

WATER PERMIT NO. 1905-1

Name of Applicant: **Luff Exploration Company**

Address: **1580 Lincoln St, Suite 850, Denver CO 80203**

Phone: **303 861-2468**

Amount of Water Claimed: **0.194 cfs (87.5 gpm)**

Total Acres: **NA**

Source of Water Supply: **groundwater (one well)**

Water to be used for: **industrial**

County: **Harding**

Type of Waste Disposal System: **NA**

Location: **1 mile north of Ludlow**

PRIORITY

Date Received: **7-28-09**

Application/License Fee: **\$950**

Corrected Application Received:

Period of Annual Use: **January 1 – December 31**

Remarks:

Diversion Point: **NW ¼ NE ¼ Sec 16-T122N-R6E**

Land to be Irrigated: **NA**

Depth of Well: **9,204 feet deep**

Well Driller:

Remarks:

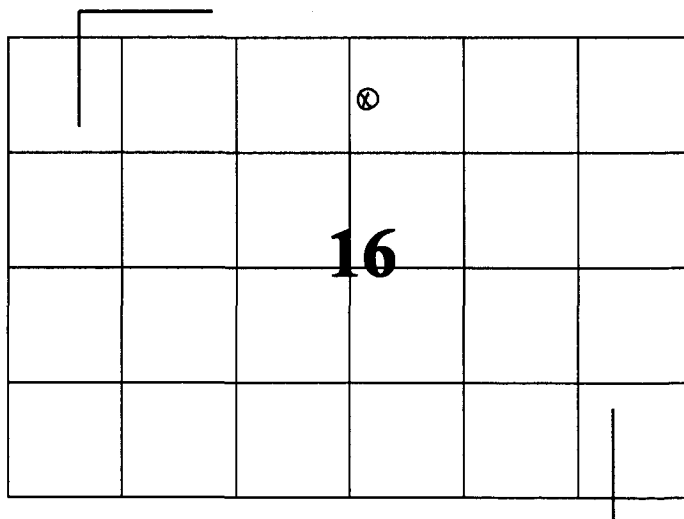
Type of Map: **plat**

Prepared by: **John Paulson, RLS**

Reviewed and the Number Assigned on: **7-28-09**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	No. <u>1905-1</u>	(office use only) Hydrologic Unit <u>10130302</u>
	Basin <u>Grand River</u>	
	Newspaper <u>Nation's Center News PO Box 107</u>	
	<u>605-375-3228</u>	<u>Buffalo 57720</u>

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JUL 28 2009
WATER RIGHTS
PROGRAM

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

- | | | | |
|---|--|--|--|
| ☐ Municipal | ☐ Suburban Housing | ☐ Recreational | ☐ Institutional |
| ☐ Rural Water System | ☐ Commercial | ☐ Fish & Wildlife | ☐ Geothermal Heat |
| ☐ Domestic (over 18 gpm) | ☒ Industrial | ☐ Other | |

Type of Application: (check one)
☒ New ☐ Vested Right (Use predates Mar 2, 1955) ☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____
☐ Amendment/Correction to Permit No. _____

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

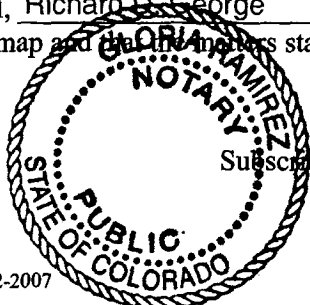
- Name of Applicant Luff Exploration Company Phone (303) 861-2468
(check one) ☒ Owner ☐ Tenant/lessee
Mailing Address 1580 Lincoln Street, Suite 850 Denver State CO 80203
(Street, RR, or Box and City) (Zip Code)
- Amount of water claimed 0.19 *CFS or 87.5 **GPM ***AF
(*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use if applicable
- Source of water supply Well - Dakota Formation
- Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) County Harding
1 well in NWNE Section 16, T22N, R6E
- County or counties where water will be used Harding
- Annual period during which water is to be used January 1 - December 31
- Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Water will be injected into the Red River formation of the proposed Pete's Creek Red River Unit.
Maximum requested rate of 3,000 bbls/day equals 87.5 GPM.

STATE OF SOUTH DAKOTA)
County of Harding) SS

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

I, Richard B. George, the applicant, certify that I have read this application, have examined the attached map and the information stated are true and that I intend, and am able to complete the necessary construction.



Applicant's signature [Signature]

Subscribed and sworn to before me this 21 day of July 20 09

Gloria Ramirez
Notary Public signature
EXP. 8/21/2010

**SOUTH DAKOTA
WATER PERMIT NO. 1905-1**

Date of first receipt of application July 28, 2009.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 1905-1 to Luff Exploration Company, 1580 Lincoln St, Suite 850, Denver CO 80203 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 1905-1 appropriates 0.195 cubic feet of water per second (87.5 gallons per minute) from one well to be completed into the Inyan Kara (approximately 4,785 feet deep below grade) located in the NW ¼ NE ¼ Section 16-T22N-R6E.
2. The water appropriated shall be used for the purpose of industrial use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 1905-1 is October 5, 2009.
5. The date from which applicant may claim right is July 28, 2009.
6. One-fifth of the construction is to be completed on or before April 5, 2012.
7. All construction is to be completed on or before October 5, 2014.
8. Water is to be put to beneficial use on or before October 5, 2018.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

WATER MANAGEMENT BOARD

By: Garland Erbele
Garland Erbele, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JAN 13 2010

date



(type or print in ink)

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1. Well Information - Proposed Construction

- a) Drill Hole Diameter 8-3/4" Depth 9,204'
- b) Casing Type Steel Diameter 7" OD Thickness 0.317"
- c) Screen Type None Diameter _____ Thickness _____
- d) Gravel Pack None Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material 4,587' (KB) Top of Dakota Formation
- f) Depth to Water (ground surface to water level) 4,569' Top of Dakota Formation
- g) Distance to nearest existing domestic well:
On applicants property Not Applicable On property owned by others 665' (Merle Johnson)

2. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) Not Applicable
- b) System Capacity (gallons) _____ Year Constructed _____
- c) Connected to the City of _____ Sanitary System

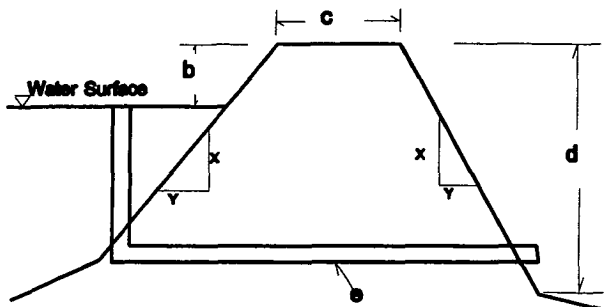
3. Dugout Information

- a) Surface Dimensions 400 Bbl Fiberglass Tanks Depth Above ground
- b) Depth to water (ground surface to water level) _____

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:



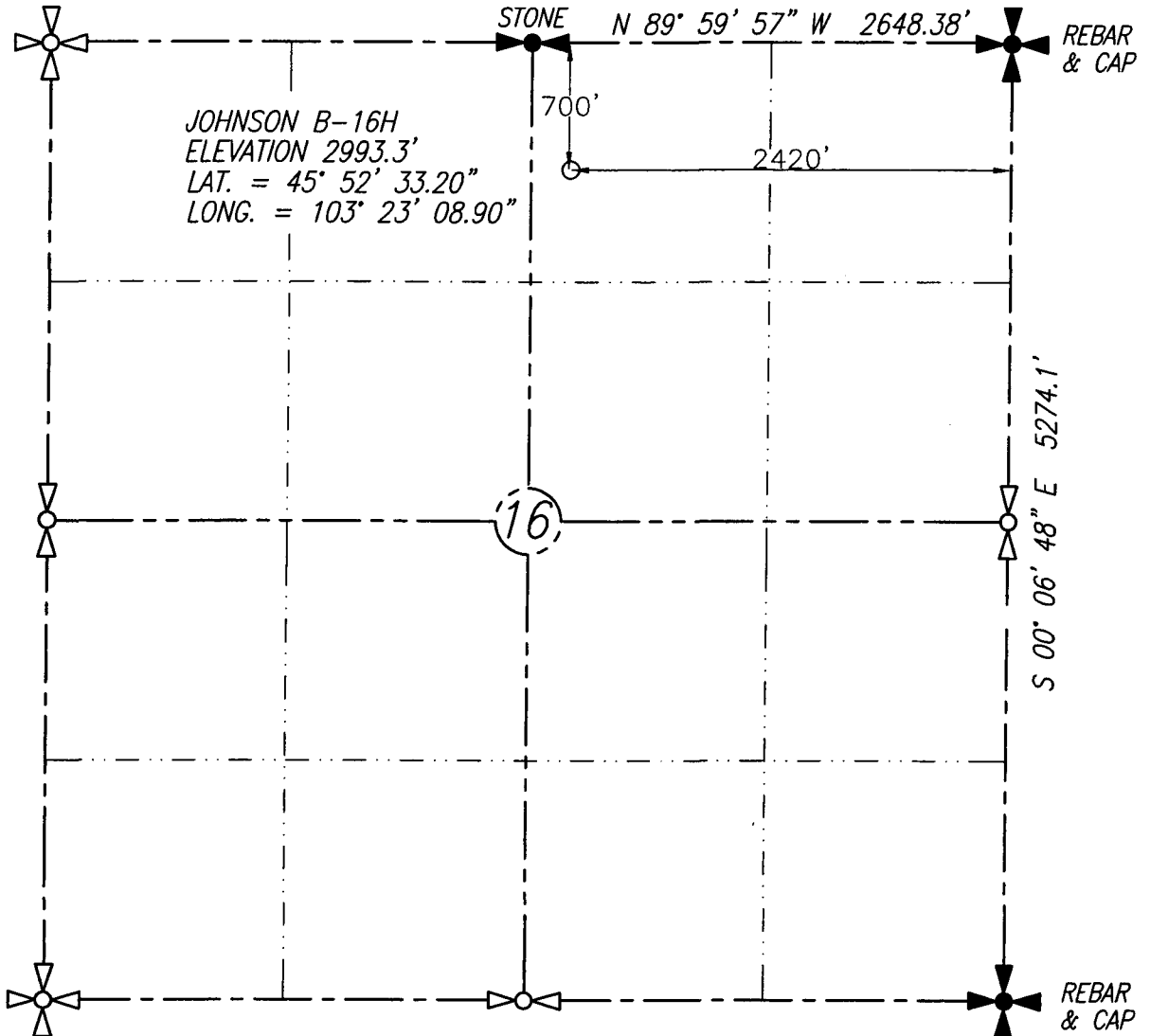
- b) Freeboard _____
- c) Crest Width _____
Crest Length _____
- d) Height _____
- e) Primary Outlet Capacity _____
If pipe, diameter _____
- f) Secondary Spillway Capacity _____
Spillway Width _____
- g) X & Y Slope _____
Upstream _____
Downstream _____
- h) Surface Area of Impoundment _____
- i) Storage _____ Acre Feet
- j) Drainage Area Above Dam _____ Acres

WELL LOCATION PLAT
LUFF EXPLORATION
JOHNSON B-16H
SECTION 16, T22N, R6E
HARDING COUNTY, S.D.
700' FNL & 2420' FEL

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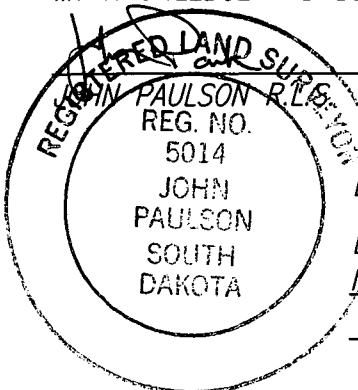
WATER RIGHTS
PROGRAM



I CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS
WORK PERFORMED BY ME OR UNDER MY RESPONSIBLE
CHARGE, AND IS TRUE AND CORRECT TO THE BEST OF
MY KNOWLEDGE AND BELIEF

PERSON AUTHORIZING SURVEY;
DAVID NORBY

EXPLANATION AREA: (NAD 27)
USGS TRIPOINT CROOK (FEET)
N = 89,802.5
E = 1,265,039.8
NORTH DAKOTA STATE PLANE
TRUE NORTH



5014

DATE STAKED: 1-24-2008

BASIS OF VERTICAL DATUM:
NAVD 1929

BROSZ ENGINEERING INC.

BOX 357
BOWMAN, N.D. 58623
PHONE: 701-523-3340
FAX: 701-523-5243
PROJECT NO. 08-52



D. DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
Minerals & Mining Program - Oil & Gas Section
2050 West Main, Suite #1, Rapid City, SD 57702-2493
Telephone: 605-394-2229, FAX: 605-394-5317

FORM 4
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AUG 04 2008

Preliminary

DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY

WELL COMPLETION OR RECOMPLETION REPORT

Type of Completion:

☒ Oil Well Gas Well Injection Workover Deepen Plug Back Other: _____

Name and Address of Operator:

Luff Exploration Company 1580 Lincoln Street, Suite 850, Denver, CO 80203

Telephone

303 861 2468

Name and Address of Drilling Contractor and Rig No:

Vertical: Nabors Drilling USA, PO Box 2396, Williston, ND 58802, Rig #684

Surface Location of well: Qtr-Qtr, Sec, Twp, Rge, County, feet from nearest lines of section, and latitude and longitude (if available):
NWNE Sec. 16-T22N-R6E, Harding County, 700' FNL x 2420' FEL; Lat = 45 52' 33.20", Long = 103 23' 08.90"

If Directional, top of pay and bottom hole location from nearest lines of section:

Top of pay: 9224' MD, 8944' TVD @ 695' FNL x 1924' FEL, Sec. 16

BHL Lat: 1592' FEL x 765' FNL Sec. 15, T22N R6E

Well Name and No.	Field and Pool, or Wildcat	Permit No.	API No.	Date Issued
Johnson B-16H	Pete's Creek Field Red River B	1856	40-063-20633	2/14/08

Spud Date	TD Date	Compl Date	Elevation	Total Depth (MD & TVD)	Plug Back TD (MD & TVD)
5/14/08	6/4/08	6/23/08	2991' GR 3009' KB	Lat: 14,859' MD, 8958' TVD	N/A

Producing Interval(s), this Completion, Top, Bottom, Name (MD & TVD) Lat: Top 9224' MD, 8944' TVD; Bottom 14,859' MD, 8958' TVD - Red River B	No. of DST's Run 0 (see page 2)	Was Well cored? ☒ No Yes List Intervals:
--	---------------------------------------	--

Type Electric and Other Logs Run: CBL, Mud Log	Date Directional Survey Submitted Attached
---	---

CASING RECORD (Report all strings set in well)

Hole Size	Casing Size	Weight (lb/ft)	Depth Set	Amount Pulled	Sacks and Type of Cement	Top of Cement
13 1/2"	9 5/8"	36#	2016'		470 sks @ 11.5 ppg & 200 sks @ 14.2 ppg	Surface
8 3/4"	7"	23,26,29#	9204'		1 st 425 sks, 2 nd 165 sks 12.7# lead, 220 sks 15.8 tail	Est @ 3040'

TUBING RECORD

Size	Weight (lb/ft)	Depth Set	Packer Type & Depth	Size	Depth Interval	Sacks and Type of Cement
2 3/8"	6.5#	8908'	Anchor 8387'			

LINER RECORD

PERFORATION RECORD

Interval/Depth	Holes Per Ft.	Formation Isolated	Amount and Type of Cement used (indicate if squeeze cemented). Amount and Type of Acid and/or Sand used. Use additional page(s) if needed.
9224-14,859' MD	6 1/8" open hole		

Continued on Next Page →

PRODUCTION

Date First Production 6/25/08		Producing Method (Flowing, gas lift, pumping - size and type of pump) Pumping 1 1/2" rod pump.				Well Status (Producing or shut-in) Producing	
Date of Test 7/29/08	Hours Tested 24	Choke Size ---	Production For Test →	Oil (Bbls) 0	Gas (Mcf) N/A	Water (Bbls & %) 305	Oil Gravity - API (Corr.) ---
Flowing Tbg Pressure N/A		Casing Pressure 25	Calculate 24 Hour Rate →	Oil (Bbls) 0	Gas (Mcf) N/A	Water (Bbls & %) 305	Gas-Oil Ratio ---
Disposition of Oil (Purchaser and Transporter), and Gas (sold, used for fuel, vented, etc.) Oil Purchaser: N/A Gas used for:: N/A Oil Transporter: N/A						Test Witnessed By N/A	
List of Attachments/Comments: Mud logs, Directional Survey GOR data will be submitted when oil production begins							

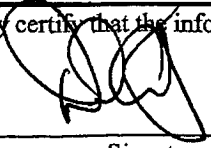
GEOLOGIC MARKERS

FORMATION NAME AND BRIEF DESCRIPTION	MEASURED DEPTH	TRUE VERTICAL DEPTH
Niobrara	3155'	3155'
Dakota	4587'	4587'
Spearfish	5819'	5819'
Minnelusa	6093'	6093'
Charles	6800'	6800'
Mission Canyon	7134'	7134'
Lodgepole	7575'	7575'
Duperow	8191'	8191'
Interlake	8410'	8410'
Red River	9042'	8906'
Red River "B" Porosity	9224'	8944'
Use additional page(s) if needed.		

DRILL STEM TEST DATA

Drill Stem Test Results Attached If not attached, list Depth Interval Tested, Cushion Used, Time Tool Open, Flowing and Shut-in Pressures, and Recoveries. Use additional page(s) if needed.
--

I hereby certify that the information herein provided is true, complete, and correct as determined from all available records.

	David A. Norby	Operations Manager	08/01/08
Signature	Name (Print)	Title	Date

FOR OFFICE USE ONLY

Approved By: 	Title: D. G. Supervisor	Date: AUG 27 2008
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DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
Minerals & Mining Program - Oil & Gas Section
2050 West Main, Suite #1, Rapid City, SD 57702-2493
Telephone: 605-394-2229, FAX: 605-394-5317

FORM 6
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JUL 27 2009

AUG 13 2009

DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY

SUNDRY NOTICE AND REPORT ON WELLS

Operator Name Luff Exploration Company	Telephone 303 - 861-2468
Address 1580 Lincoln Street, Suite 850, Denver, CO 80203	

Permit #	API No.	Well Name and Number	Location (Qtr-Qtr, Sec, Twp, Rge, County)
1856	40 063 20633	Johnson B-16H	NWNE Sec. 16, T22N, R6E, Harding Cty

Notice of Intention To:

Subsequent Report of :

Request for change of:

- | | |
|-------------------------------------|---|
| ☐ | Temporarily Abandon |
| ☐ | Plug and Abandon |
| ☐ | Pull, Alter, or Test Casing |
| ☒ | Perforate |
| ☒ | Acidize |
| ☐ | Fracture Treatment |
| ☐ | Squeeze Cement |
| ☒ | Other <u>Convert to Water Source Well</u> |

- | | |
|--------------------------|---------------------------------|
| ☐ | Drilling Progress |
| ☐ | BOP Pressure Test/Program |
| ☐ | Gas/Oil Ratio |
| ☐ | Work-Over (Perf, Frac, Acidize) |
| ☐ | Shut-In Pressure |
| ☐ | Spill |
| ☐ | Mechanical Integrity Test |
| ☐ | Other _____ |

- | | |
|--------------------------|---------------------|
| ☐ | Location |
| ☐ | Elevation |
| ☐ | Producing Method |
| ☐ | Producing Formation |
| ☐ | Injection Pressure |
| ☐ | Injection Volume |
| ☐ | Injection Fluid |
| ☐ | Other _____ |

Luff Exploration plans to set a CIBP @ 5050' and convert the Johnson B-16H to a water source well from the Dakota as follows:

- 1) Perforate from 4684' to 4709' and 4760' to 4785' with 4 SPF.
- 2) Swab test well, if results warrant acid, go to step 3, if fluid entry sufficient, go to step 4.
- 3) Acidize w/2500 gallons HCl.
- 4) Run electric submersible pump and place well on production.

An application for Permit to Appropriate Water has been submitted to the Water Rights Group South Dakota DENR.

Note: The Red River "B" was plugged by setting a CIBP @8310', 5 sks cmt were dumped on top. The casing was tested to 1000 psi and held.

I hereby certify that the foregoing as to any work or operation performed is a true and correct report of such work or operation.

Signature

David A. Norby

Name (Print)

Operations Manager

Title

7/24/09

Date

FOR OFFICE USE ONLY

Approved by: <u>Fred A. Thee</u>	Title: <u>Oil & Gas Supervisor</u>	Date: <u>AUG 10 2009</u>
Conditions, if any:		



DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
Minerals & Mining Program - Oil & Gas Section
2050 West Main, Suite #1, Rapid City, SD 57702-2493
Telephone: 605-394-2229, FAX: 605-394-5317

FORM 6

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AUG 07 2009

AUG 13 2009

DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY

SUNDRY NOTICE AND REPORT ON WELLS

Operator Name Luff Exploration Company	Telephone 303 - 861-2468
Address 1580 Lincoln Street, Suite 850, Denver, CO 80203	

Permit #	API No.	Well Name and Number	Location (Qtr-Qtr, Sec, Twp, Rge, County)
1856	40 063 20633	Johnson B-16H	NWNE Sec. 16, T22N, R6E, Harding Cty

Notice of Intention To:

- | | |
|-------------------------------------|-------------------------------|
| ☐ | Temporarily Abandon |
| ☐ | Plug and Abandon |
| ☐ | Pull, Alter, or Test Casing |
| ☐ | Perforate |
| ☐ | Acidize |
| ☐ | Fracture Treatment |
| ☐ | Squeeze Cement |
| ☒ | Other <u>Change well name</u> |

Subsequent Report of :

- | | |
|--------------------------|---------------------------------|
| ☐ | Drilling Progress |
| ☐ | BOP Pressure Test/Program |
| ☐ | Gas/Oil Ratio |
| ☐ | Work-Over (Perf, Frac, Acidize) |
| ☐ | Shut-In Pressure |
| ☐ | Spill |
| ☐ | Mechanical Integrity Test |
| ☐ | Other _____ |

Request for change of:

- | | |
|--------------------------|---------------------|
| ☐ | Location |
| ☐ | Elevation |
| ☐ | Producing Method |
| ☐ | Producing Formation |
| ☐ | Injection Pressure |
| ☐ | Injection Volume |
| ☐ | Injection Fluid |
| ☐ | Other _____ |

Luff Exploration plans to convert the Johnson B-16H to a water source well from the Dakota, therefore we request a name change as follows:

From: Johnson B-16H

To: Johnson B-16 WSW

I hereby certify that the foregoing as to any work or operation performed is a true and correct report of such work or operation.

Signature

David A. Norby
Name (Print)

Operations Manager
Title

8/5/09
Date

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Approved by:

Title: Bill & Gas Supervisor

Date: AUG 07 2009

Conditions, if any:



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OCT 29 2008

DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY

SUNDRY NOTICE AND REPORT ON WELLS

Operator Name
Luff Exploration Company

Telephone
303 - 861-2468

Address
1580 Lincoln Street, Suite 850, Denver, CO 80203

Permit #	API No.	Well Name and Number	Location (Qtr-Qtr, Sec, Twp, Rge, County)
1856	40 063 20633	Johnson B-16H	NWNE Sec. 16, T22N, R6E, Harding Cty

Notice of Intention To:

- ☒ Temporarily Abandon
- ☐ Plug and Abandon
- ☐ Pull, Alter, or Test Casing
- ☐ Perforate
- ☐ Acidize
- ☐ Fracture Treatment
- ☐ Squeeze Cement
- ☐ Other _____

Subsequent Report of:

- ☐ Drilling Progress
- ☐ BOP Pressure Test/Program
- ☐ Gas/Oil Ratio
- ☐ Work-Over (Perf, Frac, Acidize)
- ☐ Shut-In Pressure
- ☐ Spill
- ☐ Mechanical Integrity Test
- ☒ Other TA Wellbore

Request for change of:

- ☐ Location
- ☐ Elevation
- ☐ Producing Method
- ☐ Producing Formation
- ☐ Injection Pressure
- ☐ Injection Volume
- ☐ Injection Fluid
- ☐ Other _____

Well temporarily abandoned as follows:

1. Wireline set 7" CIBP @ 8310'.
2. Dump bailed cement (10 sks) on BP.
3. Pressure tested casing to 1000 psi. Held on 15 min. test. Test witnessed by Leroy Hansen of Luff Exploration.
4. Temporarily abandoned below 8310' as of 10/23/08

I hereby certify that the foregoing as to any work or operation performed is a true and correct report of such work or operation.

Signature

David A. Norby
Name (Print)

Operations Manager
Title

10/27/08
Date

FOR OFFICE USE ONLY

Approved by:

Title: O-G Supervisor

Date: OCT 30 2008

Conditions, if any:



ACOUSTIC CEMENT BOND LOG GR-CCL-VDL

Company	LUFF EXPLORATION COMPANY			
Well	JOHNSON #B-16H			
Field	PETE'S CREEK			
County	HARDING			
State	SD			
Location:	API #: 40-063-20633			
Other Services				
SEC 16	TWP 22N			
RGE 6E				
Permanent Datum	GROUND LEVEL			
Elevation	2991'			
Log Measured From	KB OR 18' AGL			
Drilling Measured From	KELLY BUSHING			
Elevation	K.B. 3009'			
	G.L. 2991'			
Date	6-5-08			
Run Number	ONE			
Depth Driller	14859'			
Depth Logger	9181'			
Bottom Logged Interval	9181'			
Top Log Interval	1981'			
Type Fluid	WATER/OIL			
Fluid Level	SURFACE			
Kick Out Point	8400'			
Max. Recorded Temp.				
Estimated Cement Top	3040'			
Time Well Ready				
Time Logger on Bottom				
Equipment Number	T1/B2/G2			
Location	BAKER MT			
Recorded By	HALL			
Witnessed By	MR CRAIG IVERSEN			
Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	9.625'	36#	SURFACE	2016' - DTWI
Prot. String				
Production String	7'	23#.26#.29#	SURFACE	9204'
Liner				
Tubing				

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

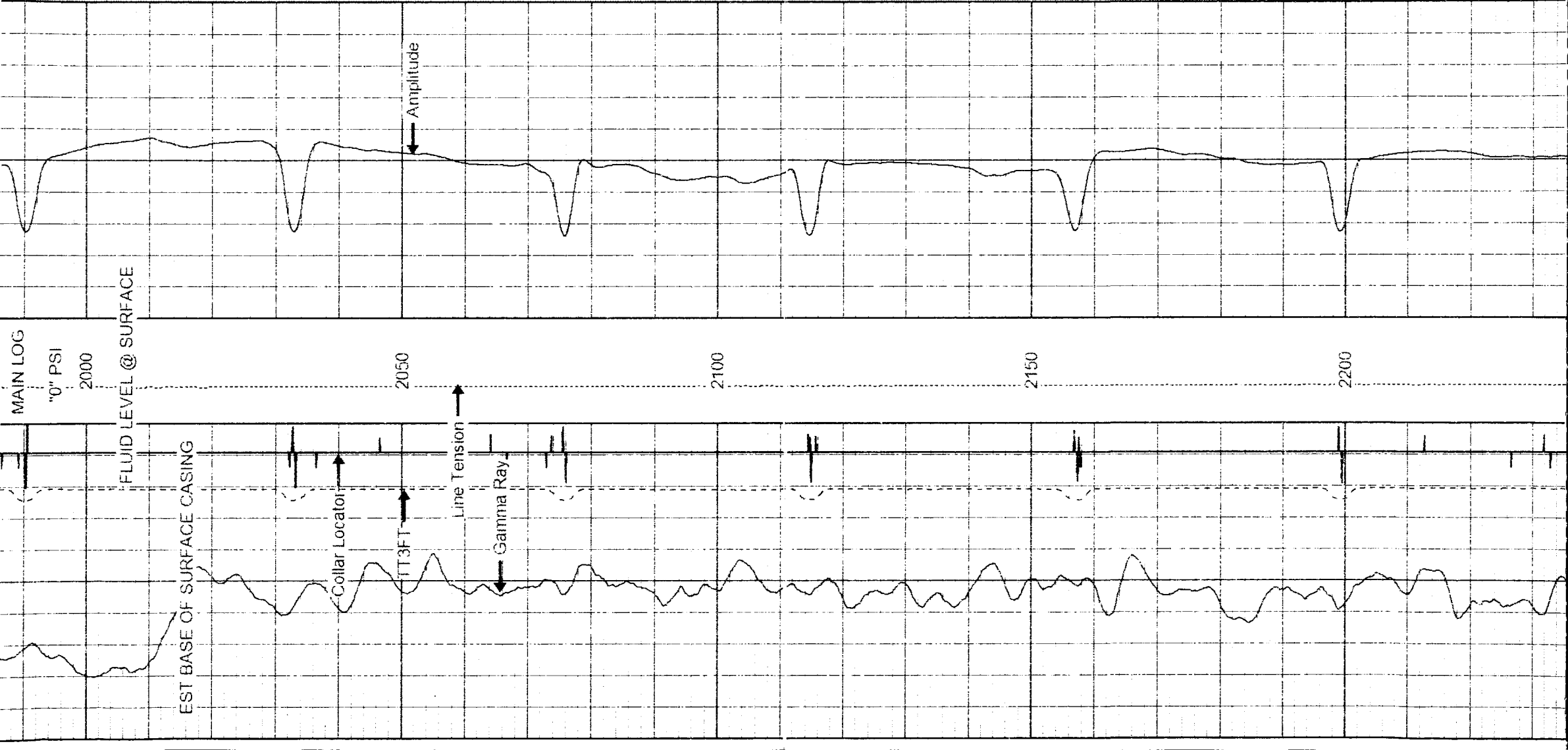
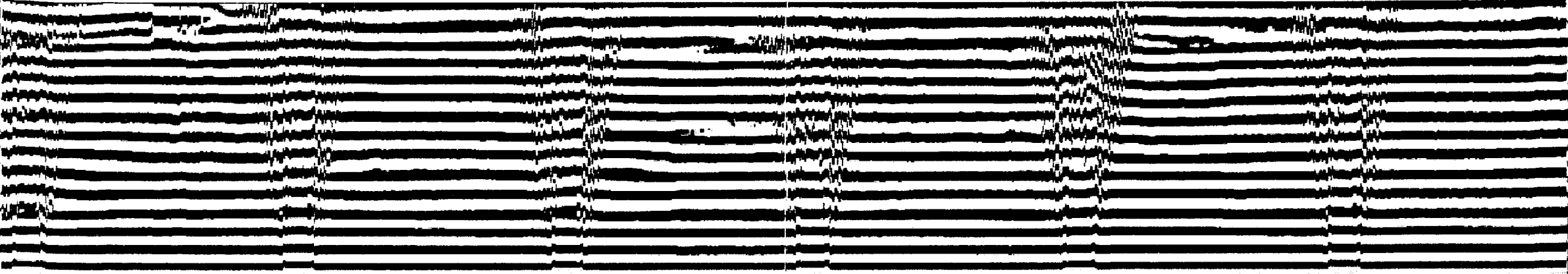
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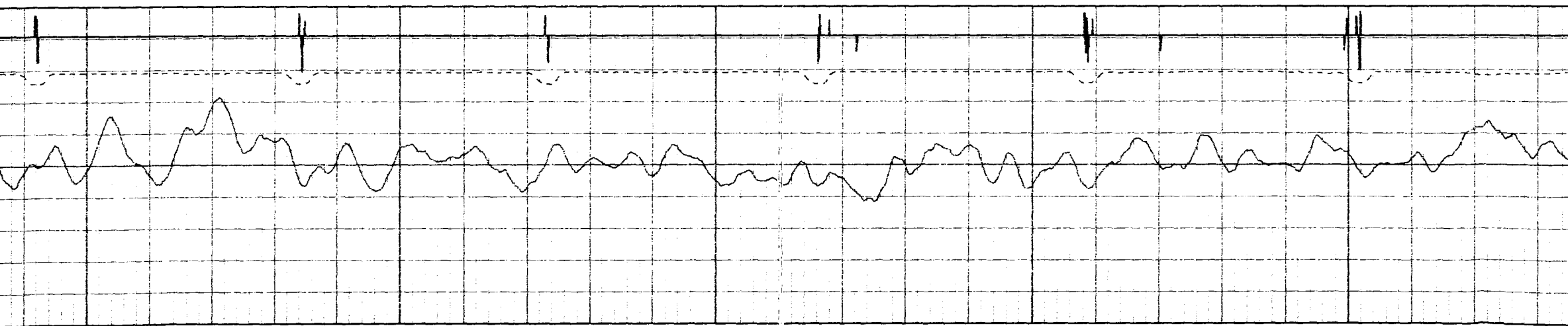
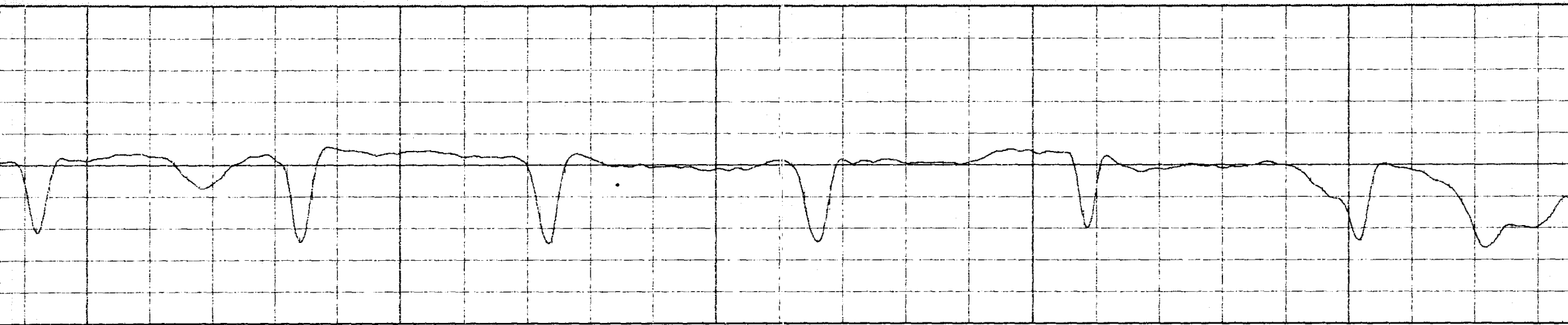
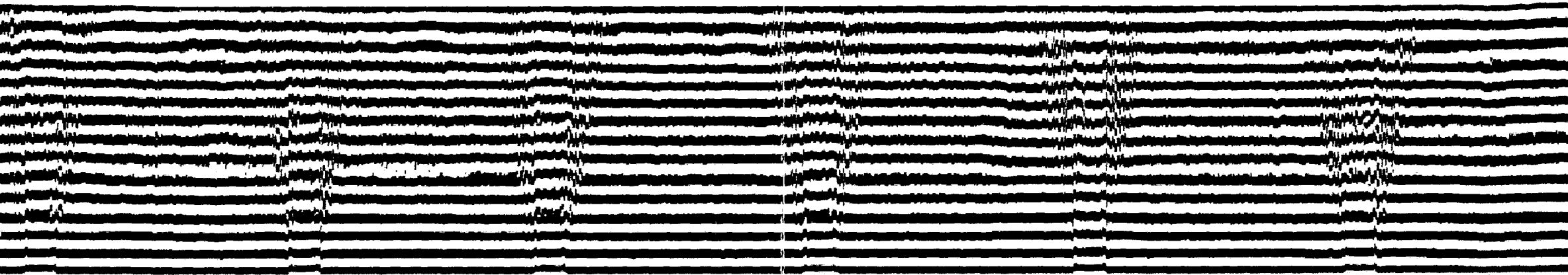
LOG RECORDED WHILE INJECTING INTO WELL TO KEEP WELLBORE FULL.

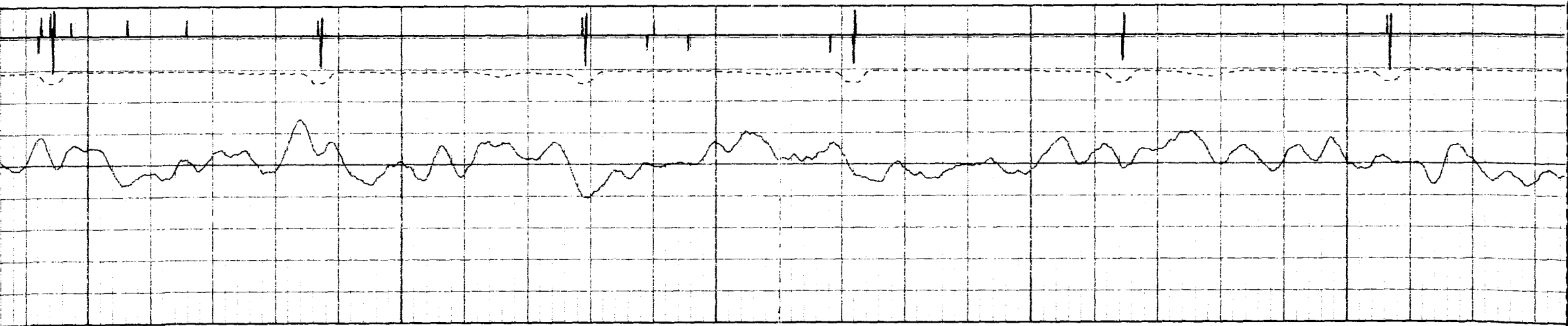
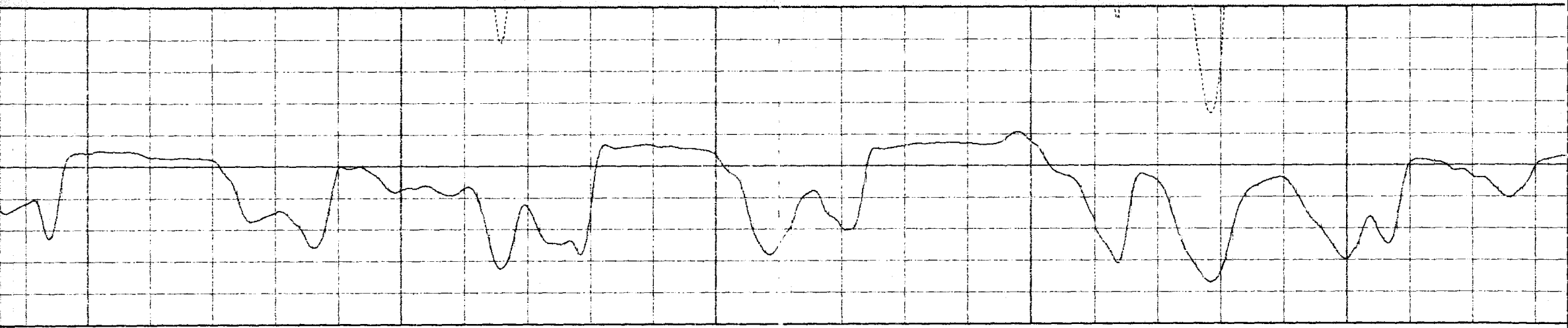
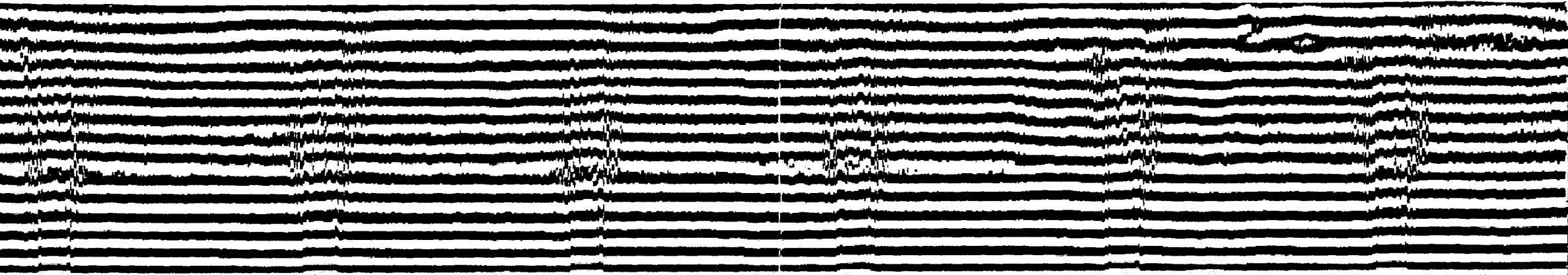
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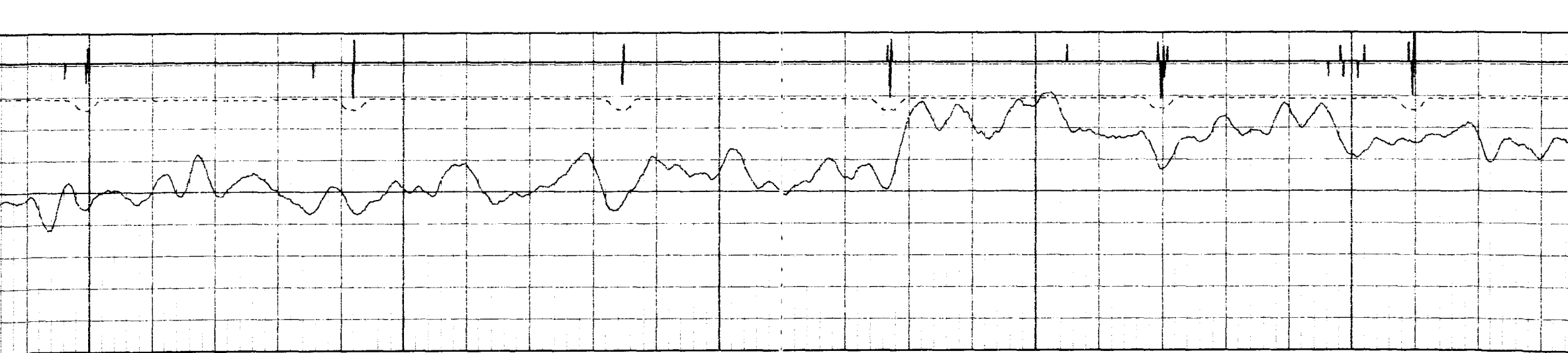
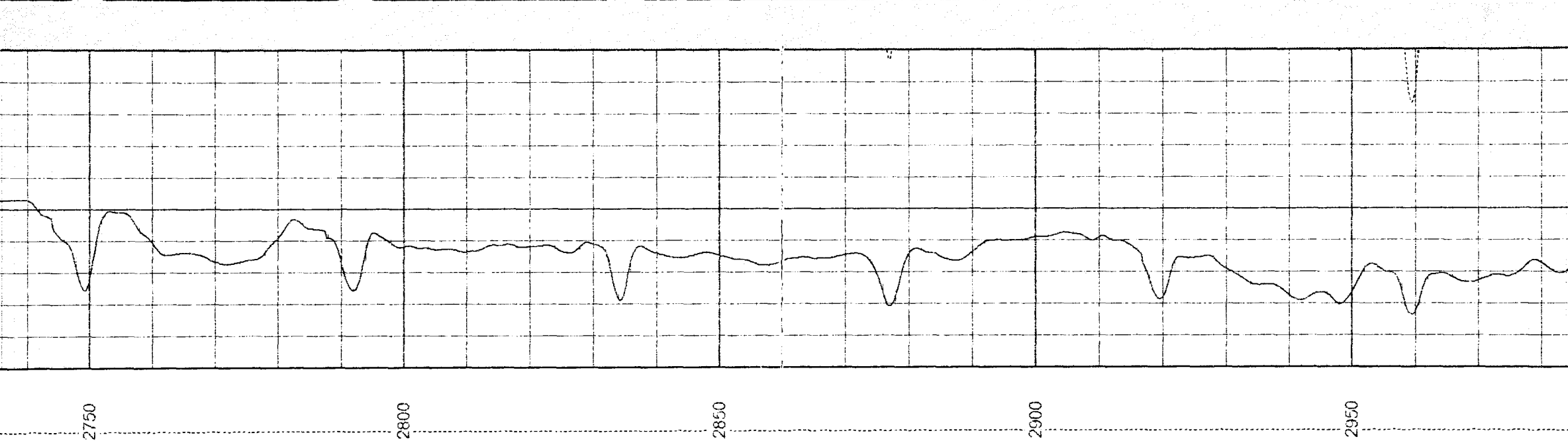
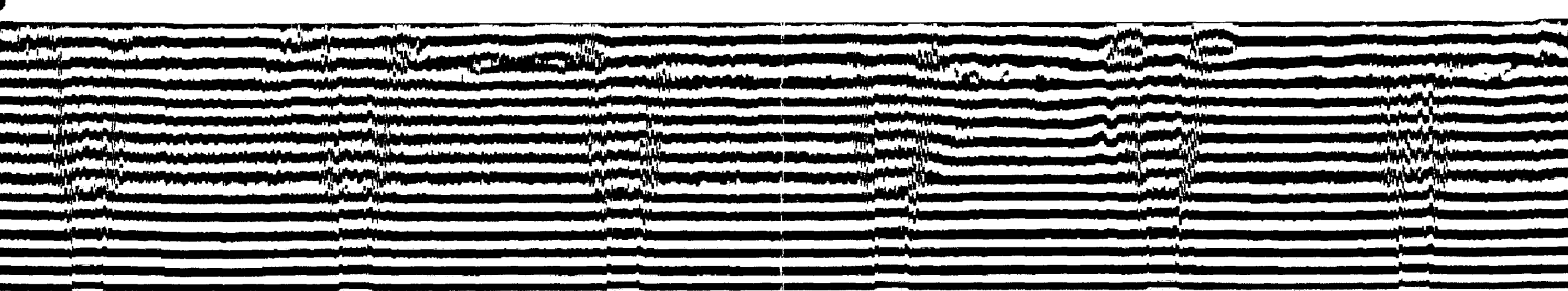
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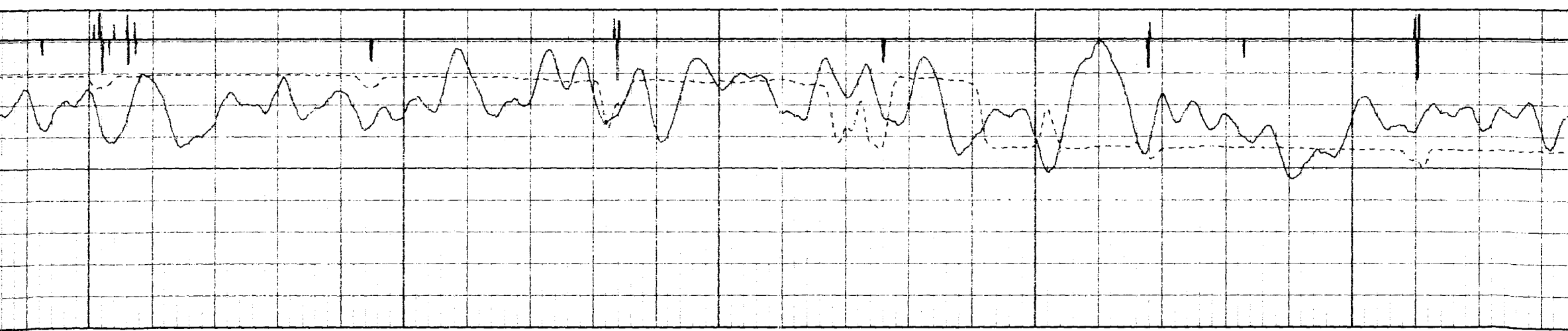
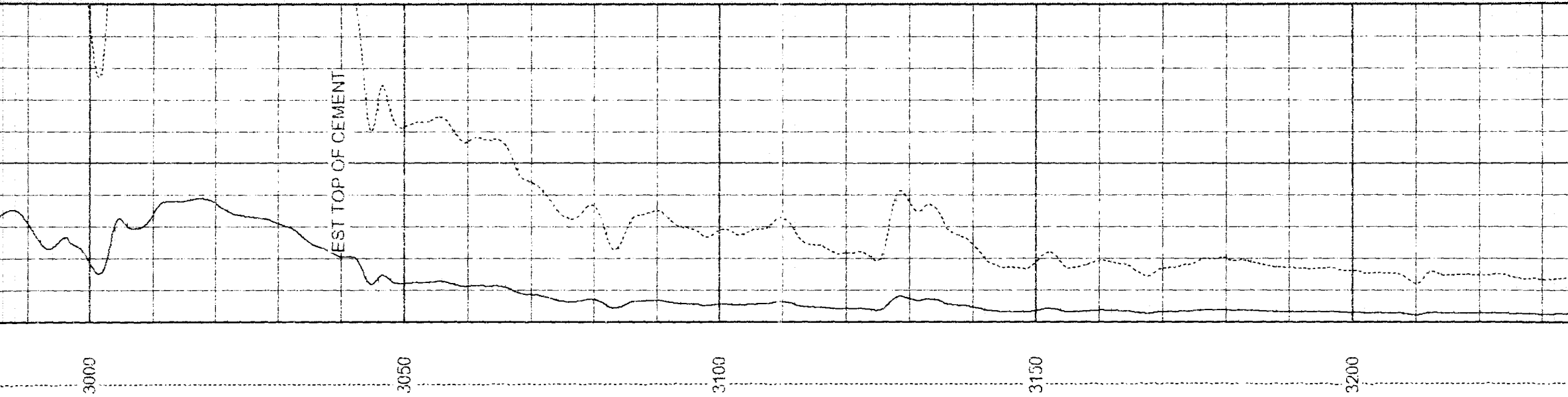
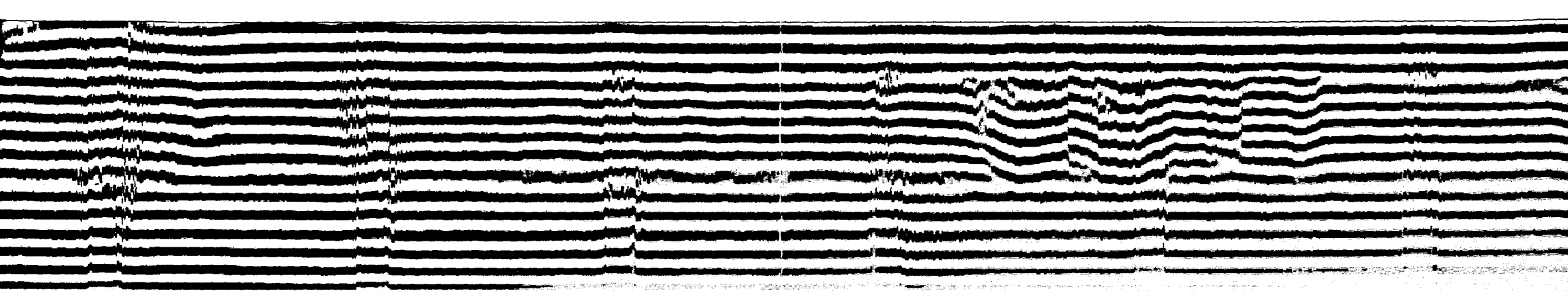
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0	Gamma Ray (cps)	200' 0	(lb)2000' 0	Amplitude (mV)	100			
400	TT3FT (usec)	200						

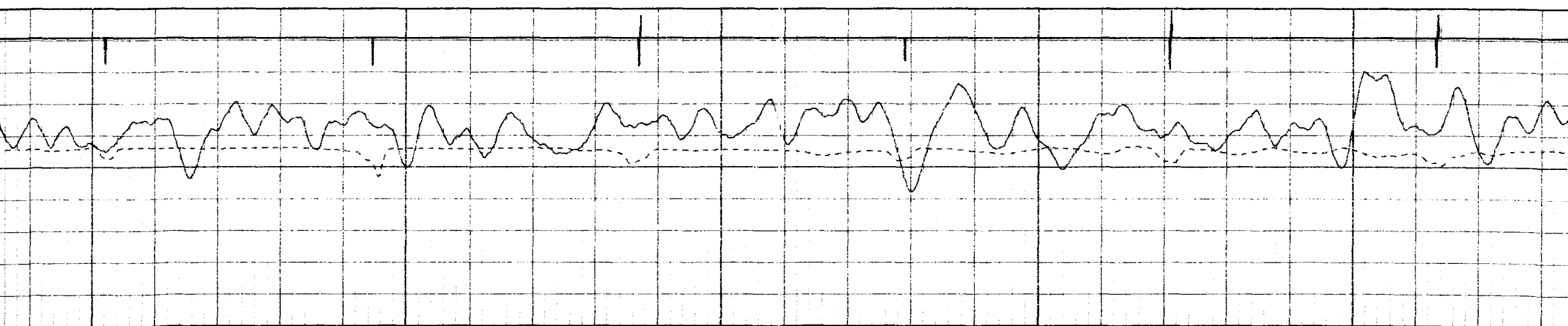
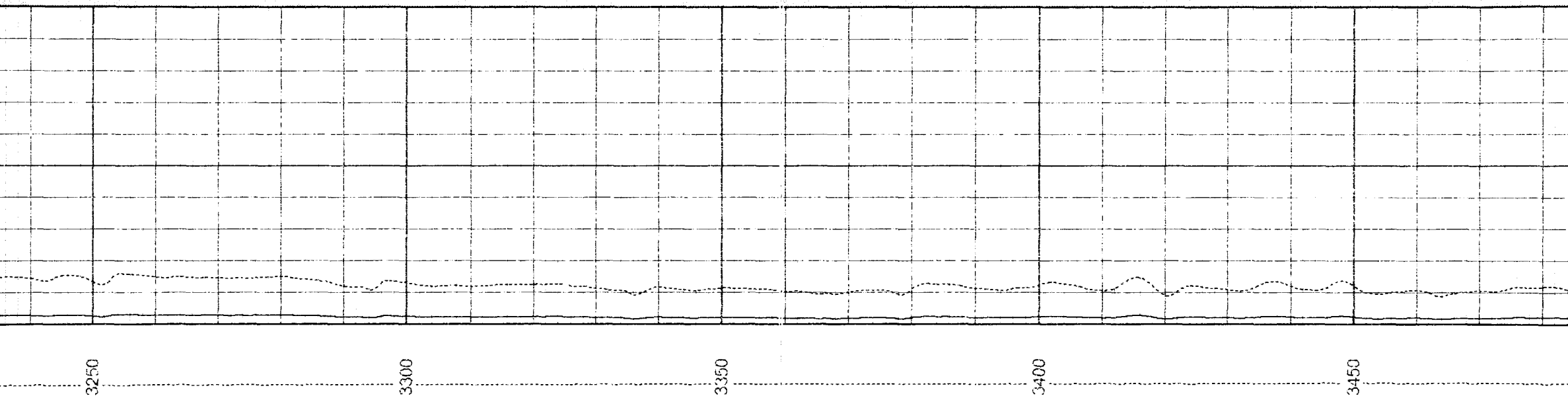
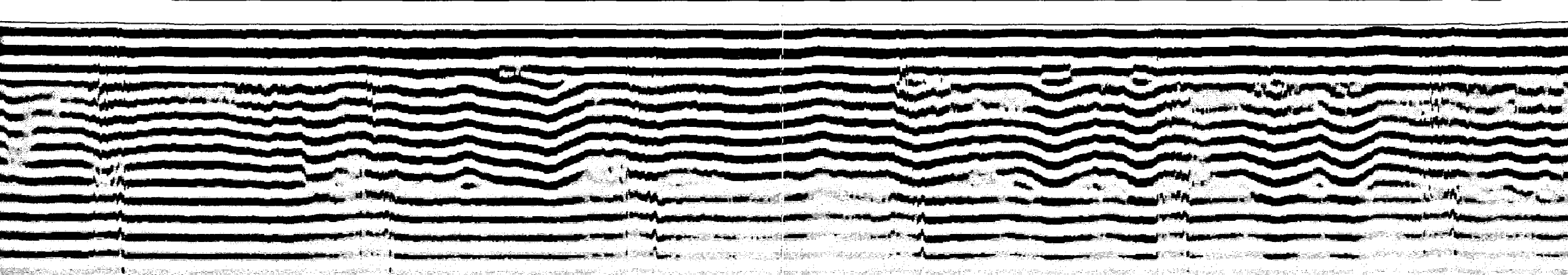


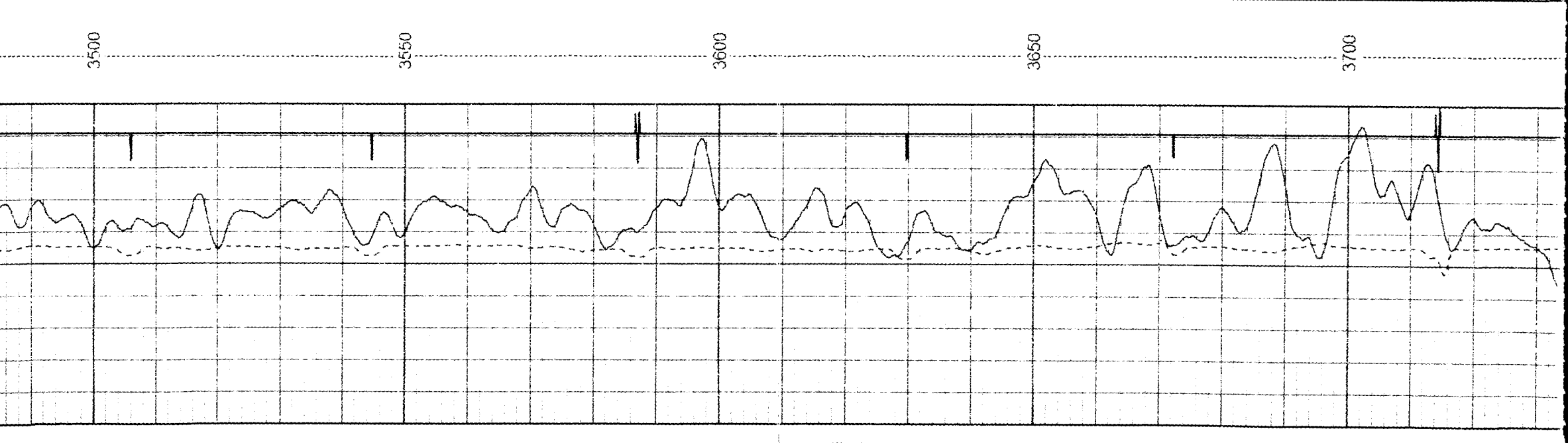
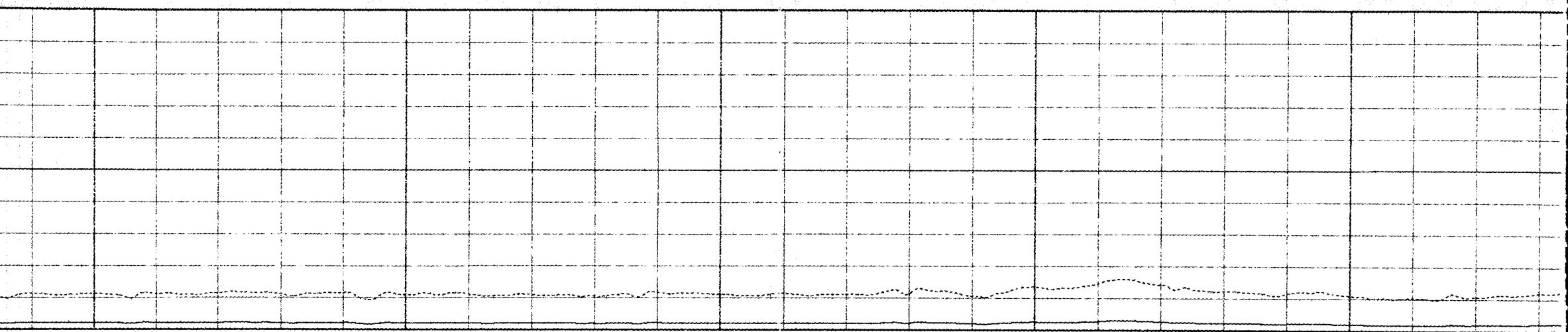
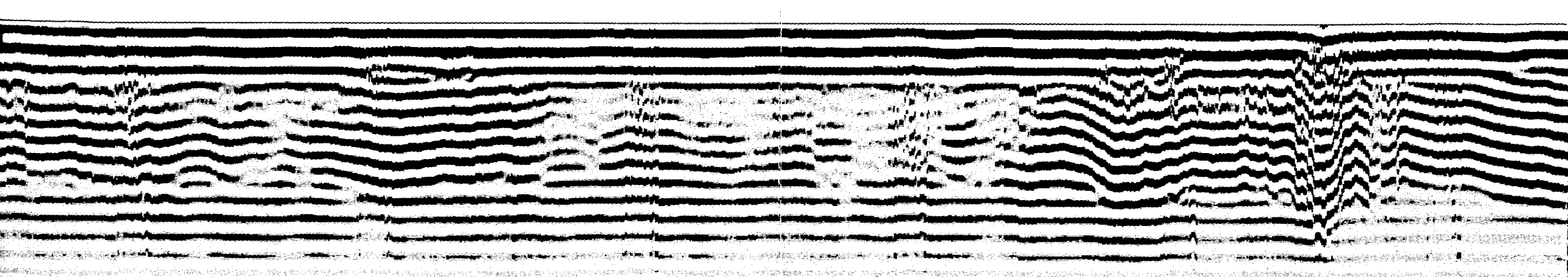


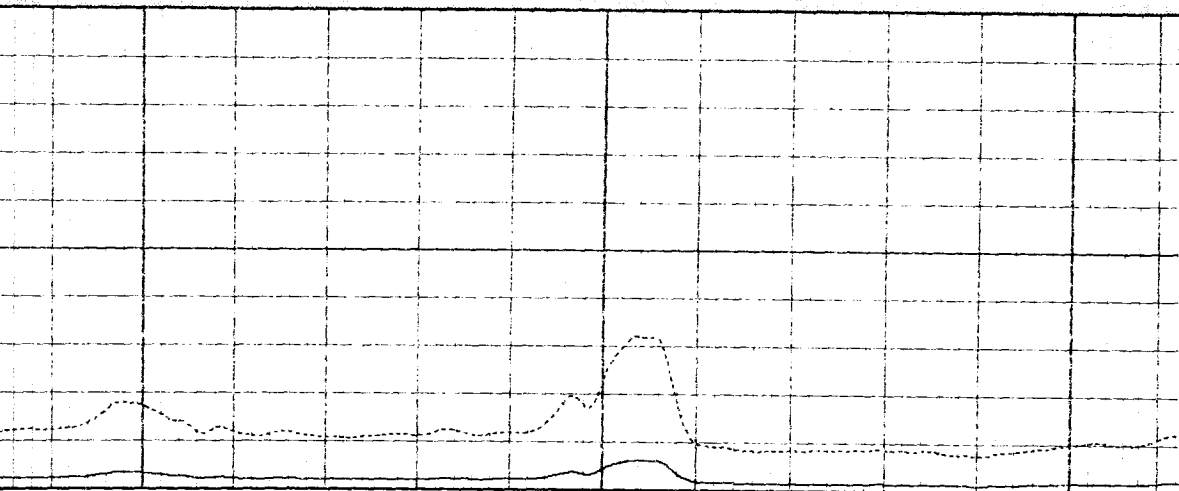
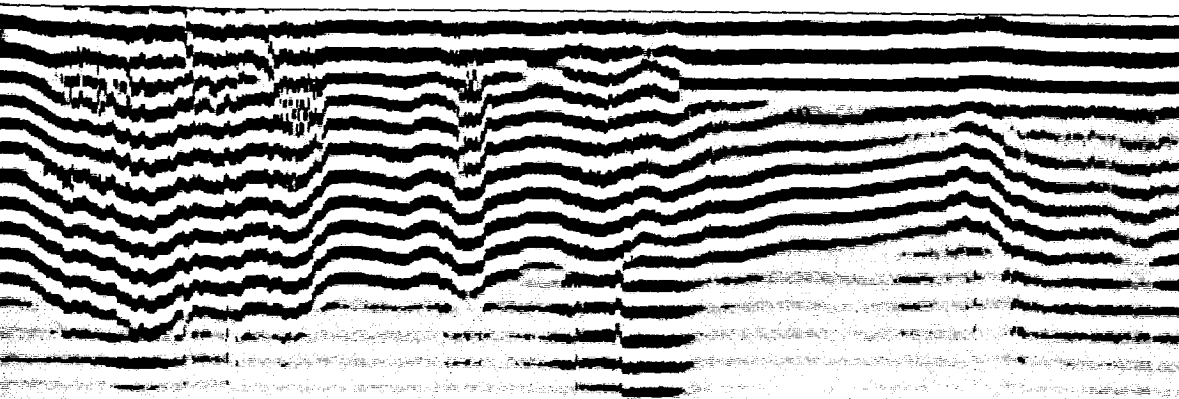








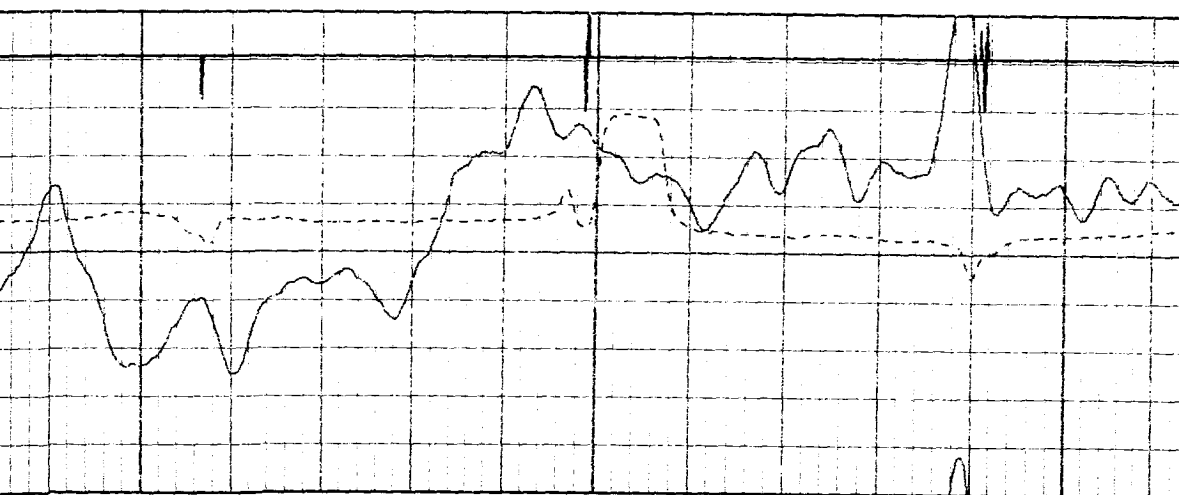


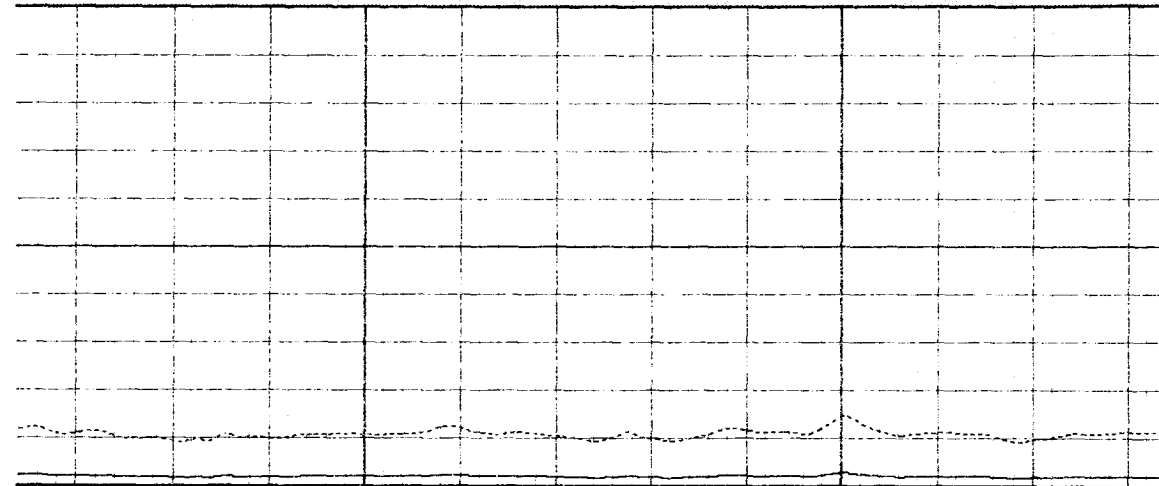
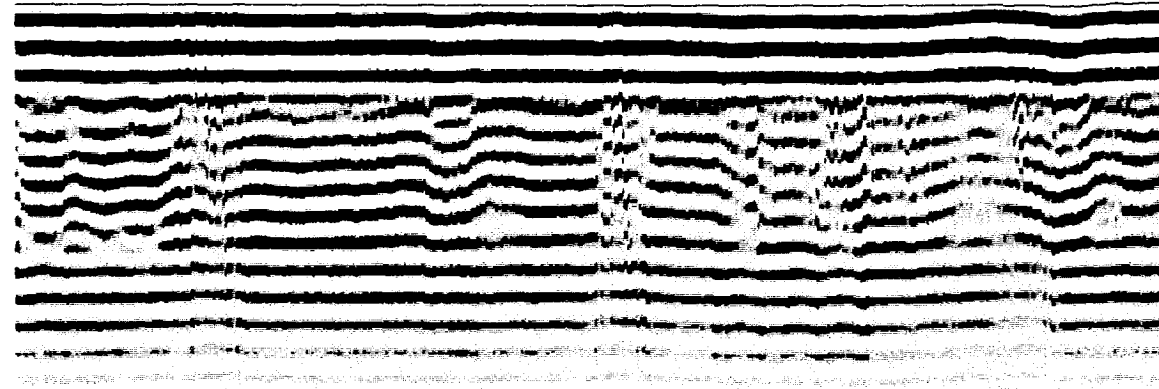


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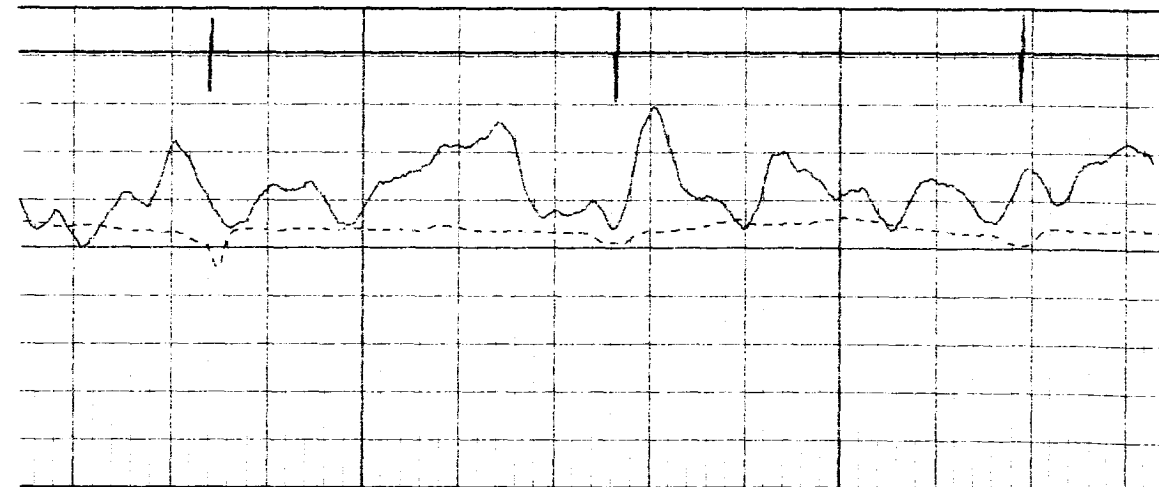
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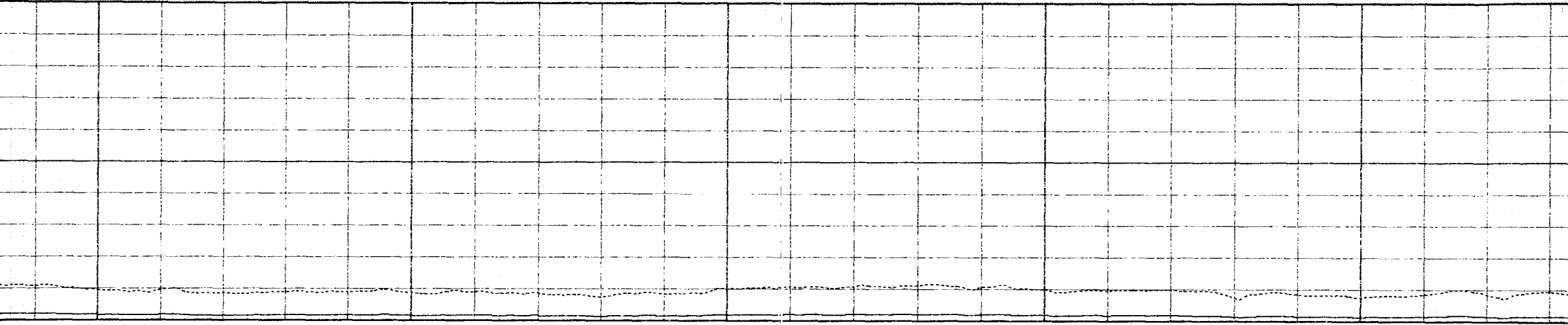
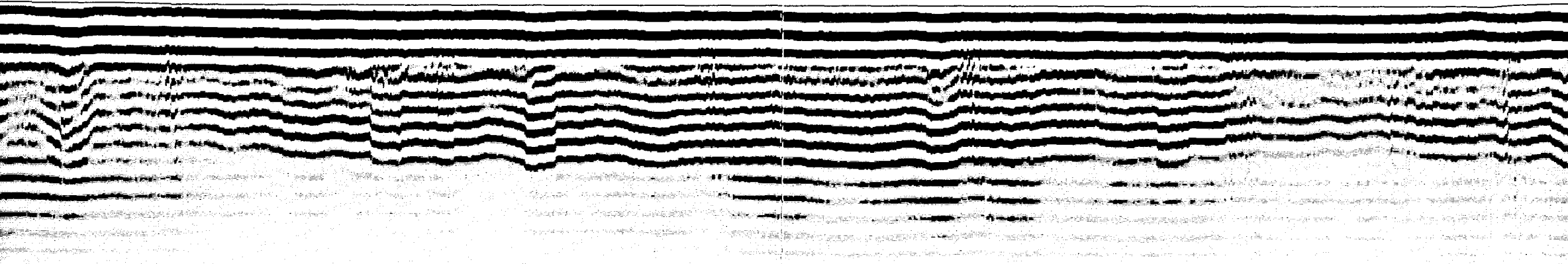




3900

3950





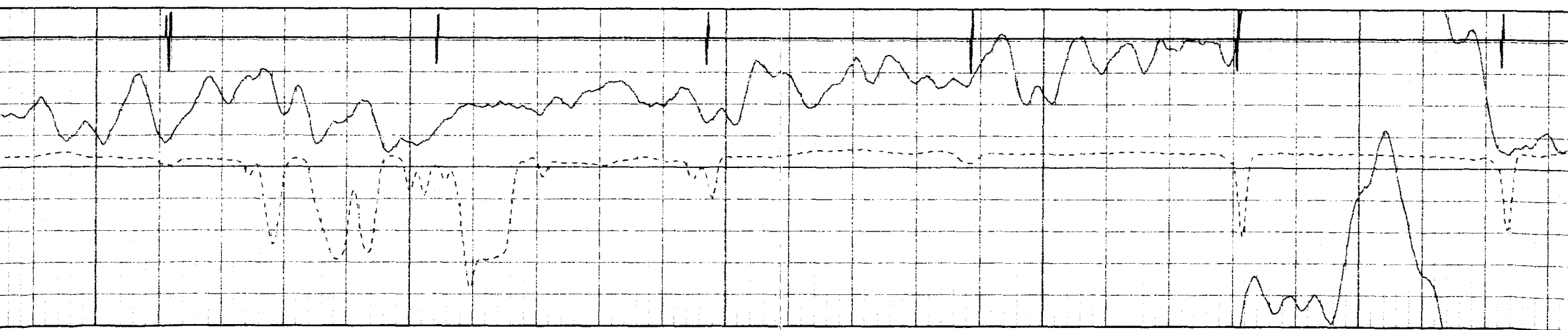
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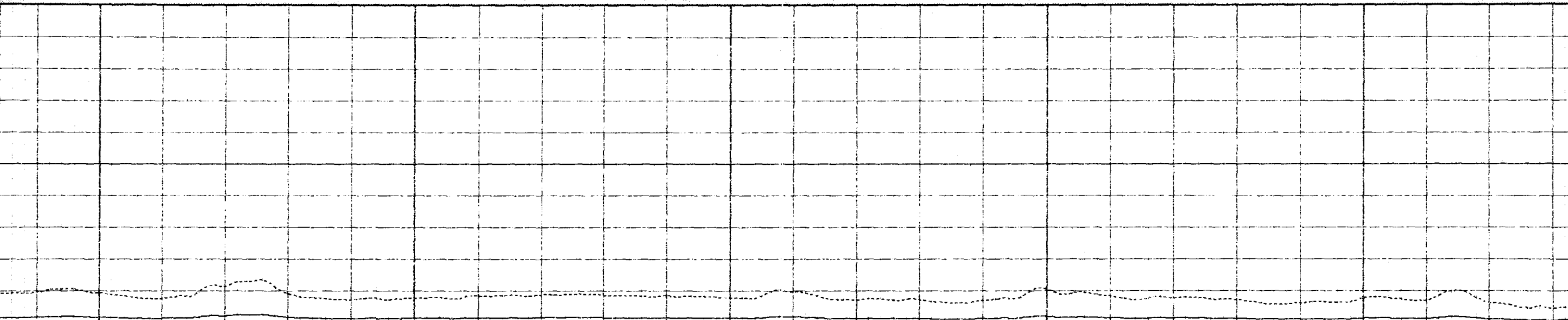
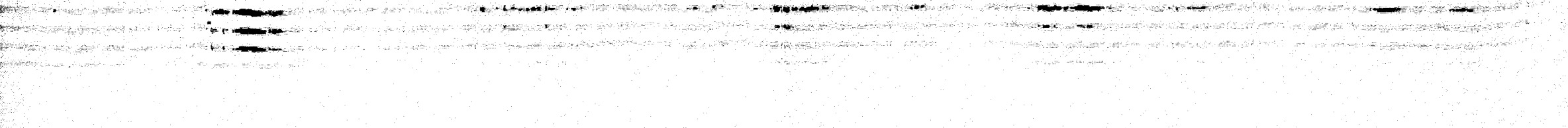
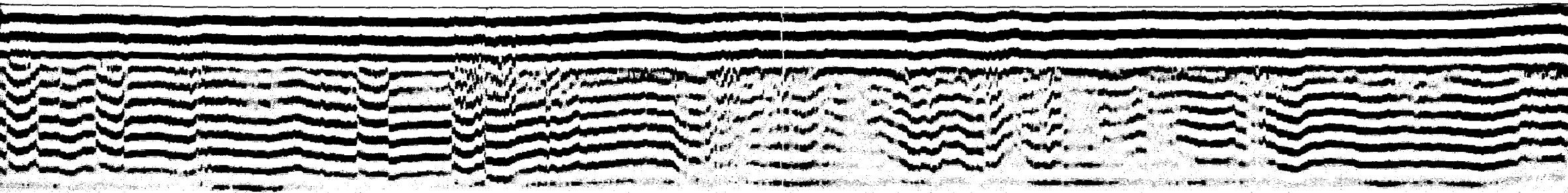
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4200





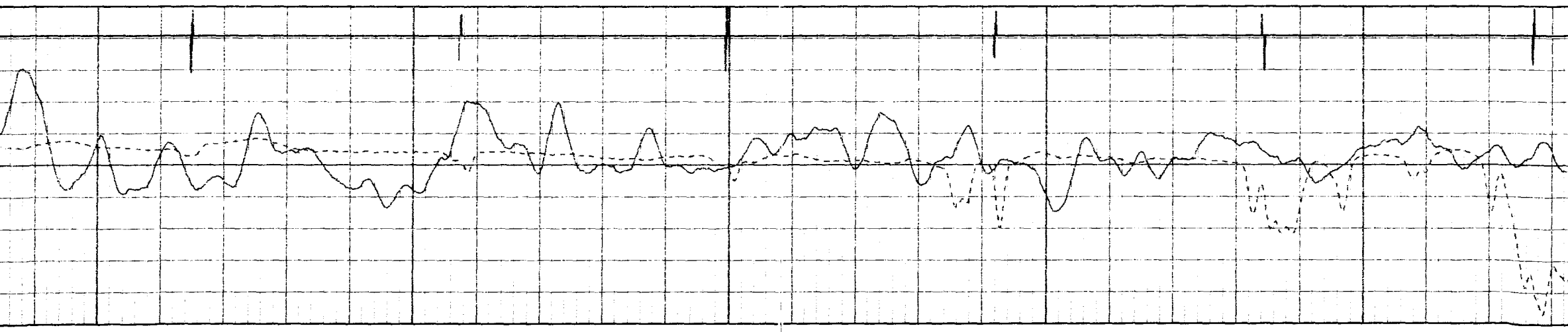
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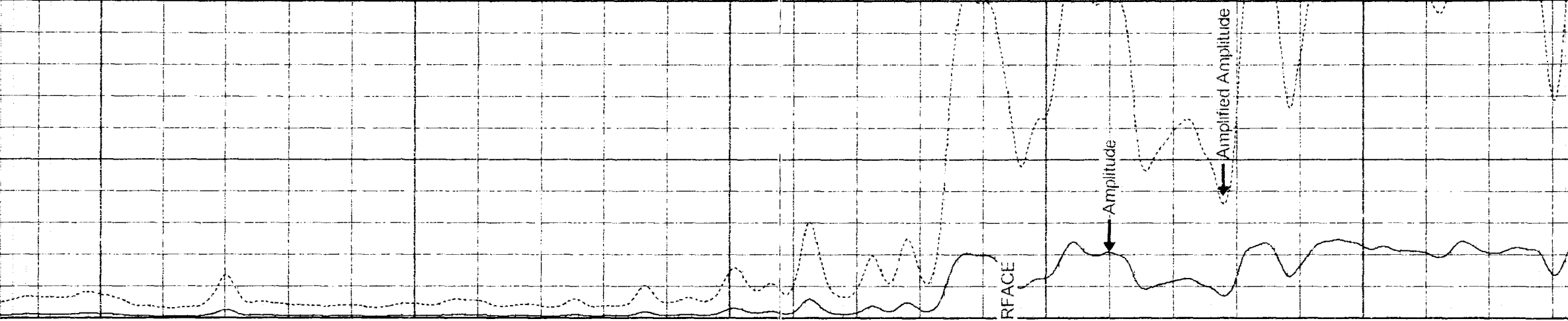
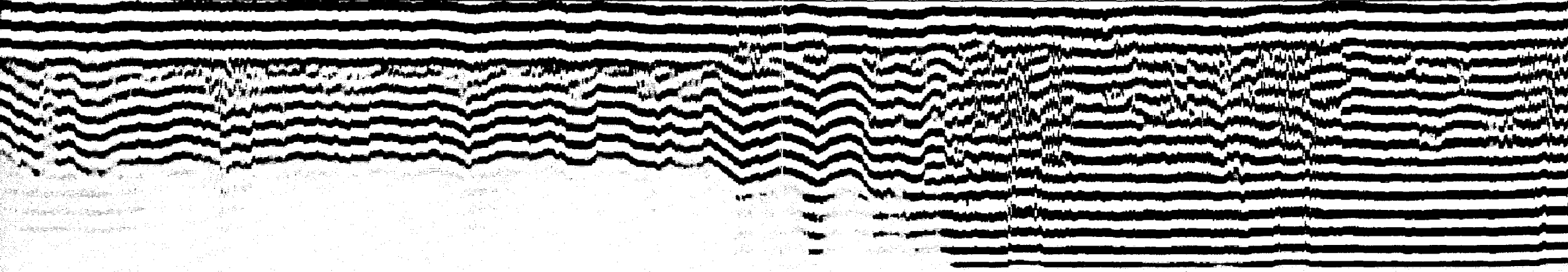
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4350

4400

4450





4500

4550

4600

MAIN LOG

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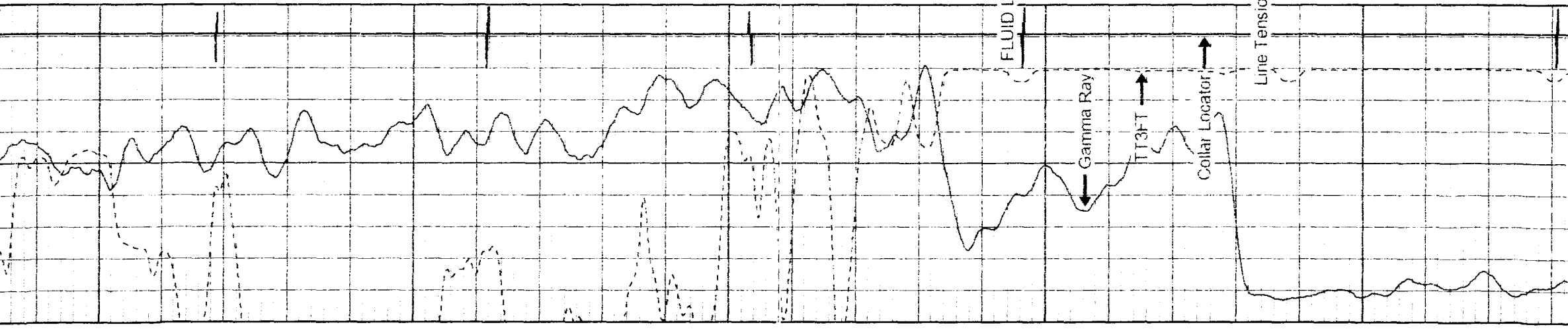
FLUID LEVEL @ SURFACE

4650

Amplitude

Amplified Amplitude

4700

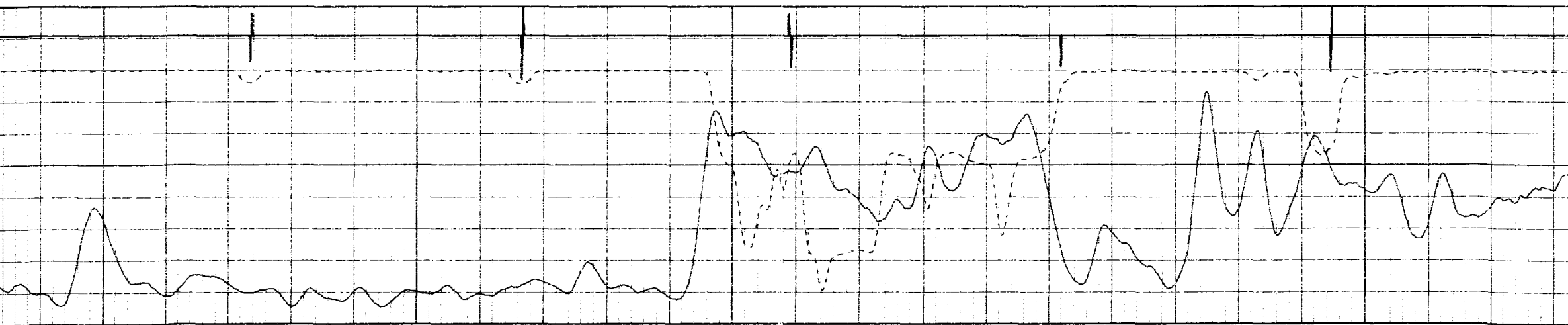
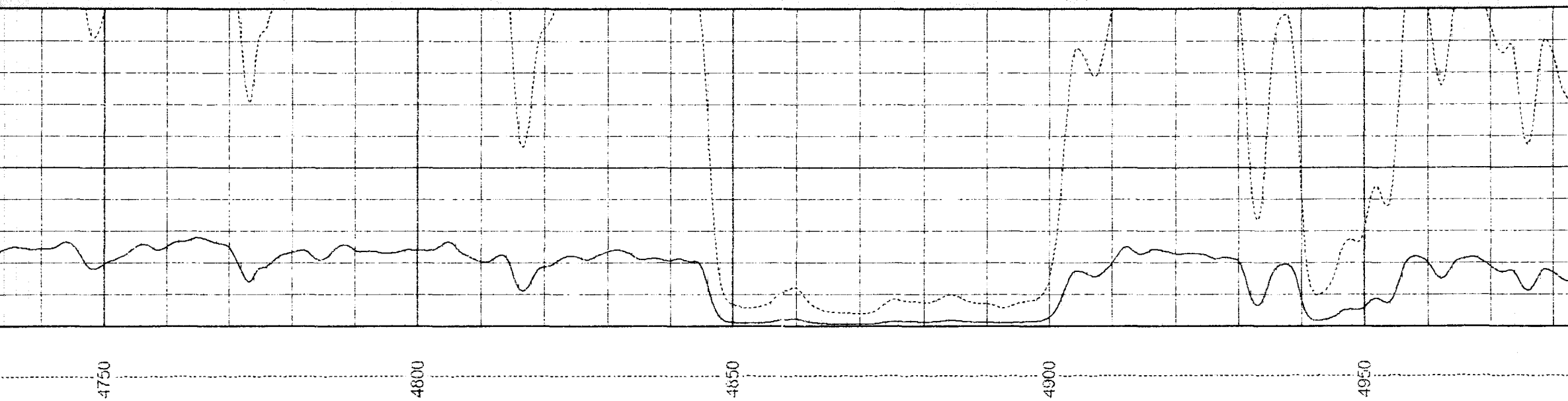
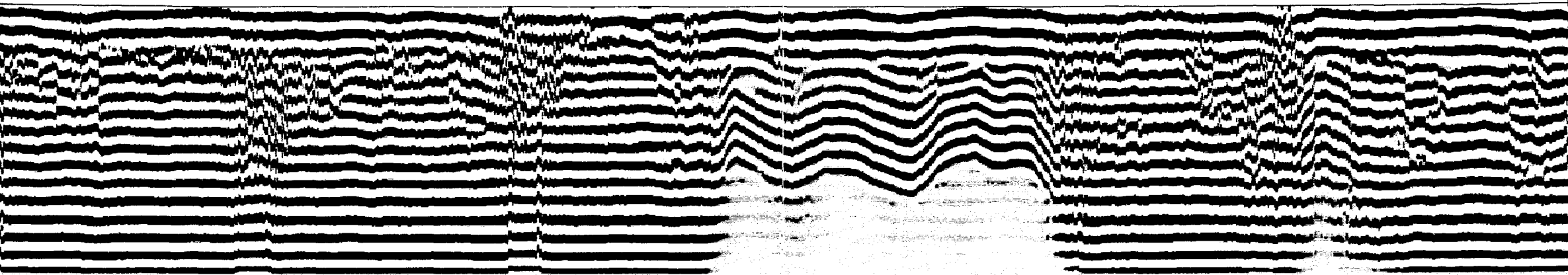


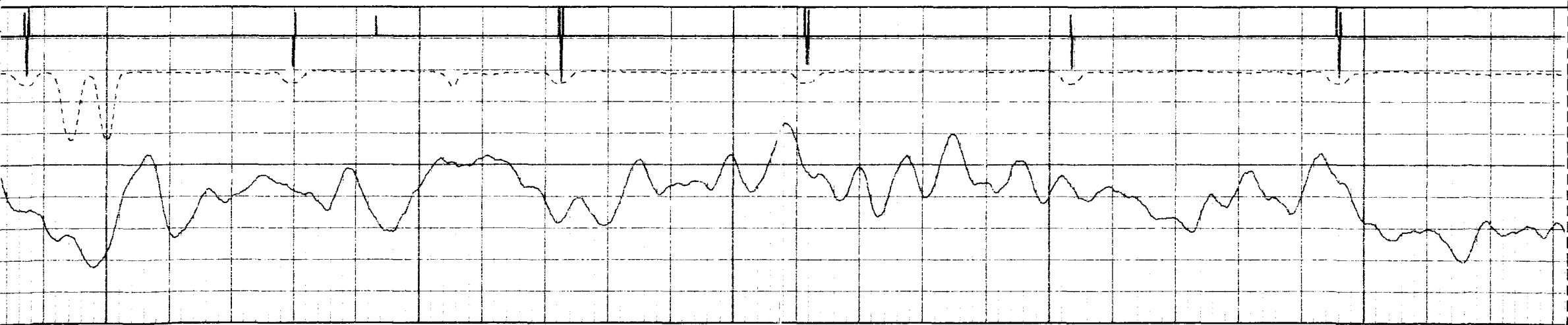
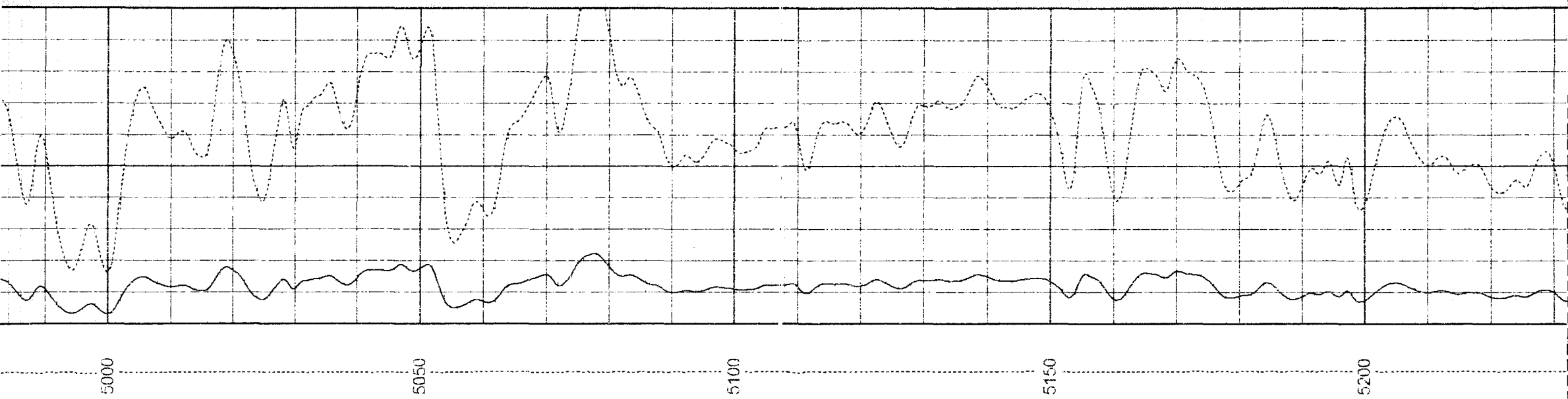
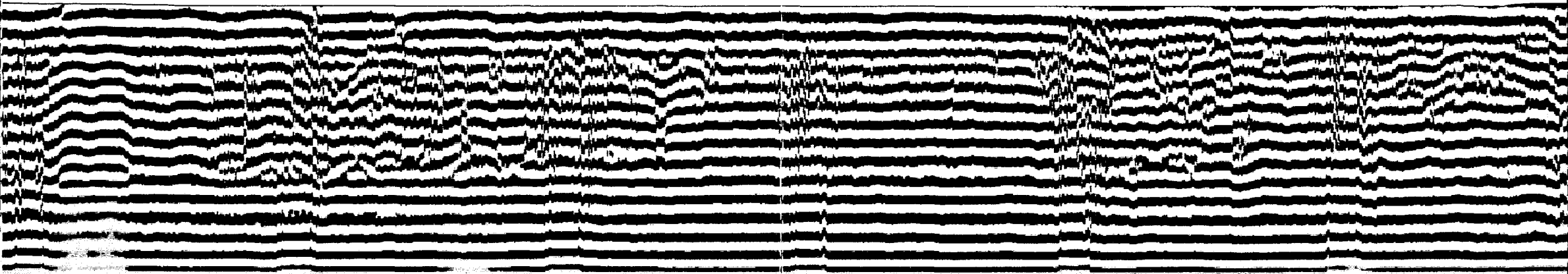
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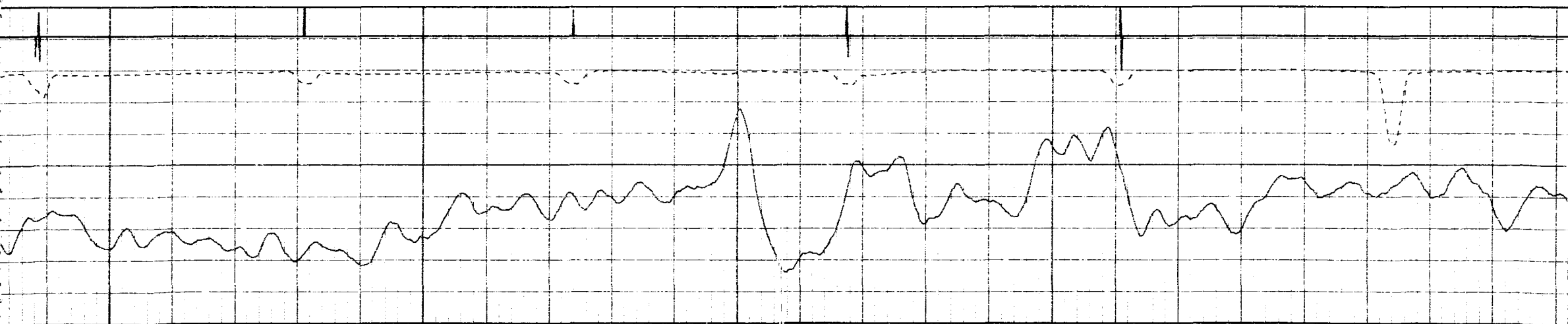
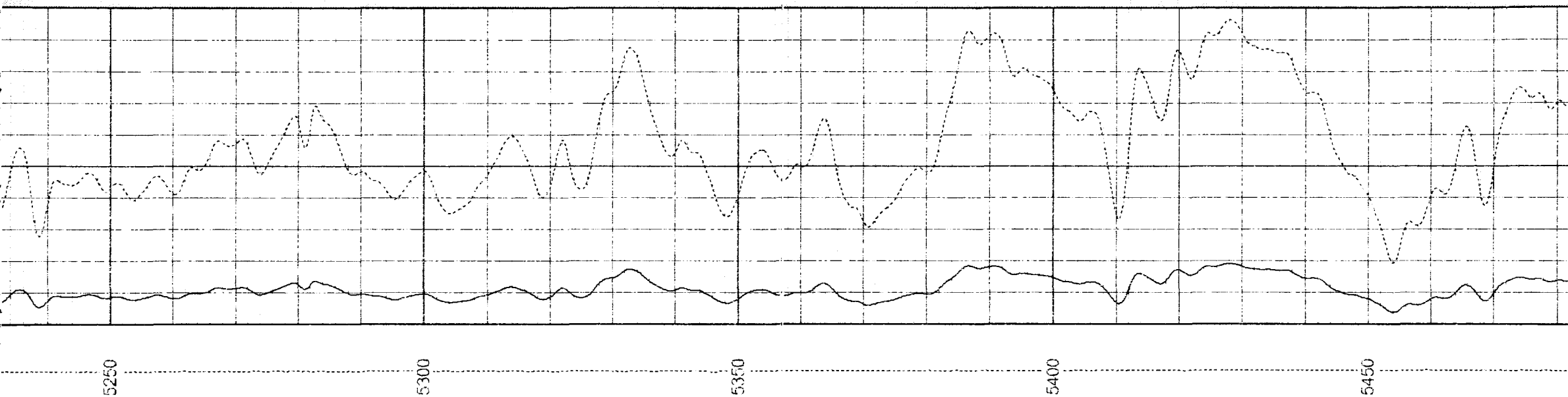
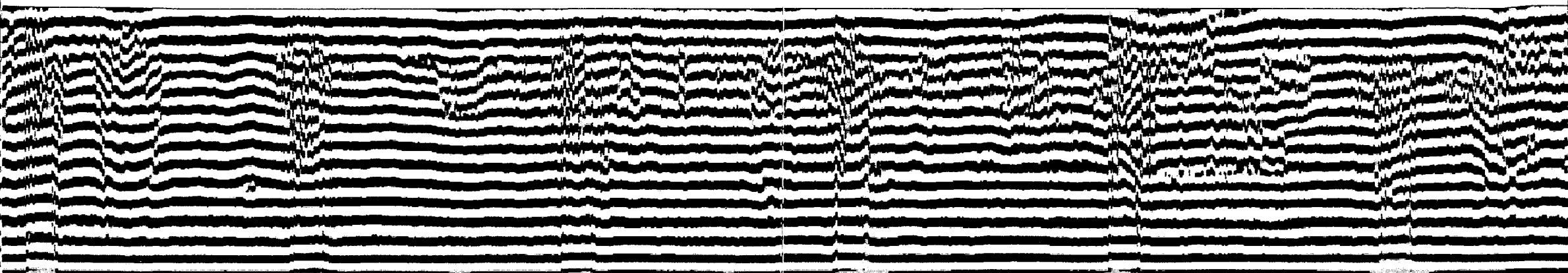
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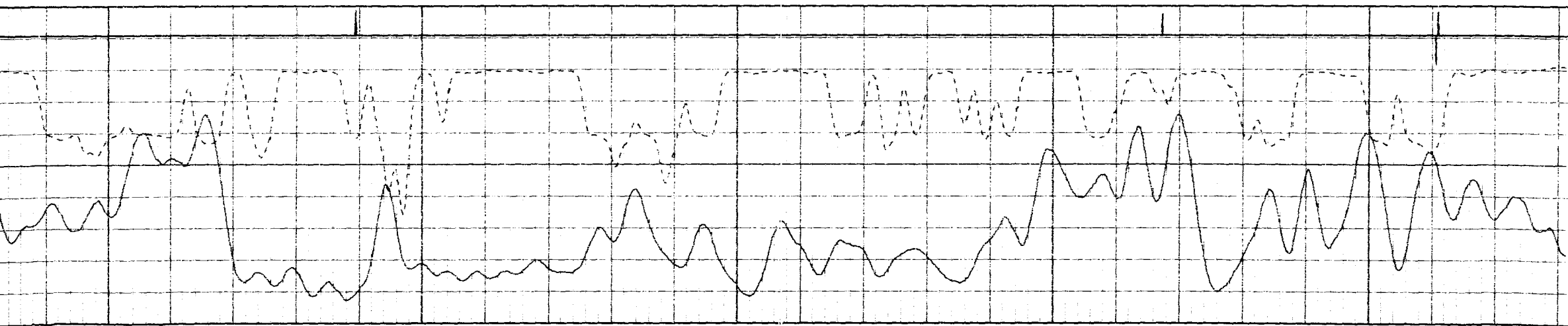
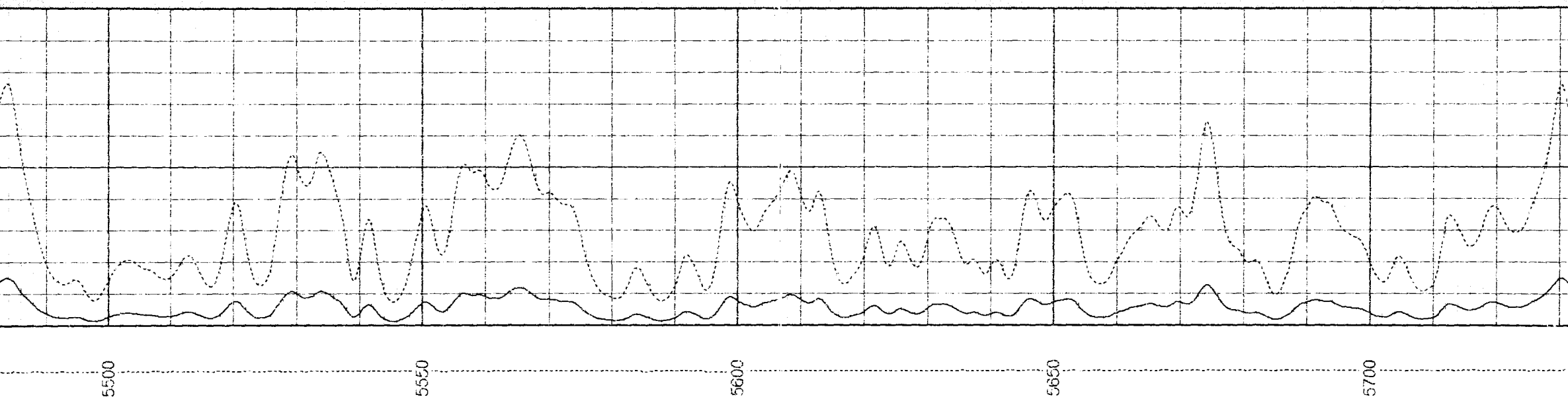
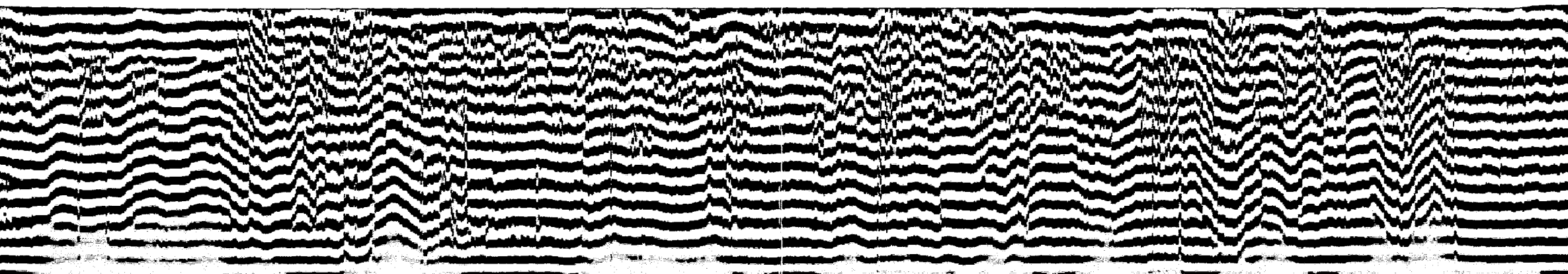
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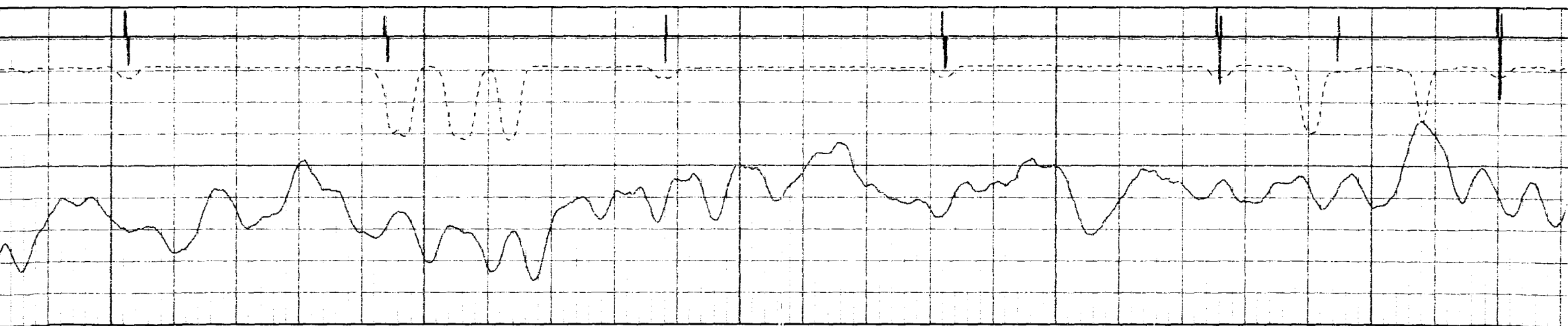
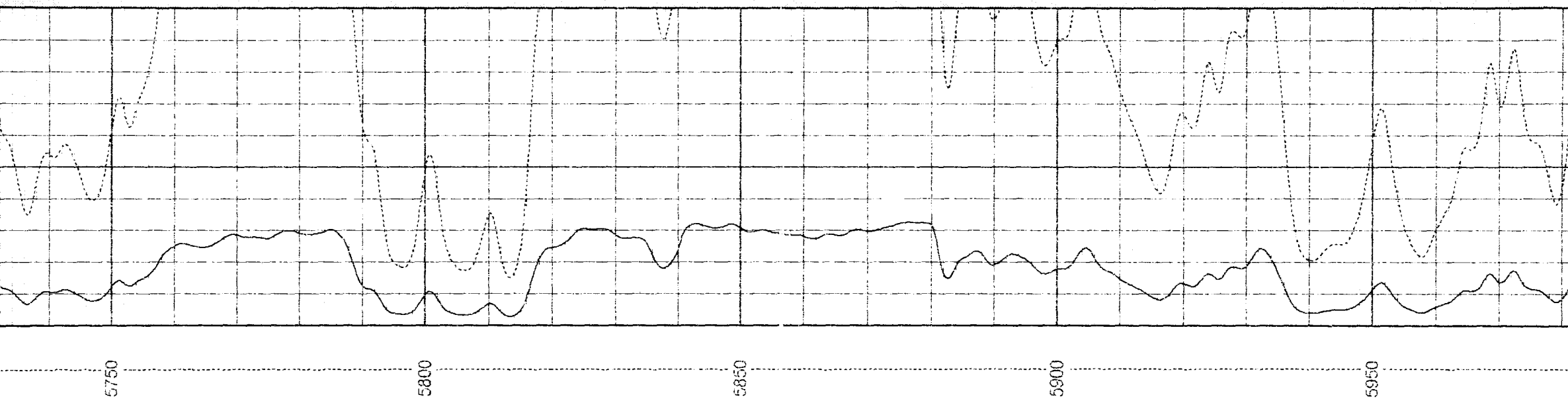
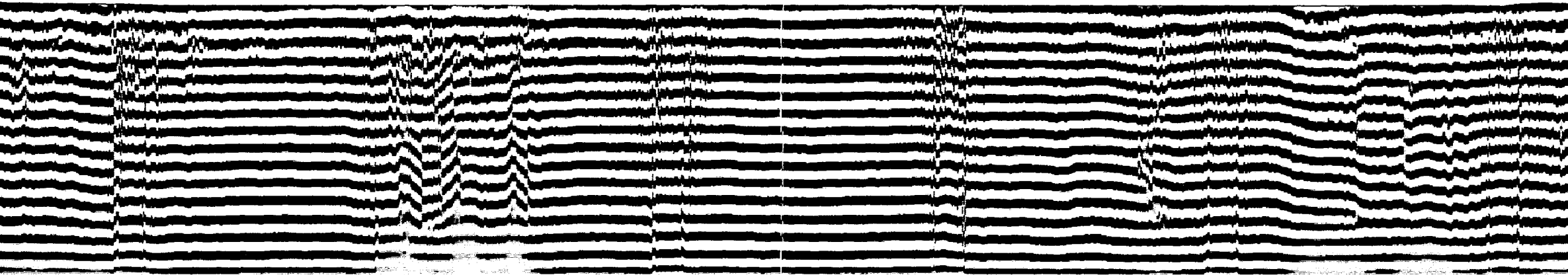
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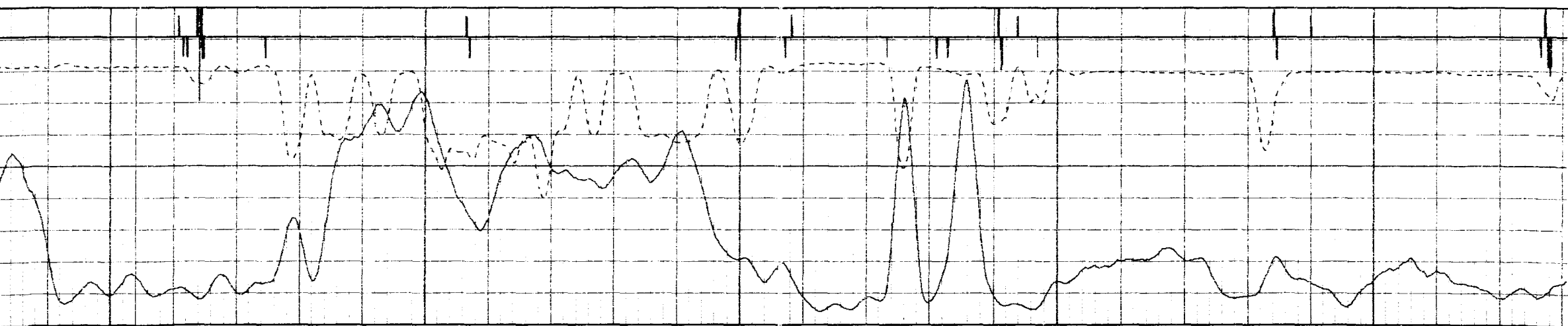
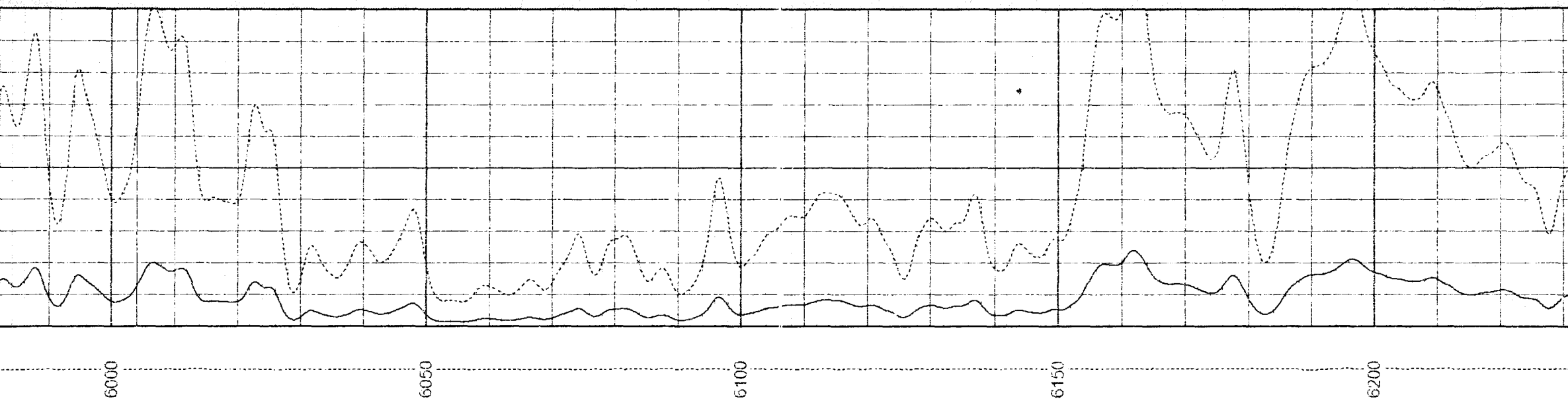
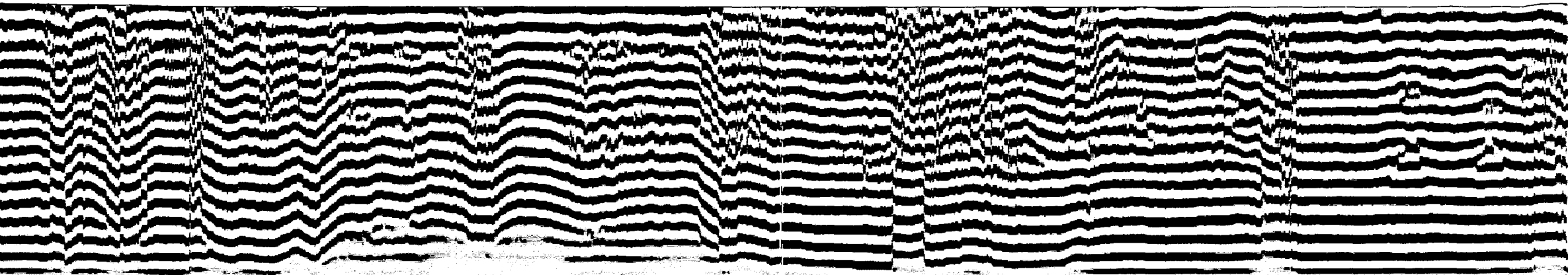


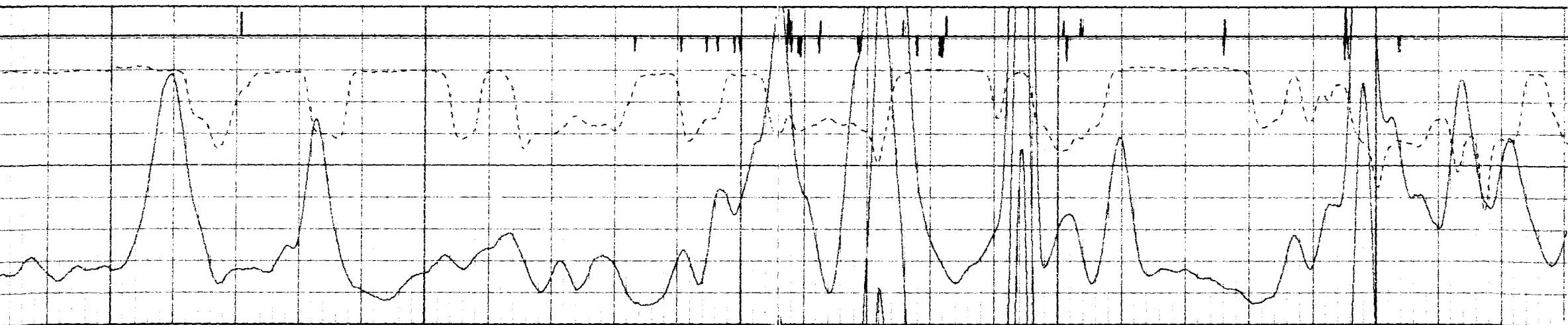
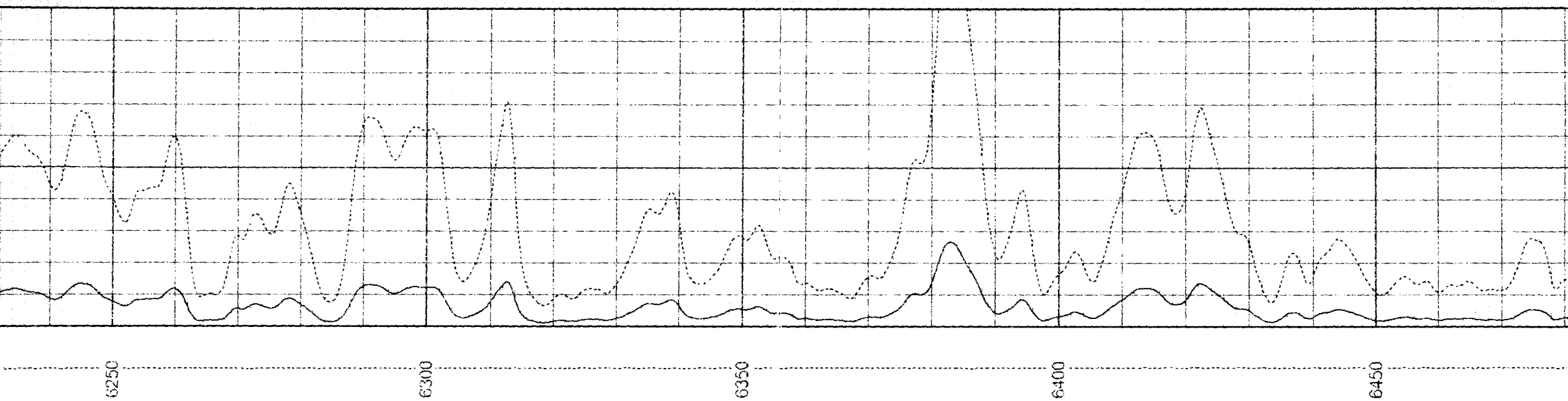
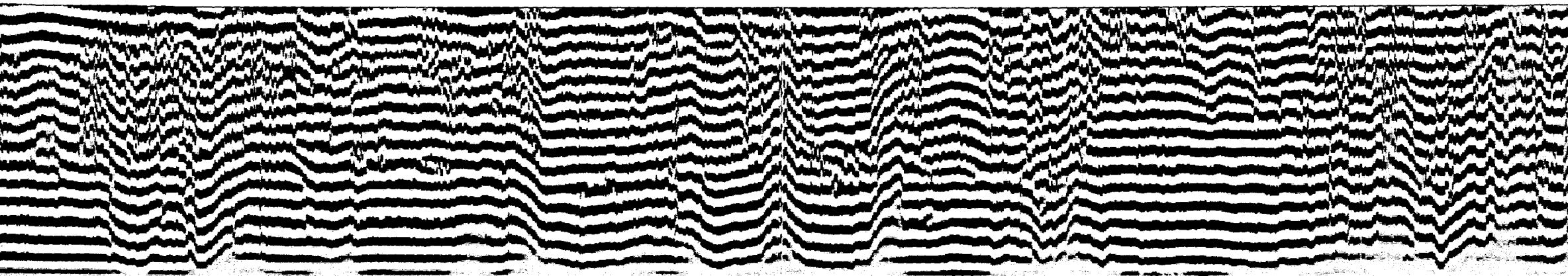


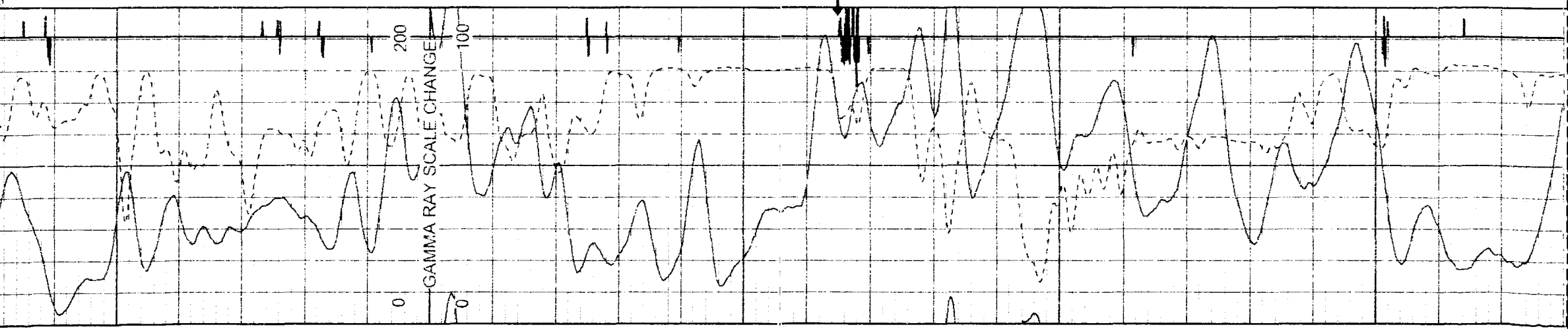
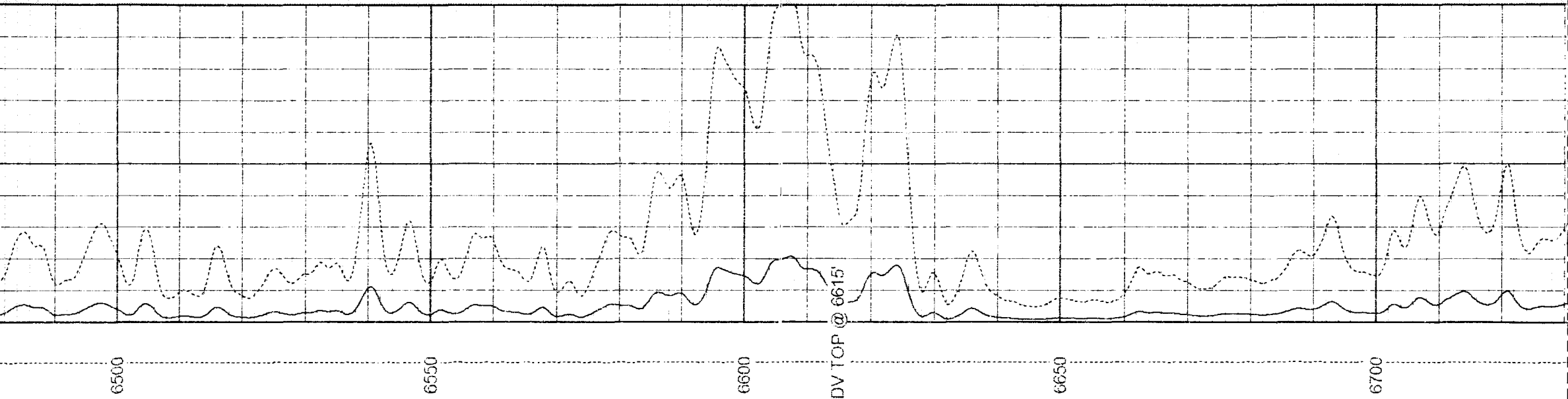
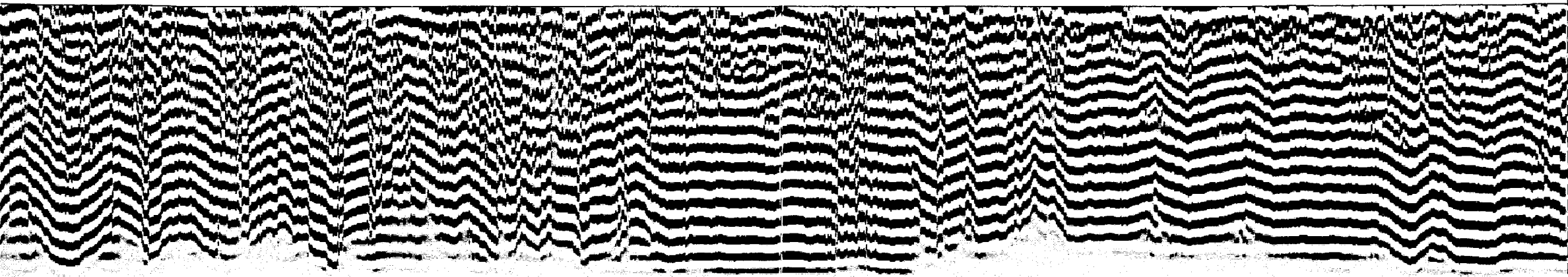


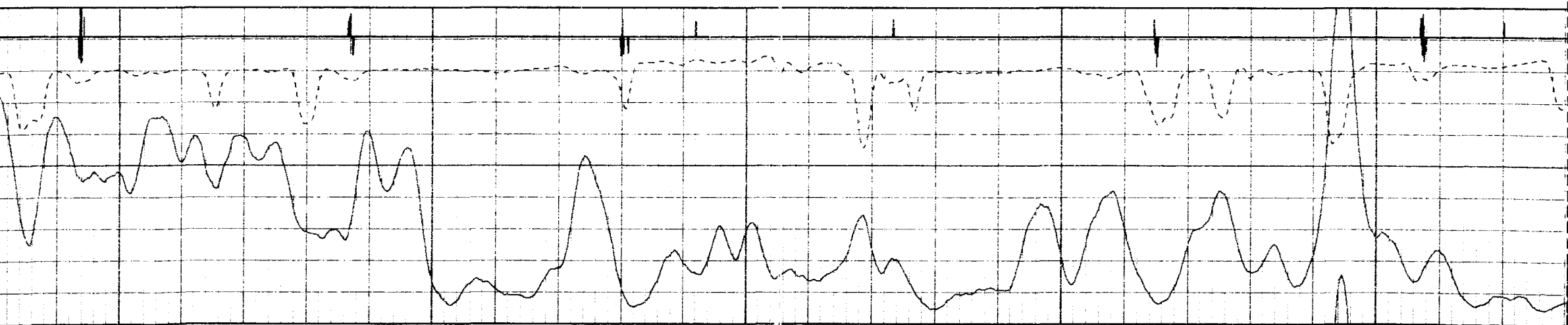
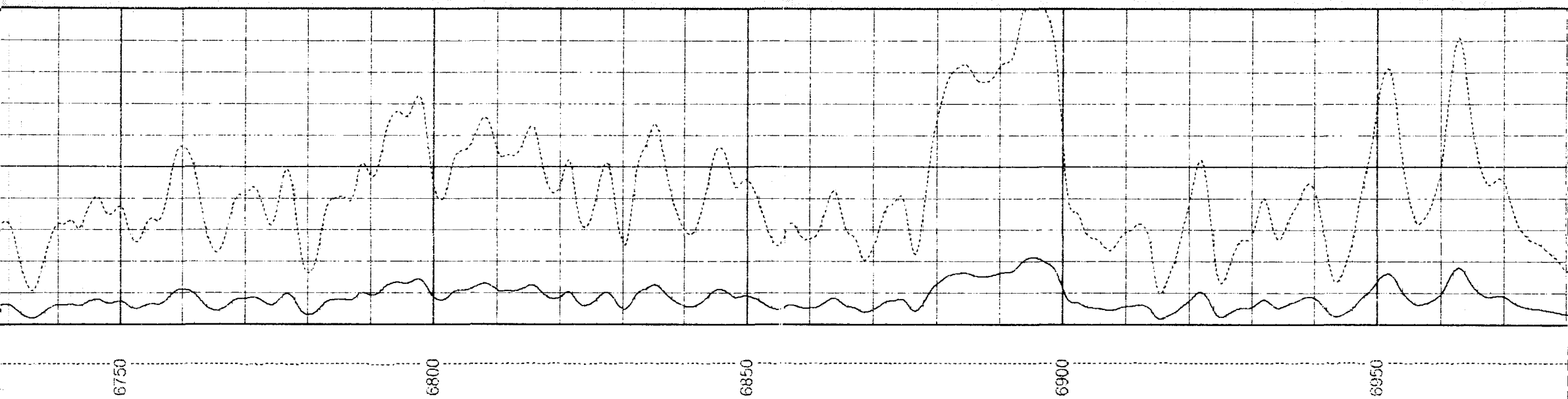
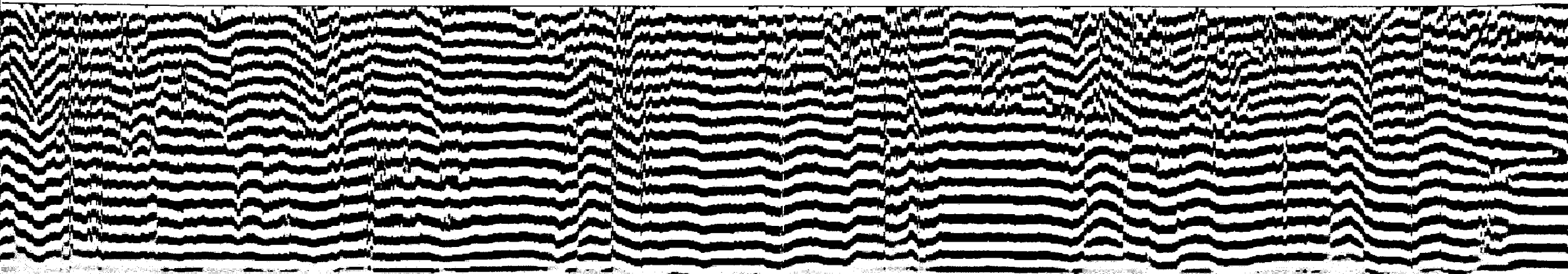


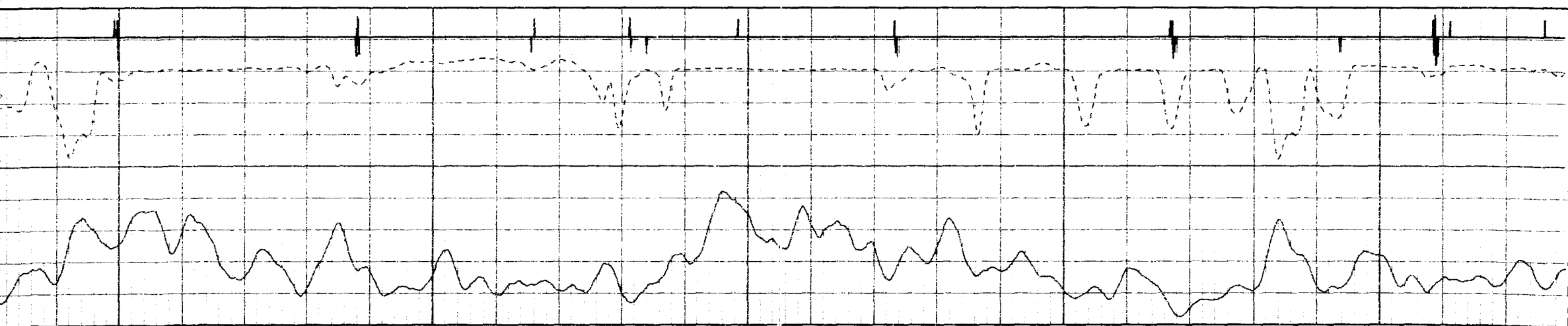
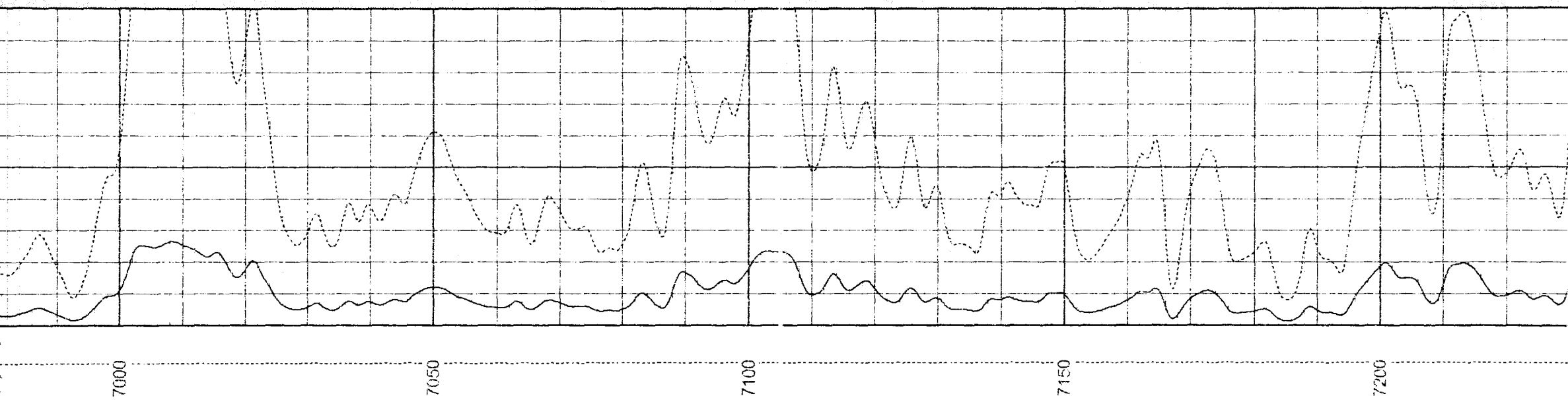
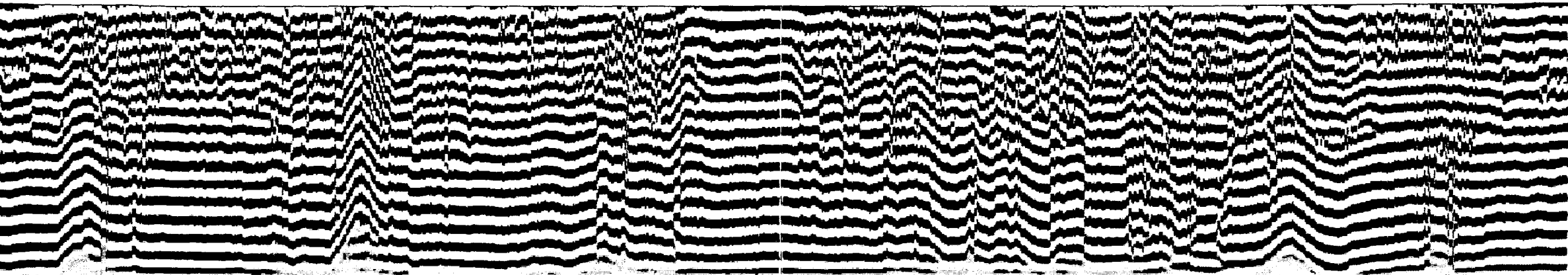


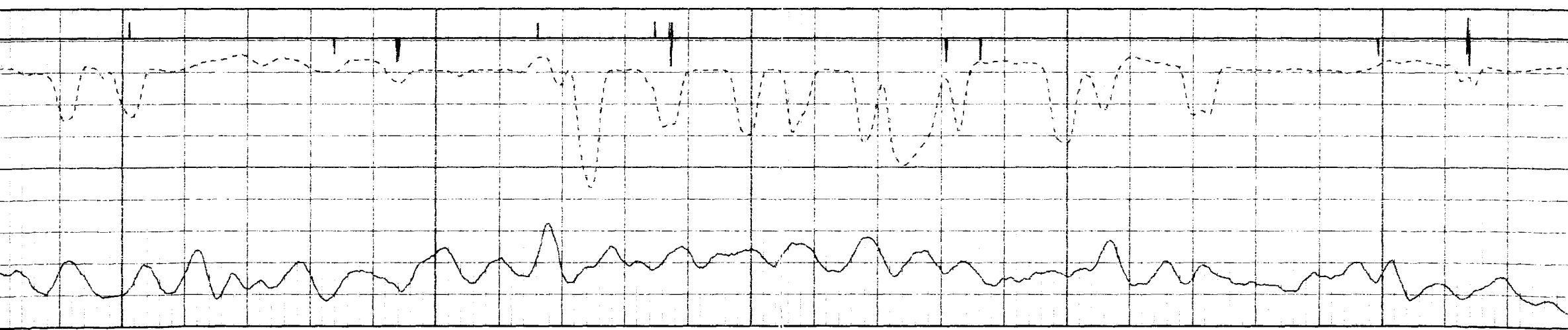
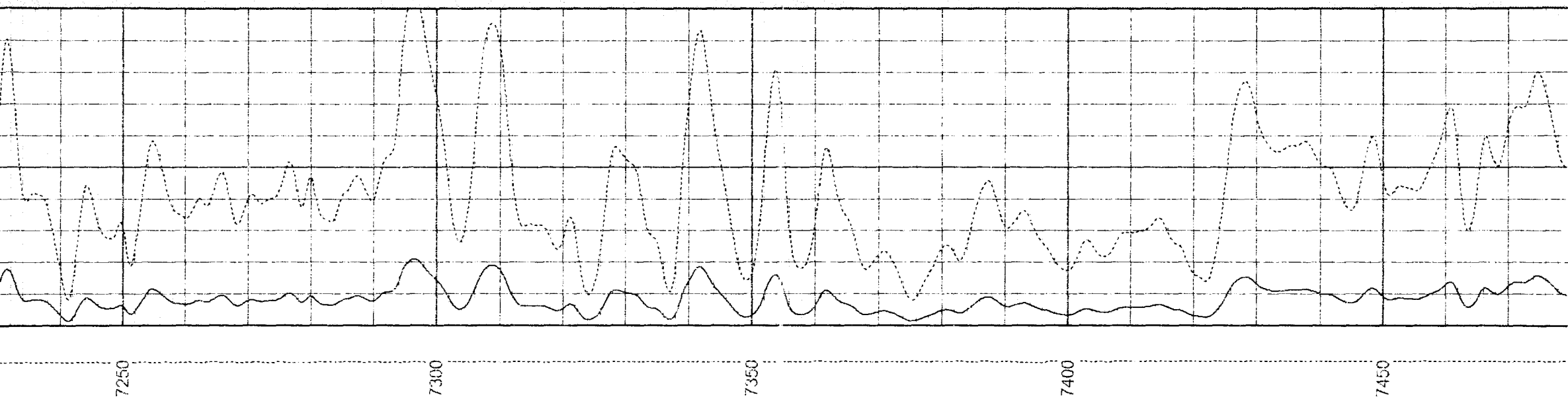
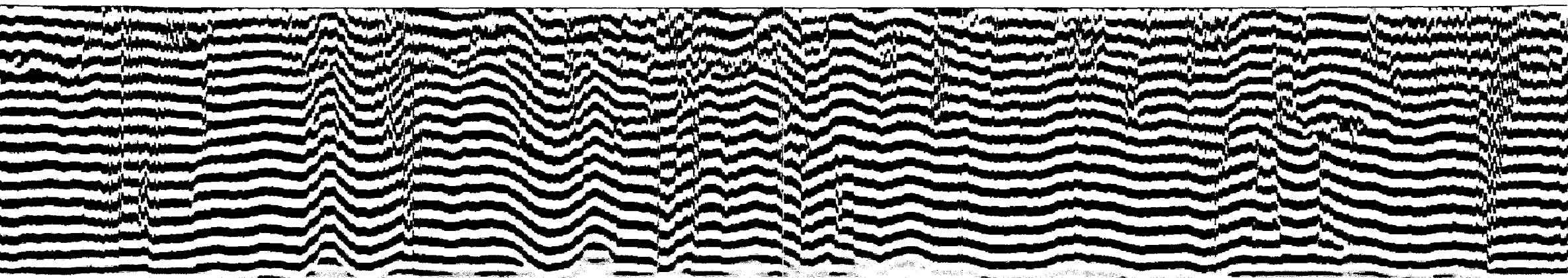


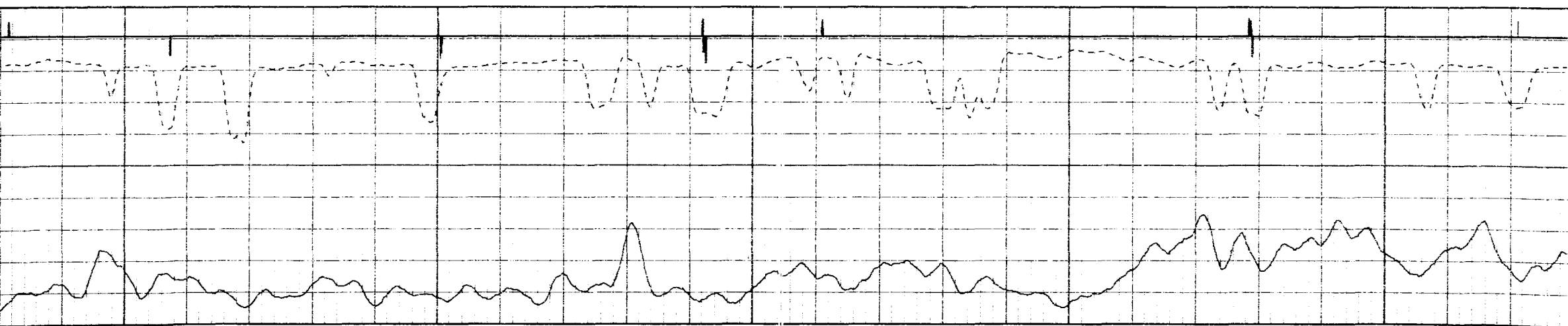
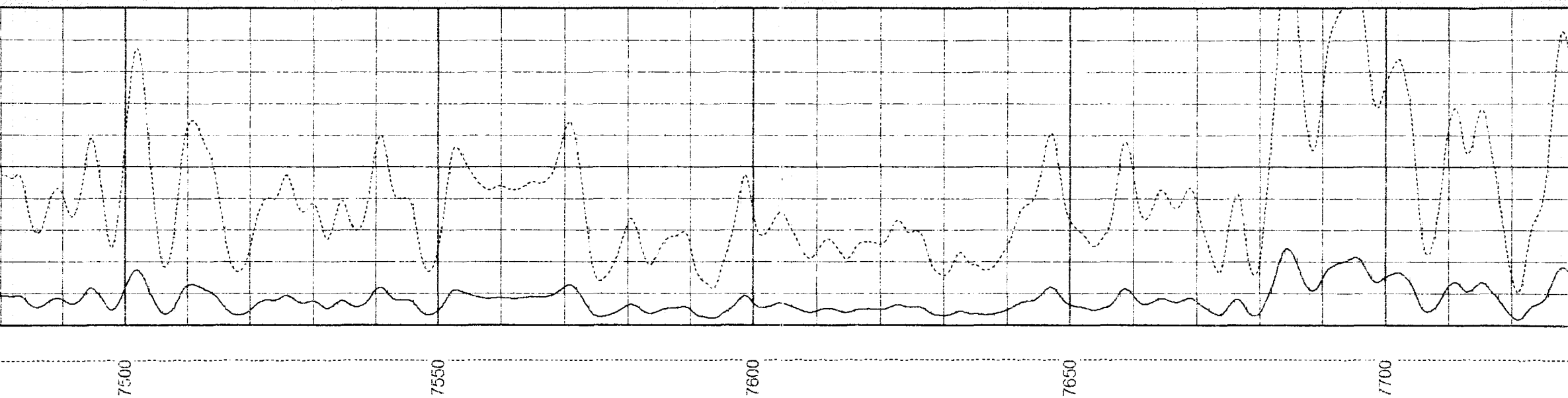
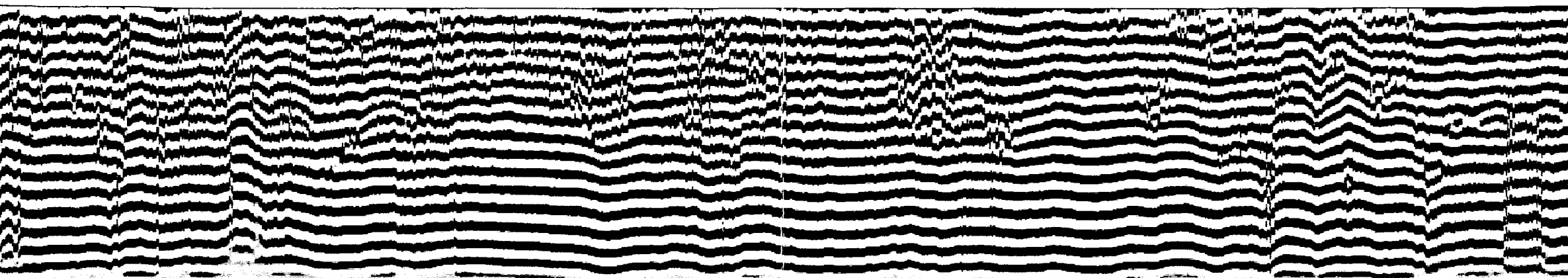


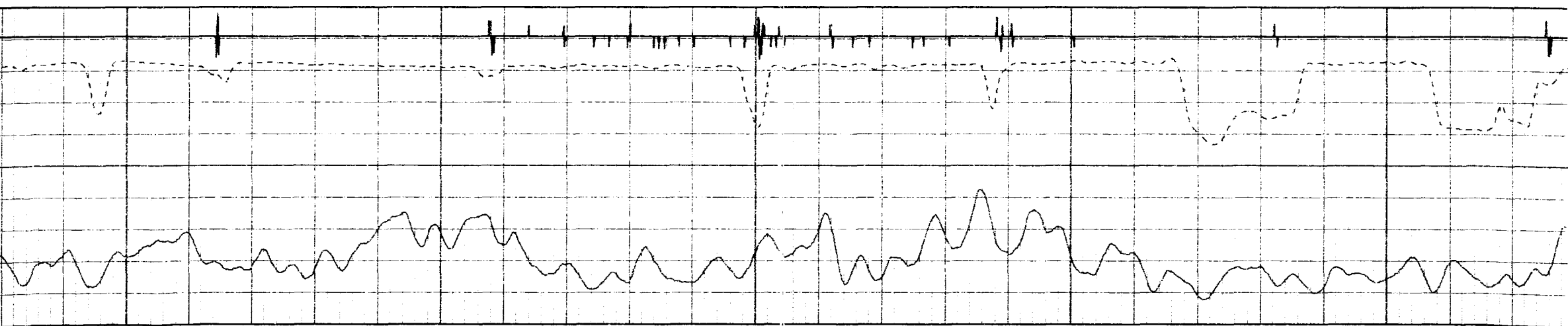
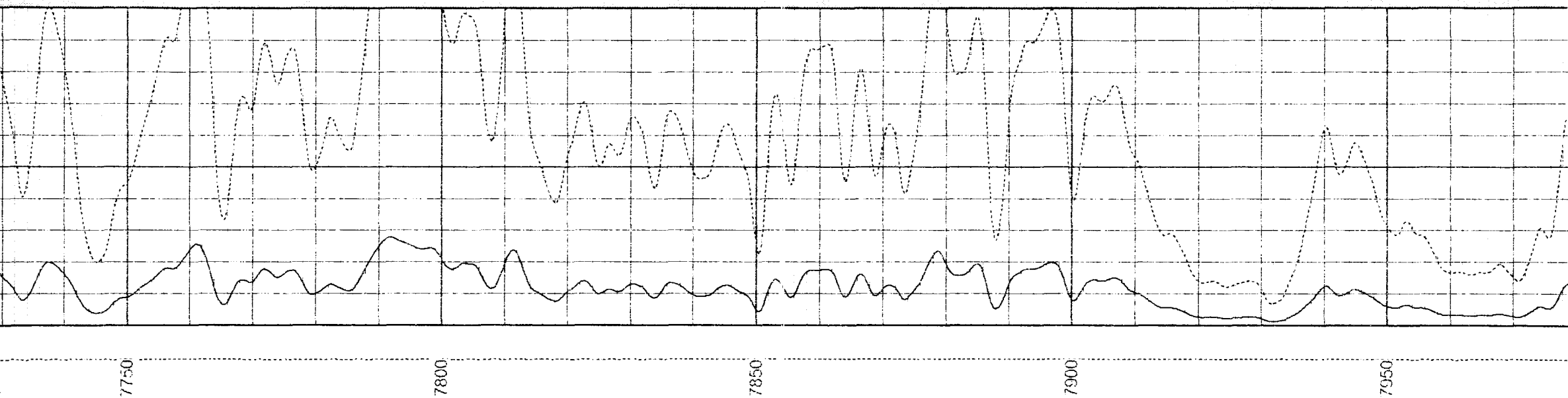
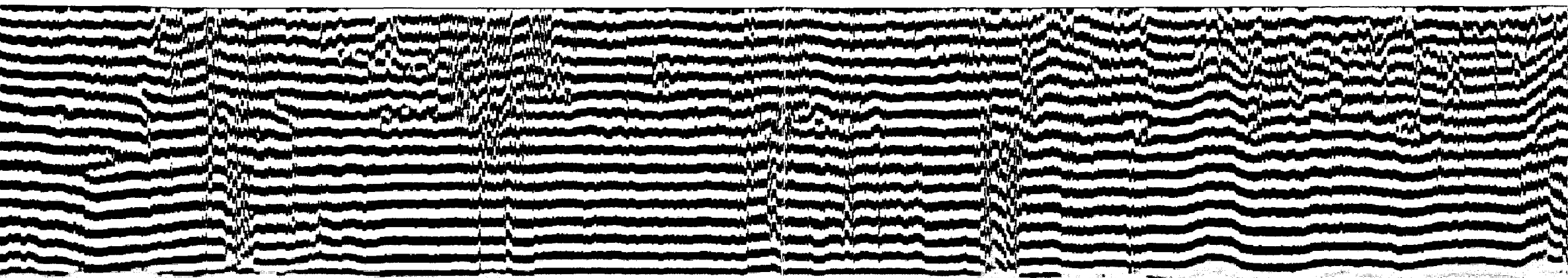


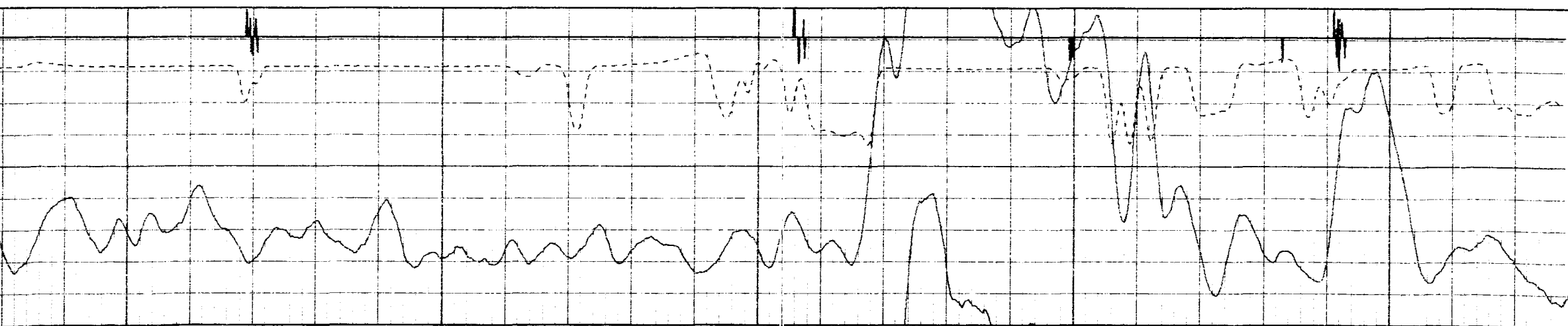
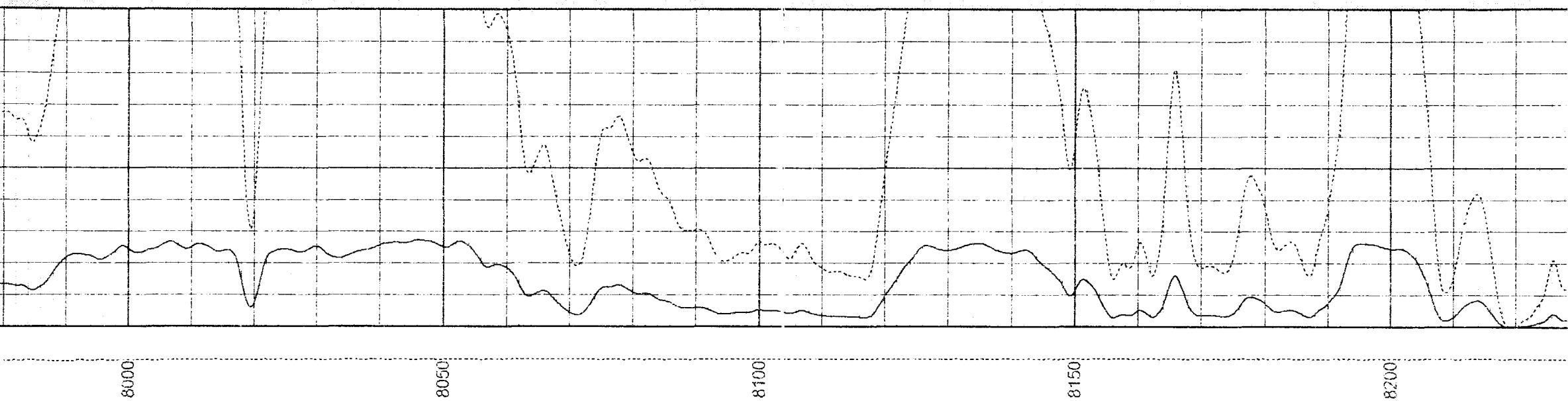
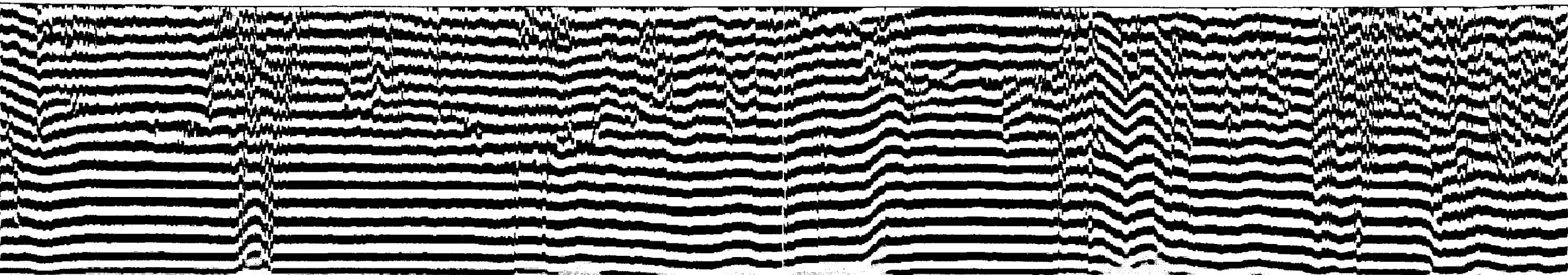


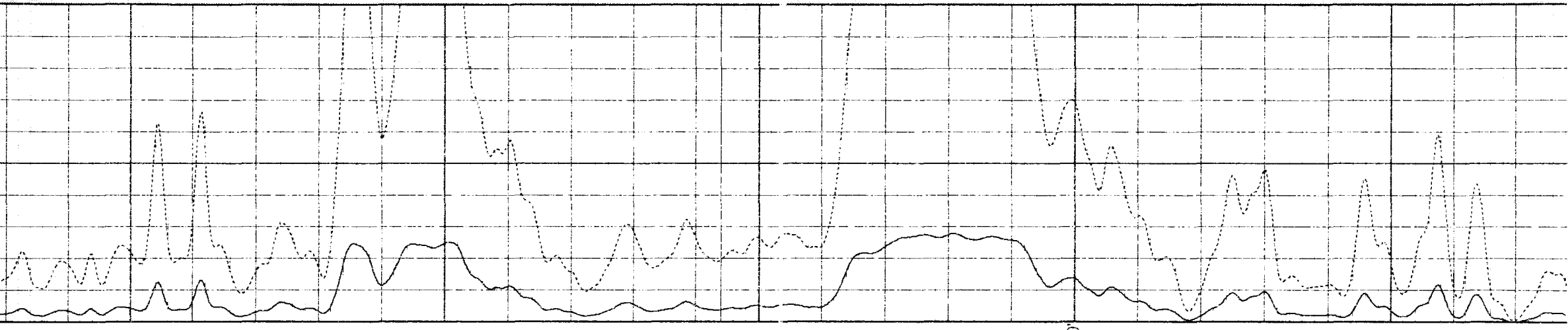
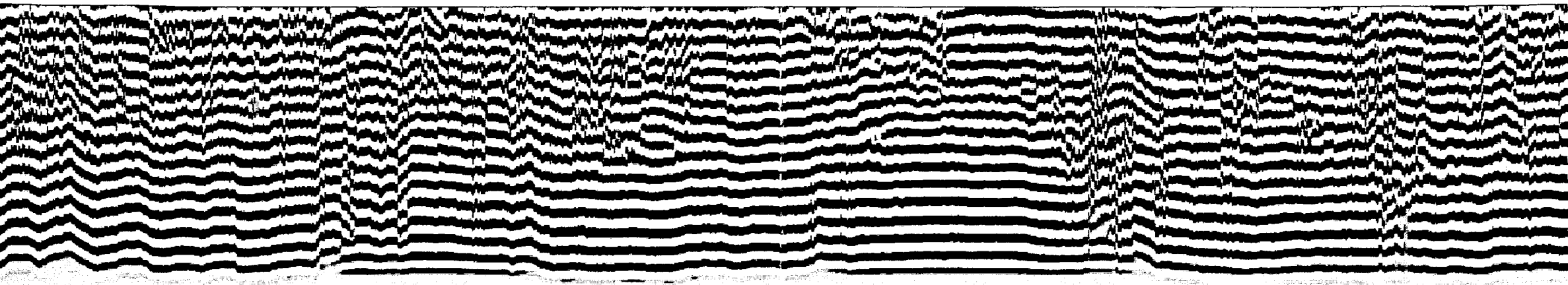












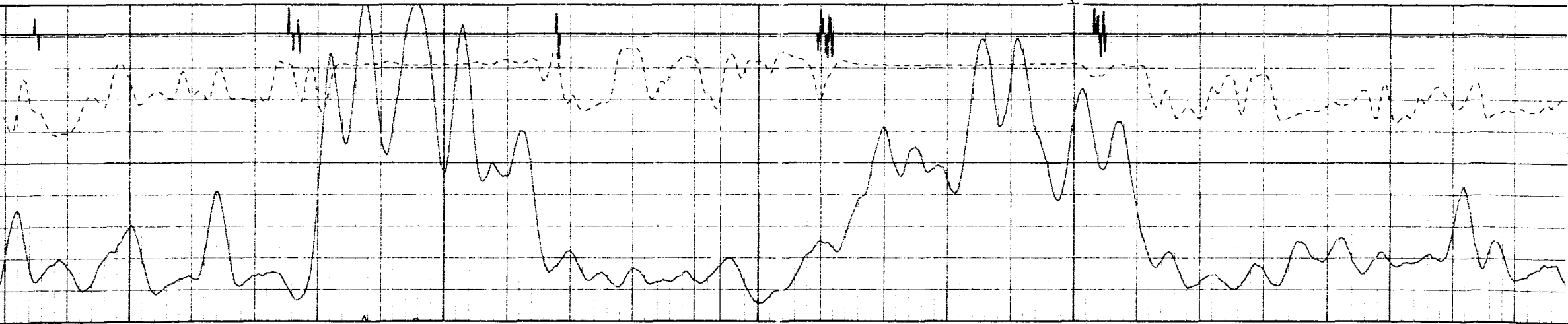
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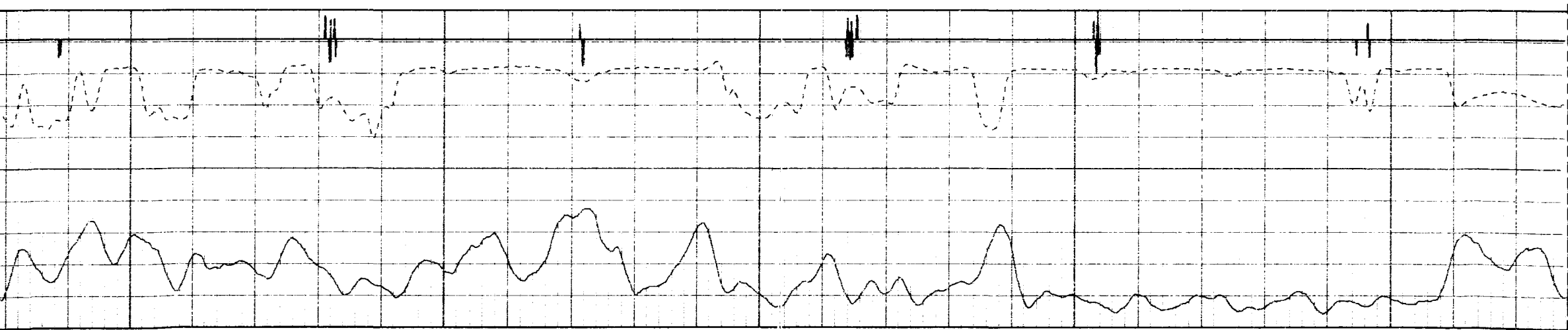
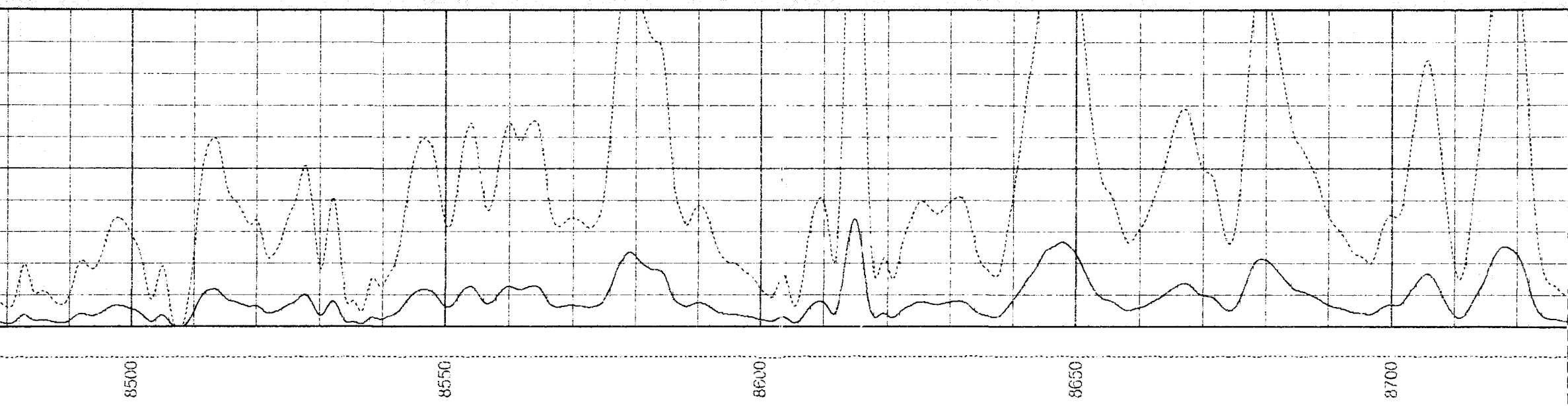
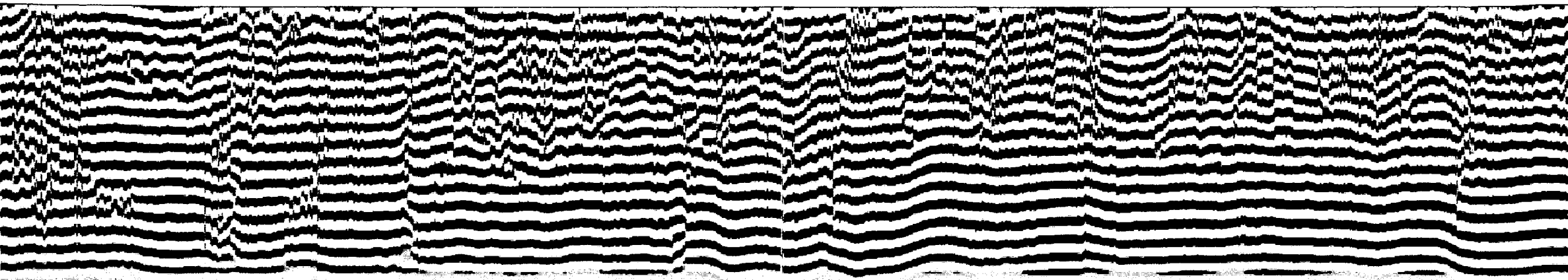
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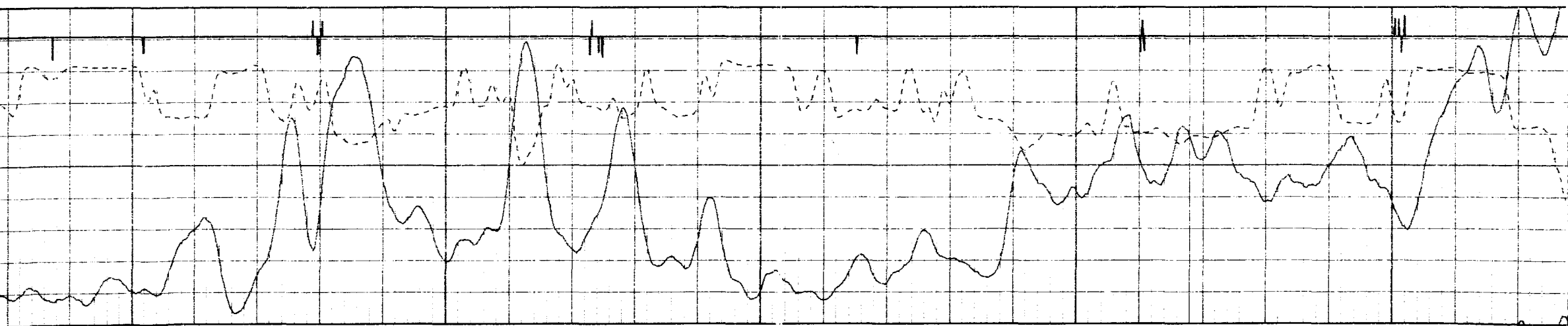
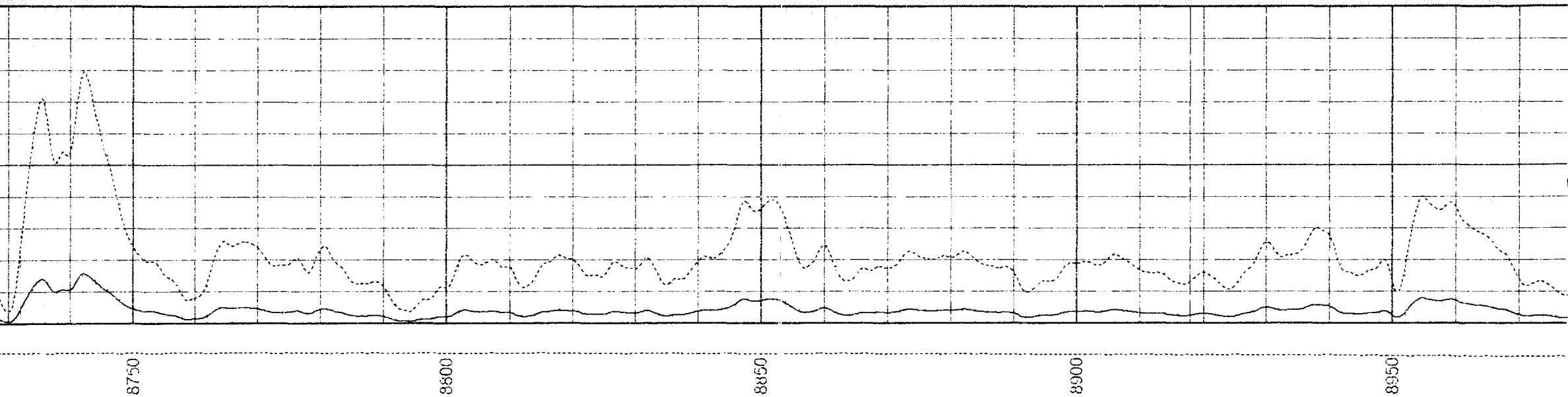
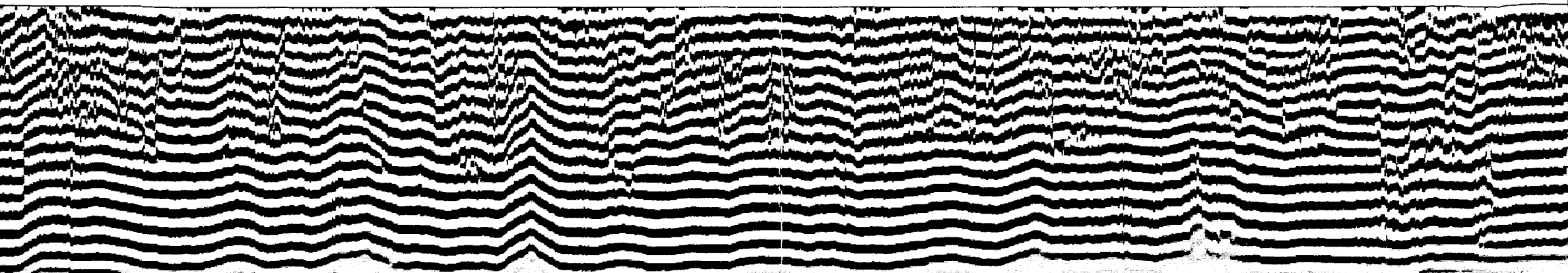
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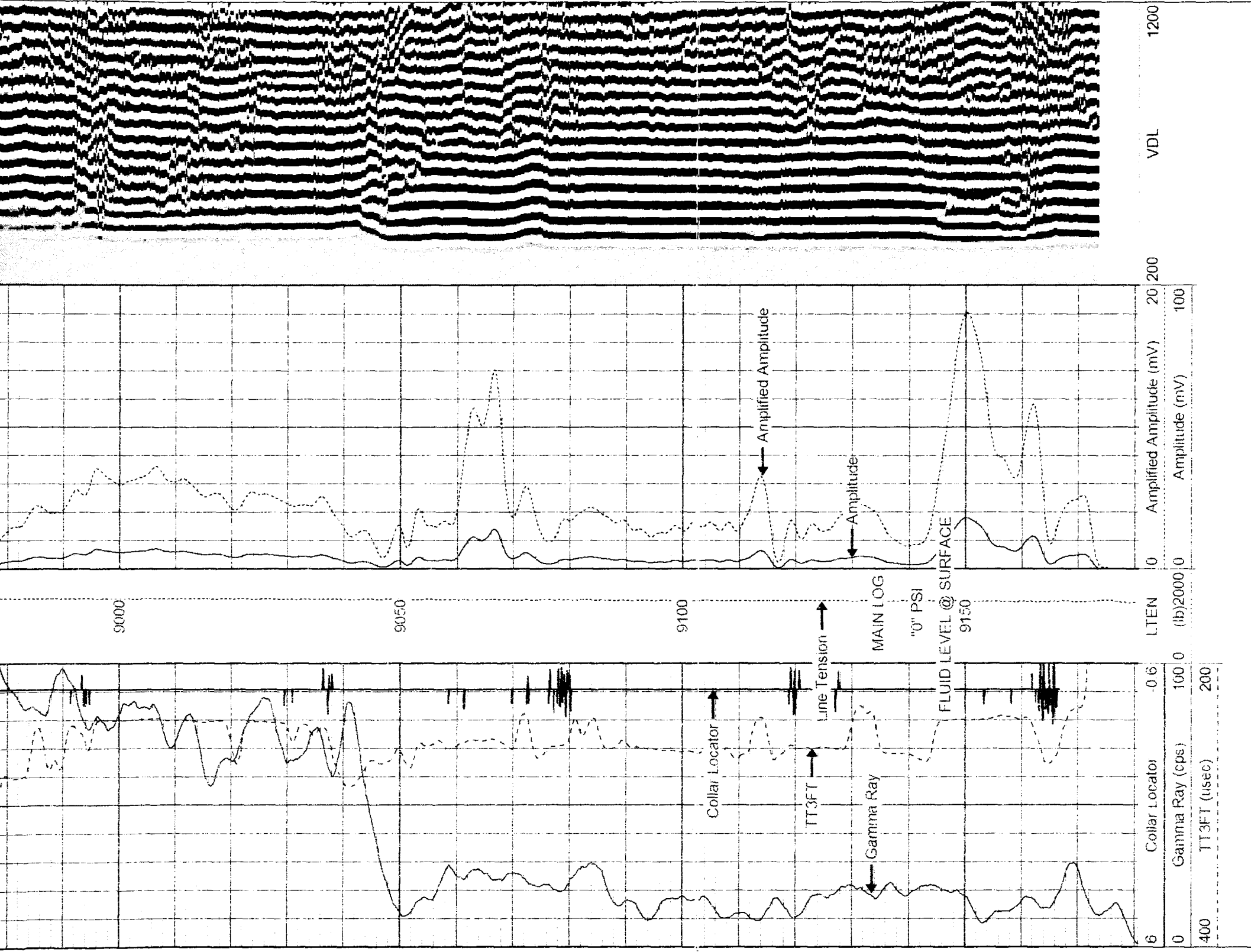
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VDL

200

Amplified Amplitude (mV)

LTEN

-0.6

Collar Locator

6

Amplitude (mV)

(lb)2000 0

Gamma Ray (cps)

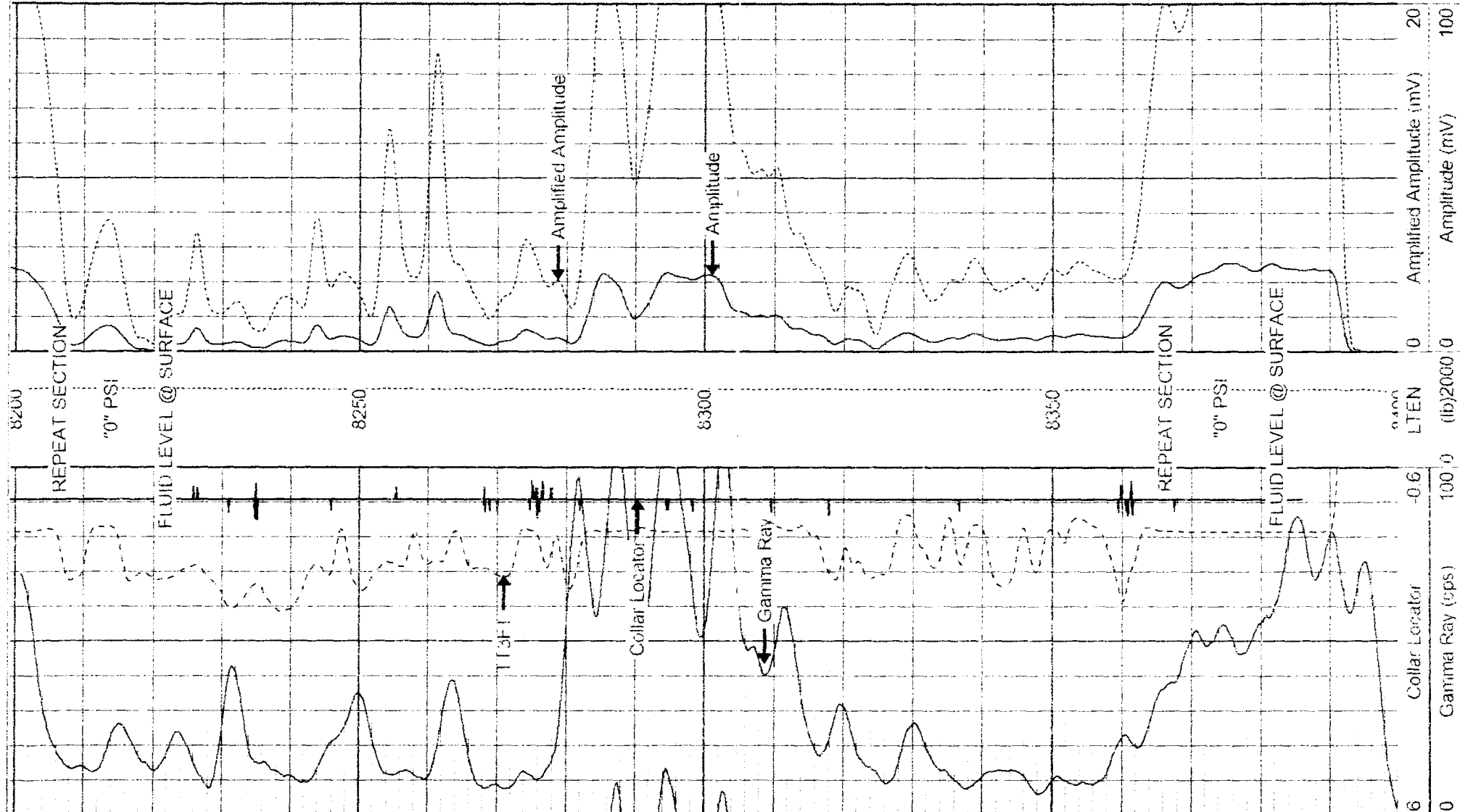
0

20 100

0

TT3FT (usec)

400



VDL

200

Amplified Amplitude (mV)

LTEN

-0.6

Collar Locator

6

Amplitude (mV)

(lb)2000 0

Gamma Ray (cps)

0

20 100

0

TT3FT (usec)

400

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date July 28, 2009

RECEIVED OF Luff Exploration Company, ±580 Lincoln St., Suite 850, Denver CO 80203

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>1905-1</u> to Appropriate Water, to construct and to put water to beneficial use	750	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>1905-1</u>	200	00
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	950.00

No. 04185

By Garland Erbele
Chief Engineer

(K3)



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1905-1, Luff Exploration Company**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 1905-1, Luff Exploration Company, c/o Richard D George, 1580 Lincoln Street, suite 850, Denver CO 80203.

The Chief Engineer is recommending APPROVAL of Application No. 1905-1 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest.

See report on application for additional information.

Garland Erbele, Chief Engineer
September 10, 2009

REPORT ON WATER PERMIT APPLICATION NO. 1905-1
LUFF EXPLORATION COMPANY
AUGUST 21, 2009

Water Permit Application No. 1905-1 proposes to appropriate 0.195 cubic feet of water per second (87.5 gallons per minute) from one well to be completed into the Inyan Kara aquifer (4,684-4,785 feet below grade). The well is located in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 16, T22N-R6E, in Harding County. The water is for industrial use in a secondary oil recovery project.

AQUFIER: INYAN KARA (INKR)

GENERAL INFORMATION:

The source of water supply cited on this application is "Well-Dakota Formation". Historically, the term "Dakota Formation" has been used somewhat generically in the Williston Basin for lower Cretaceous aged strata based on an assumed correlation with the Dakota of other geologic area subdivisions of the state. Indeed, past water permit applications from Luff Exploration (No.1734-1 and No.1870-1) identified the water source as "Dakota" when in fact the water sources were technically either the Newcastle Sandstone or the Inyan Kara aquifer; and the Minnelusa Formation respectively.

This application proposes to withdraw water from a well that had been constructed as a horizontal oil well. The well was originally completed into the Red River B Formation with its intake (5,635 feet of horizontal open hole) 8,944-8,958 feet below grade. A plug has been placed in the well casing at a depth of 8,310 feet below grade. The "Sundry Notice and Report on Wells" on file with the DENR- Oil and Gas Section, indicates that Luff Exploration plans to convert the well to a "water source well" by setting a cast iron bridge plug in the well casing 5,050 feet below grade and perforating the casing from 4,684-4,709 and 4,760-4,785 feet below grade.

A review of the South Dakota Geological Survey Oil and Gas Online Database shows the term "Dakota Mud" used interchangeably with "Fall River" in this area for strata around 4,500-4,600 feet deep. The geology and hydrology of the actual Dakota Formation in South Dakota has been described in detail by Schoon (1971). The Dakota as described by Schoon underlies most of South Dakota but does not extend west into Harding County. The Fall River Formation is not mapped directly by Schoon (1971), however, the top of the Greenhorn Limestone is projected to be 800 feet below mean sea level elevation in the vicinity of this well and a distance between the Greenhorn Limestone and the Inyan Kara Group is estimated to be 850 feet. Using Schoon's data and assuming a Greenhorn Limestone thickness of 70 feet, the top of the Inyan Kara is expected to be around 4,660 feet below grade in this area. A review of structure contour maps produced by Gries (1981), suggest the top of the Inyan Kara Group is approximately 1,725 feet below mean sea level elevation in this area, or 4,665 feet below grade at this well site. Therefore it can be assumed that this application proposes to withdraw water from the Inyan Kara aquifer.

The Inyan Kara aquifer is composed of several sandstone units of the Fall River and the underlying Lakota Formations. In a geologic sense, the Fall River and Lakota are separate

and distinct formations. However, for all practical purposes, the Fall River Formation and the Lakota Formation can be considered a single hydrologic unit in this area. The Inyan Kara, which was deposited in shallow waters along the eastern shore of the Skull Creek Sea during the Lower Cretaceous age (Merewether, 1975), occurs at a regional scale, extending into Wyoming, North Dakota and Nebraska as well as a major portion of South Dakota, see figure 1. Although the Inyan Kara is areally extensive, only a portion of the water it contains is fresh. More than one-half of the water in the Inyan Kara is moderately saline, and the water is saline to brine in parts (Driscoll and others, 2002).

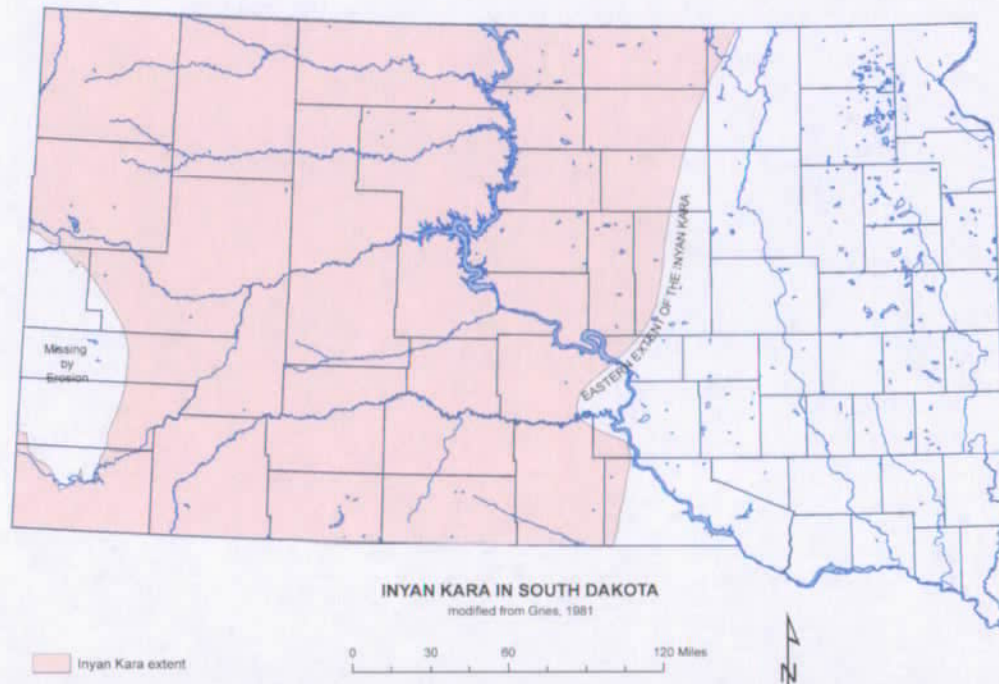


Figure 1. Areal extent of the Inyan Kara aquifer in South Dakota

The Inyan Kara underlies 23,239,040 acres and contains an estimated 308,442,000 acre-feet of recoverable water in storage in western South Dakota (Allen and others, 1985). The aquifer contains an estimated 65,483,800 acre-feet of recoverable water in storage in eastern South Dakota (Hedges and others, 1982). Gries, (1981) estimates the total thickness of the Inyan Kara Group to be around 200 feet in this area. However, the portion of the Inyan Kara considered an aquifer was estimated to only be 50-75 feet thick for this area (Bredehoeft and others, 1983). The Inyan Kara is under confined conditions at this well site.

Recharge to the Inyan Kara aquifer occurs through infiltration of precipitation and streamflow losses at the outcrop; and possibly through upward leakage from underlying aquifers (Bredehoeft and others, 1983). The total recharge to the aquifer just from infiltration at the outcrop, consequently a minimum value, is estimated to be 11,600 acre-feet per year (Driscoll and others, 2002).

REVIEW OF EXISTING WATER RIGHTS/PERMITS:

There are 181 Water Rights/Permits appropriating water from the Inyan Kara aquifer in South Dakota. The total diversion rate authorized for non irrigation appropriations is 44.12 cfs. The 14 irrigation appropriations from the Inyan Kara aquifer appropriate a total of 2,774.16 ac-ft/yr (Vested Water Right No. 466-1 appropriates 1,302 ac-ft/yr of this total although an unspecified amount (probably most) of the vested right's water is from Redwater Irrigation Association). In addition, the City of New Underwood holds Future Use Permit No. 1780-2 which reserves 142 acre-feet per year for future use.

A case can be made that the well that supplies Water Right No. 1734-1 and Water Permit No. 1870-1 may actually be completed into the Inyan Kara aquifer.

Only four of the Inyan Kara appropriations are within 70 miles of the well that is to be used for 1905-1. They are shown in table 1.

PERMIT NO	NAME	USE	CFS	DISTANCE FROM 1905-1
1350-1	Citation Oil & Gas Corporation	Industrial	0.1	20 miles
313-1	Williston Basin Interstate Pipeline Co	Industrial	0.05	67 miles
1788-1	Veritas Energy Inc	Domestic	0.1	67 miles
1892-1	Prima Exploration Inc	Industrial	0.333	14 miles

Table 1. Inyan Kara appropriations within approximately 70 miles of 1905-1

Well interference should not be adverse due to the distance between wells.

WELL CONSTRUCTION:

A South Dakota Water Well Completion Report was not completed for this well since it was originally constructed as an oil well. A review of the information that was supplied with the application along with information obtained from the SD DENR-Oil and Gas Program identify two construction deficiencies regarding the South Dakota Water Well Construction Standards (ARSD 74:02:04).

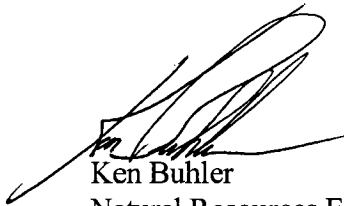
South Dakota Water Well Construction Standard 74:02:04:28 requires that the annular space between the wellbore and casing must be pressure-grouted from the top of the producing aquifer to the ground surface or to the base of the pitless unit. The information submitted with this application indicates this well was constructed in a manner typical of oil wells; the well casing was not grouted from 2,016 feet below grade to 3,040 feet below grade. The geologic stratum exposed in the open annulus encompasses the lower portion of the Pierre Shale and the upper Niobrara Formation (Baker, 1952). Neither formation is considered an aquifer, so in the case of this well, the state's water resources should not be jeopardized by the lack of grout.

South Dakota Water Well Construction Standard 74:02:04:51 requires sufficient open area in the well casing to permit the passage of the water permit or right capacity, with a water

velocity through the casing not to exceed one-tenth foot per second. This well's casing is to be perforated with four shots per foot over a 50 feet interval. At the proposed withdrawal rate of 0.195 cfs, the entrance velocity will be in excess of 0.7 feet per second. The high entrance velocity may result in the unwelcome production of sand with the water. In addition, some experts attribute excess entrance velocity to friction losses at the perforations that cause increased rate of encrustation and corrosion. The state's water resources should not be impacted by this proposed construction.

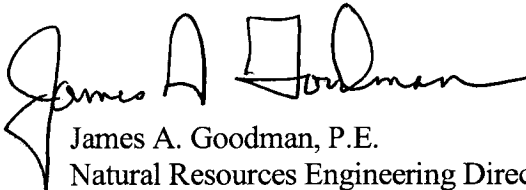
CONCLUSIONS:

1. This application proposes to appropriate water from the Inyan Kara aquifer.
2. The Inyan Kara aquifer is a viable aquifer and there is a reasonable probability that unappropriated water is available for this appropriation.
3. Well interference is not expected to be a problem due to the distance between wells.
4. The well that is to be used to supply this appropriation was originally completed as an oil well.
5. Approval of this application should be considered acceptance of the well construction.



Ken Buhler
Natural Resources Engineering Specialist

approved by



James A. Goodman, P.E.
Natural Resources Engineering Director

REFERENCES:

- Allen, J.C., Iles, D.L., and Petres, A.K., 1985, Analysis of Groundwater and Streamflow Data, Western Dakotas Region of South Dakota, Tasks 3A.B.C. and 4A.B: Groundwater Resources Inventory: US Army Corps of Engineers Contract DAWC 45-82-C-0151, SD DENR- Geological Survey, Vermillion SD
- Baker, C.L., 1952, Geology of Harding County, S.D. Department of Environment and Natural Resources- Geological Survey Report of Investigations 68, 33 p.
- Bredehoeft, J.D., Neuzil, C.E. and Milly, P.C.D., 1983, Regional Flow in the Dakota Aquifer: A Study of the Role of Confining Layers: U.S. Geological Survey Water-Supply Paper 2237, 45 p.

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- Gries, J.P., 1981, unpublished maps prepared for the Office of Drinking Water, South Dakota Dept. of Water and Natural Resources for the Underground Injection Control Program.
- Hedges, L.S., Burch, S.L., Iles, D.L., Barari, R.A., and Schoon, R.A., 1982, Evaluation of Ground-Water Resources Eastern South Dakota and Upper Big Sioux River, South Dakota and Iowa, Task 1: Bedrock Topography and Distribution, Task 2: Extent of Aquifers, Task 3: Ground-Water Storage, Task 4: Computerized Data Base, prepared for U.S. Army Corps of Engineers, contract DACW 45-80-C-0185
- Merewether, E.A., 1975, Mesozoic Rocks: Mineral and Water Resources of South Dakota, Committee on Interior and Insular Affairs, United States Senate pg. 41
- Schoon, R.A., 1971, Geology and Hydrology of the Dakota Formation South Dakota: S.D. Department of Environment and Natural Resources- Geological Survey Report of Investigations 104, 55 p.

RECEIVED

OCT - 5 2009

WATER RIGHTS
PROGRAM

OK
NOTICE OF
APPLICATION NO.
1905-1
to Appropriate Water

Affidavit of Publication

STATE OF SOUTH DAKOTA:

COUNTY OF HARDING:

Stewart Huntington of said County and State being first duly sworn, on his oath says: That the NATION'S CENTER NEWS is a legal weekly newspaper of general circulation, printed and published in the City of Buffalo, in said County and State by Stewart Huntington, and has been such a newspaper during the times hereinafter mentioned; and that said newspaper has a bonafide circulation of at least 200 copies weekly, and has been published within said County in the English language for at least one year prior to the first publication of the notice herein mentioned, and is printed in whole or in part in an office maintained at the place of publication; and that I, Stewart Huntington, the undersigned, am the Publisher of said newspaper and have personal knowledge of all the facts stated in this affidavit; and that the advertisement headed:

Notice Of Application No
1905-1 to Appropriate
Water

a printed copy of which is hereto attached, was printed and published in said newspaper for 2 successive and consecutive weeks, the first publication being made on the 17th day of Sept., 2009, and the last publication on the 24th day of Sept., 2009, that the full amount of fees charged for publishing same, to-wit: The sum of \$ 39.89, insures solely to the benefit of the publisher of the NATION'S CENTER NEWS, that no agreement or understanding for a division thereof has been made with any person and that no part thereof has been agreed to be paid to any other person whomsoever.

Stewart Huntington
Subscribed and sworn to before me this 2nd day of Oct., 2009

Robert Johnson
Notary Public, Lawrence County, South Dakota
My commission expires: 10-24-2010

Notice is given that Luff Exploration Company, c/o Richard D. George, 1580 Lincoln St., Suite 850, Denver, CO 80203 has filed an application for a water permit to appropriate 0.195 cubic feet of water per second (87.5 gallons per minute) from one well to be completed into the Inyan Kara (approximately 4,785 feet deep below grade) located in the NW 1/4 NE 1/4 Section 16-T22N-R6E. The water is for industrial use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1905-1 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E. Capitol, Pierre, SD 57501 or (605) 773-3352" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by October 5, 2009.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application.

Steven M. Pirner,
Secretary, Department
of Environment and Natural Resources
Published once at the
total approximate cost of
\$43.95.

#481
Sept. 17, 24



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

September 10, 2009

Nation's Center News
PO Box 107
Buffalo SD 57720

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application No. 1905-1 to Appropriate Water to be published twice. Please publish the first notice on September 17, 2009 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

The applicant must verify to you that the notice is to be published, before you make the first publication. **Please BILL the APPLICANT for the cost of publication.** The APPLICANT is Luff Exploration Co., c/o Richard D George, 1580 Lincoln St., Ste.850, Denver CO 80203 (Ph # 303-861-2468).

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

No. 1905-1

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of September 10, 2009 enclosing Notice to Appropriate Water by Application No. 1905-1 which was first published in our issue of _____. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

Name

Newspaper



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

September 10, 2009

Luff Exploration Company
c/o Richard D George
1580 Lincoln St Ste 850
Denver CO 80203

Dear Mr. George:

Water Permit Application No. 1905-1 for industrial use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Publisher of the Nation's Center News printed at Buffalo SD (Ph # 605-375-3228). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendations of the Chief Engineer and reports on the applications are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization, the publisher has been instructed to publish your notice once each week for two consecutive weeks. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the applications.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

Instruction to Newspaper - Publish first Notice on September 17, 2009 with the second publication 7 days later. The applicant is responsible for payment. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352 or email: Karen.schlaak@state.sd.us.

NOTICE OF APPLICATION NO. 1905-1 to Appropriate Water

Notice is given that Luff Exploration Company, c/o Richard D George, 1580 Lincoln St, Suite 850, Denver CO 80203 has filed an application for a water permit to appropriate 0.195 cubic feet of water per second (87.5 gallons per minute) from one well to be completed into the Inyan Kara (approximately 4,785 feet deep below grade) located in the NW ¼ NE ¼ Section 16-T22N-R6E. The water is for industrial use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1905-1 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by October 5, 2009.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.

Published twice at the total approximate cost of_____.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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www.state.sd.us/denr

JAN 18 2010

Luff Exploration Company
c/o Richard D George
1580 Lincoln St # 850
Denver CO 80203

Dear Mr. George:

Enclosed is Water Permit No. 1905-1 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An informational sheet *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

Report of Examination of Works and/or Application of Water to Beneficial Use For Permit No. 1905-1

I have this day, July 30, 2018 made a thorough examination of the water use system constructed by Luff Exploration Company, 1580 Lincoln St, Suite 850, Denver, CO 80203 of Permit No. 1905-1, bearing the priority of 7/28/2009 authorizing the diversion of 0.195 cu. ft. per second of the water from one well for industrial purposes in Harding County.

Inspection contact & relationship to permit holder, if applicable: **Rick Fretheim, Production Supervisor**
701-523-6244 (cell)

A. Works used to divert the water:

Well Information:

- 1) Well Drilling Firm: Luff Exploration (6/08)
- 2) No. of Wells 1
- 3) Depth(s) 8,944 feet (true vertical depth)
- 4) Well log is available Yes

Casing:

- 1) Diameter 9 5/8" 0 to 2,016' 7" 2,016' to 9,204' (Inyan Kara)
- 2) Length 9,204 feet (measured depth)
- 3) Type steel

Screen:

- 1) Type Perforated Casing (4,684' – 4,709' and 4,760' to 4,785')
- 2) Length 50 feet
- 3) Static water level approx. 1,000 feet (per production supervisor)

Note: Open hole 9,204' to 14,859', this is a directional oil well temporarily abandoned and used for water production.

Pump:

- 1) Make -----
- 2) Model -----
- 3) Size -----
- 4) Capacity 87.5 GPM. (Based on monthly production figures reported to DENR obtained from a totalizing meter, The pump operates continuously.)
- 5) Horsepower rating 75 hp

B. Works used to transport water to place of use:

- 1) Type Plastic pipe
- 2) Size ---- inches
- 3) Length -- feet

C. Works used to apply water to beneficial use:

The well pumps to a storage tank and is then distributed to five oil field injection wells.

D. Compliance with Permit Requirements:

- 1) Permit qualifications being abided by: Yes
- 2) Exceptions to compliance are: none

E. Condition and Location:

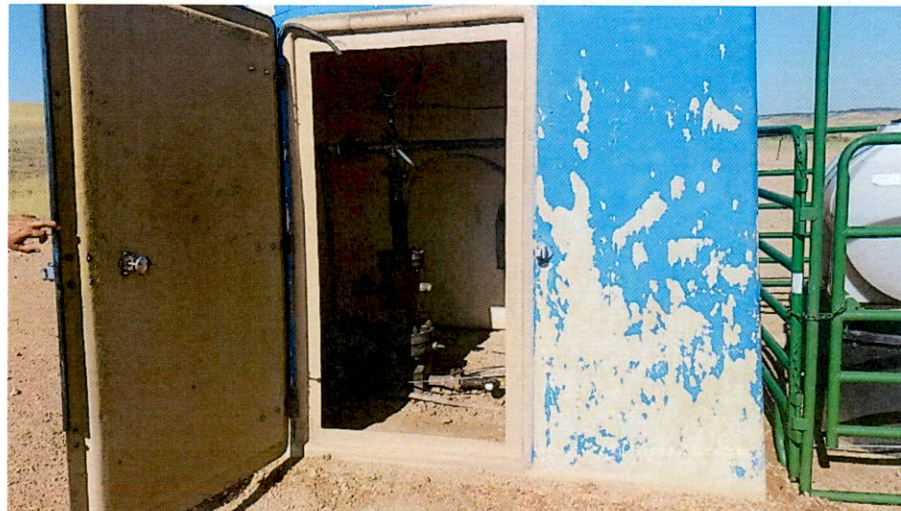
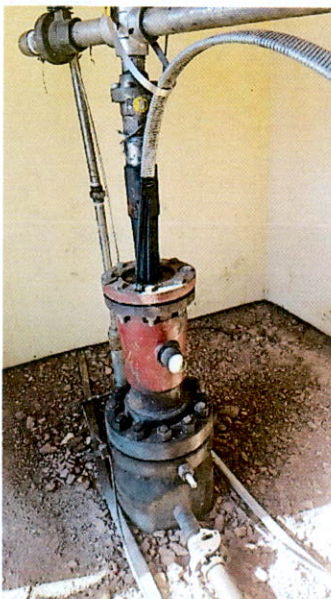
1. The system is in excellent condition with the point of diversion located as follows:
677' S and 2,428' W of the NE corner S16, T22N, R6E (45.875949 , - 103.386306)
2. The works are capable of diverting and conveying to the place of use 0.195 cu. ft. per second (87.5 gpm) of water which is to be used for **industrial use** and the license should be issued for **0.195 cfs**.
3. All structures, wells and lands on map – **Well only**

F. Comments or other permit(s) associated with the project: none



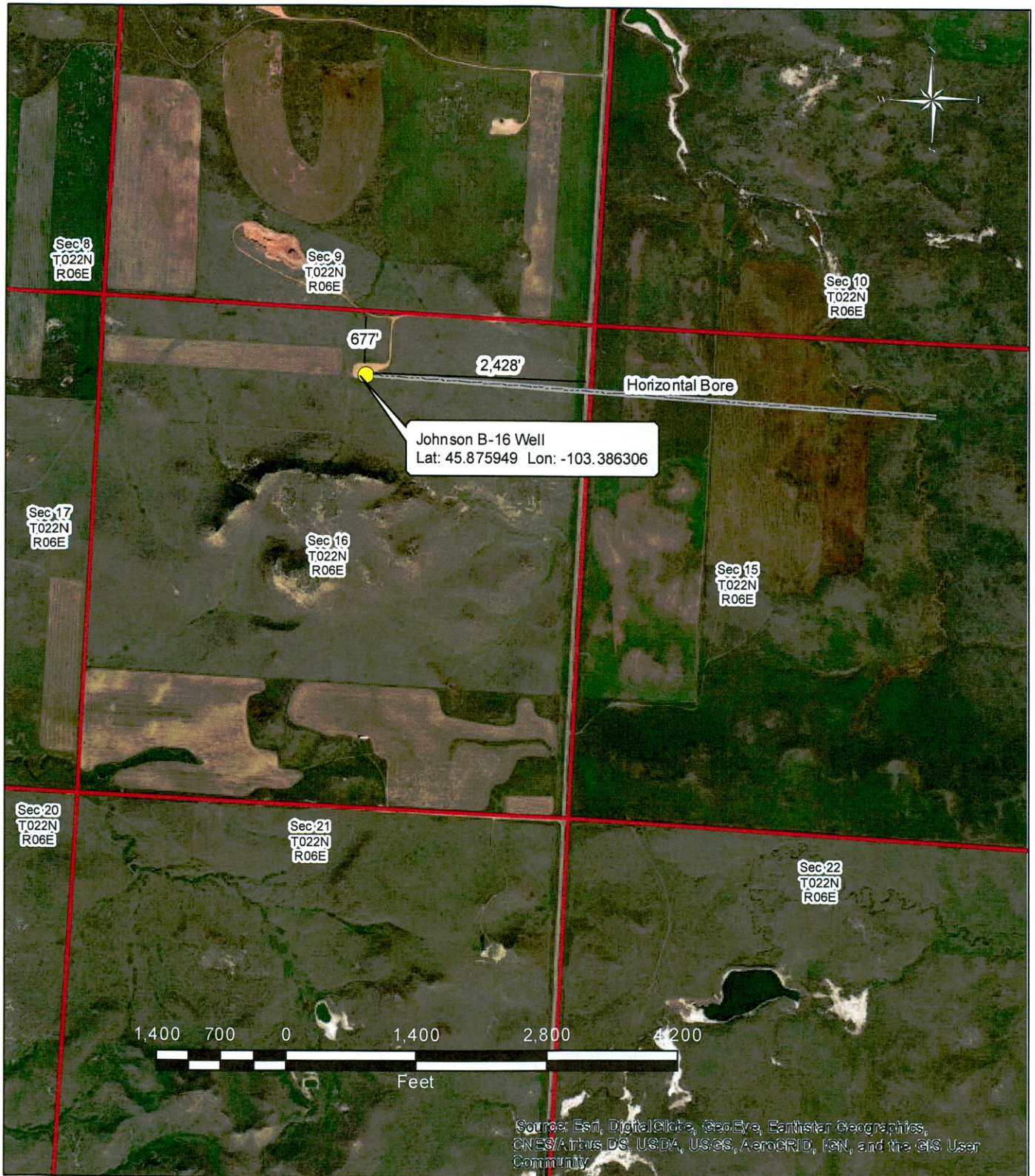
Steven Quissell
Water Rights Inspector
DENR, Water Rights Program

Date report completed: 8/1/2018



Johnson B-16 well and enclosure

Water Right #1905-1
Luff Exploration
7/30/2018



Steven Quissell

Steven Quissell
Water Rights Inspector
DENR Water Rights Program





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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<http://denr.sd.gov>

SEP 26 2018

1905-1

Luff Exploration
1580 Lincoln St, Suite 850
Denver CO 80203

Dear Sir:

Enclosed is Water License No. 1905-1. This is the final water right document completing your process of obtaining a Water Right. Included with your license is a map prepared by the staff engineer who conducted the field investigation.

For your information SDCL 46-6-27 requires that if in the future, the owner of an existing well, constructs a replacement well and does not plan to use the old well, the old well is considered abandoned and must be plugged. Also, any well that is being used or is not considered abandoned must be valved and controlled, if flowing, or sealed and capped so that no leaking occurs either underground or at the surface.

As long as you use the water beneficially, as stated in the Water License, the State Water Laws provide that you have a continuing right to use the water. If you have any questions, please contact our office.

Sincerely,

Jeanne Goodman, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 1905-1

(1) Luff Exploration, 1580 Lincoln St, Suite 850, Denver CO 80203 made Application No. 1905-1, July 28, 2009 for a water permit to divert 0.195 cubic feet of water per second from ground water, one well (Inyan Kara), Harding County, South Dakota for industrial purposes. Permit No. 1905-1, with a priority date of July 28, 2009 was approved October 5, 2009 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before October 5, 2014 and for the application to beneficial use of water on or before October 5, 2018.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the water supply system and is entitled to divert 0.195 cubic feet of water per second for beneficial use. The location of the diversion point is:

- 677'S and 2,428'W of the NE corner of Section 16, T22N, R6E (NW ¼ NE ¼)
Latitude 45.875949, Longitude - 103.386306

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use. The well pumps to a storage tank and is then distributed to five oil field injection wells.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Luff Exploration, 1580 Lincoln St, Suite 850, Denver CO 80203 the holder and/or owner of Water Right No. 1905-1 is issued a license to appropriate water, the right to use 0.195 cubic feet of water per second (87.5 gallons per minute) from ground water, one well (Inyan Kara) with a priority date of July 28, 2009 from the location specified in (2) of this license for industrial purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 1905-1.



Jeanne Goodman, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

SEP 26 2018

date

