



1300 SUN LIFE PLAZA III
112 - 4th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743



July 21, 1986

Royalty Interest Owners
Waskada Unit No. 9
(addressee list attached)

Gentlemen:

Re: Unit Agreement
Revision to Exhibit "A"

A typographical error has been noted in Page 2 of Exhibit "A" of the captioned agreement. For Tract No. 2 (12-27-1-26 WPM) the last column on the right entitled "Share of Final Participation (%)" should read 3.8447 not 3.8847.

Enclosed is a revised Page 2 showing the corrected number for this Tract, which can be inserted in your copy of the agreement. Please accept our apologies for any inconvenience this has caused.

Yours truly,

OMEGA HYDROCARBONS LTD.

R.A. Beamish, P. Eng.
Joint Interest Coordinator

RAB:vb
Encl.
c.c. Petroleum Branch (2)
Land. Dept.
Accounting Dept.
Waskada Unit No. 9

WASKADA UNIT 9
ROYALTY INTEREST OWNERS
ADDRESSEE LIST

Manitoba Department of Energy & Mines
Mineral Resources Division
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Pop's Oil Ltd.
c/o Mr. James Kirkup
Box 250
Pierson, Manitoba
ROM 1S0

R.O. McKenzie, Oil Consultants Ltd.
R.R. 1 MacKinnon Road
Pender Island, BC
VON 2M0

EXHIBIT "A"

Tract No.	Land Description (Lsd)	Royalty Interest		Working Interest		Interim Tract Participation (%)	Share of Interim Participation (%)	Final Tract Participation (%)	Share of Final Participation (%)
		Owner	Share (%)	Owner	Share (%)				
1	11-27-1-26 WPM	Pop's	100	Omega	100	8.8272	8.8272	10.0471	10.0471
2	12-27-1-26 WPM	Pop's	100	Omega	100	9.0172	9.0172	3.8447	3.8447
3	13-27-1-26 WPM	Pop's	100	Omega	100	26.3219	26.3219	18.4452	18.4452
4	14-27-1-26 WPM	Pop's	100	Omega	100	9.6816	9.6816	16.8579	16.8579
5	15-27-1-26 WPM	Pop's	100	Omega	100	11.1322	11.1322	22.1188	22.1188
6	16-27-1-26 WPM	Pop's	100	Omega	100	32.4465	32.4465	15.1220	15.1220
7	1-34-1-26 WPM	Crown	100	Omega (1)	100	2.5734	2.5734	6.8903	6.8903
8	2-34-1-26 WPM	Crown	100	Omega (1)	100	0.0000	0.0000	6.6740	6.6740
						100.0000	100.0000	100.0000	100.0000

Note: (1) Subject to Overriding Royalty Interest to R.O. McKenzie.

Effective: As of the Effective Date

Revision No. 2
1986-07-21



1400 SUN LIFE PLAZA III
112 - 11th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743

May 7, 1986

Waskada Unit 9
Royalty Interest Owners
(addressee list attached)

Gentlemen:

Re: Waskada Unit 9 - Exhibit "A"

Enclosed is a copy of Exhibit "A" revised to show the overriding royalty interest of R.O. McKenzie, Oil Consultants Ltd. Please insert Exhibit "A" in your copy of the Unit Agreement.

If you have any questions please contact the undersigned at (403) 261-0743. Thank you.

Yours truly,

OMEGA HYDROCARBONS LTD.

A handwritten signature in cursive script, appearing to read "R.A. Beamish".

R.A. Beamish, P. Eng.
Joint Interest Coordinator

RAB:vb

Encl.

c.c. Manitoba Oil and Natural
Gas Conservation Board
Land Dept.
Accounting Dept.



WASKADA UNIT 9

ROYALTY INTEREST OWNERS

ADDRESSEE LIST

Pop's Oil Ltd.
c/o Mr. James Kirkup
Box 250
Pierson, Manitoba
ROM 1S0

Manitoba Department of Energy & Mines
Mineral Resources Division
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

R.O. McKenzie, Oil Consultants Ltd.
R.R. 1 MacKinnon Road
Pender Island, BC
VON 2M0



300 SUN LIFE PLAZA III
1204 4th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743

March 24, 1986

Pop's Oil Ltd.
c/o Mr. James Kirkup
Box 250
Pierson, Manitoba
R0M 1S0

Manitoba Department of Energy & Mines
Mineral Resources Division
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Dear Sirs:

Re: Waskada Unit 9 Effective Date

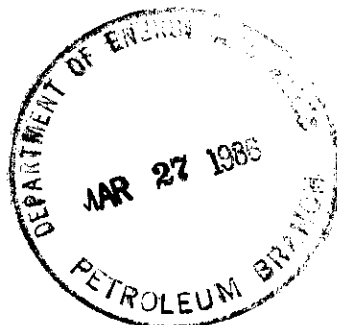
Please be advised that the Effective Date for the captioned Unit is April 1, 1986. Waterflood approval is forthcoming and we should be in a position to inject into the 11-27-1-26 WPM well on the Effective Date.

Yours truly,

OMEGA HYDROCARBONS LTD.

Mark Mawdsley
D. Mark Mawdsley
Production Engineer

DMM:vb
c.c. Waskada Unit 9 File



Manitoba

The Oil and Natural Gas
Conservation Board

Room 309
Legislative Building
Winnipeg, Manitoba, CANADA
R3C 0V8

(204) 945-3130

MAR 20 1986

Omega Hydrocarbons Ltd.
1300 Sun Life Plaza
112 - 4th Avenue S.W.
Calgary, Alberta
T2P 0H3

Attention: D. Mark Mawdsley,
Production Engineer

Dear Sirs:

Re: Waskada Unit No. 9

Receipt of your letter dated January 27, 1986 and attached
royalty owner consents is acknowledged.

The Waskada Unit No. 9 Unit Agreement is hereby approved with
an effective date (pursuant to Article XIV of the Unit Agreement)
of April 1, 1986.

Yours sincerely,

ORIGINAL SIGNED BY
CHARLES S. KANG

Charles S. Kang
Chairman

LRD/lk

b.c. Wm. McDonald
J. F. Redgwell
Petroleum Branch

March 6, 1986

Omega Hydrocarbons Ltd.
1300, 112 - 4th Avenue S.W.
CALGARY, Alberta
T2P 0H3

Attention: D. Mark Mawdsley
Production Engineer

Dear Mark:

Re: Waskada Unit No. 9

Enclosed is one copy of the Unit Agreement for Waskada Unit No. 9 which has been executed by the Minister of Energy and Mines on behalf of the Crown as royalty owner.

Please note that prior to the Unit becoming effective, the Unit Agreement must be approved by The Oil and Natural Gas Conservation Board.

Yours sincerely,

[Signature]
L.R. Dubreuil

L.R. Dubreuil
Chief Petroleum Engineer
Petroleum Branch

LRD:dah

encl



Action / Route Slip

Date March 18, 1986

To Clare

From: B02

Telephone: _____

- | | | | | |
|---|---|--|---|--|
| <input type="checkbox"/> Take Action | <input type="checkbox"/> Per Your Request | <input type="checkbox"/> Circulate, Initial and Return | <input type="checkbox"/> For Approval and Signature | <input type="checkbox"/> Make _____ Copies |
| <input type="checkbox"/> May We Discuss | <input type="checkbox"/> For Your Information | <input type="checkbox"/> Return With Comments or Revisions | <input type="checkbox"/> Draft Reply for Signature | <input type="checkbox"/> Please File |

Comments: Omega's letter was being held pending Crown consent. However when Crown consent was obtained, we neglected to obtain the Board's approval of a March 1 date. I have explained this to Mark Maudsley and apologized for the delay



HYDROCARBONS LTD

1300 SUN LIFE PLAZA III
112 - 4th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743

January 27, 1986

Manitoba Oil & Gas Conservation Board
309 Legislative Building
450 Broadway Avenue
Winnipeg, Manitoba
R3C 0V8

Attention: Mr. C.S. Kang

Dear Sir:

Re: Waskada Unit 9

All Working Interest and Royalty Interest Owners have executed the Unit Agreement - Waskada Unit 9. In this connection we are enclosing counterpart execution pages for your records. The Board's own executed document has not yet been returned to Omega but we assume it will be available in your offices.

We request the approval of the Oil & Gas Natural Gas Conservation Board for this Unit so that we may have an effective date of February 1, 1986.

Yours truly,

OMEGA HYDROCARBONS LTD.

A handwritten signature in dark ink, appearing to read "T.J. Hall", is written over a horizontal line.

T.J. Hall
President

TJH/jr

Encl:

cc: T.J. Hall
Waskada Unit No. 5 File



MANITOBA

ON MATTERS OF STATE

Order in Council

No. 200

To The Honourable the Lieutenant Governor in Council

The undersigned, the Minister of Energy and Mines
submits for approval of Council a report setting forth that:

WHEREAS Section 75 of "The Mines Act", being Chapter M160 of the Revised Statutes of Manitoba, provides as follows:

"75(1) Where the Crown is a working interest owner or royalty owner of a tract of land, the Lieutenant Governor in Council may authorize the minister, on behalf of the Crown, to enter into a unitization agreement for the unit operation of the pool or field, or part thereof, within which the tract is situated.

75(2) Notwithstanding any other provision of this Act or of an agreement or other disposition made under this Act, the Lieutenant Governor in Council may authorize the minister, on behalf of the Crown, to enter into an agreement for the calculation of the royalty payable to the Crown on the oil and gas produced from a unit area that includes a tract that is subject to the payment of a royalty to the Crown."

AND WHEREAS Omega Hydrocarbons Ltd. is the holder of Crown Oil and Natural Gas Lease No. L 792-063 covering the SE 1/4 of Section 34-1-26 WPM;

AND WHEREAS Omega Hydrocarbons Ltd. is proposing to unitize its operations in part of the Waskada Mission Canyon 3b B Pool as Waskada Unit No. 9 which Unit includes the tracts described as Legal Subdivisions 1 and 2 of Section 34, in Township 1, Range 26 WPM;

AND WHEREAS Omega Hydrocarbons Ltd. has requested agreement for the proposed unitization from the Crown as the royalty owner of the subject tracts;

AND WHEREAS in order to accomplish the more efficient and economical development and production of the oil and gas resources of the Waskada Mission Canyon 3b B Pool, it is deemed advisable for the Crown to enter into the said unitization agreement.

THEREFORE, he, the Minister, recommends:

THAT the Minister of Energy and Mines be authorized to enter into the Unit Agreement for Waskada Unit No. 9 in the form hereto annexed and marked as Schedule "A", or any form to the like effect.

Initiating Department/Agency	
Department/Agency	Authorized Officer
<i>Wm</i>	<i>CSK</i>
Approved By	
C.S.C.	Finance
Approved as to form by:	
<i>[Signature]</i>	
Initials	
<i>[Initials]</i>	
Civil Litigation Branch: Legislative Counsel	

Signature

Wilson D. Prusul

IN THE EXECUTIVE COUNCIL CHAMBER, WINNIPEG

Upon consideration of the foregoing report and recommendation Council advises that it be done as recommended.

26 February 1986

Date

Michael Smith

~~President~~ Presiding Member

AT GOVERNMENT HOUSE IN THE CITY OF WINNIPEG

Approved and Ordered this 26th day of February A.D. 1986

[Signature]
Lieutenant Governor



Memorandum

Date February 5, 1986

To Charles S. Kang
Deputy Minister of Energy and Mines
309 Legislative Building

From H. Clare Moster
Director, Petroleum Branch

Telephone

Subject Waskada Unit No. 9

Omega Hydrocarbons Ltd. is proposing to develop a portion of the Waskada Mission Canyon 3b B Pool as the Waskada Unit No. 9, which will include eight tracts. This proposed Unit involves two tracts (Lsd's) for which the Crown is the royalty interest owner (i.e. - mineral rights owner). Section 74 of The Mines Act states that before a Unitization Agreement may be put into effect, it must be approved by The Oil and Natural Gas Conservation Board. It further states that the Board shall not approve an agreement unless the royalty owners have agreed to the Unit operation. Therefore, Omega has submitted two copies of the proposed revised Unit Agreement for the proposed Waskada Unit No. 9 for approval (execution) by the Minister as an affected royalty owner.

Section 75 of The Mines Act states that the Minister, with the authorization of the Lieutenant Governor in Council, may enter such agreements on behalf of the Crown as a royalty owner.

Recommendation:

It is recommended that the Minister:

1. Request authorization from Cabinet to permit him to enter into the Waskada Unit No. 9 Unitization Agreement on behalf of the Crown (draft OIC attached) with respect to Lsd's 1 and 2 of Section 34-1-26 (WPM).
2. Execute the attached two copies of the Unit Agreement for the Waskada Unit No. 9 as a royalty owner.

Discussion:

The tracts in the proposed Waskada Unit No. 9 which contain Crown owned mineral right are Lsd's 1 and 2 of Section 34-1-26 (WPM). These tracts are held by Omega Hydrocarbons Ltd. under Crown Oil and Natural Gas lease No. L792-063 covering the southeast quarter of Section 34-1-26 (WPM). Omega has drilled three wells in the Waskada Lower Amaranth A Pool. The well Omega Waskada Prov. 1-34-1-26 (WPM) is completed in the Mission Canyon 3b B Pool. It is currently producing at an oil rate of about 0.6 m³/day and a water-oil ratio

of 19 m³/m³. The well Omega Waskada Prov. 2-34-1-26 (WPM) was formerly completed in the MC3b B Pool but only produced very little oil at a high water-oil ratio for two months, prior to being recompleted to the Lower Amaranth A Pool. Based on production trends, the well 1-34-1-26 (WPM) will probably become uneconomic in the very near future. As part of a pressure maintenance project, it is likely that Unit production and therefore revenue to the Crown will increase.

The Branch has reviewed the Tract Participation Factors proposed for the Tracts and feels they are reasonable.

Clause 1301 of the proposed Unit Agreement specifically states that the execution of the agreement by the Minister is strictly as a Royalty Interest Owner (similar to any freehold mineral owners). Therefore, by such execution, the Minister is not approving the Unit Agreement. Such approval may only be given by the Board pursuant to Section 74 of The Mines Act.

~~Original signed by H. C. Moster~~

H. Clare Moster

MA/lk

CABINET SUBMISSION
by the
DEPARTMENT OF ENERGY AND MINES

Subject:

An agreement to unitize oil development operations in the Waskada oil field.

Discussion:

The Province of Manitoba is the owner of the mines and minerals in the southeast quarter of Section 34, Township 1, Range 26 WPM which is part of the Waskada oil field. Omega Hydrocarbons Ltd. is the holder of a Crown oil and natural gas lease to the subject land. Omega has completed three wells on the property, two of which are within the boundaries of the proposed Waskada Unit No. 9. Omega is planning to initiate an enhanced oil recovery (waterflood) project in the Waskada MC3b B Pool in the area of the proposed Unit, but before proceeding, Omega must obtain the agreement of the mineral rights owners affected. As Omega wishes to include two Crown tracts in the proposed Waskada Unit No. 9, it has requested the consent of the Minister of Energy and Mines on behalf of the Crown as mineral rights owner. Inclusion of the well in the proposed Unit will result in a portion of the total crude oil and natural gas produced from the wells in the Unit being allocated to the Crown tracts, and the Crown will receive royalties on the allocated production.

The Mines Act specifically provides for the Minister to enter into unitization agreements on behalf of the Crown with the approval of the Lieutenant Governor in Council.

Communications:

"Not Required"

Recommendation:

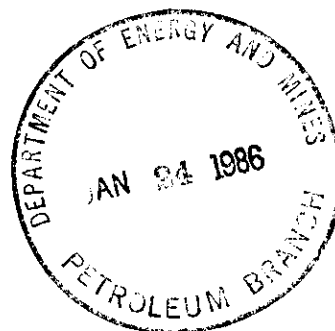
It is recommended that the Minister of Energy and Mines be authorized to enter into the Unitization Agreement for Waskada Unit No. 9 on behalf of the Crown.

Wilson D. Parasiuk
Minister of Energy and Mines



1300 SUN LIFE PLAZA III
112 - 4th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743

January 23, 1986



To: Royalty Interest Owners
Waskada Unit 9
(Addressee List Attached)

Dear Sir/Madame:

Re: Formation of Waskada Unit 9 (formerly: "Waskada Mission Canyon Unit A")

Please be advised that Omega Hydrocarbons Ltd. has elected to recall all of the signed and unsigned copies of the Waskada Mission Canyon Unit A Agreement. The recall results from a re-analysis of the participation formula which we believe will be more representative of each tract's contribution to the Unit. In addition, the Unit has been renamed to conform with the government's preference.

The new Agreements will be submitted to you within a few days and will contain factors resulting from the new Unit formula.

Your early return of the Agreements now in your possession will be appreciated.

Yours very truly,

OMEGA HYDROCARBONS LTD.

A handwritten signature in dark ink, appearing to read "D. Mark Mawdsley".

D. Mark Mawdsley
Production Engineer

DMM/jr

Encl.

WASKADA UNIT 9
ROYALTY INTEREST OWNERS
ADDRESSEE LIST

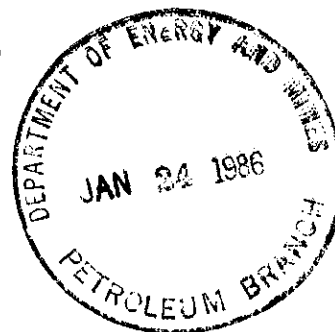
Pop's Oil Ltd.
c/o Mr. James Kirkup
Box 250
Pierson, Manitoba
R0M 1S0

Manitoba Department of Energy & Mines
Mineral Resources Division
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3



1300 SUN LIFE PLAZA III
112 - 4th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743

January 23, 1986



To: Royalty Interest Owners
Waskada Unit 9
(Addressee List Attached)

Dear Sir/Madam:

**Re: Formation of Waskada Unit 9
(Formerly: Waskada Mission Canyon Unit A)**

Omega Hydrocarbons Ltd. has had considerable success in finding and producing oil in the Waskada area. In an effort to maximize oil recovery, Omega has formed units and initiated waterflood projects. At this time, encouraging results of waterflooding have been obtained and we are proposing to implement a waterflood project in a formation in an area in which you have a royalty interest.

In order to implement a waterflood in the Mission Canyon Formation in this area of the Field, we must form a new Unit and receive the written approval of all parties affected. This is done by having all Working and Royalty Interest Owners in the area approve by signing a Unit Agreement and by successfully applying to the Manitoba Oil and Natural Gas Conservation Board for technical approval of the plan.

We expect to realize long term benefits for all parties through waterflooding by increasing the ultimate oil recovery. As a Royalty Interest Owner in the Unit you share directly in these benefits. Unitization is required to implement a pressure maintenance project such as waterflooding so that owners of tracts whose well is converted to water injection or whose tract contributes oil reserves without a well, are properly compensated for the increased recovery from the project.

Please signify your approval by signing the enclosed two copies of the Unit Agreement on page 21. If the royalty is held by an individual you should sign before an appropriate witness (Commissioner for Oaths, etc.). If the royalty is held by a corporation the appropriate officer(s) should sign, date and affix the seal. One copy of the signed Unit Agreement is to be returned to Omega as soon as possible and the other copy is for your file. If you live in the Waskada area, please drop the copy at our office there, otherwise please mail it to our Calgary office.

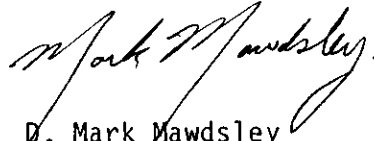
Waskada Unit 9 will contain 8 tracts as shown on the map entitled Exhibit "B". Tract participations incorporate an interim and a final interest. The final participations have been calculated on the basis of recoverable oil in place and initial well productivity. This formula preserves equity under waterflood, however, until response occurs there can be a disruption in current conditions. To minimize this effect on owners, an interim participation is being used. The interim participation is based on current well productivity and will be in effect until March 1, 1987, which is the

anticipated time for flood response to start. Tract participations are shown on Exhibit "A".

If you have any questions regarding this matter, please call me collect at (403)261-0743. An impartial third party opinion may be obtained by contacting Mr. Bob Dubreuil of the Manitoba Petroleum Branch at (204)945-6574.

Yours truly,

OMEGA HYDROCARBONS LTD.


D. Mark Mawdsley
Production Engineer

DMM/sk
Encl.

January 20, 1986

Omega Hydrocarbons Ltd.
1300, 112 - 4th Avenue S. W.
Calgary, Alberta
T2P 0H3

Attention: D. Mark Mawdsley,
Production Engineer

Dear Mark:

Waskada Unit No. 9
Tract Factor Calculations

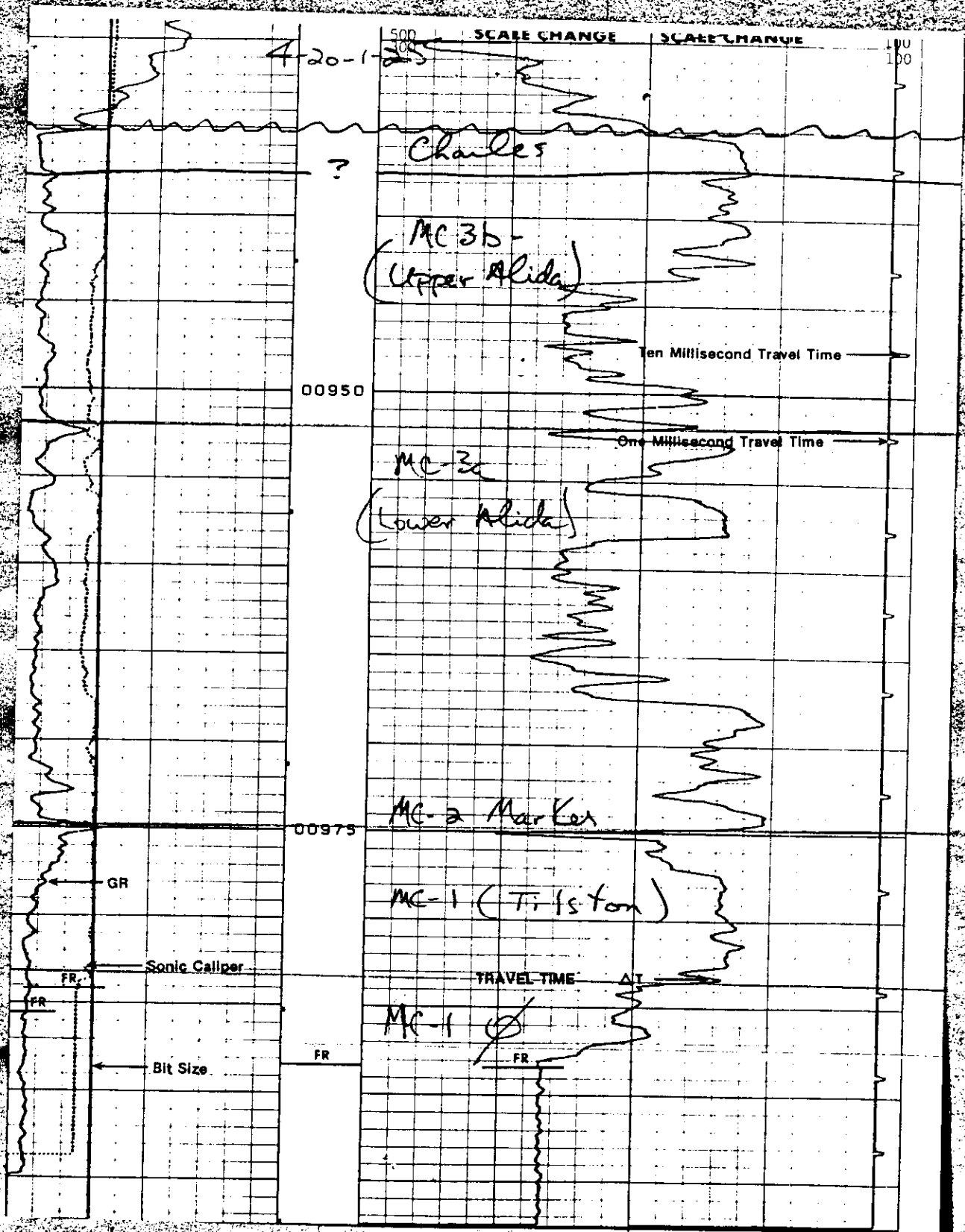
I have reviewed your proposed tract factor calculations for the subject Unit and feel them to be reasonable. On this basis, I would be prepared to recommend to the Minister that he execute the Unit Agreement on behalf of the Crown.

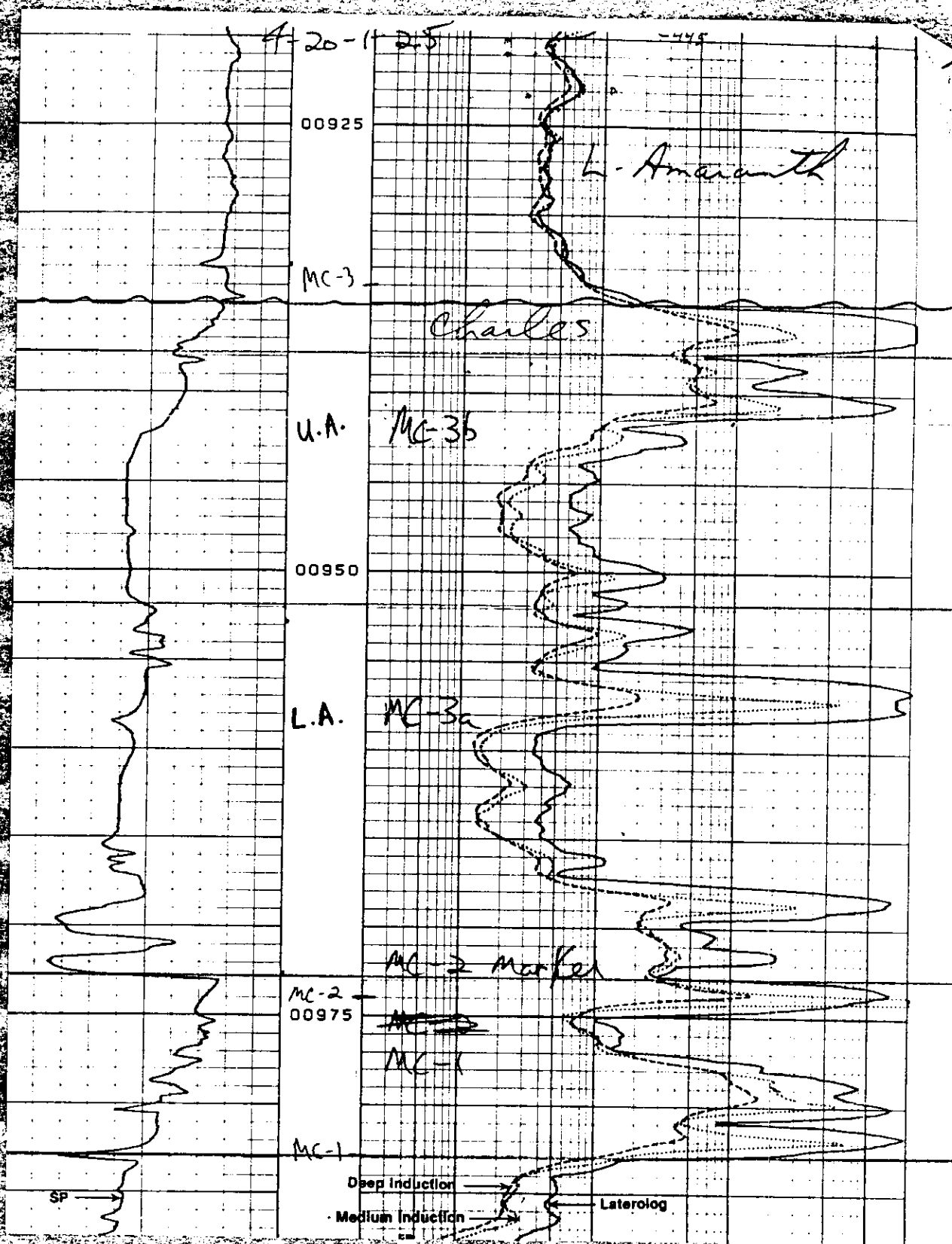
With respect to Omega Waskada 12-27MC3a-1-26, I note that this well is completed in both the MC3a or the MC3b. My review and acceptance of your proposed tract factors is based on the MC3b pay only (perforated interval 9190-9220 & 923.5-925.0 mKB). Please note that pursuant to the Regulations, (Section 61), commingling of two zones is not permitted unless specifically authorized. In as much as the proposed waterflood project appears to be confined to the MC3b zone, I would suggest that the lower perforations (931.0-933.0 mKB) should be squeezed off.

Yours sincerely,

L. R. Dubreuil
Chief Petroleum Engineer
Petroleum Branch

LRD/dp



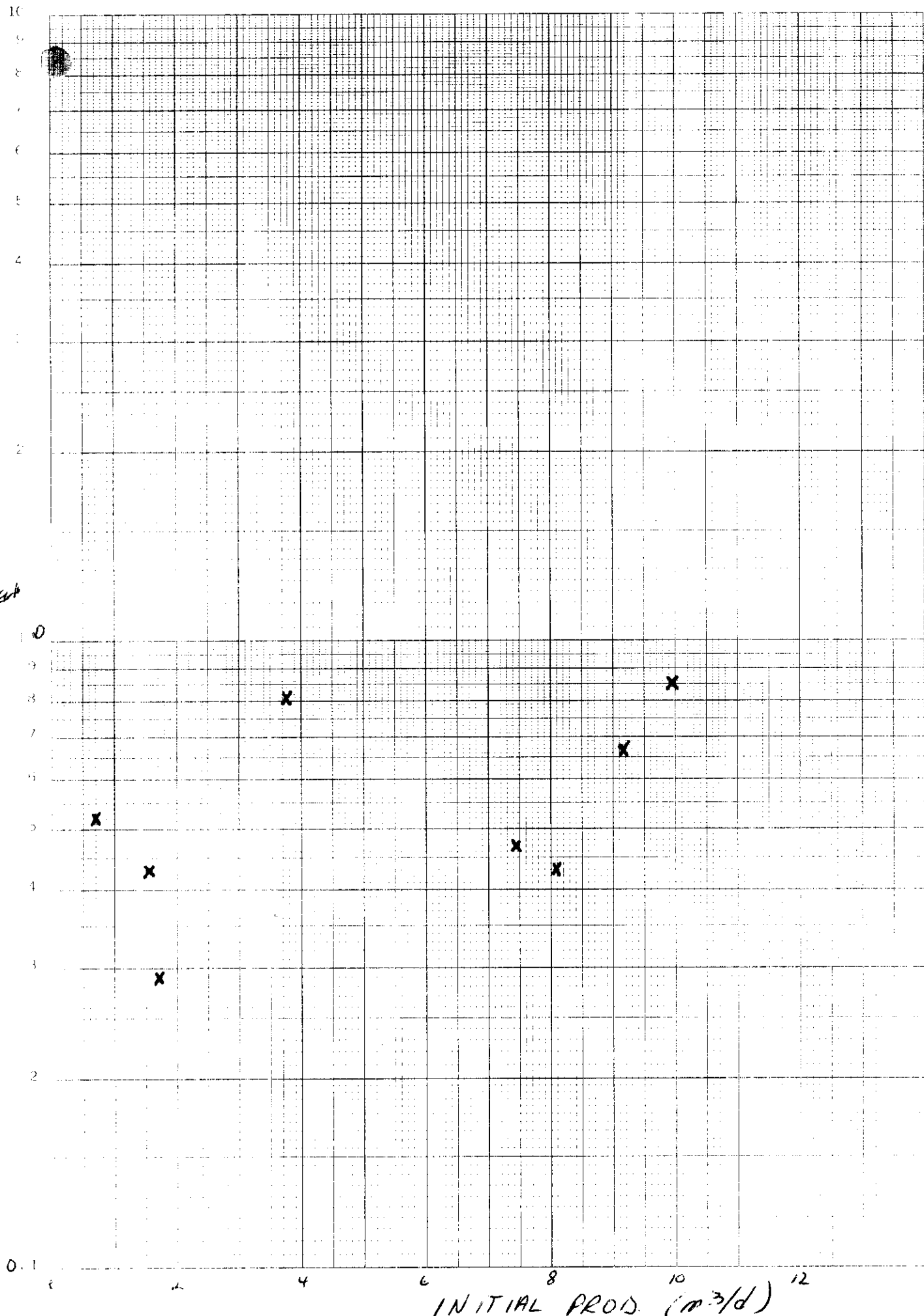


WASKAMP UNIT #9

46 5130

ϕ_h
ONE-H

K&E SEMI-LOGARITHMIC 2 CYCLES x 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.



WASKADA UNIT No 9

<u>TRACT</u>	<u>LSD</u>	<u>ϕh_{cm}</u>	<u>ϕh_{pr}</u>	<u>$\phi h_{cm} \text{ old}$</u>
1	11-27	0.81	0.80	0.84
2	12-27	0.29	0.17	0.96
3	13-27	0.67	0.54	0.84
4	14-27	0.47	0.66	1.06
5	15-27	0.85	0.84	1.10
6	16-27	0.43	0.54	0.54
7	1-34	0.43	0.44	0.42
8	2-34	0.52	0.54	0.54

- Poor correlation between ϕh and Initial production. Therefore should have a productivity factor.

<u>Well</u>	<u>ϕh</u>	<u>$(1-S_w)$</u>	<u>Cum P N (bbl)</u>	<u>Cum P</u>	<u>% of N</u>
11-27	0.81	.39	279670	23298 14654	5.24
12-27	0.29	.43	110398	942.1	5.40
13-27	0.67	.59	349963	54484	9.79
14-27	0.47	.67	276784	5370.6	12.12
15-27	0.85	.60	451508	4827.3	6.72
16-27	0.43	.56	213183	7351.7	21.69
1-34	0.43	.67	255058	251.8	0.00
2-34	0.52				

$$N = 269843 \quad \phi h (1-S_w)$$

- There is no correlation between ϕh and % of reserves produced or between ϕh and current productivity.

- A productivity factor should be included; and although the Crown participation would increase if such a factor ^{were included}, or if own production were ~~not~~ included, the minimal current productivity of the Crown wells (1-3% and 2-3%) makes justification of such modifications difficult.

- Proposed factor calculations are acceptable



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TELEPHONE (403) 261-0743

January 13, 1986

Manitoba Energy & Mines
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Attention: Mr. Bob Dubreuil

Dear Sir:

Re: Waskada Unit 9 Tract Factor Calculations

Attached for your review are Omega's revised Øh map, and initial and final Tract Factor Calculations for the subject Unit. The difference in the Crown's portion of allocated production for royalty calculations as compared to our original submittal are as follows:

<u>Participation</u>	<u>Original</u>	<u>Revised</u>
Initial	4.8852%	2.5734%
Final	11.0409%	13.5643%

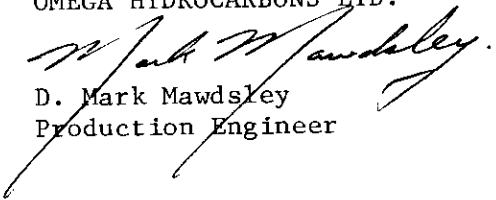
As with the revised Unit 12 we have elected to use the latest 6 months of production in the interim participation calculation and to stay with the 50/50 split of production based and reservoir based factors for the final participation. The effective period of the interim participation will also be changed to a six month period following the Effective Date of the Unit.

Please examine this data and return your comments to the undersigned at your earliest convenience so that we may distribute revised Unit Agreements to the other Royalty Interest Owners.

Thank you for you attention to this matter.

Yours truly,

OMEGA HYDROCARBONS LTD.

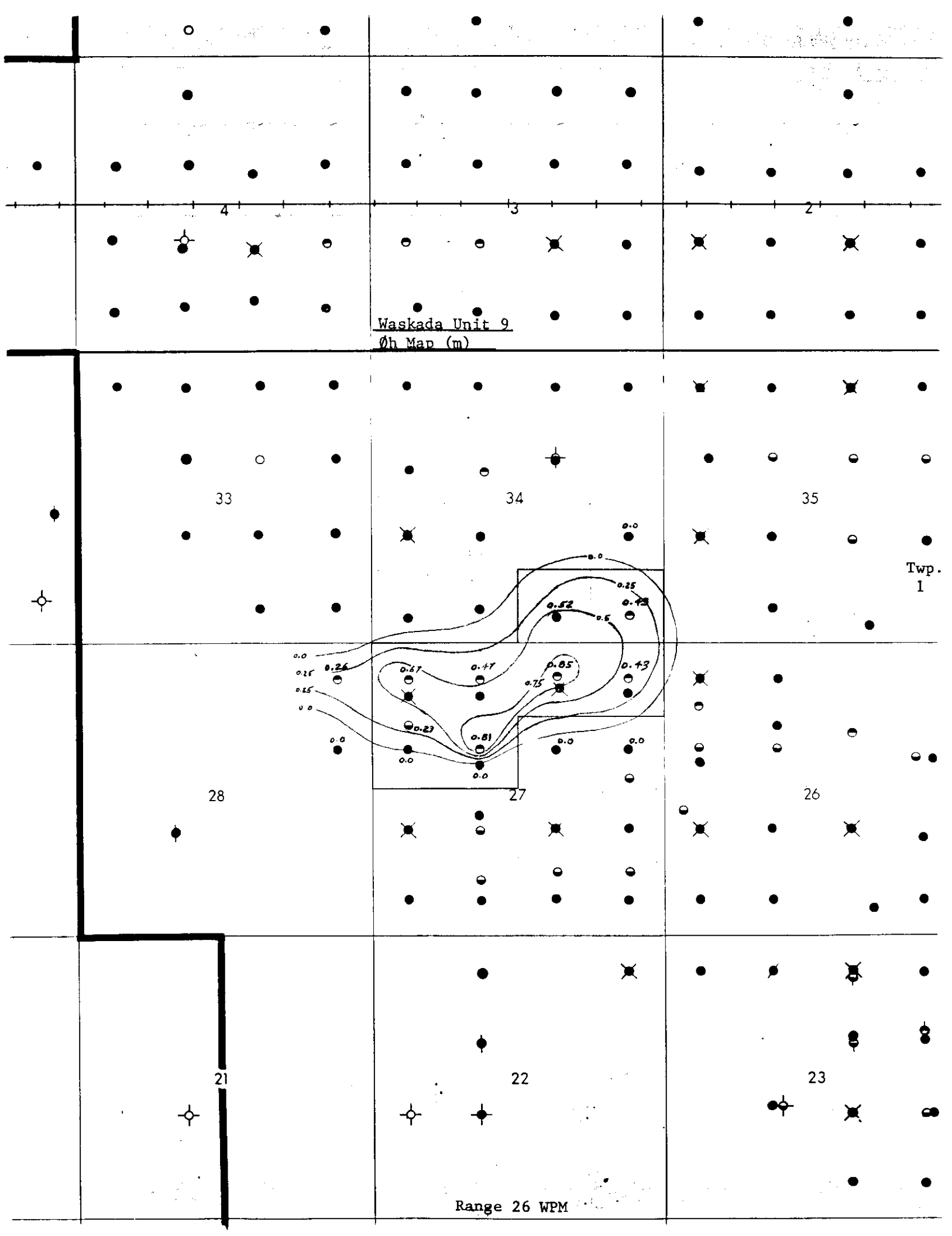

D. Mark Mawdsley
Production Engineer

DMM:vb
Encl.
c.c. T.J. Hall
R.A. Beamish
Waskada Unit 9 File

Waskada Unit 9
Oh Map (m)

Twp.
1

Range 26 WPM



WASKADA UNIT 9 INITIAL TRACT FACTOR CALCULATIONS

09-Jan-86

TRACT	LAND	85-06 to 85-11 PROD. (m3)	OIL RATE	OIL RATE	TRACT		
DESCRIPTION	HRS	OIL	WATER	FACTOR 1	FACTOR	FACTOR	
*****	*****	*****	*****	*****	*****	*****	
1	11-27-1-26 WIM	4332	337.6	866.3	0.6085	8.8272	8.8272
2	12-27-1-26 WIM	4021	320.1	1165.3	0.6216	9.0172	9.0172
3	13-27-1-26 WIM	4380	1017.8	2505.2	1.8145	26.3219	26.3219
4	14-27-1-26 WIM	4076	348.4	334.9	0.6674	9.6816	9.6816
5	15-27-1-26 WIM	3942	387.4	1938.8	0.7674	11.1322	11.1322
6	16-27-1-26 WIM	4369	1251.5	3314.6	2.2367	32.4455	32.4455
7	1-34-1-26 WIM	4231	96.1	1950.4	0.1774	2.5734	2.5734
8	2-34-1-26 WIM	0	0.0	0.0	0.0000	0.0000	0.0000
*****	*****	*****	*****	*****	*****	*****	*****
TOTALS:	29351	3758.9	12075.7	6.8935	100.0000	100.0000	100.0000
*****	*****	*****	*****	*****	*****	*****	*****

AVERAGE OIL RATE (m3/cc. day) AND OIL CUT
 FIRST 6 MONTHS OF PRODUCTION

RATE	CUT
0.0000	00.00%

WASKADA UNIT 9 TRACT FACTOR CALCULATIONS

09-Jan-86

FINAL

TRACT	LAND	A*PHI*h	4 MONTH CUM. PROD. (m ³)	A*PHI*h	OIL RATE	OIL RATE	TRACT	TRACT	LAND
	DESCRIPTION	(H*μ)	HRS	OIL	WATER	FACTOR	FACTOR 1	FACTOR	DESCRIPTION
1	11-27-1-26 WIM	5.62	2794	436.5	384.9	5.6178	0.6405	4.4293	11-27-1-26 WIM
2	12-27-1-26 WIM	1.84	2713	191.9	634.2	1.8393	0.2900	2.0054	12-27-1-26 WIM
3	13-27-1-26 WIM	7.65	2764	1052.7	33.3	7.6469	1.5615	10.7983	13-27-1-26 WIM
4	14-27-1-26 WIM	8.08	2742	849.2	395.3	8.0768	1.2698	8.7811	14-27-1-26 WIM
5	15-27-1-26 WIM	10.38	2780	1151.4	58.8	10.3758	1.6981	11.7430	15-27-1-26 WIM
6	16-27-1-26 WIM	5.57	2748	926.0	425.5	5.5678	1.3516	9.5542	16-27-1-26 WIM
7	1-34-1-26 WIM	5.03	2561	155.1	967.2	5.0280	0.2693	1.8623	1-34-1-26 WIM
8	2-34-1-26 WIM	5.85	710	20.7	369.5	5.8476	0.1193	0.5264	2-34-1-26 WIM

TOTALS:		50.02	19512	4783.5	3248.7	50.0000	7.2303	50.0000	100.0000

AVERAGE OIL RATE (m³/day) AND OIL OUT
AFTER 4 MONTHS OF PRODUCTION

RATE	OUT
5.6178	25.411

- Murray Rodgers
- Bob Beamish
Unit A.

①

CROWN TRACTS 1-34, 2-34.

$$\text{Omega Tract Factor} = 5.6998 + 5.3411 = \boxed{11.0409}$$

$$\text{Omega } \phi h \text{ based Tract factor} = (3.8375 + 4.5147) \times 2 = \boxed{16.7044}$$

My ϕh numbers.

<u>Well</u>	<u>ϕh (Branch)</u>	<u>FRACTION</u>	<u>ϕh (OMEGA)</u>	<u>Don't Agree</u>
11-27	0.80 ϕm	17.660	0.84 ϕm	
12-27	0.17	3.753	0.96	X
13-27	0.54	11.921	0.84	X
14-27	0.66	14.570	1.06	X
15-27	0.84	18.543	1.10	X
16-27	0.54	11.921	0.54	
1-34	0.44	9.713	0.42	
2-34	<u>0.54</u>	11.921	<u>0.54</u>	
	4.53		6.30	

Branch ϕh based tract factor.

$\boxed{21.634}$

Branch method is

1. determine top and base of MC3b zone*
2. using a Δt cutoff of 190 $\mu\text{sec}/m$ determine net pay (h_{net})
3. estimate the average Δt over the net pay zone
4. Using $V_{ma} = 23000 (\text{ft}/\text{sec})$ calculate ϕ_{av} .
5. Determine $\phi h_o = h_{net} \times \phi_{ave}$.

* or other zone of interest

This method was used on Unit A with the results ~~at~~ listed on the previous page.

I tested the sensitivity of this approach on the 12-27 well by

1. Changing Δt cut off to 180 msec/m
2. Changing V_{ma} to 25,000 ft/sec
3. Changing V_{ma} to 21,000 ft/sec.

1. Changing Δt to 180 increases net pay from 1.41 m to 2.19 m (pay intervals are approx 921.4-922.1 and 924.5-925.0)
 - resulted in an increase in ϕ_h from 0.17 to 0.23 ϕ_m
2. Changing V_{ma} to 25000 ft/sec
 - resulted in an increase in ϕ_h from 0.17 to 0.19 ϕ_m
3. Changing V_{ma} to 21000 ft/sec
 resulted in a decrease in ϕ_h from 0.17 to 0.13 ϕ_m
4. Combination of 1 & 2 resulted in $\phi_h = 0.26 \phi_m$
 - I cannot reasonably duplicate Omega's ϕ_h number of 0.96 ϕ_m for this well unless pay from the MC3a is included.

Inasmuch as Unit A is an MC3b Unit, I do not think MC3a pay should be included.

- Note that by using the method described above I get very close to Omega's Φh numbers on several wells (11-27, 16-27, 1-34, 2-34)

- While I would recommend Board approval of a Unit using Omega's tract factors if all royalty owners had executed the agreement, I could not at this point recommend to the Crown that it enter the Unit A agreement on the basis of the tract factors as presented. Reasons for this are summarized below.

1. Discrepancies in Φh numbers
2. Because the Φh numbers can be derived from conventional log analysis (unlike the Lower Amarantth) the weighting of Φh (or volumetric factor) should be greater than it is in the Lower Amarantth Units (not less - i.e. 50% vs 67%)
3. The interim tract factor already penalizes the Crown as 2-34 is currently not producing from the MC3b. Heavy weighting of a productivity factor would seem to compound this

penalty.

4. Does the A factor in your $A\phi h$ equation vary? - How?

At this point, I have only looked at Unit A. I will start reviewing the others immediately and should be ready to discuss them next week.

$$1-34 \quad h_{net} = 3.32 \text{ m} \quad \Delta t_{ave} = 205.38$$

$$\phi = 13.14 \quad \phi_h = 0.44 \quad \phi_h \Omega_{avg} = 0.42$$

$$11-27 \quad h_{net} = 5.59 \quad \Delta t_{ave} = 211.13$$

$$\phi = 14.345 \quad \phi_h = 0.80. \quad \phi_h \Omega_{avg} = 0.84$$

$$2-34 \quad h_{net} = 3.69 \text{ m.} \quad \Delta t_{ave.} = 212.76$$

$$\phi = 14.69\% \quad \phi_h = 0.54 \quad \phi_h \Omega_{avg} = 0.54$$

$$11-27 \quad h_{net} = 1.41 \text{ m} \quad \Delta t_{ave} = 200$$

$$\phi = 12.01 \quad \phi_h = 0.17 \quad \phi_h \Omega_m = 0.96$$

11-27 using cutoff $\Delta t = 180$

$$h_{net} = 2.19 \quad \Delta t_{ave} = 192.64$$

$$\phi = 10.47 \quad \phi_h = 0.23.$$

15-27 TOP ϕ 924.6m Base ϕ 929.9m

$h_{gross} = 5.3m$ $h_{net} = 5.3m$

Ave $\Delta t = \frac{218}{204}$ ϕ (using $V_{ma} = 23000$) = $\frac{15.78}{12.85}\%$

$\phi_h = 5.3 \times .1285 = 0.68 \phi m$ $\Omega = 1.1$

14-27 TOP $\phi = 920.5$ Base $\phi = 926.0$

$h_{gross} = 5.5$ $h_{net} = 4.52m$

Ave $\Delta t = \frac{212.7}{204.2}$ $\phi = \frac{14.65}{12.89}\%$

$\phi_h = \frac{0.66}{0.58}$ $\Omega = 1.06$

13-27 TOP $\phi = 925.3$ BASE $\phi = 931.6$

$h_{gross} = 6.3m$ $h_{net} = 4.2m$

Ave $\Delta t = \frac{204}{200}$ $\phi = \frac{12.5}{12.85}\%$

$\phi_h = \frac{0.56}{0.54}$ $\Omega = 0.84$

16-27 TOP ϕ 930.8 Base $\phi = 934.3$

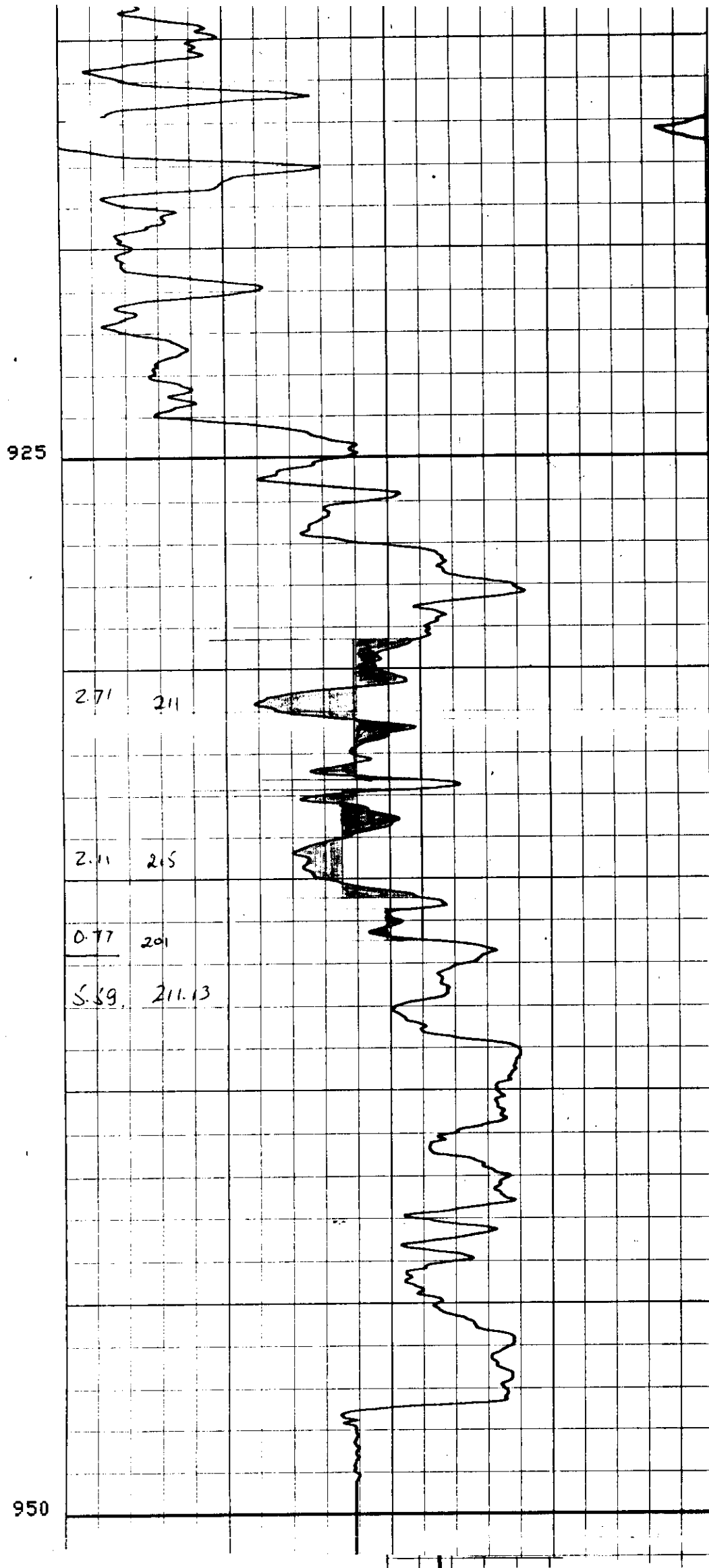
$h_{gross} = 3.5m$ $h_{net} = 3.5m$

$\Delta t = 216$ $\phi = 15.365\%$

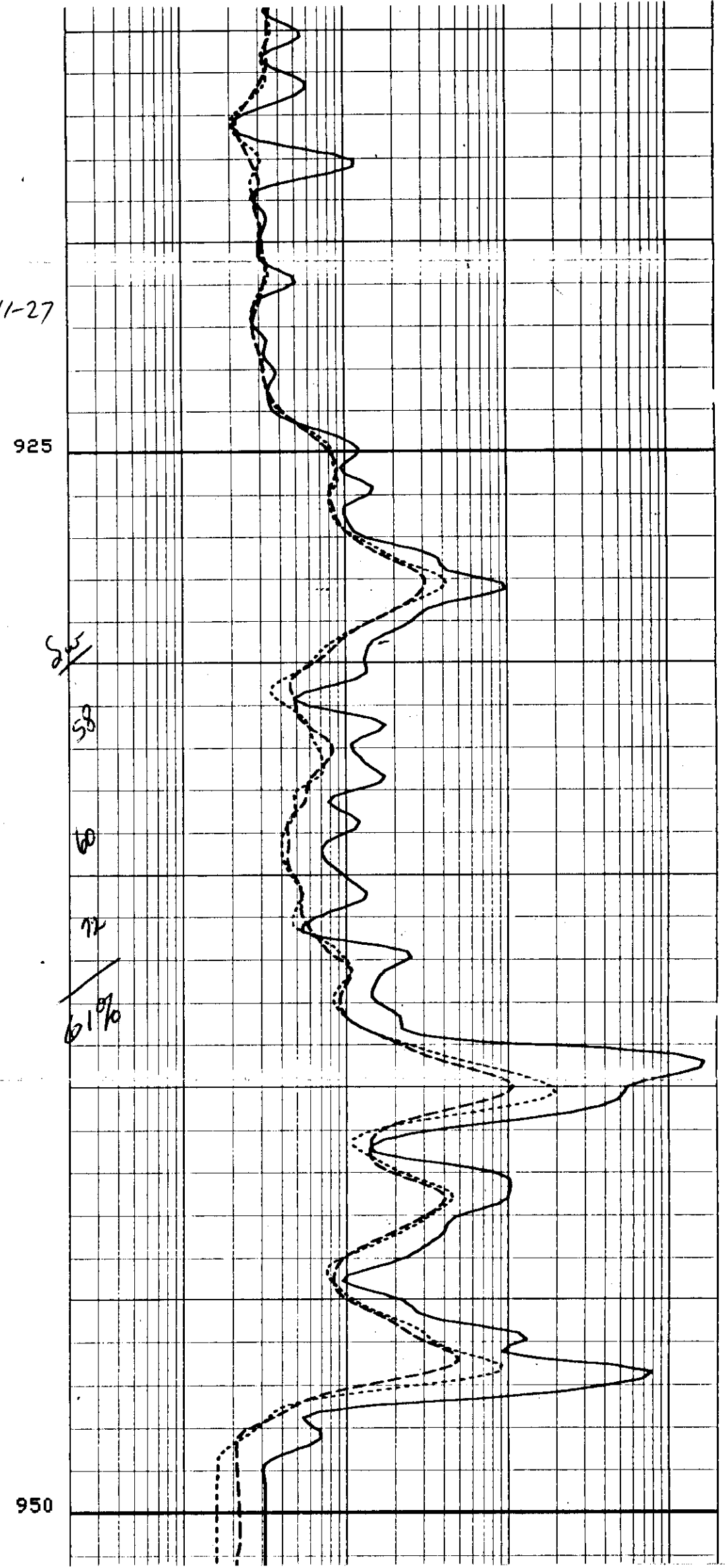
$\phi_h = 0.54$ $\Omega = 0.54$

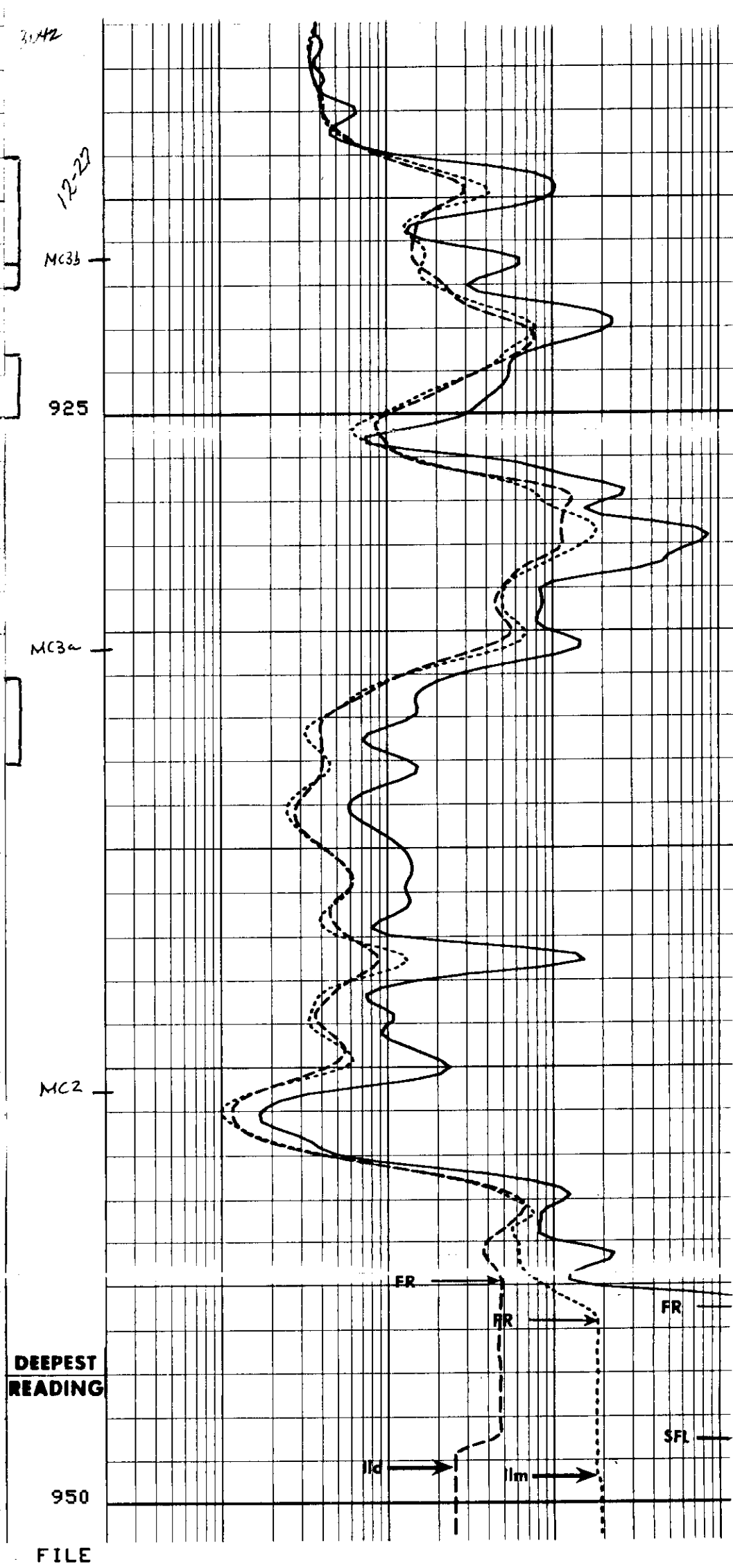
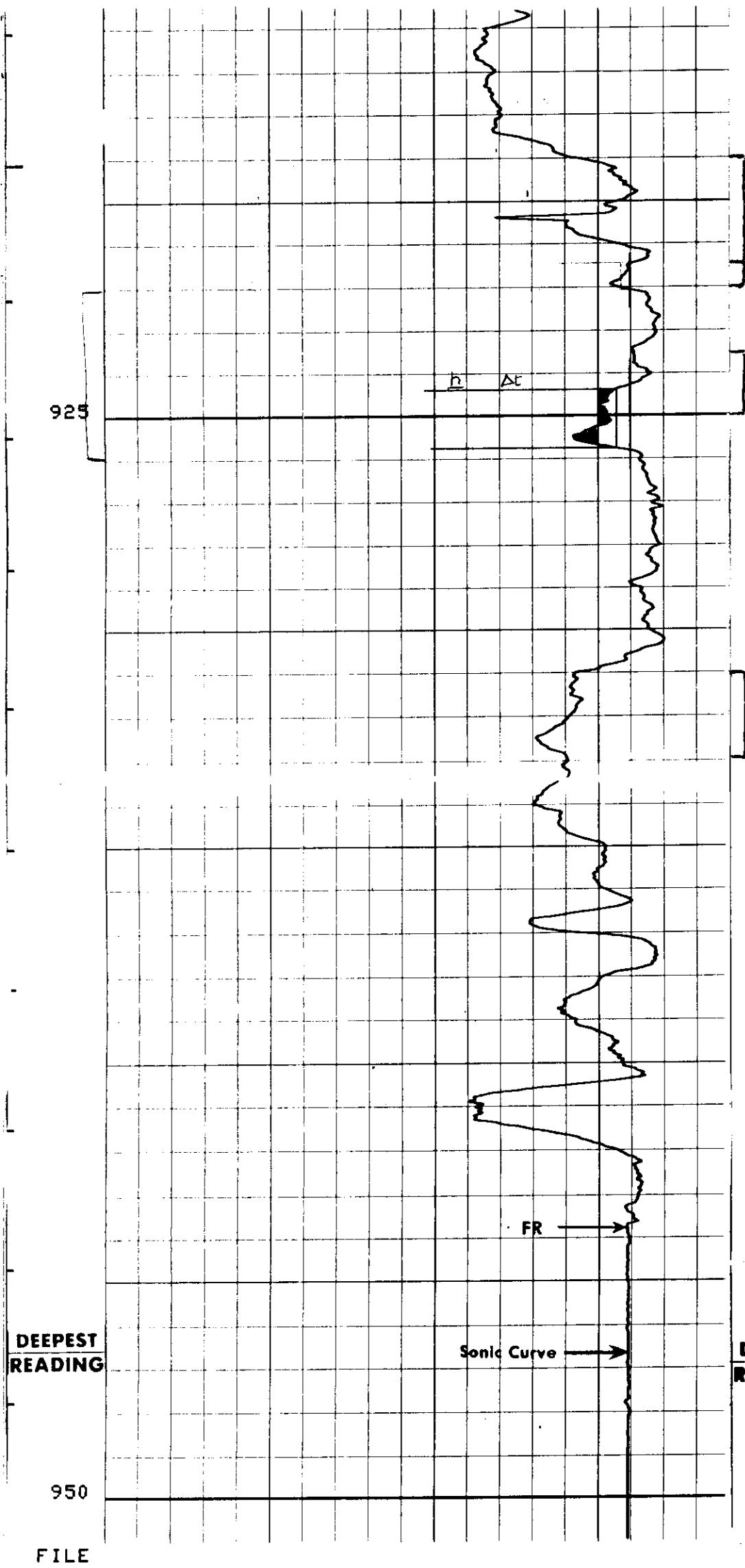
2-34 $h_{net} = 3.60$ $\Delta t = 213.77$

$\phi = 14.9$ $\phi_h = 0.54$ $\Omega = 0.54$



11-27





950

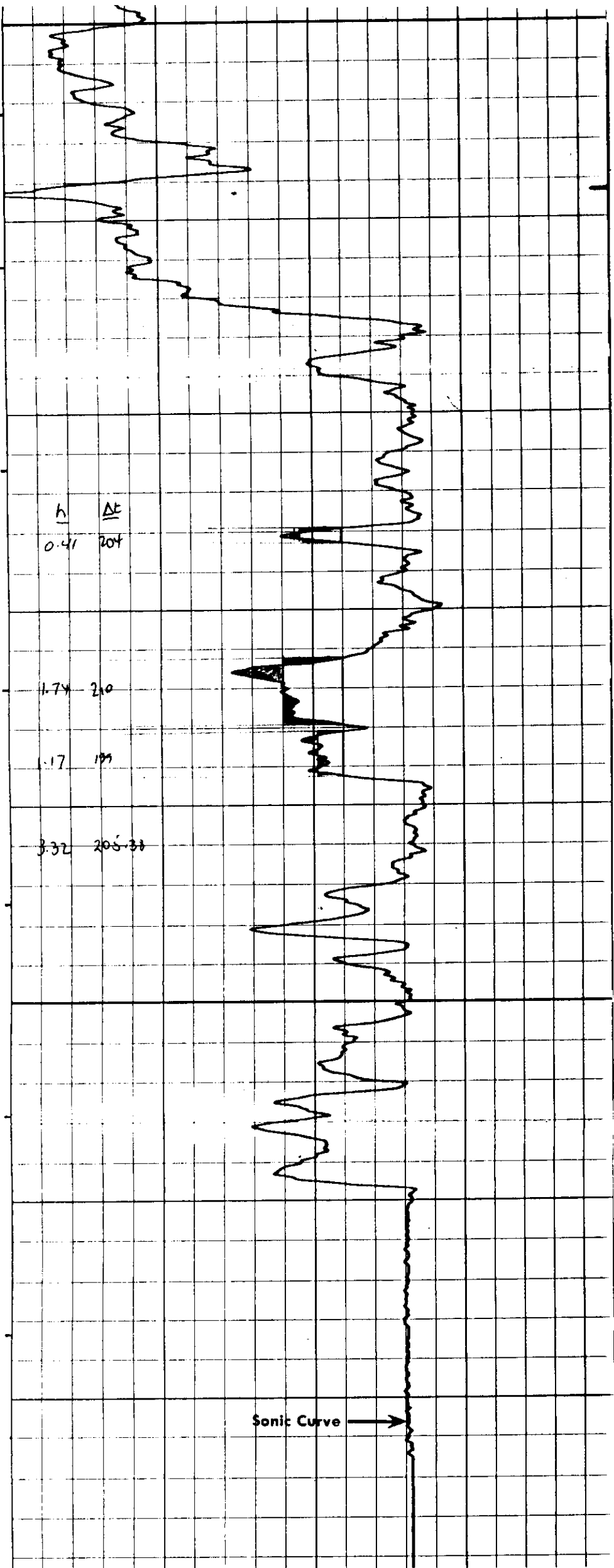
Δ	Δt
0.38	202
3.31	214

2-34-1-26

35
25

950

925



FILE

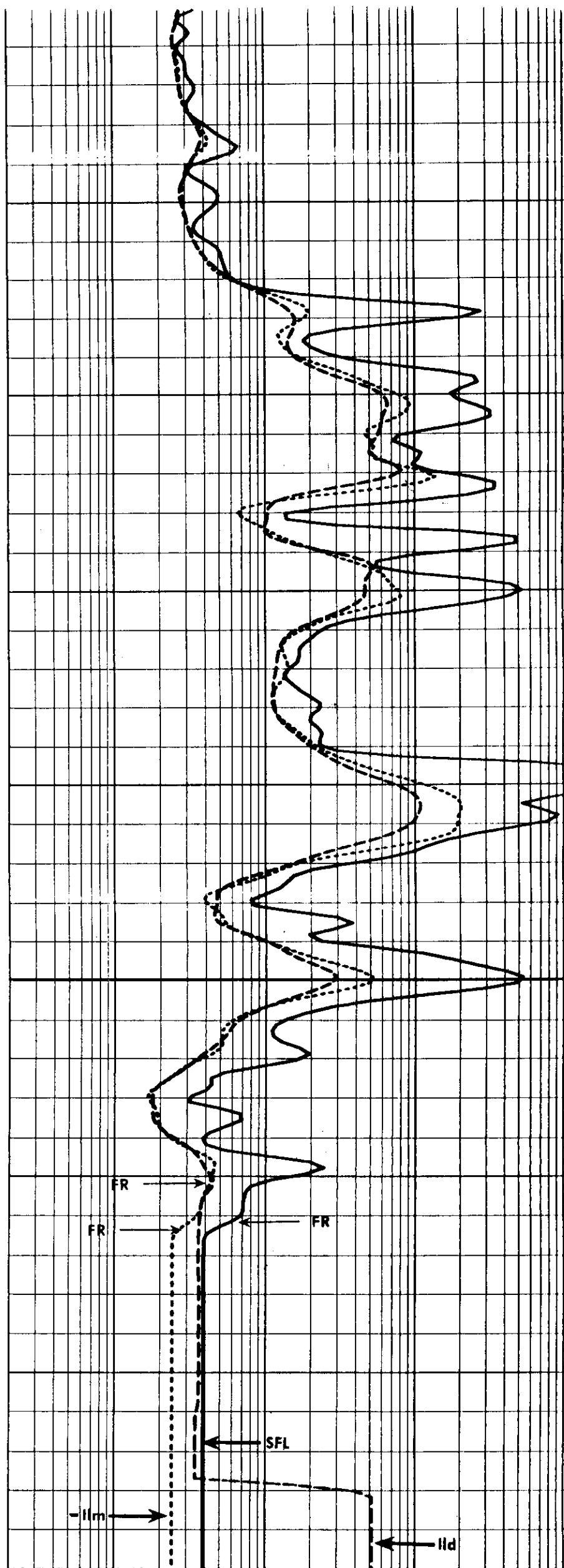
F 34

40

42

45

950



925

Sonic Curve

950

16

16-27

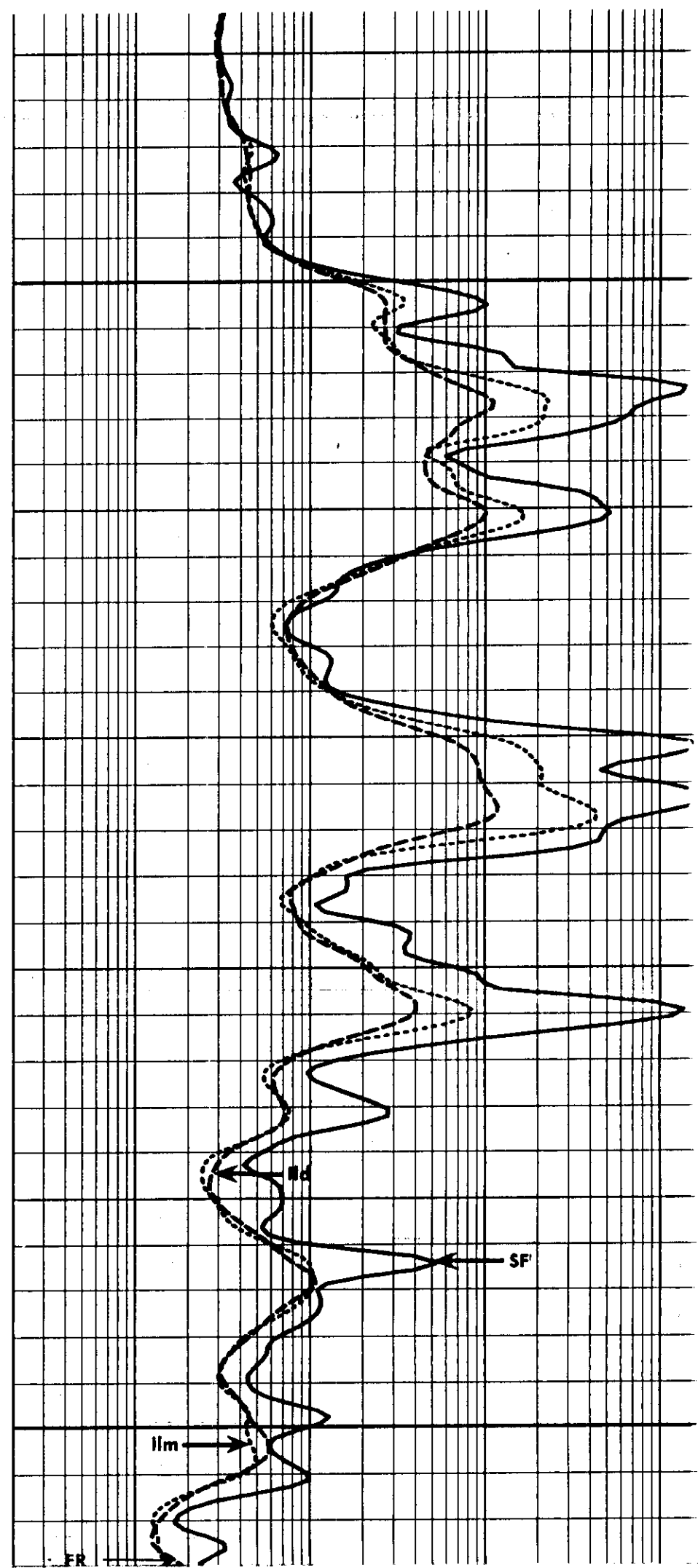
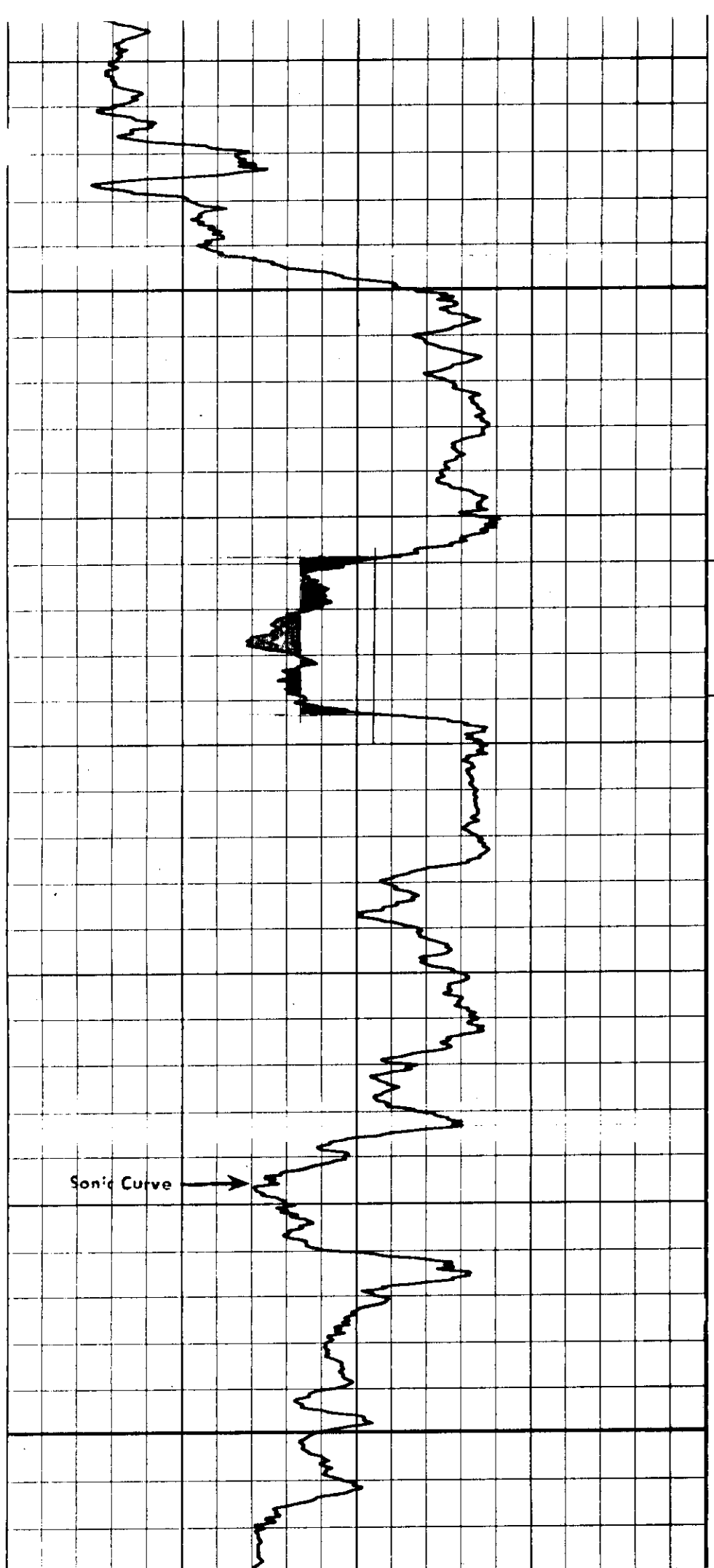
925

950

11m

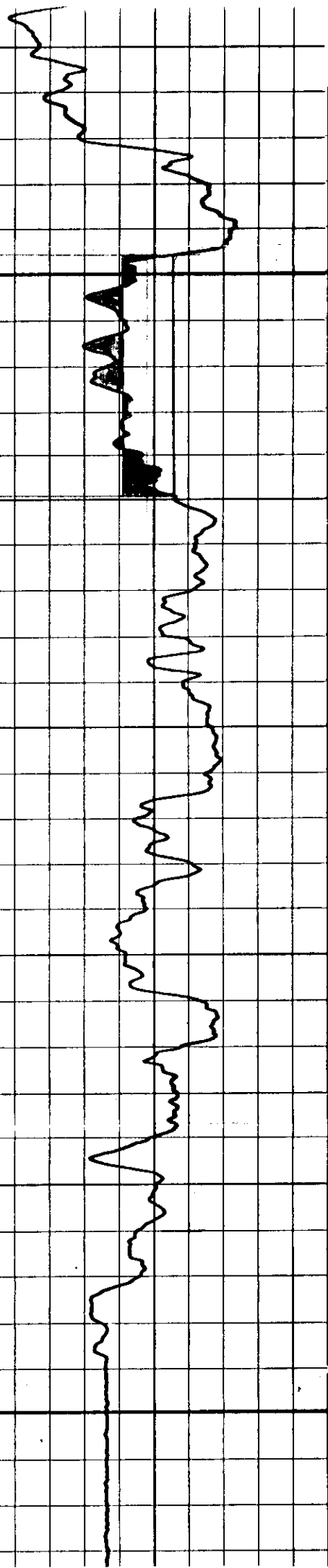
SF

FR



925

950

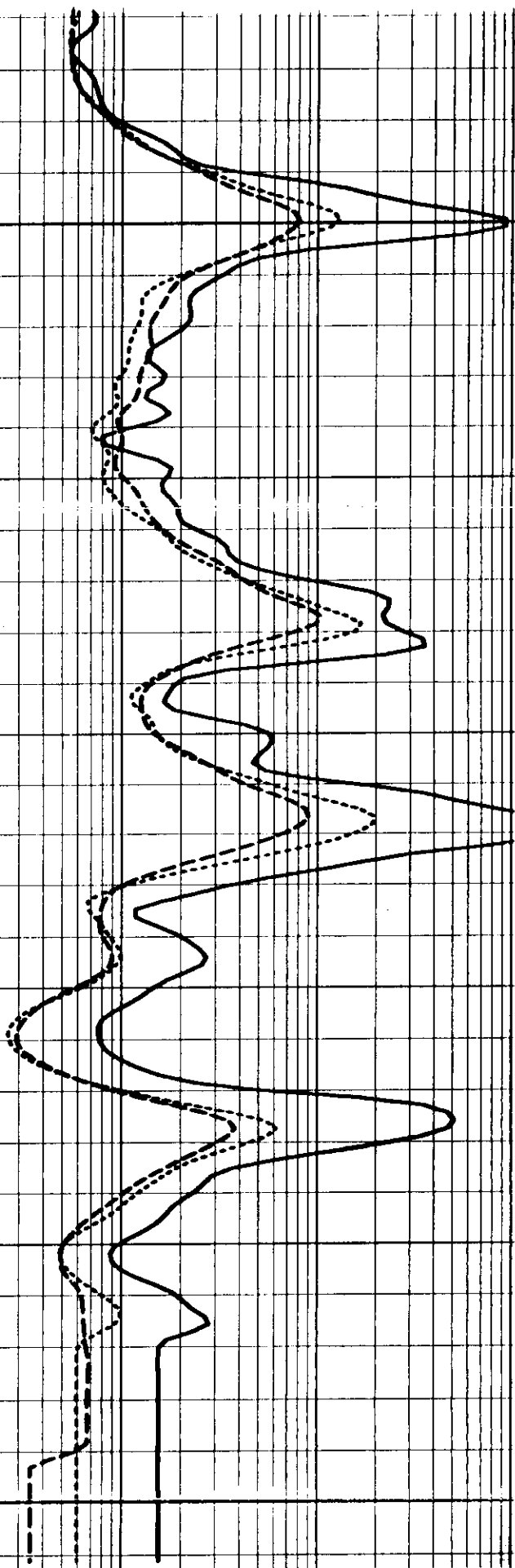


925

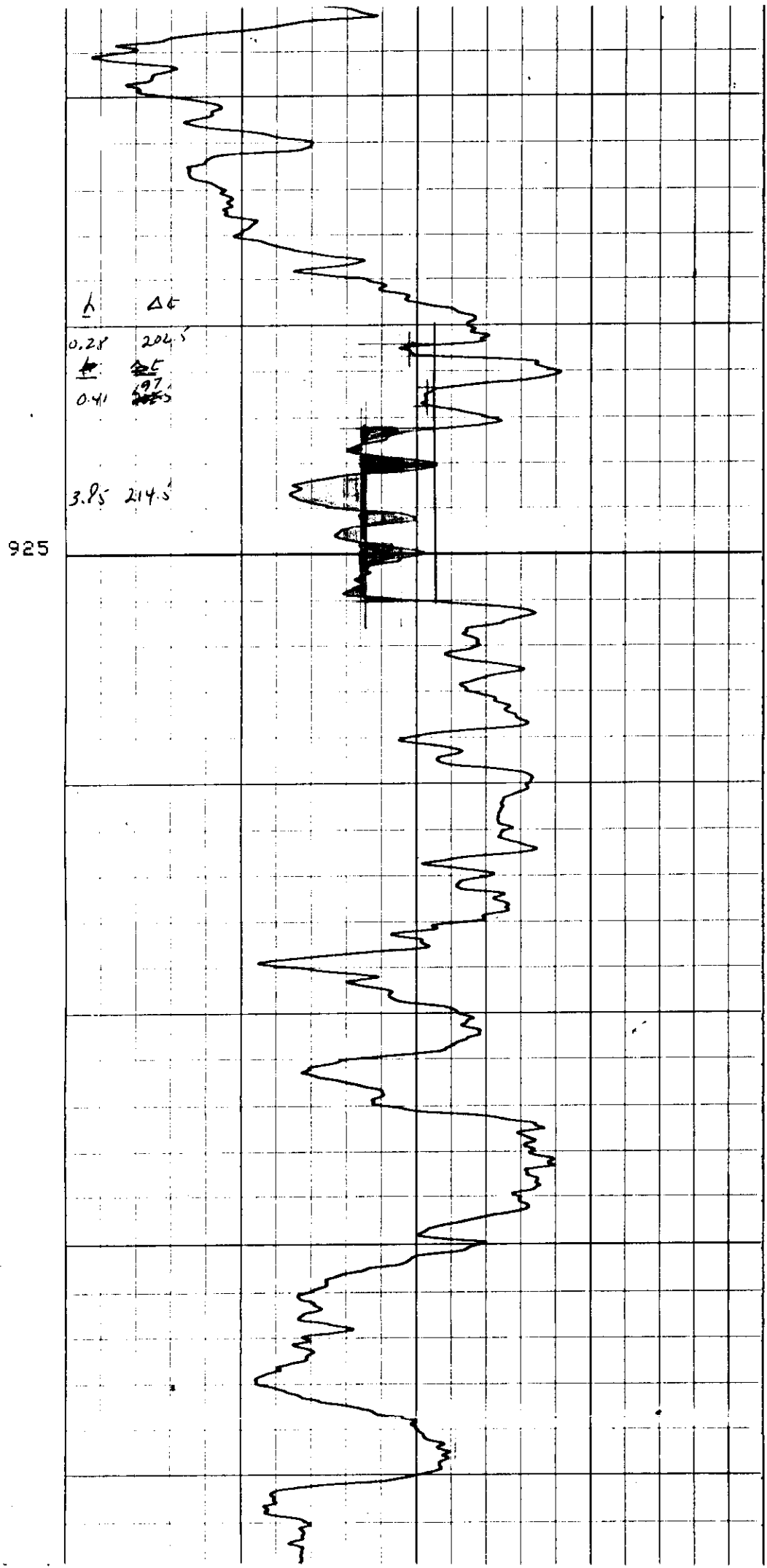
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FILE

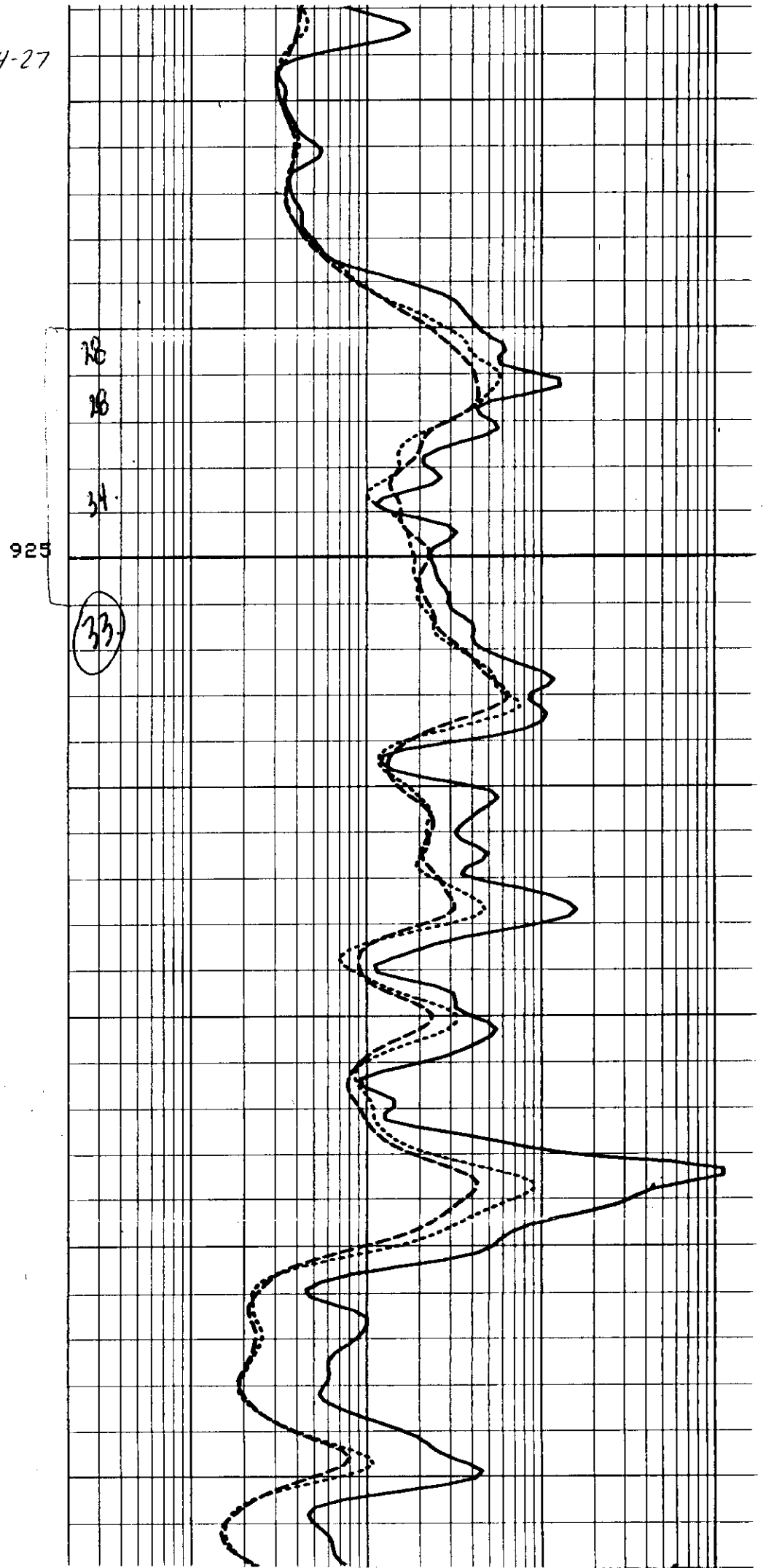
3



15-27-1-26



14-27



925

	h	Δt	ϕ
165	1.25	212	
178	.65	212.5	
199	.58	206	
374	1.86	201	
586		204	

950

13-27

925

30
30
40
35
41/20

950



Energy and Mines

Petroleum

555 — 330 Graham Avenue
Winnipeg, Manitoba, CANADA
R3C 4E3

(204) 945-6577

November 15, 1985

Omega Hydrocarbons Ltd.
1300, 112 - 4th Avenue S.W.
CALGARY, Alberta
T2P 0H3

Attention: Mr. R.A. Beamish, P. Eng.
Manager, Engineering

Dear Bob:

Re: Proposed Waskada Mission Canyon Units

Your recent letter outlining plans for a number of Mississippian Units in the Waskada Field is acknowledged.

We have reviewed your proposals and would like to make the following comments:

1. Unit Naming

After due consideration, we feel it would be more appropriate to continue the numbering sequence already in use (i.e. Waskada Unit 9, 10, etc.). Reasons for this are as follows:

- a) Waskada Unit No. 1 is a Mississippian Unit so letter designations would not exclusively indicate a Mississippian Unit.
- b) Use of Formation indicators would tend to be confusing with respect to Pool names.
- c) A letter designation is no more descriptive than a numerical one.

2. Tract Factors

In the evolution of tract factor calculations in the Lower Amaranth Units, a productivity factor (1/3) was introduced to counteract uncertainties in log determinations of hydrocarbon pore volume (ϕh and S_w). This factor was meant to be a reflection of remaining reserves. However, in a formation like the Mission Canyon, it should be possible, using conventional log analysis to arrive at reliable values for porosity and water saturation (and using appropriate recovery factors and cumulative production, remaining reserves) on a well by

cont'd...

2. Tract Factors (cont'd)

well basis. Consequently, we question the need for inclusion of the productivity factor in the final tract participation factor and particularly its increased weighting (50% vs 33% for the Lower Amaranth Units). Also, a brief review has indicated that calculated water saturations do vary somewhat from well to well. Again as the determination of water saturation is straightforward, we feel it should be included on a well by well basis.

With respect to the interim participation, we support this concept, but suggest that the most recent production data available be used.

3. Pool Designations

In designating pools in this area, the Branch has recognized the presence of two separate reservoirs (MC3a and MC3b or Lower and Upper Alida) within the MC3 zone. As these reservoirs appear to be separated, we feel that they should be produced as separate reservoirs. Upon review of well completions in the area we note that a few wells (12-27MC3a-1-26 and 9-23MC3a-1-26) appear to be completed in both zones. While the Regulations have provision for authorization of commingled production, no such authorization has been given. In our view, the separation between pools becomes more critical upon initiation of water flooding. Consequently, individual water flood projects would have to be confined to individual pools.

As part of our review of your proposal we have reviewed logs on a number of wells to verify current pool designations in the Waskada Field. As a result of the above, we have the following comments:

a) The well Omega Waskada 13-26MC3b-1-26 is currently designated as part of the Waskada MC3bB pool. However, in your proposal, the well is grouped with the MC3a Unit in Section 26 and 27-1-26 (WPM). Upon review of the logs, we concur that this well is completed in the Waskada MC3a C pool. The necessary administrative changes (Field/Pool Code and well name) will be made shortly.

922-926 is
931-933 A
B.P. 1-1-50-ATE
A FROM B
NICK PROD
(B.)
b) The well Omega Waskada 12-27MC3a-1-26 appears to be completed in both the MC3a and the MC3b. However, log response would suggest that the MC3b completion is probably ineffective. In this regard, we note that it would be more appropriate for this well to be included in the MC3a Unit (your "Unit B") than in the MC3b Unit. Your comments are requested.

c) The well Omega Waskada 9-23MC3-1-26 appears to be completed in both MC3a and MC3b zones. However, the correlation is somewhat uncertain. We request that you provide your interpretation of these zones in this well.

927-931
938-41
squeeze upper
PEERS.
MC3-
cont'd... NT.

4. Pore Volume

We are reviewing your estimated pore volume maps and will notify you of any discrepancies or comments.

5. There are a number of wells not operated by Omega that are completed in pools for which water flood projects are planned. As it is likely that such projects would have a substantial impact on these wells, we suggest that discussions be commenced to include such wells in the proposed units.

I would suggest that following your review of this letter, it may be useful for us to meet to discuss our comments and concerns.

Yours sincerely,

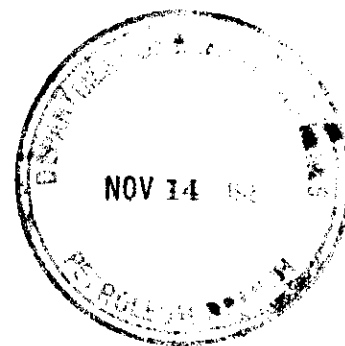


L.R. Dubreuil
Chief Petroleum Engineer
Petroleum Branch

LRD:dah



3300 SUN LIFE PLAZA III
112 - 4th AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 0H3
TELEPHONE: (403) 261-0743



Manitoba Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Attention: Mr. Bob Dubreuil

Dear Sir:

Re: Proposed Waskada Mission Canyon Units (A,B and D)

It is proposed that various productive portions of the Mission Canyon Formation in the Waskada Field be unitized to facilitate the implementation of pressure maintenance by water injection. A total of five units are proposed, three of which involve Omega as the only Working Interest Owner (the A,B and D units). In two of these (the A and D units) the Manitoba Crown has a Royalty Interest.

Unit documents are being prepared for consideration and approval of the Royalty Owners. These documents follow the same form as that used for the Lower Amaranth units previously approved by all parties.

Vertical enlargement of the Lower Amaranth units is not appropriate due to the complications presented by a Mission Canyon unit overlapping two Lower Amaranth units, or the boundary of a Lower Amaranth unit, or there is no Lower Amaranth unit.

Tract factor calculations for each of the three units along with a Øh map showing the proposed unit outline are enclosed. For further assistance in assessing the total plan, I am enclosing a Øh map for the other two units (C and E) for which we are just commencing unit negotiations with the other Working Interest Owners.

Each of the three units will have a tract participation formula based on an initial and final participation as discussed below.

The principle consideration in determining unit participation is that a tract's value to the unit under waterflood is a combination of recoverable oil by flood and initial productivity. To this end a final participation formula based 50% on reserves and 50% on initial oil production is being used.

.../2

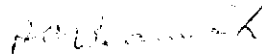
Oil reserves contributed by each tract to the unit has been calculated from a geological map of net hydrocarbon porosity meters. Other reserve parameters such as water saturation and formation volume, etc. are uniform throughout the area in question. The net pay and porosity were calculated by Omega's geological department and checked by independent consultants. Oil productivity is best represented by utilizing the operating daily oil rate for each well's first four months of representative production. To prevent the effects of flush production the first month was not used if the well produced for less than 15 days. Although some tracts do not have wells capable of producing at this time their reserve contribution to the unit will be recognized in the final participation.

The above formula used for equity is appropriate under waterflood, however until response occurs there can be a disruption in current conditons. To minimize this effect on owners an interim participation is being used. This interim factor is based on a well's daily oil rate for July and August, 1985 and will be in effect until March 1, 1987, which is the anticipated time for flood response to begin.

Waterflood applications are being prepared and will be submitted shortly. If you have any questions regarding this matter please call me.

Yours truly,

OMEGA HYDROCARBONS LTD.



R.A. Beamish, P. Eng.
Manager - Engineering

RAB:vb

Encl.

c.c. Waskada Mission Canyon
Unit Files

31-Oct-85

MISSION CANYON A UNIT TRACT PRTOR CALCULATIONS

Final Participation

TRACT	LAND	ASPH:th	4 MONTH CUM. PROD. (m ³)	ASPH:th	OIL RATE (OIL RATE)	TRACT	TRACT	LAND
DESCRIPTION	(#)	HRS	OIL	WATER	FACTOR	FACTOR	FACTOR	DESCRIPTION
1 111-27-1-26 WIN	23.5	2794	436.5	384.9	5.3047	0.6495	4.4293	1 111-27-1-26 WIN
2 112-27-1-26 WIN	28.5	2713	151.9	634.2	6.4334	0.2500	2.0054	2 112-27-1-26 WIN
3 113-27-1-26 WIN	38.0	2764	1052.7	33.3	6.7720	1.5615	10.7963	3 113-27-1-26 WIN
4 114-27-1-26 WIN	36.0	2742	849.2	395.3	8.1264	1.2678	6.7511	4 114-27-1-26 WIN
5 115-27-1-26 WIN	40.0	2780	1151.4	58.8	9.0294	1.6981	11.7430	5 115-27-1-26 WIN
6 116-27-1-26 WIN	26.5	2748	826.0	425.5	5.9819	1.3816	9.5542	6 116-27-1-26 WIN
7 1-34-1-26 WIN	17.0	2361	153.1	967.2	3.8375	0.2593	1.8623	7 1-34-1-26 WIN
8 2-34-1-26 WIN	20.0	710	20.7	369.5	4.5147	0.1195	0.8264	8 2-34-1-26 WIN
TOTALS:	221.5	19612	4783.5	3268.7	50.0000	7.2303	50.0000	

AVERAGE OIL RATE (m³/day, day) & AVERAGE OIL CUT
AFTER 4 MONTHS OF PRODUCTION

RATE CUT

5.8558 59.4061%

MISSION CANYON A UNIT TRACT FACTOR CALCULATIONS
Interim Participation

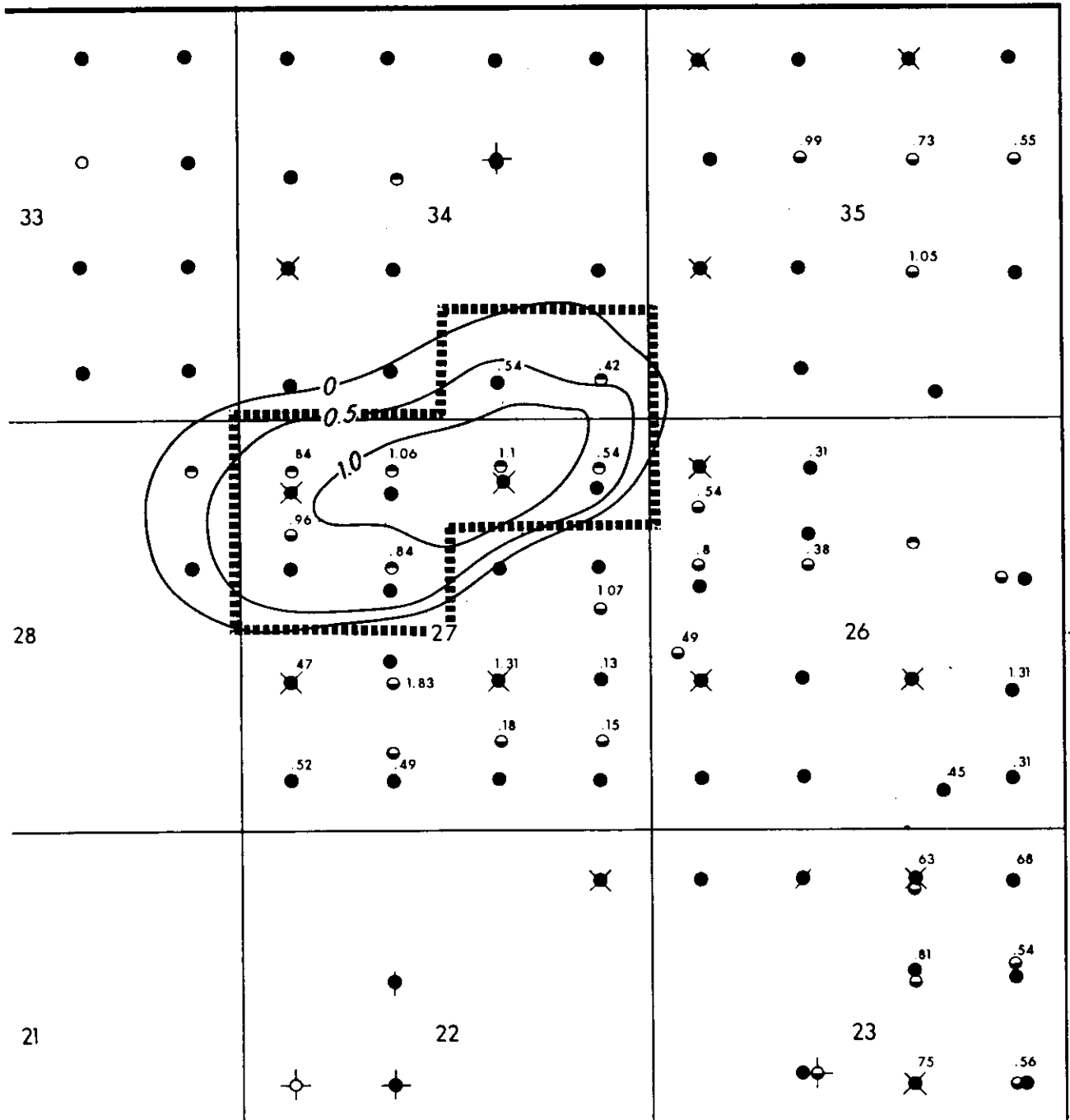
30-Oct-65

TRACT	LAND	85-07 +85-08 PROD. (a3)	OIL RATE	WATER	TRACT
DESCRIPTION	HRS	OIL	WATER	FACTOR	FACTOR
1 11-27-1-26 WIM	1476	125.9	NA	0.6661	9.6192
2 12-27-1-26 WIM	1395	119.3	NA	0.6698	9.6437
3 13-27-1-26 WIM	1476	254.8	NA	1.3521	19.4673
4 14-27-1-26 WIM	1402	143.8	NA	0.8033	11.5657
5 15-27-1-26 WIM	1424	132.1	NA	0.7266	10.4614
6 16-27-1-26 WIM	1476	449.7	NA	2.3883	34.3575
7 1-34-1-26 WIM	1438	62.3	NA	0.3393	4.8852
8 2-34-1-26 WIM	0	0.0	NA	0.0000	0.0000
TOTALS:	10087	1287.9	NA	6.9455	100.0000

AVERAGE OIL RATE (a3/bo. day) & AVERAGE OIL CUT
AFTER 4 MONTHS OF PRODUCTION

RATE	CUT
3.0643	NA

R. 26 W 1



- SPEAR FISH OIL WELL
- UPPER ALIDA (MC 3b) WELL
- LOWER ALIDA (MC 3a) WELL
- TILSTON (MC 1) WELL
- SUSPENDED WELL
- PROPOSED DRILLING LOCATION
- ✱ WATER INJECTION WELL
- ✱ GAS INJECTION WELL
- WATER SOURCE WELL
- ✱ ABANDONED WELL

OMEGA HYDROCARBONS LTD.

WASKADA MISSISSIPPIAN
WATER FLOOD

PROPOSED UNIT "A"

øh MAP

C.I.=.5 POROSITY METRES

----- PROPOSED UNIT OUTLINE

SCALE: 1:25000

DATE: NOV. 1985