh speckled to milky
[illegible]	1236	Chert, wh, smooth, speckled, some brn to buff fn xln lms
		SILURIAN
		Bass Islands Group
[illegible]	1294	Dol, tan to lt gry, tan, v fn xln, generally tight but w/ several zones of good vugular & inter xln por
[illegible]	1297	Anhy
[illegible]	1320	Dol, tan-gry, v fn xln, fair [illegible] por
[illegible]	1339	Anhy wh interbedded w/gry tan [illegible]

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		Salina Group
1339	1361	Sh, gry, anhydritic
1361	1406	Dol, tan to brn, micro xln w/ anhydritic & shaly [illegible]
1406	1486	Shale, gry & grn, some maroon shle, anhydritic
		"F" Salt
1486	1742	Salt w/thin interbeds of sh & anhy
		"E" Unit
1742	1756	Sh, gry, dolomitic
1756	1765	Salt, clear to [illegible], some gry sh
1765	1828	Dol, tan to gry, shaly [illegible]
		"D" Salt
1828	1862	Salt, clear w/few thin stringers, gry [illegible]
		"C" Shale
1862	1888	Sh, grn, soft, silty
1888	1918	See Core Description
		"B" Unit
1918	1943	See Core Description
		"B" Salt
1943	2253	See Core Description
		A-2 Carbonate
2253	2269	See Core Description
2269	2295	Dol, buff, fn sucrosic
2295	2370	Lms, tan, micro xln, dns, grades downward into gry micro xln lms
2370	2395	Lms, lt buff, gry, micro xln
2395	2404	Dol, buff, micro sucrosic, wh anhy
		A-2 Salt
2404	2520	Salt, fairly pure
2520	2531	Dol, buff, fn, sucrosic, porous, anhydritic
2531	2538	Anhy, wh
		A-1 Carbonate
2538	2576	Dol, tan, fn sucrosic, [illegible] porosity
2576	2654	Dol, brn to gry, v fn xln, dns
		A-1 Evaporite
2654	2677	Anhy, lt brn to gry [illegible]
		Brown Niagaran
2677	2685	Dol, lt brn to tan, mottled, fn granular texture, [illegible]

FORMATION RECORD

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

ELEVATION	GEOLOGIST NAME	TOPS TAKEN FROM
		☐ DRILLERS LOG ☐ SAMPLE LOG ☐ ELECTRIC LOG

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
		Gray Niagaran
[illegible]	[illegible]	Dol, gry, to dk gry, sli argill, v dns
		White Niagaran
[illegible]	[illegible]	Dol, lt gry to [illegible], v fn xln, scatt pinpt vugs
		Clinton
[illegible]	3795	Dol, gry to dk gry, v fn, granular xln, [illegible]
[illegible]	3800	Dol, gry-dk, fn to med xln, along vuggy por
		Cataract Group
[illegible]	[illegible]	Dol, buff to grnsh-buff, fn xln, interbedded w/grn to gra silty shales
[illegible]	[illegible]	Sh, dk red & grn, soft, minor amts of buff-[illegible], fine xln [illegible]
		Manitoulin Dolomite
[illegible]	[illegible]	Dol, grnsh-buff, granular xln slghtly interbedded w/grn waxy shale
		ORDOVICIAN
		Cincinnatian Series
[illegible]	3805	Sh, dk gry, calc w/traces of dk red sh; few thin interbeds of med-crs granular clastic argill lms, grnsh-tan to buff
[illegible]	3840	Sh, dk red & grn, firm, silty some grnsh-buff, med xln, argill, dns, dol
[illegible]	3870	Lms, grnsh-gry, fine frag foss to medxln, argill, interbedded w/thin grn shales
		Utica Shale
[illegible]	[illegible]	Sh, grnsh-gry, firm, calc w/ abun thin frag foss, limy zones
[illegible]	[illegible]	Sh, dk grnsh-gry, fairly clean
		Trenton Group
[illegible]	[illegible]	Lms, lt gry, buff, v fn frag foss, dns, dolomitic
[illegible]	[illegible]	Lms, tan, fn frag foss to v fn xln, dns
[illegible]	[illegible]	Ls, buff to tan, med to coarse frag foss, becoming somewhat argill w/thin dk shaly ptgs
[illegible]	[illegible]	Lms, brn to buff wh, v fn textured, [illegible], foss, dns, v little argill material
[illegible]	[illegible]	Lms, [illegible] to buff, wh, med to coarse frag foss, becoming increasingly argill w/[illegible]

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)
4045	4058	Sh, dk gry, splintery, w/ small dk reddish-brn specks throughout
		Black River Group
[illegible]	4180	Lms, lt brn to buff, micro xln to v fn frag foss, dlsm, some buff wh chalky zones
4180	4541	Lms, brn to gry-brn, micro xln, v dns, few buff "earthy" textured chalky zones
4541	4579	See Core Description
		Glenwood
4579	4586	See Core Description
		CAMBRIAN
		Eau Claire
4586	4674	See Core Description
		Mt. Simon Sandstone
4674	4710	See Core Description
		PRE-CAMBRIAN
4710	4733	See Core Description
	4736	TD Driller
	4733	TD Schlumberger

CONSUMERS POWER COMPANY
[illegible]
[illegible]
St. Clair County, Michigan

Diamond Core Description

Core	Formation	Depth	Description
		[illegible]	See 58.5'
		[illegible]	Sh, grn-gry, dolomitic w numerous anhy nodules & a few thin anhy beds - 1/2" to 3/4" thick
		[illegible]	Sh, grn-gry, dolomitic w/occas an anhy nodules & clusters of nodules
		[illegible]	Sh aa but fairly well laminated w/thin discontinuous anhy laminae; also some individual irreg nodules
		1899.2-1900.3	Sh aa, highly disturbed & fractured; some frac infillings of anhy & orange-red salt (Sylvite?)
		1900.3-1903.3	Core intersects vert frac filled w/ orange-reddish salt; rest of core is predominantly grn sh w/anhy nodules; contact of frac filling & sh is extremely sharp; v little solution along frac surface
		1903.3-1904.5	Sh aa w/tr of orange salt filled frac intersection less than 1/2" thick
		1904.5-1914.8	Core intersects vert frac - up to half the core consists of the orange salt; salt has v fibrous crystal structure which appears to be at right angles to frac surface; frac from approx 1904-1906.5 is high angle (about 60°) - rest is near vert
		[illegible]	Sh, gry-grn, dol aa w/abun anhy nodules & discont bands; nodules appear to have been distorted & flattened

[illegible] (Contd)

Core	Formation	Depth	Description
		1918.2-1921.7	Sh as up to 60% laminated w/"flattened" anhy nodules & thin wavy beds of brn sucrosic dol less than 1/2" thick
		1921.7-1924.8	(Irregular erosional contact) Dol, tan, xln, dns, appears to be quite anhydritic; (surf of core dries nearly wh) few hair-line high-angle fracs (healed)
		1924.8-1927.5	Dol, anhydritic as, v highly fractured & jumbled, abun infilling of clear salt into fracs & star shaped tension cracks
		1927.5-1928.2	Dol, as, fairly massive-dns
		1928.2-1930.5	Sh, gry to sli grnsh-gry, v firm, quite dolomitic
		1930.5-1934.2	Sh, gry-grn, dolomitic w/abun anhy nodules & discontinuous wavy laminae; also minor amts of interlaminated tan sucrosic dolomites
		1934.2-1935	Sh, some w/ 1/2" vert frac down to 35 filled w/orange salt - frac dies out completely @ 35
		1935-1945.8	Sh, as w/abun irreg wavy anhy beds & occas dol
	P Salt	1945.8-1946.9	Salt, clear, glassy; contact @ 1945.8 is v irregular
		1947-2007	Rec 59.75'
		1947-1953.4	Salt, xln w/sli drkr bands of impure salt
		1953.4-1956.5	Salt, dk, xln, sli anhydritic throughout
		1956.5-1957.2	Salt, fairly pure w/a total of about 4" of wh-gry impure anhy bands
		1957.2-1959.3	Salt, fairly pure

[illegible] Description (Contd)

[illegible]	Formation	Depth	Description
		1959.3-1959.7	Anhy, brn, poss dolomitic
		1959.7-1967.5	Salt, fairly pure w/ 3/4" anhy band @ 1965.4
		1967.5-1968.4	Salt, dk xln sli impure, few thin scatt anhy bands
		1968.4-1971.2	Salt, clean, wh, xln-wh - 1/2" anhy band @ 1969.2'
		1971.2-1971.5	Anhy, fnly brecciated
		1971.5-1972	Salt w/minor anhy frags
		1972-1976.4	Salt, fairly clean w/a few widely scatt stringers of anhy breccia
		1976.4-1978.1	Anhy breccia
		1978.1-1978.7	Salt, fairly pure
		1978.7-1985	Mostly anhy w/shaly or dolomitic bands, brecciated in spots
		1985-1985.4	Salt
		1985.4-1985.8	Anhy
		1985.8-1989.9	Salt, pure w/one thin 1/2" layer of anhy breccia @ 1987.7
		1989.9-1991	Anhy, highly brecciated & jumbled
		1991-1992.8	Salt, w/few thin ahy breccia layers
		1992.8-1998.5	Anhy, brecciated; banded w/shaly material or dolomitic sh; some sli dips (poss slurry fracs) on bedding planes
		1998.5-1999.4	Salt, dk, impure w/abun angular imbedded anhy frags
		1999.4-2001.5	Anhy, dns, dolomitic in pt; somewhat brecciated; some slt infilling of tension cracks

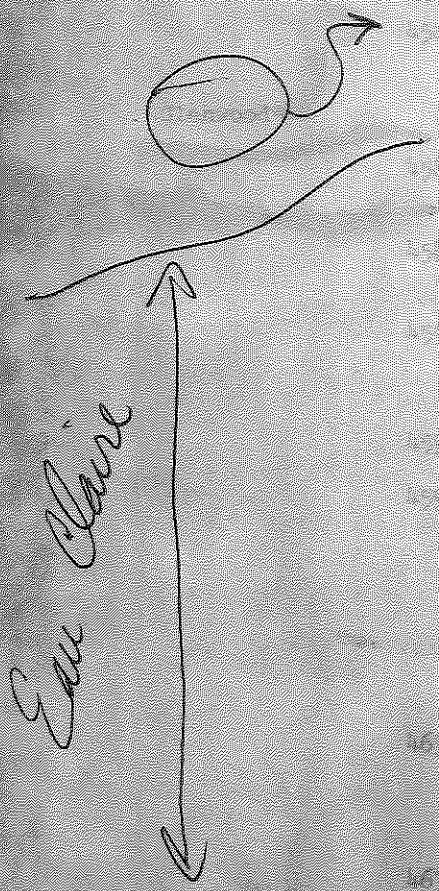
[illegible] Description (Contd)

Core	Formation	Depth	Description
		[illegible]	Salt, dk, somewhat impure
		[illegible]	Breccia: mostly angular anhy w/some minor amts of salt
		[illegible]	Salt, dk, impure w/some brecciated anhy
		[illegible]	Rec 60'
		[illegible]	Salt, dk, somewhat impure, abun wh veinlets of anhy up to 1/2" thick
		[illegible]	Salt, dk, somewhat more pure
		[illegible]	Salt, crs xln, impure, abun anhy veinlets
		[illegible]	Salt, dk, crs xln, abun scatt fine irreg anhy veinlets
		[illegible]	Salt, more pure crs xln
		[illegible]	Mostly anhy
		[illegible]	Salt, dk crs xln, scatt minor anhy inclusions & veinlets
		[illegible]	Anhy & poss sm argill material
		[illegible]	Salt, brnsh, fairly pure
		[illegible]	Rec 51.3' (Actual recovery was 56'; however, top 4' was considered loss from Core #3 and was included with Core #3)
		[illegible]	Salt, dk, crs xln, fairly pure
		[illegible]	Anhy & sh grn
		[illegible]	Salt, v crs xln (about 5' of broken core came from this interval and was lost when core barrel was emptied)
		2077.7-2080.1	Salt, tan, fairly pure
		[illegible]	Salt as w/minor irreg anhy incl

Core Description (Contd)
[illegible]

Core #	Formation	Depth	Description
		2198.2-2219.5	Salt, fairly pure w/minor anhy veinlets throughout
		2219.5-2220.6	Anhy, somewhat brecciated w/clear salt frags
		2220.6-2221.8	Salt
		2221.8-2222.1	Anhy
		2222.1-2225.7	Salt
		2225.7-2228	Anhy, highly disturbed bedding planes, somewhat brecciated; infilled w/clear salt
		2228-2230	Anhy, fnly laminated w/bedding planes in place
		2230-2231	Salt
		2231-2231.3	Brecciated anhy & salt
		2231.3-2240	Salt, fairly pure
		2244-2272	Rec 28'
		2244-2256.9	Salt, fairly pure
		2256.9-2259	Anhy grading downward into dolomitic anhy
	A-2 Carbonate		
		2259-2265.5	Dol, brn, v dns & fn xln, all calc & sweating salt wtr in intermittent thin bands up to 2" thick; v all show of brn oil bleeding in few spots between 2261.5 & 2262.0'
		2265.5-2271	Dol, brn, extremely dns & massive, v fn xln; no evidence of any fluid saturation
		2271-2272	Dol, as, but all sweating salt wtr along a few bedding planes

Black River 4541-4579



Formation	Depth	Description
	[illegible]	Rec [illegible]'
	[illegible]	Lms, lt brn, micro xln w/considerable [illegible]
	[illegible]	Lms, tan to gry, micro xln to lithographic, abun wavy dk irreg shaped ptgs mottled appearance (similar to "boudinage" of Gray Niagaran; some open vert frac between 4563 and 4564.5'
	[illegible]	Lms, tan, litho as but dk irreg ptgs much farther apart (2-3 In.); all v dns
	[illegible]	Sh, dk grn to blk - grades downward from above lime to sh and into grn shaly ss
	[illegible]	Ss, grn, med grd, glauc; some por evident
	[illegible]	Highly laminated grn silty sh & grn siltstone & pinkish tan; v fn xln; all sdy dol
	[illegible]	Rec 56.47'
	[illegible]	Dol, v fn to micro-xln; extremely dns, silty to v silty, grn to pink; extremely laminated w/thin highly disturbed & jumbled bedding planes; occas thin zones of intraformational breccia; occas minor erosional contact bedding planes; some near vert hairline fracs which sweat v sl amt wtr after about 30 minutes
	[illegible]	Dol, dk gry to grn-gry, micro xln; extremely dns interbedded w/thin lenses (1/16" to 2") of dk grn med-crs grd tight glauconitic ss
	[illegible]	Dol, dk gry micro-xln slate-like appearance

Core #	Formation	Depth	Description
	Eau Claire	4639-4641.5	Mostly dk grn-gry glauconitic "tight" med-crs grd sand highly interbedded w/ dns micro xln gry dol aa
		4641.5-4646.2	Dol, dk gry, sub-litho, extremely dns, poss silty, almost no RX with acid; occas paper-thin ss ptgs of med grd glauc ss
		4646.2-4648.2	Ss, dk red, also v glauconitic, med-crs grd, tight
		4648.2-4651.5	Ss, dk red & grn, v crs grd, extremely glauconitic, good por, sweats some salt wtr
10		4651-4710	Rec 55.10'
		4651-4659	Ss, dk red, med-crs grd, v glauc, fair por to about 4657'
		4659-4663	Ss, dk grn, sli reddish, crs, glauc, sl less apparent por
		4663-4666	Ss, dk grn, glauc, med grd, hard, somewhat non-por
		4666-4672	Highly banded, gry & grn, silty sh & shaly ss, v fn text - hard & dns
		4672-4674	Glauc, grn ss, highly disturbed bedding planes, dns
		4674-4676	Sh, siltstone, dk gry to grn, v banded, v hard
		4676-4678	Ss & silty ss, red & grn, highly interbedded, somewhat conglomerated, tight
	Mt. Simon	4678-4681.3	Ss, med-crs, v glauc, becoming conglomerated at base

Description (Contd)

Formation	Depth	Description
Mt. Simon		
	4681.1-4683	Ss, pink w pale grnsh mottling, fn grd, v hard & dns, abun wavy grn argill bedding planes
	4688-4691	Ss, mostly lt grn, v mottled in appearance, med grd, sli porous
	4691-4697	Ss, pink & grn, mottled, interbedded, abun grnsh thin argill wavy ptgs
	4697-4699	Ss, much the same but v/highly disturbed bedding planes; some intraformational brecciation; few poss hiatus type ptgs
	4699-4706	Ss, pink to reddish pink; some grnsh argill ptgs; fn-med grd, hard, poss arkosic
	4710-4736	Sec 26'
	4710-4712.8	Ss, pink, med grd, well cemented, arkosic; scatt grnsh-gry argill wavy ptgs
	4712.8-4713	Conglomerate consisting of sand as, [illegible] angular milky qtz frags & brick-red [illegible] lar feldspar frags; also some [illegible] material; angular unconformity at base
Pre-Cambrian		
	4713-4734	Reworked basement rock; pink granitic material interbedded w/dk grn [illegible] poss hornblende; v banded w/[illegible] ptgs on bedding planes; [illegible] high angle hairline frags; [illegible] w/ qtz
Basement Rock		
	4734-4756	Dk hornblende granite; fairly massive w/ absence of bedding planes [illegible]

APPLICATION FOR PERMIT TO DRILL A WELL FOR OIL, GAS, GEOLOGICAL TEST, BRINE DISPOSAL, GAS OR L.P.G. STORAGE OR FOR SECONDARY RECOVERY

UNDER AUTHORITY OF ACT 61 P.A. OF 1939, AS AMENDED, AND ACT 326, P.A. 1937 AS AMENDED.

MAIL TO:
SUPERVISOR OF WELLS
GEOLOGICAL SURVEY
STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING, MICHIGAN 48926

See Reverse Side Before Filling Out This Application

1. APPLICATION TO DRILL A WELL FOR: Brine Disposal
2. DATE: June 25, 1971
3. FEE RECEIVED: $ [redacted] $ 1.00
4. LESSEE (OWNER OF LEASE RIGHTS): Consumers Power Company
5. PERMANENT ADDRESS: 212 West Michigan Avenue, Jackson, Michigan
6. PHONE: 783-0710
7. LESSOR (FULL NAME OF OWNER OF MINERAL RIGHTS): Consumers Power Company
8. WELL NO.: 1-7 BSM
9. SURFACE OWNER (IF OTHER THAN MINERAL OWNER): Same
10. DRILLING CONTRACTOR: Will notify when available.
11. ADDRESS:
12. PHONE:
13. LOCATE WELL AND OUTLINE LEASE ON SECTION PLAT -- AND ACRES: N/ ¼ of NW ¼ of NW ¼, SECTION 7 T 5N R 17E
14. TOWNSHIP: St. Clair
15. COUNTY: St. Clair
16. TOTAL ACRES IN LEASE OR UNIT (SPECIFY): Approx. 390 Acres

Locate well in two directions from nearest lines of quarter section and property ownership or unit lines:

17.	FT. FROM North (PROPERTY LINE)	LINE OF QUARTER SECTION	623	FT. FROM West (PROPERTY LINE)	LINE OF QUARTER SECTION
18.	FT. FROM North (PROPERTY LINE)	[redacted] LINE	623	FT. FROM West (PROPERTY LINE)	[redacted] LINE

19. PROPOSED PURPOSE OF WELL (OIL, GAS, GEOLOGICAL, BRINE, SECONDARY): Brine
20. FORMATION IN WHICH WELL IS TO BE COMPLETED: Cambrian
21. ESTIMATED DEPTH OF WELL: 4800'
22. PROGRAM OF CASING, SEALING, CEMENTING AND COMPLETING WELL:

a minimum depth of 500' and cement to the surface.

Set 8-5/8" surface casing at ~~approximately 500' and cement to surface~~

Set 5-1/2" casing at total depth and cement to surface.

CASING IS NOT TO BE STRIPPED FROM THE HOLE AND NO CHANGE IS TO BE MADE IN THE PROGRAM OUTLINED ABOVE WITHOUT APPROVAL OF THE SUPERVISOR OF WELLS OR HIS AUTHORIZED REPRESENTATIVE.

23. ARE THERE ANY LAKES, STREAMS, DRAINAGE DITCH, MARSHES, OR MUCKS WITHIN 200 FEET FROM WELL LOCATION? Yes ☐ No ☒
24. ARE THERE ANY BUILDINGS OR OTHER STRUCTURES WITHIN 75 FEET OF THE PROPOSED LOCATION? Yes ☐ No ☒
25. IF ANSWER TO NO. 23 ABOVE IS YES, INDICATE THE DISTANCE FROM LOCATION:

APPLICANT AGREES TO COMPLY WITH THE PROVISIONS OF ACT 61, PUBLIC ACTS OF 1939, AS AMENDED, AND ACT 326, PUBLIC ACTS OF 1937 AS AMENDED, AND RULES AND REGULATIONS PERTAINING TO THE LOCATING, DRILLING, CASING, SEALING, COMPLETING, PRODUCING, AND PLUGGING OF WELLS. BEFORE COMMENCING DRILLING OPERATIONS, CONTACT THE NEAREST FIELD OFFICE. (See reverse side)

26. APPLICATION FILED BY (NAME OF AGENT): A. J. Burkons, Consumers Power Co., Jackson, Mich.
27. NAME OF OWNER: Consumers Power Company
28. SIGNATURE OF OWNER OR AGENT:

LEAVE BLANK

PERMIT NUMBER	PERMIT FEE
FOR DEPUTY OR SUPERVISOR OF WELLS USE ONLY	

STATE OF MICHIGAN
DEPARTMENT OF CONSERVATION
SUPERVISOR OF WELLS

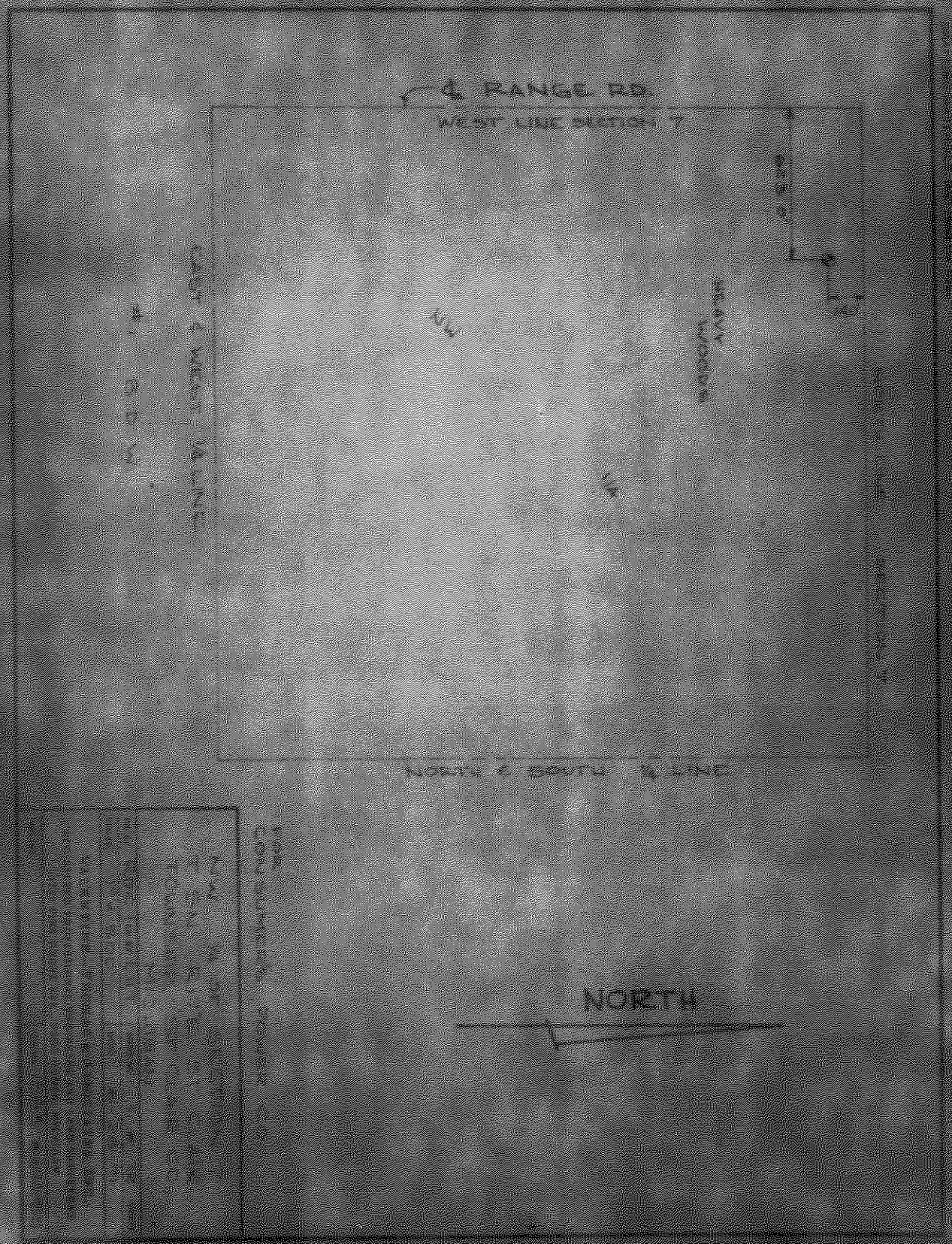
PERMIT TO DRILL A WELL FOR BRINE DISPOSAL

PERMIT NO. BD # 151
Index
No. [illegible] Lansing, Michigan, June 30 1971

In accordance with the provisions of Act 61, P. A. 1939, as amended, and the General Regulations issued thereunder, permission is hereby granted to drill a well ONLY for BRINE DISPOSAL. Consumers Power Company, Consumers Power Co. FL-7 BDW. [illegible] Section 7, T.5N., R.17E. St. Clair Twp., St. Clair County. (Cambrian-Approx. 4800')

Signed [signature]
Supervisor of Wells

By [signature]



℄ RANGE RD.
WEST LINE SECTION 7
HEAVY WOODS
NORTH & SOUTH ¼ LINE
NORTH

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

LOG OF OIL, GAS OR TEST WELL

TO BE FILED WITH SUPERVISOR OF WELLS WITHIN 30 DAYS AFTER COMPLETION OF WELL (ACT 61 P.A. 1939 AND ACT 326 P.A. 1937)

SUBMIT IN DUPLICATE

NAME OF OWNER OR OPERATOR: Consumers Power Company	ADDRESS OF OWNER OR OPERATOR: 212 West Michigan Avenue, Jackson, Michigan 49201
NAME OF DRILLING CONTRACTOR: [illegible] Drilling Company	ADDRESS OF DRILLING CONTRACTOR: 301 Orchard Street, St. Clair, Michigan
	WELL NO.: 1-7 [illegible] — PERMIT NO.: BD #151 — S.P. NO.: [illegible]
	SECTION: 7 — TWP.: 5N — RANGE: 17[illegible]
	COUNTY: St. Clair

[illegible] Ft. from North Line and [illegible] Ft. from West Line of quarter section

DATE DRILLING BEGUN: [illegible]/71	DATE DRILLING COMPLETED: 7/29/71	DATE WELL COMPLETED:	TYPE OF WELL: Brine Disposal
ROTARY TOOLS COMPLETED IN: [illegible] Cambrian	TOTAL DEPTH: 4733 (Sch1)	ELEVATION: KB 637.5	RB / RT / RF / [illegible]
		CABLE TOOLS: From	Feet to

Feet to 4733 Feet

CASING AND CEMENTING

DATE	WHERE SET	CEMENT	AMOUNT PULLED
[illegible]	[illegible]	325	
[illegible]	4731	1280	

PERFORATIONS

DATE	NO. HOLES	FROM	TO

DEPTH CORRECTION

DEPTH	CORRECTION

OIL OR GAS ZONES

FORMATION	FROM	TO	AMOUNT

WATER ZONES

FORMATION	FROM	TO	AMOUNT

DEVIATION SURVEY

SUN AT	DEVIATION

SAND FRAC OR ACID TREATMENT

DATE	FROM	TO	QUANTITY

MECHANICAL LOGS RUN

BRAND	NO.	TYPE LOG	[illegible]
Schlumberger	X	[illegible]	[illegible]
Shelwell			
Birdwell			
Burgener			
Other			

PRODUCTION DATA

WELL COMPLETED FOR	[illegible]	[illegible]	[illegible]	PRESS.	[illegible]	[illegible]

The above information is complete and correct. Signed [illegible]

[illegible]

[illegible]

FORMATION RECORD

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

ELEVATION USE:	GEOLOGIST NAME:	TOPS TAKEN FROM: ☐ DRILLERS LOG ☐ SAMPLE LOG ☐ ELECTRIC LOG

FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)	FROM	TO	FORMATION (TYPE, COLOR, HARDNESS)

IF WELL WAS CORED, ATTACH CORE DESCRIPTION

DRILL STEM TEST DATA

DST #1 [illegible]

Recovered: [illegible] Salt water & drlg [illegible]
[illegible] Brine water

Pressures: IHMP - [illegible]
IFP - [illegible] (15 Min.)
ICIP - [illegible] (121 Min.)
FFP - [illegible] (120 Min.)
FCIP - [illegible] (121 Min.)
FHMP - [illegible]

LIST OF FIGURES

For UIC Permit Application, Form 4 Attachments

Figure No	Title		Corresponding Attachments
Figure 1	Maness Petroleum Laboratories, Inc Completion Coregraph	(2 Pages)	A,F
Figure 2	Michigan DNR "Log of Oil, Gas or Test Well"	(3 Pages)	A,F,J,L
Figure 3	Dowell Treatment Reports	(6 Pages)	A,F,J
Figure 4	"Region Well Locations" Map with St Clair County "Water Well Records"	(1 Page) (37 Pages)	B,F
Figure 5	"Plot Plan" of Well Locations	(1 Page)	B,K
Figure 6	Maps and Cross Sections of USDW's	(3 Pages)	D
Figure 7	Geologic Structure of the Area	(2 Pages)	F
Figure 8	Brine Disposal Well Data	(2 Pages)	H,K,L
Figure 9	A. Casing Collar Log & Perforating Record B. Cement Bond Log C. Bore Compensated Sonic Log - Gamma Ray D. Gamma Ray - Neutron E. Laterolog - Gamma Ray - Neutron	(2 Pages) (22 Pages) (52 Pages) (30 Pages) (30 Pages)	L
Figure 10	CPCo Drawing Showing Well Cross Section, Perforations and Cementing Record	(1 Page)	L,M
Figure 11	Disposal Well Casing Head Drawing & Description	(2 Pages)	L,M
Figure 12	Monitoring Program, Forms and Annual Monitoring Report	(3 Pages)	P,O
Figure 13	"Brine Disposal Well Failure Plan"	(1 Page)	O
Figure 14	Mechanical Integrity Testing	(1 Page)	D,P
Figure 15	Plugging and Abandonment Plan	(1 Page)	Q
Figure 16	Necessary Resources	(4 Pages)	R
Figure 17	Description of Business	(1 Page)	U

JAG/6-11-85

EPA ID No. MID 065 571 077

#1-7BDW

MICHIGAN
PERMIT APPLICATION CHECKLIST
FOR NEW CLASS I WELLS

Applicant Consumers Power Company, Marysville Gas Reforming Plant

Application # _____

Date _____

A. Area of Review

___ 1. Permeability of disposal zone see Figure 1

___ 2. Net thickness of disposal zone see Figure 2

___ 3. Original bottom hole pressure see Figure 3

___ 4. Static water level of drinking water aquifer 77' to 168', local domestic well depths

___ 5. Porosity Coarse sand and gravel

___ 6. Specific gravity of fluid in injection zone Sp Gr = 1.2 (saturated NaCl brine)

B. Maps of Wells and Area of Review

___ 1. Producing wells - Cavern storage wells, Figure 5

___ 2. Abandoned wells and dry holes - None

___ 3. Water wells)
___ 4. Road, residences, lakes, mines, quarries) Figure 4, with attachments

___ 5. Faults - None

___ 6. Public Water Systems and other pertinent information

all from public records. City of Marysville - municipal water, source: St Clair River

C. Corrective Action Plan and Well Data - Not applicable: Only two wells are those which are the subject of this Permit Application.

___ 1. Corrective action plan for unplugged wells which penetrate injection zone.

___ 2. Tabulation of all wells penetrating zone with: - No other wells within area

___ (a) well construction data

___ (b) operator

___ (c) cementing data

___ (d) distance Not applicable

___ (e) date drilled

___ (f) depth

___ (g) plugging records.

D. Maps and Cross Sections of USDW's - See Figure 6

___ (1) A piezometric map of the water table

___ (2) Maps and cross-sections of USDW's

E. Does not apply to Class I wells

F. Maps and Cross Sections of Geologic Structure of Area

1. Regional geology - See Figure 7

___ (a) surface geology

___ (b) cross-sections

___ (c) structural contour map

2. Local geology - See Figure 7

___ (a) two prependicular cross-sections

___ (b) description of upper and lower confining strata (lithology, permeability, etc.)

___ (c) description of faulting in area

___ (d) depositional, structural, and tectonic history of the area

___ (e) structural contour map of injection zone.

___ (f) isopach map of injection zone

3. Geohydrology - rese oir mechanics of injection zone

___ (a) depth)
___ (b) geologic name)
___ (c) porosity) Figure 1 and Figure 2
___ (d) permeability)
___ (e) temperature)

___ (f) reservoir pressure)
___ (g) faulting, fracturing, solution channels) Figure 3 and Figure 1
___ (h) fracture gradient)

___ (i) piezometric surface map -

G. Does not apply to Class I wells

H. Operating Data - All Figure 8

___ 1. Average and maximum injection rates (daily) and volume

___ 2. Average and maximum injection pressure

___ 3. Source and analysis of waste

___ (a) physical

___ (b) chemical - saturated NaCl brine

___ (c) biological

___ (d) radiological

___ 4. Compatibility tests - saturated NaCl brine

___ 5. Corrosion tests

___ 6. Average and maximum rate of injection

I. Formation Testing Program - Not Available

___ 1. Collection and analysis of formation fluid

___ 2. Cores and core testing

___ 3. Injectivity testing.

J. Stimulation Program

___ 1. Fracturing)
___ 2. Acidizing) Figure 3 and Figure 2
___ 3. Other)

K. Injection Procedures

___ 1. Filters types and location is system - None

___ 2. Injection pumps (type & capacity) - see Figure 8

___ 3. Plant plat with flow line - see Figure 5

___ 4. Tank size, capacity, and construction material - see Figure 8 - "Surface Brine Ponds"

___ 5. Description of pretreatment process and facilities - Not Applicable

L. Construction Procedures

___ 1. Total depth - Figure 2

___ 2. Type completion - Figure 2

___ 3. Surface casing - Figure 10

___ (a) size

___ (b) type

___ (c) weight

___ (d) setting depth

___ (e) number and location of centralizers, wall scratchers, etc.

___ 4. Intermediate casing - Figure 10

___ (a) size

___ (b) type

___ (c) weight

___ (d) setting depth

___ (e) number and location of centralizers, wall scratchers, etc.

L (cont) 5 Long string casir - see Figure 10

___ (a) size

___ (b) type

___ (c) weight

___ (d) setting depth

___ (e) number and location of centralizers, wall scratchers, etc.

___ 6. Liner or other casing - see Figure 10

___ (a) size

___ (b) type

___ (c) weight

___ (d) setting depth

___ 7. Logging program - see Figure 9

___ (a) surface (open) hole

___ spontaneous potential

___ resistivity

___ caliper

(b) after surface casing installed

___ cement bond, temperature or density log (circle one)

(c) Before installation of intermediate and long string casing

___ spontanious potential

___ resistivity

___ porosity log

___ gama ray log

___ directional or inclination survey

___ fracture finder log

(d) after casing installed

___ cement bond, temperature, or denisty

___ 8. Cementing data - see Figure 10

___ (a) surface casing

___ 1. type cement

___ 2. volume

___ 3. cementing technique and equipment

___ 9. Tubing - see Figure 2 and Figure 3

___ (a) size

___ (b) type

___ (c) setting depth

___ 10. Packer - see Figure 8

___ (a) type

___ (b) setting depth

M. Construction Details

engineering drawings

___ 1. well construction - see Figure 10

___ 2. well head - see Figure 11

N. Does not apply to Class I wells.

O. Plans for well failures - see Figure 13

___

___ 1. frequent analysis of waste - saturated NaCl brine only

___ 2. recorders for

___ (a) injection pressure

___ (b) injection rate and volume

___ (c) annulas pressure

) see Figure 12

___ 3. mechanical integrity testing - Figure 14

___ 4. monitoring wells - None

Q. Plugging and abandonment plan - See Figure 15

___ 1. plugs

___ (a) type

___ (b) location

___ 2. cement

___ (a) type

___ (b) grade

___ (c) quantity

___ 3. placement

___ (a) method

___ (b) static equilibrium

R. Necessary resources - See Figure 16

___ certificate of necessary resources for plugging well -

S. Aquifer exemptions - Not Applicable

___ 1. does not serve as a source of drinking water

___ 2. will not serve as a source of drinking water

___ 3. between 3,000 and 10,000 mg lb TDS

T. Existing EPA permits NONE

___ 1. NPDES

___ 2. PSD

___ 3. RCRA

___ 4. Other

U. Description of business - see "Introduction and Description of Business" - Figure 17

___

Consumers Power Well No 1-7 BDW
State of Mich n Permit Designation: BD 151

Form Approved. OMB No. 2040-0042. Expires 9-30-86

Form 4 UIC

EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT APPLICATION
(Collected under the authority of the Safe Drinking Water Act, Sections 1421, 1422, 40 CFR 144)

I. EPA ID NUMBER MID 065 571 077

		T/A	C
U			

READ ATTACHED INSTRUCTIONS BEFORE STARTING
FOR OFFICIAL USE ONLY

Application approved mo	day	year	Date Received mo	day	year	Permit/Well Number	Comments
						MI-147-1I-0001	

II. FACILITY NAME AND ADDRESS

Facility Name: Gas Reforming Plant, Consumers Power Co
Street Address: 2510 Busha Highway
City: Marysville State: MI ZIP Code: 48040

III. OWNER/OPERATOR AND ADDRESS

Owner/Operator Name: Consumers Power Company
Street Address: 212 W Michigan Avenue
City: Jackson State: MI ZIP Code: 49201

IV. OWNERSHIP STATUS *(Mark 'x')*

☐ A. Federal ☐ B. State ☒ C. Private
☐ D. Public ☐ E. Other *(Explain)*

V. SIC CODES

4925

VI. WELL STATUS *(Mark 'x')*

☒ A. Operating — Date Started: mo 10 day 02 year 71
☐ B. Modification/Conversion ☐ C. Proposed

VII. TYPE OF PERMIT REQUESTED *(Mark 'x' and specify if required)*

☒ A. Individual ☐ B. Area

Number of Existing wells	Number of Proposed wells	Name(s) of field(s) or project(s)

VIII. CLASS AND TYPE OF WELL *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
1	I		

IX. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR PROJECT

C	A. Latitude Deg	Min	Sec	B. Longitude Deg	Min	Sec	Township and Range Twsp	Range	Sec	¼ Sec	Feet from	Line	Feet from	Line
I							5N	17E	7	NW	140	N	623	W

X. INDIAN LANDS *(Mark 'x')*

☐ Yes ☒ No

XI. ATTACHMENTS

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

FOR CLASSES I, II, III (and other classes) complete and submit on separate sheet(s) Attachments A — U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application:

XII. CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*: D E Lutz, General Superintendent / R J Odlevak, Vice President

B. Phone No. *(Area Code and No.)*: (517) 788-2235 (313) 364-8100

C. Signature: D E Lutz R J Odlevak

D. Date Signed: 4-26-85

FIGURE 1

Maness Petroleum Laboratories, Inc
Completion Coregraph

Figure 1

Maness Petroleum Laboratories, INC.

COMPANY Consumers Power Company — DATE ON July 26, 1971 — FILE NO.

WELL C.P.C. No. 1-7 BWD — DATE OFF — ENGRS. Maness

FIELD — FORMATION Mt Simon — ELEV.

COUNTY St Clair — STATE Mich — DRLG. FLD. — CORES 11

LOCATION N/2 NW NW Sec 7, T5N, R17E — REMARKS

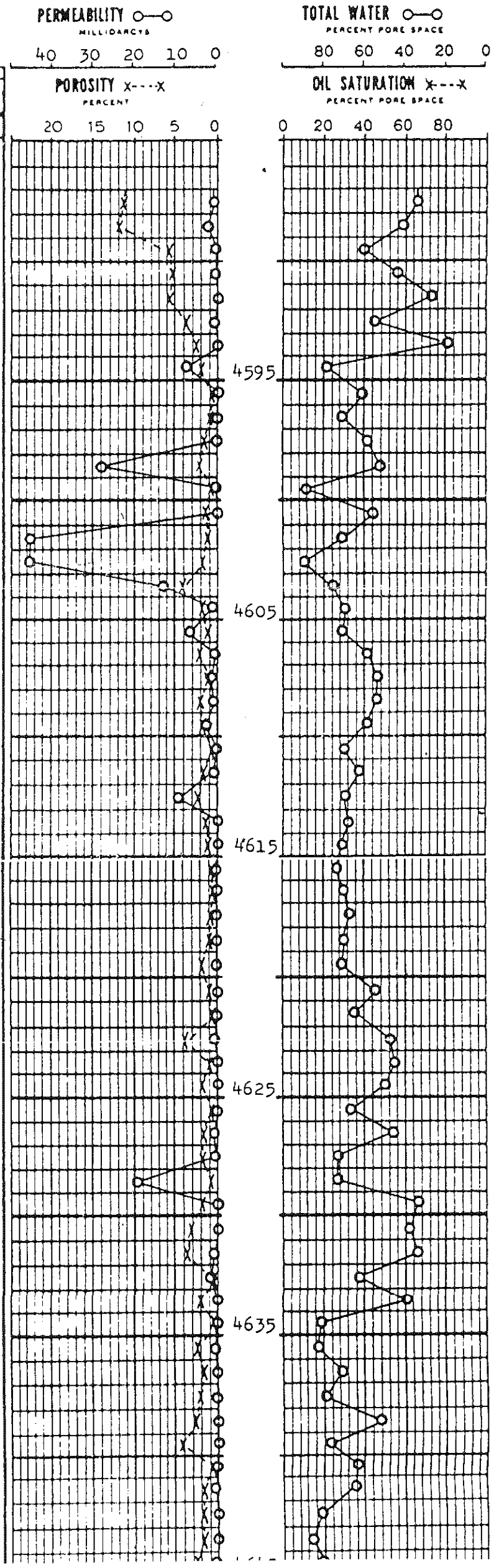
SAND — LIMESTONE — CONGLOMERATE — CHERT

SHALE — DOLOMITE — ANHYDRITE

TABULAR DATA and INTERPRETATION

Depth Feet	Permeability, Millidarcys Air	Permeability, Millidarcys 90°	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
4587 4588	0.9	0.9	11.4	0.0	34.6	
4589	2.2	2.0	12.0	0.0	41.0	
4590	0.1	<0.1	5.6	0.0	60.0	
4591	0.2	<0.1	5.3	0.0	44.0	
4592	<0.1	<0.1	5.6	0.0	27.4	
4593	0.8	0.1	3.7	0.0	55.5	
4594	<0.1	<0.1	2.6	0.0	19.0	
4595	7.6	3.9	2.0	0.0	79.0	
4596	<0.1	<0.1	0.8	0.0	61.0	
4597	<0.1	Plug*	1.0	0.0	71.5	
4598	<0.1	Plug*	1.6	0.0	58.5	
4599	28.0	4.7	2.2	0.0	52.0	
4600	0.3	<0.1	1.0	0.0	88.0	
4601	<0.1	<0.1	1.5	0.0	56.2	
4602	45.2	1.5	1.2	0.0	71.5	
4603	45.3	4.7	1.8	0.0	89.0	
4604	12.8	2.2	4.1	0.0	76.0	
4605	1.7	<0.1	1.9	0.0	69.0	
4606	6.5	3.9	1.3	0.0	71.0	
4607	0.2	0.1	2.1	0.0	58.5	
4608	1.6	1.3	1.1	0.0	54.0	
4609	0.7	0.3	2.0	0.0	54.0	
4610	2.6	0.2	1.9	0.0	59.0	
4611	<0.1	<0.1	0.8	0.0	69.5	
4612	0.4	<0.1	1.6	0.0	63.2	
4613	9.1	1.8	2.4	0.0	69.0	
4614	<0.1	<0.1	1.4	0.0	68.0	
4615	<0.1	<0.1	1.2	0.0	71.5	
4616	<0.1	<0.1	0.5	0.0	73.0	
4617	0.1	<0.1	0.5	0.0	70.0	
4618	<0.1	<0.1	0.8	0.0	67.5	
4619	<0.1	<0.1	1.0	0.0	70.0	
4620	<0.1	Plug*	1.8	0.0	71.0	
4621	<0.1	<0.1	1.0	0.0	55.0	
4622	<0.1	<0.1	0.5	0.0	65.0	
4623	0.3	<0.1	3.9	0.0	48.0	
4624	<0.1	<0.1	1.0	0.0	45.0	
4625	<0.1	<0.1	1.9	0.0	50.0	
4626	<0.1	<0.1	0.8	0.0	67.5	
4627	0.2	0.2	1.6	0.0	46.8	
4628	0.3	<0.1	1.8	0.0	73.0	
4629	19.4	0.2	0.9	0.0	72.5	
4630	<0.1	<0.1	1.8	0.0	33.3	
4631	<0.1	Plug*	3.2	0.0	38.5	
4632	0.7	0.6	3.6	0.0	34.6	
4633	1.9	<0.1	0.6	0.0	63.5	
4634	<0.1	<0.1	2.0	0.0	39.2	
4635	<0.1	<0.1	0.6	0.0	81.0	
4636	0.3	0.3	2.5	0.0	83.0	
4637	<0.1	<0.1	1.6	0.0	71.0	
4638	<0.1	<0.1	2.1	0.0	79.3	
4639	<0.1	<0.1	2.6	0.0	52.5	
4640	<0.1	<0.1	4.1	0.0	77.4	
4641	0.1	<0.1	0.8	0.0	64.0	
4642	0.7	0.4	1.7	0.0	64.2	
4643	<0.1	<0.1	1.7	0.0	81.0	
4644	<0.1	<0.1	1.6	0.0	65.5	

COMPLETION COREGRAPH



EPA ID No. MID 065 571 077

4634	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4635	<0.1	<0.1	0.6	0.0	81.0
4636	0.3	0.3	2.5	0.0	83.0
4637	<0.1	<0.1	1.6	0.0	71.0
4638	<0.1	<0.1	2.1	0.0	79.3
4639	<0.1	<0.1	2.6	0.0	52.5
4640	<0.1	<0.1	4.1	0.0	77.4
4641	0.1	<0.1	0.8	0.0	64.0
4642	0.7	0.4	1.7	0.0	64.2
4643	<0.1	<0.1	1.7	0.0	81.0
4644	<0.1	<0.1	1.6	0.0	65.5
4645	0.2	<0.1	2.5	0.0	60.2
4646	0.3	<0.1	3.8	0.0	68.0
4647	<0.1	<0.1	1.8	0.0	65.0
4648	<0.1	<0.1	3.8	0.0	72.0
4649	0.2	<0.1	14.8	0.0	84.5
4650	<0.1	<0.1	15.5	0.0	89.5
4651	<0.1	<0.1	13.7	0.0	89.0
4652	<0.1	<0.1	14.8	0.0	91.0
4653	0.3	0.3	15.2	0.0	82.2
4654	0.8	0.7	12.4	0.0	84.0
4655	3.5	3.5	14.3	0.0	89.0
4656	2.4	2.1	11.8	0.0	82.5
4657	0.8	0.7	12.7	0.0	86.3
4658	<0.1	<0.1	6.2	0.0	82.0
4659	3.2	2.4	10.5	0.0	79.3
4660	<0.1	<0.1	7.0	0.0	82.5
4661	<0.1	<0.1	4.9	0.0	77.5
4662	<0.1	<0.1	11.9	0.0	67.0
4663	<0.1	<0.1	8.3	0.0	83.3
4664	<0.1	<0.1	8.9	0.0	79.0
4665	<0.1	<0.1	4.9	0.0	79.5
4666	<0.1	<0.1	5.9	0.0	73.0
4667	<0.1	<0.1	1.5	0.0	84.0
4668	3.7	<0.1	1.8	0.0	71.5
4669	0.5	<0.1	1.3	0.0	69.0
4670	<0.1	<0.1	1.2	0.0	79.0
4671	1.0	0.9	1.2	0.0	81.5
4672	<0.1	<0.1	1.8	0.0	77.5
4673	5.0	1.2	3.1	0.0	81.0
4674	<0.1	<0.1	2.6	0.0	77.5
4675	<0.1	<0.1	1.4	0.0	83.0
4676	10.1	0.4	1.2	0.0	79.5
4677	0.3	<0.1	1.0	0.0	82.5
4678	<0.1	<0.1	1.5	0.0	78.0
4679	0.6	0.6	8.2	0.0	83.0
4680	<0.1	<0.1	5.8	0.0	86.0
4681	<0.1	<0.1	6.1	0.0	84.0
4682	<0.1	<0.1	5.2	0.0	83.0
4683	<0.1	<0.1	1.8	0.0	78.5
4684	7.4	6.1	5.3	0.0	81.0
4685	10.5	2.1	5.6	0.0	80.2
4686	9.5	<0.1	6.9	0.0	82.0
4687	1.2	1.0	4.8	0.0	88.0
4688	1.9	1.5	6.0	0.0	79.0
4689	0.8	0.7	5.7	0.0	82.3
4690	<0.1	<0.1	4.3	0.0	89.5
4691	<0.1	<0.1	5.9	0.0	78.0
4692	<0.1	<0.1	0.7	0.0	59.0
4693	<0.1	<0.1	1.6	0.0	71.0
4694	<0.1	Plug*	8.8	0.0	63.7
4695	<0.1	<0.1	7.9	0.0	61.9
4696	<0.1	<0.1	0.6	0.0	79.0
4697	<0.1	<0.1	7.5	0.0	75.5
4698	<0.1	<0.1	1.1	0.0	82.0
4699	1.4	1.0	2.0	0.0	81.0
4700	<0.1	<0.1	0.6	0.0	89.0
4701	44.0	3.9	13.1	0.0	86.0
4702	40.6	31.8	18.5	0.0	88.8
4703	1.3	1.3	3.8	0.0	82.5
4704	<0.1	<0.1	3.6	0.0	83.0
4705	<0.1	<0.1	4.4	0.0	87.0
4706	<0.1	<0.1	8.1	0.0	84.8

*Core too broken for full diameter analysis.

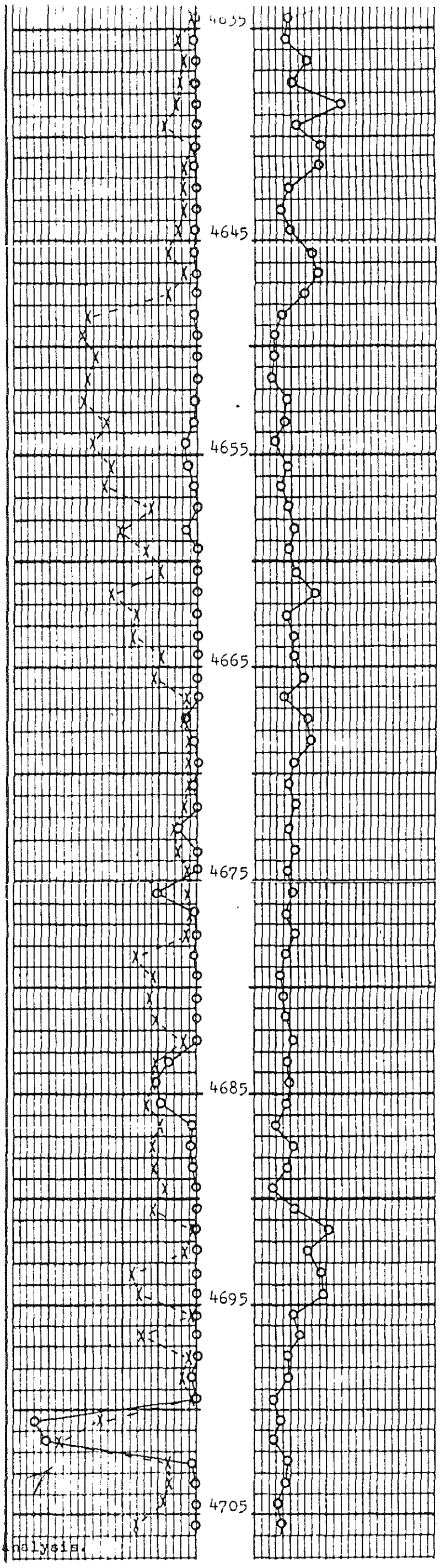
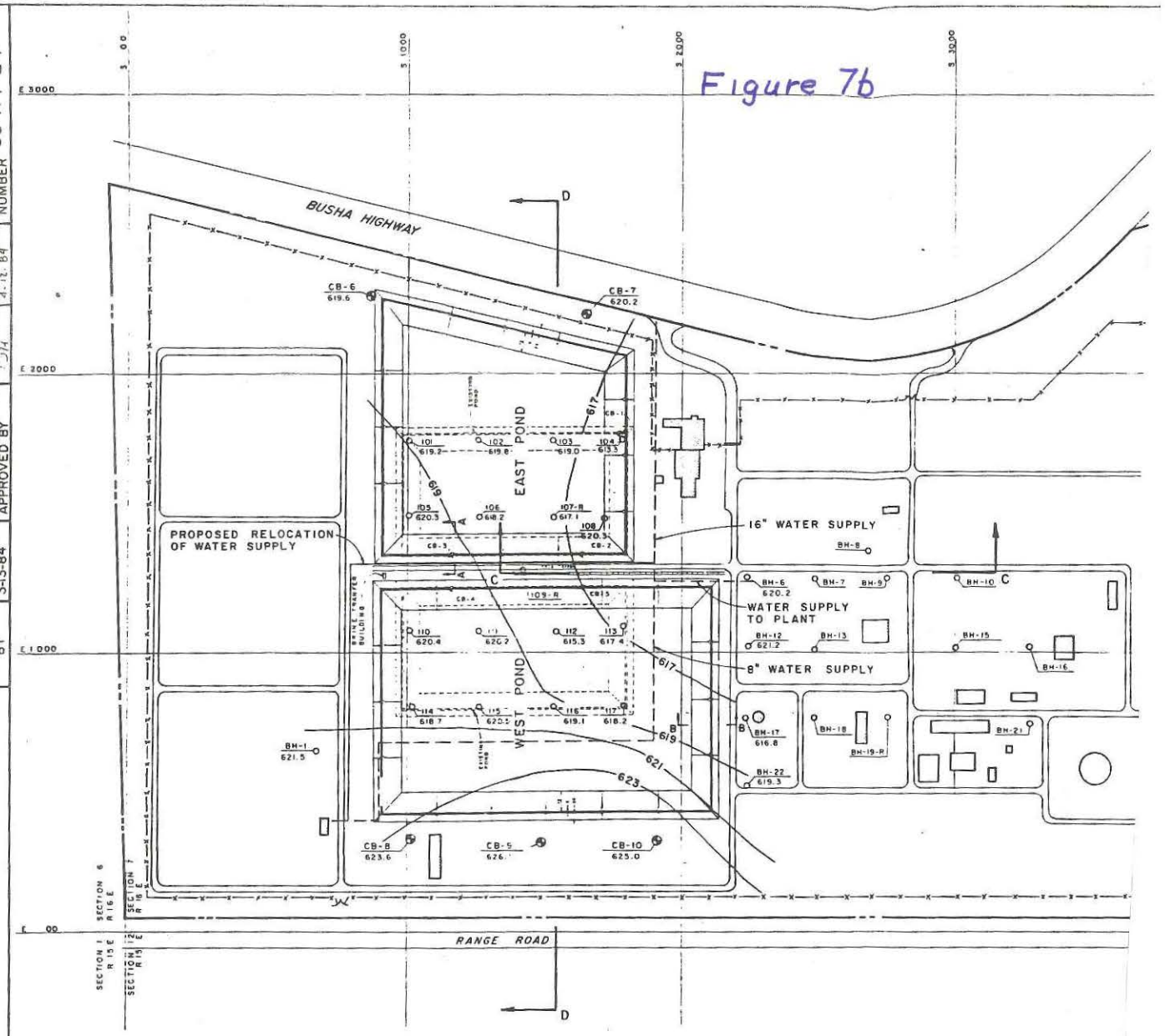


FIGURE 5

"Plot Plan" of Well Locations

Figure 7b



SITE LOCATION

T5N, R16E
SECTION 7
OF ST. CLAIR COUNTY
CITY OF MARYSVILLE

LEGEND:

- CB-7 CANONIE ENGINEERS BORING
- BH-18 WOODWARD-MOORHOUSE BORING
- BH-17 / 616.8 BORING NUMBER / TOP OF CLAY ELEVATION
- 617 TOP OF CLAY CONTOUR
- FENCE LINE
- RAILROAD
- PROPERTY LINE

REFERENCE DRAWINGS:

- LUMMUS COMPANY DRAWING E6626-000108-10, 7-6-71

DRAWING NUMBER	83-177-E4
	4-12-84
CHECKED BY	
APPROVED BY	
DRAWN BY	AHA 3-13-84

REVISIONS

NO.	DATE

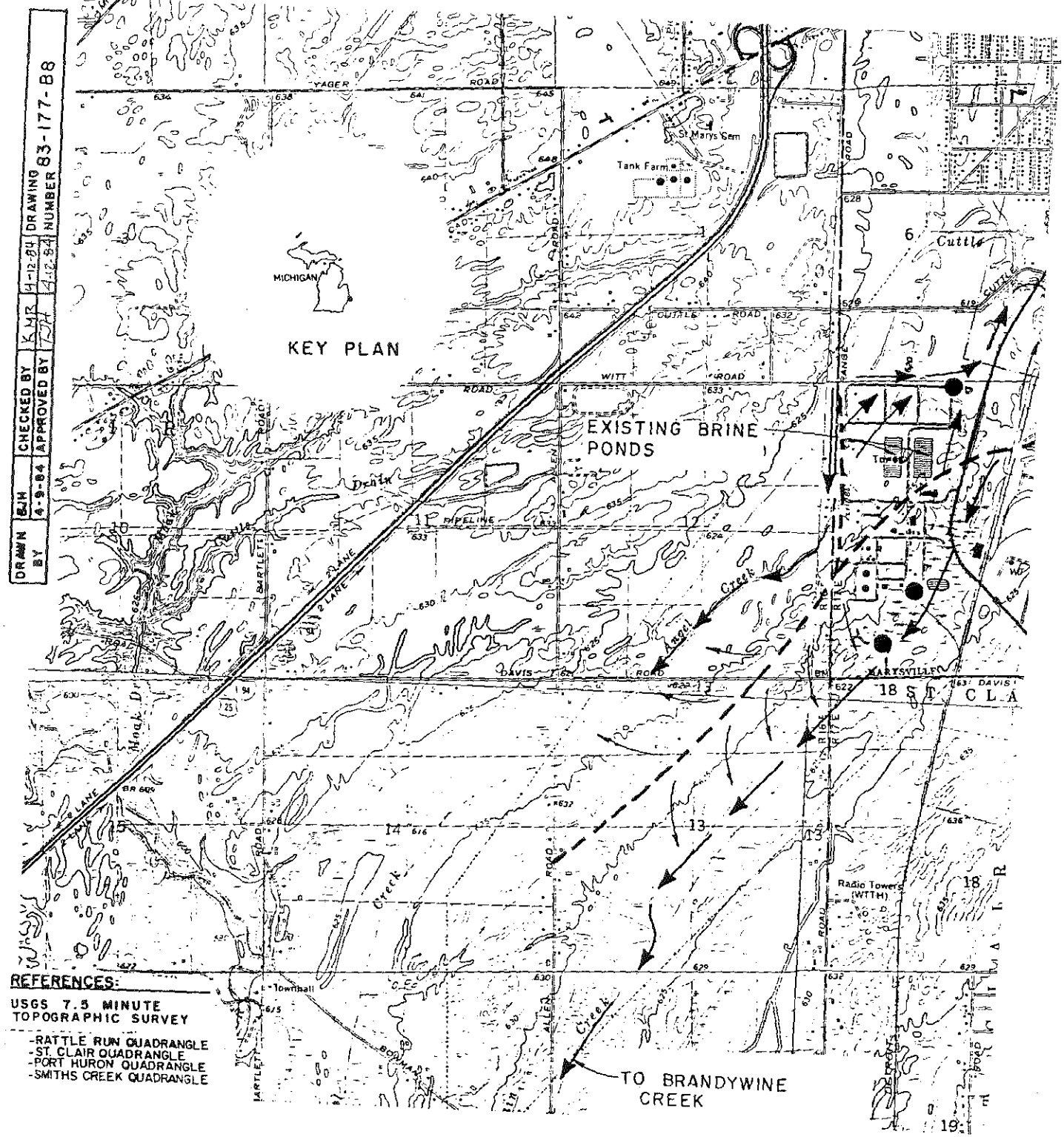

DRAWN BY BJH 4-9-84
CHECKED BY KMR 4-12-84
APPROVED BY TJH 4-12-84
DRAWING NUMBER 83-177-B8
KEY PLAN
MICHIGAN
EXISTING BRINE PONDS
Tank Farm
St Marys Cem
YAGER ROAD
CUTTLE ROAD
WITT ROAD
PIPELINE
DAVIS ROAD
MARYSVILLE
Angel Creek
Cuttle
Radio Towers (WTTH)
Townhall
TO BRANDYWINE CREEK
REFERENCES:
USGS 7.5 MINUTE TOPOGRAPHIC SURVEY
-RATTLE RUN QUADRANGLE
-ST. CLAIR QUADRANGLE
-PORT HURON QUADRANGLE
-SMITHS CREEK QUADRANGLE

Figure 7c

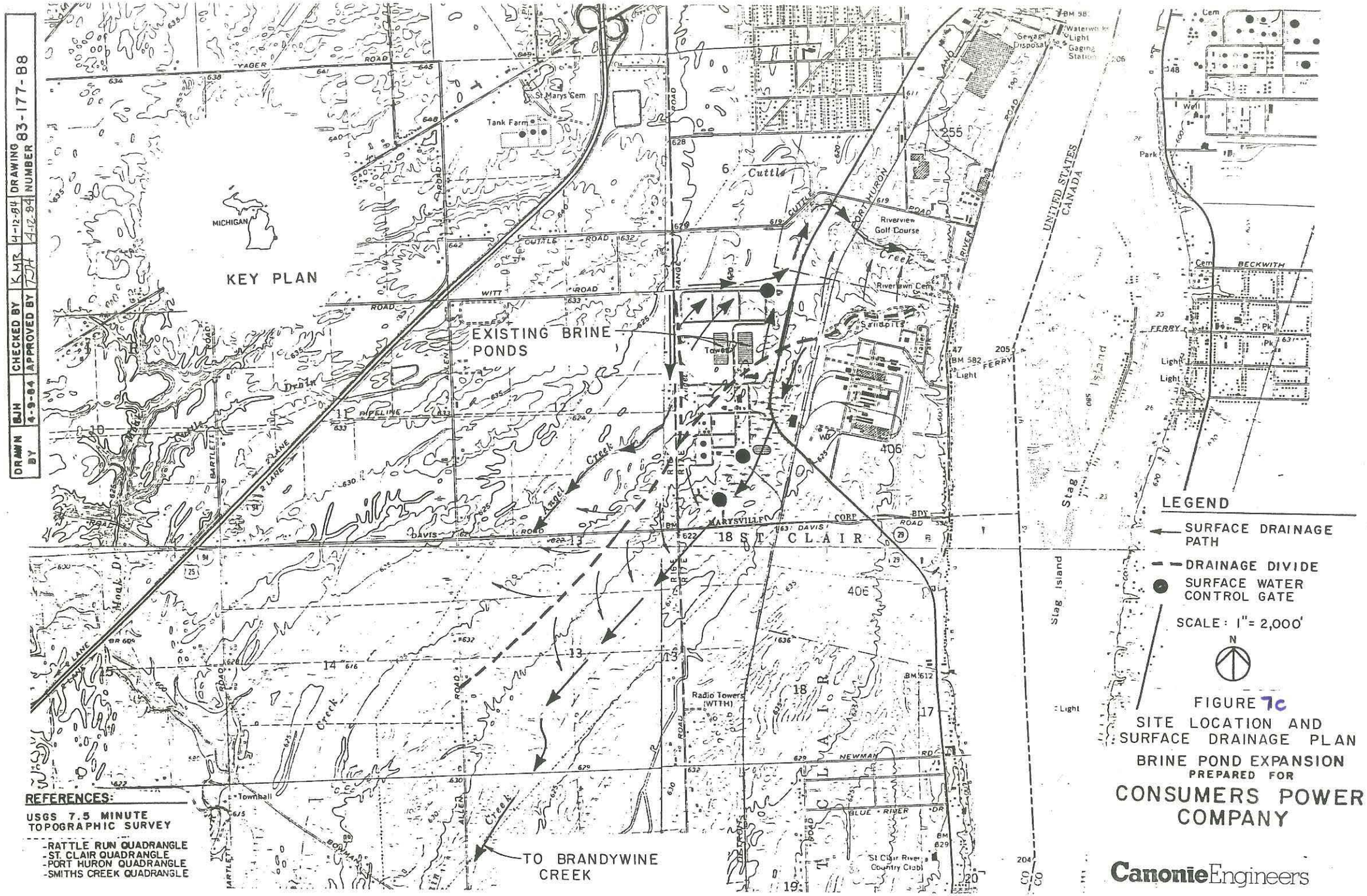

DRAWN BY BJH 4-9-84
CHECKED BY KMR 4-12-84
APPROVED BY TJH 4-12-84
DRAWING NUMBER 83-177-B8
KEY PLAN
MICHIGAN
EXISTING BRINE PONDS
TO BRANDYWINE CREEK
18 ST CLAIR
Riverview Golf Course
Riverlawn Cem
Sandpits
Tank Farm
St Marys Cem
Radio Towers (WTTH)
St Clair River Country Club
Townhall
Stag Island
UNITED STATES
CANADA
LEGEND
SURFACE DRAINAGE PATH
DRAINAGE DIVIDE
SURFACE WATER CONTROL GATE
SCALE: 1" = 2,000'
N
REFERENCES:
USGS 7.5 MINUTE TOPOGRAPHIC SURVEY
-RATTLE RUN QUADRANGLE
-ST. CLAIR QUADRANGLE
-PORT HURON QUADRANGLE
-SMITHS CREEK QUADRANGLE
FIGURE 7c
SITE LOCATION AND SURFACE DRAINAGE PLAN
BRINE POND EXPANSION
PREPARED FOR
CONSUMERS POWER COMPANY
CanonieEngineers

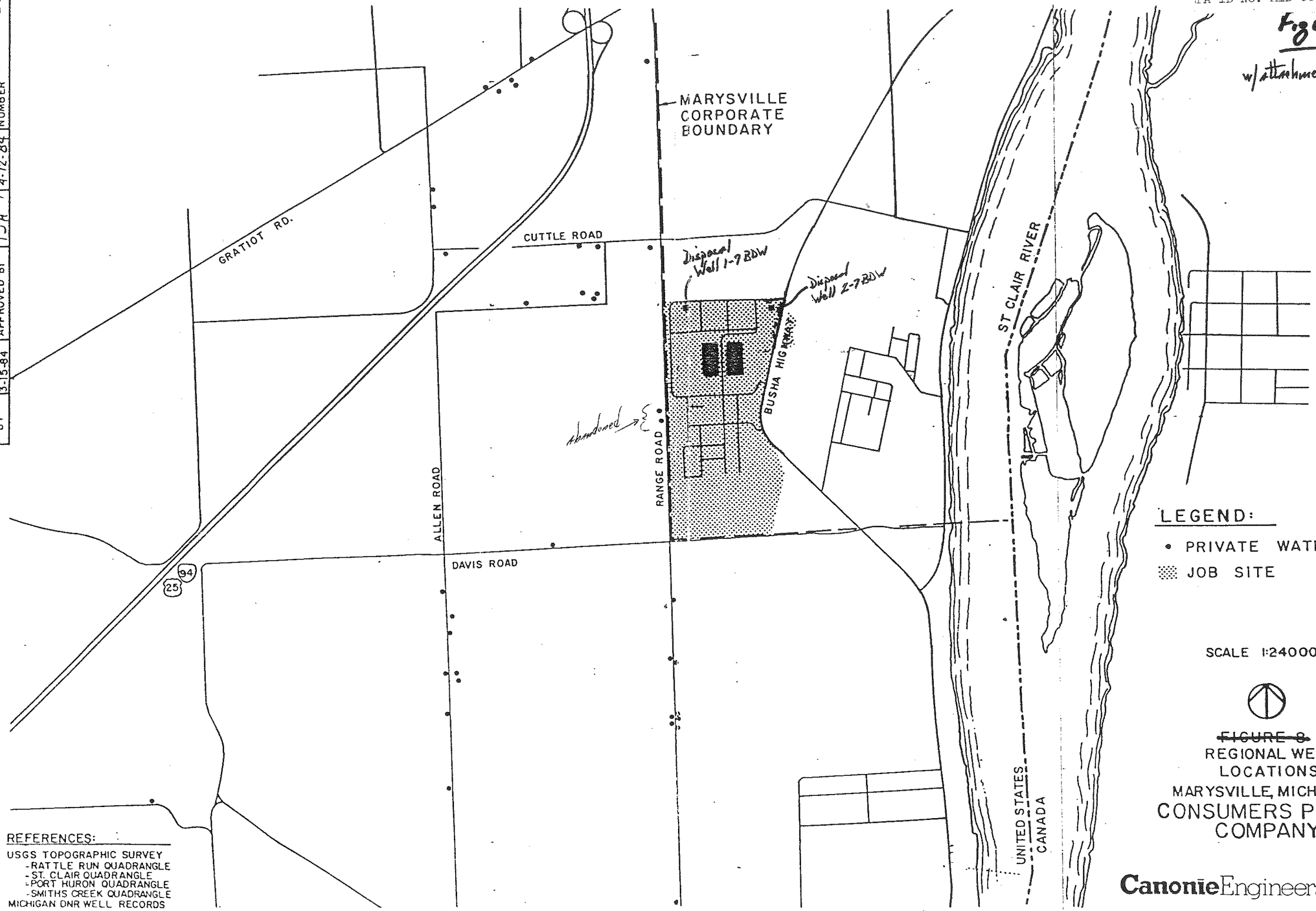
Figure 7c

TPA ID No. MID 065 571 077

Figure 4

w/attachments

DRAWN BY	AHA 3-15-84	CHECKED BY	KMB	4-12-84	DRAWING NUMBER 83-177-E
		APPROVED BY	TJH	4-12-84	



~~FIGURE 8~~
REGIONAL WELL LOCATIONS
MARYSVILLE, MICHIGAN
CONSUMERS POWER COMPANY

CanonieEngineers

FIGURE 2

Michigan DNR - Log of Oil, Gas or Test Well

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

LOG OF OIL, GAS OR TEST WELL

BE FILED WITH SUPERVISOR OF WELLS WITH 0 DAYS
AFTER COMPLETION OF WELL (ACT 61 P.A. 1939
AND ACT 326 P.A. 1937)

Figure 2

SUBMIT IN DUPLICATE

NAME OF OWNER OR OPERATOR	ADDRESS OF OWNER O: EPA ID No. MID 065 571 077
Consumers Power Company	212 West Michigan Avenue Jackson, Michigan 49201
NAME OF DRILLING CONTRACTOR	ADDRESS OF DRILLING CONTRACTOR
CEDCO Drilling Company	301 Orchard Street St. Clair, Michigan

FARM NAME	WELL NO.	PERMIT NO.	O.P. NO.
Fee	1-7 BDW	BD 151	

LOCATION	SECTION	TWP.	RANGE
N/2 NW NW	7	5N	17E

TOWNSHIP	COUNTY
St. Clair	St. Clair

FOOTAGE: 140 Ft. from North Line and 623 Ft. from West Line of quarter secti

DATE DRILLING BEGUN	DATE DRILLING COMPLETED	DATE WELL COMPLETED	TYPE OF WELL
7/3/71	7/29/71	9/29/71	Brine Disposal

FORMATION COMPLETED IN	TOTAL DEPTH	ELEVATION	KB	RB	RT	RF	GRD
Eau Claire & Mt.Simon	4733 (Schl)		637.5				624.5

ROTARY TOOLS	CABLE TOOLS
From 0 Feet to 4733 Feet	From Feet to Fe

CASING AND CEMENTING

SIZE	WHERE SET	CEMENT	AMOUNT PULLED
8-5/8	500	325	
5-1/2	4731	1280	

PERFORATIONS

DATE	NO. HOLES	FROM	TO
9/27/71	40	4638	4658
"	36	4676	4694
"	12	4699	4705

DEPTH CORRECTION

DEPTH	CORRECTED T

OIL OR GAS ZONES

FORMATION	FROM	TO	AMOUNT

WATER ZONES

FORMATION	FROM	TO	AMOUNT

DEVIATION SURVEY

RUN AT	DEGREES

SAND FRAC OR ACID TREATMENT

DATE	FROM	TO	QUANTITY
9/28/71	4638	4705	1000gal.acid
9/29/71	4638	4705	40,000 gal. frac

MECHANICAL LOGS RUN

BRAND	(X)	TYPE LOG	INTERVAL LOGGED
Schlumberger	X	LL-GRN;BHCSL-GR, CCL	50-4730
Shelwell			501-4722
Birdwell			
Burgener			
Other			

GAS REFORMING PROJECT DEC 9 1971

PRODUCTION DATA

WELL COMPLETED FOR:	BOPD	BWPD	MCF GAS	PRESSURES:	CASING - PSI	TUBING - PSI

- The above information is complete and correct Signed _____

- Date December 8, 1971 Title General Geological Supervisor

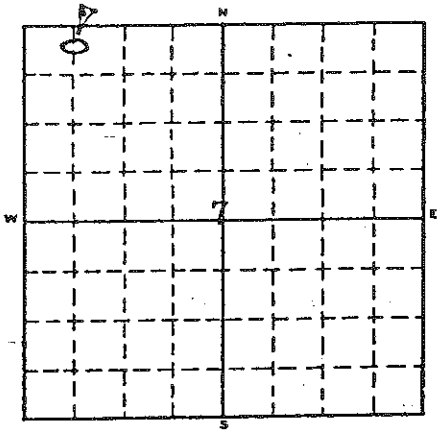
APPLICATION FOR PERMIT TO DRILL A WELL FOR OIL, GAS, GEOLOGICAL TEST, BRINE DISPOSAL, GAS OR L.P.G. STORAGE OR FOR SECONDARY RECOVERY

UNDER AUTHORITY OF ACT 61 P.A. OF 1939, AS AMENDED, AND ACT 326, P.A. 1937 AS AMENDED.

MAIL TO:
SUPERVISOR OF WELLS
GEOLOGICAL SURVEY
STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING, MICHIGAN 48926

Figure 2 (p. 2)

See Reverse Side Before Filling Out This Application



LOCATE WELL AND OUTLINE LEASE OR UNIT ON SECTION PLAT -- 640 ACRES

1. APPLICATION TO DRILL A WELL FOR: Brine Disposal
2. DATE: June 25, 1971
3. FEE ENCLOSED: $ ~~XXXXX~~ $ 1.0
4. LESSEE (OWNER OF LEASE RIGHTS): Consumers Power Company
5. PERMANENT ADDRESS: 212 West Michigan Avenue, Jackson, Michigan
6. PHONE: 788-0716
7. LESSOR (FULL NAME OF OWNER OF MINERAL RIGHTS): Consumers Power Company
8. WELL NO.: 1-7 BDW
9. SURFACE OWNER (IF OTHER THAN MINERAL OWNER): Same
10. DRILLING CONTRACTOR: Will notify when available.
11. ADDRESS:
12. PHONE:
13. N/2 ¼ OF NW ¼ OF NW ¼. SECTION 7 T 5N R 17E
14. ACRES IN LEASE OR UNIT (SPECIFY): Approx. 300 Acres
15. TOWNSHIP: St. Clair
16. COUNTY: St. Clair
17. *Locate well in two directions from nearest lines of quarter section and property ownership or unit lines*

140 FT. FROM North (north-south) LINE OF QUARTER SECTION — 623 FT. FROM West (east-west) LINE OF QUARTER SECTION

140 FT. FROM North (north-south) (PROPERTY) ~~XXXX~~ LINE — 623 FT. FROM West (east-west) (PROPERTY) ~~XXXX~~ LINE

18. KIND OF TOOLS TO BE USED *(Cable, rotary, combination)*: Rotary
19. FORMATION IN WHICH WELL IS TO BE COMPLETED: Cambrian
20. INTENDED DEPTH OF WELL: 4800'
21. PROGRAM OF CASING, SEALING, CEMENTING AND COMPLETING WELL

Set 8-5/8" surface casing at ~~approximately 300' and cement to surface~~ a minimum depth of 500' and cement to the surface.

Set 5-1/2" casing at total depth and cement to surface.

This document paid for with State funds

CASING IS NOT TO BE STRIPPED FROM THE HOLE AND NO CHANGE IS TO BE MADE IN THE PROGRAM OUTLINED ABOVE WITHOUT APPROVAL OF THE SUPERVISOR OF WELLS OR HIS AUTHORIZED REPRESENTATIVE

22. ARE THERE ANY LAKES, STREAMS, DRAINAGE WAYS, SWAMPS, OR MARSHES NEARER THAN 300 FEET FROM WELL LOCATION? *Yes* [ ] *No* [X]
23. ARE THERE ANY BUILDINGS OR OTHER STRUCTURES WITHIN 75 FEET OF THE PROPOSED LOCATION? *Yes* [ ] *No* [X]
24. IF ANSWER TO NO. 22 ABOVE IS *Yes*, DESCRIBE AND GIVE DISTANCE FROM LOCATION.

APPLICANT AGREES TO COMPLY WITH THE PROVISIONS OF ACT 61, PUBLIC ACTS OF 1939, AS AMENDED, AND ACT 326, PUBLIC ACTS OF 1937, AS AMENDED, AND RULES AND REGULATIONS PERTAINING TO THE LOCATING, DRILLING, CASING, SEALING, COMPLETING, PRODUCING, AND PLUGGING OF WELLS. BEFORE COMMENCING DRILLING OPERATIONS, CONTACT THE NEAREST FIELD OFFICE. *(See reverse side)*

25. ADDRESS CORRESPONDENCE AND PERMIT TO: R. J. Burgess, Consumers Power Co, Jackson, Mich
26. PHONE: 788-0716

LEAVE BLANK

DATE ISSUED	PERMIT NO.
6-30-71	SD-151

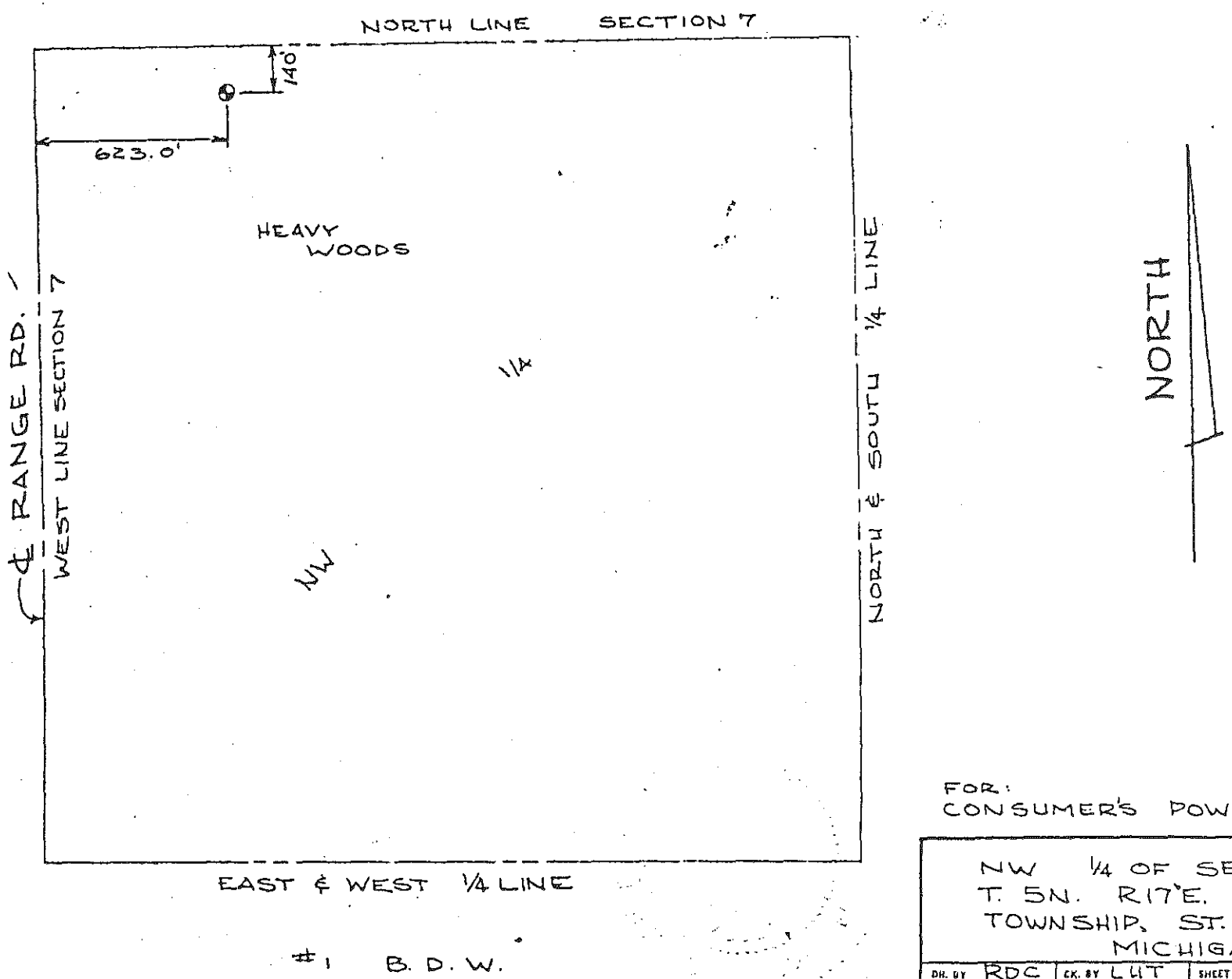
27. OWNER OF LEASE RIGHTS: Consumers Power Company
28. AUTHORIZED REPRESENTATIVE: R. J. Burgess

FOR CASHIER'S USE ONLY DO NOT WRITE IN THIS SPACE

DISTRIBUTION
1. WHITE. LANSING 4. GOLDENROD. FIELD
2. CANARY. CASHIER 5. GREEN. APPLICANT

DRAFTING MATERIALS, INC. 350M 1M 7-70

This document paid for with State funds



FOR:
CONSUMER'S POWER CO.

NW 1/4 OF SECTION 7
T. 5N. R17E. ST. CLAIR
TOWNSHIP, ST. CLAIR CO.,
MICHIGAN

DR. BY RDC	CK. BY LHT	SHEET NO. 1 OF 12 SHEETS	
SCALE: 1" = 500'		DATE: 6-28-71	

VALENTINE—THOMAS & ASSOCIATES, INC.
REGISTERED PROFESSIONAL ENGINEERS AND LAND SURVEYORS
1721 PINE GROVE AVE., PORT HURON, MICHIGAN

DWG. NO. | JOB NO. 1583 BK. 69A-85

Figure 2-(2)

Figure 7
(p. 4)

STATE OF MICHIGAN
DEPARTMENT OF CONSERVATION
SUPERVISOR OF WELLS
BRINE DISPOSAL

PERMIT TO DRILL A WELL FOR ~~GEOLOGICAL EXPLORATION~~
~~SECONDARY RECOVERY WATER INJECTION~~

PERMIT NO. BD # 151
Index
~~XXXXXX~~ No. 4570 Lansing, Michigan, June 30 1971

In accordance with the provisions of Act 61, P. A. 1939, as amended, and the General Regulations issued thereunder, permission is hereby granted to drill a well ONLY for BRINE DISPOSAL. Consumers Power Company, Consumers Power Co. #1-7 BDW. ~~NE~~ N½ NW¼ NW¼ Section 7, T.5N., R.17E. St. Clair Twp., St. Clair County. (Cambrian-Approx. 4800')

Signed [illegible]
Supervisor of Wells

By [illegible]

This document paid for with State funds

FIGURE 3

Dowell Treatment Reports

TREATMENT REPORT

DWL-494-1 PRINTED IN U.S.A.

EPA ID No. MID 065 571 077

Figure 3, p.1

EMICAL COMPANY

DATE: 9/28/71

WELL NAME AND NUMBER	1-7 BDW
LOCATION	SE Clay Twp
CUSTOMER REPRESENTATIVE	D. Kirsky
TREATMENT NUMBER	1-17-2507
POOL	Maysville
FORMATION	Mt. Simon
JOB DONE DOWN: TUBING A ☑ CASING B ☐ ANNULUS C ☐	ALLOWABLE PRESSURE TBG: 4000 CSG:
COUNTY	St Clair
STATE	Michigan
TYPE OF WELL: OIL A ☐ GAS B ☐ WATER C ☑ INJ. Brine Disposal	
TYPE OF SERVICE	Mud Acid + CaCl2 Water
AGE OF WELL: NEW WELL A ☑ REWORK B ☐	TOTAL DEPTH 4709 / CIRC. BHT. ?
CUST. NAME	Consumers Power
ADDRESS	212 W Michigan Jackson
CITY, STATE & ZIP CODE	Michigan
REMARKS:	

CASING SIZE	CASING DEPTH	TUBING SIZE	TUBING DEPTH
5½ 15#	4750	2½ EUE	4708
LINER SIZE	LINER DEPTH	PACKER TYPE	PACKER DEPTH
—	—	—	—
OPEN HOLE	CSG. OR ANRL. VOL.	TBG VOLUME	STATIC BHT.
?	266	27	?

PERFORATED INTERVALS

DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES
4638-58	✓ 40	4699-4700	✓ 12		
4676-95	✓ 36	Total	88		

FOR CONVERSION PURPOSES 24 BBLS EQUALS 1000 GALLONS

ARRIVED ON LOCATION: 0830

TIME	INJECTION RATE	INJECTION BBLS IN	PRESSURE CSG.	PRESSURE TBG.	SERVICE REMARKS
					Hook up Dowell Conn - Tail Gate Meeting
0908				2800	Pressure test Lines
10					Start acid down tubing
15		29			Acid across perforations
22				1000	Pressure leading - repair surface leak
31					Start displacing acid
34	—	—	—	2000	Formation breakdown 2000 psi to 1800 psi
					Spot pumps
39	4	53		1800	All acid displaced - Flow well back
1020					Spot CaCl2 water
27		28	-	—	CaCl2 on Spot -
35					Start injection test.
~~1100~~					
36	1.0	29		900	Pumping at 1 BPM slow pump to .5 BPM
1100	.5	41		1100	✓ ✓ .5 ✓ ✓ ✓ ✓ .25 ✓
18	.25	52		1150	All CaCl2 displaced into formation -
					Shut in pressure 1100 psi

TIME LEFT LOCATION	AVG. LIQUID INJ. RATE	ADJ. INJ. RATE (SOLIDS INC.)	TOTAL FLUID PUMPED: OIL	WATER
1201	—	—	50	25
MAX. PRESSURE	AVG. PRESSURE	FINAL PUMP IN PRESSURE	SHUT IN PRESSURE: IMMEDIATE	15 MINUTE
2200	1100	1100	1100	NA

PROPS AND LIQUIDS INJECTED

TYPE	SIZE OR PURPOSE	AMOUNT
Mud Acid		1000
1% CaCl2 Water		1000

DOWELL LOCATION: Richmond Mich.

DOWELL ENGINEER: D. Miller

CALL BACK	DATE	CUSTOMER REP. CONTACTED	CUSTOMER CONSIDERED SERVICE ☐ SATISFACTORY ☐ UNSATISFACTORY ☐ UNKNOWN	PROD. BEFORE TREATMENT ☐ TEST ☐ ALLOWABLE	PROD. AFTER TREATMENT ☐ DAYS ☐ TEST ☐ ALLOWABLE

Fig 3, p.2

TREATMENT REPORT

DWL-4904 PRINTED IN U.S.A.

DOWELL DIVISION OF THE DOW CHEMICAL COMPANY

DATE 9/29/71

WELL NAME AND NUMBER: 1-17 BDW	LOCATION: St Clair Twp Sec 17	CUSTOMER REPRESENTATIVE: Wm Kirchke	TREATMENT NUMBER: 1-17-2512
POOL: Marysville	FORMATION: Mt. Simon	JOB DONE DOWN: TUBING A ☑ CASING B ☐ ANNULUS C ☑	ALLOWABLE PRESSURE: TBG: 4000 CSG: 4000
COUNTY: St Clair	STATE: Michigan	TYPE OF WELL: OIL A ☐ GAS B ☐ WATER C ☐ Disposal D ☐ INJ.	
TYPE OF SERVICE: Water Frac 60		AGE OF WELL: NEW WELL A ☐ REWORK B ☐	TOTAL DEPTH: 4709 CIRC. BHT.: ?

CASING SIZE	CASING DEPTH	TUBING SIZE	TUBING DEPTH
5½ 15.5	4730	2½ EUE	4528
LINER SIZE	**LINER DEPTH**	**PACKER TYPE**	**PACKER DEPTH**
—	—	—	—
OPEN HOLE	**CSG. OR ANRL. VOL.**	**TBG VOLUME**	**STATIC BHT.**
—	73	26	?

CUST. NAME: Consumers Power

ADDRESS: 212 W Michigan

CITY, STATE & ZIP CODE: Jackson Michigan

REMARKS:

FOR CONVERSION PURPOSES 24 BBLS EQUALS 1000 GALLONS

ARRIVED ON LOCATION: 0830

PERFORATED INTERVALS

DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES
4638-58	20	4692-4705	12		
4676-94	36	Total Holes	88		

TIME	INJECTION RATE	INJECTION BBLS IN	PRESSURE CSG.	PRESSURE TBG.	SERVICE REMARKS
					Premix F-160 + CaCl2 - Hook up Dowell Conn
1330					Tail Gate Meeting
1350					Start circulating Water Frac 60 to Load hole
1421	3	93			Hole Loaded
23			3400	3400	Pressure Test Lines
24					Start pumping to establish Injection Rate
25	20	118	2100	2100	Injection Rate Established - Start 10/20 sand .5 #/gal
29	21	202	2100	2100	Water Frac 60 1% CaCl2 10/20 sand .5 #/gal
32	24	274	2400	2400	✓ ✓ ✓ .5 #/gal
37	25	399	2500	2500	✓ ✓ ✓ 1.0 #/gal
42	25	529	2500	2500	✓ ✓ ✓ 2.0 #/gal
46	24	620	2600	2600	✓ ✓ ✓ 2.0 #/gal
51	24	740	2600	2600	✓ ✓ 8/12 Sand 1.0 #/gal
56	25	865	2500	2500	✓ ✓ ✓ 1.0 #/gal
1506	24	1105	2700	2700	✓ ✓ ✓ 2.0 #/gal
12	23	1210	2700	2700	Fresh Water Flush

TIME LEFT LOCATION	AVG. LIQUID INJ. RATE	ADJ. INJ. RATE (SOLIDS INC.)	TOTAL FLUID PUMPED: OIL —	WATER 1092 bbls
1630	23.5	24.1		
MAX. PRESSURE	**AVG. PRESSURE**	**FINAL PUMP IN PRESSURE**	**SHUT IN PRESSURE: IMMEDIATE**	**15 MINUTE**
2700	2525	2750	1750	1600

PROPS AND LIQUIDS INJECTED

TYPE	SIZE OR PURPOSE	AMOUNT
Water Frac 60		40,000
CaCl2		3300
Sand	10/20	27100 lb.
✓	8/12	3040 lb.

DOWELL LOCATION: Richmond

DOWELL ENGINEER: D N Miller

CALL BACK: DATE | CUSTOMER REP. CONTACTED | CUSTOMER CONSIDERED SERVICE ☐ SATISFACTORY ☐ UNSATISFACTORY ☐ UNKNOWN

PROD. BEFORE TREATMENT: TEST ☐ ALLOWABLE ☐

PROD. AFTER TREATMENT: DAYS | TEST ☐ ALLOWABLE ☐

Figure 3, p. 3

CEMENTING TREATMENT REPORT

DOWELL

DWL-436-G PRINTED IN U.S.A.

TREATMENT NUMBER	STAGE NUMBER	DOWELL STATION	DATE
1-17-3513		Richmond	9/30/71

WELL NAME AND NUMBER: 1-7 BDW	STATION: St Clair Twp
POOL: Algonquin	FORMATION: Alt Simon
COUNTY: St Clair	STATE: Michigan
TYPE JOB: Equipment Rental	DOWELL ENGINEER: Dr Miller

NAME: Consumers Power

ADDRESS: 212 W Michigan

Jackson

CITY & STATE: Michigan

JOB INSTRUCTIONS:

JOB SCHEDULED FOR	ARRIVED LOCATION	TIME LEFT LOCATION
0700	0800	1000

WELL DATA

HOLE AND MUD		CASING A	CASING B	
HOLE SIZE	SIZE			STAGE TOOL
DEPTH	WEIGHT			TYPE
ROT.	GRADE			DEPTH
CABLE	THREAD			TYPE
BHST	FLOAT TYPE			DEPTH
MUD TYPE	FLOAT DEPTH			ROT.
	SHOE TYPE			RECIP.
MUD WT.	SHOE DEPTH			CENTRALIZER
MUD VISC.	CAPACITY			

TUBING-D. P.	HEADS & PLUGS	SQUEEZE	
SIZE 2 1/2 EOF	DOUBLE	PERFORATION	TYPE PACKER
WEIGHT	SINGLE	TO	
GRADE	SWEDGE	TO	DEPTH
THREAD 8 RD	KNOCKOFF	TO	
NEW USED ✓	TOP	TO	TAIL PIPE
DEPTH 4676	BOTTOM	TO	SIZE
CAPACITY	OTHER		LENGTH

TIME	PRESSURE TBG. OR D.P.	PRESSURE CASING	BARRELS PUMPED	SERVICE LOG
				Hook up Dowell Co. [illegible]
0845	1000			Pressure test lines
46				Start injecting CaCl2 water at .5 BPM
0925	1100		24	All water in tubing - injection test [illegible]

REMARKS:

CEMENT DATA

CUBIC FEET	SACKS	BRAND	TYPE	% GEL.	OTHER ADMIXES	%	SLURRY WT.

CUBIC FEET: MIXED _____ DISPLACED _____

PRESSURE: BREAKDOWN _____

AVERAGE _____

FINAL _____

WASHED THRU: ☐ YES ☐ NO TO _____

PUMPED BY ☑ DOWELL ☐ RIG

MEASURED BY ☑ DISPLACEMENT ☐ WIRE LINE

PRESSURE MAXIMUM _____ MINIMUM _____

WAS CIRCULATION LOST ☐ YES ☐ NO

WAS CEMENT CIRCULATED TO SURFACE ☐ YES ☐ NO

CEMENT LEFT IN PIPE FT. ☐ NECESSITY ☐ REQ'D

MODIFIED CEMENT LICENSE APPLIED ON _____ SACKS | GULF HIGH GEL LICENSE APPLIES ON _____ SACKS

MATERIAL FURNISHED BY CUSTOMER

TYPE OF WELL: OIL OR GAS PROD. A ☐ STORAGE B ☐ BRINE C ☑ INJECTION D ☐

CALL BACK	DATE	CUSTOMER REPR. CONTRACTED	CUSTOMER CONSIDERED SERVICE: Disposal ☐ SATISFACTORY ☐ UNSATISFACTORY ☐ UNKNOWN

STIMULATION TREATMENT REPORT Report Figure 3, p.4

DOWELL DIVISION OF THE DOW CHEMICAL COMPANY

DATE 10-4-71

WELL NAME AND NUMBER: I.T. B DWELL

FORMATION: MARSHALL Plant SITE

CUSTOMER REPRESENTATIVE: Ray Osiala

TREATMENT NUMBER: 1-17-2517

POOL: Salt disposal

FORMATION: MT SIMINS

JOB DONE DOWN: TUBING A☒ CASING B☐ ANNULUS C☐

ALLOWABLE PRESSURE: TBG: 2000 CSG:

COUNTY: St Clair Co

STATE: Michigan

TYPE OF WELL: OIL A☐ GAS B☐ WATER C☐ INJ. D☒

TYPE OF SERVICE: Pump Rental

AGE OF WELL: NEW WELL A☒ REWORK B☐

TOTAL DEPTH: 4710

CIRC. BHT.:

CUST. NAME: Consumers Power Co

ADDRESS: 212 Michigan AVE.

CITY STATE & ZIP CODE: ATTN Raymond Osiala Jackson Michigan 49201

CASING SIZE	CASING DEPTH	TUBING SIZE	TUBING DEPTH
5½	93	2½	4620
LINER SIZE	LINER DEPTH	PACKER TYPE	PACKER DEPTH
N/A	0	[illegible]	4620
OPEN HOLE	CSG. OR ANRL. VOL.	TBG VOLUME	STATIC BHT.
0	—	26.75	

PERFORATED INTERVALS

DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES	DEPTH	NO. OF HOLES
4638	4705				

REMARKS: Pump in well for pre surf test injection test

FOR CONVERSION PURPOSES 24 BBLS EQUALS 1000 GALLONS

ARRIVED ON LOCATION: 0100

TIME	INJECTION RATE	BBLS IN	PRESSURE CSG.	PRESSURE TBG.	SERVICE LOG
					!! Hold All Formation !!
0100	mix Dowflak in Tanks				Mix Dowflak in Tanks circulate 30 min 1030 Bls 3.8 sks Dowflake
0130					Test Lines 2000 lbs
0131					Pressure Bomb Test Head 1000 lbs
0135					Run Bomb To Bottom
1450	5.1	0 -	1040		Start pump in Formation
1725	1000 -		1240		pump 96 Bls in Formation
1725	5.1 -	96	1040		change chart 96 Bls pumped
2025	5.0	186	1240		change charts 186 Bls pumped
2255					Bring Bomb out of well
2400	5.0	278	1200		72 hr Bomb on Bottom Resume pumping
0100	1	302	1400		Raise injection rate
0102	2				Raise to 2 bls per min
0130	2	354	1700		Change water tanks
0500	2	802	1700		Change water tanks
0520	2				Change chart
0700	2	1142	1700		0700 Job complete Shut

TIME LEFT LOCATION	AVG. LIQUID INJ. RATE	ADJ. INJ. RATE (SOLIDS INCL)	TOTAL FLUID PUMPED OIL	WATER
0700				
MAX. PRESSURE	AVG. PRESSURE	FINAL PUMP IN PRESSURE	SHUT IN PRESSURE IMMEDIATE	15 MINUTES
1700		1700	1700	

PROPS AND LIQUIDS INJECTED

TYPE	SIZE OR PURPOSE	AMOUNT
Lp Solvent		

DOWELL LOCATION: Port Huron Mich

DOWELL ENGINEER: W. E. Hurley

CALL BACK: DATE | CUSTOMER REP. CONTACTED | CUSTOMER CONSIDERED SERVICE ☐ SATISFACTORY ☐ UNSATISFACTORY ☐ UNKNOWN | PROD. BEFORE TREATMENT ☐ | PROD. AFTER TREATMENT ☐

FIGURE 4

"Region Well Locations" Map and St Clair County "Water Well Records"

WATER WELL RECORD

1 LOCATION OF WELL

County: St Clair

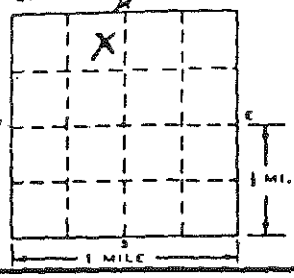
Township Name: St Louis

Section Number: 1

Distance and Direction from Road Intersections: 0.1 S. west of Lichfield Rd & 0.1 mile S. of Water Rd. 130' E. of 139 Murphy St.

Street address of City or Village: 139 Murphy St. Marysville

Locate with "X" in section below — Sketch Map:



2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Yellow Sand	6	6
Clay	88	94
Clay w/ Sand	34	128
medium Sand	4	132

USE A 2ND SHEET IF NECESSARY

18 Remarks, elevation, source of data, etc.

OWNER OF WELL: William [illegible]

Address: 139 Murphy St. Marysville

WELL DEPTH: (completed) 132 ft. Date of Completion: 6-17-75

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Diam. 4 in. to 128 ft. Depth. Weight 14 lbs/ft. Above Surface ___ ft. Diam. ___ in. to ___ ft. Depth. Drive Shoe? Yes [X] No [ ]

8 SCREEN: Johnson Type: S.S. Steel Diam. 4 Slot/Gauge 12 Length 4 Set between 128 ft. and 132 ft.

Fittings: 2" x 8" packer Seal 4x2 & 3x12 nipple

9 STATIC WATER LEVEL: 58 ft. below land surface

10 PUMPING LEVEL below land surface: 100' ft. after 3 hrs. pumping 7 g.p.m. ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [X] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No [ ] Neat Cement [ ] Bentonite [ ] ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination: ___ feet W. Direction ___ Type ___ Affected upon completion ___

Name of Driller: [illegible]

Date: 6-17-75

Signature: [illegible]

DRILLER'S CERTIFICATION: This well was drilled under my jurisdiction and believe it to be [illegible]

Form [illegible] 100M (Rev. 12-68)

LOCAL REG[illegible]

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County: St Clair | Township Name: St Clair | Section Number: 13 | Town Number: N/S | Range Number: E/W

Distance And Direction From Road Intersection: 150 E. of Allen Rd, 1/2 south of Davis Rd

Street Address & City of Well Location

Locate with "X" in Section Below

Sketch Map: Allen Rd, Davis, X

3 OWNER OF WELL

Address: [illegible]

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH: (completed) 112 ft. | Date of Completion: 5-11-83

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE: ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING: Diameter ☒ Steel ☐ Threaded ☐ Plastic ☐ Welded

4 in. to 108 ft. depth

___ in. to ___ ft. depth

Grouted Drill Hole Diameter

___ in. to ___ ft. depth

___ in. to ___ ft. depth

Height: Above/Below Surface 2 ft.

Weight 11.00 lbs./ft.

Drive Shoe ☒ Yes ☐ No

8 SCREEN: ☐ Not Installed

Type: Johson | Diameter: 4"

Slot/Gauze: 010 | Length: 4'

Set between 112 ft. and 108 ft.

FITTINGS: ☒ K-Packer ☐ Lead Packer ☐ Bremer Check ☒ Blank above screen 1 ft. Other

9 STATIC WATER LEVEL: 40 ft. below land surface ☐ Flow

10 PUMPING LEVEL: below land surface

80 ft. after 2 hrs. pumping at 15 G.P.M.

___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION: ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From ___ to ___ ft.

☐ Neat cement ☐ Bentonite ☐ Other

No. of bags of cement ___ Additives

13 Nearest source of possible contamination

Type: Septic | Distance: 55 ft. | Direction: South

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP: ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name: Goulds

Model number: 7EH | HP: 1/2 | Volts: 220

Length of Drop Pipe: 80 ft. capacity: 15 G.P.M.

TYPE: ☒ Submersible ☐ Jet

15 PRESSURE TANK:

Manufacturer's name: Well Tech

Model number: WX208 | Capacity: ___ Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Topsoil	1'	1'
Yellow Clay	12'	13'
Gray Clay	77'	90'
Hard Pan	5'	95'
Sand	13'	108
Coarse Sand & Gravel	4'	112'

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

16 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] Well Drilling 74-1528

REGISTERED BUSINESS NAME | REGISTRATION NO.

[illegible] Burma Rd

[illegible] 5-10-83

AUTHORIZED REPRESENTATIVE

0676 (Rev. 10-80)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

MICHIGAN DEPARTMENT

1. LOCATION OF WELL

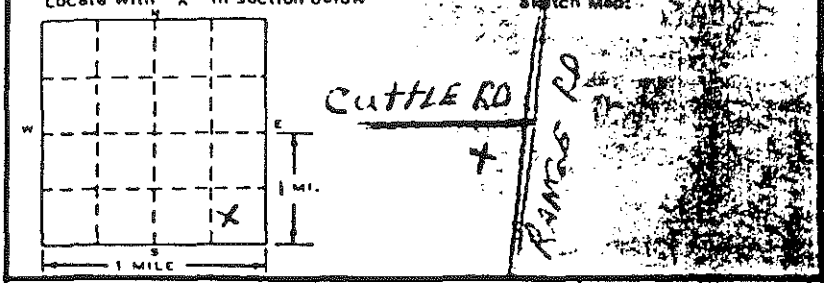
County	Township Name	Section Number	Town Number	Range Number
St Clair	St Clair	1	N.S.	16 E.W.

Distance And Direction from Road Intersections: About 300 ft. [illegible] Cuttle Road [illegible] Range Rd [illegible]

Street address & City of Well Location

Locate with "X" in section below

Sketch Map:



3 OWNER OF WELL: [illegible]

Address: 4017 RANGE ROAD, ST CLAIR, MICH 48079

4 WELL DEPTH: (completed) 135 ft. Date of Completion: 7-10-82

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface [illegible] ft.

Diam. [illegible] in. to 135 ft. Depth. Height [illegible] lbs./ft.

[illegible] in. to [illegible] ft. Depth. Drive Shoe: Yes ☒ No ☐

8 SCREEN: [illegible]

Slot Gauge [illegible] Length [illegible]

Set between [illegible] ft. and [illegible]

Fittings: 3" K Packer

9 STATIC WATER LEVEL: 55 ft. below land surface

10 PUMPING LEVEL below land surface: 75 ft. after 4 hrs. pumping [illegible] g.p.m.

[illegible] ft. after [illegible] hrs. pumping [illegible] g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) [illegible] Chlorides (Cl) [illegible] Hardness [illegible] Other [illegible]

12 WELL HEAD COMPLETION: ☐ In Approved [illegible] ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted: ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite [illegible]

Depth: From 35 ft. to [illegible] ft.

14 Nearest Source of possible contamination: 50 feet E Direction [illegible] Type [illegible]

Well disinfected upon completion: [illegible]

15 PUMP: [illegible]

Manufacturer's Name [illegible]

Model Number [illegible]

Length of Drop Pipe [illegible]

[illegible] Submersible [illegible]

[illegible] Jet ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	[illegible]	[illegible]
Clay	12	125'
Sand w/ Gas	1'	126'
Cemented Sand	8'	134'
Sand w/ Gravel	4'	13[illegible]

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

WELSER WELL DRILLING

[illegible] Gratiot Rd.

St. Clair, Michigan

364-6[illegible]

REGISTRATION NO.

Signed [illegible] Date [illegible]

AUTHORIZED REPRESENTATIVE

D47 100M (Rev. 12-68)

LOCAL HEALTH DEPT. [illegible]

WATER WELL RECORD

1 LOCATION OF WELL

County: St. Clair | Township Name: St. Clair | Fraction: ¼ | Section Number: 13

Distance And Direction from Road Intersections: 3/4 mile S of Vaughn Lane

Street address & City of Well Location: 1440 Range Rd. St. Clair

Location with "X" in section below: Vaughn

Sketch Map: Range Rd. 1 MILE

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	138	138
Sand	7	145
Clay	13	158
Cemented Gravel	4	162
Coarse Sand	7	169

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL: Milton Schultz

Address: 1440 Range Rd. St. Clair Mich.

4 WELL DEPTH (completed): 154 ft. Date of Completion: July 1972

6 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐

USE ☒ Domestic ☐ Public Supply ☒ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Feedwater ☐

7 ☒ Threaded ☐ Welded ☐ Casing Above Surface 6 in. to 154 ft. Depth Weight 17 lbs. ☐ in. to ft. Depth Drive Shoe Yes ☐ No ☐

8 SCREEN: Stainless Diameter 4 in. Slot 40 Length 20 ft. Set at 154 ft. Rubber packer

9 STATIC WATER LEVEL: 24 ft. below land surface

10 PUMPING LEVEL below land surface: 56 ft. after 2 hrs. pumping 70 g.p.m. ft. after hrs. pumping g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) Chloride (Cl) Hardness Other

12 WELL HEAD COMPLETION: ☐ Sanitary Pitless ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☒ Neat Cement ☐ Bentonite Depth: From 24 ft. to 154 ft.

14 Nearest Source of possible contamination: Feet (ft): Direction

15 Well disinfected upon completion: ☒ Yes ☐ No

16 Pump: ☐ Not Installed Manufacturer's Name Goulds Type: Deep Well Drop Pipe Capacity g.p.m. ☐ Submersible ☐ Jet ☐ Reciprocating

18 Remarks, elevation, source of data, etc.

WATER WELL CONTRACTOR'S CERTIFICATION: This record is true to the best of my knowledge and belief.

Walker Well Drilling

Contractor's License No. 1

Date 4-18-73

100M (Rev. 12-68)

LOCAL FILE

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

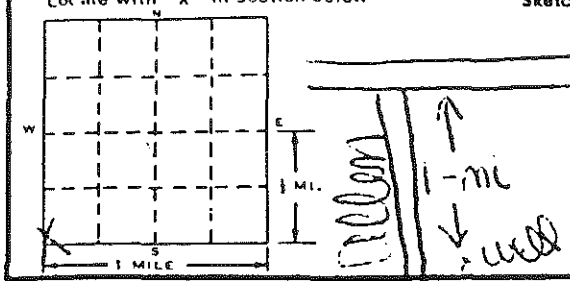
County	Township Name	Fraction	Section Number	Town Number	Range Number
St Clair	St Clair	¼ ¼ ¼	13	5 N/S	16 E/W

Distance And Direction from Road Intersections: About 1 mile South of Davis Allen Rd. St Clair

Street address & City of Well Location

Locate with "X" in section below

Sketch Map: Davis rd



3 OWNER OF WELL: Dr. G.H. Friedrichs

Address: 1517 Allen Rd St. Clair

4 WELL DEPTH: (completed) 111 ft. Date of Completion: Aug. 30. 78

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☒ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/~~Below~~ Surface 1 ft.

Diam. 4 in. to 108 ft. Depth; Weight 11 lbs./ft.

___ in. to ___ ft. Depth; Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type: Stainless Dia.: 3"

Slot/Gauze 12 Length 4'

Set between 107 ft. and 111 ft.

Fittings: 3" ft. Packer on top

9 STATIC WATER LEVEL 47 ft. below land surface

10 PUMPING LEVEL below land surface

55 ft. after 2 hrs. pumping 10 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) 55 Chlorides (Cl) ___

Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite ☒ clay slurry

Depth: From 35 ft. to top ft.

14 Nearest Source of possible contamination

75 feet NE Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not Installed

Manufacturer's Name ___

Model Number 7EH05422 HP ½ Volts 220

Length of Drop Pipe 84 ft. capacity 10 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	79'	79'
Gravel with Gas	1'	80'
Clay + Gravel	20'	100'
Fine Sand	5'	105
Course Sand	6'	111'

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Weiser Well Drilling — REGISTERED BUSINESS NAME

0257 — REGISTRATION NO.

5640 Gratiot Rd. St. Clair, Mich.

Address

Signed: [signature] Date: [illegible]

AUTHORIZED REPRESENTATIVE

100M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

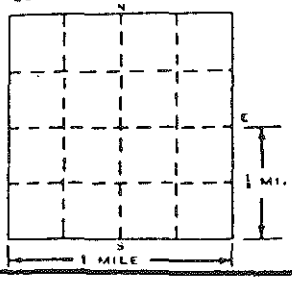
1 LOCATION OF WELL

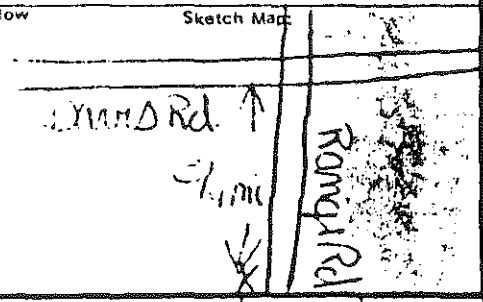
County	Township Name	Fraction	Section Number	Town Number	Range Number
St Clair	St Clair	¼ ¼ ¼	13	5 N	16 E

Distance And Direction from Road Intersections: About ¼ mi south of Dove Rd

Street address & City of Well Location: 1308 S Range Rd. St Clair

Locate with "X" in section below — Sketch Map





3 OWNER OF WELL: Harold Baber

Address: 1308 S. Range Rd St Clair

4 WELL DEPTH: (completed) 162 ft. Date of Completion: Oct 13 78

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface 1 ft.
Diam. 4 in. to 159 ft. Depth — Weight 11 lbs./ft.
in. to ft. Depth — Drive Shoe: Yes ☒ No ☐

8 SCREEN: Type Stainless Dia. 3 4"
Slot/Gauge 14 Length
Set between 158 ft. and 162 ft.
Fittings: 3" K-Packer on top

9 STATIC WATER LEVEL 65 ft. below land surface

10 PUMPING LEVEL below land surface 68 ft. after 2 hrs. pumping 15 g.p.m.
ft. after hrs. pumping g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☒ Clay
Depth: From 35 ft. to top

14 Nearest Source of possible contamination 300 feet SE Direction Septic

Well disinfected upon completion? Yes No

15 Pump: ☐ Not Installed
Manufacturer's Name Berkeley
Model Number 15HDP2XA Capacity
Length of Drop Pipe 50 ft. Capacity
Type: ☒ Submersible ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	43'	43'
Marl	7'	50
Clay	95'	145'
gravel-clay	6'	151'
gravel-sand	11'	162'

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name of Well Drilling Contractor: Well Drilling
Address: 5849 Gratiot Rd.
City, State: Saginaw, Mich.
Registration No. 02572

Signature of Driller

Form No. 1000M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

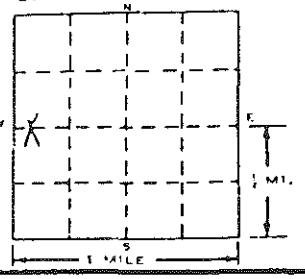
1 LOCATION OF WELL

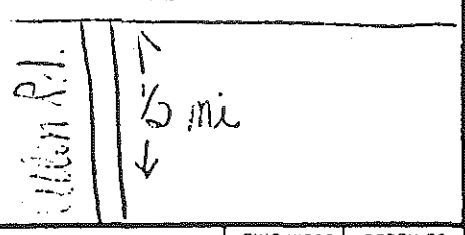
County	Township Name	Fraction	Section Number	Town Number	Range Number
St. Clair	St. Clair	¼ ¼ ¼	13	5 N/S.	16 E/W.

Distance And Direction from Road Intersections: ½ mi. South of Doward

Street address & City of Well Location: 1103 Allen Rd. St. Clair

Locate with "X" in section below — Sketch Map: Dave





3 OWNER OF WELL: Bruce Kammer

Address: 1103 Allen Rd St Clair

4 WELL DEPTH: (completed) 124 ft. Date of Completion: Aug. 31. 78

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 124 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/~~Below~~ Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: Stainless Steel Dia.: 3" Slot/Gauze 13 Length 4' Set between 120 ft. and 124 ft. Fittings: 3" K Packer on top

9 STATIC WATER LEVEL 48 ft. below land surface

10 PUMPING LEVEL below land surface: 48 ft. after 2 hrs. pumping 10 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☒ clay

Depth: From 35 ft. to 100 ft.

14 Nearest Source of possible contamination: 75 feet W Direction septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not Installed

Manufacturer's Name Dould

Model Number 75H05422 HP ½ Volts 220

Length of Drop Pipe 70 ft. capacity 10 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	2'	2'
Clay	99'	101'
Clay + Gravel	11'	112'
Coarse Sand	12'	124'

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Welser Well Drilling — REGISTERED BUSINESS NAME

0257 — REGISTRATION NO.

5640 Gratiot Rd. St. Clair, Mich. — Address

[signature] — AUTHORIZED REPRESENTATIVE

Date [illegible]

0676 100M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

ACT 294 [illegible]

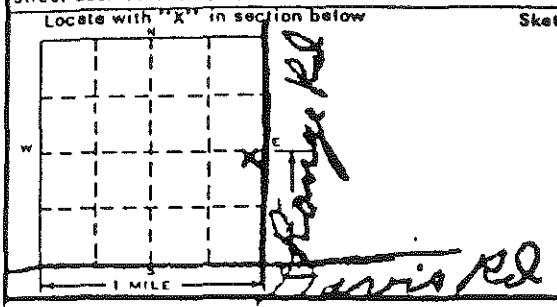
MICHIGAN DEPARTMENT [illegible] PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
St Clair	St Clair	¼ ¼ ¼	12	N/S	E/W

Distance And Direction from Road Intersections: ½ Mi North of Davis Rd.
870 Range Rd St Clair
Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: Joe Vermier
Address: 23612 Carlington Mt Clem

4 WELL DEPTH: (completed) 146 ft. Date of Completion: May 5 1970

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [ ] Welded [ ]
Diam. 4 in. to 145 ft. Depth
___ in. to ___ ft. Depth
Height: Above/Below Surface 2 ft.
Weight 11 lbs/ft.
Drive Shoe? Yes [X] No [ ]

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	3'	3'
Clay	127'	130'
Sand & gravel	2'	132'
cemented gravel	11'	143'
gravel	3'	146

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: Brass Dia.: 3"
Slot/Gauze 25 slot Length 4'
Set between 143 ft. and 146 ft.
Fittings: 3" rubber packer on top

9 STATIC WATER LEVEL
35 ft. below land surface

10 PUMPING LEVEL below land surface
64 ft. after 2 hrs. pumping 10 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ Other ___

12 WELL HEAD COMPLETION: [ ] In Approved Pit [ ] Pitless Adapter [X] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No
[ ] Neat Cement [ ] Bentonite [ ]
Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination
___ feet ___ Direction None Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not Installed
Manufacturer's Name Gould
Model Number UEH05412 Volts 220
Length of Drop Pipe 105 ft. capacity 10 G.P.M.
Type: [X] Submersible [ ] Jet [ ] Reciprocating

JUL 1970 RECEIVED ST. CLAIR CO. HEALTH DEPT. BY

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the [illegible] of my knowledge and belief.

Weiser Well Drilling
5640 Gratiot Rd.
St. Clair, Mich.

REGISTERED BUSINESS NAME — REGISTRATION NO.
Address
Signed ___ Date ___
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

ACT 2[illegible] 1966

MICHIGAN DEPARTMENT

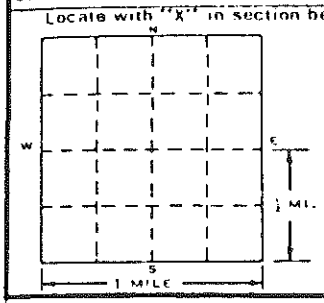
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
St. Clair	St Clair	¼ ¼ ¼	12	5 N/S	16 E/W

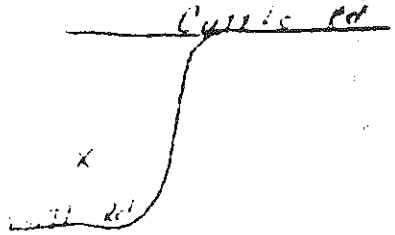
Distance And Direction from Road Intersections
72 Ft. N. of Witt Rd.
1/10 M. S. of Cuttle Rd.

Street address & City of Well Location: Job on Witt Rd.

Locate with "X" in section below



Sketch Map:



3 OWNER OF WELL:

Mr. Edward Reilly
Address 4551 Atkins Rd.
Port Huron, Mich.

4 WELL DEPTH: (completed) Date of Completion

143 ft. June, 1978

5

[X] Cable tool [ ] Rotary [ ] Driven [ ] Dug
[ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE:

[X] Domestic [ ] Public Supply [ ] Industry
[ ] Irrigation [ ] Air Conditioning [ ] Commercial
[ ] Test Well [ ] ____

7 CASING:

Threaded [X] Welded [ ]
Diam. 4 in. to 135 ft. Depth
____ in. to ____ ft. Depth

Height: Above/~~Below~~ Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe? Yes [X] No [ ]

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0' to 14' Yellow clay	14'	14'
14' to 124' Blue clay	110'	124'
124' to 129' Hard pan	5'	129'
129' to Gas		129'
129' to 134' Hard pan	5'	134'
134' to 135' Dirty sand	1'	135'
135' to 140'6" Sand	4'6"	140'6"
140'6" to 143' Clay	2'6"	143'

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: Stainless Steel Dia. 4"
Slot/~~Gage~~ 16 & 25 Length 8'
Set between 135 ft. and 143 ft.
Fittings: Screwed

9 STATIC WATER LEVEL

55 ft. below land surface

10 PUMPING LEVEL below land surface

126 ft. after 12 hrs. pumping 12 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION:

[ ] In Approved Pit
[X] Pitless Adapter [X] 12" Above Grade

13 Well Grouted?

[ ] Yes [X] No.
[ ] Neat Cement [ ] Bentonite [ ] ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

72 feet N Direction Septic Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP:

[ ] Not Installed
Manufacturer's Name Gould
Model Num [illegible] Hp ½ Volts 220
Length of Drop Pipe 126 ft. capacity 16 G.P.M.
Type: [X] Submersible
[ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Madge Well Drilling, Inc. 0344
REGISTERED BUSINESS NAME REGISTRATION NO.

Address [illegible] Harris Rd. Goodells, Mich.

Signed [signature] Date 3/25/79
AUTHORIZED REPRESENTATIVE

D474 100M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

MICHIGAN DEPARTMENT ...

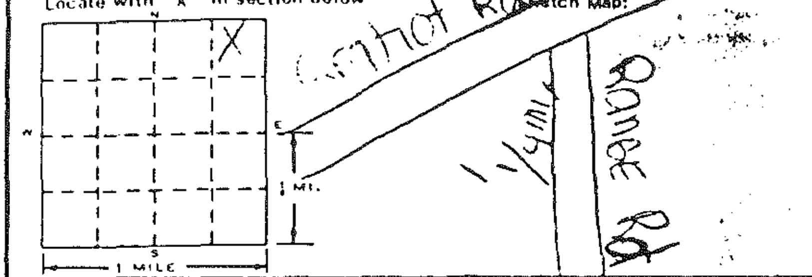
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
St Clair	St Clair		1	5 N/S	17 E

Distance And Direction from Road Intersections: About 1/4 mi South of Gratiot Rd

Street address & City of Well Location: 64 S Range Rd Marysville

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: Pacer Tool Co.

Address: 64 S. Range Rd, Marys[ville]

4 WELL DEPTH: (completed) ____ ft. Date of Completion: 8-1-80

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☑ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Diam. ____ in. to ____ ft. Depth ____ in. to ____ ft. Depth. Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☐ No ☐

8 SCREEN: Type: ____ Dia. ____ Slot/Gauze ____ Length ____ Set between ____ ft. and ____ ft. Fittings:

9 STATIC WATER LEVEL ____ ft. below land surface

10 PUMPING LEVEL below land surface ____ ft. after ____ hrs. pumping ____ g.p.m. ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☑ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ Clay slurry Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination ____ feet ____ Direction ____ Type. Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name ____ Model Number ____ Length of Drop Pipe ____ ft. Type: ☐ Submersible ☐ Jet ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Dry Hole no 1		
Clay	125'	125'
Sand w/gas	1'	126'
clay & gravel	12'	138'
blue shale	7'	145
Dry hole No 2		
Clay	130'	130'
Sand w/gas	1'	131'
Cemented gravel	9'	140'
blue shale	30'	170'

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

100M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

1961

ACT 294 PA 1965

OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
St. Clair	St. Clair	¼ ¼ ¼	1	N/S	E/W

Distance And Direction from Road Intersections: 4 mi. East of Allen Rd.

OWNER No. 2

4918 Gratiot Rd. Port Huron, Mich.

Street address & City of Well Location

3 OWNER OF WELL: Huron Automatic [illegible]

Address: 4918 Gratiot Rd. Port Huron

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	78'	78'
Gravel & Clay	16'	115'
Cemented Gravel	3'	118'
Clay	15'	133'
Sand	6'	139'
Gravel	6'	145'

4 WELL DEPTH: (completed) 145 ft. Date of Completion Oct 5 - 1967

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 4 in. to 132 ft. Depth; Threaded ☐ Welded ☐; Height: Above/Below surface 4 ft.; Weight 11 lbs/ft.; Drive Shoe? Yes ☐ No ☐

___ in. to ___ ft. Depth

8 SCREEN: Type Stainless Steel; Slot/Gauze 18 + 12; Length 7; Set between 136 ft. and 145 ft. 2 screens

Fittings: 3" top Coupling

9 STATIC WATER LEVEL 71 ft. below land surface

10 PUMPING LEVEL below land surface 75 ft. after 2 hrs. pumping 20 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING: Well Grouted? ☐ Yes ☒ No; Material: ☐ Neat Cement ☐ ___; Depth: From ___ ft. to ___ ft.

14 SANITARY: Nearest Source of possible contamination 200 feet E Direction Septic Type; Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: Manufacturer's Name Gould; Model Number Vehmio; Length of Drop Pipe 125 ft. capacity 12 G.P.M.; Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

DEC 1967 RECEIVED ST. CLAIR CO. HEALTH DEPT. BY ___

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Water Well Drilling
5640 Gratiot Rd.
St. Clair, Mich.

Signed [signature] Date 10-10-67

REGISTRATION NO.

AUTHORIZED REPRESENTATIVE

0870 100M 6-66

LOCAL HEALTH DEPT. COPY

ACT 294 PA 1965

D OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
St. Clair	St Clair	¼ ¼ ¼	1	N/S.	E/W.

Distance And Direction from Road Intersections: ½ Mi. W. of Range Rd. 4725 Gratiot Rd. Port Huron, Mich.

Street address & City of Well Location

OWNER No.

3 OWNER OF WELL: FRANK SCHNEIDERMAN

Address: 206 Wellington Crescent Drive, Mt. Clemens, Mich.

4 WELL DEPTH: (completed) 118 ft. Date of Completion 4-10-68

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Diam. 4 in. to 111 ft. Depth; Threaded ☐ Welded ☐; Height: Above/Below surface 4 ft.; Weight 11 lbs/ft.; Drive Shoe? Yes ☒ No ☐

___ in. to ___ ft. Depth

8 SCREEN: Type STAINLESS Dia. 3"; Slot/Gauze 10 Length 4'; Set between 114 ft. and 118 ft.; Fittings: 3" top Coup.

9 STATIC WATER LEVEL 66 ft. below land surface

10 PUMPING LEVEL below land surface 67 ft. after 2 hrs. pumping 14 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING: Well Grouted? ☐ Yes ☒ No; Material: ☐ Neat Cement ☐ ___; Depth: From ___ ft. to ___ ft.

14 SANITARY: Nearest Source of possible contamination 65 feet W Direction SEPTIC Type; Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: Manufacturer's Name GOULD; Model Number VEH03 HP ½; Length of Drop Pipe 74 ft. capacity 10 G.P.M.; Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my belief.

Welson Well Drilling
5640 Gratiot Rd.
St. Clair, Mich.
RESIDENCE ADDRESS NAME

0257
REGISTRATION NO.

Signed [signature] Date 4-10-68
AUTHORIZED REPRESENTATIVE

RECEIVED NOV 1968 St. Clair Co. Health Dept.

D67D 100M 6-66

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

ACT 294, PA 1965 — MICHIGAN DEPARTMENT OF PUBLIC HEALTH

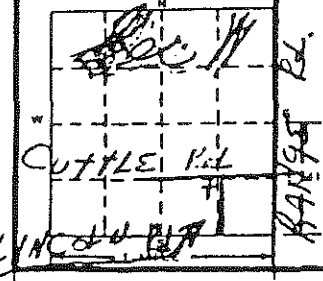
1 LOCATION OF WELL

County: St. Clair | Township Name: St. Clair | Fraction: ¼ ¼ ¼ ¼ | Section Number: 1 | Town Number: N/S | Range Number: E/W

Distance And Direction from Road Intersections: So West Corner Cuttle + Lincoln Rds.

Street address & City of Well Location: 406 Lincoln Rd. St. Clair, MICH

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: Leoward Sobczak

Address: 406 Lincoln Rd. St. Clair

4 WELL DEPTH: (completed) 140 ft. Date of Completion: 11-22-72

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 137 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/~~Below~~ Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	135'	135'
Fine Sand	5'	140

8 SCREEN: Type: Stainless Dia.: 3" Slot/~~Gauze~~ 10 Length 4" Set between 136 ft. and 140 ft.

Fittings: 3" Rubber Packer

9 STATIC WATER LEVEL: 54 ft. below land surface

10 PUMPING LEVEL below land surface: 120 ft. after 2 hrs. pumping 5 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☒ Clay Slurry

Depth: From 45 ft. to Top ft.

14 Nearest Source of possible contamination: 50 feet W. Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name: Gould

Model Number: VEH05412 HP ½ Volts 230

Length of Drop Pipe 126 ft. capacity 5 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Welser Well Drilling — REGISTERED BUSINESS NAME — 0237 REGISTRATION NO.

Address: 5640 Gratiot St. Clair, MICH

Signed: [illegible] AUTHORIZED REPRESENTATIVE — Date: 11-24-72

D67d 100M (Rev. 12-68)

LOCAL HEALTH DEPT. COPY

WATER WELL RECORD

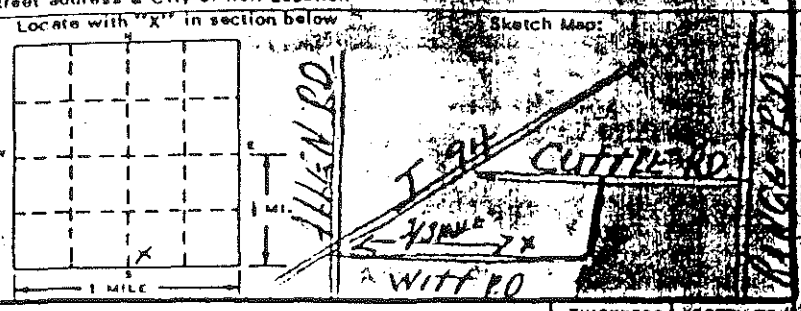
1 LOCATION OF WELL

County: ST CLAIR | Township Name: ST CLAIR | Section Number: 7

Distance And Direction from Road Intersection: About 1/2 [illegible]

Street address & City of Well Location: 4158 WITT RD ST CLAIR

Locate with "X" in section below | Sketch Map:



2 OWNER OF WELL: [illegible]

4158 WITT RD ST CLAIR

4 WELL DEPTHS (completed): 117 ft. | Date of Completion: [illegible]

5 ☒ Cable tool ☒ Rotary ☐ Driven ☒ Dug
☐ Hollow rod ☐ Jetted ☐ Bored ☐ Other

6 USE: ☒ Domestic ☐ Public Supply ☐ Industrial
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐

7 CASING: ☐ Threaded ☒ Welded ☐ Height Above Below Surface
Diameter: 4 in. | 117 ft. Depth | ft. Depth | Diameter: 4 in. | ft. Depth | Other: ☒ Ko

8 SCREEN: Type: STAINLESS
Slot/Gauze: 8 | Length: [illegible]
Set between: 115 ft. and 117 ft.
Fittings: 3 6-POCKET

9 STATIC WATER LEVEL: 20 ft. below land surface

10 PUMPING LEVEL below land surface: 80 ft. after 3 hrs. pumping 10 G.P.M.
[illegible] ft. after [illegible] hrs. pumping [illegible] G.P.M.

11 WATER QUALITY in Parts Per Million: Iron (Fe) [illegible] Chlorides (Cl) [illegible]
Hardness [illegible] Other [illegible]

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Below Grade
☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Other [illegible]
Depths: From 35 ft. to 70 ft.

14 Nearest Source of possible contamination: 60 ft. N.W. Direction [illegible]
Was well disinfected upon completion? ☒ Yes

15 [illegible]
Name: [illegible]
Address: [illegible]
[illegible]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
CLAY	110	110
FINE SAND	7	117

USE A 2ND SHEET IF NEEDED

26 Remarks, elevation, source of data, etc.

27 CONTRACTOR'S CERTIFICATION
[illegible] jurisdiction
[illegible] knowledge and belief.
[illegible] 8/20/[illegible]
[illegible] NAME
[illegible] ADDRESS
[illegible] No.
[illegible]

[illegible] 100M 18ev. 7-2-68

WATER WELL RECORD

1. LOCATION OF WELL

Distance And Direction from [illegible]

Street address & City of Well Location

Locate with "X" in section below

1 MILE

2. FORMATION

FORMATION	THICKNESS OF STRATUM	
Clay		
Fine Sand		
[illegible] Gravel		
Sand		

USE A 2ND SHEET IF NEEDED

Cable tool · Rotary

CASING: Threaded ☒ Welded ☐

SCREEN:

Set between 123 ft. and [illegible] ft.

Fittings

9 STATIC WATER LEVEL

ft. below land surface

10 PUMPING LEVEL below land surface

ft. after 2 hrs. pumping

ft. after ___ hrs. pumping

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ________ Chlorides (Cl)

Hardness ________ Other

12 WELL HEAD COMPLETION:

Pitless Adapter · 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

Cement ☐ Bentonite

Depth: From 75 ft. to

14 Nearest source of possible contamination

Direction

Well disinfected upon completion

Remarks, elevation, source of data, etc.

CONTRACTOR'S CERTIFICATION

RECEIVED OCT 1 [illegible] 1234567891011 [illegible]

WATER WELL RECORD

MICHIGAN DEPARTMENT

1 LOCATION OF WELL #8

County: St. Clair

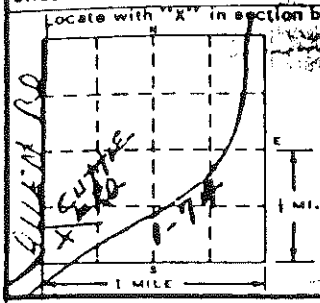
Township Name: St. Clair

Section Number: 1

Distance And Direction from Road Intersection: S.E. Corner

Street address & City of Well Location: 405 Allen Rd. St. Clair

Locate with "X" in section below — Sketch Map



3 OWNER OF WELL: C. Ang

Address: 405 Allen Rd. St. Clair

4 WELL DEPTH: (completed) 142 ft. — Date of Completion: 9/10/76

5 [X] Cable tool [X] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored

6 USE: [X] Domestic [ ] Public Supply [ ] Industrial [ ] Irrigation [ ] Air Conditioning [ ] Government [ ] Test Well

7 CASTING: Threaded [X] Welded [ ] Diam. 4 in. 37 ft. Depth — Height Above/Below Surface 11 in. — Weight ___ lbs. — ___ ft. Depth — Drive Shoe? YES [X] NO [ ]

8 SCREEN: Type Stainless — Diam. 2 — Slot/Gauge 20 — Set between 135 ft. and 142 ft. — Fittings: Gravel Pack

9 STATIC WATER LEVEL: 64 ft. below land surface

10 PUMPING LEVEL below land surface: 68 ft. after 2 hrs. pumping 10 GPM — ___ ft. after ___ hrs. pumping ___ GPM

11 WATER QUALITY in Parts Per Million: Chloride ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: Pitless Adapter [ ] Other [ ]

13 [X] Yes [ ] No

Depth: 30 ft.

14 Water source: Sand

Well grouted after completion: Yes

15 [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	5	5
Clay	115	120
Fine Sand	15	135
Coarse Sand	7	142

USE A 2ND SHEET IF NEEDED

20 Remarks, elevation, source of data, etc.

WATER WELL CONTRACTOR'S CERTIFICATION

Name: Well Drilling
Address: 1000 Gratiot Rd.
St. Clair, Mich.

WATER WELL RECORD

1. LOCATION OF WELL

County: St. Clair

Township Name: [illegible]

Section Number: [illegible]

Distance And Direction [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below

Sketch Map

FORMATION	THICKNESS	[illegible]
SAND	[illegible]	[illegible]
CLAY	[illegible]	[illegible]
CEMENTED GRAVEL	[illegible]	[illegible]
SAND W/ GRAVEL	[illegible]	[illegible]

Remarks: elevation, source of data, etc.

[illegible] WELL DEPTH (completed) [illegible] ft.

Date of Completion [illegible]

Cable tool [illegible]

Domestic [illegible]

Irrigation [illegible]

Test Well [illegible]

CASING [illegible]

[illegible] below land surface

PUMPING LEVEL below land surface

WATER QUALITY in Parts Per Million

WELL HEAD COMPLETION

Pitless Adapter

Grouted

[illegible]

Sec. Well Drilling

WATER WELL RECORD

1 LOCATION OF WELL

County: St. Clair

Distance And Direction from Road Intersection: ... So. of ...

Street address & City of Well Location: ...

Locate with "X" in section below

1 MILE

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	101'	101'
Cemented Gravel	7'	108'
Sand	10'	118'

USE A 2ND SHEET IF NEEDED

Remarks, elevation, source of data, etc.

WELL DEPTH: (completed) Date of Completion

Cable tool / Rotary / Driven / Dug / Hollow rod / Jetted / Bored

USE: Domestic / Public Supply / Industry / Irrigation / Air Conditioning / Commercial / Test Well

7 CASING: Threaded Welded Height: Above/Below Surface
Diam.: 2 in. to 110 ft. Depth Weight
in. to ft. Depth Drive Shoe? Yes No

8 SCREEN:
Type: Plastic
Slot/Gauge: 13
Set between 112 ft. and 117 ft.
Fittings: 3 Rubber Packer

9 STATIC WATER LEVEL
ft. below land surface

10 PUMPING LEVEL below land surface
66 ft. after ... hrs. pumping ...
ft. after ... hrs. pumping ... g.p.m.

11 WATER QUALITY in Parts Per Million:
Hardness ... Other

12 WELL HEAD COMPLETION:
Pitless Adapter

WELL CONTRACTOR'S CERTIFICATION

WATER WELL RECORD

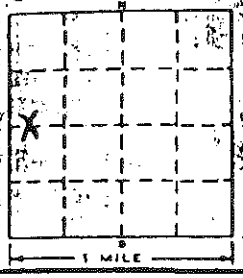
MICHIGAN DEPARTMENT

LOCATION OF WELL

Distance And Direction

Street address & City of Well Location

Locate with "X" in section below



1 MILE

Gratiot Lead

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	[illegible]	[illegible]
Clay	[illegible]	[illegible]
Sand w/ Gas	[illegible]	[illegible]
Fine Muddy Sand	50	[illegible]
Gravel w/ Sand	[illegible]	[illegible]

4 WELL DEPTH: (completed) Date of Completion

[illegible] ft.

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 ☒ Domestic ☐ Public Supply ☐ Industrial ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height Above Surface

Diam. 4 in. to 136 ft. Depth

in. to ft. Depth

Drive Shoe? Yes ☒ No

8 SCREEN: Stainless

Slot 18

Set between 135 ft. and [illegible]

Fittings: 3 ft. [illegible]

9 STATIC WATER LEVEL

60 ft. below land surface

10 PUMPING LEVEL below land surface

90 ft. after 4 hrs. pumping

ft. after hrs. pumping

11 WATER QUALITY in Parts Per Million

Iron (Fe) Chlorides (Cl)

Hardness Other

12 WELL HEAD COMPLETION: ☐ Approved ☒ Pitless Adapter ☐ Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Cement ☐ Bentonite

Depth: From 35 to [illegible]

14 Nearest Source of possible [illegible]

W Direction

Remarks: elevation, source of data, etc.

LOCATION OF WELL

County: St. Clair | Twp.: St. Clair | Section No.: 12

Distance And Direction from Road Intersections: 2 mi. N. of Davis Rd. 750 Range Rd. St. Clair Mich.

OWNER No.

Street address & City of Well Location

OWNER OF WELL: [illegible] Curtis, 750 Range Rd. St. Clair

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	123	123
Sand	5'	128'
Cemented Gravel	10'	138'
Sand Gravel	9'	147'

WELL DEPTH: (completed) 147 ft. Date of Completion 1-2-68

☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

CASING: Diam. 4 in. to 137 ft. Depth; Threaded ☒ Welded ☐; Height Above/Below surface 4 ft.; Weight 11 lbs/ft.; Drive Shoe? Yes ☒ No ☐

SCREEN: Type Stainless; Slot/Gauze 10; Set between 143 ft. and 142 ft.; Fittings 3" top Coupling

STATIC WATER LEVEL 38 ft. below land surface

PUMPING LEVEL below land surface: 38 ft. after 2 hrs. pumping 12 g.p.m.; ft. after hrs. pumping g.p.m.

WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness

WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

GROUTING: Well Grouted? ☐ Yes ☒ No; Material ☐ Neat Cement ☐; Depth From ft. to ft.

Remarks, elevation, source, etc.

Drilling

WATER WELL RECORD

MICHIGAN DEPARTMENT

LOCATION OF WELL

County: St. Clair

Township Name: [illegible]

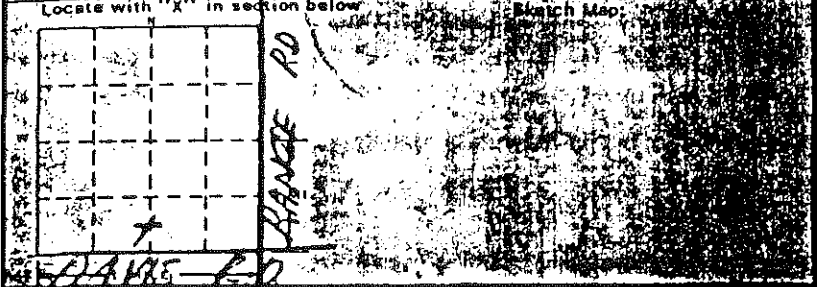
Section Number: 12

Distance And Direction from Road Intersections: [illegible] West [illegible] Road [illegible] Davis Road [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below

Sketch Map:



FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND	[illegible]	[illegible]
CLAY	71	[illegible]
SAND	17	[illegible]

OWNER OF WELL: [illegible] Davis [illegible]

WELL DEPTH (completed) Date of Completion: [illegible]

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

Threaded ☒ Welded ☐ Height Above/Below

[illegible] ft. Depth [illegible]

[illegible] ft. Depth [illegible]

SCREEN: [illegible]

Slot/Gauze 10

Set between 110 ft. and 114 ft.

Fittings: [illegible]

9 STATIC WATER LEVEL: 45 ft. below land surface

10 PUMPING LEVEL below land surface: 55 ft. after 2 hrs. pumping 10 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☒ Depth From 35 ft. to [illegible]

Remarks: elevation, source of data, etc.

WATER WELL CONTRACTOR'S CERTIFICATION

[illegible]

WATER WELL RECORD

MICHIGAN DEPARTMENT

1 LOCATION OF WELL

County: St. Clair | Township Name: ST. CLAIR | Fraction | Section Number: 18

Distance And Direction from Road Intersections: Davis Rd.

Street address & City of Well Location: 1255 Range Rd. St. Clair, Mich.

Locate with "X" in section below: Sketch Map: Davis Rd. Range Rd. 1 mi. 1 MILE

3 OWNER OF WELL: Louis Bailey

Address: 1255 Range Rd. St. Clair

4 WELL DEPTH: (completed) 152 ft. Date of Completion 2-8-72

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Inches Above/Below Surface: 4 Diam. 152 Depth

8 SCREEN: Diam. 4 Length 18 Set between 147 ft. and 152 ft. Fittings: Rubber Packer

9 STATIC WATER LEVEL: 46 ft. below land surface

10 PUMPING LEVEL below land surface: 95 ft. after 2 hrs. pumping ___ g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No Cement ☐ Bentonite ☐ Depth: From ___ ft. to ___

14 Nearest Source of possible contamination: Direction ___ Distance ___ Disinfected upon completion ☒

2

FORMATION	THICKNESS FT. OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	133	133
Cemented Gravel	8	143
Sand	6	149
Coarse Sand	3	152

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION: Well drilled under my jurisdiction and this report is true to the best of my knowledge and belief. Name of Well Drilling Contractor: Bill's Well Drilling. Address: 8540 Gratiot Rd. Marine City, Mich.

RECEIVED MAY 1972 ST. CLAIR HEALTH DEPT.

LOCAL

WATER WELL RECORD

MICHIGAN DEPARTMENT

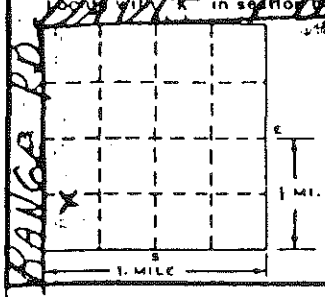
1 LOCATION OF WELL

County: St. Clair | Township Name: [illegible] | Section Number: [illegible]

Distance And Direction from Road Intersections: 3/4 Mile [illegible] 1425 Range [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL: Gary [illegible] 1425 Range [illegible] St. Clair, Mich.

4 WELL DEPTH: (completed) 157 ft. Date of Completion 7-14-75

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface [illegible] ft. Diam. 4 in. to 157 ft. Depth Weight [illegible] in. to ___ ft. Depth Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type Stainless Dia. [illegible] Slot/Gauze 12 Length [illegible] Set between 157 ft. and 157 ft. Fittings: 3" Rubber Packer

9 STATIC WATER LEVEL 51 ft. below land surface

10 PUMPING LEVEL below land surface 123 ft. after 2 hrs. pumping 6 g.p.m. ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☒ Clay Depth: From 40 ft. to Top ft.

14 Nearest Source of possible contamination [illegible] feet E Direction [illegible] Type [illegible] disinfected upon completion ☒ Yes ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	148	148
Fine Sand	3	151
Cemented Sand	6	157
Coarse Sand	2	157

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

WATER WELL CONTRACTOR'S CERTIFICATION

[illegible]

[illegible] NAME [illegible]

1 LOCATION OF WELL

County: ST CLAIR | Township: ST CLAIR | Section No.: 18

Distance And Direction from Road Intersections: 1/2 MI. SO. OF [illegible]

OWNER No.

Street address & City of Well Location: 1441 RANGE [illegible] ST CLAIR

OWNER OF WELL: [illegible] SHAW

[illegible] RANGE [illegible]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BROWN CLAY	18'	[illegible]
SOFT BLUE CLAY	12'	[illegible]
CEMENTED GRAVEL	8'	[illegible]
COARSE SAND	12'	[illegible]

4 WELL DEPTH: (completed) [illegible] ft. Date of C[illegible]

[illegible] ☒ Cable tool, ☐ Rotary, ☐ Drive, ☐ Dug, ☐ Hollow rod, ☐ Jetted, ☐ Bored, ☐ [illegible]

6 USE: ☒ Domestic, ☐ Public Supply, ☐ Industrial, ☐ Irrigation, ☐ Air Conditioning, ☐ Commercial, ☐ Test Well, ☐ [illegible]

7 CASING: Diameter [illegible] Threaded ☒ Welded ☐ Height Above/Below [illegible] ft. Depth [illegible] ft. Depth [illegible] Drive Shoe ☐ No

8 SCREEN: [illegible] Slot [illegible] Between [illegible] Fittings: [illegible] TOP COUPLING

9 STATIC WATER LEVEL: [illegible] ft. below land surface

10 PUMPING LEVEL below land surface: [illegible] ft. after [illegible] hrs. pumping [illegible] g.p.m.

[illegible] ft. after [illegible] hrs. pumping [illegible] g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) [illegible] Chlorides (Cl) [illegible] Hardness [illegible]

12 WELL HEAD COMPLETION: ☐ In Approved Pit, ☒ Pitless Adapter, ☐ 12" Above Grade

13 GROUTING: Well Grouted? ☐ Yes ☒ No. Materials: ☐ Neat Cement ☐ [illegible] Depths From [illegible] ft. [illegible]

14 SANITARY: [illegible] Source of possible [illegible] [illegible] Disinfected [illegible] Pitless [illegible]

[illegible] Elevation, Source of data [illegible]

[illegible] Water Well [illegible]

[illegible]

WATER WELL RECORD

LOCATION OF WELL

Township Name

Section Number

Distance And Direction from Road Intersection

Street address & City of Well Location

Locate with "X" in section below

Sketch Map

1 MILE

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	80	80
Gravel + Clay	3	83
Clay	15	98
fine Sand	3	[illegible]
Course Sand	12	113

USE A 2ND SHEET IF NEEDED

Remarks, elevation, source of data, etc.

WELL DEPTH (completed) Date of Completion

ft. 1978

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface

4 in. to 110 ft. Depth Weight 11 lbs./ft.

in. to ft. Depth Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type Stainless Steel

Slot/Gauze 10 Length 41

Set between 109 ft. and 113 ft.

Fittings: Bulk Packer

9 STATIC WATER LEVEL

48 ft. below land surface

10 PUMPING LEVEL below land surface

49 ft. after 2 hrs. pumping 12

ft. after hrs. pumping

11 WATER QUALITY in Parts Per Million:

Iron (Fe) Chlorides (Cl)

Hardness Other

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

Depth from ft.

Source of possible contamination

Direction

Well Disinfected upon completion ☐ Yes ☐

CONTRACTOR'S CERTIFICATION

Welser Well Drilling

WATER WELL RECORD

MICHIGAN DEPARTMENT

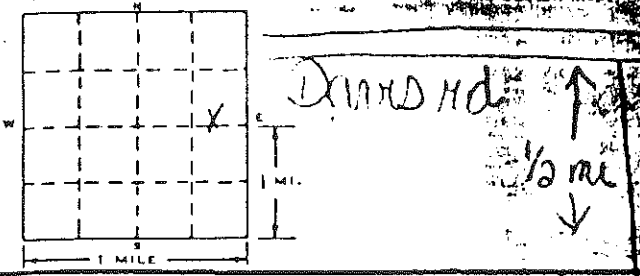
LOCATION OF WELL

County: Ottawa | Township Name: [illegible] | Section Number: 13

Distance And Direction from Road Intersection: about ½ mile south of Ottawa rd.

Street address & City of Well Location: 1410 Range rd. Holland

Locate with "X" in section below | Sketch Map:



OWNER OF WELL: [illegible] 1410 Range rd. Holland

4. WELL DEPTH: (completed) 155 ft. | Date of Completion: July 7 58

☒ Cable tool ☒ Rotary ☒ Driven ☐ Dug
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6. USE: ☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐

7. CASING: Threaded ☒ Welded ☐ Height Above Below Surface: 1 ft.
Diameter: 6 in. | Depth: 155 ft. | Weight: [illegible] lbs. | Drive shoe used? YES ☐ NO ☐

8. SCREEN: [illegible] Diameter: [illegible] Length: [illegible] Slot: [illegible]
Depth: [illegible] ft. | Material: [illegible]

9. STATIC WATER LEVEL: 51 ft. below land surface

10. PUMPING LEVEL below land surface: [illegible] ft. after [illegible] hrs. pumping [illegible] G.P.M.

11. WATER QUALITY in Parts Per Million: Chlorides (Cl): [illegible] Hardness: [illegible] Other: [illegible]

12. WELLHEAD COMPLETION: ☒ Pitless Adapter ☐ [illegible]

13. Well Casing: ☒ Steel ☐ [illegible] ☐ Concrete ☐ [illegible]
Depth: From 35 ft. to 155 ft.

14. Nearest Source of possible contamination: [illegible] SW Direction [illegible]
Well Disinfected upon completion? YES ☐ NO ☐

15. Name: [illegible]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	5	5
Clay	135	155
Clay & gravel	12	155
Sand	5	155

USE A 2ND SHEET IF NEEDED

16. Remarks: elevation, source of data, etc.: [illegible]

17. CONTRACTOR'S CERTIFICATION: [illegible]

Name of Well Driller: [illegible]

Signature: [illegible]

Date: [illegible]

WATER WELL RECORD

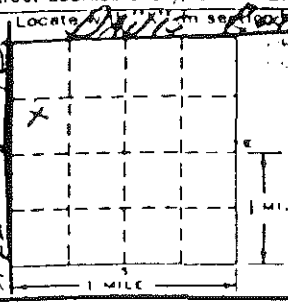
1 LOCATION OF WELL

County: St Clair | Township Name: St Clair | Section Number: 13

Distance And Direction from Road Intersections: 3 miles S of Dakota

Street address & City of Well Location: 1155 Allenford St Clair

Locate Well in section below | Sketch Map:



OWNER OF WELL: Rodgers

Address: 1155 Allenford St Clair

4 WELL DEPTH: (completed) 133 ft. | Date of Completion: 8-24-74

5 [1] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [X] Domestic [ ] Public Supply [ ] Industrial [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] | Height: Above/Below Surface 6 in. ft. | Diam. 4 in. to ft. Depth | Weight 11 lbs/ft. | in. to ft. Depth | Drive Shoe? Yes [X] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	117'	117
Dirty Sand	10'	127'
Course Clean Sand	6'	133'

8 SCREEN: Type Stainless | Diam. 4 | Slot/Gauze 12 | Length 4 | Set between 129 ft. and 133 ft. | Fittings: 3" Rubber Packer

9 STATIC WATER LEVEL: 53 ft. below land surface

10 PUMPING LEVEL below land surface: 55 ft. after 2 hrs. pumping 75 | ft. after hrs. pumping gpm

11 WATER QUALITY in Parts Per Million: Iron (Fe) | Chlorides (Cl) | Hardness | Other

12 WELL HEAD COMPLETION: [X] Pitless Adapter [ ] Above Grade

13 Well Grouted? [X] Yes [ ] No | [X] Cement [X] Bentonite | Depth: From 75 ft. to 133 ft.

Nearest Source of possible contamination: 60 ft. S. Date: 8-24-74

Was a chemical analysis made? [ ] Yes [X] No

USE A 2ND SHEET IF NEEDED

14 Remarks: elevation, source of data, etc.

15 CERTIFICATION: Well Driller: [illegible] | 40 Grant Rd | St Clair Mich | Date: 8-24-74

AUG 1974 RECEIVED ST. CLAIR COUNTY HEALTH DEPT.

100M (REV. 1/72)

WATER WELL RECORD

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

1. LOCATION OF WELL

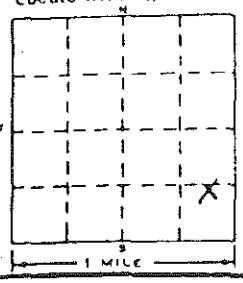
County: ST. CLAIR | Township Name: ST. CLAIR | Section: | Section Number: 13

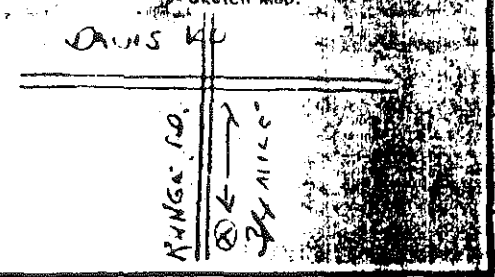
Distance And Direction from Road Intersections: About 3/4 mile So. of DAVIS

1266 RANGE RD. ST. CLAIR, MICH.

Street address & City of Well Location

Locate with "X" in section below | Sketch Map:





2. OWNER OF WELL: ROGER [illegible]

1266 RANGE RD. ST. CLAIR, MICH.

4. WELL DEPTH: (completed) 161 ft. | Date of Completion: Feb. 11-79

5. [X] Cable-tool [X] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6. USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7. CASING: Threaded [X] Welded [ ] Diam. 6 in. to 151 ft. Depth. Height Above/Below Surface [illegible] ft. Weight [illegible] lb. Depth ft. Drive Shoe? Yes [X] No [ ]

8. SCREEN: [illegible] Diameter 6 in. Length [illegible] ft. Set between 151 ft. and 161 ft. Material [illegible]

9. STATIC WATER LEVEL: [illegible] ft. below land surface

10. PUMPING LEVEL below land surface: [illegible] ft. after [illegible] hrs. pumping [illegible] gpm

11. WATER QUALITY In Parts Per Million: Iron [illegible] Chlorides [illegible] Hardness [illegible] Other [illegible]

12. WELL HEAD COMPLETION: [illegible] Pitless Adapter [illegible] Grouted? [X] Yes [ ] No [illegible] Cement [illegible] Depth: From [illegible] ft. to [illegible]

Nearest Source of possible contamination: [illegible] Direction [illegible] Distance [illegible] Was pump and pump house completely disinfected? [illegible]

[illegible] Manufacturer [illegible] Model [illegible] Drop Pipe [illegible] Capacity [illegible] Jet [illegible] Type [illegible]

USE A 2ND SHEET IF NECESSARY

13. Remarks, elevation, source of data, etc.: [illegible]

14. WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] Well Drilling

[illegible] Gratiot Rd.

[illegible]

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	130	130
Sand w/Gravel	21	151
Clay w/Gravel	10	161
Muddy Sand	4	165
Clean Sand w/Gravel	[illegible]	[illegible]

[illegible] 100M (Rev. 12-68)

WATER WELL RECORD

MICHIGAN DEPARTMENT

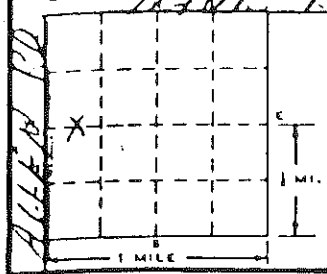
1 = LOCATION OF WELL

County: St. Clair | Township Name: [illegible] | Section Number: 13 | Town Number: [illegible] | Range Number: [illegible]

Distance And Direction from Road Intersections: [illegible]

Street address & City of Well Location: [illegible]

Locate with X in section below | Sketch Map:



3 OWNER OF WELL: [illegible]

4 WELL DEPTH: (completed) 180 ft. | Date of Completion: [illegible]

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ [illegible]

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ | Height: Above/Below Surface [illegible] ft. | Diameter [illegible] to 150 ft. Depth | Weight [illegible] | [illegible] to [illegible] ft. Depth | Drive Shoe ☐ Yes ☒ No ☐ [illegible]

8 SCREEN: [illegible] | Mat/Gauze [illegible] Length [illegible] | Set between [illegible] ft. and [illegible] ft. | Fittings [illegible]

9 STATIC WATER LEVEL: [illegible] ft. below land surface

10 PUMPING LEVEL below land surface: [illegible] ft. after [illegible] hrs. pumping [illegible] | [illegible] ft. after [illegible] hrs. pumping [illegible] g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) [illegible] Chlorides (Cl) [illegible] | Hardness [illegible] Other [illegible]

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No | ☐ Neat Cement ☐ Bentonite | Depth: From [illegible] ft. to [illegible] ft.

14 Nearest Source of possible contamination: [illegible] Direction [illegible] | Was it disinfected upon completion? ☒ Yes ☐ No

15 [illegible] ☐ Stockwell [illegible] | Name [illegible]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay	2	[illegible]
Blue Clay	110	130
[illegible]	1	131
Clay	16	147
[illegible]	13	160

16 Remarks: elevation, source of data, etc.: [illegible]

17 CONTRACTOR'S CERTIFICATION: [illegible]

[illegible]

WATER WELL RECORD

LOCATION OF WELL

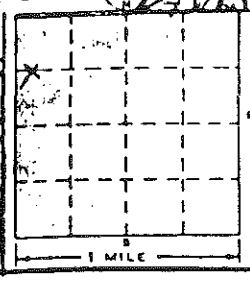
County | Township Name | Range | Section Number

Distance And Direction from Road Intersection

Street address & City of Well Location

Locate with X in section below

Sketch Map



OWNER OF WELL

4 WELL DEPTH: (completed) Date of Completion

5 ☒ Cable tool ☒ Rotary ☐ Dug ☐ Bored
☐ Hollow rod ☐ Jetted ☐ Driven ☐ Other

6 USE ☒ Domestic ☐ Public supply
☐ Irrigation ☐ Air conditioning
☐ Test Well ☐ Other

7 CASING: Threaded ☒ Welded ☐ Other

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay w/ Gravel	[illegible]	[illegible]
Blue Clay	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

8 SCREEN: Type [illegible] Diameter [illegible] Set between [illegible] ft. and [illegible] ft. Slotted [illegible] 12 [illegible]

9 STATIC WATER LEVEL [illegible] ft. below land surface

10 PUMPING LEVEL below land surface [illegible] ft. after 2 hrs. pumping [illegible]
[illegible] ft. after [illegible] hrs. pumping [illegible]

11 WATER QUALITY in Parts Per Million: Iron [illegible] Chlorides [illegible] Hardness [illegible] Other [illegible]

12 WELL HEAD COMPLETION: ☐ Approved ☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Other
Depth: From [illegible] ft. to [illegible]
Nearest Source of Possible Contamination [illegible]
Direction from Well [illegible]
Distance from Well [illegible]

USE A 2ND SHEET IF NECESSARY

10 Remarks: Elevation, source of data, etc.

CERTIFICATION: [illegible] Well Drilling [illegible] Rd. [illegible]

WATER WELL RECORD

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

1 LOCATION OF WELL

County: St Clair | Township Name: St Clair | Fraction: | Section Number: 17

Distance And Direction from Road Intersections: About 3/4 mile South of Davis Rd

Street address & City of Well Location: 1479 Range Rd St Clair

Locate with "X" in section below — Sketch Map: Davis Rd. Range Rd 3/4 mi

3 OWNER OF WELL: Merle Rowling

Address: 1479 Range Rd St Clair

4 WELL DEPTH: (completed) 168 ft. Date of Completion: Sept 8 78

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ Air

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well

7 CASING: Threaded ☐ Welded ☐ Diam. 4 in. to 165 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface 1 ft. Weight 4 lbs/ft. Drive Shoe? Yes ☐ No ☒

8 SCREEN: Stainless Diam. 4 Slot/Gauge 10 Length 4 Set between 164 ft. and 168 ft. Fittings: 3" K Packer on top

9 STATIC WATER LEVEL 55 ft. below land surface

10 PUMPING LEVEL below land surface 65 ft. after 2 hrs. pumping 10 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

14 Nearest Source of possible contamination: ___ Direction ___ Distance ___

15 LITHOLOGY LOG

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	2	2
Clay	146	148
Cemented gravel	18	156
muddy sand	1	157
cemented gravel & clay	3	160
sand	8	168

USE A 2ND SHEET IF NEEDED

16 Remarks: elevation, source of data, etc.

17 CERTIFICATION

Well Driller

Date of Issue

Form 1000 (Rev. 1-68)

LOCAL REGISTRATION

WATER WELL RECORD

1 LOCATION OF WELL

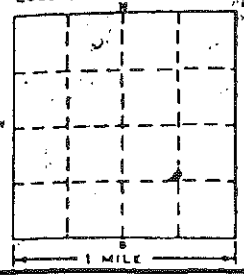
County: St. Clair

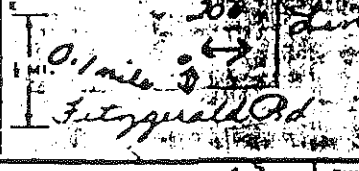
Township Name: [illegible]

Distance And Direction from Road Intersection: Approx. 200 [illegible] approx. 0 [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below — Sketch Map





2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	1	1
Yellow Sand	2	3
Blue Clay	113	126
Hard Pan	7	133
Water Bearing Sand	8	141

3 OWNER OF WELL

[illegible]

St. Clair [illegible]

4 WELL DEPTH: (completed) Date of Completion: 141 ft. [illegible] 31 74

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [X] Domestic [ ] Public Supply [ ] Industrial [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Height Above Below Diam. [illegible] 4 in. to 133 ft. Depth [illegible] Weight [illegible] in. to ___ ft. Depth [illegible] Drive Shoe [ ] Yes [X] No

8 SCREEN: Stainless [illegible] Slot/Gauge (2) 10 [illegible] Set between 133 ft. and 141 [illegible] Fittings: Leader [illegible]

9 STATIC WATER LEVEL: 55 ft. below land surface

10 PUMPING LEVEL below land surface: 115 ft. after 3 hrs. pumping [illegible] ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) 10 GPM Chlorides (Cl) [illegible] Hardness 0.5 PPM Other [illegible]

12 WELLHEAD COMPLETION: [ ] Approved Pit [X] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No [ ] Neat Cement [ ] Bentonite [ ] Depth: From ___ ft. to ___

14 Nearest Source of possible contamination: [illegible]

15 Remarks, elevation, source of data, etc.

WATER WELL RECORD

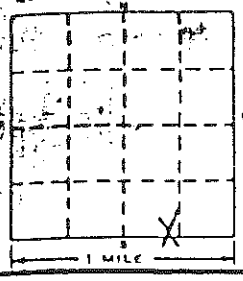
1 LOCATION OF WELL

County: Clay

Distance and Direction from Nearest Town or City: 3/4 mile south of Neumann Rd

Street address of Well Location: 5700 Neumann Rd

Locate with "X" in section below:



Sketch Map: Neumann Rd

2 WELL DEPTH: (completed) 165 **Date of Completion:** Nov 20 78

Type: [X] Cable Tool [X] Rotary [ ] Dug [ ] Driven [ ] Jetted

Use: [X] Domestic [ ] Public [ ] Stock [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well

7 CASING: Threaded [X] Welded [ ] Height Above/Below Surface: 1

Diameter 4 in. to 164 ft. Depth; ft. Depth

8 SCREEN: Manufacturer's Name

Slot/Gauze ____ Diameter ____ Set between ____ ft. and ____ ft.

Filter pack: ____

9 STATIC WATER LEVEL 40 ft. below land surface

10 PUMPING LEVEL below land surface: 90 ft. after 2 hrs. pumping ____ g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: [ ] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [X] Yes [ ] No [ ] Not Applicable

[X] Neat Cement [ ] Bentonite [ ] Other

Depth: From 2 ft. to 5 ft.

Nearest Source of possible contamination: ____

[ ] Direction ____ [ ] Distance ____

Was grouting performed upon completion? [ ] Yes [ ] No

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	11	11
Clay	115	126
cemented gravel	12	138
clay	22	160
fine sand	1	161
gravel	4	165

14 Remarks: Elevation, source of data, etc.

15 CERTIFICATION: This water well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. Kind of Pump: ____ Date Water Well Was Completed: Nov 20 78

Contractor's License No. 1063

Signature of Driller: ____

WATER WELL RECORD

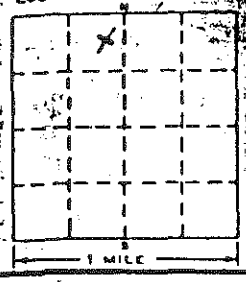
LOCATION OF WELL

County: [illegible]

Distance And Direction [illegible]

Street address & City of Well Location: 4827 Gratiot [illegible]

Locate with "X" in section below



Section Number

OWNER OF WELL: [illegible]

4827 Gratiot [illegible]

WELL DEPTH: (completed) Date of Completion: 137 ft. Nov [illegible]

☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Jetted ☐ Bored

☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well

CASING: Threaded ☒ Welded ☐ Height Above/Below

134 ft. Depth

ft. Depth

Set between 132 ft. and 137 ft.

STATIC WATER LEVEL: ft. below land surface

PUMPING LEVEL below land surface: ft. after hrs. pumping

WATER QUALITY in Parts Per Million: Chlorides (Cl) Hardness Other

WELLHEAD COMPLETION: ☒ Pitless Adapter ☐ 12 Above Grade

Well Disinfected? ☒ Yes ☐ No

FORMATION		
Sand		
Clay	129	130
Sand	7	[illegible]

USE A 2ND SHEET IF NEEDED

Remarks: elevation, source of data, etc.

Well Drilling

100M

WATER WELL RECORD

LOCATION OF WELL

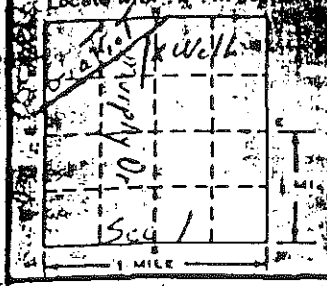
County: St [illegible]

Distance And Direction from [illegible]

[illegible] Murphy [illegible]

Street address & City of Well Location [illegible]

Locate with "X" in section below



FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	[illegible]	[illegible]
Clay	12	12
Sand	6	[illegible]

Remarks: elevation, source of [illegible]

OWNER OF WELL

[illegible]

[illegible]

[illegible] Domestic [illegible]

[illegible] Irrigation [illegible]

[illegible] Test Well [illegible]

CASING: Threaded [illegible]

[illegible] ft. Depth [illegible]

[illegible] Depth [illegible]

SCREEN

[illegible] 10 [illegible]

Set between 12 ft. and [illegible]

Fittings [illegible]

9 STATIC WATER LEVEL

[illegible] ft. below land surface

10 PUMPING LEVEL below land surface

[illegible] ft. after 2 hrs. pumping [illegible]

[illegible] ft. after ___ hrs. pumping [illegible]

11 WATER QUALITY in Parts Per Million

Iron (Fe) [illegible] Chlorides (Cl) [illegible]

Hardness [illegible] Other [illegible]

12 WELL HEAD COMPLETION: [illegible] Approved [illegible]

[illegible] Pitless Adapter [illegible] 12" Above Grade

[illegible] Grouted? [illegible] Yes [illegible] No

[illegible] Cement [illegible] Bentonite [illegible]

Depth From [illegible] ft.

[illegible]

[illegible]

[illegible]

[illegible]

WATER WELL RECORD

MICHIGAN DEPARTMENT

LOCATION OF WELL

County: St. Clair | Township Name: St. Clair | Section Number: 13 | Range Number: 16

Distance And Direction from Road Intersection: 800 Ft. [illegible] Davis Road

1025 Allen Rd. St. Clair, Mich.

Street address & City of Well Location

Locate with "X" in section below

Sketch Map: Davis Rd

1 MI.

1 MILE

OWNER OF WELL: Day [illegible]

1025 Allen Rd. St. Clair, Mich.

4 WELL DEPTH (completed) 113 ft. Date of Completion May 17 [illegible]

5 [X] Cable tool [X] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Height Above Below Surface [illegible]

Diam. 4 in. to 110 ft. Depth; Weight 11 lbs./ft.

in. to ft. Depth; Drive Shoe Yes [ ] No [ ]

8 SCREEN: Type Stainless; Slot/Gauge 14; Length 4'; Set between 109 ft. and 113 ft.

Fittings 3

9 STATIC WATER LEVEL 45 ft. below land surface

10 PUMPING LEVEL below land surface 45 ft. after 2 hrs. pumping 12 [illegible]

ft. after 1 hrs. pumping [illegible]

11 WATER QUALITY in Parts Per Million: Iron (Fe) [illegible] Chloride (Cl) [illegible] Hardness [illegible] Other [illegible]

12 WELL HEAD COMPLETION: [ ] Approved [X] Pitless Adapter [ ] [illegible]

13 Well Grouted? [X] Yes [ ] No [illegible]

[illegible] 40 [illegible]

[illegible]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	3'	3'
Clay	75'	75'
Fine Sand	8'	103'
Coarse Sand	10'	113'

Remarks: elevation, source of data, etc.

[illegible] Well Drilling [illegible]

[illegible] Mich.

[illegible]

LOCAL [illegible]

LOCATION OF WELL: East Clair | West Clair | Section No. 13

Distance And Direction from Road Intersections: 1/2 mi N of [illegible] on Range Road

OWNER No.

Street address & City of Well Location:

OWNER OF WELL: Glen J. [illegible]

Address: 1450 St. Clair [illegible]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Red yellow Clay	14	14
Blue Clay	65	79
Sandy Clay (gray)	23	102
Fine Sand & Sand	3	105
Hard stony Clay	42	147
Fine sand & Water	3	150
Coarse Sand & gravel	5	155

4 WELL DEPTH: (completed) 155 ft. Date of Completion: Nov 8 1977

5 ☒ Cable tool ☐ Rotary (Air) ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well

7 CASING: Diam. 4 in. to 151 ft. Depth; Threaded ☒ Welded ☐; Height Above/Below surface 6 ft.; Weight 12 lbs/ft.; Drive Shoe? Yes ☒ No ☐; ___ in. to ___ ft. Depth

8 SCREEN: Type: Johnson; Diam. 4 in.; Slot/Gauge 25 slot; Length 4 ft.; Set between 151 ft. and 155 ft.; Fittings: 18" nipple & [illegible]

9 STATIC WATER LEVEL: 45 ft. below land surface

10 PUMPING LEVEL below land surface: 80 ft. after 12 hrs. pumping 10 g.p.m.; 80 ft. after 24 hrs. pumping 10 g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ✓; Chloride (Cl) ✓; Hardness ✓

12 WELL HEAD COMPLETION: ☐ Pitless Adapter ☒ Pitless Adapter ☐ Pitless Unit ☐ None

13 GROUTING: Was grouted? ☐ Yes ☒ No; Material: ☐ Neat Cement ☐ ___; Depth: From ___ ft. to ___ ft.

14 SANITARY: Nearest Source of Possible Contamination: [illegible]; Well Disinfected upon completion? [illegible]

15 PUMP: [illegible]; Manufacturer's Name: [illegible]; Model Number: [illegible]; Length of Drop Pipe: 74 ft.; Capacity: [illegible] g.p.m.; Type: ☒ Submersible ☐ [illegible] ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.:

17 WATER WELL CONTRACTOR'S CERTIFICATION: This record is true to the best of my knowledge and belief. Licensed water well contractor's signature: [illegible]

Licensed water well contractor's name or business name: [illegible]

Date: [illegible]

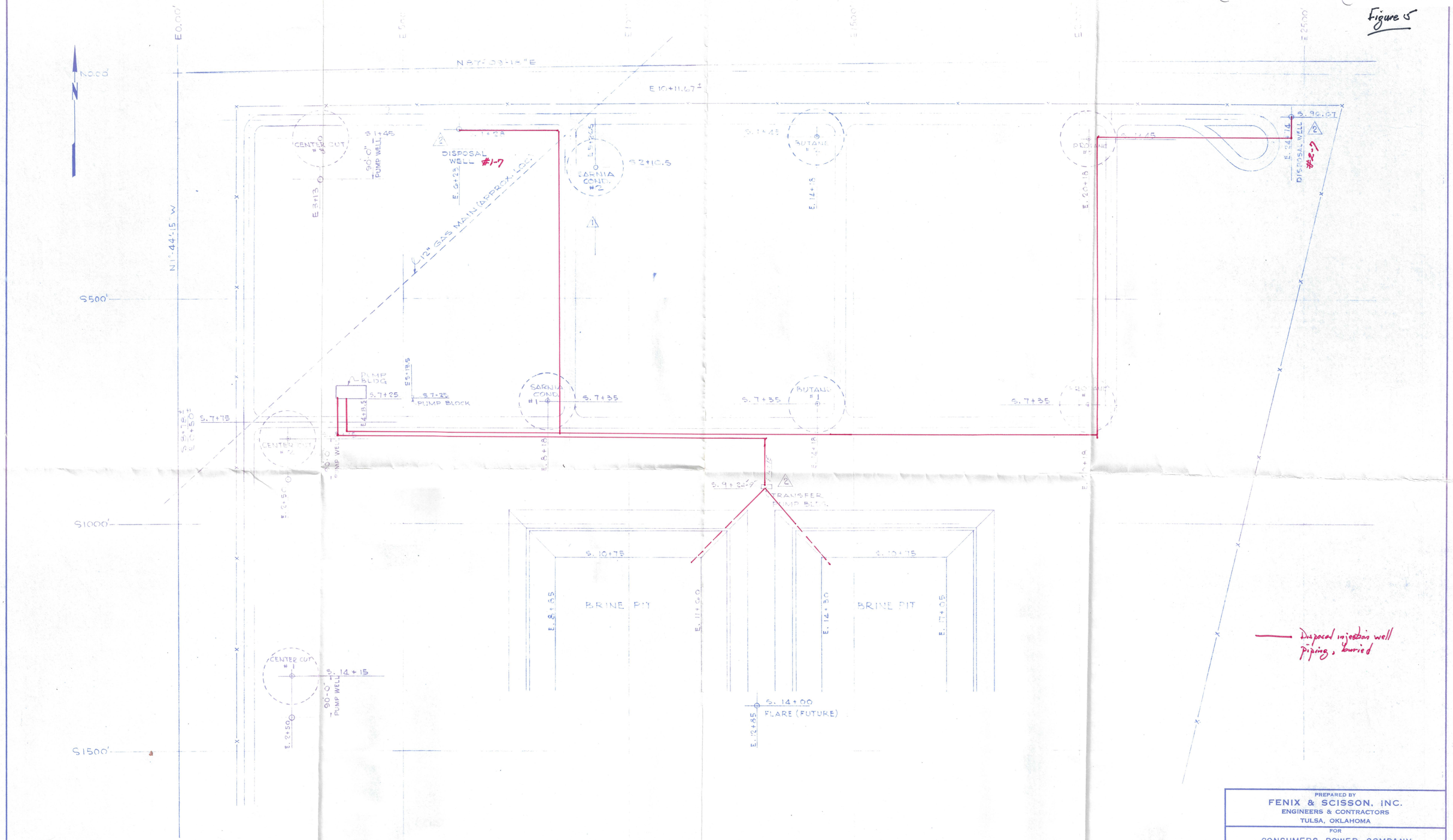
RECEIVED ENGINEERING DIVISION

D-670 10044 6-66

LOCAL HEALTH DEPT. COPY

PA ID No. MID 065 571 077

Figure 5



AS-BUILT

REV. NO	DATE	DESCRIPTION	BY
3	4-12-72	AS BUILT	C.C.
2	9-14-71	ADDED TRANSF. PUMP BLDG - ADDED CO-ORD. RELOCATED DISP. WELLS	R.G.
1	9-2-71	RELOCATED SARNIA COND. #2	R.G.

PREPARED BY
FENIX & SCISSON, INC.
ENGINEERS & CONTRACTORS
TULSA, OKLAHOMA

FOR
CONSUMERS POWER COMPANY
MARYSVILLE MICHIGAN

PLOT PLAN

DRAWN	DATE	JOB NO.
JACK DAY	JULY, 1971	200
CHECKED	SCALE	DRAWING NO.
KERMIT ALLEN	1" = 100'	200-3-1

24X36 PRINTED ON RIDGWAY'S NO. 1000-H

FIGURE 6 (a&b)

Maps and Cross Sections of USDW's

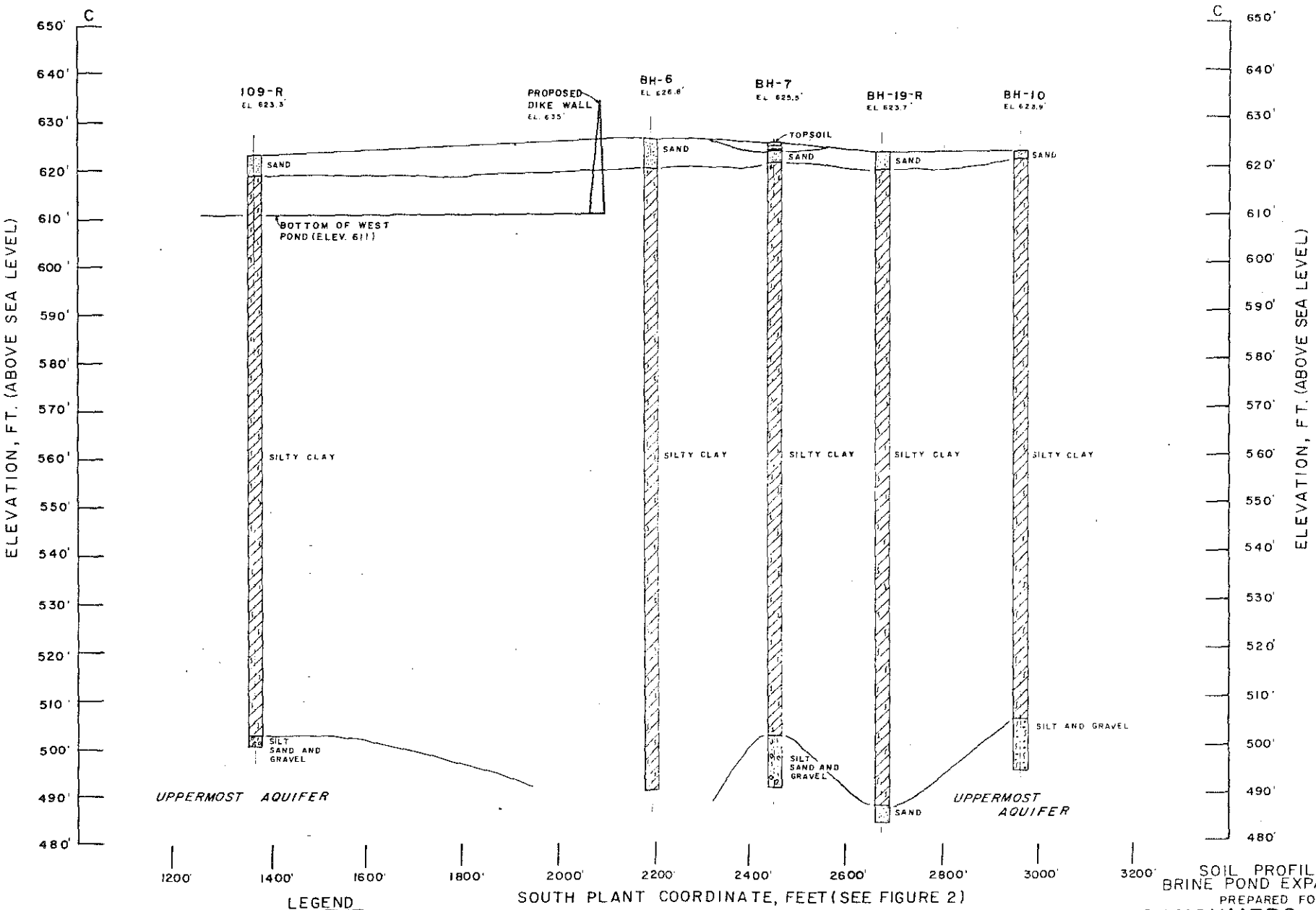
FIGURE 6

D. Maps and Cross Sections of USDW's

The uppermost aquifer at this site is located approximately 125-140 feet below the surface (Figure 6a). The vertical limits of the aquifer range from 77 to 168 feet below ground surface. This uppermost aquifer is an artesian aquifer with a piezometric level varying from 40 to 50 feet below ground surface. Injections are made into the Cambrian formation at a depth of 4800 feet (Figure 6b).

There are 37 recorded private domestic water wells in the vicinity of the Marysville Plant (Figure 4). The static water levels in the domestic supply wells in the uppermost aquifer indicate that ground water flows from south to north.

Figure 6a



LEGEND

- TOPSOIL
- CLAY
- SAND
- GRAVEL
- SILT

HORIZONTAL SCALE 100 0 100

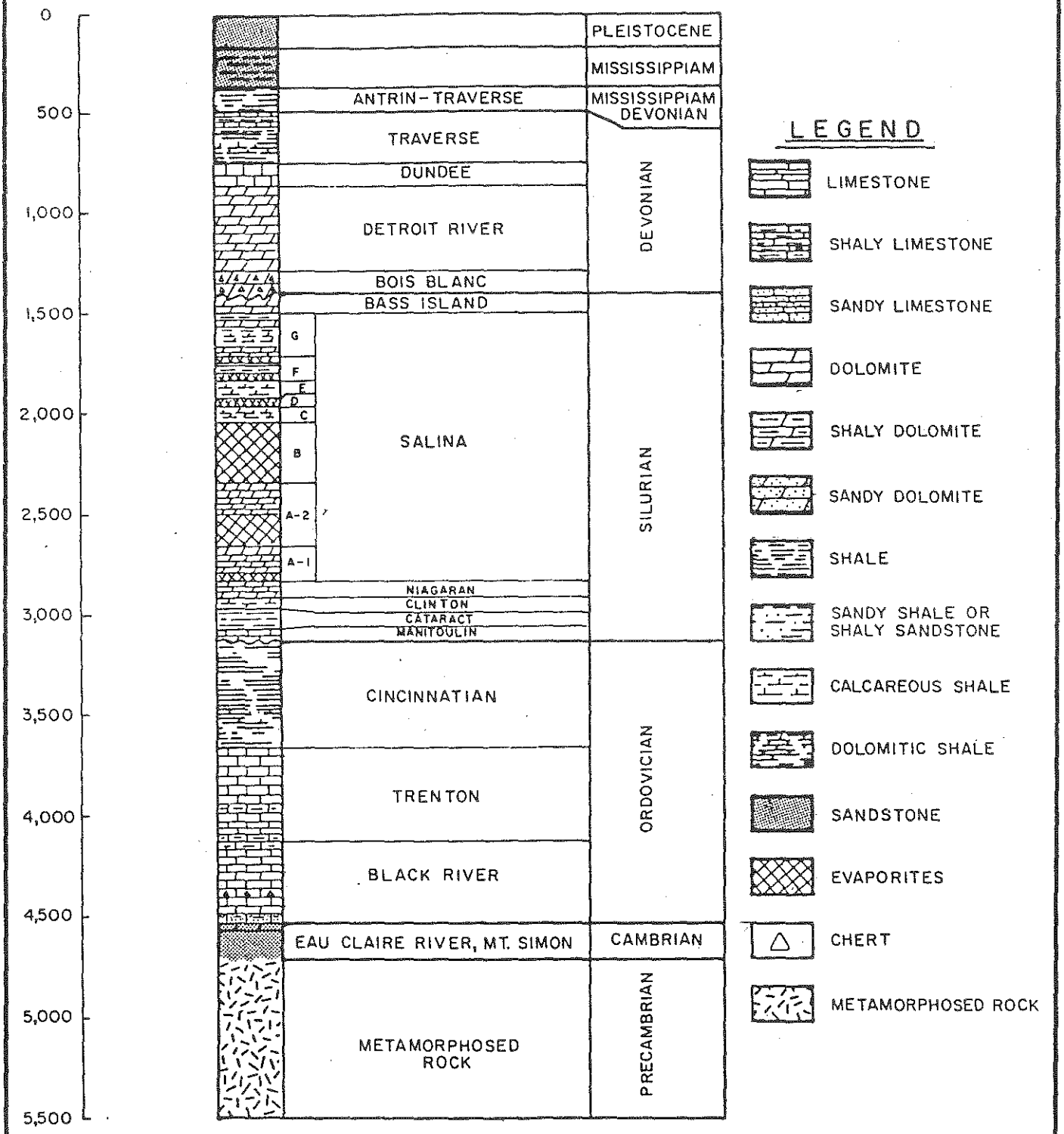
VERTICAL SCALE 10 0 10

SOIL PROFILE C-C
BRINE POND EXPANSION
PREPARED FOR
CONSUMERS POWER COMPANY

Camonie Engineers

DATE 3-6-84 | Figure 6a | DRAWING NUMBER

FIGURE 6b



PREPARED BY	FOR
FENIX & SCISSON, INC. ENGINEERS & CONTRACTORS TULSA, OKLAHOMA	CONSUMERS POWER COMPANY JACKSON, MICHIGAN

COLUMNAR GEOLOGICAL SECTION				JOB NO. 192
DRAWN A. G. JR.	CHECKED K. ALLEN	DATE MAY, 1971	SCALE AS NOTED	DRAWING NO. 3

FIGURE 7 (a-c)

Geologic Structure of the Area

FIGURE 7

F. Geologic Structure of the Area, Maps and Cross Sections

The unconsolidated deposits at the site consist of glacio-lacustrine soils deposited during the Wisconsinan stage of the Pleistocene glaciation. The deposits consist of three distinctly different soil groups. The stratigraphy of the soils at the site vicinity is shown in Figure 7a. The locations of the perpendicular cross sections is shown on Figure 7b.

The surface topography, Figure 7c, consists of a series of nearly parallel northeast to southwest trending sand bars. The bars consist of fine-grained sand, occasionally mixed with organic matter. The thickness of sand varies from less than 1 foot to as much as 13 feet with an average thickness of approximately 4 feet.

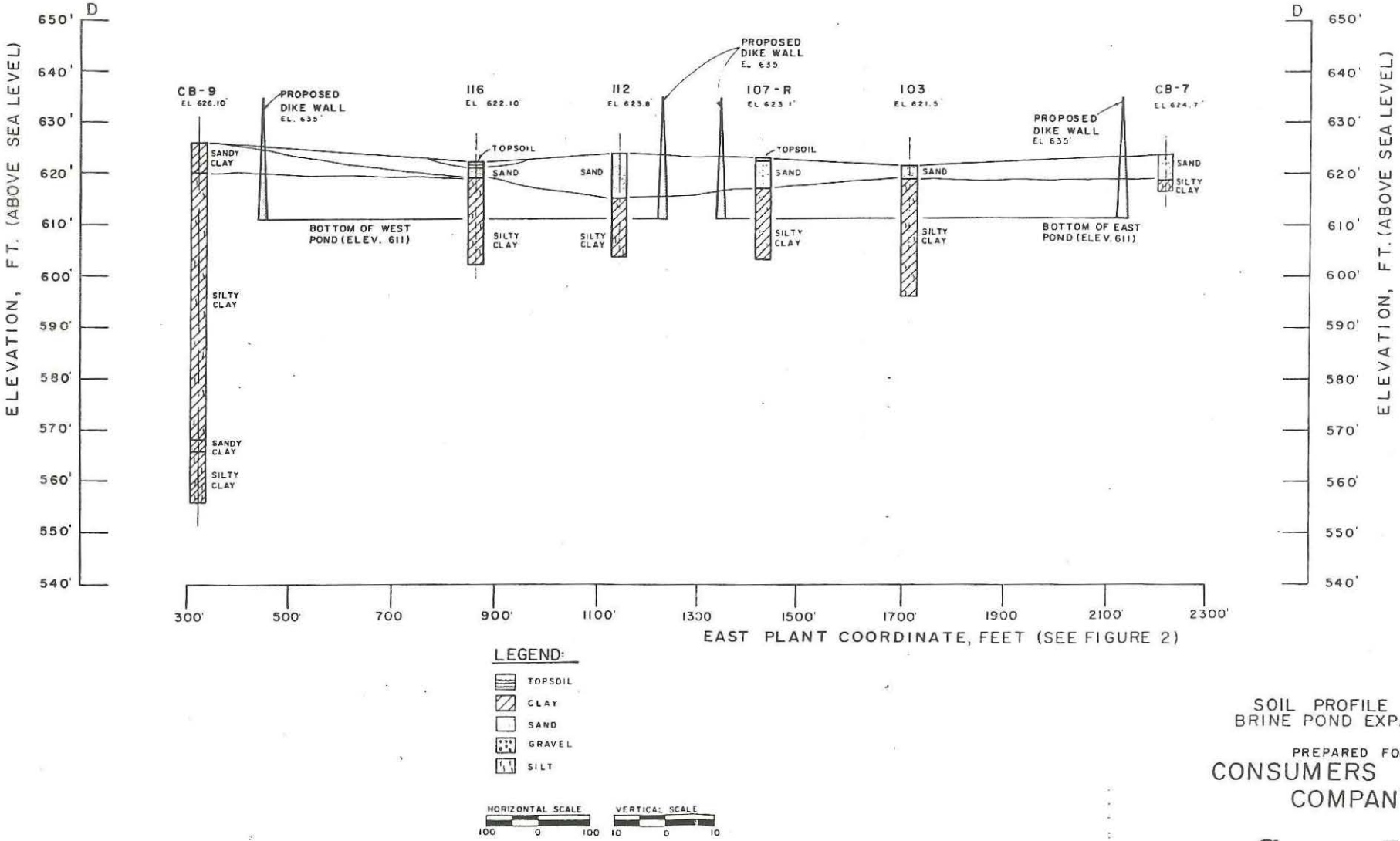
The deposit immediately below the surficial sand is an impermeable silty clay which is very stiff near the clay-sand interface and becomes softer with depth. The clay deposit varies in thickness from approximately 125 feet to 140 feet at the site. The upper 15 to 20 feet is grayish-brown from desiccation and is characterized by low water content, high strength, and low compressibility.

An accumulation of perched ground water within the surficial sand overlying the silty clay is due to the impervious nature of the clay. Information obtained from the monitoring wells installed by Canonie in December 1983 indicates that the perched water flows from the northwest portion of the site to the southeast. The top of the clay contours shown on Figure also indicate that the perched ground water will flow from the northwest to the southeast.

The third deposit, which is at a depth of 125 feet to 140 feet, is a glacial outwash composed primarily of silt, sand, and gravel. The outwash is the "uppermost aquifer" in the area of the site. Private domestic water wells in the Marysville area are all located in this "uppermost aquifer".

The Hydrogeologic Atlas of Michigan reports the bedrock surface at a depth of approximately 450 feet. The bedrock is a shale formation and is not a water-producing stratum (Figure 6b).

Figure 7a



LEGEND:

- TOPSOIL
- CLAY
- SAND
- GRAVEL
- SILT

HORIZONTAL SCALE 100 0 100

VERTICAL SCALE 10 0 10

SOIL PROFILE D-D
BRINE POND EXPANSION

PREPARED FOR
CONSUMERS POWER COMPANY

Canonie Engineers

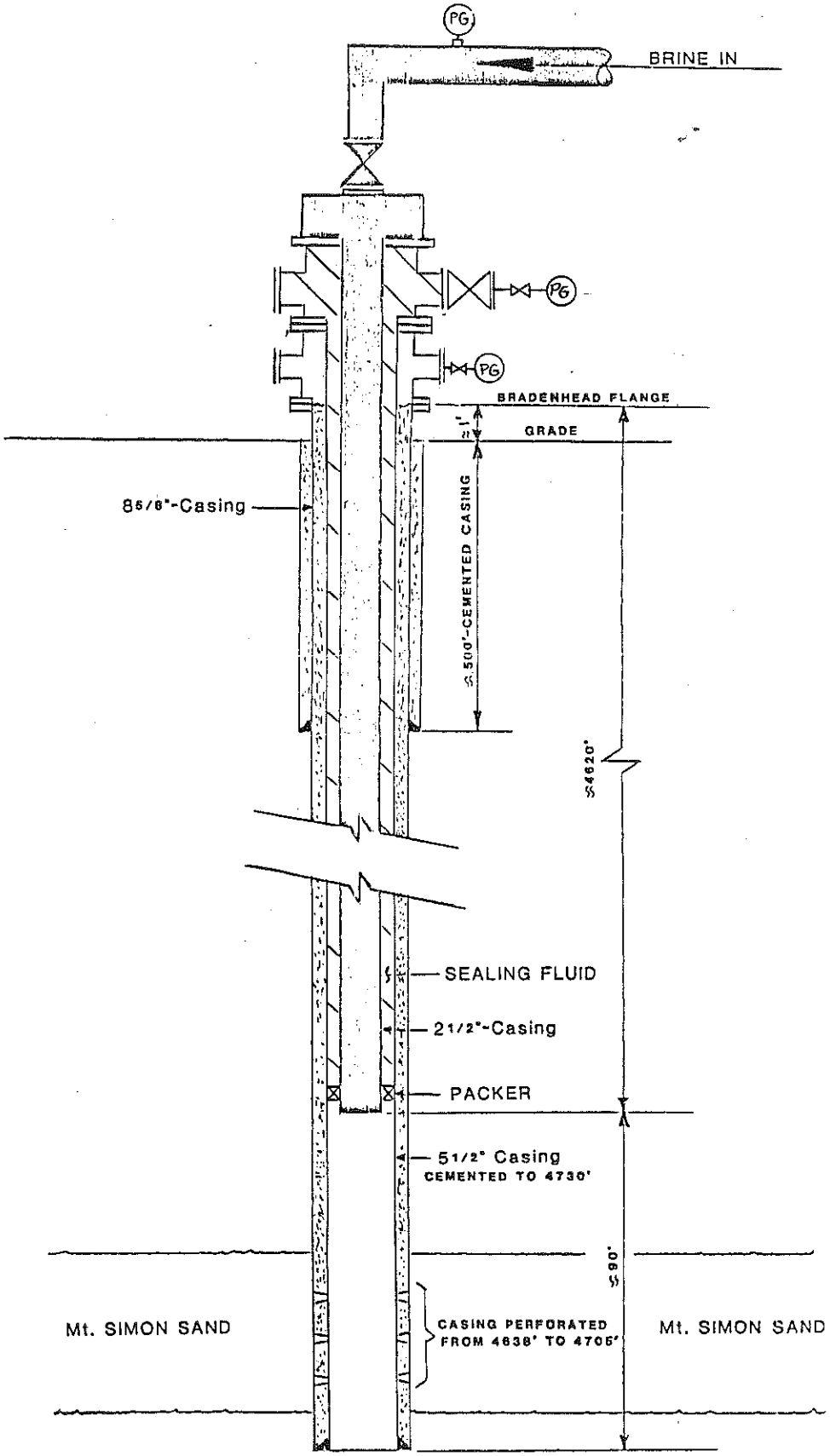
DATE 3-5-84	FIGURE 7a	DRAWING NUMBER
SCALE AS SHOWN		83-177-E2

FIGURE 8

Brine Disposal Well Data

BRUNING 149440

TYPICAL MGRP BRINE DISPOSAL WELL



EST NO.

ENG. ____ DATE ____

DWG. DMR DATE 10-31-83

CHK. ____ DATE ____

APP. ____ DATE ____

W. O. NO.

TYPICAL BRINE
DISPOSAL WELL
FLOW DIAGRAM

CONSUMERS POWER CO.

MARYSVILLE GAS REFORMING PLANT

SCALE ____

NO. ____

Figure 12 b

CONSUMERS POWER GAS REFORMING PLANT

MARYSVILLE MICHIGAN

BRINE DISPOSAL LOG SHEET - OUTSIDE

DATE			
SHIFT			
OPER.			
SUPV.			

		BD #1-7 (~~EAST~~ West)					BD #2-7 (~~WEST~~ East)							
	DESCRIPTION	BRINE INJECTION PRESSURE-PSIG	SEALING FLUID ANNULUS -PSIG	CASING ANNULUS PSIG			BRINE INJECTION PRESSURE-PSIG	SEALING FLUID ANNULUS -PSIG	CASING ANNULUS PSIG			BRINE FLOW TO PUMPS-GPM	PUMP DISCHARGE PRESSURE-PSIG	COMMENTS
TIME	INST NO.											FR 7201	PR 7201	
0000														
0200														
0400														
0600														
0800														
1000														
1200														
1400														
1600														
1800														
2000														
2200														

Table 2.0-1 - Analytical Results of Gas Plant Brine Water Analyses Conducted in June 1985

Parameter	Units	Brine Disposal Wells				
		Marysville	Overisel (0-142)	Salem (Goodman)	St Clair (BD-139)	St Clair (Smith "E")
pH	SU	7.1	5.6	5.1	5.6	5.6
Diluted Specific Conductance (1000:1)	µmho/cm at 25°C	630	750	750	670	750
Diluted Specific Resistance (1000:1)	ohm-cm @ 25°C	1,587	1,333	1,333	1,493	1,333
Specific Gravity @ 22°C	-	1.194	1.229	1.227	1.210	1.228
Bicarbonate	mg/L as $CaCO^3$	40	80	70	22	25
Total Hardness	mg/L as $CaCO^3$	4,267	160,800	160,800	142,800	151,900
Ammonia - N	mg/L as N	0.9	308	291	233	275
Chloride, Cl	mg/L	188,594	210,431	211,424	186,609	191,572
Sulfate, SO^4	mg/L	3,505	190	183	134	149
Filterable Residue (TDS @ 180°C)	mg/L	296,560	325,830	327,170	296,170	325,570
Nonfilterable Residue (TSS @ 103-105°C)	mg/L	720	824	556	618	810
Sulfide, S	mg/L	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
Dissolved Barium, Ba	mg/L	< 21	< 21	< 21	< 21	< 21
Dissolved Calcium, Ca	mg/L	1,610	43,000	43,000	44,000	46,000

Figure 15

EPA ID No. MID 065 571 077

Form Appr

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

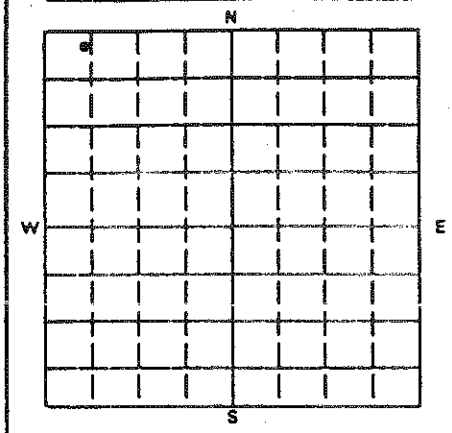
EPA

PLUGGING AND ABANDONMENT PLAN

NAME AND ADDRESS OF FACILITY
Consumers Power Co., Gas Reforming Plant
2510 Busha Highway
Marysville, MI 48040

NAME AND ADDRESS OF OWNER/OPERATOR
Consumers Power Co.
212 W. Michigan Ave.
Jackson, MI 49201

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MI	St. Clair	BD-151 (Mich.)

SURFACE LOCATION DESCRIPTION
NW ¼ OF NW ¼ OF NW ¼ SECTION 7 TOWNSHIP 5N RANGE 17E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location 140 ft. from (N/S) N Line of quarter section
and 623 ft. from (E/W) W Line of quarter section

TYPE OF AUTHORIZATION
- [x] Individual Permit
- [ ] Area Permit
- [ ] Rule

Number of Wells 1

Lease Name N/A

WELL ACTIVITY
- [x] CLASS I
- [ ] CLASS II
  - [ ] Brine Disposal
  - [ ] Enhanced Recovery
  - [ ] Hydrocarbon Storage
- [ ] CLASS III

Well Number 1-7 BDW

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT(LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
5-1/2"	15		4731	
8-5/8"	32		500	already
				cement filled

METHOD OF EMPLACEMENT OF CEMENT PLUGS
- [ ] The Balance Method
- [ ] The Dump Bailer Method
- [ ] The Two-Plug Method
- [ ] Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	5-1/2	5-1/2	5-1/2	5-1/2	500		
Depth to Bottom of Tubing or Drill Pipe (ft.)	4638	4633	4383	500	10		
Sacks of Cement To Be Used (each plug)		29		56			
Slurry Volume To Be Pumped (cu. ft.)		34		66			
Calculated Top of Plug (ft.) (Bridge Plug-Cast Iron)	4633	4383	500	10			
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)		15.6	15.6	15.6			
Type Cement or Other Material (Class III)		Class A	Sat. Brine Class A				

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED *(If any)*

From	To	From	To

Estimated Cost to Plug Wells Pull 2-1/2" tubing and packer. Set bridge plug just above perforations. Fill casing with 250' cement. Fill with brine to 500'. Fill casing with 490' cement. Cut and cap 5-1/2" and 8-5/8" casing 3' below ground level. Estimated cost: $27,000

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE *(Please type or print)*	SIGNATURE	DATE SIGNED
D E Lutz, General Superintendent	D E Lutz	5-23-85

EPA Form 7520-14 (3-84)

Figure 15

Form App

UNITED STATES ENVIRONMENTAL PROTECTION AGE
WASHINGTON, DC 20460

EPA ID No. MID 065 571 077

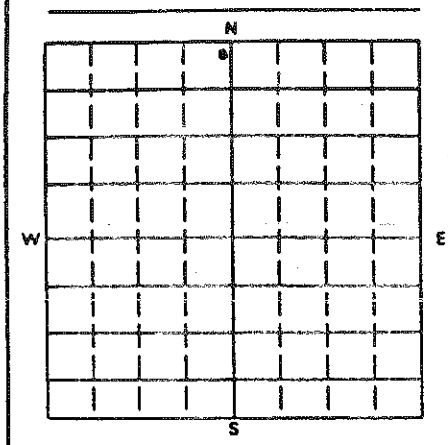
EPA

PLUGGING AND ABANDONMENT PLAN

NAME AND ADDRESS OF FACILITY
Consumers Power Co., Gas Reforming Plant
2510 Busha Highway
Marysville, MI 48040

NAME AND ADDRESS OF OWNER/OPERATOR
Consumers Power Co.
212 W. Michigan Ave.
Jackson, MI 49201

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MI	St. Clair	BD-152 (Mich.)

SURFACE LOCATION DESCRIPTION
NE ¼ OF NE ¼ OF NW ¼ SECTION 7 TOWNSHIP 5N RANGE 17E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location 140 ft. from (N/S) N Line of quarter section
and 2473 ft. from (E/W) W Line of quarter section

TYPE OF AUTHORIZATION
- [X] Individual Permit
- [ ] Area Permit
- [ ] Rule

Number of Wells 1

Lease Name N/A

WELL ACTIVITY
- [X] CLASS I
- [ ] CLASS II
  - [ ] Brine Disposal
  - [ ] Enhanced Recovery
  - [ ] Hydrocarbon Storage
- [ ] CLASS III

Well Number 2-7 BDW

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT(LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
5-1/2"	15		4693	
8-5/8"	32		507	already
				cement filled

METHOD OF EMPLACEMENT OF CEMENT PLUGS
- [X] The Balance Method
- [ ] The Dump Bailer Method
- [ ] The Two-Plug Method
- [ ] Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	5-1/2	5-1/2	5-1/2	5-1/2			
Depth to Bottom of Tubing or Drill Pipe (ft.)	4617	4612	4362	500			
Sacks of Cement To Be Used (each plug)		29		56			
Slurry Volume To Be Pumped (cu. ft.)		34		66			
Calculated Top of Plug (ft.)	(Bridge Plug-Cast Iron) 4612	4362	500	10			
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)		15.6		15.6			
Type Cement or Other Material (Class III)		Class A	SatBrin	Class A			

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED *(If any)*

From	To	From	To

Estimated Cost to Plug Wells

Pull 2-1/2" tubing and packer. Set bridge plug just above perforations. Fill casing with 250' cement. Fill with brine to 500'. Fill casing with 490' cement. Cut and cap 5-1/2" and 8-5/8" casings 3' below ground level. Estimated cost: $27,000

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE *(Please type or print)*	SIGNATURE	DATE SIGNED
D E Lutz, General Superintendent	D E Lutz	5-23-85

EPA Form 7520-14 (2-84)

FORM NO. 722 - REV.8-61

OIL CENTER TOOL DIVISION

FMC CORPORATION

CHRISTMAS TREE PARTS LIST

8-10-71

Figure 9
p.2

CONSUMERS POWER COMPANY
MICHIGAN

X-3363-D-REV. 2

8-5/8" X 5-1/2" X 2-7/8"

TREE NO. SIZE WORKING PRESSURE 2000#

ITEM	PART NO.	QUAN.	DESCRIPTION	UNIT PRICE	TO
1	13-112-252	1	Casing Head, Type C-22, 8-5/8" O.D. 8RF Female Btm. x 8" 2000#WP Flanged Top W/ Two 2" 2000#WP Flanged Outlets W/ V.R. Threads		
2	25-410-307	1	Plug, Type V.R., 1-1/2" Complete W/ Inner Check Valve		
3	61-549-	1	Protector Flange F/ 2" 2000#WP Flanged Connection (Pt. #523325 Nat'l.)		
	78-010-039	4	(1/2 Set) Studs & Nuts, Blk., 5/8" x 4-1/2"	.93	
4	26-100-203	1	Flange, Blind, 2" 2000#WP		
	73-010-023	1	Ring Gasket, API Metal, R-23		
	78-010-039	8	(1 Set) Studs & Nuts, Blk., 5/8" x 4-1/2"	.93	
	12-090-320	1	Casing Hanger, Type C-21-F, 8" x 5-1/2"		
	73-010-049	1	Ring Gasket, API Metal, R-49		
	78-010-435	12	(1 Set) Studs & Nuts, Blk., 1-1/8" x 8"	2.66	

FIGURE 9 (A-E)

A. Casing Collar Log & Perforating Record
B. Cement Bond Log
C. Bore Compensated Sonic Log - Gamma Ray
D. Gamma Ray - Neutron
E. Laterolog - Gamma Ray - Neutron

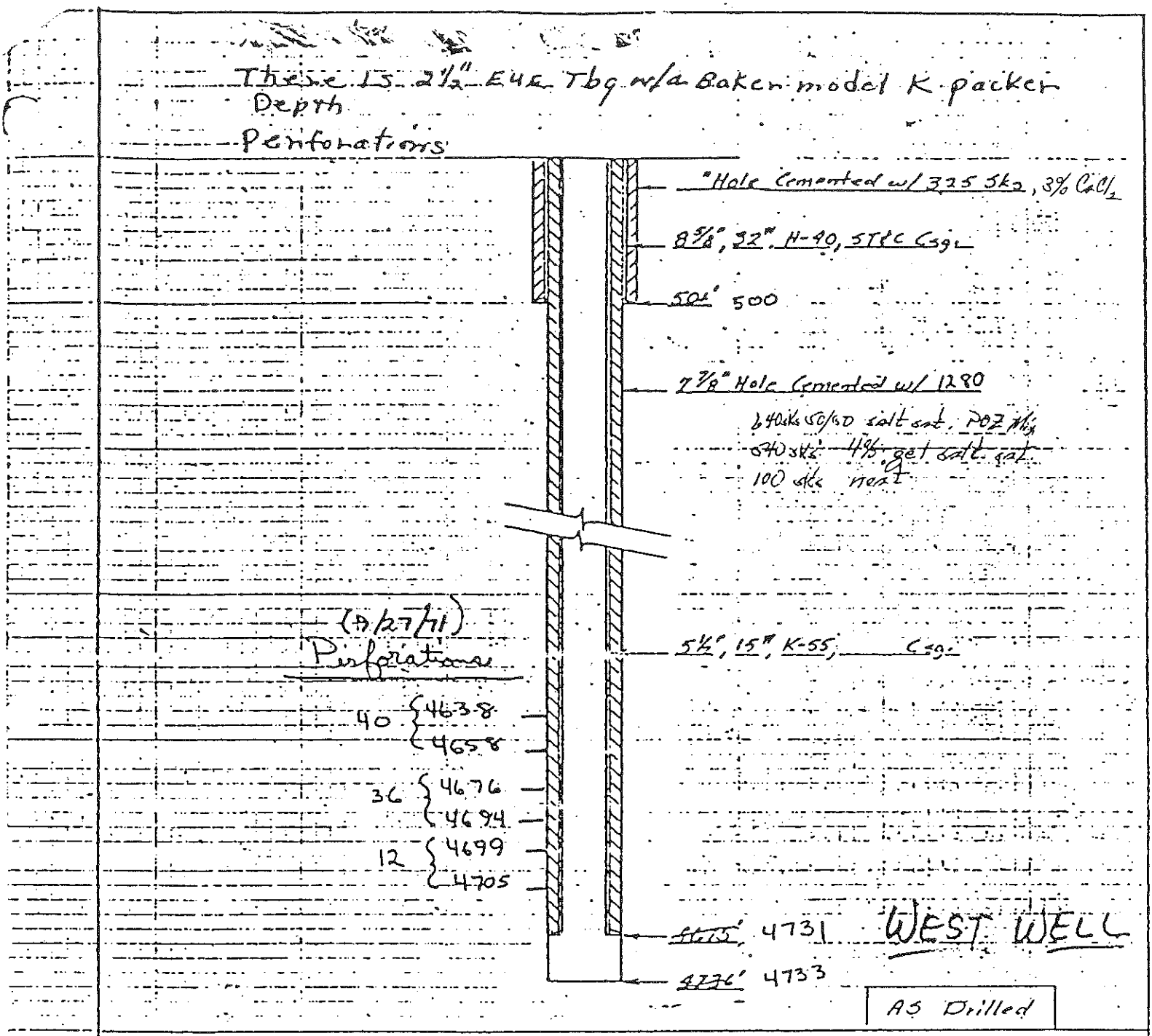
(located at back of packet - 11x14½ Sheets)

FIGURE 10

Well Cross Section, Perforations and Cementing Record

FIGURE 10

EPA ID No. MID 065 571 077



Consumers Power Company No. 1-7 Brine Disposal Well
All Measurements from Kelly Bushing at 637' Above Sea Level
Ground Level at 620' A.S.L. 624.5
Located 140' from North Line and 623' from West Line
N.W. Quarter, Sec. 7, Twp 5N., Range 17E.
Drilled by Calvert Eastern Drilling Co.
Begun 7/13/71 Completed 7/29/71 (Drilling)
Well Completed 8/29/71

FIGURE 8

EPA ID No. MID 065 571 077

CONSUMERS POWER COMPANY
MARYSVILLE GAS REFORMING PLANT

BRINE DISPOSAL WELL DATA

CPCo Disposal Well Number :	1-7 BDW	2-7 BDW
State Disposal Well Number:	BD-151	BD-152
Injection Casing -		
Size	5-1/2"	5-1/2"
Amount	4,731'	4,693'
Injection Tubing -		
Size	2-1/2"	2-1/2"
Amount	4,620'	4,585'
Type	EUE	EUE
Date Ran	September 1971	May 1985 (Note 1)
Packer -		
Depth Set	4,620'	4,585'
Type	Baker Model R	Baker Model AL-2 Lok-Set with Model F Seating Nipple
Date Ran	October 2, 1971 (approx)	May 9, 1985
Annulus Filling Fluid	Water w/Dow Corban	Water w/Dow Corban
Disposal -		
Average Rates (Note 2)	1,012 BPD	862 BPD
Maximum Rates	2,436 BPD	2,075 BPD
Pressure (Note 3)	1100-1850 psig	1100-1850 psig
Surface Facilities	2 - Brine Disposal Pumps, FWI Model #HP-160M, with 150 HP belt drive, electric motors. Pump GA-7024A capacity is 106 gpm; pump GA-7024B capacity is 66 gpm @ 2000 psig.	
	2 - Surface brine ponds (lined), each approximately 33,500,000 gal storage capacity. Primarily used for process operations, not for disposal.	

Note 1 - Packer was replaced which necessitated removal of tubing. The same tubing was reinstalled except for a few stringers which were "gouged" by the pulling. Tubing was inspected and found to be in excellent condition.

Note 2 - Disposal operations are intermittent and variable. Reports are submitted to the Michigan Department of Natural Resources whenever brine disposal is done.

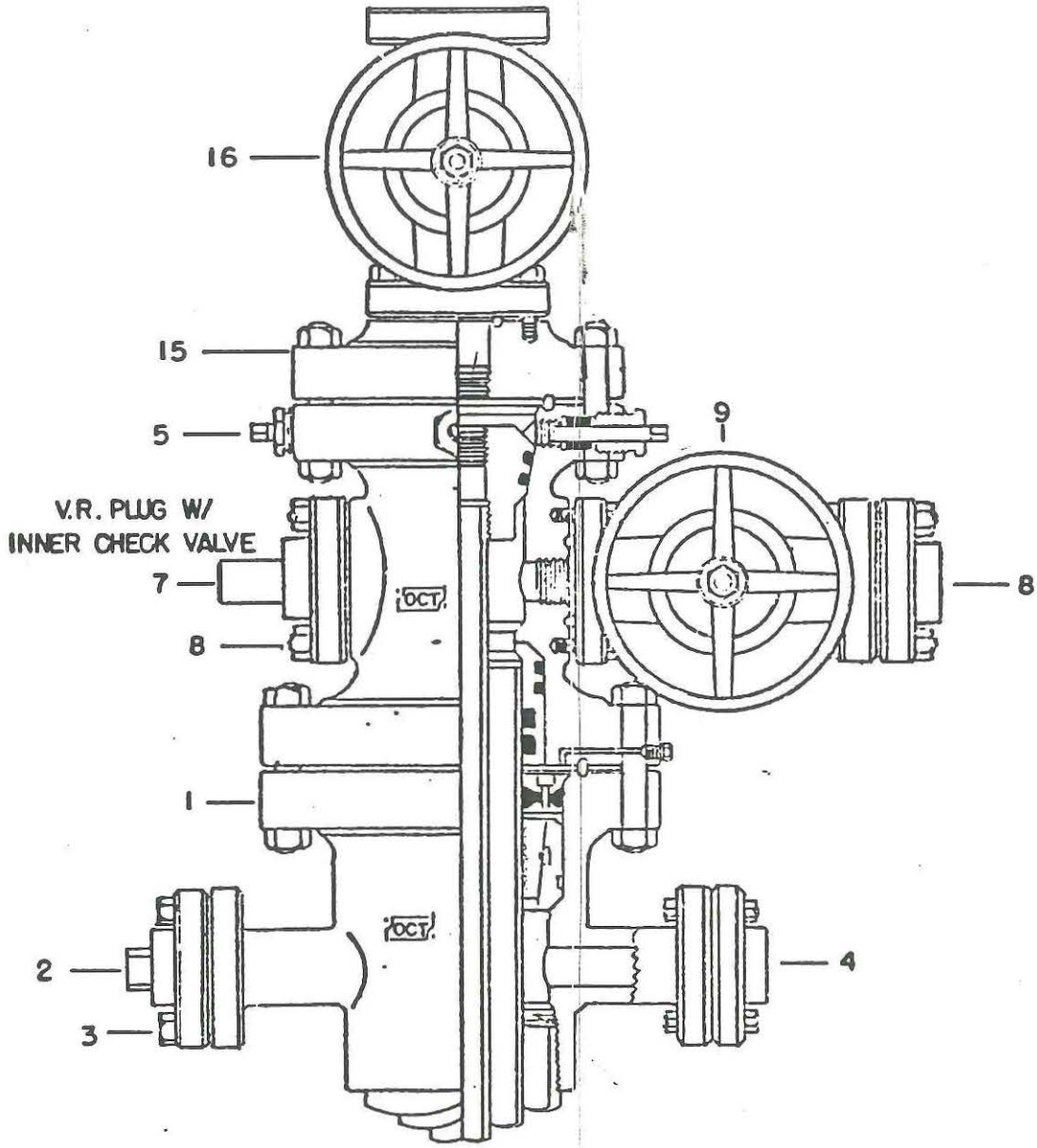
Note 3 - The initial disposal pressure is typically 1100 psig and may increase to as much as 1850 psig during the disposal operation.

FIGURE 11

Disposal Well Casing Head Drawing and Description

Figure 11

EPA ID No. MID 065 571 077



Two Disposal Wells (#1-7 & #2-7)

X-3363-D-REV. 2			PROPERTY OF OIL CENTER TOOL DIVISION FMC CORP.		
PART NO.	SCALE	PATTERN NO.	DATE 9-22-71	SIZE	FILE NO.
CONSUMER POWER COMPANY			DRN BY CPM CKD BY APPRVD.		DWG. NO.

FIGURE 12

Monitoring Program, Forms and Annual Monitoring Report

FIGURE 12a

CONSUMERS POWER COMPANY
GAS REFORMING PLANT
MARYSVILLE, MICHIGAN

Monitoring Program for Class I, Type I Brine Injection Wells

Injection of brine is monitored by plant operator personnel. Injection pressure is continuously recorded during operation. Injection pressure, sealing fluid annulus pressure, and casing annulus are monitored every two hours during injection.

Operators "make rounds" every two hours on a 24-hour shift schedule to visually check proper operation. A written log (Figure 12b) is produced daily.

The injected brine is excess brine for the surface brine storage ponds at the site.

Figure 12b

CONSUMERS POWER GAS REFORMING PLANT

MARYSVILLE MICHIGAN

BRINE DISPOSAL LOG SHEET - OUTSIDE

DATE			
SHIFT			
OPER.			
SUPV.			

		BD #1-7 (~~EAST~~ West)					BD #2-7 (~~WEST~~ East)							
	DESCRIPTION	BRINE INJECTION PRESSURE-PSIG	SEALING FLUID ANNULUS -PSIG	CASING ANNULUS PSIG			BRINE INJECTION PRESSURE-PSIG	SEALING FLUID ANNULUS -PSIG	CASING ANNULUS PSIG			BRINE FLOW TO PUMPS-GPM	PUMP DISCHARGE PRESSURE-PSIG	COMMENTS
TIME	INST NO.											FR 7201	PR 7201	
0000														
0200														
0400														
0600														
0800														
1000														
1200														
1400														
1600														
1800														
2000														
2200														

Figure 12c

Form Approved. OMB No. 2000-0042. Approval expires 9-30-86

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

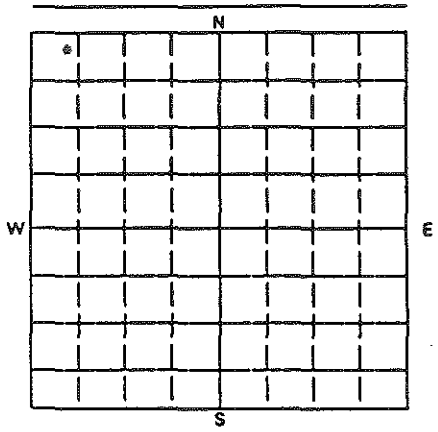
EPA

ANNUAL DISPOSAL/INJECTION WELL MONITORING REPORT

NAME AND ADDRESS OF EXISTING PERMITTEE
Consumers Power Company, Gas Reforming Plant
2510 Busha Highway
Marysville, MI 48040

NAME AND ADDRESS OF SURFACE OWNER
Consumers Power Company
212 W. Michigan Avenue
Jackson, MI 49201

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MI	St. Clair	BD-151 (Mich.)

SURFACE LOCATION DESCRIPTION
NW ¼ OF NW ¼ OF NW ¼ SECTION 7 TOWNSHIP 5N RANGE 17E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location 140 ft. from (N/S) N Line of quarter section
and 623 ft. from (E/W) W Line of quarter section

WELL ACTIVITY
- [x] Brine Disposal
- [ ] Enhanced Recovery
- [ ] Hydrocarbon Storage

TYPE OF PERMIT
- [x] Individual
- [ ] Area

Number of Wells 1

Lease Name N/A Well Number 1-7BDW

MONTH YEAR	INJECTION PRESSURE AVERAGE PSIG	INJECTION PRESSURE MAXIMUM PSIG	TOTAL VOLUME INJECTED BBL	TOTAL VOLUME INJECTED MCF	TUBING — CASING ANNULUS PRESSURE (OPTIONAL MONITORING) MINIMUM PSIG	TUBING — CASING ANNULUS PRESSURE (OPTIONAL MONITORING) MAXIMUM PSIG
May 1984			0			
June			0			
July			0			
August			0			
September			0			
October			0			
November			0			
December			0			
January 1985			0			
February			0			
March	1650	1790	30,451			
April	1700	1850	50,780			

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE (Please type or print)	SIGNATURE	DATE SIGNED
D. E. Lutz, General Superintendent	D. E. Lutz	5-23-85

EPA Form 7520-11 (2-84)

FIGURE 13

Brine Disposal Well Failure Plan

Figure 13

EPA ID No. MID 065 571 077

BRINE DISPOSAL WELL FAILURE PLAN

If the data recorded in daily monitoring during operation of the disposal well indicates that the well has "failed" or may be "failing", the following steps will be taken:

1. The brine disposal operation of the affected well shall be immediately stopped.

2. Assessment of possible causes will ensue:

   A. Casing hanger gasket leaks (?)

   B. Packer leaking(?)

   C. Pinhole corrosion in piping (?)

   D. Other

3. Inspection to determine causes will be done by plant personnel, supplemented by licensed well service consultants as necessary.

4. Determination will be made if "failure" has affected USDW.

5. The Environmental Department, CPCo, shall be contacted and informed of the problem. The Environmental Department will advise concerning Michigan DNR and USEPA requirements for notification, repair procedures and permits, if applicable.

6. Repairs shall be accomplished by plant Maintenance personnel, CPCo Well Service Group or a licensed well service contractor as appropriate.

7. After repairs are effected, testing of the well for integrity shall be validated by the Michigan DNR, Supervisor of Wells representative.

8. If abandonment is necessary, procedures shall be in accord with well permit "Abandonment Plans".

4-25-85

FIGURE 14

Mechanical Integrity Tests

Figure 14

ANNULAR PRESSURE TE

EPA ID No. MID 065 571 077

OPERATOR Consumers Power Co

ADDRESS 2510 Busha Highway

Marysville MI

WELL NAME BOW 1-7 TYPE 2D Class I Type I

LOCATION _____ QUARTER OF THE _____ QUARTER OF THE NW QUARTER

SECTION 7 TOWNSHIP 5N RANGE 17 E

COMPANY REPRESENTATIVE Chuck Overbeck

FIELD INSPECTOR Howard Novakowski

TYPE PRESSURE GUAGE 4" INCH FACE 400 PSI FULL SCALE

NEW GUAGE YES ☑ NO ☐

IF NO, DATE OF TEST CALIBRATION _____

CALIBRATION CERTIFICATION SUBMITTED YES ☐ NO ☐

RESULTS

TIME	PRESSURE (PSIG)
1:14	297
1:50	297

TEST PRESSURE

MAX. ALLOWABLE PRESSURE CHANGE

TEST PRESSURE X .03 300 X .03 = 9 PSI

HALF HOUR-PRESSURE CHANGE 0 PSI

TEST PASSED ☑ TEST FAILED ☐ (CHECK ONE)

IF PASSED, WELL IS AUTHORIZED TO INJECT UNDER CONDITION OF PERMIT OR SALE.

IF FAILED, NO INJECTION MAY OCCUR UNTIL CORRECTIONS HAVE BEEN MAKE AND WELL PASSES.

FIGURE 15

Plugging and Abandonment Plan

Figure 15

Form Appr.

EPA ID No. MID 065 571 077

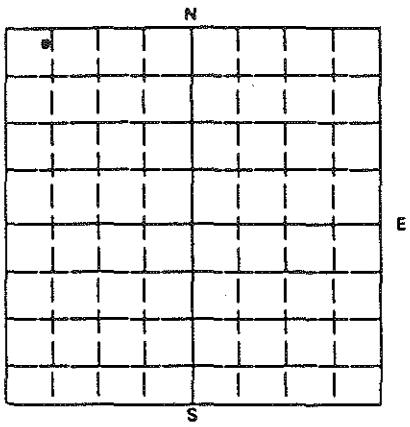
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

EPA

PLUGGING AND ABANDONMENT PLAN

NAME AND ADDRESS OF FACILITY	NAME AND ADDRESS OF OWNER/OPERATOR
Consumers Power Co., Gas Reforming Plant 2510 Busha Highway Marysville, MI 48040	Consumers Power Co. 212 W. Michigan Ave. Jackson, MI 49201

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MI	St. Clair	BD-151 (Mich.)

SURFACE LOCATION DESCRIPTION

NW ¼ OF NW ¼ OF NW ¼ SECTION 7 TOWNSHIP 5N RANGE 17E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location 140 ft. from (N/S) N Line of quarter section

and 623 ft. from (E/W) W Line of quarter section

TYPE OF AUTHORIZATION

- ☒ Individual Permit
- ☐ Area Permit
- ☐ Rule

Number of Wells 1

Lease Name N/A

WELL ACTIVITY

- ☒ CLASS I
- ☐ CLASS II
  - ☐ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☐ CLASS III

Well Number 1-7 BDW

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT(LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
5-1/2"	15		4731	
8-5/8"	32		500	already
				cement filled

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☐ The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two-Plug Method
- ☐ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	5-1/2	5-1/2	5-1/2				
Depth to Bottom of Tubing or Drill Pipe (ft.)	4620	4620	500				
Sacks of Cement To Be Used (each plug)		17	56				
Slurry Volume To Be Pumped (cu. ft.)		20	66				
Calculated Top of Plug (ft.)	(Bridge	4467	10				
Measured Top of Plug (if tagged ft.)	Plug,						
Slurry Wt. (Lb./Gal.)	Cast-	15.6	15.6				
Type Cement or Other Material (Class III)	Iron)	Class A	Class A				

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED *(If any)*

From	To	From	To

Estimated Cost to Plug Wells Pull 2-1/2" tubing and packer. Set bridge plug just above perforations. Fill casing with 150' cement. Fill with brine to 500'. Fill casing with 490' cement. Cut and cap 5-1/2" and 8-5/8" casing 3' below ground level. Estimated cost: $26,000

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE *(Please type or print)*	SIGNATURE	DATE SIGNED
D E Lutz, General Superintendent	D E Lutz	5-23-85

EPA Form 7520-14 (3-84)

FIGURE 16

Necessary Resources

PA ID No. MID 065 571 077

☐ Fireman's Fund Insurance Company
☒ The American Insurance Company
☐ National Surety Corporation
☐ Associated Indemnity Corporation
☐ American Automobile Insurance Company

CONTINUATION CERTIFICATE

PRODUCTION CODE	PREFIX	BOND NUMBER	CONTINUED FROM	TO
21 075 926	SL	342 21 64	July 11, 1984	July 11, 1987

ON BEHALF OF

Consumers Power Company

IN FAVOR OF

State of Michigan

TYPE OF BOND	DATED	AMT. OF BOND	PREMIUM
Surety License Bond	July 11, 1977	$ 50,000.00	$ 1,250.00

EXECUTED AT (CITY - STATE)	DATE
Detroit, Michigan	July 5, 1984

In consideration of an agreed premium payable in advance the Bond described above is hereby continued in force for the period indicated. Continuation is subject to the condition that the maximum aggregate liability of the Surety under the Bond and any and all continuations thereof shall in no event exceed the amount of liability shown herein. This certificate shall be valid only when executed by an attorney-in-fact of the Surety.

Detroit Branch Office
BRANCH OFFICE

Hall & Kennedy, Inc.
PRODUCER OR AGENT

The American Insurance Company
SURETY

BY Mary N. Burge
Mary N. Burge
ATTORNEY-IN-FACT

360156-3-71

FIGURE 16

GENERAL
POWER OF
ATTORNEY

THE AMERICAN INSURANCE COMPANY

KNOW ALL MEN BY THESE PRESENTS: That THE AMERICAN INSURANCE COMPANY, a Corporation duly organized and existing under the laws of the State of New Jersey, and having its principal office in the City and County of San Francisco, California, has made, constituted and appointed, and does by these presents make, constitute and appoint

-----MARY N. BURGE-----

SOUTHFIELD, MI

its true and lawful Attorney(s)-in-Fact, with full power and authority hereby conferred in its name, place and stead, to execute, seal, acknowledge and deliver any and all bonds, undertakings, recognizances or other written obligations in the nature thereof ----------

and to bind the Corporation thereby as fully and to the same extent as if such bonds were signed by the President, sealed with the corporate seal of the Corporation and duly attested by its Secretary, hereby ratifying and confirming all that the said Attorney(s)-in-Fact may do in the premises.

This power of attorney is granted pursuant to Article VIII, Section 30 and 31 of By-laws of THE AMERICAN INSURANCE COMPANY now in full force and effect.

"Article VIII. *Appointment and Authority of Resident Assistant Secretaries, and Attorney-in-Fact and Agents to accept Legal Process and Make Appearances.*

Section 30. *Appointment.* The Chairman of the Board of Directors, the President, any Vice-President or any other person authorized by the Board of Directors, the Chairman of the Board of Directors, the President or any Vice-President, may, from time to time, appoint Resident Assistant Secretaries and Attorneys-in-Fact to represent and act for and on behalf of the Corporation and Agents to accept legal process and make appearances for and on behalf of the Corporation.

Section 31. *Authority.* The Authority of such Resident Assistant Secretaries, Attorneys-in-Fact, and Agents shall be as prescribed in the instrument evidencing their appointment, and any such appointment and all authority granted thereby may be revoked at any time by the Board of Directors or by any person empowered to make such appointment."

This power of attorney is signed and sealed under and by the authority of the following Resolution adopted by the Board of Directors of THE AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 28th day of September, 1966, and said Resolution has not been amended or repealed:

"RESOLVED, that the signature of any Vice-President, Assistant Secretary, and Resident Assistant Secretary of this Corporation, and the seal of this Corporation may be affixed or printed on any power of attorney, on any revocation of any power of attorney, or on any certificate relating thereto, by facsimile, and any power of attorney, any revocation of any power of attorney, or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Corporation."

IN WITNESS WHEREOF, THE AMERICAN INSURANCE COMPANY has caused these presents to be signed by its Vice-President,

and its corporate seal to be hereunto affixed this 22nd day of November, 19 82.

THE AMERICAN INSURANCE COMPANY

By Richard Williams
Vice-President

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO } ss.

On this 22nd day of November, 19 83, before me personally came Richard Williams, to me known, who, being by me duly sworn, did depose and say: that he is Vice-President of THE AMERICAN INSURANCE COMPANY, the Corporation described in and which executed the above instrument; that he knows the seal of said Corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation and that he signed his name thereto by like order.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year herein first above written.

OFFICIAL SEAL
SUSIE K. GILBERT
NOTARY PUBLIC — CALIFORNIA
CITY & COUNTY OF SAN FRANCISCO
My Commission Expires Nov. 17, 1984

Susie K. Gilbert
Notary Public

CERTIFICATE

STATE OF CALIFORNIA,
CITY AND COUNTY OF SAN FRANCISCO } ss.

I, the undersigned, Resident Assistant Secretary of THE AMERICAN INSURANCE COMPANY, a NEW JERSEY Corporation, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked; and furthermore that Article VIII, Sections 30 and 31 of the By-laws of the Corporation, and the Resolution of the Board of Directors, set forth in the Power of Attorney, are now in force.

Signed and sealed at the City and County of San Francisco. Dated the 5th day of July, 19 84

Joseph C. Durinck
Resident Assistant Secretary

FIGURE 17

Description of Business

DESCRIPTION OF BUSINESS

Consumers Power Company, Michigan's largest public utility, supplies electricity or natural gas, or both, to a service area with more than 5.3 million residents. This includes a large rural area as well as numerous industries. Overall, the Company serves about 1.36 million electric customers and 1.19 million gas customers. Approximately 513,000 of these are both electricity and gas customers.

The Marysville Gas Reforming Plant was constructed for Consumers Power Company in the early 1970s to manufacture synthetic natural gas (methane) from liquid hydrocarbon feedstocks. This plant produced gas from 1973 into 1979 supplementing the natural gas needs of Consumers Power customers including those years of pipeline shipment curtailments.

In September of 1979, the Gas Reforming Plant was shut down because of reduced gas requirements. It was subsequently "mothballed" to be preserved for future production when the need arises.

The plant feedstocks were stored in nine underground caverns developed for this purpose in the salt layer approximately 2,000 feet beneath the surface. These storage caverns have been leased to other refinery processors for their storage needs. Consequently, limited operations continue at the Gas Reforming Plant, i.e. operations necessary to injection and withdrawal of hydrocarbons as required in a storage facility.

Injection and withdrawal of the contents of the caverns are effected by brine displacement. This operation facility includes the nine caverns, two large surface brine storage ponds, brine transfer pumps and hydrocarbon metering facilities.Two brine disposal injection wells are also operated intermittently in connection with the storage service.

Significant volumes of rain and snow fall on the surface of the brine storage ponds. Each pond has a capacity of 33,300,000 gallons and a surface area of approximately seven acres. Precipitation exceeds evaporation; therefore, there is an increase in total brine volume accumulating throughout the year. This increase, or excess brine, must be disposed of to maintain safe operating levels in the brine ponds. The excess brine in recent years has amounted to about 8,400,000 gallons per year.

Disposal of this excess is by means of the injection disposal wells, the subject of this Permit application.

April 22, 1985