MERRION

OIL & GAS

OIL CONSERVATION DIVISION
RECEIVED

'95 MAR 7 AM 8 52

February 28, 1995

Mr. Bill Lemay
NMOCD
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: Objection to Applications to Inject
J.K. Edwards Associates, Inc.
Nelson #1 and Frontier A #1
Section 8, T26N, R12W
San Juan County, New Mexico

Dear Mr. Lemay:

J.K. Edwards has applied to the OCD for injection permits for the above referenced wells. As an offset leaseholder, Merrion Oil & Gas Corporation has some concern with these applications. This letter reviews the reasons for our concern.

The target injection zone, in both cases, is the Dakota Formation. In the area immediately surrounding these wells, there have been very few Dakota penetrations. While there are no offset producers, we feel the Dakota may be productive in the future under our acreage. We are concerned that any injection into the Dakota in the offset J.K. Edwards wells will jeopardize any chances of recovering hydrocarbons from our leases.

We recommend that J.K. Edwards only be allowed to inject into the Burrough Canyon interval. In addition, during the deepening of the two wells, we ask that you require J.K. Edwards to run a mud log and to document any oil or gas shows.

Please contact me at (505) 327-9801 with any questions. We appreciate your consideration.

Sincerely,

George F. Sharpe
Manager - Oil & Gas Investments

xc: J.K. Edwards Associates, Inc.

610 Reilly Avenue • P.O. Box 840 • Farmington, New Mexico 87499 • 505-327-9801 / 505-326-5900 (Fax)

3·27·95

584

STATE OF NEW MEXICO
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
PO BOX 2088
SANTA FE, NM 87504-2088

FORM C-108
Revised 7-1-81

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: ____ Secondary Recovery ____ Pressure Maintenance _X_ Disposal ____ Storage
Application qualifies for administrative approval? __Yes __No

II. OPERATOR: J. K. EDWARDS ASSOCIATES, INC.

ADDRESS: 1401 17th Street, Suite 1400, Denver, CO 80202

CONTACT PARTY: J. Keith Edwards PHONE: (303) 298-1400

III. WELL DATA: Complete the data required on the reverse side of this form for each well processed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project: __ Yes __x No
If yes, give the Division order number authorizing the project _____

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/1 or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

* X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted.)

* XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

NAME: J. KEITH EDWARDS TITLE: PRESIDENT

SIGNATURE: J. Keith Edwards DATE: 2-27-95

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstance of the earlier submittal. _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

APPLICATION FOR AUTHORIZATION TO INJECT
Form C-108 Supplemental Data
Nelson #1 Well

I. Water Disposal

II. J. K. Edwards Associates, Inc.
1401 17th Street, Suite 1400
Denver, CO 80202
Contact: Keith Edwards (303) 298-1400

III. Well data is attached.

IV. This is not an expansion of an existing project.

V. Map with area of review is attached.

VI. There are no wells within the area of review that penetrate the proposed Basin Dakota injection zone.

VII. Data on proposed injection operations:

1. Average injection rate - 500 bwpd
Maximum injection rate - 1000 bwpd

2. Closed system. Water would be trucked or piped into tanks on location.

3. Average injection pressure - 750 psi
Maximum injection pressure - 1100 psi

4. Produced Fruitland Coal water with TDS of 2000 to 10000 ppm will be injected into the Basin Dakota zone in the Nelson #1 well. Analyses of coal water in the area are attached.

5. Chemical analysis of water in the Basin Dakota zone will be submitted after deepening the well from its current TD of 5420' in the Gallegos Gallup zone.

VIII. Geologic and Lithologic data on injection zone.

1. Injection zone - Basin Dakota at approximately 5775' - 6050' (logs will be submitted after deepening of the well).

2. Lithology - Dakota sands.

3. Overlying aquifer - Point Lookout
4. Underlying aquifer - Morrison

IX. Perforate and acidize prior to injection operations.

X. Logs traversing the Gallegos Gallup zone have been submitted previously; logs for the Basin Dakota zone will be submitted after deepening the well into said zone.

XI. No known sources of potable water exist in the immediate area of the well.

XII. Geologic studies of the area do not indicate fault communication between the proposed injection zone and any underground potential sources of drinking water.

XIII. Proof of notice is attached.

XIV. Certification is signed.

INJECTION WELL DATA SHEET

OPERATOR	LEASE
J. K. EDWARDS ASSOCIATES, INC	FEDERAL SF-081100-A

WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
NELSON WELL NO. 1	990' FNL, 1090' FEL,	Sec. 8	T26N,	R12W NMPM

Schematic

Tabular Data

Surface Casing

Size 9-5/8" " Cemented with 150 sx.

TOC Surface feet determined by Circulated

Hole size 12-1/4"

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" " Cemented with 585 sx.

TOC 190' feet determined by Temp Survey

Hole size 8-3/4"

Total depth 5420'

Injection interval

4850' feet to 5028' (perf) feet
(perforated or open-hole, indicate which)

Tubing size 2-3/8" lined with Epoxy (material) set in a

Baker Model G (brand and model) packer at 4750' feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation **Basin Dakota**

2. Name of Field or Pool (if applicable) Gallegos Gallup

3. Is this a new well drilled for injection? [ ] Yes [X] No

   If no, for what purpose was the well originally drilled? Oil & Gas Producer/Gallup

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used)

   All perforating carried out in the Gallup zone.

5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. Pictured Cliffs/Fruitland/Fruitland Coal and Dakota

WELL NAME: NELSON NO. 1

LOCATION: 990' FNL, 1090' FEL, Sec. 8, T26N, R12W
COUNTY: San Juan **STATE:** New Mexico
LEASE: SF-081100-A **TYPE:** Federal **SURFACE:**
OPERATOR: J.K. EDWARDS,ASSOCIATES, INC.

GLE - 5963'
KBE - 5973'
KBM - 10'

SURFACE CASING:

HOLE SIZE: 12-1/4"
CASING: 9-5/8"
CSA: 171'
CEMENT: 150 SX 3%CACL
CIRC TO SURFACE

FORMATION TOPS:

FRUITLAND:	917'
PICT CLIFFS:	1187'
LEWIS:	1313'
CLIFFHOUSE	3053'
MENEFEE:	3171'
POINT LOOKOUT:	3700'
MANCOS:	3910'
GALLUP:	4775'

TOP CEMENT:	190'
TOP CEMENT:	3710'

Baker Set Down Packer

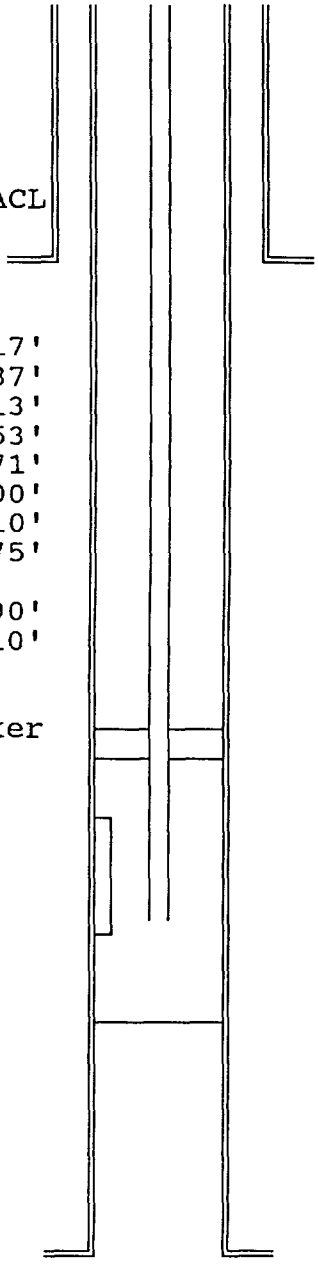
PERFORATIONS:

4850'-4862'
4886'-4900'
4991'-5009'
5016'-5028'

PBD: 5169'

PRODUCTION CASING:

HOLE SIZE: 8-3/4"
SIZE: 7"
WT & GR: 20# J-55
CSA: 5211'
TD: 5420'



WELL DATA:

SPUD DATE: 5/07/55
ORIGINAL OWNER:EPNG/BED
IP: 4385 MCFD
ZONE: LOWER GALLUP
COMPL: SWF 40,000# SAND
WI: 100% NRI:
TUBING: 2-3/8" @ 5040'

REMARKS:

Squeezed perfs 4882'-86' 4900'-02' w/100 sx

2/11/68 Cement squeezed casing hole @ 3587' w/ 150 sx Class C 2% CaCl 2nd squeeze @ 3529'-3623' Spot 25 sx braden head squeeze Calculated cement 3587'-2409' w/185 sx

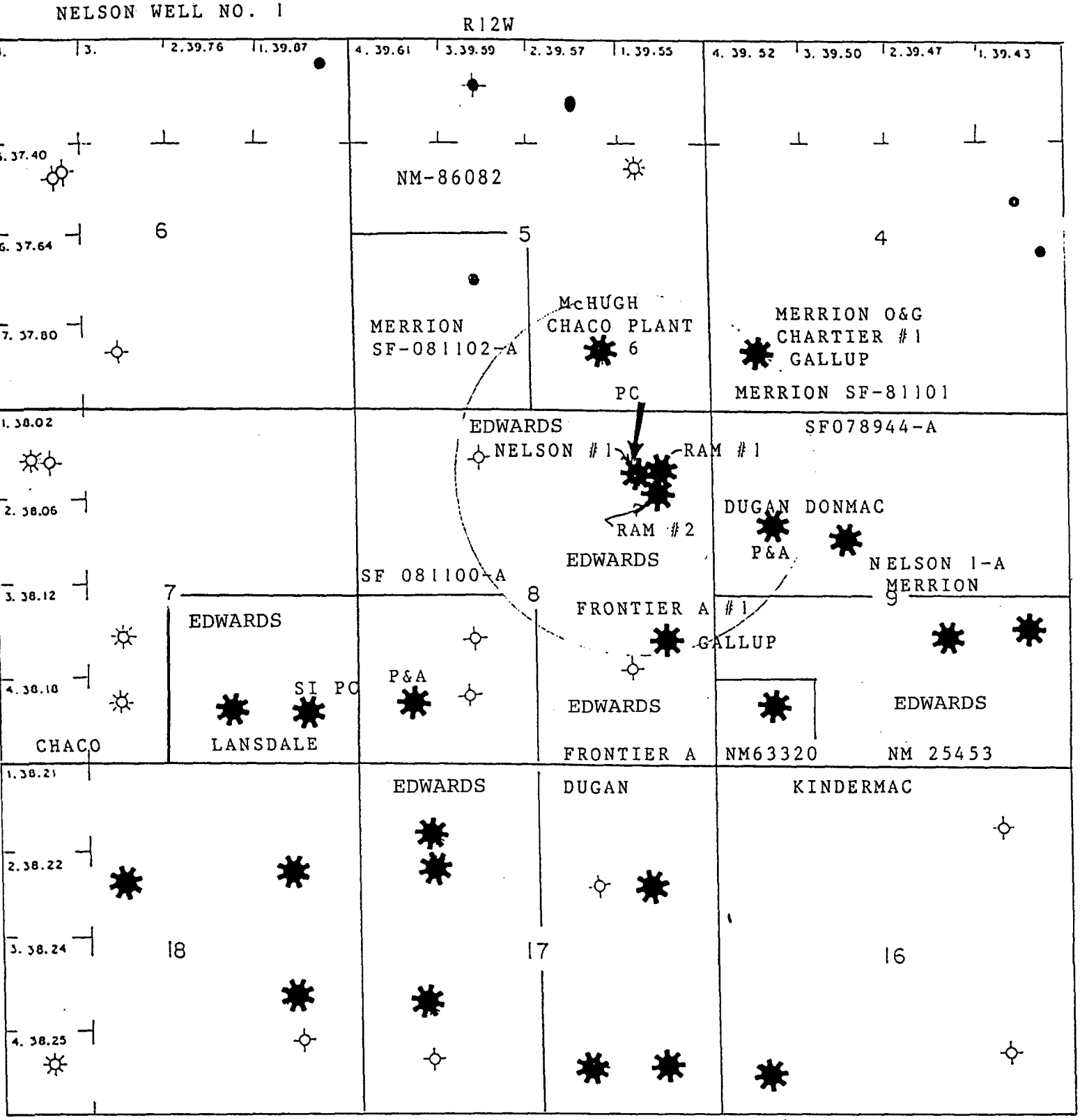
2nd Stage Collar @ 1503'

CEMENTING RECORD:

Stage #1	100 sx	regular
	100 sx	pozmix
Stage #2	100 sx	regular
	100 sx	pozmix

WILL DEEPEN THROUGH DAKOTA WITH 6 1/4" HOLE AND RUN AND SET 5 1/2" LINER CEMENTED BACK TO EXISTING STRING.

NELSON WELL NO. 1



APPLICATION FOR AUTHORIZATION TO INJECT
FORM C-108 AREA OF REVIEW PROXIMITY MAP

J.K. EDWARDS ASSOCIATES, INC.

OIL & GAS PROPERTIES

1401 17TH STREET / SUITE 1400

DENVER, COLORADO 80202

303/298-1400 FAX 303/298-0757

CERTIFIED MAIL-RETURN RECEIPT

February 9, 1995

BUREAU OF LAND MANAGEMENT
FARMINGTON RESOURCE AREA
1235 LaPlata Highway
Farmington, NM 87401

Re: Application to Inject
Nelson #1 Well
NE/4 Section 8-T26N-R12W
San Juan County, NM

Gentlemen and Ladies:

Pursuant to the regulations of the NMOCD, you are advised of JKEAI's intention to deepen the referenced well to the Basin Dakota formation and use it as a salt water disposal well. I am enclosing a copy of the application for your reference.

Any request for information or any objections should be filed with the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, NM 87501 within 15 days of publication in the Farmington Daily Times.

Very truly yours,

Richard L. Lewis
Contract Landman

RLL:ll
encls.

P 879 671 513

Certified Mail Receipt

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

UNITED STATES POSTAL SERVICE

Sent to Bureau of Land Mgmt	
Street & No. Farmington Resource Area	
P.O., State & ZIP Code 1235 La Plata Hwy	
Postage Farmington NM 87401	$ 1.24
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$ 3.44
Postmark or Date	2/9/95 RC

PS Form 3800, June 1990

Is your RETURN ADDRESS completed on the reverse side?

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
BUREAU OF LAND MANAGEMENT
FARMINGTON RESOURCE AREA
1235 LAPLATA HIGHWAY
FARMINGTON NM 87401

4a. Article Number
P 879 671 513

4b. Service Type
☐ Registered ☐ Insured
■ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

5. Signature (Addressee)

6. Signature (Agent)

7. Date of Delivery
2/13/95

8. Addressee's Address (Only if requested and fee is paid)

PS Form 3811, December 1991 *U.S. GPO: 1993-352-714 DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

J.K. EDWARDS ASSOCIATES, INC.

OIL & GAS PROPERTIES

1401 17TH STREET / SUITE 1400

DENVER, COLORADO 80202

303/298-1400 FAX 303/298-0757

CERTIFIED MAIL-RETURN RECEIPT

February 9, 1995

JEROME P. MCHUGH & ASSOCIATES
NASSAU RESOURCES, INC.
Attn: Land Department
650 South Cherry St., Suite 1225
Denver, CO 80222

Re: Application to Inject
Nelson #1 Well
NE/4 Section 8-T26N-R12W
San Juan County, NM

Gentlemen and Ladies:

Pursuant to the regulations of the NMOCD, you are advised of JKEAI's intention to deepen the referenced well to the Basin Dakota formation and use it as a salt water disposal well. I am enclosing a copy of the application for your reference.

Any request for information or any objections should be filed with the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, NM 87501 within 15 days of publication in the Farmington Daily Times.

Very truly yours,

Richard L. Lewis
Contract Landman

RLL:ll
encls.

P 879 671 587

Certified Mail Receipt
No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

UNITED STATES POSTAL SERVICE

Sent to Jerome P McHugh + assoc	
Street & No. land dept 650 S. Cherry #1225	
P.O., State & ZIP Code DC 80222	
Postage	$1.24
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$3.44
Postmark or Date	2-10-95 RO

PS Form **3800**, June 1990

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SENDER:
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I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
JEROME P. MCHIGH & ASSOC.
KINDERMAC PARTNERS
ATTN LAND DEPT
650 S CHERRY ST #1225
DENVER CO 80222

4a. Article Number
P 879 671 587

4b. Service Type
☐ Registered ☐ Insured
XX Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

5. Signature (Addressee)

6. Signature (Agent)

7. Date of Delivery

8. Addressee's Address (Only if requested and fee is paid)

USA 80222 FEB 13 COLORADO

PS Form **3811**, December 1991 *U.S. GPO: 1993—352-714 DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

J.K. EDWARDS ASSOCIATES, INC.

OIL & GAS PROPERTIES

1401 17TH STREET / SUITE 1400

DENVER, COLORADO 80202

303/298-1400 FAX 303/298-0757

CERTIFIED MAIL-RETURN RECEIPT

February 9, 1995

MERRION OIL AND GAS CORPORATION
Attn: Land Department
610 Reilly Avenue
P.O. Box 840
Farmington, NM 87499

Re: Application to Inject
Nelson #1 Well
NE/4 Section 8-T26N-R12W
San Juan County, NM

Gentlemen and Ladies:

Pursuant to the regulations of the NMOCD, you are advised of JKEAI's intention to deepen the referenced well to the Basin Dakota formation and use it as a salt water disposal well. I am enclosing a copy of the application for your reference.

Any request for information or any objections should be filed with the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, NM 87501 within 15 days of publication in the Farmington Daily Times.

Very truly yours,

Richard L. Lewis
Contract Landman

RLL:ll
encls.

P 879 671 589

Certified Mail Receipt

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

UNITED STATES POSTAL SERVICE

Sent to Merrion Oil & Gas	
Street & No. Land Dept 610 Reilly Ave	
P.O., State & ZIP Code Farmington NM 87499	
Postage	$1.24
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$3.44
Postmark or Date	1-10-95 VC

PS Form 3800, June 1990

Is your RETURN ADDRESS completed on the reverse side?

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- Complete items 1 and/or 2 for additional services.
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1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
MERRION OIL & GAS CORP
ATTN: LAND DEPARTMENT
610 REILLY AVENUE
FARMINGTON NM 87499

4a. Article Number
P 879 671 589

4b. Service Type
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

5. Signature (Addressee)

6. Signature (Agent)
[signature]

7. Date of Delivery

8. Addressee's Address (Only if requested and fee is paid)

PS Form 3811, December 1991 *U.S. GPO: 1993-352-714 DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

AFFIDAVIT OF PUBLICATION

No. 34360

STATE OF NEW MEXICO
County of San Juan:

VICKI SHORTER being duly sworn says: That he is the Classified Manager of THE DAILY TIMES, a daily newspaper of general circulation published in English at Farmington, said county and state, and that the hereto attached Legal Notice was published in a regular and entire issue of the said DAILY TIMES, a daily newspaper duly qualified for the purpose within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico for publication on the following day(s):

TUESDAY, FEBRUARY 14, 1995

and the cost of publication was: $19.45

Vicki Shorter

On 2/15/95 VICKI SHORTER appeared before me, whom I know personally to be the person who signed the above document.

Mary G. Maes

My Commission Expires March 21, 1998.

COPY OF PUBLICATION

Legals

NOTICE

J.K. Edwards Associates, Inc., 1401 17th Street, Suite 1400, Denver, CO 80202 (303) 298-1400 whose agent is Keith Edwards, hereby notifies all interested parties that the following well is to be deepened and converted to a water disposal well. Injection will be into the Basin Dakota interval at approximately 5775' - 6050'. Maximum well rate will be 1000 Bwpd at less than 1100 psi. Any requests for information or any objections should be filed with the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, NM 87501 within 15 days of this notice.

Gallegos Gallup Field, Nelson # 1, NE/4, NE/4 Section 8, T26N-R12W, San Juan County, New Mexico.

Legal No. 34360 published in The Daily Times, Farmington, New Mexico, Tuesday, February 14, 1995.

ANALYSIS NO. 53-35-91

FIELD RECEIPT NO. _____

PI FORM 45-1

API WATER ANALYSIS REPORT FORM

Company	Sample No.	Date Sampled
Giant E&P		08-07-91

Field	Legal Description	County or Parish	State

Lease or Unit	Well	Depth	Formation	Water, B/D
Bisti Coal 3	#1		Fruitland	

Type of Water (Produced, Supply, etc.)	Sampling Point	Sampled By
Produced		

ISSOLVED SOLIDS

ATIONS

	mg/l	me/l
odium, Na (calc.)	5473	237.95
alcium, Ca	140	7.00
agnesium, Mg	61	5.00
arium, Ba	—	—
otassium, K	98	2.51

NIONS

hloride, Cl	8010	225.96
ulfate, SO_4	0	0
arbonate, CO_3	0	0
carbonate, HCO_3	1617	26.50
ydroxide, OH	0	0
		1

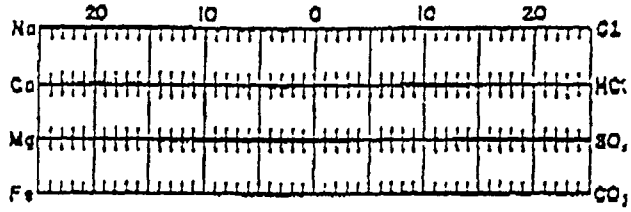
tal Dissolved Solids (calc.)	15399
n, Fe (total)	25 ppm
lfide, as H_2S	neg

OTHER PROPERTIES

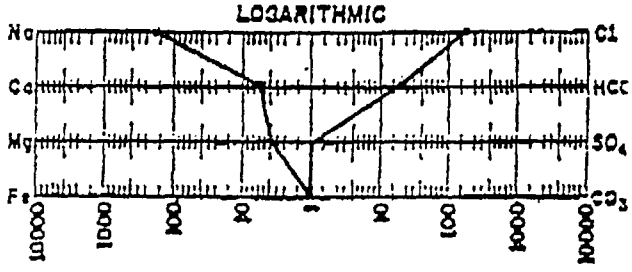
pH	7.25
Specific Gravity, 60/60 F.	1.010
Resistivity (ohm-meters) 74 F.	.44
Total Hardness	600

WATER PATTERNS — me/l

STANDARD



LOGARITHMIC



MARKS & RECOMMENDATIONS:

ANALYST: Lee

EASE REFER ANY QUESTIONS TO:

: WESTERN CO. OF NORTH AMERICA
MINGTON, N.M.
AN AULT-District Engineer
05) 327-6222

Table 3. Chemical analyses of produced Fruitland coalbed waters.

Sample Number	1	2	3	4	5	6	7	8	9	10
Well	Perry Land GU B 1	Shoemaker 1-34	Southern Ute 12U-1	Mayfield-Melton GU 1	NEBU 432	NEBU 218	Ealum Gas Com C 1R	Elliott Gas Com Y 1	Bisti Coal 36-1	Rick Wells 1
Location	30 35N 6W	34 35N 8W	12 34N 9W	1 33N 9W	7 30N 7W	16 31N 7W	33 32N 10W	9 30N 9W	36 25N 12W	8 26N 13W
Production Interval	1,304-1,480	1,896-2,026	2,400-2,478	2,530-2,747	3,004-3,216 (OH)	3,200-3,346 (OH)	2,777-2,813	2,790-2,944	1,074-1,092	1,383-1,427
Source	wellhead	wellhead	wellhead	separator[a]	separator[a]	wellhead	wellhead	wellhead	wellhead	wellhead
TDS	5,820	1,360	2,650	6,220	21,970	13,030	20,110	28,210	14,330	16,190
Na	1,600	349	698	1,670	6,160	3,560	5,820	8,140	5,290	5,750
K	9.9	4.3	5.8	5.4	19.5	13.2	33.3	53.1	22.5	27.5
Ca	28.8	6.5	5.8	15.1	37.7	24.4	23.6	28.1	128	246
Mg	6.2	1.2	1.2	4.2	27.4	17.3	15.5	15.1	36.4	57.7
Sr	4.3	0.6	0.7	5.0	17.7	13.2	12.3	19.4	6.9	12.3
Ba	6.5	0.7	1.1	6.1	62.9	21.1	36.2	51.5	8.4	7.6
Fe	0.12	0.80	0.04	0.05	0.64	0.72	1.24	0.59	0.57	2.37
Mn	0.06	0.03	0.03	0.01[b]	0.01	0.01	0.03	0.01	0.49	0.15
Li	0.88	0.34	0.94	1.54	1.39	1.11	0.58	1.13	0.50	0.53
B	1.08	0.21	0.63	1.55	2.15	0.98	8.54	9.17	1.18	1.09
SiO_2	21.0	22.8	26.1	31.5	26.6	27.1	24.7	26.1	12.5	15.0
Field alkalinity (as HCO_3^-)	3,943	956	1,854	4,333	14,601	8,940	12,883	17,295	722	468
Organic acids (as CH_3COOH)	270	220	210	330	330	210	210	220	120	160
NH_3	2.53	1.50	1.11	4.47	11.3	8.57	9.13	16.2	4.99	6.20
organic-N	0.39	0.78	0.85	1.04	1.45	1.59	0.85	1.50	0.60	0.48
Cl	199	16	56	138	1,000	396	1,240	2,550	8,090	9,590
SO_4	<5[c]	<5	<5	<5	<5	<5	<5	<5	<5	10.4
Br	0.85	0.14	0.50	0.76	4.65	3.49	3.99	6.19	7.64	8.68
I	0.38	0.10	0.33	1.13	0.41	0.11	0.52	0.87	0.60	0.56
Field pH	7.65	8.21	8.23	7.73	7.62	7.89	8.06	8.02	7.39	7.33
$\delta^{18}O$[d]	-14.0	-14.6	-14.6	-14.1	-7.4	-7.9	-7.7	-7.6	-10.8	-10.5
δD	-85	-98	-102	-85	-32	-43	-28	-36	-81	-80
$\delta^{13}C$[e]	+23.5	+17.5	+16.7	+24.0	+25.6	+24.7	+26.0	+24.9	+19.7	+19.5
Σ cations (meq/L)	71.94	15.73	30.92	74.03	273.71	158.30	257.14	359.07	240.27	268.10
Σ anions (meq/L)	70.28	16.13	31.98	74.95	267.66	157.78	246.25	355.55	239.98	278.33

[a] flowing well; [b] near detection limit of 0.01 mg/L; [c] detection limit 5 mg/L; [d] $\delta^{18}O$ and δD in per mil relative to SMOW; [e] $\delta^{13}C$ of total dissolved carbonate species in per mil relative to PDB.

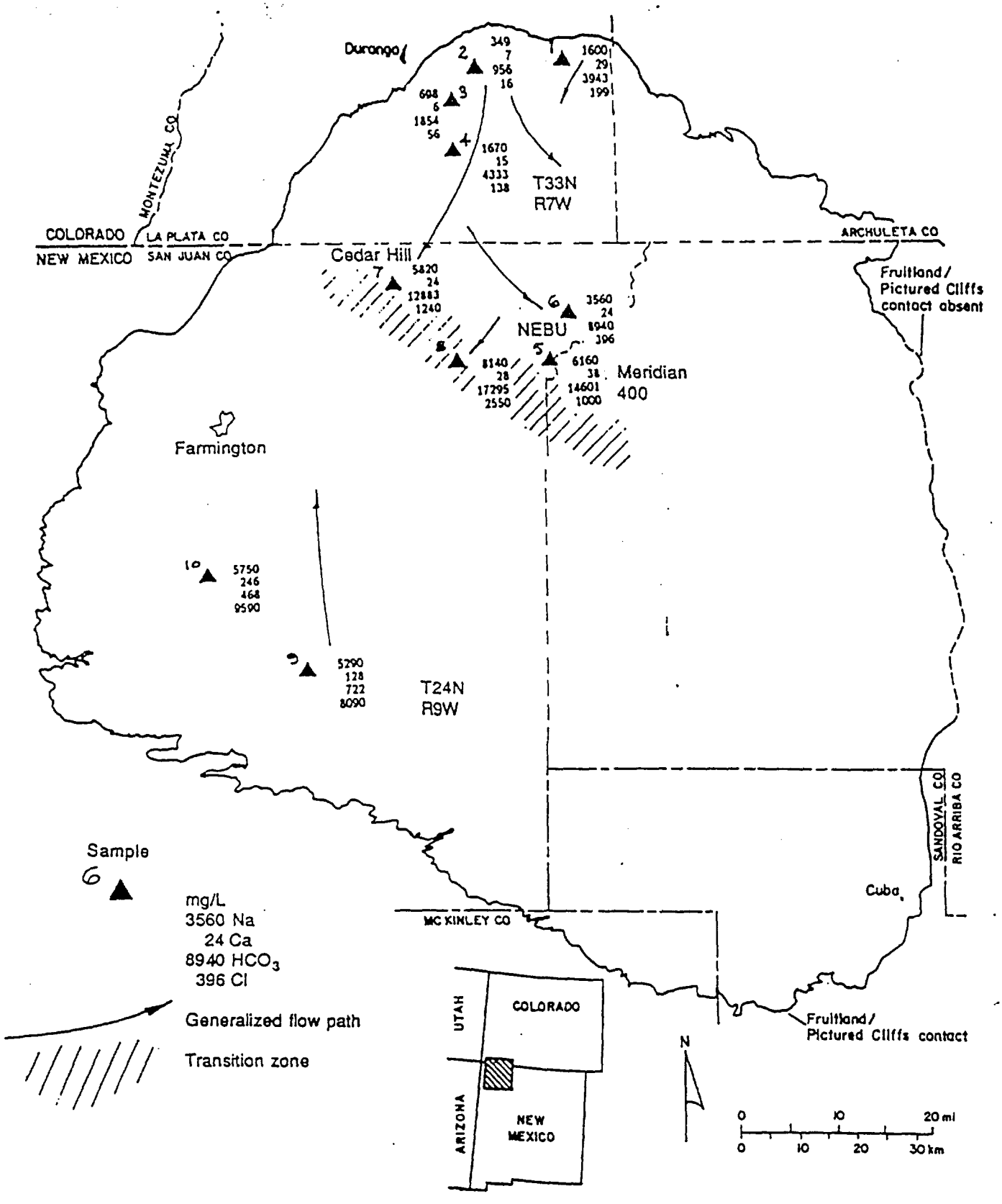


Figure 16. Location of GRI/BEG Fruitland coalbed water samples. In the north-central part of the basin, Na^+ and $HCO3^-$ increase down flow path, reaching their highest concentration in the transition zone. Southern waters are enriched in Cl- and Ca^{2+}. The transition zone is a regional facies, potentiometric, pressure, and hydrochemical boundary. Complete chemical analyses in table 3.

CLI-12A
PRAIRIE PUBLISHING CO. — 61517

CHEMICAL & GEOLOGICAL LABORATORIES

Casper Farmington Glendive Sterling

WATER ANALYSIS REPORT

Field Bisti, New Mexico Well No. CBU No. 29

Operator Sunray Mid-Continent Oil Company Location NE SE 8-25N-12W

Sampled by Date

Formation Gallup Depths 4750 - 4800 How sampled From Treater

Other pertinent data Sample No. 2

Analyzed by DM & DS Date October 2, 1959 Lab. No. 14747-2

CONSTITUENTS	PPM	MEQ.	MEQ.%
Sodium	18,064	785.37	47.15
Calcium	646	32.24	1.94
Magnesium	185	15.21	0.91
Sulfate	10	0.21	0.01
Chloride	29,000	817.80	49.10
Carbonate	-	-	-
Bicarbonate	903	14.81	0.89
Hydroxide	-	-	-

Observed pH 7.2 Resistivity @ 68°F. ohms/meter³ 0.165

TOTAL SOLIDS IN PARTS PER MILLION:

By evaporation	49,490
After ignition	48,400
Calculated	48,350

PROPERTIES OF REACTION IN PERCENT:

Primary salinity	94.30
Secondary salinity	3.92
Primary alkalinity	0.00
Secondary alkalinity	1.78
Chloride salinity	99.98
Sulfate salinity	0.02

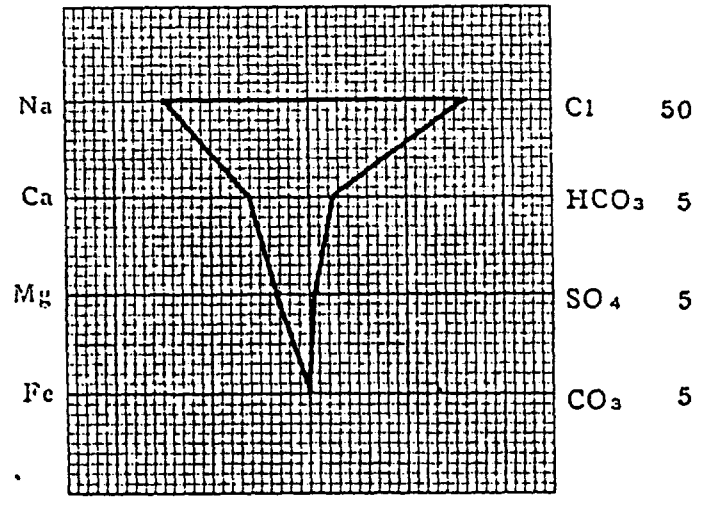
Remarks: Correlates with Gallup water from this area and with water from CBU No. 28 sampled as known Gallup water.

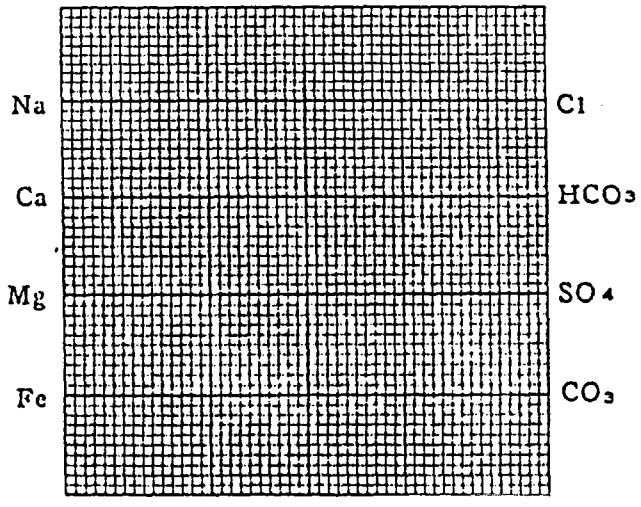
Note: PPM=Milligrams per liter (1 PPM is equivalent to 0.0001% by weight). MEQ=Milliequivalents per liter. MEQ%=Milliequlivalents per liter in percent.

WATER ANALYSIS PATTERN

Sample above described

Scale MEQ per Unit





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CHEMICAL & GEOLOGICAL LABORATORIES

Casper Farmington Glendive Sterling

WATER ANALYSIS REPORT

Field Bisti, New Mexico Well No. CBU No. 28

Operator Sunray Mid-Continent Oil Company Location NW SW 9-25N-12W

Sampled by Date

Formation Gallup Depths 4750 - 4800 How sampled From treater

Other pertinent data Sample No. 1

Analyzed by DM & DS Date October 2, 1959 Lab. No. 14747-1

CONSTITUENTS	PPM	MEQ.	MEQ.%
Sodium	16,789	729.95	47.18
Calcium	608	30.34	1.96
Magnesium	162	13.32	0.86
Sulfate	10	0.21	0.01
Chloride	27,000	761.40	49.21
Carbonate	-	-	-
Bicarbonate	732	12.00	0.78
Hydroxide	-	-	-

Observed pH 7.6 Resistivity @ 68°F. ohms/meter 0.190

TOTAL SOLIDS IN PARTS PER MILLION:

By evaporation	46,030
After ignition	44,560
Calculated	44,929

PROPERTIES OF REACTION IN PERCENT:

Primary salinity	94.36
Secondary salinity	4.08
Primary alkalinity	0.00
Secondary alkalinity	1.56
Chloride salinity	99.98
Sulfate salinity	0.02

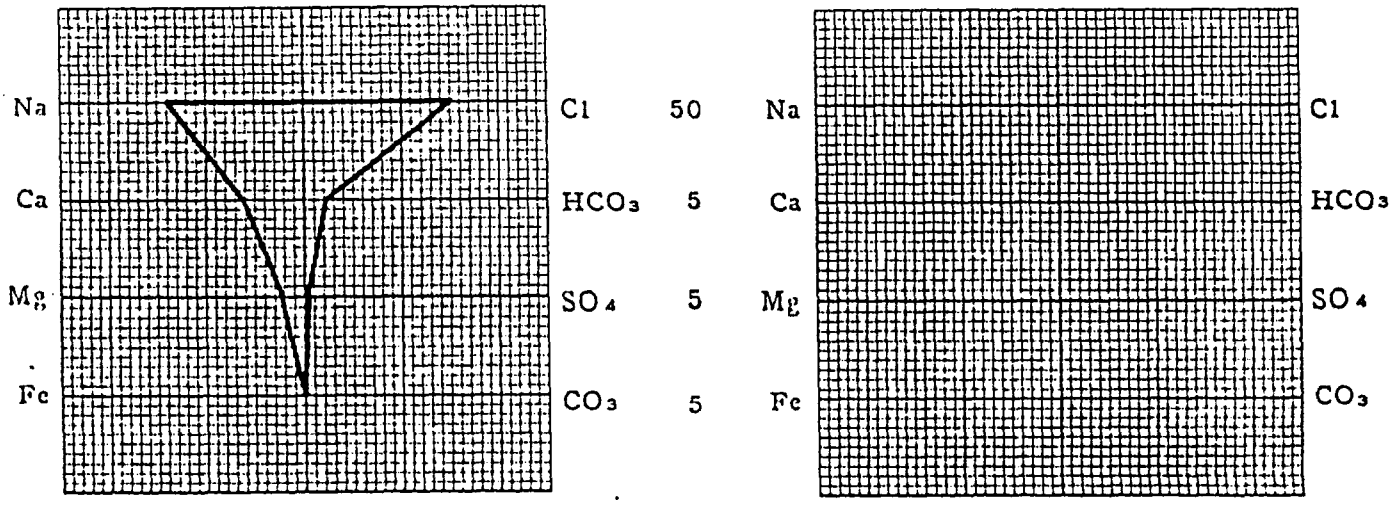
Remarks Sampled as known Gallup water.

Note: PPM=Milligrams per liter (1 PPM is equivalent to 0.0001% by weight). MEQ=Milliequivalents per liter. MEQ%=Milliequlivalents per liter in percent.

WATER ANALYSIS PATTERN

Sample above described

Scale MEQ per Unit



HOUSTON, TEXAS

SCHLUMBERGER

Gamma Ray

COUNTY SAN JUAN
FIELD or LOCATION WILDCAT
WELL NELSON #1
COMPANY EL PASO NATURAL GAS COMPANY

COMPANY EL PASO NATURAL GAS COMPANY
WELL NELSON #1
FIELD WILDCAT
LOCATION SEC. 8-26N-12W
COUNTY SAN JUAN
STATE NEW MEXICO

Location of Well
990' FR N/L
1090' FR E/L
SEC. 8-26N-12W

GRL
(SC-PGP)

Elevation: D.F.: 5965'
K.B.:
or G.L.: 5959'

FILING No.

RUN NO.	ONE	
Date	6-15-55	
Depth Reference	RT	
First Reading	4934	
Last Reading	950	
Footage Measured	884	
Max. Depth Reached	4936	
Bottom Driller	4935	
Maximum Temp. °F.		
Mud: Nature	DRY	
" Density		
" Viscosity		
" Resistivity	@ °F.	@ °F.
Casing Size & 1 7"	Surf. to T.D.	to
Weight 2	to	to
Open Hole 1 8 3/4"	Surf. to T.D.	to
2	to	to
Recording Speed (ft/hr)	2000	
Sensitivity Tap	140	
Panel	GNP-2A	
Time Constant	1.4	
Truck No.	1714FARM	
Observer	HILLER	

FOLD HERE

REMARKS NOTE: CASING COLLARS RECORDED 8' TOO DEEP

RECORDING SPEED IS 2000'/HR

POINT OF ZERO EMISSION FOR GAMMA RAY IS 2 DIV. LEFT

860-200-100(200)

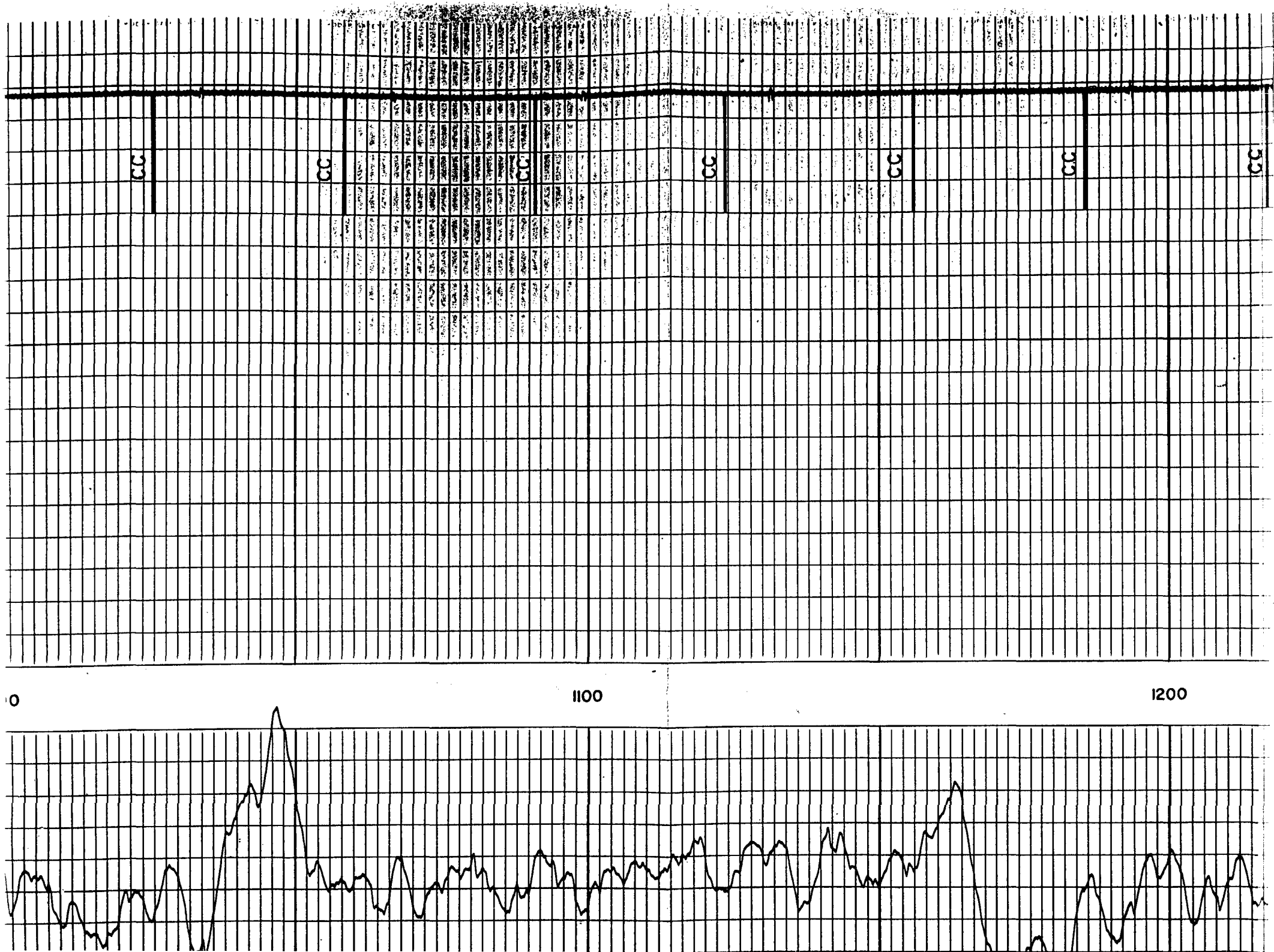
DEPTH

GAMMA RAY LOG
C. GM. RAD-EQ/TON

2" = 100'

4 4.9 8.4

L.R. 950'


CC
CC
CC
CC
CC
CC
0
1100
1200


CC
CC
CC
CC
CC
1300
1400

HOUSTON, TEXAS

SCHLUMBERGER

Temperature Log

COUNTY SAN JUAN
FIELD or LOCATION W.C.
WELL NELSON #1
COMPANY EL PASO NATURAL GAS COMPANY

COMPANY EL PASO NATURAL GAS COMPANY
WELL NELSON #1
FIELD W.C.
LOCATION SEC. 8-26N-12W
COUNTY SAN JUAN
STATE NEW MEXICO

Location of Well
990' FR N/L
1090' FR E/L
SEC. 8-26N-12W

TEMP (ML-ES)

Elevation: D.F.: 5965'
K.B.:
or G.L.: 5959'

FILING No.

Date 6-8-55 Time Started 0630 Time Finished 2230
First Reading 5421
Last Reading 100
Footage Measured 5321
Max. Depth Reached 5422
Bottom Driller 5420
Hole Size 8 3/4"
Casing Size 9 5/8"
Depth Datum KB
Mud Data Nature GEL-CHEM Resistivity 1.74@ 80 °F
Fluid Level
Max. Temp. 135
Cementation Data Date Time Started Time Finished
Circulation Data Date Time Started Time Finished
A-Cement Top Determination
1) Date Pressure Released Time Released
2) Amount Cement
3) Calculated Top
4) Depth of Plug
B-Location of Oil and Gas
1) Casing Shoe Driller 172
2) Date Drilling Stopped Time Stopped
Truck No. 754FARM
Recorded By COVEY
Witnessed By SPEER

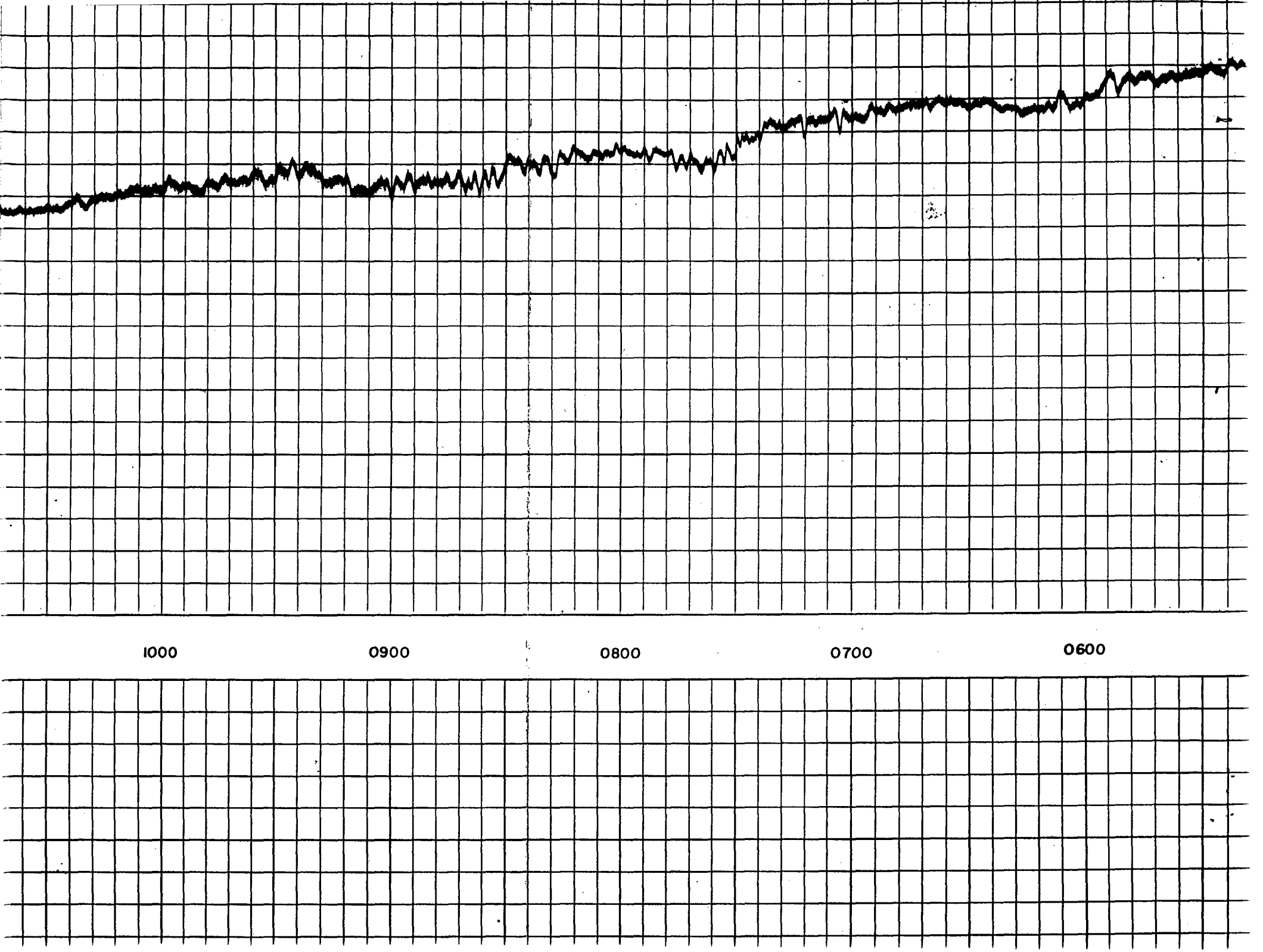
FOLD HERE

REMARKS RUN ONE GAS ZONE DETERMINATION

DEPTH
2" = 100'
L.R.
100'

TEMPERATURE °F.
10°F = 100 DIVISIONS

120°
0010
110°
100°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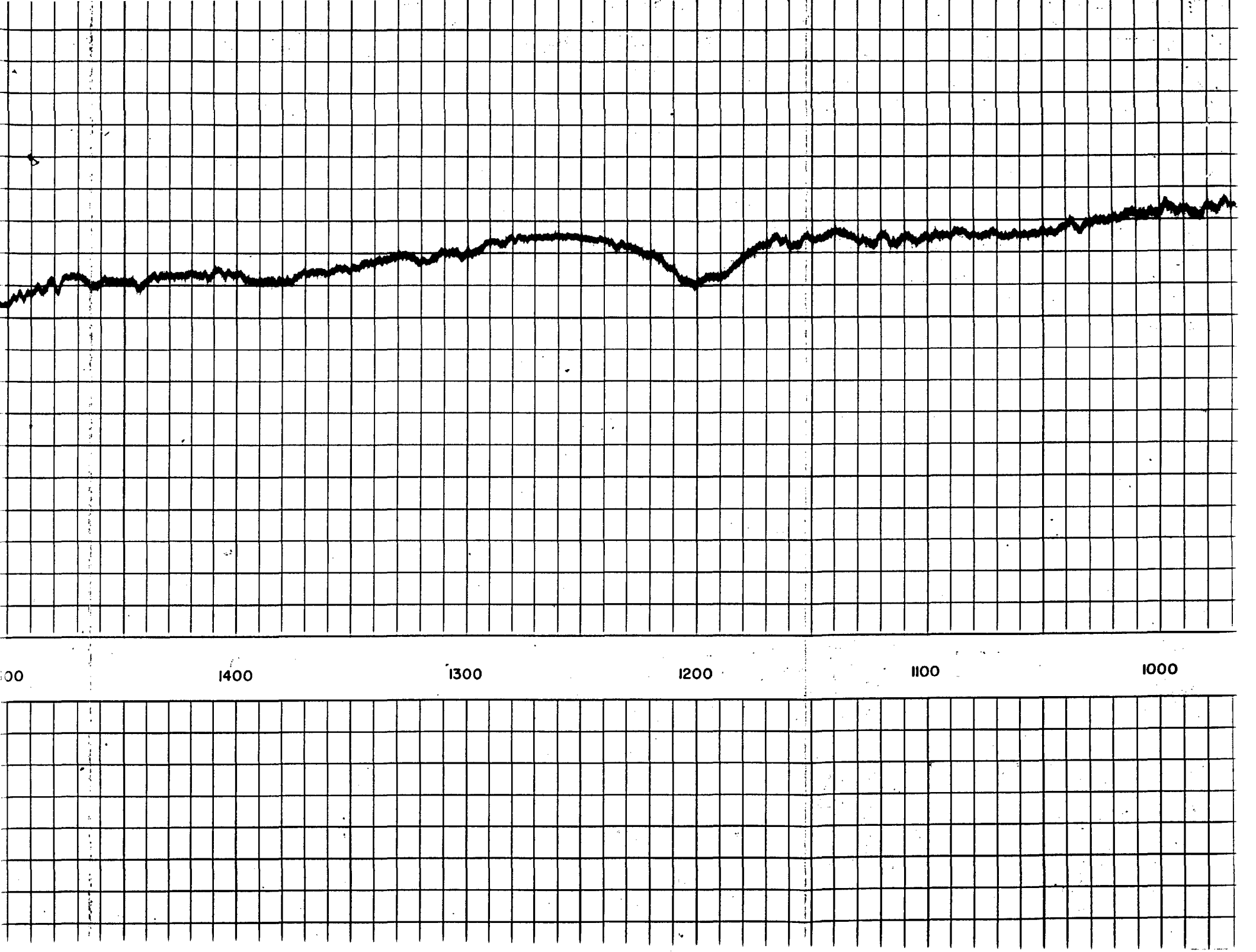
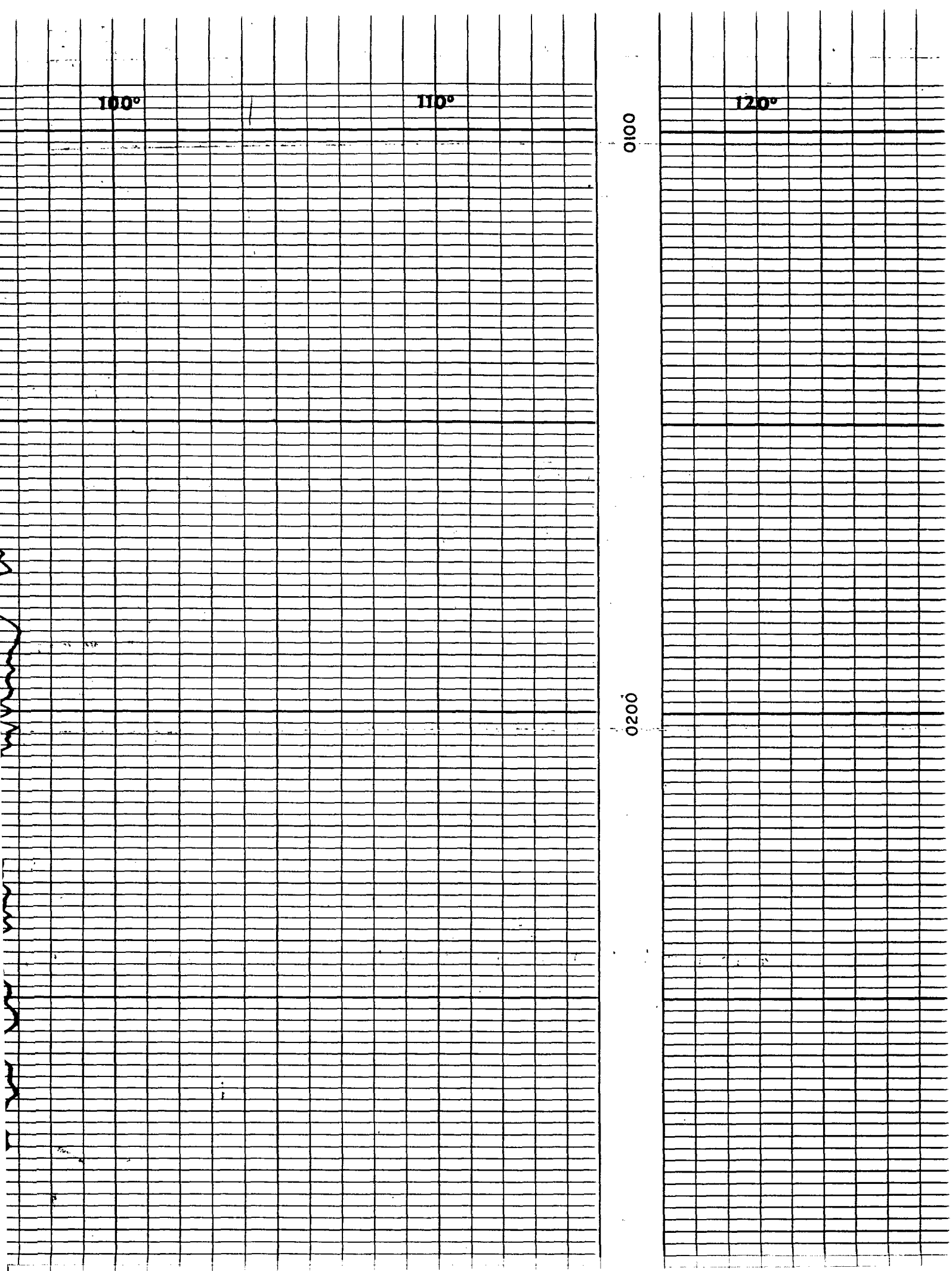
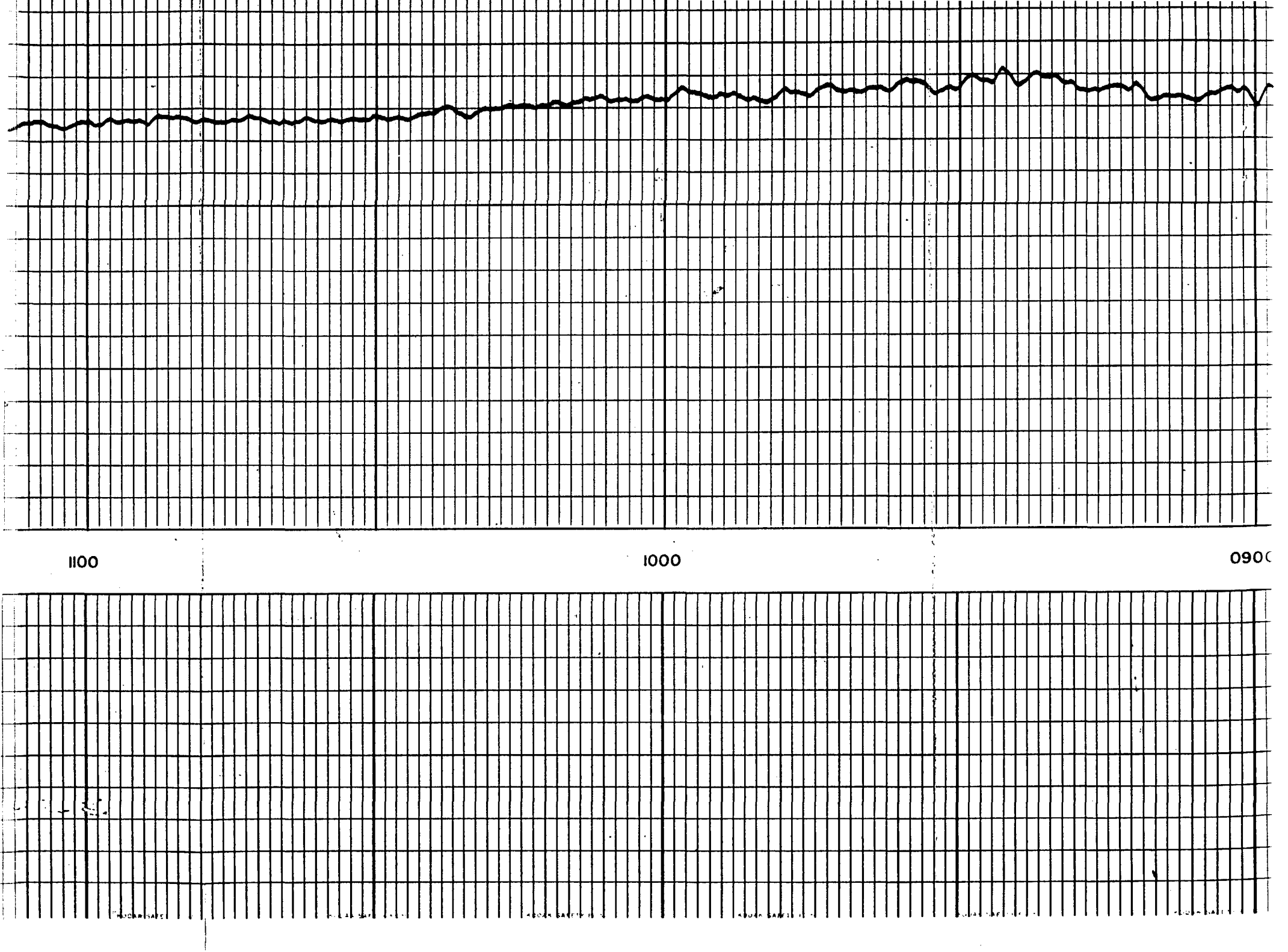
0900
0800
0700
0600


00
1400
1300
1200
1100
1000


100°
110°
120°
0100
0200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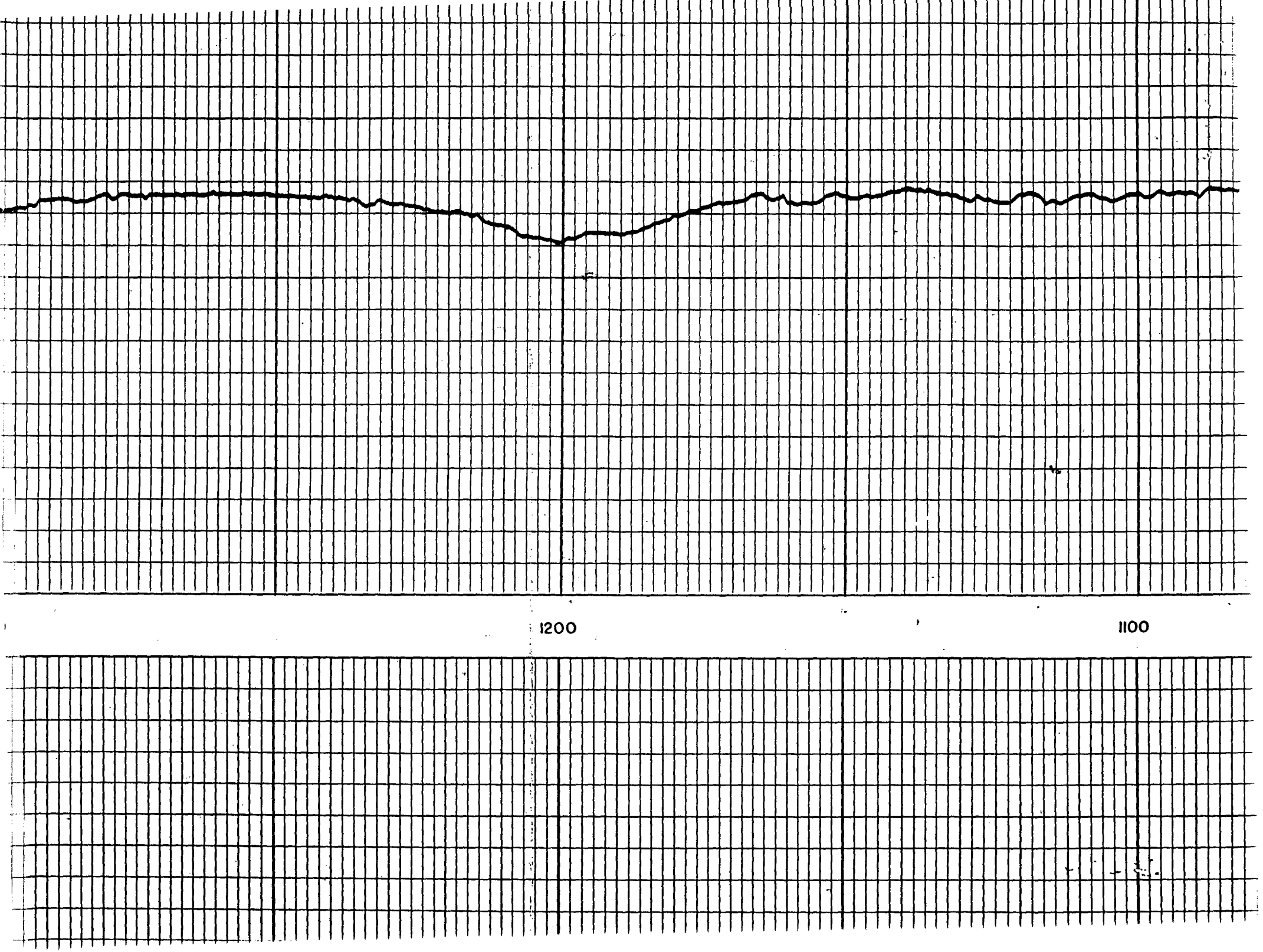
1000
0900


1200
1100


1400
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