

File: Field/Perm

Daly Unit No. 3

New Oil Status

October 14, 1994

Mr. J. E. Causgrove, P.Eng.
Virden Business Unit Manager
Chevron Canada Resources
P.O. Box 100
Virden MB ROM 2C0

Dear Mr. Causgrove:

Re: Daly Unit No. 3 - New Oil Status

Your application for continuation of new oil status for incremental production from Daly Unit No. 3 has been reviewed.

The Branch recognizes that a significant portion of the incremental production resulting from the 1984 waterflood expansion project can reasonably be attributed to an increase in recovery. New oil status for all production from Daly Unit No. 3 exceeding the historical production decline is approved for an additional five (5) year period, July 1, 1994 to June 30, 1999. A historical production decline of 1%/year (exponential) will continue to be used to determine the incremental production. Table 1 lists the historical production rate to be used to determine the volume of new oil for each month of the approval period. Production from infill wells drilled on 8 ha spacing qualifies as holiday or new oil and is not governed by this approval. Chevron may apply prior May 1, 1999 for extension of this approval.

If you have any questions in respect of this matter please contact the undersigned or John N. Fox, Chief Petroleum Engineer at 945-6573 and 945-6574, respectively.

Yours truly,

Original Signed by
L. R. DUBREUIL

L.R. Dubreuil
Director of Petroleum

cc. Administration

PETROLEUM DOCUMENT REGISTRY	
Document No.	<u>94-40</u>
Registered:	<u>November 17, 1994</u>
<u>D. Schuessen</u>	
Petroleum Registrar	

TABLE 1

DALY UNIT NO. 3 - NEW OIL STATUS
HISTORICAL PRODUCTION DECLINE

Year	Month	Daily Rate (m3/d)	Monthly Production (m3)
1994	June	68.605	2058.1
	July	68.548	2125.0
	August	68.491	2123.2
	September	68.434	2053.0
	October	68.377	2119.7
	November	68.320	2049.6
	December	68.263	2116.1
1995	January	68.206	2114.4
	February	68.149	1908.2
	March	68.092	2110.9
	April	68.036	2041.1
	May	67.979	2107.3
	June	67.922	2037.7
	July	67.866	2103.8
	August	67.809	2102.1
	September	67.753	2032.6
	October	67.696	2098.6
	November	67.640	2029.2
	December	67.584	2095.1
1996	January	67.527	2093.3
	February	67.471	1956.7
	March	67.415	2089.9
	April	67.359	2020.8
	May	67.303	2086.4
	June	67.247	2017.4
	July	67.191	2082.9
	August	67.135	2081.2
	September	67.079	2012.4
	October	67.023	2077.7
	November	66.967	2009.0
	December	66.911	2074.2

TABLE 1

DALY UNIT NO. 3 - NEW OIL STATUS
HISTORICAL PRODUCTION DECLINE

Year	Month	Daily Rate (m3/d)	Monthly Production (m3)
1997	January	66.855	2072.5
	February	66.800	1870.4
	March	66.744	2069.1
	April	66.688	2000.7
	May	66.633	2065.6
	June	66.577	1997.3
	July	66.522	2062.2
	August	66.467	2060.5
	September	66.411	1992.3
	October	66.356	2057.0
	November	66.301	1989.0
	December	66.245	2053.6
1998	January	66.190	2051.9
	February	66.135	1851.8
	March	66.080	2048.5
	April	66.025	1980.7
	May	65.970	2045.1
	June	65.915	1977.4
	July	65.860	2041.7
	August	65.805	2040.0
	September	65.750	1972.5
	October	65.696	2036.6
	November	65.641	1969.2
	December	65.586	2033.2
1999	January	65.532	2031.5
	February	65.477	1833.4
	March	65.422	2028.1
	April	65.368	1961.0
	May	65.313	2024.7
	June	65.259	1957.8



On Matters of State

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 Subsection 5(1) of the Oil and Gas Production Tax Regulation being Manitoba Regulation 357/87 under The Oil and Gas Production Tax Act (C.C.S.M. c.037), provides as follows:

"5(1) Notwithstanding anything contained in section 3, the Lieutenant Governor in Council may approve the temporary or permanent reduction or exemption of the freehold production tax to be charged on any oil or natural gas produced or deemed to be produced from a location.";

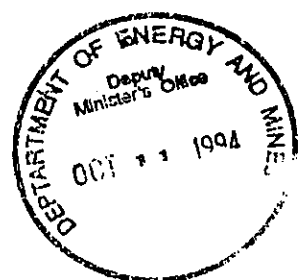
AND WHEREAS Chevron Canada Resources, as Unit Operator of Daly Unit No. 3 ("the Unit") has made application requesting that the portion of oil production from the Unit which is considered by the Director of Petroleum to be attributable to improvements to and expansion of the enhanced recovery project ("incremental production") continue to be assessed freehold production tax at new oil rates;

AND WHEREAS it is deemed to be in the public interest to support the ongoing optimization of the enhanced recovery project in the Unit by allowing incremental production to continue to be assessed freehold production tax at new oil rates for an additional five year period.

THEREFORE, he, the Minister, recommends:

THAT a temporary reduction of the freehold production tax charged on incremental production from the Unit be approved for the period July 1, 1994 to June 30, 1999. During the approval, freehold production tax will be assessed at the rate set out for new oil in Schedule A of the Oil and Gas Production Tax Regulation.

Initiating Department/Agency	
Department/Agency	Authorized Officer
ENERGY AND MINES	<i>[Signature]</i>
Approved by C.S.C.	Finance
Approved as to form by:	
Name	<i>[Signature]</i>
Civil Legal Services: or Legislative Counsel:	Initials <i>[Initials]</i>



Signature *[Signature]*

IN THE EXECUTIVE COUNCIL CHAMBER, WINNIPEG

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

October 5, 1994
Date

[Signature]
President or Presiding Member

AT GOVERNMENT HOUSE IN THE CITY OF WINNIPEG

Approved and Ordered this 5th day of October A.D. 1994

[Signature]
Lieutenant Governor



Memorandum

Date September 22, 1994

To Garry Barnes
Acting Deputy Minister
Petroleum Branch

From Bob Dubreuil
Director
Petroleum Branch

Subject **New Oil Status for Incremental Freehold Oil Production from Daly Unit No. 3 - Log #9405818**

The following are answers to the Minister's questions regarding New Oil status for Daly Unit No. 3.

(1) Was this an oversight?

No. The Branch believed the authority to grant new oil status for freehold production under the Oil and Gas Production Tax Regulation would transfer to the Minister with the introduction of the Oil and Gas Act. Legal Services' position is there is no power to delegate the authority of the now defunct Oil and Natural Gas Conservation Board to the Minister, necessitating the involvement of the LG in C.

(2) How many similar designations exist and where?

None under similar circumstances. Other company's have received new oil status on old oil wells on a well by well basis, where unique economic circumstances existed. There is some potential for similar situations to arise in the future.

(3) What is the difference - old oil royalty vs enhanced (new oil) royalty?

Old oil freehold production tax rates are higher (see attached graph). New oil rates were designed as an incentive to operators to recover additional oil by drilling new wells and implementing enhanced oil recovery projects.

(4) What was the expectation in 1984, when the 10 year agreement was signed?

Chevron expected new oil status approval to continue until the waterflood operations ceased. The Branch was initially concerned that waterflood modifications would accelerate oil production and the volume of incremental recovery would be limited. For this reason a series of approvals were granted - a 2 year, followed by a 3 year and then a 5 year approval. When each approval expired the technical data was reviewed by the Branch. The Branch is now satisfied the production observed is primarily reflective of increased recovery efficiency. As a result the incremental production qualifies as new oil under the definition in the Crown Royalty and

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Incentives regulation and clearly satisfies the intent of the new oil definition in The Oil and Gas Production Tax Act.

(5) Would they continue the waterflood without tax relief?

Yes, but any further investment to optimize production from the unit would likely be dropped due to poor economics. The additional tax load would likely result in premature abandonment of some wells resulting in lost reserves.

(6) What investment would be dropped?

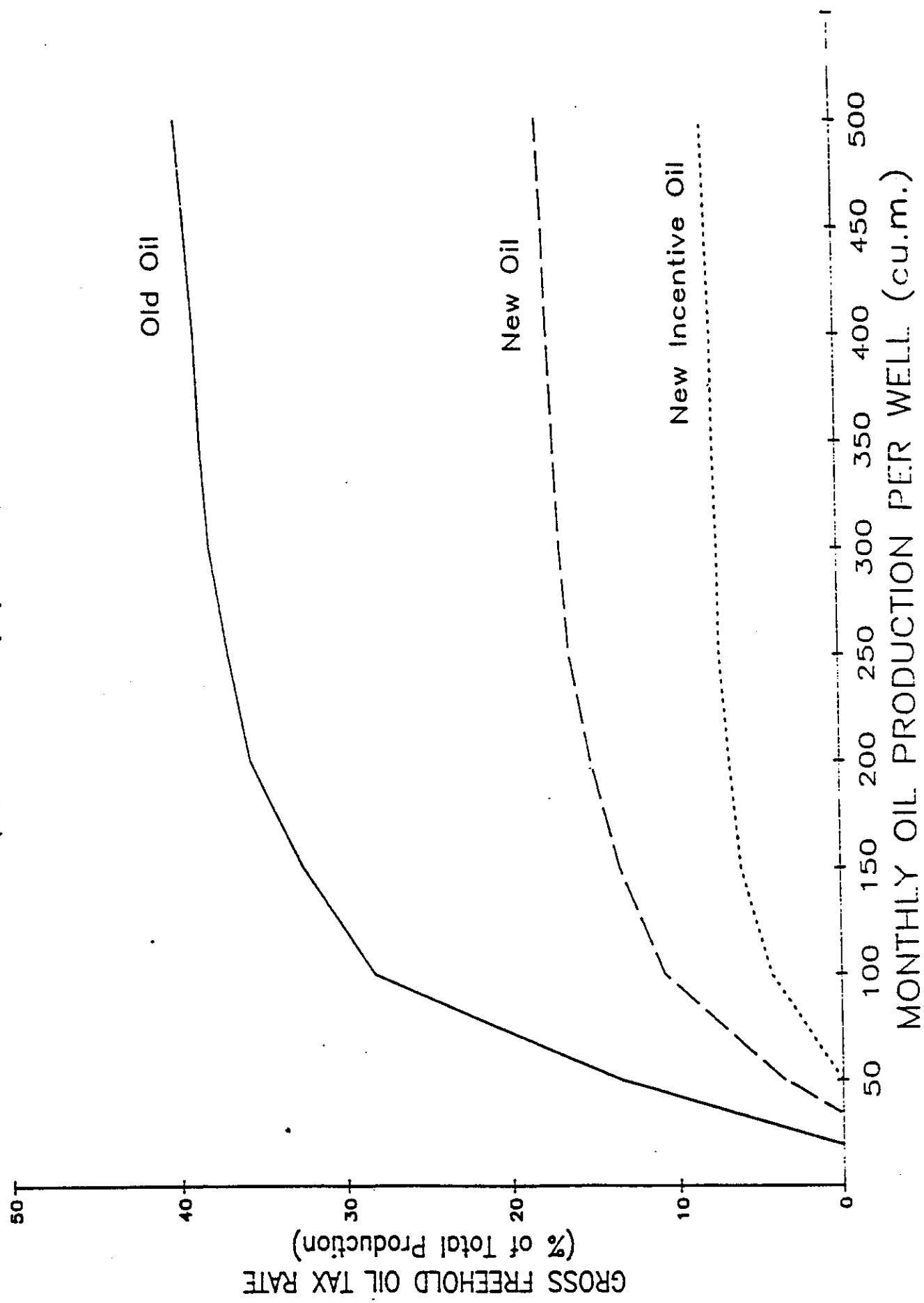
Because clearly the intent of the new oil definition is to recognize incremental recovery as new oil a decision to deny the application would be seen as an act of bad faith on the Government's part. It is unlikely that Chevron would subsequently pursue infill drilling enhanced oil recovery (EOR) or other projects in Manitoba. The Branch has had ongoing discussions with Chevron on implementation of Manitoba's first tertiary EOR project, a hydrocarbon miscible flood in North Virden Scallion Unit No. 1. Initial investment in a pilot project is estimated at \$ 7.7 million. In the Virden Field there is the potential to recover an additional 30 million barrels of oil using tertiary EOR techniques.

This situation highlights an inconsistency between the manner in which new oil is designated under Crown or freehold ownership. This is one of the reasons for a legislative proposal to amend The Oil and Gas Production Tax Act.



Bob Dubreuil

MANITOBA FREEHOLD OIL TAX RATES (for illustrative purposes only)



OFFICE OF THE DEPUTY MINISTER OF ENERGY AND MINES

ACTION/ROUTE SLIP

DATE: September 21, 1994

LOG NUMBER: 9405818

TO: Bob Dubreuil
Petroleum Branch
Energy & Mines
5th Floor 330 Graham Ave.

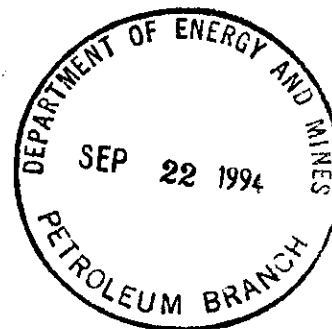
FROM: Garry Barnes
Acting Deputy Minister
Energy & Mines
314 Legislative Building

Telephone: 945-4172
Fax: 945-8374

NAME: L. R. Dubreuil

SUBJECT: Cabinet Submission - New Oil Status for incremental freehold
oil production from Daly Unit No. 3

ACTION: As discussed, please review questions raised in attached
route slip from Mr. Orchard, for discussion at next meeting.



DUE DATE: SEPTEMBER 27, 1994

Cub. Files

OFFICE OF THE MINISTER OF ENERGY AND MINES AND RESPONSIBLE FOR MANITOBA HYDRO

ACTION/ROUTE SLIP

DATE: September 20, 1994

LOG NUMBER: 9405818

TO: Garry Barnes
Acting Deputy Minister
Dept. of Energy & Mines
314 Legislative Building
Winnipeg, MB. R3C 0V8

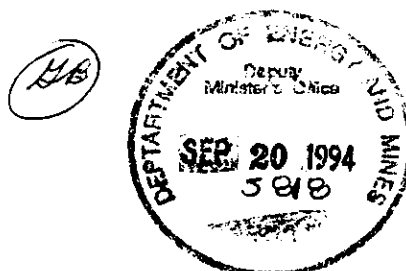
FROM: Honourable Donald W. Orchard
Minister of Energy & Mines
Minister Responsible for
Manitoba Hydro
314 Legislative Building
Telephone: 945-6429
Fax: 945-8374

NAME: L. R. Dubreuil

SUBJECT: Cabinet Submission - New Oil Status for incremental freehold
oil production from Daly Unit No. 3

ACTION: For discussion.

Was this an oversight?
How many similar designations exist and where?
What is the difference--old oil royalty vs enhanced royalty?
What was the expectation in 1984, when 10 year agreement
was signed?
Surely it was to go it alone after 10 years.
Would they continue the waterflood without tax relief?
What investment would be dropped?





Memorandum

Date September 9, 1994

To Garry Barnes
Acting Deputy Minister
Energy and Mines
314 Legislative Building

From L.R. Dubreuil
Director
Petroleum Branch
555-330 Graham Avenue

Telephone

Subject **NEW OIL STATUS - DALY UNIT NO. 3**

Chevron Canada Resources has applied for continuation of new oil status for incremental production resulting from improvements to and expansion of the waterflood enhanced recovery project in Daly Unit No. 3.

The Crown Royalty and Incentives Regulation under The Oil and Gas Act defines new oil to include "oil produced from an old oil well that can, in the opinion of the director, be reasonably attributed to an increase in reserves as a result of a project of enhanced recovery".

Based on the observations discussed below, it is the Director's opinion that incremental oil production (over extrapolation of the pre-1984 production decline) is attributable to the improvements to and expansions of the waterflood project and thereby qualifies as new oil. This determination applies to the percentage of unit production allocated to oil and gas rights owned by the Crown.

The Oil and Gas Production Tax Regulation under The Oil and Gas Production Tax Act provides, similar authority to The Oil and Natural Gas Conservation Board to designate incremental production from freehold oil and gas rights as new oil.

With proclamation of The Oil and Gas Act and repeal of The Mines Act, The Oil and Natural Gas Conservation Board, constituted under The Mines Act no longer exists. Legal Services has advised that the authority to designate incremental production as new oil cannot be transferred from the now defunct Board to the Minister, the Director or any other official. As a result, the definition of new oil in the Oil and Gas Production Tax Regulation cannot be used to recognize increased recovery in the manner intended.

The only option available to designate as new oil a portion of the Unit production from freehold oil and gas rights is under subsection 5(1) of the Oil and Gas Production Tax Regulation which provides:

"5(1) Notwithstanding anything contained in section 3, the Lieutenant Governor in Council may approve the temporary or permanent reduction or exemption of the freehold production tax to be charged on any oil or natural gas produced or deemed to be produced from a location."

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New oil royalty and tax rates are lower than old oil rates and are intended to encourage maximum development of Manitoba's oil and gas resources through drilling, enhanced recovery or other means.

Recommendations:

It is recommended that new oil status be approved for incremental freehold oil production from Daly Unit No. 3 resulting from improvements to and expansion of the waterflood project. The proposed term of approval is five (5) years; July 1, 1994 to June 30, 1999.

A copy of the proposed Cabinet Submission and Order-in-Council (approved by Legal Services) are attached.

Discussion:

In 1984 Chevron expanded its waterflood operations in Daly Unit No. 3. The project involved conversion of a number of producing wells to water injection and reactivation of a number of shut-in water injection wells (see Fig. 1). Project economics at the time were marginal with an estimated pay-out of more than 10 years. Since 1984, Chevron has invested \$4.2 million in additional wells, upgraded facilities and waterflood expansion and modification.

Daly Unit No. 3 performance from 1984-94 was reviewed to determine if increased Unit production resulting from improvements to and expansion of the waterflood project represents an increase in recovery. A plot of the Unit's production history is shown in Figure 2. The plot also shows the historical production decline established by the Branch based on Unit performance from Jul/76 to Apr/84. Without the improvements to and expansion of the waterflood, Unit production would have followed the historical decline. It is apparent from the plot that waterflood modifications continue to have a significant impact on Unit production. From Sep/87 through Apr/94 an additional 43 514 m³, in excess of the Unit's historical production decline has been produced. This incremental production, which represents 14.6% of the total Unit production during this period, has been classified as new oil.

Incremental Unit production is a result of improved sweep efficiency and accelerated recovery. Injector conversions and reactivations undertaken in 1984 have resulted in oil from previously unswept parts of the reservoir being recovered. The waterflood modifications have also accelerated production, ensuring less reserves are lost in the future when low production rates will make well replacement and repairs uneconomic. It is estimated incremental recoverable reserves resulting from waterflood modifications will ultimately total 103 000 m³ or 1.9% of the original oil-in-place in the Unit.

Since 1984 new oil status has been granted by The Oil and Natural Gas Conservation Board to incremental oil production from the Unit in accordance with the definition of new oil under the Petroleum Crown Royalty and Incentives Regulation under The Mines Act for the Crown portion of the incremental production and under the Oil and Gas Production Tax Regulation for the freehold portion of the incremental production. The latest approval of new oil status expired June 30, 1994.

The lower new oil Crown royalty and freehold production tax rates have resulted in savings to Chevron and the other Unit owners of approximately \$950,000 over the past 10 years. Incremental production has also provided additional Crown revenue (royalties and freehold production tax) of approximately \$830,000 over the same period. Without these savings Chevron would not have proceeded with this project. Chevron has indicated continuation of new oil status is needed to make any future investment in the unit economically attractive.

In the Branch's opinion incremental production in Daly Unit No. 3 is a result of modifications to the waterflood and should qualify as new oil.

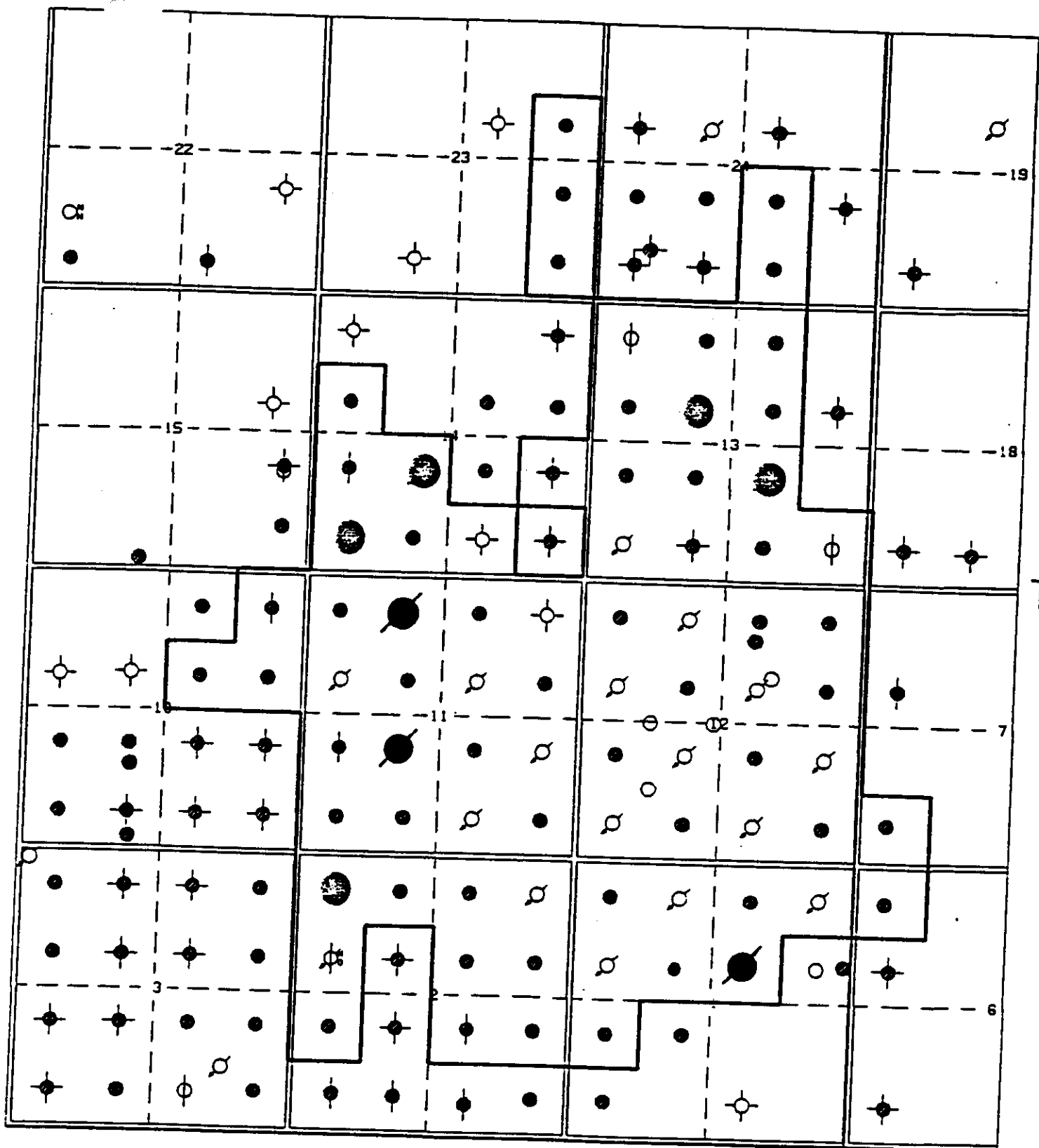
Therefore, it is recommended that the Lieutenant Governor in Council approve new oil status for incremental freehold production from Daly Unit No. 3. In order to accommodate possible future modifications to the project or to the Province's royalty and production tax structure, approval of new oil status should be limited to a term of five years, July 1, 1994 to June 30, 1999.

Over the proposed 5 year term of the approval additional Crown revenue of \$520,000 is anticipated (assumes the waterflood modifications would not have been made without the original approval in 1984). The saving to Chevron and the other unit owners in foregone Crown royalty and production tax revenue is approximately \$625,000.



L.R. Dubreuil

R.28W1M

R.27W1M








T.1

-  PROJECT CONVERSION
-  PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE 1

LEGEND

-  OILWELL
-  SUSPENDED OILWELL
-  INJECTION WELL
-  ABANDONED OILWELL
-  UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

Daily Unit No. 3 (No Infill Wells)

09/08/94 14:55

Type :

Date 5201-9309

Operator :

Field :

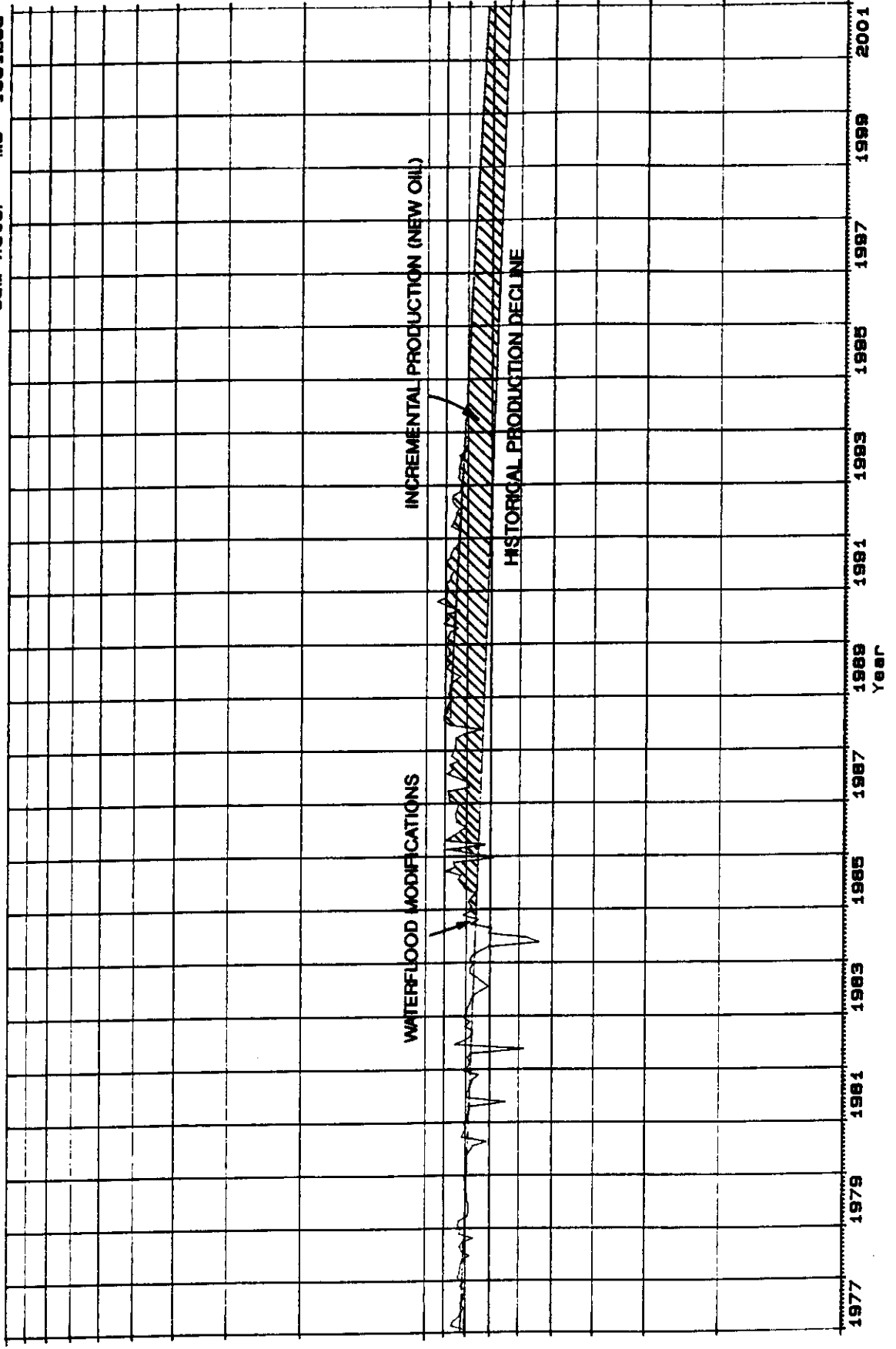
Zone/Pool:

Cum Oil m3 1607458
Cum Gas E3m3 0
Cum Water m3 1661298

1000
1000

100
100

10
10



whichever is the later, and continuing for such number of producing months as may be determined in accordance with the provisions of The Mines Act, regulations and orders thereunder; ("période d'encouragement à la RAP")*

"holiday oil" means the initial volume of oil produced, or deemed to be produced, from a new well drilled and completed on or after January 1, 1987 and prior to January 1, 1992, with the volume determined in accordance with the provisions of The Mines Act, regulations and orders thereunder; ("pétrole exempté")

"incentive oil" means oil obtained from a well or allocated to a spacing unit during either a production incentive period or an EOR incentive period; ("pétrole d'encouragement")

"location" means the tract of land described in a lease or title covering the freehold oil and gas rights from which oil or gas is produced or deemed to be produced; ("emplacement")

"new oil" means

- (a) oil obtained from or deemed to be obtained from, a new oil well, or
- (b) oil, obtained from a well not classified as a new oil well as a result of an enhanced recovery scheme conducted pursuant to an order made under The Mines Act and dated on or after January 1, 1979 and prior to January 1, 1987, consisting of that portion of the oil obtained which can be reasonably attributed to an increase in reserves which has been recognized by the board as resulting from an enhanced recovery scheme other than an enhanced recovery scheme authorized by any previous order under The Mines Act and dated prior to January 1, 1979 and relating to the same pool or part thereof; ("pétrole nouveau")

"new oil well" means

- (a) a well drilled and completed on or after April 1, 1974 and that is the only well in the spacing unit in which the well is located that is producing or capable of producing from the pool in which the well is completed, or
- (b) a well abandoned prior to April 1, 1974 that is re-entered on or after April 1, 1974 and that is the only well in the spacing unit in which the well is located that is producing or capable of producing from the pool in which the well is completed,

"mois de production" Mois civil pendant lequel, selon le cas :

- a) du pétrole est effectivement extrait d'un puits;
- b) du pétrole est attribué à un puits ou à une unité d'espacement aux termes d'un accord de mise en commun ou d'un accord d'union. ("producing month")

"période d'encouragement à la production" Période, à l'égard d'un puits de pétrole nouveau foré et achevé entre le 1^{er} janvier 1979 et le 1^{er} janvier 1987, qui commence à la plus tardive des dates suivantes et qui se prolonge durant le nombre de mois de production précisé par les dispositions de la Loi sur les mines, ou par des règlements et des décrets de ladite loi :

- a) le premier jour du mois pendant lequel le puits commence à produire;
- b) le 1^{er} juillet 1979. ("production incentive period")

"période d'encouragement à la RAP" Période, à l'égard d'un projet nouveau ou élargi de récupération assistée de pétrole approuvé en application de la Loi sur les mines à partir du 1^{er} janvier 1987 et complètement mis en application avant le 1^{er} janvier 1992, qui commence à la plus tardive des dates suivantes et qui se prolonge durant le nombre de mois de production précisé par les dispositions de la Loi sur les mines, ou par ses règlements et décrets d'application :

- a) le premier jour du mois pendant lequel le projet nouveau ou élargi de récupération assistée de pétrole est complètement mis en application;
- b) le premier jour du mois suivant le mois pendant lequel la période d'encouragement à la production pour le puits expire;
- c) le mois pendant lequel le dernier volume de pétrole exempté du puits a été produit ou est réputé avoir été produit. ("EOR incentive period")*

"pétrole d'encouragement" Pétrole extrait d'un puits ou attribué à une unité d'espacement pendant une période d'encouragement à la production ou une période d'encouragement à la RAP. ("incentive oil")

"pétrole exempté" Le volume initial de pétrole extrait ou réputé avoir été extrait d'un nouveau puits foré et achevé entre le 1^{er} janvier 1987 et le 1^{er} janvier 1992, le volume de pétrole étant fixé conformément aux dispositions de la Loi sur les mines ou à ses règlements et décrets d'application. ("holiday oil")

*Note: See the Petroleum Crown Royalty and Incentives Regulation, Manitoba Regulation 63/87

* Note : voir le règlement du Manitoba 63/87 intitulé Règlement sur les redevances pétrolières de la Couronne et les mesures d'encouragement du secteur pétrolier

"EOR incentive period" means, in respect of a well or a spacing unit in a new or enlarged project of enhanced oil recovery approved under The Mines Act, R.S.M. 1987, chapter M160, on or after January 1, 1987 and fully implemented before January 1, 1992, the period that commenced

(a) on the first day of the month in which the new or enlarged enhanced oil recovery project was fully implemented,

(b) on the first day of the month following the month in which the royalty incentive period for the well expired, or

(c) in the month in which the final holiday oil volume for the well was produced,

whichever is later, and continuing for the number of producing months determined under The Mines Act; (« période d'encouragement à la RAP »)

"holiday oil" means the initial volume of oil produced from a new well,

(a) as the volume was determined under The Mines Act, R.S.M. 1987, chapter M160, or

(b) as the volume is determined by the registrar under section 4; (« pétrole exempté »)

"horizontal well" means

(a) a well that is drilled so as to achieve an angle of not less than 80° from the vertical for not less than 100 m, or

(b) a well in which the angle or distance requirements in clause (a) are not achieved owing, in the director's opinion, to mechanical difficulties; (« puits horizontal »)

"incentive oil" means oil produced from a well during a royalty incentive period or an EOR incentive period; (« pétrole d'encouragement »)

"licensee" means the holder of a well license issued under Part 8 of the Act; (« titulaire de permis »)

"new oil" means

(a) oil that is produced from a new oil well, or

(b) oil that is produced from an old oil well that can, in the opinion of the director, be reasonably attributed to an increase in reserves as a result of a project of enhanced recovery implemented under the Act or The Mines Act, R.S.M. 1987, chapter M160; (« pétrole nouveau »)

< Loi > La Loi sur le pétrole et le gaz naturel. ("Act")

< mois de production > Mois au cours duquel du pétrole est extrait d'un puits ou d'une parcelle ou est attribué à un puits ou à une parcelle. ("producing month")

< période d'encouragement à la RAP > Dans le cas d'un puits ou d'une surface unitaire faisant partie d'un nouveau projet ou d'un projet élargi de récupération assistée du pétrole approuvé en vertu de la Loi sur les mines, c. M160 des L.R.M. 1987, à partir du 1^{er} janvier 1987 et complètement mis en oeuvre avant le 1^{er} janvier 1992, s'entend de la période commençant au plus éloigné des moments suivants :

a) le premier jour du mois au cours duquel le projet a été complètement mis en oeuvre;

b) le premier jour du mois suivant le mois au cours duquel expire la période de redevances subventionnée du puits;

c) le mois au cours duquel est extrait le volume final de pétrole exempté du puits.

La période se poursuit pendant le nombre de mois de production déterminé par la Loi sur les mines. ("EOR incentive period")

< période de redevances subventionnée > Période débutant le premier jour du mois au cours duquel un puits de pétrole nouveau foré entre le 1^{er} janvier 1979 et le 1^{er} janvier 1987 exclusivement commence à produire du pétrole et se poursuivant pendant le nombre de mois de production déterminé aux termes de la Loi sur les mines, c. M160 des L.R.M. 1987. ("royalty incentive period")

< pétrole ancien > Pétrole autre que du pétrole nouveau, du pétrole d'encouragement ou du pétrole exempté. ("old oil")

< pétrole d'encouragement > Pétrole extrait d'un puits pendant une période de redevances subventionnée ou pendant une période d'encouragement à la RAP. ("incentive oil")

< pétrole exempté > Volume initial de pétrole extrait d'un nouveau puits et déterminé, selon le cas :

a) en vertu de la Loi sur les mines, c. M160 des L.R.M. 1987;

b) par le registraire en vertu de l'article 4. ("holiday oil")

< pétrole nouveau > Selon le cas :

a) pétrole extrait d'un puits de pétrole nouveau;

DEPARTMENT OF ENERGY AND MINES

APPROVAL MEMORANDUM

X

ORDER IN COUNCIL

X

CABINET SUBMISSION

TREASURY BOARD SUBMISSION

TREASURY BOARD PRE-CLEARANCE

OTHER (SPECIFY) _____

SUBJECT: New oil status for incremental freehold oil production
from Daly Unit No. 3

ORIGINATOR: L. R. Dubreuil

PREPARED BY: L. R. Dubreuil

POSITION

APPROVAL

DATE

BRANCH DIRECTOR: _____

September 12, 1994

DIRECTOR,
ADMINISTRATION: _____

DEPUTY MINISTER: _____

MINISTER OF ENERGY AND MINES



Date September 9, 1994

Memorandum

To Garry Barnes
Acting Deputy Minister
Energy and Mines
314 Legislative Building

From L.R. Dubreuil
Director
Petroleum Branch
555-330 Graham Avenue

Subject NEW OIL STATUS - DALY UNIT NO. 3

Chevron Canada Resources has applied for continuation of new oil status for incremental production resulting from improvements to and expansion of the waterflood enhanced recovery project in Daly Unit No. 3.

The Crown Royalty and Incentives Regulation under The Oil and Gas Act defines new oil to include "oil produced from an old oil well that can, in the opinion of the director, be reasonably attributed to an increase in reserves as a result of a project of enhanced recovery".

Based on the observations discussed below, it is the Director's opinion that incremental oil production (over extrapolation of the pre-1984 production decline) is attributable to the improvements to and expansions of the waterflood project and thereby qualifies as new oil. This determination applies to the percentage of unit production allocated to oil and gas rights owned by the Crown.

The Oil and Gas Production Tax Regulation under The Oil and Gas Production Tax Act provides, similar authority to The Oil and Natural Gas Conservation Board to designate incremental production from freehold oil and gas rights as new oil.

With proclamation of The Oil and Gas Act and repeal of The Mines Act, The Oil and Natural Gas Conservation Board, constituted under The Mines Act no longer exists. Legal Services has advised that the authority to designate incremental production as new oil cannot be transferred from the now defunct Board to the Minister, the Director or any other official. As a result, the definition of new oil in the Oil and Gas Production Tax Regulation cannot be used to recognize increased recovery in the manner intended.

The only option available to designate as new oil a portion of the Unit production from freehold oil and gas rights is under subsection 5(1) of the Oil and Gas Production Tax Regulation which provides:

"5(1) Notwithstanding anything contained in section 3, the Lieutenant Governor in Council may approve the temporary or permanent reduction or exemption of the freehold production tax to be charged on any oil or natural gas produced or deemed to be produced from a location."

New oil royalty and tax rates are lower than old oil rates and are intended to encourage maximum development of Manitoba's oil and gas resources through drilling, enhanced recovery or other means.

Recommendations:

It is recommended that new oil status be approved for incremental freehold oil production from Daly Unit No. 3 resulting from improvements to and expansion of the waterflood project. The proposed term of approval is five (5) years; July 1, 1994 to June 30, 1999.

A copy of the proposed Cabinet Submission and Order-in-Council (approved by Legal Services) are attached.

Discussion:

In 1984 Chevron expanded its waterflood operations in Daly Unit No. 3. The project involved conversion of a number of producing wells to water injection and reactivation of a number of shut-in water injection wells (see Fig. 1). Project economics at the time were marginal with an estimated pay-out of more than 10 years. Since 1984, Chevron has invested \$4.2 million in additional wells, upgraded facilities and waterflood expansion and modification.

Daly Unit No. 3 performance from 1984-94 was reviewed to determine if increased Unit production resulting from improvements to and expansion of the waterflood project represents an increase in recovery. A plot of the Unit's production history is shown in Figure 2. The plot also shows the historical production decline established by the Branch based on Unit performance from Jul/76 to Apr/84. Without the improvements to and expansion of the waterflood, Unit production would have followed the historical decline. It is apparent from the plot that waterflood modifications continue to have a significant impact on Unit production. From Sep/87 through Apr/94 an additional 43 514 m³, in excess of the Unit's historical production decline has been produced. This incremental production, which represents 14.6% of the total Unit production during this period, has been classified as new oil.

Incremental Unit production is a result of improved sweep efficiency and accelerated recovery. Injector conversions and reactivations undertaken in 1984 have resulted in oil from previously unswept parts of the reservoir being recovered. The waterflood modifications have also accelerated production, ensuring less reserves are lost in the future when low production rates will make well replacement and repairs uneconomic. It is estimated incremental recoverable reserves resulting from waterflood modifications will ultimately total 103 000 m³ or 1.9% of the original oil-in-place in the Unit.

Since 1984 new oil status has been granted by The Oil and Natural Gas Conservation Board to incremental oil production from the Unit in accordance with the definition of new oil under the Petroleum Crown Royalty and Incentives Regulation under The Mines Act for the Crown portion of the incremental production and under the Oil and Gas Production Tax Regulation for the freehold portion of the incremental production. The latest approval of new oil status expired June 30, 1994.

The lower new oil Crown royalty and freehold production tax rates have resulted in savings to Chevron and the other Unit owners of approximately \$950,000 over the past 10 years. Incremental production has also provided additional Crown revenue (royalties and freehold production tax) of approximately \$830,000 over the same period. Without these savings Chevron would not have proceeded with this project. Chevron has indicated continuation of new oil status is needed to make any future investment in the unit economically attractive.

In the Branch's opinion incremental production in Daly Unit No. 3 is a result of modifications to the waterflood and should qualify as new oil.

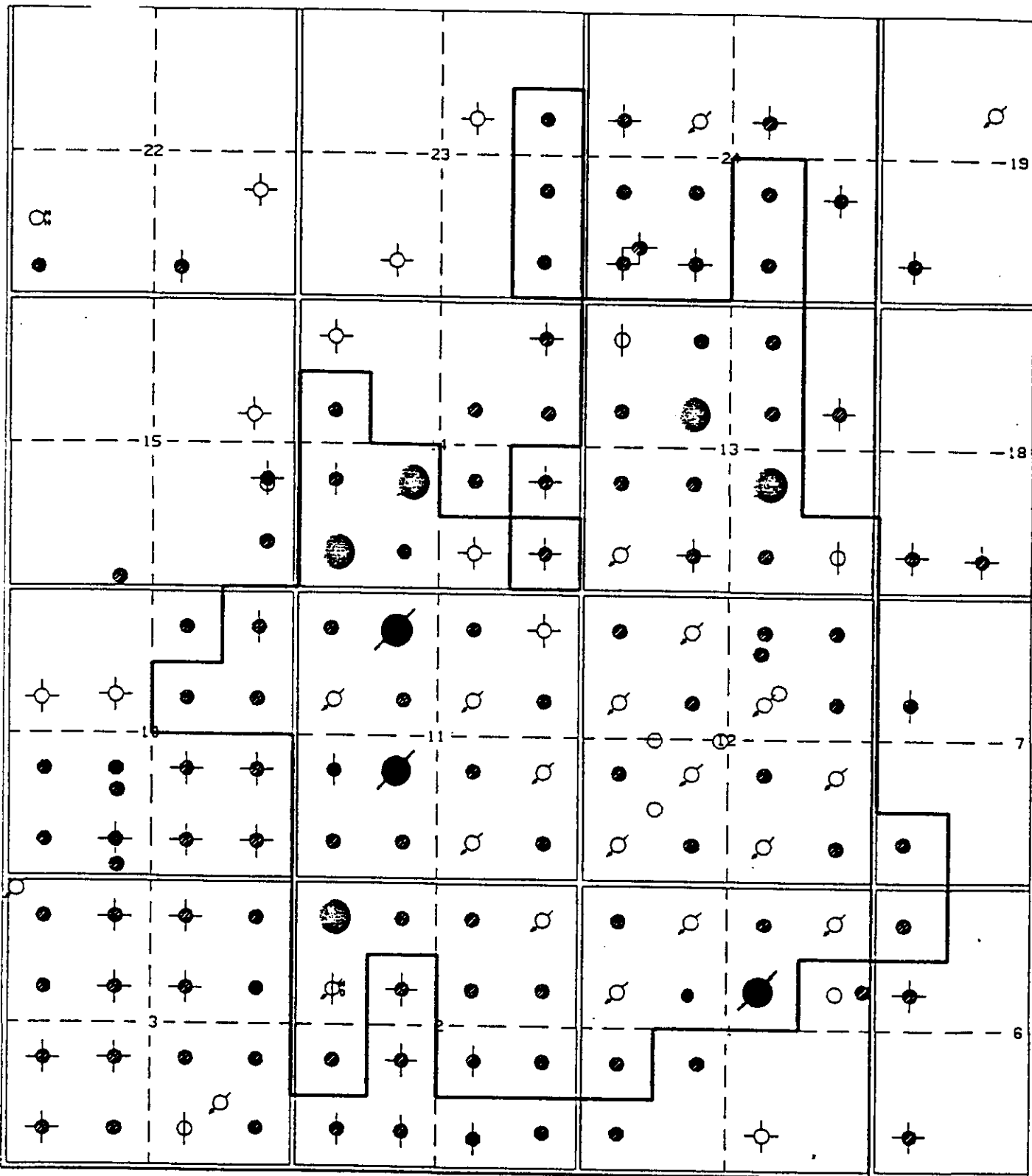
Therefore, it is recommended that the Lieutenant Governor in Council approve new oil status for incremental freehold production from Daly Unit No. 3. In order to accommodate possible future modifications to the project or to the Province's royalty and production tax structure, approval of new oil status should be limited to a term of five years, July 1, 1994 to June 30, 1999.

Over the proposed 5 year term of the approval additional Crown revenue of \$520,000 is anticipated (assumes the waterflood modifications would not have been made without the original approval in 1984). The saving to Chevron and the other unit owners in foregone Crown royalty and production tax revenue is approximately \$625,000.




L.R. Dubreuil

R.28W1M

R.27W1M








T.10

-  PROJECT CONVERSION
-  PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE 1

LEGEND

-  OILWELL
-  SUSPENDED OILWELL
-  INJECTION WELL
-  ABANDONED OILWELL
-  UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

Daily Unit No. 3 (No Infill Wells)

09/08/94 14:55

Type :

Date 5201-9309

Operator :

Field :

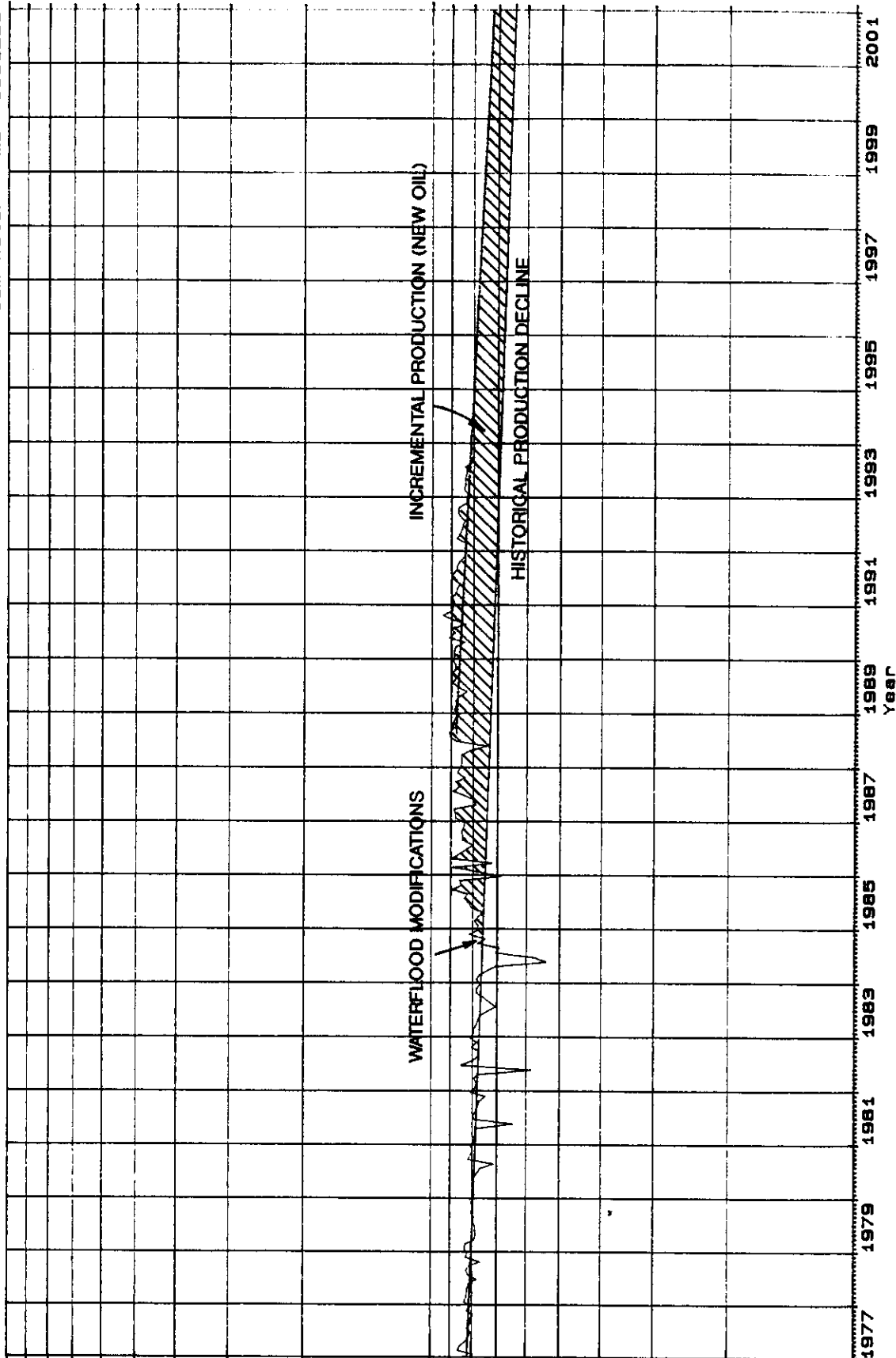
Zone/Pool:

Cum Oil m3 1607458
Cum Gas E3m3 0
Cum Water m3 1661238

1000
1000

1000
1000

10
10



Forecast #1 m3/d
Cal Day Oil m3/d

FIGURE 2



On Matters of State

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 Subsection 5(1) of the Oil and Gas Production Tax Regulation being Manitoba Regulation 357/87 under The Oil and Gas Production Tax Act (C.C.S.M. c.037), provides as follows:

"5(1) Notwithstanding anything contained in section 3, the Lieutenant Governor in Council may approve the temporary or permanent reduction or exemption of the freehold production tax to be charged on any oil or natural gas produced or deemed to be produced from a location.";

AND WHEREAS Chevron Canada Resources, as Unit Operator of Daly Unit No. 3 ("the Unit") has made application requesting that the portion of oil production from the Unit which is considered by the Director of Petroleum to be attributable to improvements to and expansion of the enhanced recovery project ("incremental production") continue to be assessed freehold production tax at new oil rates;

AND WHEREAS it is deemed to be in the public interest to support the ongoing optimization of the enhanced recovery project in the Unit by allowing incremental production to continue to be assessed freehold production tax at new oil rates for an additional five year period.

THEREFORE, he, the Minister, recommends:

THAT a temporary reduction of the freehold production tax charged on incremental production from the Unit be approved for the period July 1, 1994 to June 30, 1999. During the approval, freehold production tax will be assessed at the rate set out for new oil in Schedule A of the Oil and Gas Production Tax Regulation.

Initiating Department/Agency	
Department/Agency	Authorized Officer
ENERGY AND MINES	<i>[Signature]</i>
Approved by	
C.S.C.	Finance
Approved as to form by:	
Name	<i>[Signature]</i>
Civil Legal Services: or Legislative Counsel:	Initials <i>[Initials]</i>

Signature

IN THE EXECUTIVE COUNCIL CHAMBER, WINNIPEG

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

.....
Date

.....
President or Presiding Member

AT GOVERNMENT HOUSE IN THE CITY OF WINNIPEG

Approved and Ordered this day of A.D.

.....
Lieutenant Governor

**DEPARTMENT OF ENERGY AND MINES
CABINET SUBMISSION**

SUBJECT:

New oil status for incremental freehold oil production from Daly Unit No. 3.

BACKGROUND:

Since July 1984, Chevron Canada Resources and other Unit owners have received new oil status for incremental Crown and freehold oil production resulting from improvements to and expansion of the waterflood enhanced recovery project in Daly Unit No. 3. The approval of new oil status by The Oil and Natural Gas Conservation Board (July 1, 1989) expired June 30, 1994. Chevron, as Unit Operator, has applied for an extension of new oil status for incremental Crown and freehold oil production from the Unit.

DISCUSSION:

The definition of new oil for freehold oil production under subsection 1(1) of the Oil and Gas Production Tax Regulation includes that portion of oil produced from a well not classified as a new oil well that can, in the opinion of The Oil and Natural Gas Conservation Board, be reasonably attributed to an increase in reserves as a result of an enhanced recovery project. With the coming into force of The Oil and Gas Act, July 1, 1994, The Mines Act was repealed and The Oil and Natural Gas Conservation Board ceased to exist. Legal Services has advised that subsection 1(1) of the Oil and Gas Production Tax Regulation is therefore inoperable. As a result, new oil status can only be granted by the Lieutenant Governor in Council in accordance with section 5 of the Oil and Gas Production Tax Regulation (Tax reduction or exemption).

The authority to approve new oil status for incremental Crown oil production resulting from an enhanced recovery project is provided to the Director of Petroleum under section 1(1) of the Crown Royalty and Incentives Regulation under The Oil and Gas Act.

Since 1984 Chevron has invested \$4.2 million in Daly Unit No. 3 in additional wells and improvements to and expansion of the waterflood enhanced recovery project. The investment has resulted in incremental Crown and freehold oil production, above the Unit's historical production decline, of 43 514 m³, or 14.6% of the Unit's production since 1984.

The incremental production resulting from modifications to the enhanced recovery project, has yielded additional Crown revenues (royalties and freehold production taxes) of approximately \$830,000 over the last 10 years. Over the same period savings to Chevron and the other Unit owners resulting from lower new oil royalty and production tax rates (versus old oil rates) was approximately \$953,000.

Incremental production from Daly Unit No. 3 to date has not met Chevron's original expectations. Chevron has indicated continuation of new oil status is needed to make any future investment in Daly Unit No. 3 economically feasible.

The intent of the "new oil" provisions of the Oil and Gas Production Tax Regulation is to encourage oil companies to implement enhanced recovery projects to maximize the recovery of oil. It is suggested that new oil status for incremental freehold oil production from Daly Unit No. 3 be extended for a period of five years. The proposed extension of new oil status is consistent with the intent of legislation.

FINANCIAL IMPLICATIONS:

Additional revenues to the Crown over the five year extension are estimated at \$520,000 (assumes waterflood modifications would not have been made without the original approval in 1984). Savings to Chevron and the other Unit owners are estimated at \$625,000.

COMMUNICATION STRATEGY:

Letter to Chevron as Unit Operator outlining the terms of the extension of new oil status for incremental oil production from Daly Unit No. 3.

RECOMMENDATIONS:

Incremental freehold oil production from Daly Unit No. 3 resulting from improvements to and expansion of the waterflood enhanced recovery project in an amount to be determined by the Director of Petroleum be subject to new oil tax rates for the period July 1, 1994 to June 30, 1999.

Donald W. Orchard
Minister of Energy and Mines

Contact Person:

L. R. Dubreuil - 945-6573

Date: September 7, 1994

Manitoba**Memorandum**

Date: August 18, 1994

FILE NO. EM0300(18)

To: John N. Fox
Chief Petroleum Engineer
Petroleum Branch
555-330 Graham Avenue
VIA FAX ONLY

From: Dirk Blevins
Crown Counsel
Civil Legal Services
7th Floor - 405 Broadway

Telephone: 945-2834

SUBJECT: THE OIL & GAS PRODUCTION TAX ACT - REGULATION - NEW OIL

I am now in a position to respond to your memo of July 13, 1994.

I have reviewed the legislation in question, being the old Mines Act, the new Oil & Gas Act, The Oil & Gas Production Tax Act and the application regulation thereunder.

Based on the facts set out in your memo, it is my legal opinion that the minister does not have authority under The Oil & Gas Production Tax Regulation to designate "new oil" as the Oil & Gas Conservation Board did. This being the case, there is no power to delegate to the director.

Please advise if you have any questions or wish to discuss this matter.

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

Dirk Blevins
Crown Counsel

DB/ps



Memorandum

Date: July 18, 1994

FILE NO.


To: John N. Fox
Chief Petroleum Engineer
Petroleum Branch
555-330 Graham Avenue

From: D. Blevins
Crown Counsel
Civil Legal Services
7th Floor - 405 Broadway

Telephone: 945-2834

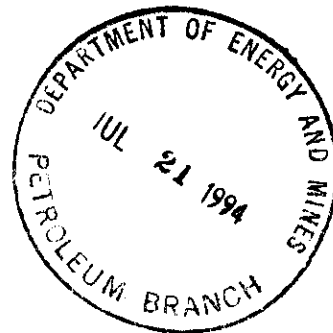
SUBJECT: O & G ACT - ROYALTY REG. - NEW OIL

I acknowledge receipt of your memo of July 13, 1994 and will reply as soon as possible.


.....
D. Blevins
Crown Counsel

DB/ps

H:\DEPT\DDB\FILEOPEN.MEM



July 13, 1994

Dirk Blevins
Crown Counsel

John N. Fox,
Chief Petroleum Engineer
Petroleum Branch
945-6574

Interpretation of the Definition of New Oil

The definition of new oil for oil production owned by the Crown is provided for under The Crown Royalty and Incentives Regulation under The Oil and Gas Act. New oil is defined as

"new oil" means

- (a) oil that is produced from a new oil well, or
- (b) oil that is produced from an old oil well that can, in the opinion of the director, be reasonably attributed to an increase in reserves as a result of a project of enhanced recovery implemented under the Act or The Mines Act, R.S.M. 1987, chapter M160.

The definition of new oil for oil production owned by a freehold mineral owner is provided for in The Oil and Gas Production Tax Regulation under The Oil and Gas Production Tax Act. New Oil is defined as

"new oil" means

- (a) oil obtained from or deemed to be obtained from, a new oil well, or
- (b) oil, obtained from a well not classified as a new oil well as a result of an enhanced recovery scheme conducted pursuant to an order made under The Mines Act and dated on or after January 1, 1979 and prior to January 1, 1987, consisting of that portion of the oil obtained which can be reasonably attributed to an increase in reserves which has been recognized by the board as resulting from an enhanced recovery scheme other than an enhanced recovery scheme authorized by any previous order under The Mines Act and dated prior to January 1, 1979 and relating to the same pool or part thereof.

Daly Unit No. 3 produces a combination of Crown and freehold oil. The Oil and Natural Gas Conservation Board approved new oil status for a portion of production from Daly Unit No. 3 using clause (b) under The Oil and Gas Production Tax Regulation and an identical clause under The Petroleum Crown Royalty and Incentives Regulation (predecessor to The Crown Royalty and Incentives Regulation). The Board's approval expired June 30, 1994. The

Director intends to use his authority under clause (b) of The Crown Royalty and Incentives Regulation to continue approval of new oil status for a portion of the Crown oil production from Daly Unit No. 3. However, the approval mechanism for continuing new oil status for a portion of the freehold oil production from Daly Unit No. 3 is unclear as the Oil and Natural Gas Conservation Board no longer exists and The Oil and Gas Production Tax Regulation has not been amended. (Note: the consequential amendments to The Oil and Gas Production Tax Act under The Oil and Gas Act involved striking out The Mines Act and substituting The Oil and Gas Act).

The definition of new oil under the two regulations has always been identical. The intent is to eventually amend both The Oil and Gas Production Tax Act and regulations thereunder. Until that time the Branch is seeking your opinion on whether the Director has the authority to approve new oil status for freehold oil production, based on the following argument.

As approval of a project of enhanced recovery rests with the Minister under Section 116 of The Oil and Gas Act and this authority has been delegated to the director (see attached memo) and this delegated authority is consistent with the intent outlined in the definition of new oil, it is assumed that the director has the authority to approve new oil status for freehold oil production.

Please provide myself or Bob Dubreuil with your opinion on this matter as soon as possible.



John N. Fox

JNF

Daily Unit No. 3 (No Infill Wells)

09/08/94 14:55

Date 5201-9309

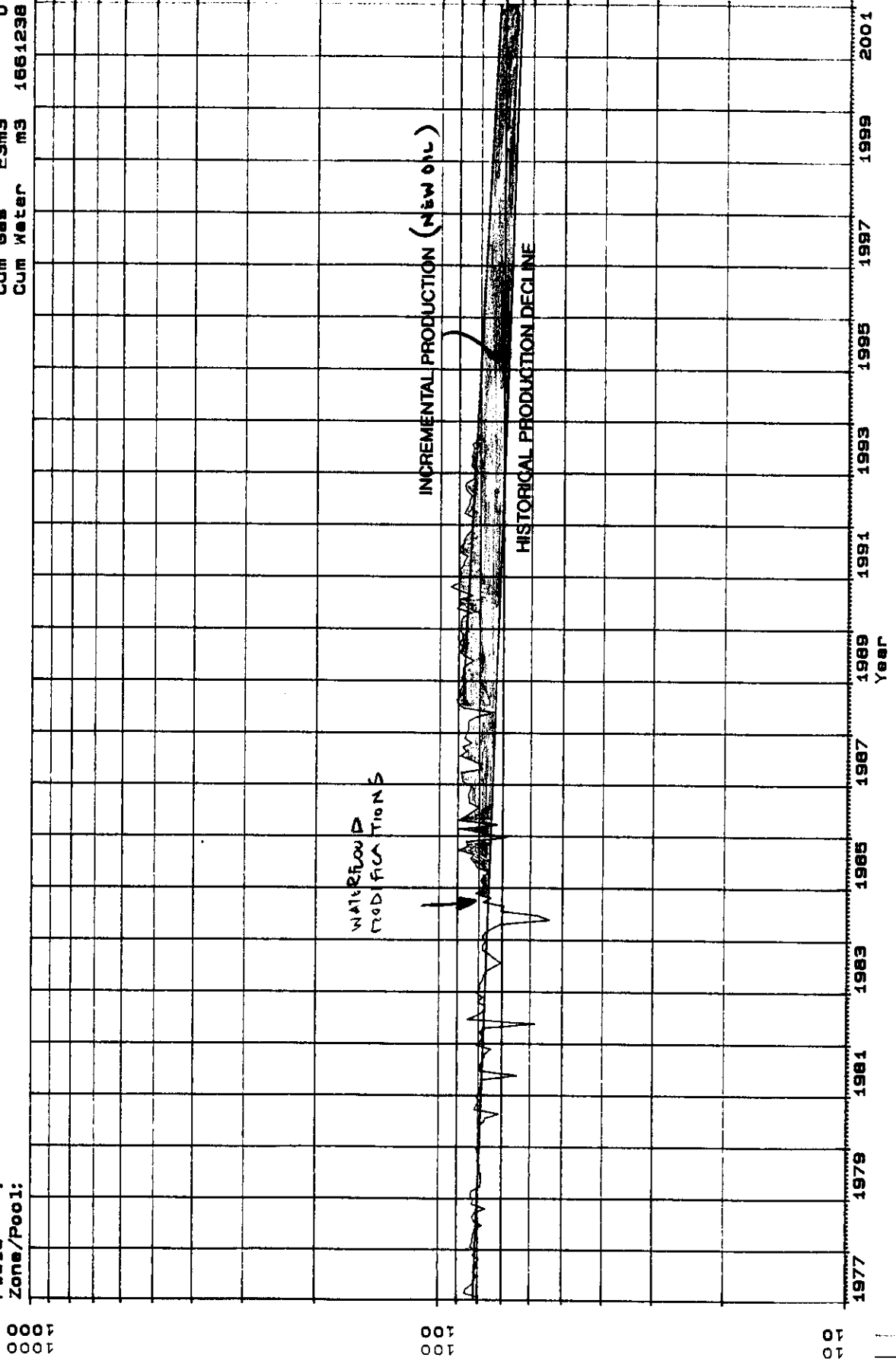
Operator :

Field :

Zone/Pool:

Type :

Cum Oil m3 1607458
Cum Gas E3m3 0
Cum Water m3 1661238



Forecast #1 m3/d
Cal Day Oil m3/d

FIGURE 2

July 14, 1994

DRAFT

Bob Dubreuil
Director
Petroleum Branch

John N. Fox,
Chief Petroleum Engineer
Petroleum Branch

Daly Unit No. 3 - New Oil Status

Chevron Canada Resources has applied (May 10, 1994) for continuation of new oil status for incremental production resulting from their 1984 waterflood expansion project.

Recommendations

It is recommended that:

- (1) Incremental production resulting from the waterflood expansion project, be recognized by the Director as representing an increase in recovery.
- (2) New oil status be granted for the incremental production. Approval by the Director for the Crown portion of the incremental production is provided for in the definition of new oil under The Crown Royalty and Incentives Regulation. The mechanism for approval for the freehold portion is currently under review by Legal Services. A copy of the proposed letter of approval is attached.
- (3) A historical production decline of 1%/year (exponential) be used to determine incremental production.

Background

In September 1984 the Board approved Chevron's application to modify and expand waterflood operations in Daly Unit No. 3. The waterflood expansion project involved conversion of five wells to injection, reactivation of three suspended injectors and an increase in injection pressure and volume (see Fig.1).

The Board also approved, on an interim basis, classification of incremental production resulting from the waterflood expansion project as new oil. The last interim approval of new oil status expired June 30, 1994.

Waterflood Expansion Project Review

Daly Unit No. 3 performance from 1984-94 has been reviewed in an attempt to determine, once and for all, if increased Unit production resulting from the waterflood expansion project represents an increase in recovery.

Production History

The waterflood expansion project continues to have a significant impact on Unit production. From Sep/84 through Apr/94 an additional 43 514 m³, in excess of the Unit's historical production decline has been produced. This production, which represents 14.6% of the total Unit production during this period, has been classified as new oil. The Unit's historical production decline has been estimated by the Branch at 1%/yr (exponential) based on unit performance from Jul/76 to Apr/84. In 1991, six infill wells were drilled in the Unit. Production from these wells (6633 m³ to Apr/94), which automatically qualifies as holiday or new oil, has been excluded from this analysis.

A plot of the production history for Daly Unit No. 3 is shown in Figure 2. The plots shows; a) the 1%/yr historical production decline; b) Unit production with and without the 1991 infill wells; and c) the estimated 1.46%/yr production decline from 1987 to 1994. Chevron estimates incremental recoverable reserves associated with the waterflood expansion project will total 103 000 m³ or 1.9% OOIP. Figure 3 shows; a) Unit production forecast 1994 to 2035 with and without the infill wells; b) historical production decline; and c) the percentage of new oil.

Injection History

As a result of the waterflood expansion project, water injection into the unit increased from 200 m³/d to a maximum of 740 m³/d (1988). Between 1990 - 92 injection rates averaged 445m³/d. Since March 1993 injection rates have averaged 234 m³/d. Though the 1993 Unit VRR was only 0.87 and the cumulative VRR is 1.61. Chevron indicates it's current strategy is to improve the production/injection balance for individual unit patterns with a target VRR of 1.0. This strategy should improve overall sweep efficiency and reduce reservoir pressure in portions of the Unit that are over-pressured.

Chevron indicated in the application it is reviewing the feasibility of converting two additional wells to injection; 13-1-10-28 and 15-13-10-28.

Increased Recovery

Under The Crown Royalty and Incentives Regulation new oil is defined as

- (b) oil that is produced from an old oil well that can, in the opinion of the director, be reasonably attributed to an increase in reserves as a result of a project of enhanced recovery implemented under the Act or The Mines Act, R.S.M. 1987, chapter M160.

The Oil and Gas Production Tax Regulation has the same definition with slightly different wording. A legal opinion on the approval process under The Oil and Gas Production Tax Regulation is being sought (see attached memo to D. Blevins).

A number of analysts, myself included, have attempted to separate the production response resulting from the waterflood expansion project into two categories; accelerated production and incremental production. Concerns regarding the magnitude of the acceleration component of the production response are what prompted the Board to grant an interim approval of new oil status. I believe two factors tip the scales in favour of incremental vs. accelerated production - (1) improved volumetric sweep efficiency resulting from the injector conversions and reactivations and (2) the Unit's long production life.

Perhaps the best illustration of the potential for improved sweep efficiency in the Unit is the results of the 1991 infill drilling project. The five infill wells (one well is shut-in) produce at an average water-cut of 6.9%, compared to an average water-cut of 34.6% at offsetting producers and a Unit water-cut of 67.7%. Chevron estimates the infill wells will recovery 85 328 m³ (14 220 m³/well) or 1.5% OOIP. In comparison there are 22 producers offsetting the eight injectors converted or reactivated as part of the waterflood expansion project. Dividing the estimated incremental recoverable reserves of 103 000 m³ among the 22 wells yields an average incremental recovery of 4681 m³/well. A further division shows an average incremental recovery of only 1807 m³/producer in the Unit.

The majority of the wells in the Unit were drilled in 1952-56. At a production decline of between 1-1.5%/year, the economic limit of 0.4 m³/d/well will be reached between 2088-2115. Experience indicates most of the wells will have casing or equipment failures before they reach their economic limit and due to low productivity it is unlikely that economics for well replacement or repair will be favourable. In a situation like this any acceleration of production will therefore be incremental production. Chevron has assumed production from the Unit will terminate in 2035.

I believe production in Day ² Unit No. 3 in excess of the historical production decline of 1%/yr should be considered to be an increase in reserves reasonably attributable to the waterflood expansion project, in satisfaction of the definition of new oil.

Cost and Benefits of New Oil Status

Chevron has calculated the cost and benefits to working interest owners, the Crown and freehold mineral owners of new oil status to date and over the remainder of the Unit's production life. The costs and benefits are listed in Table 1 and assume Chevron

would not have proceeded with the waterflood expansion project without approval of new oil status.

John N. Fox

Approved: _____
L.R. Dubreuil, Director

Date: _____

TABLE 1
DALY UNIT NO. 3
NEW OIL STATUS - COSTS AND BENEFITS**

	1984-1993 (\$M)	1994-2035* (\$M)	Total
Unit WIO's Royalty and Tax Savings	953.6	2584.6	3538.2
Additional Royalty and Tax Paid to the Crown	830.8	2077.5	2908.3
Additional Royalty Paid to Freehold Owners	450.3	1247.0	1697.3

* Assuming an oil price \$125/m³

** Includes 1991 infill wells

FIGURE 2

DAILY UNIT NO. 3 + INFILL WELLS

07/12/94 13:09

r/pd :

Data 5201-9309

Operator :

Field :

Zone/Pool:

WATERFLOOD

EXPANSION PROJECT

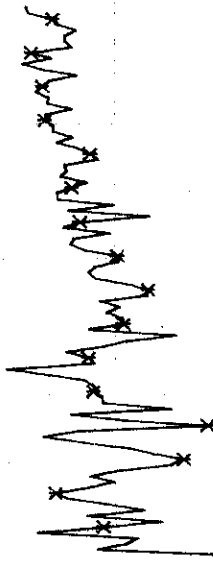
Cum Oil m3 1607458
Cum Gas m3 0
Cum Water m3 1661238

INFILL WELL PRODUCTION

00
00
00

HISTORICAL
PRODUCTION
DECLINE

No. of wells



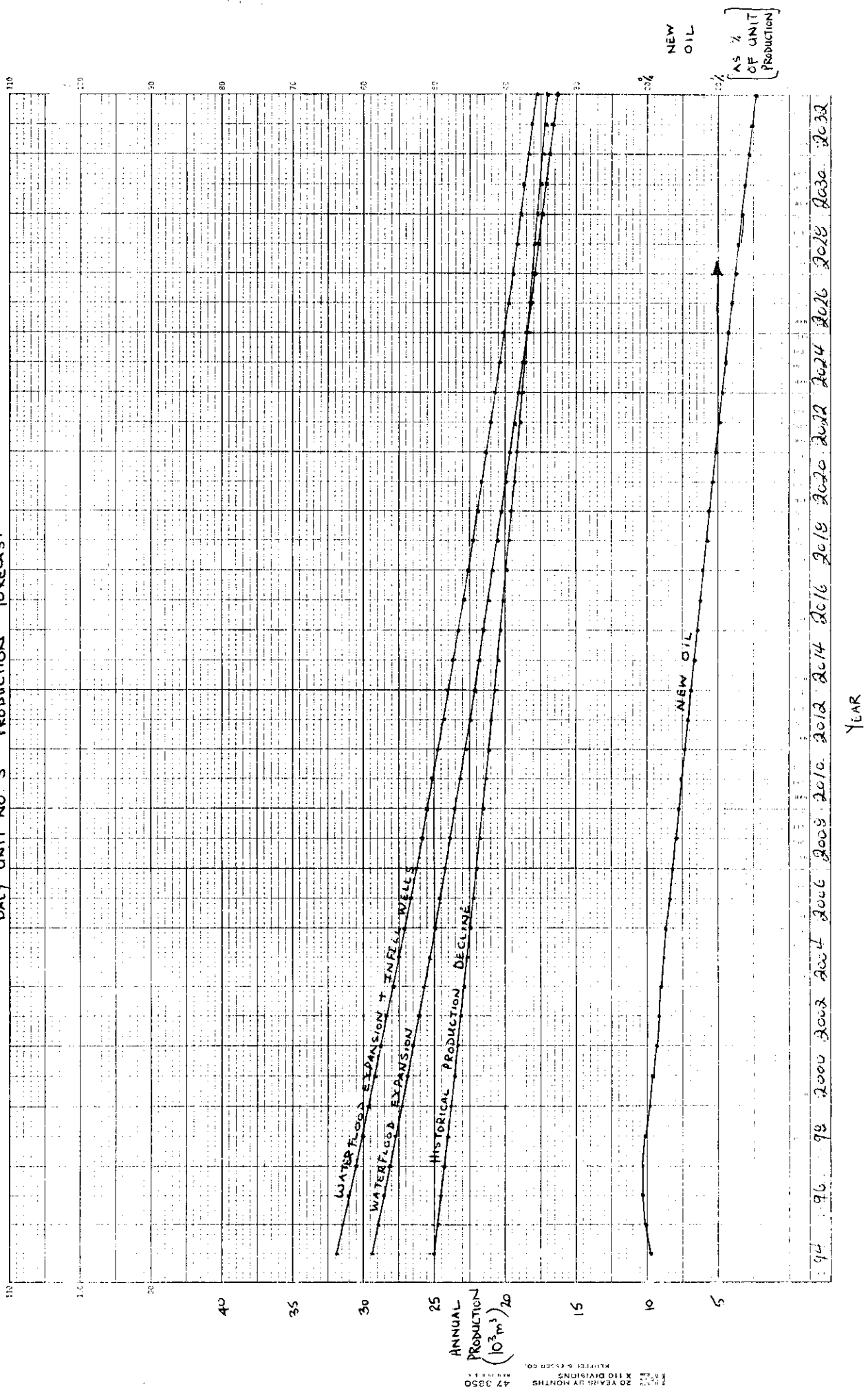
Cal Day Oil m3/d

WOR

Num Wells
m3/m3

X

Figure 3
DAILY UNIT NO. 3 - PRODUCTION FORECAST



47 3850
20 YEARS BY MONTHS
K 110 DIVISIONS
MAY 1994
MAY 1994

Daly Unit No. 3 (No Infill Wells)

09/08/94 14:55

Type :

Date 5201-9309

Operator :

Field :

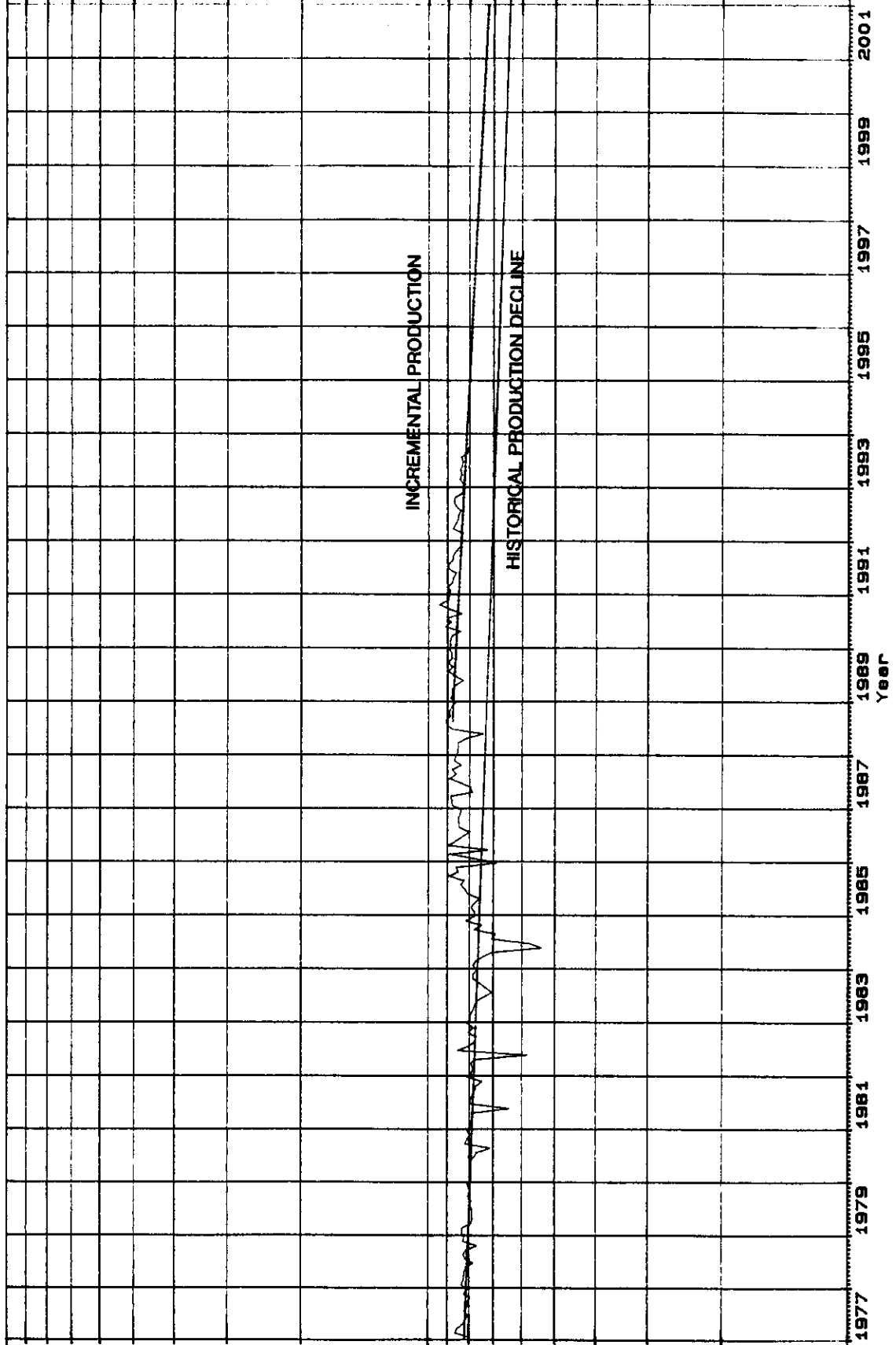
Zone/Pool:

Cum Oil m3 1607458
 Cum Gas E3m3 0
 Cum Water m3 1661238

1000
 1000

100
 100

10
 10



Forecast #1 m3/d
 Cal Day Oil m3/d

FIGURE 2

Daily Unit No. 3

07/12/94 13:27

Date 5201-9309

Operator :

Field :

Zone/Pool:

Type :

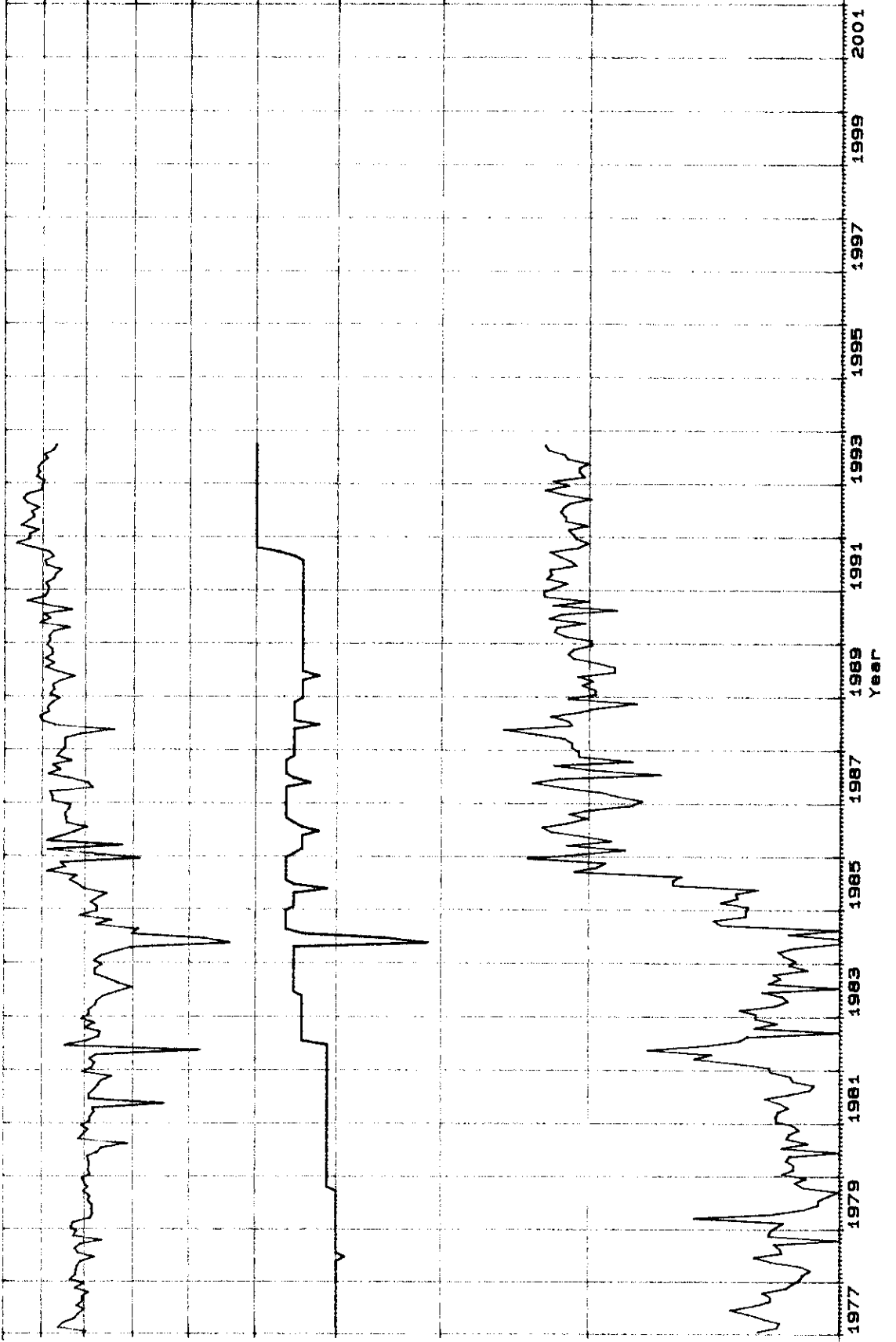
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Cum Gas E3m3 0

Cum Water m3 1662697

100

100



10

10

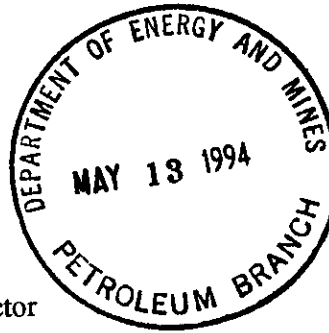
Cell Day Oil m3/d

WOR

Num Wells
m3/m3

May 10, 1994

Department of Energy and Mines
Petroleum Branch
Attention: Mr. L. R. Dubreuil, Director
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3



Chevron

Chevron Canada Resources
P.O. Box 100
Virden, Manitoba ROM 2C0
Phone (204) 748-1334
Fax (204) 748-6762

Dear Sir:

RE: Daly Unit #3 - Extension of New Oil Status

Chevron Canada Resources, as Operator of the Daly Unit No. 3 hereby applies for continuation of New Oil status on incremental oil production as a result of the 1984 Waterflood Expansion Project.

Unit production continues to exhibit incremental oil production above the Manitoba Petroleum Branch recognized base case. Present production is 15.3 m³ opd above the base case production of 68.8 m³ opd in 1994-03. Of this 15.3 m³ opd, 9.1 m³ can be directly attributed to the waterflood expansion while 6.2 m³ opd is the result of the 1991 six well infill pilot project. Total incremental oil recovery for the period 1984-09 to 1994-03 is estimated at 35,200 m³ above the base case.

Infill Drilling

As evidenced in Chevron's previously submitted "Daly Unit No. 3 Extension of New Oil Status Performance Review", dated 1989-05-04, reservoir throughput is at a maximum. Further injection rate increases are not possible with existing injectors and will not enhance reserve depletion. Infill drilling is deemed the only way to increase fluid throughput in the unit. An infill pilot project was attempted in 1987. The first well at 6a-12-10-28 encountered an unexpected high pressure zone above the productive zone resulting in suspended operations. In 1991, six infill wells were drilled. Figure 1 is a unit map showing the infill well locations. Incremental oil production generated by the infills is shown in Figure 2. Combined production is 6.2 m³ opd with 6633 m³ total recovery as of 1994-03. Table 1 lists calculated additional Crown royalty and freehold production tax payments resulting from the project. The wells were drilled using intermediate casing and high density drilling fluids due to potential high pressures. The associated high drilling costs along with the lower than anticipated incremental reserves and production rates caused the project to be economically unsuccessful. If infill drilling is to be a viable means of increasing recovery from the unit, drilling costs must be reduced substantially. To this end, Chevron is presently in the process of implementing waterbalancing within the unit. Waterbalancing will reduce reservoir pressures such that infill drilling will be economically viable. Overall sweep efficiency will also be improved. Although reduced costs will have an impact, new oil status is still necessary to make future infill projects feasible.

Future Work

Chevron is currently evaluating acquisition potential of four Triton wells at the north end of the unit. These wells are 3-24, 5-24, 6-24 (producers) and 11-24 (disposal). In conjunction with acquiring Tritons holdings in Sec. 24, Chevron intends to convert the suspended well at 15-13-10-28 to an injector.

Department of Energy and Mines
Attention: Mr. R. L. Dubreuil
May 10, 1994
Page two

Another potential conversion exists at 13-1-10-28. However, economics for this conversion are marginal at current oil prices, even with new oil status.

Information submitted with our previous application, "Daly Unit No. 3 Extension of New Oil Status - Additional Information", dated 1989-06-19 has been updated. Table 2 lists the work conducted in conjunction with the waterflood expansion and enhancement for the period 1989-01 to 1994-03. Table 3 is an updated summary of revenue, operating costs, Chevron's Crown and freehold royalty payments and Chevron's freehold production tax payments for the years 1984 to 1993. Table 4 shows the calculated total unit Crown royalty and production tax savings as a result of new oil status. Table 5 shows the calculated unit Crown royalty and production tax in excess of the base case. Table 6 shows the calculated total unit freehold royalties in excess of the base case. Table 7 is an updated summary of the benefits of the expansion project to all parties involved (based on expansion work completed to date).

New oil status continues to be an economic necessity for ongoing optimization and improved recovery work for Daly Unit No. 3. This not only applies to major projects such as infill drilling and injection conversions but also to normal remedial work required to maintain injectivity and production.

Should you have any questions or require any additional information regarding this application, please contact John Falck at (204) 748-6337.

Yours truly,



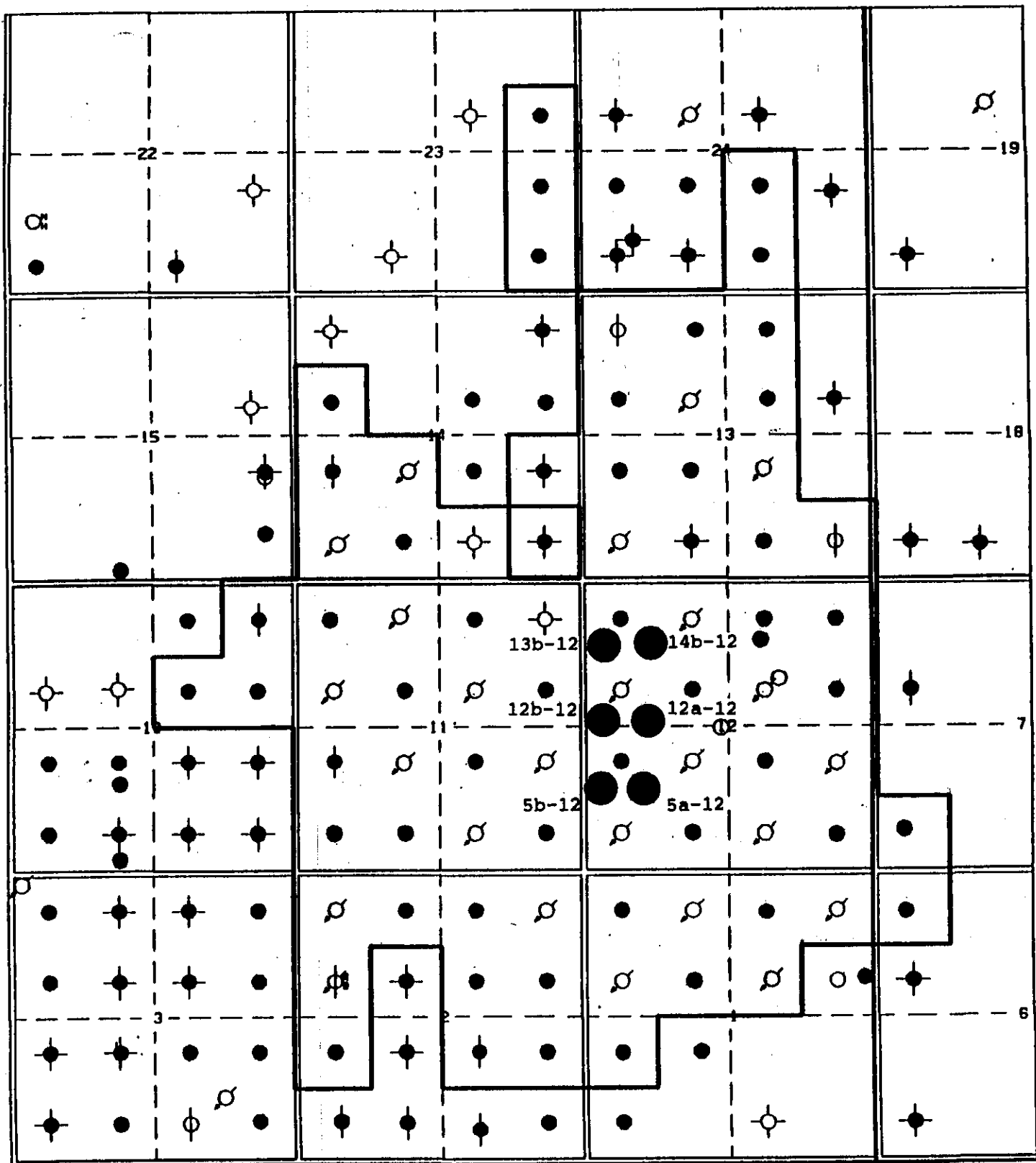
FOR J. E. CAUSGROVE, P. Eng.
Virden Business Unit Manager

JF/tjs

Attachment

R.28W1M

R.27W1M



T.10

DALY UNIT NO. 3

FIGURE 1

LEGEND

● OILWELL

⬮ SUSPENDED OILWELL

⊕ INJECTION WELL

⊙ ABANDONED OILWELL

— UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

DALY #3
Effect of 1991 Infill Project

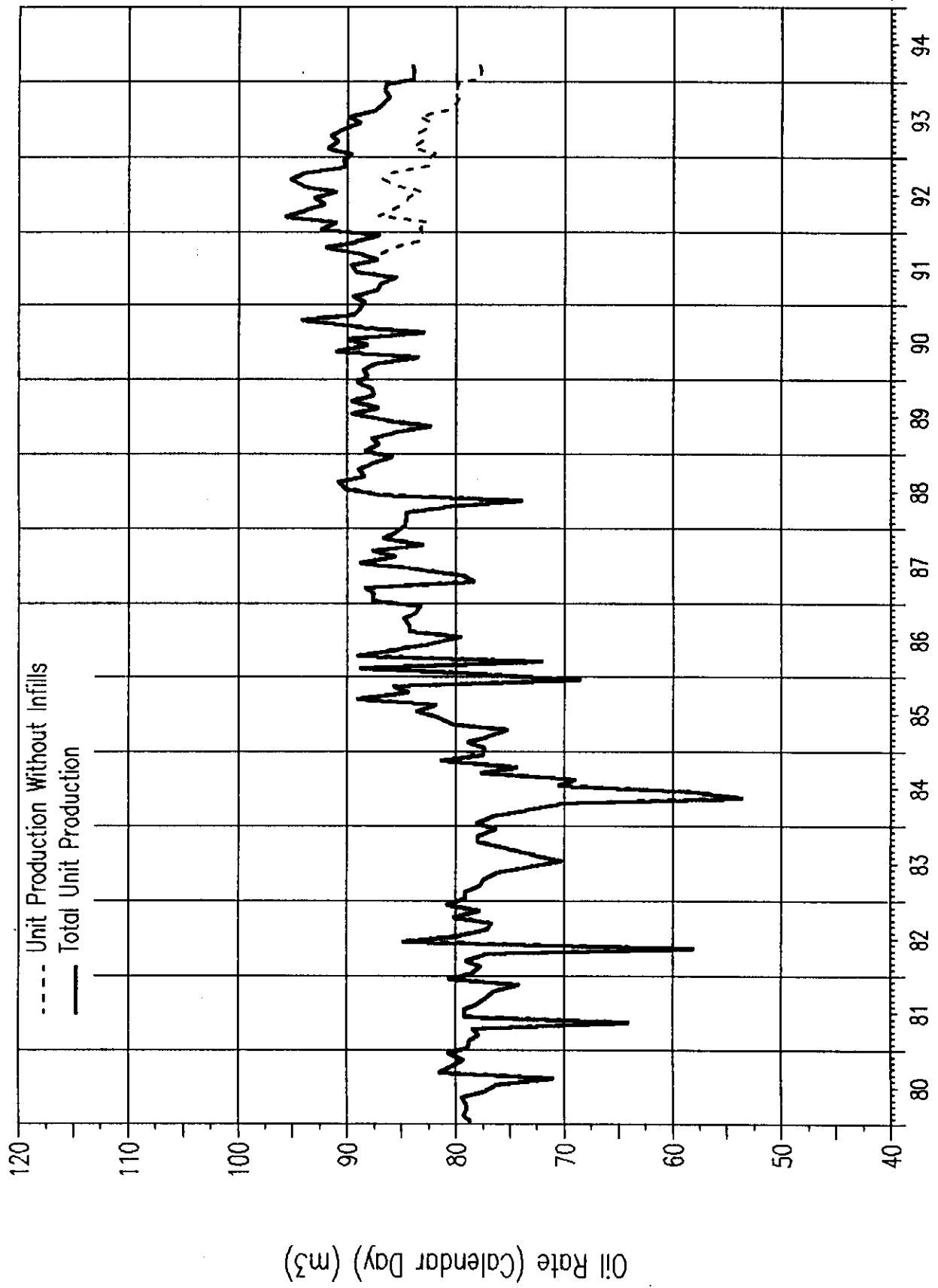


FIGURE 2

TABLE 1

**CALCULATED ADDITIONAL CROWN ROYALTY, PRODUCTION
TAX AND FREEHOLD ROYALTY DUE TO 1991 INFILL PROJECT**

Year	Expansion Case w/ Infill				Expansion Case w/o Infill				Incremental			
	Prod'n (E3 m3)	Crown Royalty (m3)	Prod'n Tax (m3)	Freehold Royalty (m3)	Prod'n (E3 m3)	Crown Royalty (m3)	Prod'n Tax (m3)	Freehold Royalty (m3)	Crown Royalty (m3)	Prod'n Tax (m3)	\$	Freehold Royalty (m3)
1984	26,220	1877.4	1824.3	1889.2	26,220	1877.4	1824.3	1889.2	0	0	0	0
1985	29,531	2221.6	1984.7	2105.3	29,531	2221.6	1984.7	2105.3	0	0	0	0
1986	30,247	2282.7	2010.7	2156.3	30,247	2282.7	2010.7	2156.3	0	0	0	0
1987	31,097	2315.3	2044.3	2216.9	31,097	2315.3	2044.3	2216.9	0	0	0	0
1988	31,354	2320.1	2037.2	2235.2	31,354	2320.1	2037.2	2235.2	0	0	0	0
1989	31,889	2348.3	2049.4	2273.3	31,889	2348.3	2049.4	2273.3	0	0	0	0
1990	32,280	2365.0	2052.1	2301.2	32,280	2365.0	2052.1	2301.2	0	0	0	0
1991	32,281	2301.8	1985.7	2280.5	31,709	2301.8	1985.7	2280.5	0	0	0	0
1992	33,949	2229.3	1911.9	2128.1	30,983	2229.3	1908.8	2128.1	2.4	313	274	39.4
1993	32,429	2213.4	1888.3	2112.7	29,866	2121.1	1808.8	2128.1	92.4	81.6	10020	211.4
1994	31,946	2204.6	1869.8	2097.3	29,421	2070.3	1751.1	2097.3	134.3	118.7		182.7
1995	31,470	2187.4	1843.5	2086.1	28,983	2020.5	1697.0	2086.1	166.9	146.5		177.3
1996	31,001	2159.3	1808.4	2065.3	28,551	1971.8	1644.5	2035.3	187.5	163.9		174.7
1997	30,539	2117.3	1760.9	2005.0	28,126	1924.6	1592.7	2005.0	192.7	168.1		172.0
1998	30,084	2068.5	1703.9	1945.7	27,707	1878.4	1542.2	1945.7	188.1	161.7		168.5
1999	29,636	2016.7	1650.1	1916.7	27,284	1833.4	1443.0	1916.7	183.3	157.1		167.0
2000	29,194	1967.8	1595.5	1888.1	26,887	1798.4	1395.7	1888.1	173.6	148.1		164.5
2001	28,759	1918.9	1543.8	1860.0	26,466	1746.2	1365.7	1860.0	168.2	143.7		159.6
2002	28,330	1873.2	1494.7	1832.2	26,091	1703.9	1351.0	1832.2	165.2	138.5		157.3
2003	27,908	1827.7	1446.1	1804.9	25,702	1662.5	1308.6	1804.9	161.3	136.8		154.9
2004	27,492	1783.1	1398.6	1778.1	25,319	1621.8	1281.8	1778.1	157.7	130.2		152.6
2005	27,082	1739.8	1352.3	1751.5	24,942	1582.1	1222.0	1751.5	154.2	124.4		150.3
2006	26,678	1697.2	1308.9	1725.4	24,570	1543.0	1182.4	1725.4	150.6	117.8		148.0
2007	26,280	1655.6	1263.0	1699.7	24,204	1505.0	1145.2	1699.7	146.9	111.5		145.8
2008	25,888	1614.7	1219.0	1674.4	23,843	1467.8	1107.5	1674.4	143.2	104.8		143.6
2009	25,502	1574.7	1174.8	1649.5	23,488	1431.5	1089.9	1649.5	138.7	98.8		141.4
2010	25,122	1535.5	1131.9	1624.9	23,138	1395.8	1033.0	1624.9	136.2	94.0		139.4
2011	24,748	1497.2	1083.2	1600.6	22,793	1361.0	999.1	1600.6	132.9	91.8		137.3
2012	24,379	1459.8	1055.9	1576.7	22,453	1327.0	964.2	1576.7	129.9	87.8		135.3
2013	24,016	1423.7	1020.6	1553.2	22,118	1283.8	932.8	1553.2	127.0	84.2		133.3
2014	23,658	1388.4	988.2	1530.0	21,788	1261.4	902.0	1530.0	124.1	79.8		131.3
2015	23,305	1353.7	953.3	1507.2	21,463	1229.6	873.5	1507.2	121.2	75.2		129.4
2016	22,958	1319.8	920.0	1484.8	21,143	1198.6	844.8	1484.8	118.0	70.9		127.5
2017	22,616	1286.6	887.0	1462.7	20,828	1168.6	816.1	1462.7	114.6	66.8		125.5
2018	22,279	1254.1	855.9	1440.9	20,518	1139.5	789.1	1440.9	111.2	64.4		123.7
2019	21,947	1222.3	826.5	1419.4	20,212	1111.1	762.2	1419.4	107.8	61.7		121.8
2020	21,620	1191.1	799.4	1398.2	19,911	1083.3	737.7	1398.2	104.4	59.2		120.0
2021	21,298	1160.6	772.0	1377.4	19,614	1056.1	712.8	1377.4	101.4	57.4		118.3
2022	20,981	1131.0	746.4	1356.9	19,322	1029.6	689.1	1356.9	98.8	55.5		116.5
2023	20,668	1102.4	720.3	1336.6	19,034	1003.6	668.1	1336.6	96.3	52.9		114.8
2024	20,360	1074.8	694.9	1316.8	18,750	978.5	641.9	1316.8	93.6	50.1		113.1
2025	20,057	1047.7	668.2	1297.1	18,471	954.2	618.1	1297.1	90.8	48.1		111.4
2026	19,758	1021.3	645.1	1277.8	18,196	930.5	597.0	1277.8	88.1	46.1		109.7
2027	19,464	995.5	621.9	1258.8	17,925	907.4	575.8	1258.8	85.4	43.8		108.1
2028	19,174	970.3	599.8	1240.0	17,658	884.9	556.0	1240.0	82.8	41.2		106.4
2029	18,888	945.6	577.9	1221.6	17,395	862.8	536.7	1221.6	80.4	40.1		104.9
2030	18,607	921.7	557.7	1203.4	17,136	841.3	517.6	1203.4	78.3	38.0		103.3
2031	18,330	898.6	538.0	1185.4	16,881	820.3	500.0	1185.4	76.2	37.0		101.8
2032	18,057	876.0	519.3	1167.8	16,629	799.8	482.4	1167.8	74.2	34.7		100.3
2033	17,788	853.9	500.4	1150.4	16,381	779.8	465.7	1150.4	72.2	31.3		98.8
2034	17,523	832.4	482.7	1133.3	16,137	760.2	451.4	1133.3	70.2	27.4		97.3
2035	17,262	811.3	464.3		15,897	741.1	436.9					
Total	1313,909	82436.9	63658.9	93665.5	1228,581	77032.5	59811.6	87582.7	5403.4	3847.3		6082.8

- Both cases assume a 1.6% decline rate

TABLE 2

Work Performed and Capital Expenditures

Date	Work	Cost (E3\$)	Producers	Injectors
91-09	Drill/complete 14b-12	421.6	14b-12	
91-09	Drill/complete 13b-12	323.9	13b-12	
91-10	Drill/complete 12b-12	322.7	12b-12	
91-10	Drill/complete 5b-12	331.8	5b-12	
91-10	Drill/complete 5a-12	546.5	5a-12	
91-11	Drill/complete 12a-12	350.5	12a-12	
91-11	Tie in 6 infills	360.0		
92-02 to 94-03	Acid jobs	30.8	10-10 1-12 14b-12 10-13 13-1	
89-10 to 92-09	Attempt annular isolation	5.2		8-12
93-06	Acid jobs	11.9		11-13 6-14
93-7	Abandonment	18.0		8-12
93-06 to 93-07	Backflow to clean	3.0		16-2 10-11 12-11 4-12 10-12
89-01 to 93-07	Packer replacements	18.2		10-11 12-11 10-12

\$ 2744.1 m

1984 - 88

447.1

1517.4

Total

1984-94

\$ 4261.5 m

TABLE 3

REVENUE, COSTS AND ROYALTY DATA

Year	Total Revenue (\$)	Total Operating Cost (\$)	Chevron's Share Crown Royalties Paid		Chevron's Share Freehold Royalties Paid		Freehold Total Unit (m3)	Prod'n Tax Chevron's Share (\$)
			(m3)	(\$)	(m3)	(\$)		
1984	4,935,000	966,900	1875.8	352,772	1721.5	323,388	1869	278,573
1985	6,104,000	955,900	2172.4	448,786	1922.2	399,971	2105	386,645
1986	3,650,000	802,000	2191.4	267,367	1956.8	238,515	2156	215,064
1987	4,397,000	943,000	2271.8	318,855	2034.9	285,369	2217	294,844
1988	3,242,000	863,000	2294.3	239,265	2054.7	217,584	2235	212,451
1989	3,714,000	865,000	2470.0	287,676	2243.8	261,324	2273	229,000
1990	4,658,000	754,000	2491.1	359,464	2262.9	326,536	2301	288,000
1991	4,064,000	907,000	2458.3	309,684	2233.1	281,316	2300	243,000
1992	4,165,000	772,000	2220.6	289,243	2260.0	293,778	2420	228,412
1993	3,788,000	731,000	2186.0	268,399	2186.7	268,578	2312	211,399

TABLE 4

**CALCULATED CROWN ROYALTY AND
PRODUCTION TAX SAVINGS TO WIO's**

Year	Expansion Case Prod'n (E3 m3)	Old Oil Treatment		New Oil Treatment				Savings for Unit		
		Crown Royalty (m3)	Prod Tax (m3)	% New Oil	Crown Royalty (m3)	Prod Tax (m3)	Crown Royalty (m3)	\$	Prod Tax (m3)	\$
1984	26.220	1895.2	1653.5	1.1	1877.4	1624.3	17.8	3350	29.2	5490
1985	29.531	2358.9	2207.4	7.3	2221.6	1984.7	137.3	28454	222.7	46167
1986	30.247	2464.1	2335.0	10.4	2262.7	2010.7	201.4	24565	324.4	39559
1987	31.097	2589.9	2487.1	13.7	2315.3	2044.3	274.6	38523	442.8	62126
1988	31.354	2628.2	2533.5	15.2	2320.1	2037.2	308.2	32370	496.2	52127
1989	31.889	2708.6	2630.8	17.5	2348.3	2049.4	360.3	41963	581.4	67713
1990	32.280	2767.9	2702.6	19.3	2365.0	2052.1	402.8	58124	650.5	93867
1991	32.261	2681.2	2597.8	18.7	2301.8	1985.7	379.5	47807	612.1	77108
1992	33.949	2577.4	2471.9	17.7	2229.3	1911.9	348.1	45340	560.0	72940
1993	32.429	2576.1	2470.3	18.5	2213.4	1888.3	362.7	44540	582.0	71470
1994	31.946	2587.2	2483.9	19.5	2204.6	1869.8	382.6		614.0	
1995	31.470	2582.6	2478.3	20.2	2187.4	1843.5	395.2		634.8	
1996	31.001	2558.0	2448.3	20.6	2159.3	1808.4	398.7		639.9	
1997	30.539	2507.3	2387.0	20.5	2117.3	1760.9	390.0		626.1	
1998	30.084	2440.2	2305.3	20.1	2066.5	1703.9	373.7		601.5	
1999	29.636	2374.5	2226.0	19.7	2016.7	1650.1	357.8		575.9	
2000	29.194	2309.9	2148.4	19.3	1967.8	1595.5	342.2		552.8	
2001	28.759	2246.9	2072.2	18.8	1919.9	1543.8	327.0		528.4	
2002	28.330	2185.7	1999.1	18.4	1873.2	1494.7	312.5		504.4	
2003	27.908	2126.3	1928.2	18.0	1827.7	1446.1	298.7		482.1	
2004	27.492	2068.4	1859.3	17.6	1783.1	1398.6	285.3		460.7	
2005	27.082	2012.2	1792.2	17.2	1739.8	1352.3	272.4		439.9	
2006	26.678	1957.2	1726.7	16.8	1697.2	1306.9	259.9		419.8	
2007	26.280	1903.4	1663.1	16.4	1655.6	1263.0	247.8		400.1	
2008	25.888	1850.8	1600.7	15.9	1614.7	1219.0	236.1		381.7	
2009	25.502	1799.4	1541.2	15.5	1574.7	1174.8	224.7		366.5	
2010	25.122	1749.1	1483.6	15.1	1535.5	1131.9	213.6		351.7	
2011	24.748	1700.0	1427.7	14.7	1497.2	1093.2	202.8		334.5	
2012	24.379	1652.1	1373.4	14.2	1459.8	1055.9	192.2		317.5	
2013	24.016	1605.7	1320.8	13.8	1423.7	1020.6	182.0		300.2	
2014	23.658	1560.4	1268.9	13.4	1388.4	986.2	172.0		282.7	
2015	23.305	1516.0	1219.0	12.9	1353.7	953.3	162.4		265.6	
2016	22.958	1472.8	1171.6	12.5	1319.8	920.0	153.0		251.6	
2017	22.616	1430.5	1125.6	12.1	1286.6	887.0	143.9		238.6	
2018	22.279	1389.2	1080.9	11.6	1254.1	855.9	135.1		225.0	
2019	21.947	1348.8	1037.7	11.2	1222.3	826.5	126.5		211.2	
2020	21.620	1309.3	995.2	10.7	1191.1	799.4	118.2		195.8	
2021	21.298	1270.7	952.8	10.3	1160.6	772.0	110.1		180.8	
2022	20.981	1233.5	912.7	9.8	1131.0	746.4	102.5		166.3	
2023	20.668	1197.8	875.0	9.4	1102.4	720.3	95.4		154.7	
2024	20.360	1163.2	838.5	8.9	1074.8	694.9	88.4		143.6	
2025	20.057	1129.5	802.4	8.5	1047.7	668.2	81.7		134.1	
2026	19.758	1096.5	768.4	8.0	1021.3	645.1	75.2		123.3	
2027	19.464	1064.5	735.7	7.5	995.5	621.9	68.9		113.8	
2028	19.174	1033.2	703.9	7.1	970.3	599.8	62.9		104.1	
2029	18.888	1002.7	672.9	6.6	945.6	577.9	57.1		95.0	
2030	18.607	973.3	642.7	6.1	921.7	557.7	51.5		85.0	
2031	18.330	945.0	612.1	5.7	898.6	538.0	46.4		74.1	
2032	18.057	917.5	583.8	5.2	876.0	519.3	41.5		64.4	
2033	17.788	890.7	557.5	4.7	853.9	500.4	36.8		57.1	
2034	17.523	864.6	532.1	4.3	832.4	482.7	32.2		49.4	
2035	17.262	839.2	507.6	3.8	811.3	464.3	27.9		43.3	
Total	1313.909	93113.3	80952.2		82435.9	63658.9	10677.4		17293.3	

- Expansion case production declined at 1.5%
- New oil royalty and production tax calculated above a 1.0% base decline

TABLE 5

**CALCULATED ADDITIONAL CROWN ROYALTY
AND PRODUCTION TAX PAID TO MANITOBA GOVERNMENT**

Year	Expansion Case				Base Case				Incremental			
	Prod'n (E3 m3)	% New	Crown Royalty (m3)	Prod'n Tax (m3)	Prod'n (m3)	% New	Crown Royalty (m3)	Prod'n Tax (m3)	Crown Royalty (m3)	\$	Prod'n Tax (m3)	\$
1984	26.220	1.1	1877.4	1624.3	25.924	0	1855.5	1606.2	21.9	4113	18.1	3400
1985	29.531	7.3	2221.6	1984.7	27.387	0	2053.8	1841.9	167.8	34779	142.8	29594
1986	30.247	10.4	2262.7	2010.7	27.114	0	2016.5	1797.5	246.2	30025	213.2	26000
1987	31.097	13.7	2315.3	2044.3	26.845	0	1979.7	1753.5	335.6	47084	290.8	40800
1988	31.354	15.2	2320.1	2037.2	26.578	0	1943.5	1710.5	378.6	39564	326.8	34325
1989	31.889	17.5	2348.3	2049.4	26.313	0	1907.9	1668.4	440.4	51292	381.1	44385
1990	32.280	19.3	2365.0	2052.1	26.051	0	1872.7	1627.0	492.4	71053	425.1	61342
1991	32.261	18.7	2301.8	1985.7	25.792	0	1838.0	1585.8	463.8	58426	399.9	50377
1992	33.949	17.7	2229.3	1911.9	25.535	0	1803.8	1546.3	425.5	55421	365.6	47619
1993	32.429	18.5	2213.4	1888.3	25.281	0	1770.1	1507.6	443.3	54437	380.7	46750
1994	31.946	19.5	2204.6	1869.8	25.030	0	1737.0	1469.7	467.6		400.1	
1995	31.470	20.2	2187.4	1843.5	24.781	0	1704.3	1432.6	483.1		410.9	
1996	31.001	20.6	2159.3	1808.4	24.534	0	1672.0	1396.1	487.3		412.3	
1997	30.539	20.5	2117.3	1760.9	24.290	0	1640.7	1360.4	476.7		400.4	
1998	30.084	20.1	2066.5	1703.9	24.048	0	1609.8	1325.4	456.7		378.5	
1999	29.636	19.7	2016.7	1650.1	23.809	0	1579.5	1291.2	437.3		358.9	
2000	29.194	19.3	1967.8	1595.5	23.572	0	1549.6	1256.8	418.2		338.7	
2001	28.759	18.8	1919.9	1543.8	23.338	0	1520.2	1223.5	399.7		320.3	
2002	28.330	18.4	1873.2	1494.7	23.106	0	1491.2	1191.7	382.0		303.0	
2003	27.908	18.0	1827.7	1446.1	22.876	0	1462.6	1160.5	365.0		285.6	
2004	27.492	17.6	1783.1	1398.6	22.648	0	1434.5	1129.8	348.7		268.8	
2005	27.082	17.2	1739.8	1352.3	22.423	0	1406.8	1099.9	333.0		252.4	
2006	26.678	16.8	1697.2	1306.9	22.200	0	1379.5	1070.6	317.7		236.3	
2007	26.280	16.4	1655.6	1263.0	21.979	0	1352.7	1041.9	302.9		221.1	
2008	25.888	15.9	1614.7	1219.0	21.760	0	1326.2	1013.3	288.6		205.7	
2009	25.502	15.5	1574.7	1174.8	21.543	0	1300.0	984.5	274.6		190.3	
2010	25.122	15.1	1535.5	1131.9	21.329	0	1274.4	956.6	261.1		175.2	
2011	24.748	14.7	1497.2	1093.2	21.117	0	1249.4	930.3	247.8		162.9	
2012	24.379	14.2	1459.8	1055.9	20.907	0	1224.9	903.7	234.9		152.2	
2013	24.016	13.8	1423.7	1020.6	20.699	0	1201.3	878.7	222.4		141.9	
2014	23.658	13.4	1388.4	986.2	20.493	0	1178.1	854.2	210.3		132.0	
2015	23.305	12.9	1353.7	953.3	20.289	0	1155.2	830.2	198.4		123.2	
2016	22.958	12.5	1319.8	920.0	20.087	0	1132.8	806.7	187.0		113.3	
2017	22.616	12.1	1286.6	887.0	19.887	0	1110.7	783.0	175.9		104.0	
2018	22.279	11.6	1254.1	855.9	19.689	0	1089.0	760.7	165.1		95.2	
2019	21.947	11.2	1222.3	826.5	19.493	0	1067.6	738.9	154.6		87.7	
2020	21.620	10.7	1191.1	799.4	19.299	0	1046.6	717.5	144.4		81.8	
2021	21.298	10.3	1160.6	772.0	19.107	0	1026.0	696.6	134.6		75.4	
2022	20.981	9.8	1131.0	746.4	18.917	0	1005.8	676.1	125.3		70.3	
2023	20.668	9.4	1102.4	720.3	18.729	0	985.8	655.8	116.6		64.5	
2024	20.360	8.9	1074.8	694.9	18.543	0	966.7	636.0	108.1		58.9	
2025	20.057	8.5	1047.7	668.2	18.358	0	947.8	614.9	99.9		53.3	
2026	19.758	8.0	1021.3	645.1	18.176	0	929.4	596.5	91.9		48.7	
2027	19.464	7.5	995.5	621.9	17.995	0	911.3	577.7	84.3		44.2	
2028	19.174	7.1	970.3	599.8	17.816	0	893.4	560.2	76.9		39.6	
2029	18.888	6.6	945.6	577.9	17.638	0	875.9	543.1	69.7		34.9	
2030	18.607	6.1	921.7	557.7	17.463	0	858.7	526.4	63.0		31.3	
2031	18.330	5.7	898.6	538.0	17.289	0	841.8	510.1	56.7		27.9	
2032	18.057	5.2	876.0	519.3	17.117	0	825.2	494.2	50.7		25.1	
2033	17.788	4.7	853.9	500.4	16.947	0	809.0	478.7	44.9		21.7	
2034	17.523	4.3	832.4	482.7	16.778	0	793.0	463.5	39.4		19.2	
2035	17.262	3.8	811.3	464.3	16.611	0	777.3	448.7	34.1		15.6	
Total	1313.909		82435.9	63658.9	1125.531		69385.2	53732.0	13050.7		9926.9	

– New oil royalty and tax calculated above a 1.0% base decline

TABLE 6

CALCULATED ADDITIONAL FREEHOLD ROYALTY PAID

Year	Expansion Case			Base Case			Incremental	
	Prod'n (E3 m3)	% New	Freehold Royalty (m3)	Prod'n (E3 m3)	% New	Freehold Royalty (m3)	Freehold Royalty (m3)	\$
1984	26.220	1.1	1869.2	25.924	0	1848.1	21.1	3966
1985	29.531	7.3	2105.3	27.387	0	1952.4	152.8	31683
1986	30.247	10.4	2156.3	27.114	0	1933.0	223.4	27238
1987	31.097	13.7	2216.9	26.845	0	1913.8	303.1	42528
1988	31.354	15.2	2235.2	26.578	0	1894.7	340.5	35767
1989	31.889	17.5	2273.3	26.313	0	1875.8	397.5	46295
1990	32.280	19.3	2301.2	26.051	0	1857.1	444.0	64069
1991	32.261	18.7	2299.8	25.792	0	1838.7	461.2	58099
1992	33.949	17.7	2420.1	25.535	0	1820.3	599.8	78124
1993	32.429	18.5	2311.8	25.281	0	1802.2	509.5	62567
1994	31.946	19.5	2277.4	25.030	0	1784.3	493.0	
1995	31.470	20.2	2243.4	24.781	0	1766.6	476.8	
1996	31.001	20.6	2210.0	24.534	0	1749.0	461.0	
1997	30.539	20.5	2177.0	24.290	0	1731.6	445.5	
1998	30.084	20.1	2144.6	24.048	0	1714.3	430.3	
1999	29.636	19.7	2112.7	23.809	0	1697.3	415.4	
2000	29.194	19.3	2081.2	23.572	0	1680.4	400.8	
2001	28.759	18.8	2050.2	23.338	0	1663.7	386.4	
2002	28.330	18.4	2019.6	23.106	0	1647.2	372.4	
2003	27.908	18.0	1989.5	22.876	0	1630.8	358.7	
2004	27.492	17.6	1959.8	22.648	0	1614.5	345.3	
2005	27.082	17.2	1930.6	22.423	0	1598.5	332.1	
2006	26.678	16.8	1901.8	22.200	0	1582.6	319.2	
2007	26.280	16.4	1873.4	21.979	0	1566.8	306.6	
2008	25.888	15.9	1845.5	21.760	0	1551.2	294.3	
2009	25.502	15.5	1818.0	21.543	0	1535.7	282.2	
2010	25.122	15.1	1790.9	21.329	0	1520.5	270.4	
2011	24.748	14.7	1764.2	21.117	0	1505.4	258.8	
2012	24.379	14.2	1737.9	20.907	0	1490.4	247.5	
2013	24.016	13.8	1712.0	20.699	0	1475.6	236.5	
2014	23.658	13.4	1686.5	20.493	0	1460.9	225.6	
2015	23.305	12.9	1661.4	20.289	0	1446.4	215.0	
2016	22.958	12.5	1636.6	20.087	0	1432.0	204.7	
2017	22.616	12.1	1612.2	19.887	0	1417.7	194.5	
2018	22.279	11.6	1588.2	19.689	0	1403.6	184.6	
2019	21.947	11.2	1564.5	19.493	0	1389.6	174.9	
2020	21.620	10.7	1541.2	19.299	0	1375.8	165.5	
2021	21.298	10.3	1518.3	19.107	0	1362.1	156.2	
2022	20.981	9.8	1495.7	18.917	0	1348.5	147.1	
2023	20.668	9.4	1473.4	18.729	0	1335.1	138.2	
2024	20.360	8.9	1451.4	18.543	0	1321.9	129.5	
2025	20.057	8.5	1429.8	18.358	0	1308.7	121.1	
2026	19.758	8.0	1408.5	18.176	0	1295.7	112.8	
2027	19.464	7.5	1387.5	17.995	0	1282.8	104.7	
2028	19.174	7.1	1366.9	17.816	0	1270.1	96.8	
2029	18.888	6.6	1346.5	17.638	0	1257.4	89.1	
2030	18.607	6.1	1326.4	17.463	0	1244.9	81.6	
2031	18.330	5.7	1306.7	17.289	0	1232.5	74.2	
2032	18.057	5.2	1287.2	17.117	0	1220.2	67.0	
2033	17.788	4.7	1268.1	16.947	0	1208.1	60.0	
2034	17.523	4.3	1249.2	16.778	0	1196.1	53.1	
2035	17.262	3.8	1230.6	16.611	0	1184.2	46.4	
Total	1313.909		93665.5	1125.531		80236.5	13429.0	

TABLE 7

BENEFITS SUMMARY

WIO's	27970 m3
Government Benefits	22980 m3
Freeholder benefits	13430 m3

ULTIMATE REC. RESERVES ESTIMATES

- ① CHEVRON ASSUMES A PRODUCTION LIFE OF 41 YEARS (2035)
- ② BASE CASE 1% DECLINE (PET. BRANCH) - $1125.5 \times 10^3 \text{ m}^3$
(PROD 1984 - 2035)
- ③ CHEVRON EXPANSION CASE WITHOUT INFILL WELLS (2 1.5% decline)
(PROD 1984 - 2035) $1228.6 \times 10^3 \text{ m}^3$
- ④ Chevron Total incremental recoverable reserves due to water flood expansion
 $103,100 \text{ m}^3$
- ⑤ As Chevron has accelerated the production decline from 1.0%/year to 1.5%/year, the two forecasts cross in 2027 and the volume of new oil drops to zero
- ⑥ 6 INFILL WELLS IN SECTION 12 ARE ESTIMATED BY CHEVRON TO RECOVER 85328 m^3
($14220 \text{ m}^3/\text{well}$) by 2035
- ⑦ Pre-1984 cumulative production $1,040,725.9$

⑧ ESTIMATED OOIP $5558.6 \times 10^3 \text{ m}^3$

RECOVERY ESTIMATES

WITHOUT WF EXPANSION 38.9% OOIP

WITH WF EXPANSION (NO INFILL WELLS) 40.8% OOIP

WITH WF EXPANSION + INFILL WELLS 42.3% OOIP

INCREMENTAL RECOVERY

ASSOCIATED WITH WF EXPANSION (NO INFILLS) 1.9% OOIP

" " " (INCLUDING INFILLS) 3.4% OOIP

WATERFLOOD EXPANSION PROJECT - INCREMENTAL PRODUCTION

DATE	ACTUAL * PRODUCTION	HISTORICAL PROD DECLINE	INCREMENTAL PRODUCTION
1984-09 to 1989-05	-	-	16893.6
1989-06	2593.2	2163.7	429.5
1989-07 to 1989-12	16275.2	13231.9	3043.3
1990	32280.2	26051.4	6228.8
1991	31708.5 31921.1	25792.1	5916.4
1992	30983.3	25605.7	5377.6
1993	29866.5	25281.3	4585.2
1994-01 to 1994-04	9296.5	8256.6	1039.9
TOTAL			<u>43514.3</u>

* EXCLUDES INFILL WELL PRODUCTION = 7340

discussion for a new royalty & production tax purposes.

- new oil status definition / intent
- effect of paragraph of OGA Act
- deficiency in the regulation under the OGA Tax Act
- Crown investment in Unit & type of work
- incremental recoverable reserves above the ~~pre-determined~~ ¹⁹⁸⁴ historical production to date and predicted over the remaining life of the project
- additional revenues to the Crown & savings to unit owners.

- intent of new oil provisions
 - new oil status necessary for economically justifying exploration & production.

Extended for a term of five (5) years.
RECOMMENDED THAT incremental production resulting from the WF operations project be recognised as incremental reserves and new oil status be established for a term of 5 years from July 1, 1994 to June 30, 1999, on all production from July 1, 1994 to June 30, 1999, on all historical production.

The 5 year term of new oil status allows for future modification to the province royalty & production tax regime without having to accommodate special situations such as this + maintaining a fair & equitable system.

Background

• Sep/84 Board approved WF modifications & expansion in Dally #3

- new oil status approved on an interim basis for oil production above historical prod. dec.

- Board concern @ time acceleration vs. incremental acc. res.

- performance measures

① wh. inj. rate \uparrow 200 m³/d currently 1994 (4 Lm) 184 m³/d

1993 wh. inj. rate	250 m ³ /d	1993	742
1992	461 m ³ /d	1987	682
1991	405 m ³ /d	1986	646
1990	469	1985	
1989	650 m ³ /d		

② Reservoir Pressure

③ Production Response

- production began to decline in 1991

④ what happened over the past 5 years. in Dally Unit No. 3.

- plot infill production

- infill project (6 wells) uneconomic → compare with expected results.

- additional conversion @ 15-13-10-28, if producers in SW 1/4 of Sec 24 acquired

- potential conversion 13-1-10-28

- note: frequency & type of service work = 1992 & 1993

- holiday Oil Volume

TRAP 10-28	Hov	Production To 94-04-30
5a-12	1359.4	546.2
5b-12	1359.4	845.9
12a-12	1266.6	3137.0 ✓
12b-12	1319.6	254.8
13b-12	1319.6	1257.3
14b-12	1319.6	1298.8

- plots
- ① Total unit daily oil vs time ✓
 - ② (Total unit - infill wells) daily oil vs time ✓
 - ③ Infill well only
 - ④ Base Case 1.0% decline ✓

1993 Progress Report - Only unit No. 3

- year to year production decline - unit total 4.3 %
- with inj. volume down to 252 - 3/d vs. 461 - 3/d
in 1992
- VRR = 0.87 1993
- Clever working on improving prod/inj. balance
for individual patterns with a target VRR=1.0
- Commencing in Mar/93 significant drop in inj. vol.
and inj. press. VRR (Mar-Dec) = 0.72

Daily Unit No. 3 (No Infill Wells)

07/12/94 14:15

Date 5201-9309

Operator :
Field :
Zone/Pool:

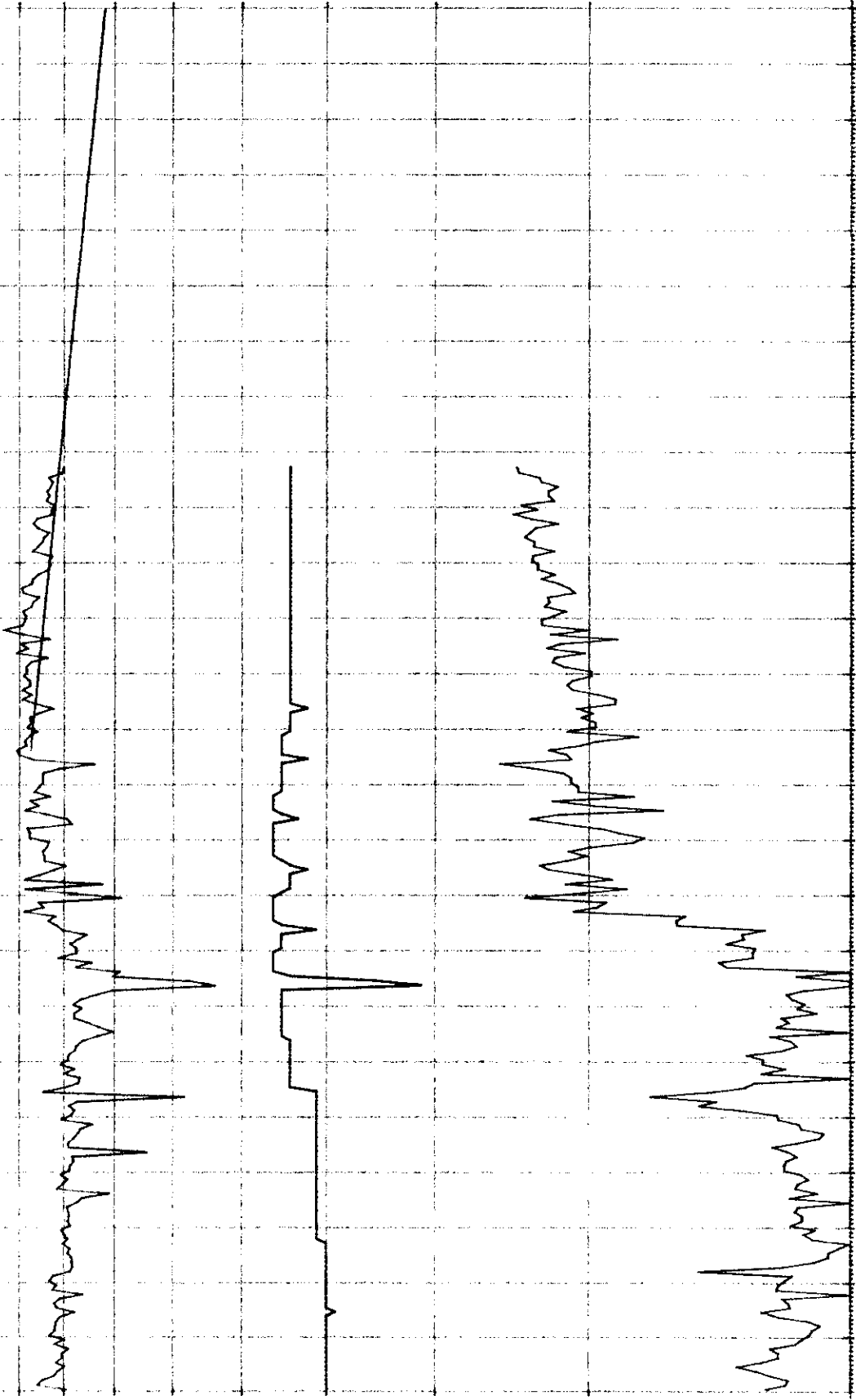
Fcst#1 RR: 652408 dl: 1.46
Fcst#2 RR: 0 dl: 0.00
Fcst#3 RR: 0 dl: 0.00
Fcst#4 RR: 0 dl: 0.00

Type :

Cum Oil m3 1607458
Cum Gas E3m3 0
Cum Water m3 1661238

0001
0001
0001

001
001



001
001

001
001

Forecast #2 m3/d
Forecast #1 m3/d
Cal Day Oil m3/d

WOR
Num Wells m3/m3

Daily Unit No. 3

07/06/94 10:50

Date 5201-9309

Operator :

Field :

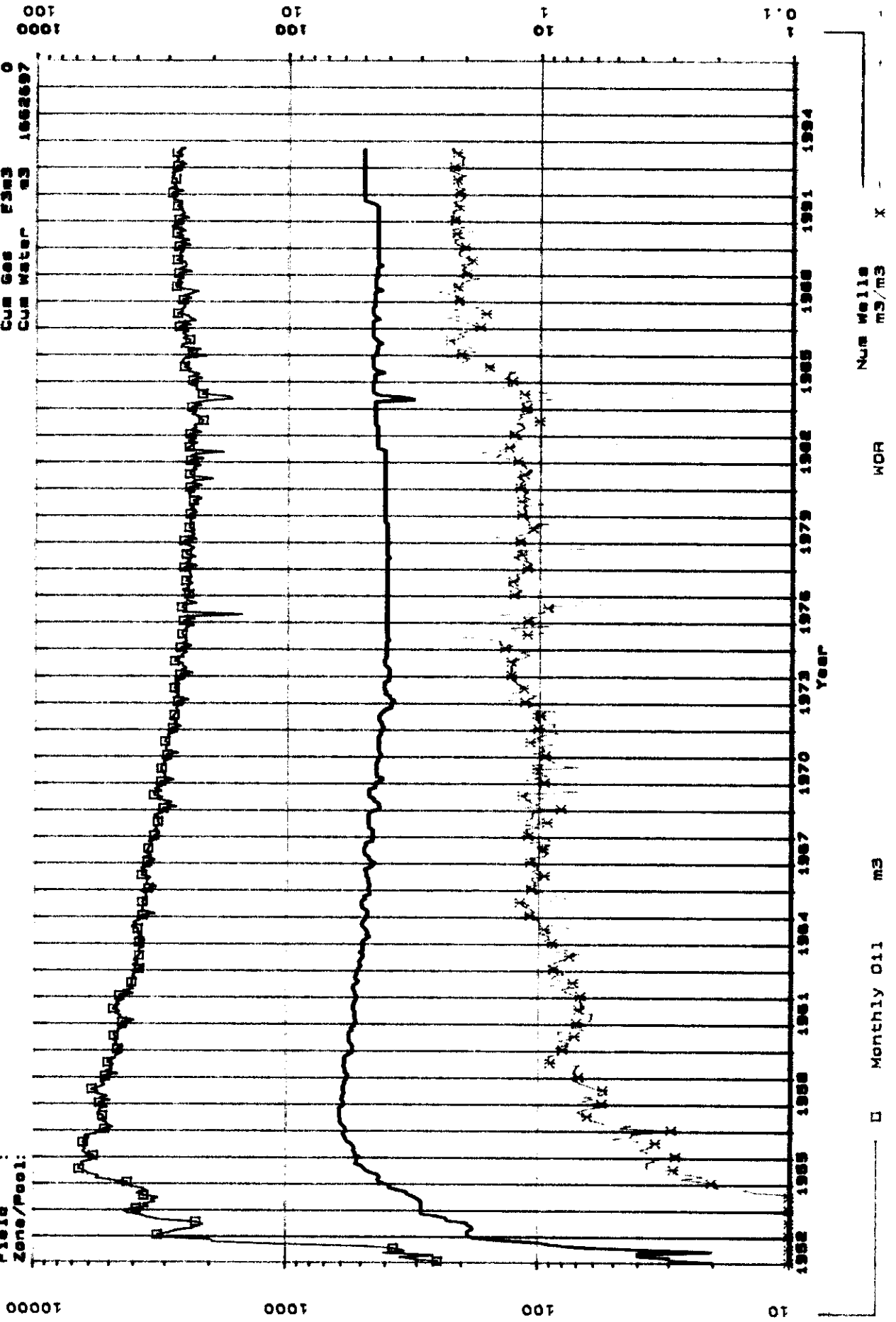
Zone/Pool:

Type :

Cum Oil m3 1613427

Cum Gas F3m3 0

Cum Water m3 1662697



Daly Unit No. 3 - Infill wells

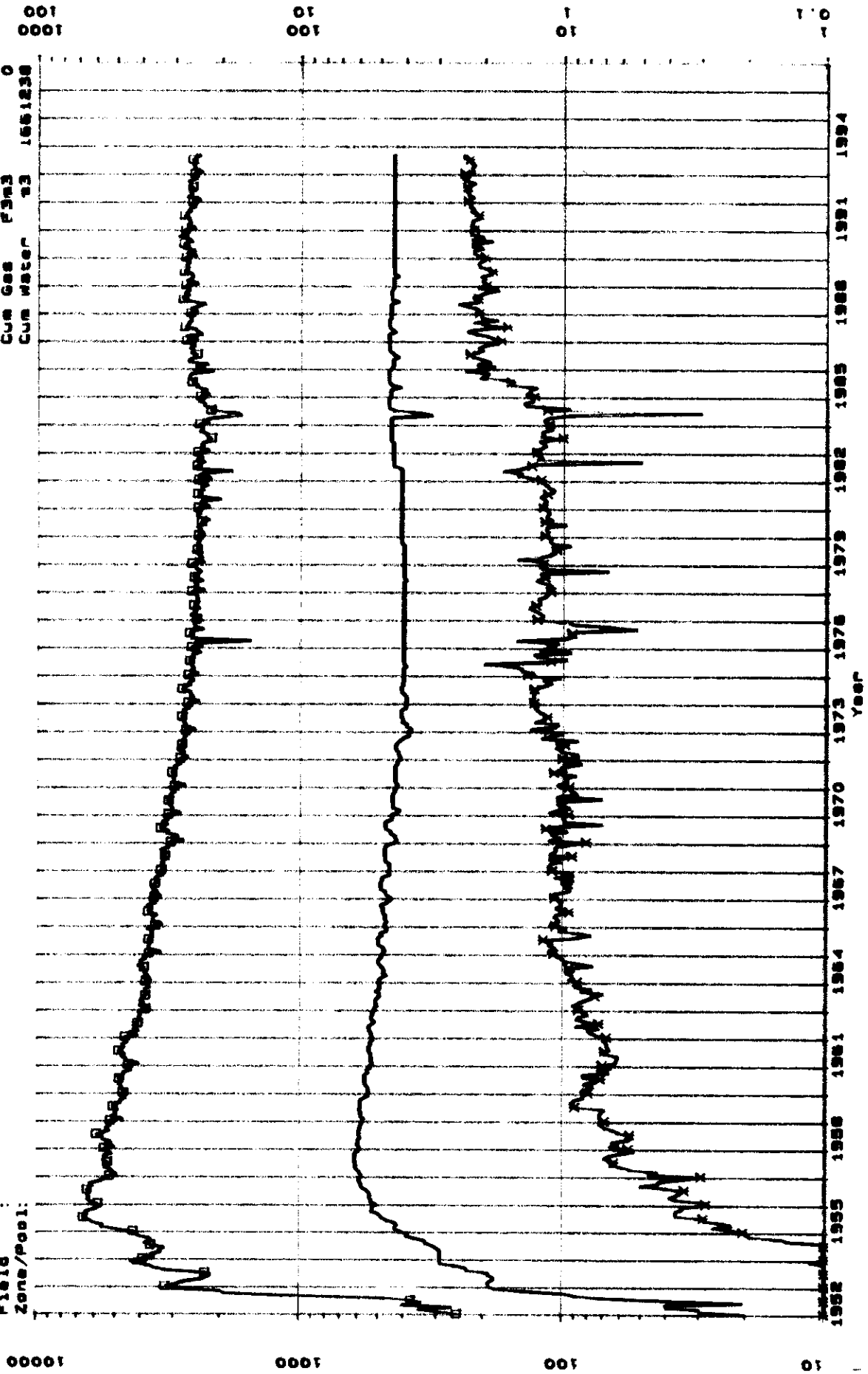
07/06/94 11:09

Date 5201-2309

Operator :
Field :
Zone/Pool:

Type :

Cum Oil m3 1607498
Cum Gas m3 0
Cum Water m3 1661238



Daly Unit #3 Infill Area-16 ha Prod

1-11, 9-11

07/12/94 13:36

3-12, 5-12, 11-12, 13-12

Type :

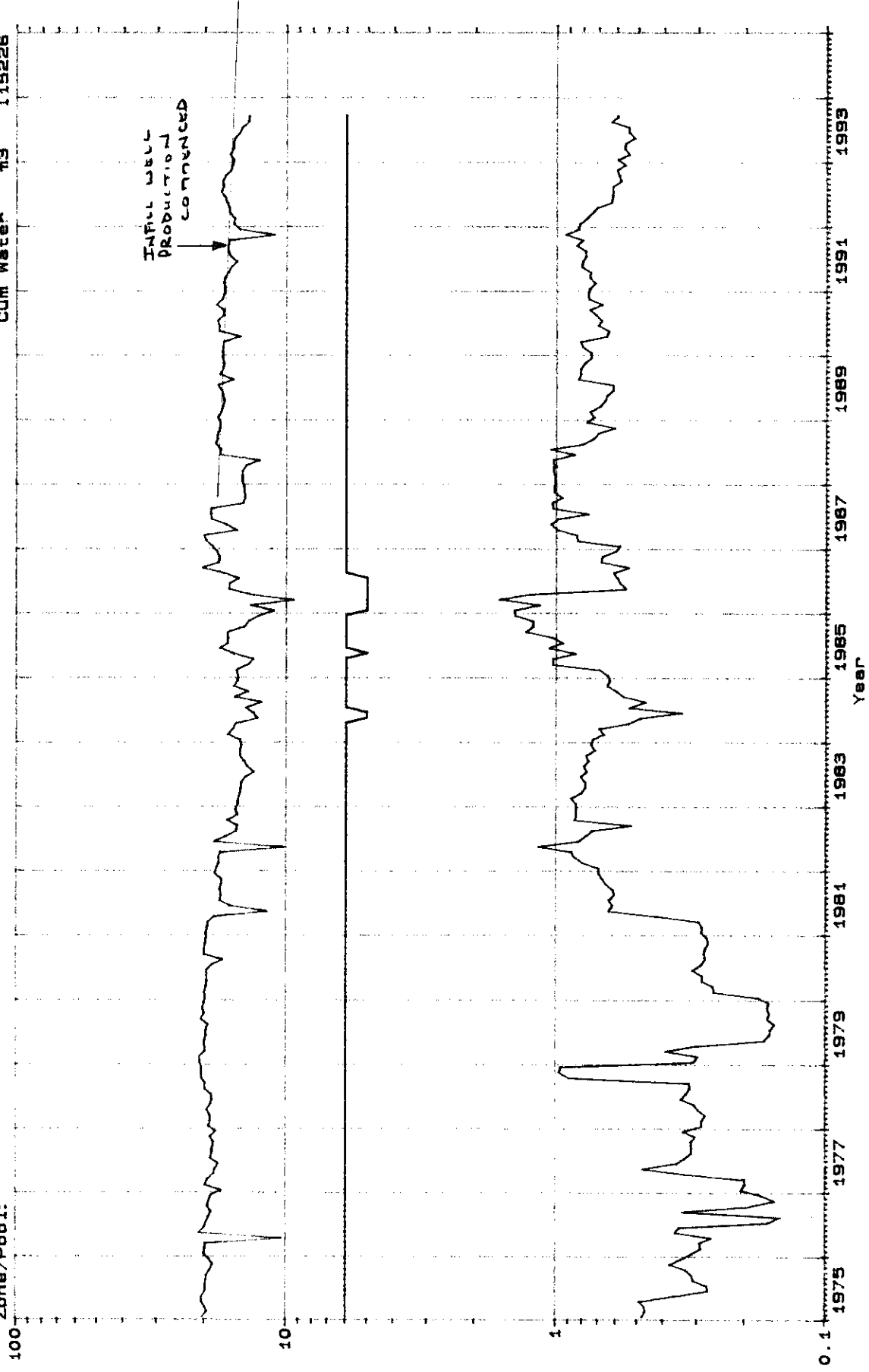
Data 5207-9309

Operator :

Field :

Zone/Pool:

Cum Oil m3 387139
Cum Gas F3m3 0
Cum Water m3 115226

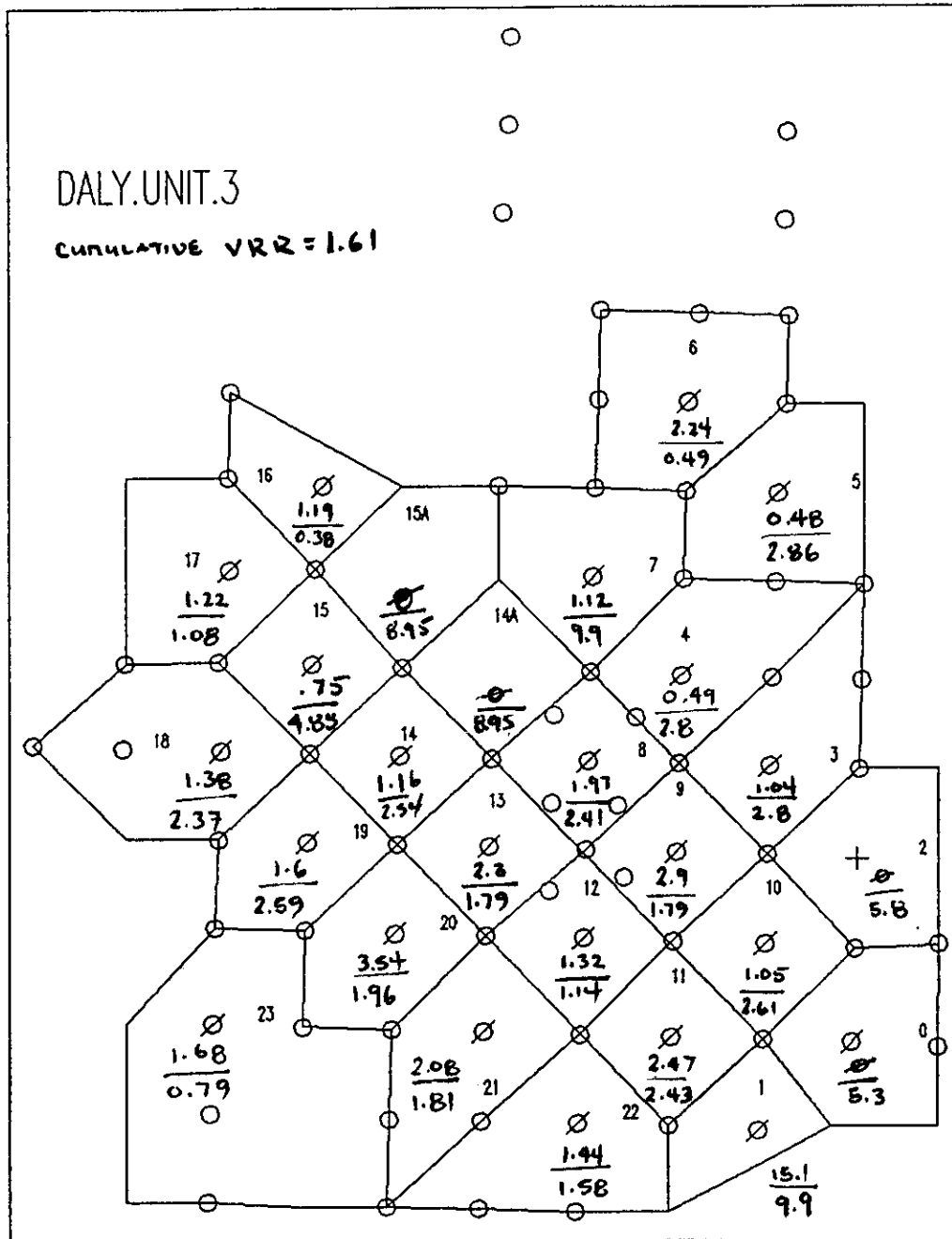


Cal Day Oil m3/d

WOR

Num Wells m3/m3

Figure 2



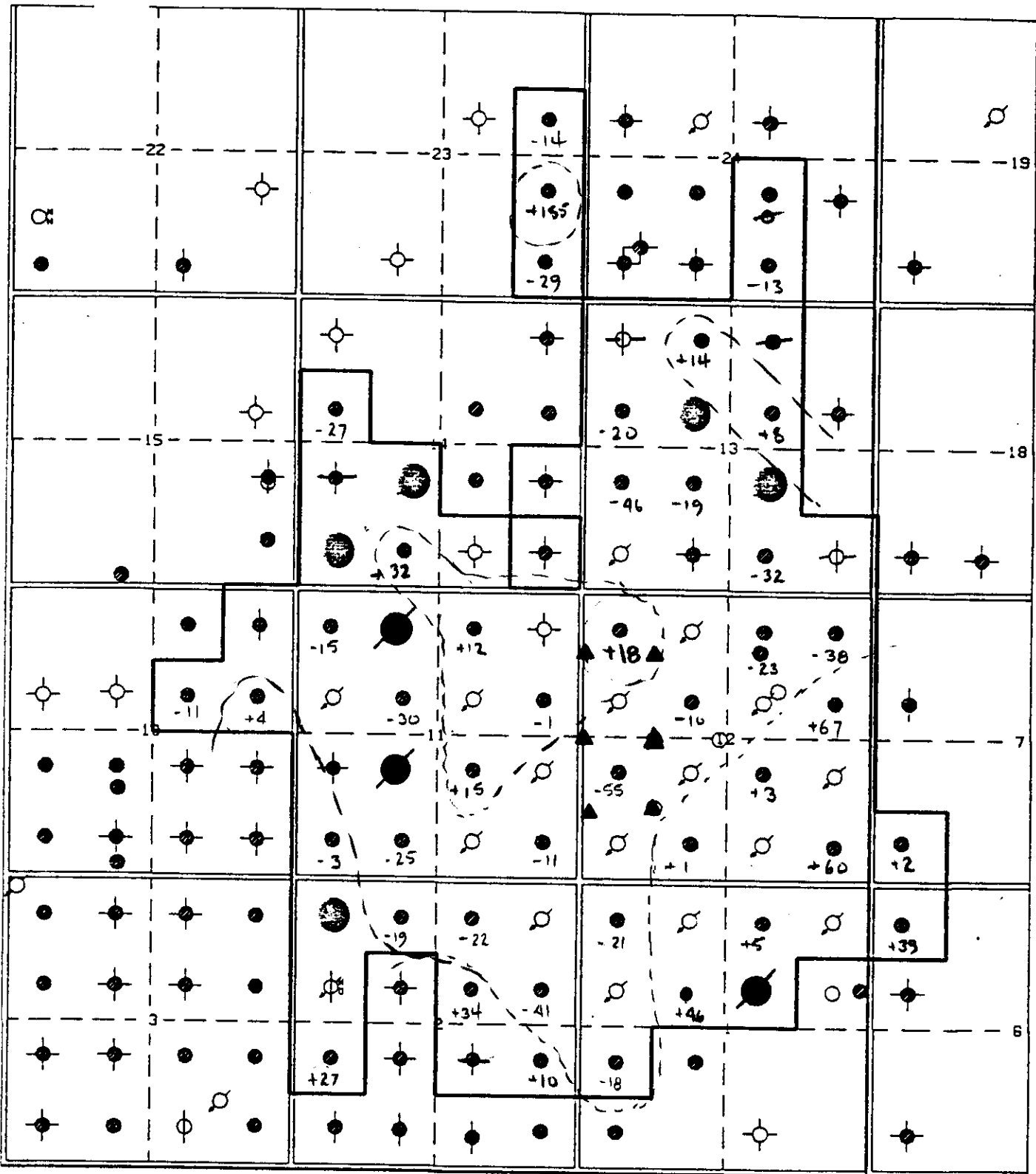
○ Oil Producer ∅ Water Injector + Plugged & Abandoned

BLM Mon Mar 21 20:02:31 1994

$$\frac{1.12}{9.9} = \frac{\text{VRR - Dec/93}}{\text{cumulative VRR}}$$

R.28W1M

R.27W1M



T.10

- PROJECT CONVERSION
- PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE 1
1991
▲ INFILL WELLS

LEGEND

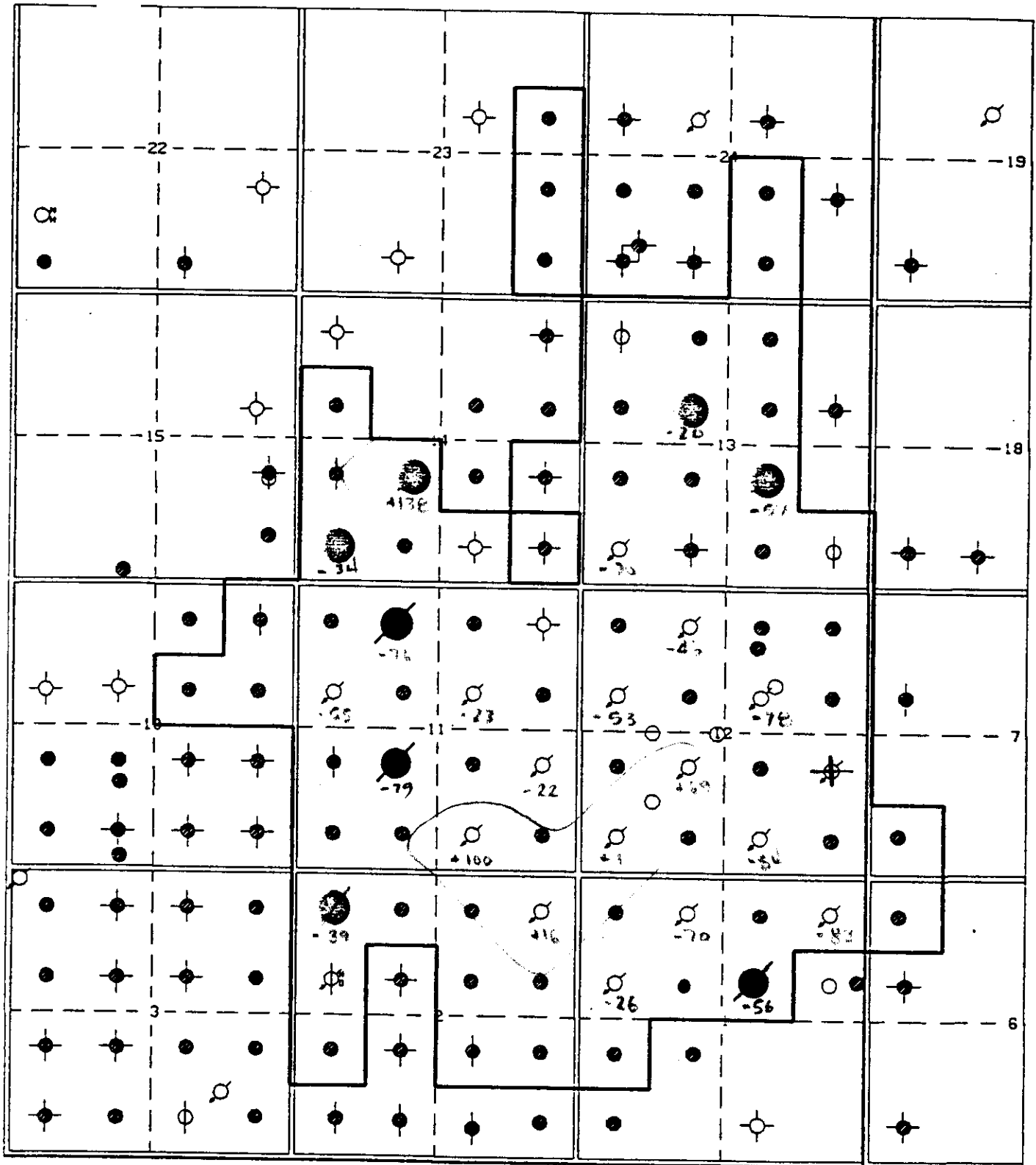
- OILWELL
- SUSPENDED OILWELL
- INJECTION WELL
- ABANDONED OILWELL
- UNIT OUTLINE

PRODUCTION INCREASED
BETWEEN 1989 & 1994

(DATUM DEPTH = -237.7 m SS)

R.28W1M

R.27W1M



T.10

- PROJECT CONVERSION
- PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE 1

-39 - % DECREASE IN INJECTION

LEGEND

- OILWELL
- SUSPENDED OILWELL
- INJECTION WELL
- ABANDONED OILWELL
- UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

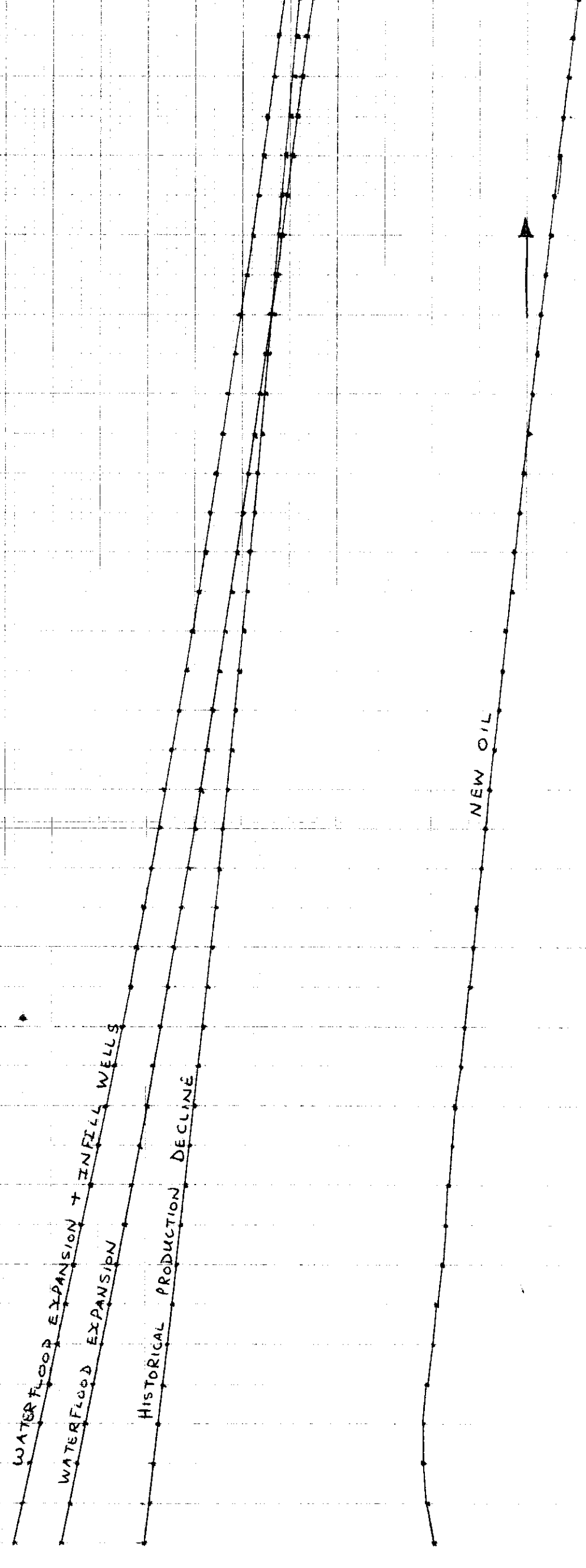
DAILY UNIT NO. 3 - PRODUCTION FORECAST

119

40
35
30
25
20
15
10
5

ANNUAL PRODUCTION
(10³m³)

47 0000
20 YEARS 07 MONTHS
K 110 DIVISION
KEURTEL & ESSER CO.



NEW OIL
AS % OF UN
PRODUCT

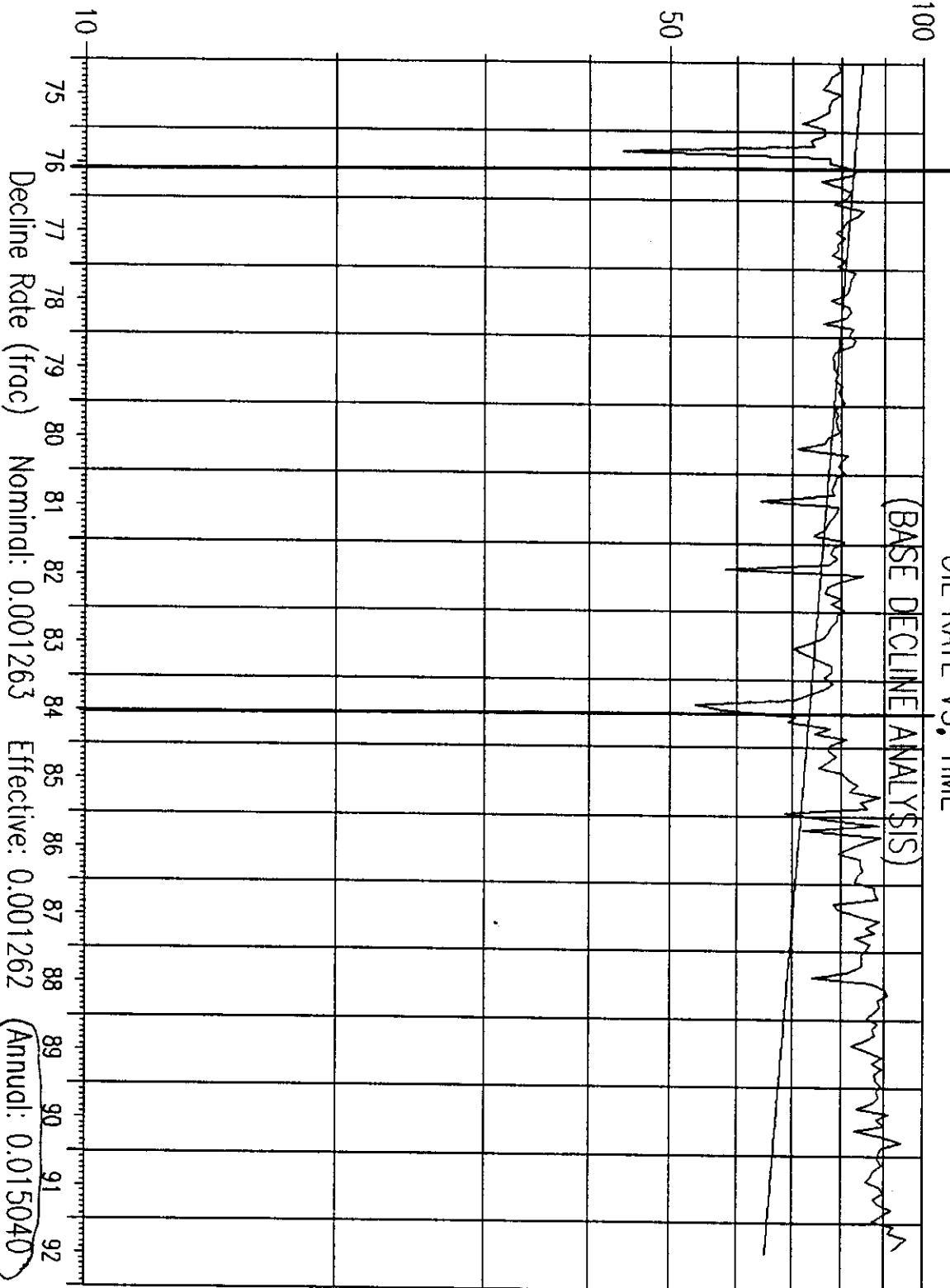
94 96 98 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026 2028 2030 2032

YEAR

Oil Rate (Calendar Day) (m3)

DAILY UNIT # 3
OIL RATE VS. TIME

Decline between
76-07 to 84-06



Decline Rate (frac) Nominal: 0.001263 Effective: 0.001262

Current Oil rate: 92.1 m3/d

Economic Limit: 0.9 m3/d

Cumulative Oil Produced: 1415.9 E3m3

Remaining Reserves: 2196.9 E3m3

Total Reserves: 3612.7 E3m3 - At the Economic Limit

Annual: 0.015040

Decline = 1.5 %/year

between 76-07 to 84-06



Memorandum

Date July 13, 1989

To The Oil and Natural Gas
Conservation Board

From John N. Fox
Chief Petroleum Engineer
Petroleum Branch

Ian Haugh - Chairman
H. Clare Moster - Deputy Chairman

Subject Wm. McDonald - Member

Telephone

Re: Daly Unit No. 3 - Extension of New Oil Status

Chevron Canada Resources, as operator of Daly Unit No. 3 applied May 4, 1989 for continuation of new oil status on incremental production resulting from their 1984 waterflood expansion project. Chevron also requested revision of the historical production decline rate used by the Petroleum Branch to determine incremental production, from 1% to 1.5% per year.

RECOMMENDATIONS

It is recommended that:

- (1) Incremental production resulting from the waterflood expansion project, be recognized by the Board as incremental reserves.
- (2) New oil status be continued for a term of 5 years, from July 1, 1989 to June 30, 1994 on all production from Daly Unit No. 3 exceeding the historical production decline. Chevron would be required to apply for an extension of new oil status beyond June 30, 1994. A copy of the proposed Board approval is attached.
- (3) The historical production decline of 1.0% continue to be used to determine incremental production.

BACKGROUND

In September, 1984 the Board approved Chevron's application to modify and expand waterflood operations in Daly Unit No. 3. The waterflood expansion project involved the conversion of 5 wells to water injectors, reactivation of 3 suspended injectors and an increase in the wellhead injection pressure (Figure 1).

Chevron also applied to have the incremental production resulting from the waterflood expansion project classified as new oil for Crown royalty and freehold production tax purposes. New oil status was approved on an interim basis for all oil produced from Daly Unit No. 3 in excess of the unit's historical production performance.

The reason for interim approval of new oil status was concerns that the waterflood expansion project would only accelerate depletion of the existing recoverable reserves and not increase the ultimate recovery from the Unit.

It is, and has been, the intent of the Petroleum Crown Royalty and Incentives Regulation and the Oil and Gas Production Tax Regulation and their predecessors, that only production associated with an increase in recoverable reserves qualifies for new oil status.

Prior to the project commencing in 1984 and again when it was reviewed in 1987 it was difficult to determine whether the incremental production resulting from the waterflood expansion project was primarily due to accelerated depletion or the recovery of incremental reserves and therefore, whether such incremental production should be granted new oil status.

In accordance with the approval extending new oil status to June 30, 1989, Chevron submitted a technical review of the project and requested extension of new oil status for incremental production. The company indicated that new oil status was necessary to economically justify ongoing waterflood optimization and remedial work.

WATERFLOOD EXPANSION PROJECT PERFORMANCE

The performance of the waterflood expansion project was evaluated in detail by Chevron in their report submitted May 4, 1989 and the report has been reviewed by the Petroleum Branch.

As a result of the waterflood expansion project water injection into Daly Unit No. 3 has increased from 200 m³ WIPD to 700 m³ WIPD. Of the 500 m³ WIPD increase, approximately 250 m³ WIPD represents the injectivity increase at the 16 existing injectors, as a result of the increase in wellhead injection pressure from 7500 kPa to 8500 kPa. The remaining 250 m³ WIPD has been injected into the 5 converted and 3 reactivated injectors.

Increased injection has resulted in a 20% increase in reservoir pressure from a pre-project average reservoir pressure of 5900 kPa to 7000 kPa.

Daly Unit No. 3 production has increased as a result of the waterflood expansion project. Oil production has risen from 76.2 m³ in 1983-12 to 82.4 m³ OPD in 1989-05. Figure 2 is a plot of actual Unit production versus the historical production decline for the Unit. The plot clearly shows a favourable production response to the expansion project and no evidence of the beginning of a production decline. When compared with the historical production decline, incremental production in May, 1989 was 10.2 m³ OPD. The plot also shows that incremental production varies considerably on a monthly basis as a result of well recompletions, repairs and maintenance, pressure surveys and other factors. Since commencement of the expansion project in 1984-09 to 1985-05, incremental production above the historical production decline has totalled 16900 m³.

PRODUCTION RESPONSE

In order to try to determine what portion of the incremental production to date has been a result of accelerated depletion and what portion is the recovery of incremental reserves it is important to understand how the waterflood expansion project has affected oil production.

The areal sweep efficiency in a waterflood is a function of the location of the injection and production wells and the volume of water injected.

The 5 injector conversions resulted in previously unswept portions of the reservoir being affected by water injection and the recovery at offsetting producers, of oil displaced by the advance of the waterflood. The definition of new oil in the Petroleum Crown Royalty and Incentives Regulation and the Oil and Gas Production Tax Regulation was designed to recognize situations such as this, where incremental reserves are recovered as a result of expanded waterflood operations.

After water breakthrough at a producing well continued water injection increases the areal sweep of the waterflood and results in the recovery of oil from both the previously swept and unswept portions of the reservoir. Cumulative water injected into the 3 reactivated injectors since the start of the expansion project is 127,545 m³, 140% more water than was injected before the project commenced. Because areal sweep efficiency and oil recovery are a function of cumulative water injection (Figure 3), it can be concluded that the injector reactivations have resulted in the recovery of incremental reserves that would have remained unrecovered if the injectors had not been reactivated.

In a heterogeneous reservoir such as the Daly Lodgepole A Pool the waterflood will advance at different rates through the various zones in the reservoir, with the rate of advance being a function of the zonal permeability. For example when the higher permeability intervals have experienced water breakthrough, the lower permeability intervals may have received little or no injection support. By increasing the injection pressure there is evidence that the volumetric sweep efficiency in the Unit may be improved as more water is forced into the lower permeability zones resulting in an improvement in recovery from these zones.

Though the increase in injection pressure and corresponding increase in water injection rate from 200 m³ WIPD to 700 m³ WIPD, has primarily accelerated depletion of the existing waterflood recoverable reserves, there is evidence that it may also have resulted in the recovery of incremental reserves from the lower permeability zones.

Chevron in their report reviewed each producer and injector in Daly Unit No.3 to determine the effects of the waterflood expansion project on individual well performance. Chevron concluded that 21 of the Unit's 44 producing wells have experienced a production increase as a result of the expansion project. The total increase in production attributed to these wells is 18.6 m³ OPD.

Production increases in 8 of the 21 wells has been attributed by Chevron as response to injector conversions and reactivations and therefore represents the recovery of incremental reserves. The incremental production associated with these wells is 9.8 m³ OPD or 53% of the production increase. Chevron attributed the remaining production increase of 8.8 m³ OPD in the other 13 wells, to accelerated oil production. Figure 4 shows the wells considered by Chevron to have experienced a production increase and the cause of the increase.

In order to verify Chevron's finding a comparison of 1984 and 1988-89 individual well test production rates was performed. This analysis indicated 23 wells had experienced an increase in production, totalling 15.8 m³ OPD. Figure 5 is a plot of the percentage increase/decrease in production experienced by each well in the Unit from 1984 to 1989. Also shown in the plot is the area of the Unit determined to have exhibited favourable response to the expansion project. Both the total increase in production attribute to, and the area favourably affected by the expansion project support Chevron's interpretation of the production response.

Figure 6 shows the production response to the expansion project predicted by Chevron in their 1984 application, the actual production response and Chevron's revised forecast. Chevron anticipated a significant acceleration of production over the first 3 years of the project which failed to materialize. The main reason the production has failed to respond as anticipated is that much of the increased injection is migrating out of zone both above and below the reservoir and is not contacting and accelerating the depletion of existing recoverable reserves.

Figure 5 shows that the majority of the area exhibiting a favourable production response is surrounding the converted and reactivated injectors in Sections 10, 11 and 13. This coupled with the fact that the anticipated acceleration response failed to materialized supports the conclusion that the majority of incremental production is associated with the recovery of incremental reserves.

Chevron has also argued since their original application in 1970 to increase the wellhead injection pressure in the Unit, that if production from Daly Unit No. 3 is not accelerated, a significant portion of the recoverable reserves will not be recovered prior to the end of the field's life.

The majority of the wells in the Unit were drilled between 1952-56. Chevron feels the cost of well and equipment repairs and replacement will prematurely terminate the productive life of the field in 2035. The Petroleum Branch agrees that due to the extremely long remaining production life, accelerated production may in fact result in incremental recovery.

INCREMENTAL RESERVES

In the Petroleum Crown Royalty and Incentives Regulation and the Oil and Gas Production Tax Regulation the definition of new oil is as follows:

"new oil" means

- (a) oil obtained from or deemed to be obtained from, a new oil well, or
- (b) oil, obtained from a well not classified as a new oil well as a result of an enhanced recovery scheme conducted pursuant to an order made under The Mines Act and dated on or after January 1, 1979 and prior to January 1, 1987, consisting of that portion of the oil obtained which can be reasonably attributed to an increase in reserves which has been recognized by the board as resulting from an enhanced recovery scheme authorized by any previous order under The Mines Act and dated prior to January 1, 1979 and relating to the same pool or part thereof;

In accordance with the definition of new oil, any incremental reserves recognized by the Board as resulting from an approved waterflood expansion project would be classified as new oil. Therefore, the Board's decision on whether to recognize Chevron's project as a bonafide waterflood expansion project determines whether the incremental production attributed to the project may be classified as new oil.

The Board approved the waterflood expansion project in 1984-09. Production has responded favourably to the expansion project and there is enough evidence to indicate that incremental production can reasonably be attributed to the recovery of incremental reserves. Therefore it is recommended that new oil status be continued on all production from Daly Unit No. 3 exceeding the historical production decline.

It is also recommended that new oil status be approved for 5 years until June 30, 1994 at which time Chevron would be required to apply for a further extension of new oil status.

A limited 5 year extension of new oil status will allow future modifications to the province's royalty regime without the problem of having to accomodate special situations such as this.

The approval of new oil status should also be subject to the condition that the approval may be cancelled for an administratively simpler option in the event of infill drilling within the Unit or expansion of the Unit or the pressure maintenance operations.

HISTORICAL PRODUCTION DECLINE

In order to determine incremental production to which new oil status would apply it is necessary to define a historical production decline rate.

When new oil status was originally granted in 1984 the historical production decline rate used was an exponential decline of 1.0%/year. This decline rate was similar to but not identical to Chevron's proposed decline rate (Figure 7).

Chevron has requested the historical production decline rate be revised to an annual exponential decline of 1.5%/year based on their evaluation of the production trend from 1977-01 to 1984-06. A similar evaluation by the Petroleum Branch of the production trend from 1976-07, the date the Unit became effective to 1984-04 (production in 1984-05 & 06 was 25% lower than normal due to a number of well shut-ins) indicated an annual exponential decline rate of 1.2%. If three months where the production is anomalously high or low are excluded from the analysis the calculated exponential decline rate from 1976-07 to 1984-04 is 1.1%/year.

Chevron claims a historical production decline of 1.0% is too low and yields an unrealistic pre-project ultimate recovery for the Unit. In support of this conclusion the company compared the ultimate recoveries for a 1.0% and 1.5% decline (production extrapolated to a zero producing rate) versus the mobile oil saturation to determine the degree of continuity in the reservoir. According to Chevron the 1.5% decline yields a more realistic continuity factor of 75% compared with an unrealistically high value of 97% for the 1.0% decline.

Calculation of the continuity factor is very sensitive to estimates of original oil in place, initial and residual oil saturation. The original oil in place for Daly Unit No. 3 has been determined volumetrically using poor quality log data and its accuracy is questionable. A 15% increase in the original oil in place and a 2% change in the initial and residual oil saturations changes the calculated continuity factor for a 1.0% decline to 78% and the 1.5% decline to an unrealistically low 60%.

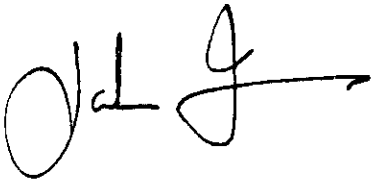
A historical production decline of 1.5% as requested by Chevron is too high. A more realistic historical production decline is somewhere between 1.0 - 1.2% based on interpretation of the pre-project production trend from 1976-07 to 1984-04. It is recommended that the lower value of 1.0% be used. Retaining a historical production decline of 1.0% recognizes that a portion of the incremental production is actually accelerated oil production and eliminates any administrative inconsistencies or complications.

FUTURE DEVELOPMENT

Since 1984, Chevron has spent over \$1.5 million on water plant expansion, injection line upgrading, injector conversions and reactivations and well workovers and recompletions in Daly Unit No. 3.

Chevron's future plans involve spending approximately \$200,000 per year on well workovers and the possible conversion of 1-13-10-28 (WPM). The company has indicated without new oil status continued waterflood optimization and remedial work such as this would not be economically feasible.

Eventually when economics improve the company has indicated it may conduct a pilot infill project to evaluate the incremental recovery associated with reduced well spacing.

A handwritten signature in black ink, appearing to read 'J. Fox' with a stylized flourish extending to the right.

John Fox
Chief Petroleum Engineer

JF:jtb



The Oil and Natural Gas
Conservation Board

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

(204) 945-3130

July 13, 1989

Chevron Canada Resources
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Attention: Mr. C. G. Folden, P. Eng.
Manager, Reservoir Engineering

Dear Sir:

Re: Daly Unit No. 3 - New Oil Status

Your application for continuation of new oil status for incremental production from Daly Unit No. 3 has been reviewed.

The Board recognizes that a significant portion of the incremental production resulting from the 1984 waterflood expansion project can reasonably be attributed to the recovery of incremental reserves. The Board also agrees that due to the extremely long remaining production life, accelerated production may in fact result in incremental recovery. Therefore, the Board is prepared to extend new oil status for a term of five (5) years, from July 1, 1989 to June 30, 1994, on all production from Daly Unit No. 3 exceeding the historical production decline. Chevron may apply prior to May 1, 1994 for an extension of this approval.

The Board has considered your request to revise the historical production decline rate from 1.0% to 1.5%. As indicated in your application the production decline rate is dependent on the period over which the analysis is conducted. Evaluation of the production trend from 1976-07, the date the Unit became effective, to 1984-06 excluding those months where the production was anomalously high or low, supports the continued use of a historical production decline of 1.0%.

Approval of new oil status for incremental production from Daly Unit No. 3 is extended, subject to the following conditions:

1. The historical production decline of 1.0% will continue to be used to determine incremental production. Table 1, attached, indicates the historical production rate for each month of the term of the approval.

2. If prior to June 30, 1994, infill drilling is commenced in the Unit, the Unit is enlarged or the pressure maintenance project expanded, this approval may be cancelled in favour of an administratively simpler incentive.
3. This approval expires June 30, 1994.

Yours sincerely,

H. Clare Moster
Deputy Chairman

cc: Ian Haugh, Chairman
Wm McDonald, Member
L. R. Dubreuil, Director of Petroleum

Table 1

Daly Unit No. 3

Historical Production Rate

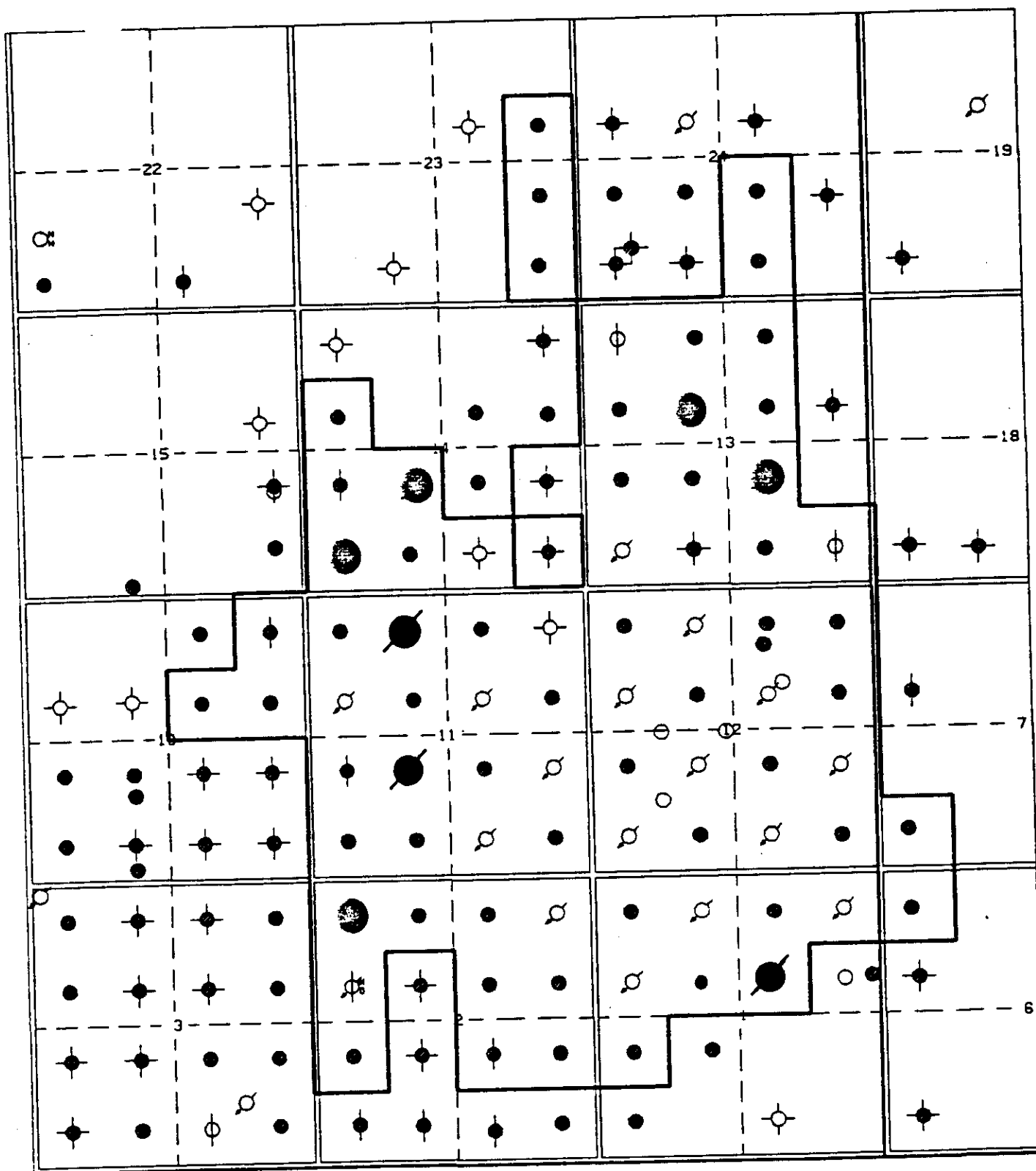
Year	Month	Daily Rate (m ³ /d)	Monthly Production (m ³)
1989	July	72.062	2 233.9
	Aug.	72.002	2 232.1
	Sept.	71.942	2 158.3
	Oct.	71.882	2 228.3
	Nov.	71.822	2 154.7
	Dec.	71.762	2 224.6
1990	Jan	71.703	2 222.8
	Feb.	71.643	2 006.0
	Mar.	71.583	2 219.1
	Apr.	71.524	2 145.7
	May	71.464	2 215.4
	June	71.405	2 142.1
	July	71.345	2 211.7
	Aug.	71.286	2 209.9
	Sept.	71.226	2 136.8
	Oct.	71.167	2 206.2
	Nov.	71.108	2 133.2
	Dec.	71.048	2 202.5
1991	Jan	70.989	2 200.7
	Feb.	70.930	1 986.0
	Mar.	70.871	2 197.0
	Apr.	70.812	2 124.4
	May	70.753	2 193.3
	June	70.694	2 120.8
	July	70.635	2 189.7
	Aug.	70.576	2 187.9
	Sept.	70.518	2 115.5
	Oct.	70.459	2 184.2
	Nov.	70.400	2 112.0
	Dec.	70.341	2 180.6
1992	Jan.	70.283	2 178.8
	Feb.	70.224	2 036.5
	Mar.	70.166	2 175.1
	Apr.	70.107	2 103.2
	May	70.049	2 171.5
	June	69.991	2 099.7
	July	69.932	2 167.9
	Aug.	69.874	2 166.1
	Sept.	69.816	2 094.5
	Oct.	69.758	2 162.5
	Nov.	69.700	2 091.0
	Dec.	69.642	2 158.9

Table 1 (cont'd)

Year	Month	Daily Rate (m ³ /d)	Monthly Production (m ³)
1993	Jan.	69.584	2 157.1
	Feb.	69.526	1 946.7
	Mar.	69.468	2 153.5
	Apr.	69.410	2 082.3
	May	69.352	2 149.9
	June	69.294	2 078.8
	July	69.236	2 146.3
	Aug.	69.179	2 144.5
	Sept.	69.121	2 073.6
	Oct.	69.064	2 141.0
	Nov.	69.006	2 070.2
	Dec.	68.949	2 137.4
1994	Jan.	68.891	2 135.6
	Feb.	68.834	1 927.3
	Mar.	68.776	2 132.1
	Apr.	68.719	2 061.6
	May	68.662	2 128.5
	June	68.605	2 058.1

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R.27W1M








T.10

DALY UNIT NO. 3

FIGURE 1

-  PROJECT CONVERSION
-  PROJECT REACTIVATION (INJECTION)

- LEGEND
-  OILWELL
 -  SUSPENDED OILWELL
 -  INJECTION WELL
 -  ABANDONED OILWELL
 -  UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

FIGURE 2

DALY UNIT #3

PRODUCTION HISTORY

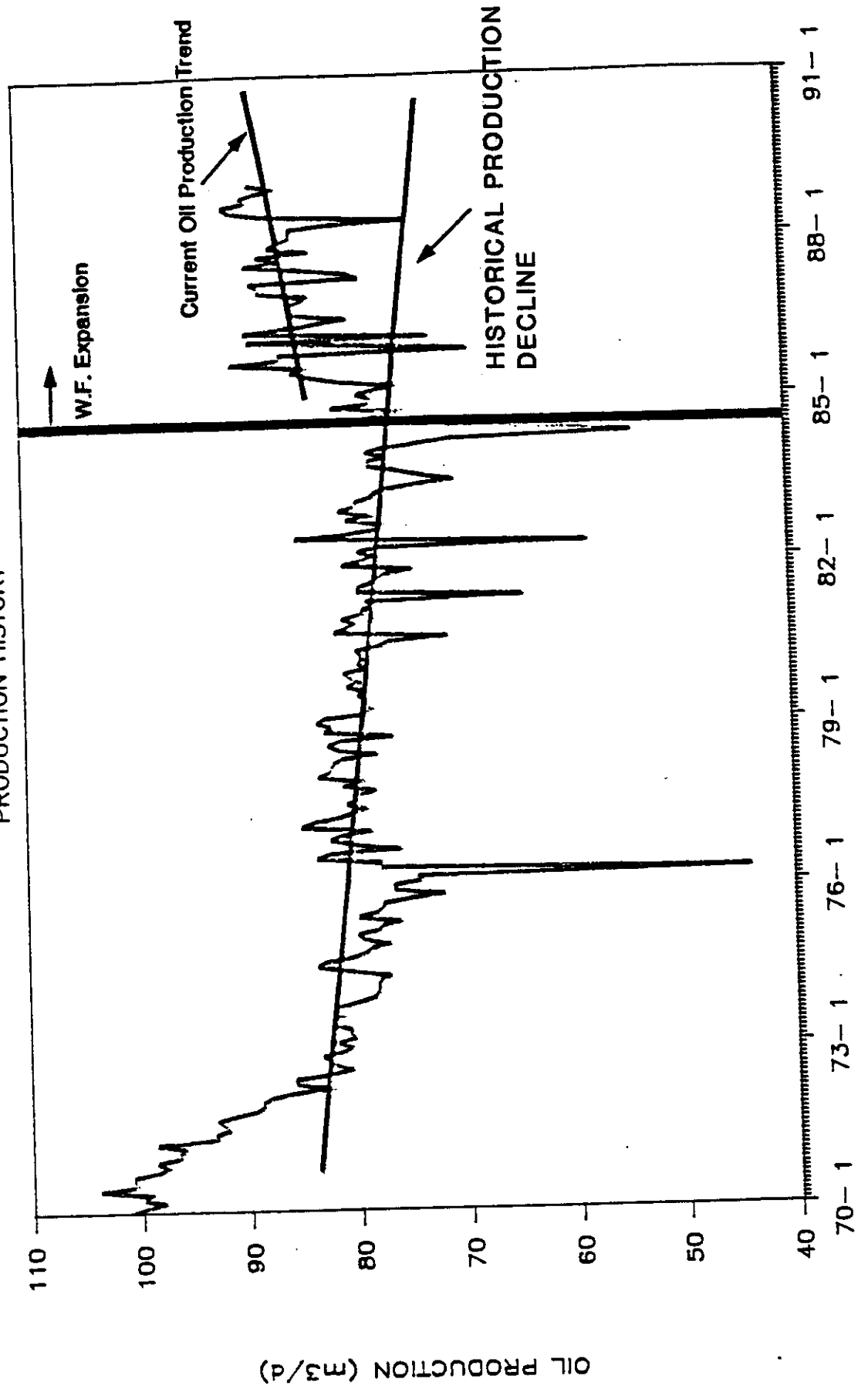
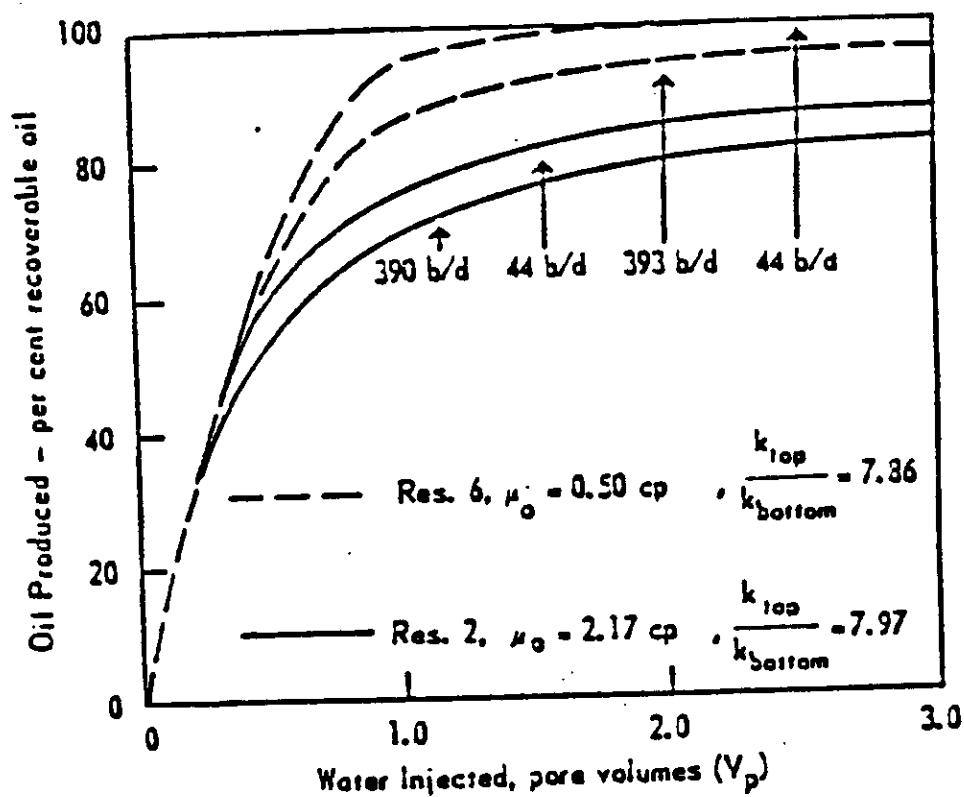


FIGURE 3

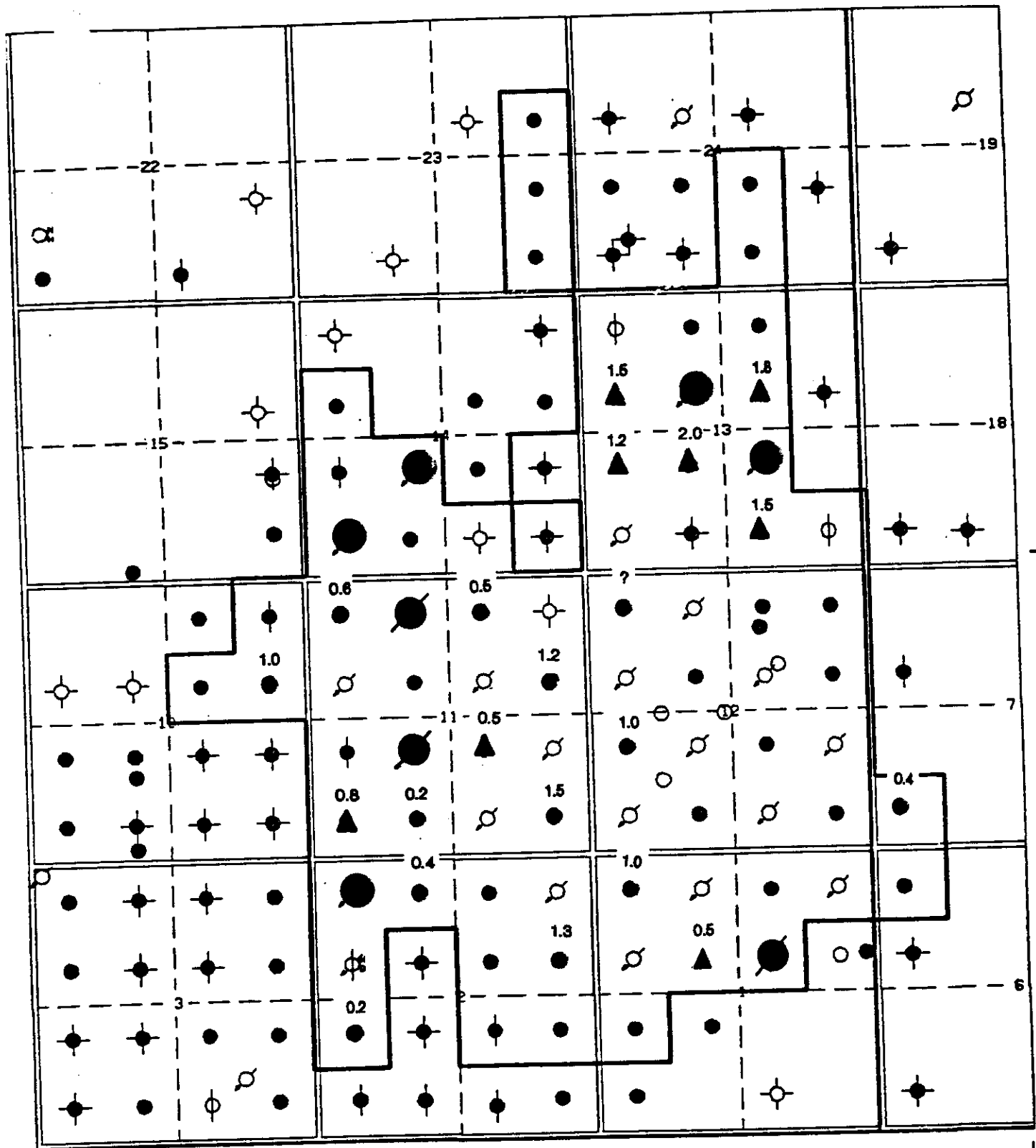
Mechanics of Secondary Oil Recovery



Prototype performance in a modelled five-spot water flood where two strata are in intimate contact (after Gaucher and Lindley¹⁰).

R.28W1M

R.27W1M



T.10

- PROJECT CONVERSION
- PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE 4
RESPONSE WELL MAP

INCREMENTAL OIL RATE (m3opd) → X.X

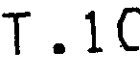
(DATUM DEPTH = -237.7 m SS)

- ▲ RESPONSE WELL (INCREMENTAL)
- RESPONSE WELL (ACCELERATION)

LEGEND

- OILWELL
- SUSPENDED OILWELL
- ⊗ INJECTION WELL
- ⊙ ABANDONED OILWELL
- UNIT OUTLINE

R.27W1M







(DATUM DEPTH = -237.7 m SS)

DALY UNIT NO. 3

FIGURE 5
Percentage Production
Increase/Decrease

1984 to 1989

LEGEND

-  OILWELL
 SUSPENDED
 INJECTION
 ABANDONED

UNIT OUTLINE

FAVOURABLE PRODUCTION RESPONSE

DALY UNIT NO. 3 - NEW OIL STATUS PREDICTED PRODUCTION PERFORMANCE

LEGEND

- CHEVRON PRODUCTION FORECAST (1984)
- CHEVRON PRODUCTION FORECAST (1989)
- PETROLEUM BRANCH BASE CASE

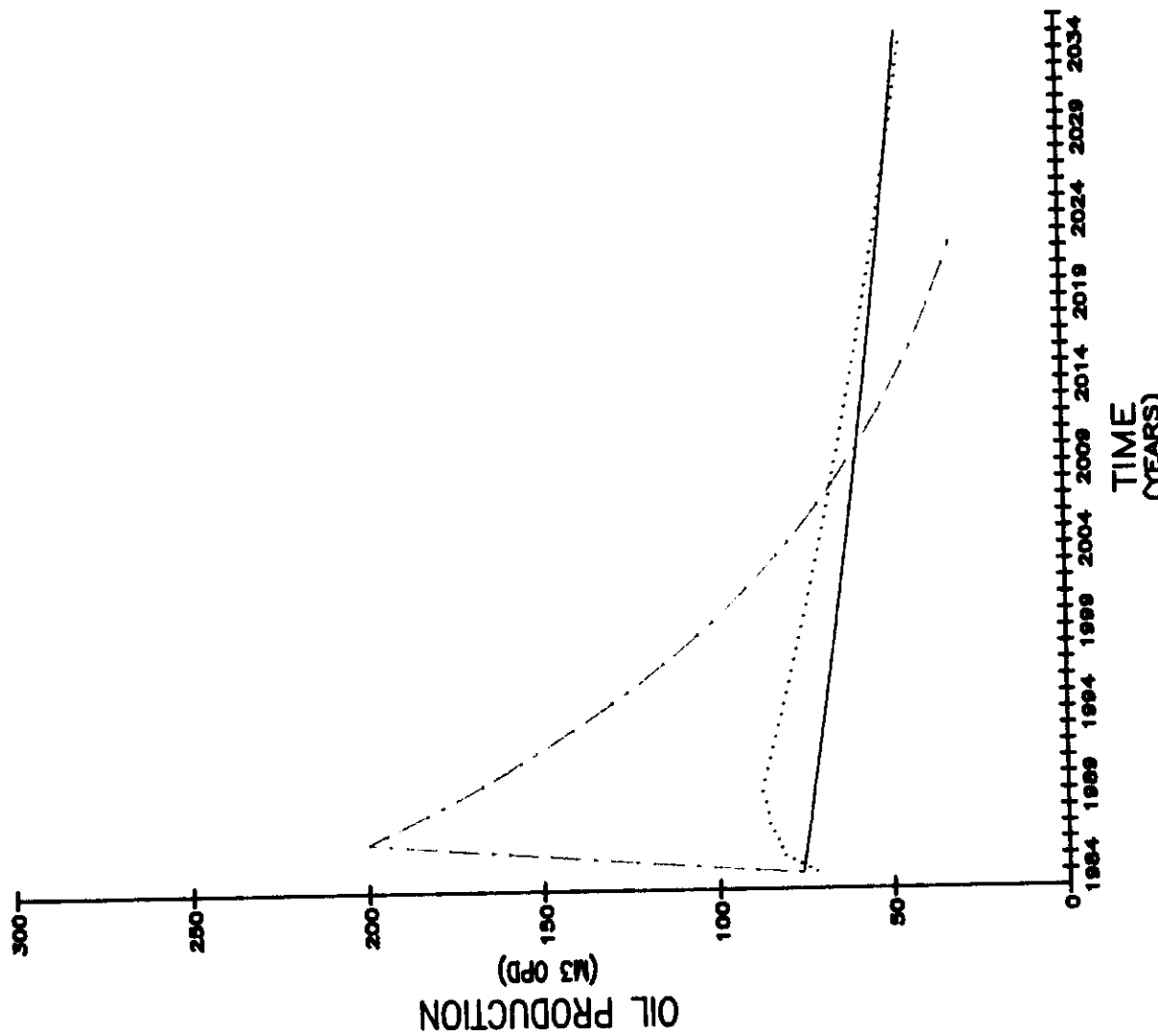


FIGURE 6

DALY UNIT NO. 3 - NEW OIL STATUS HISTORICAL PRODUCTION DECLINE

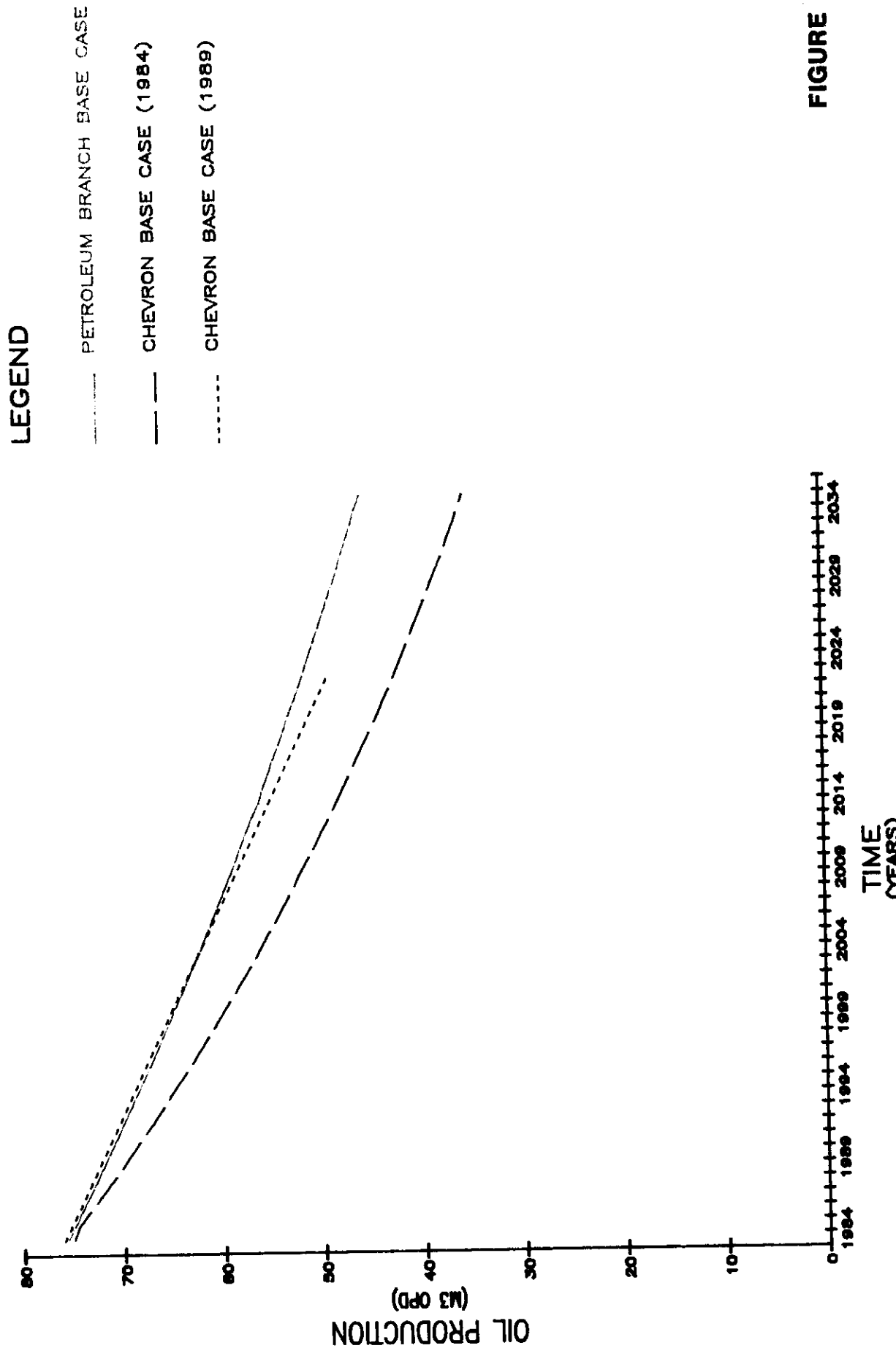


FIGURE 7



Memorandum

Date July 13, 1989

To H. Clare Moster
Deputy Chairman
O&NGC Board

From John N. Fox
Chief Petroleum Engineer
Petroleum Branch

Subject Daly Unit No. 3 - New Oil Status

Telephone

The estimated Daly Unit No. 3 Crown royalty and freehold production tax savings as a result of approval of new oil status for incremental production totalled \$393,000 for the period 1984-07 to 1989-06. The additional savings if new oil status is extended for 5 years from 1989-07 to 1994-06 are estimated to total \$655,000.

The additional Crown royalties and freehold production paid on incremental production above the historical production decline from 1984-09 to 1989-06 are estimated at \$342,000. For the extended approval period additional Crown royalties and freehold production tax are estimated to total \$570,000.

The additional freehold royalties paid on incremental production above the historical production decline are estimated at \$167,000 for the period 1984-09 to 1989-06 and \$282,000 from 1989-07 to 1994-06.

When determining the benefits to the Crown and freehold mineral owners, it is assumed that the waterflood expansion project would not have been undertaken without approval of new oil status for incremental production.

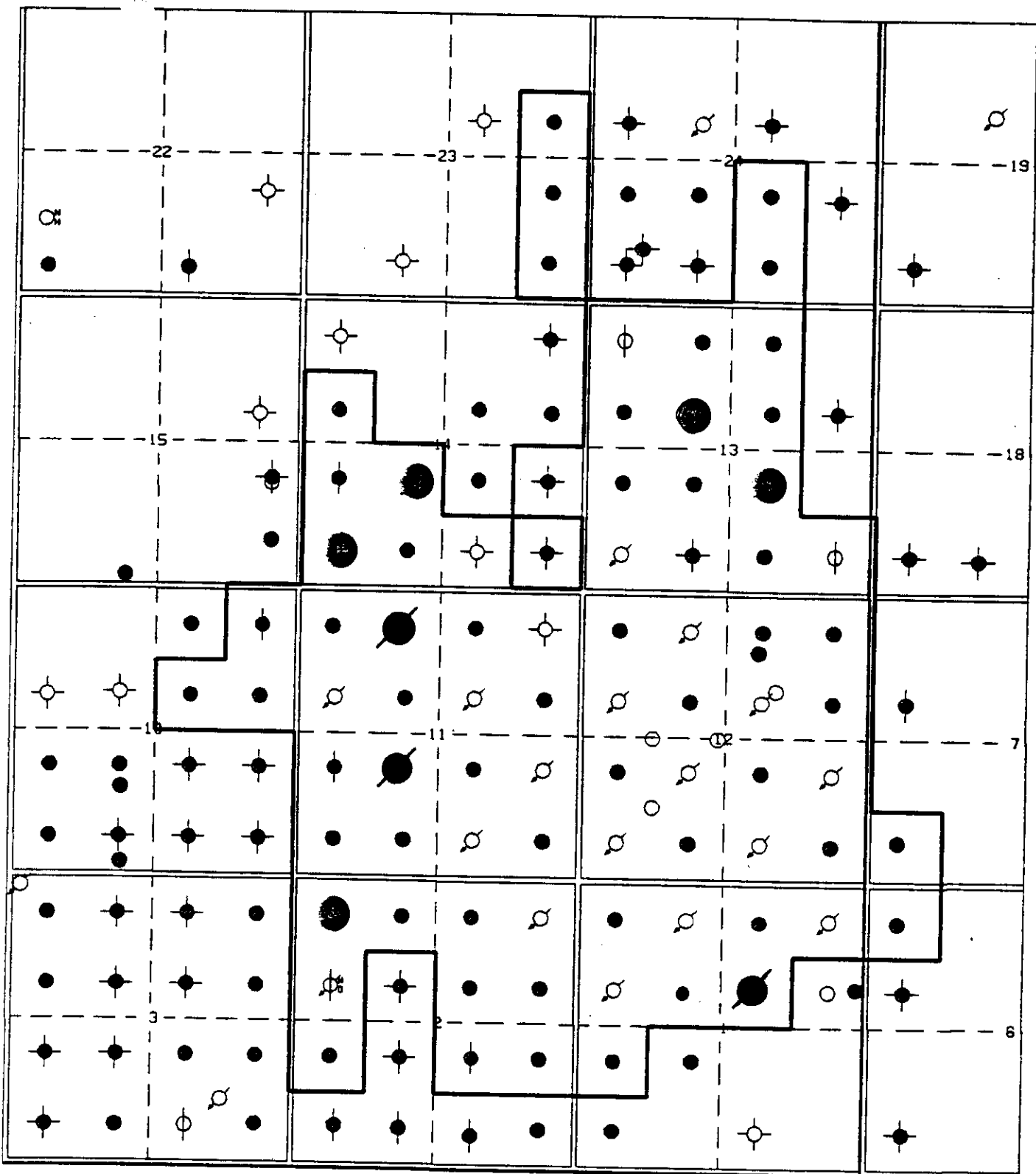
John N. Fox

JNF:dah

First Fold

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R.27W1M








T.10

-  PROJECT CONVERSION
-  PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE 1

LEGEND

-  OILWELL
-  SUSPENDED OILWELL
-  INJECTION WELL
-  ABANDONED OILWELL
-  UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

FIGURE 2

DALY UNIT #3

PRODUCTION HISTORY

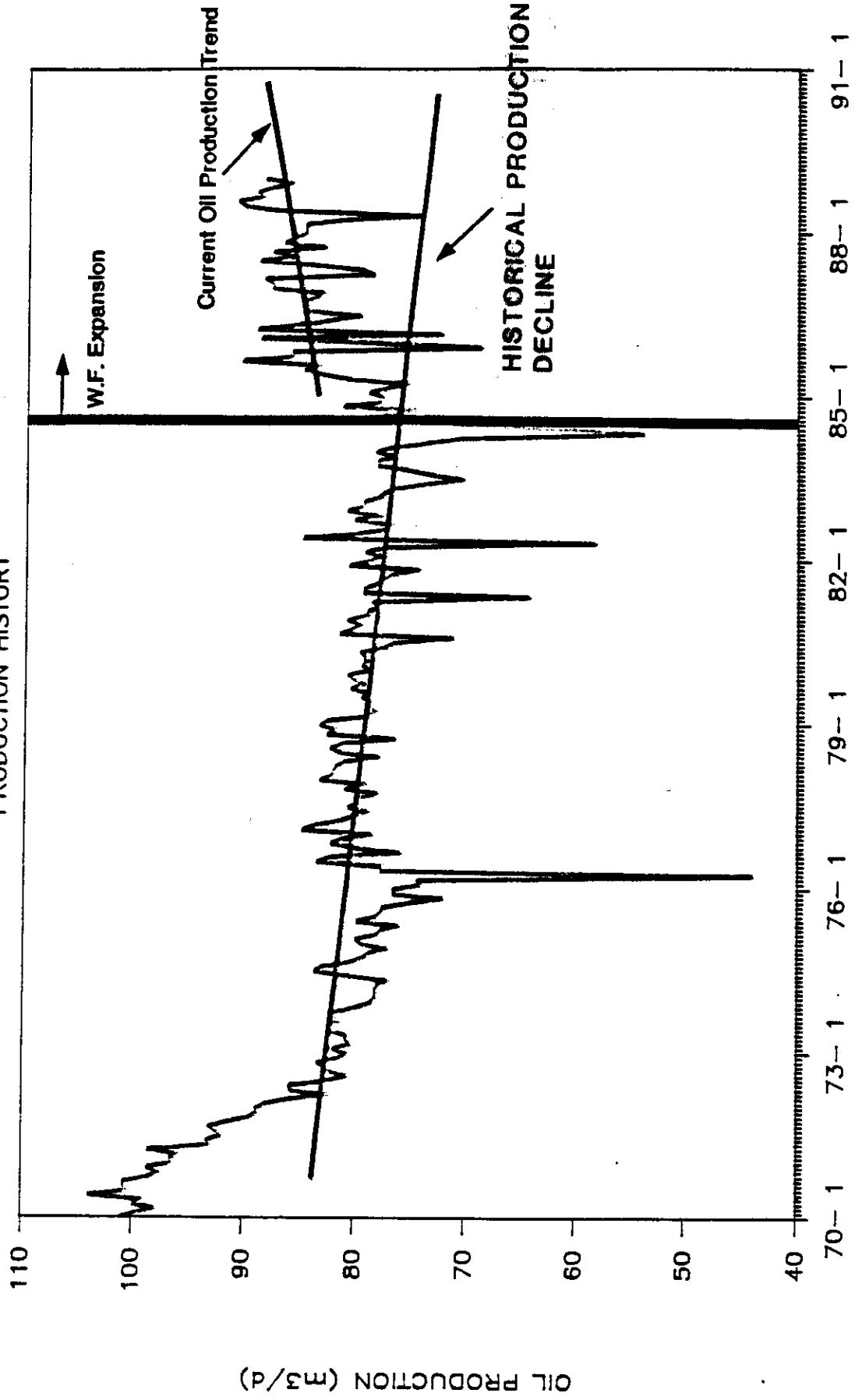
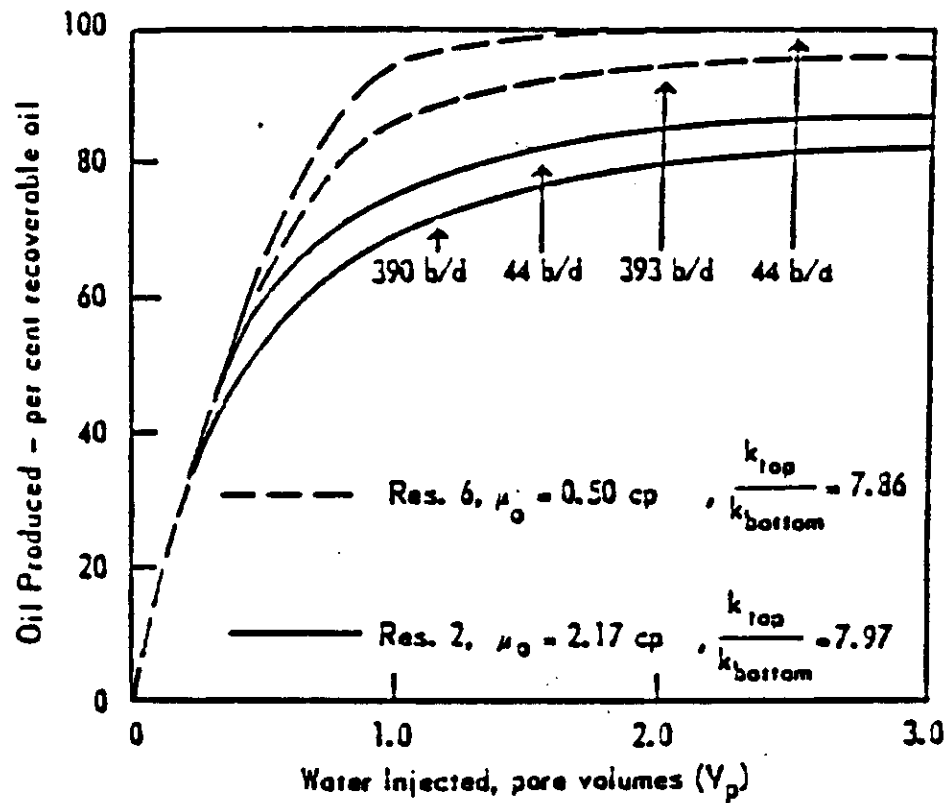


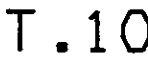
FIGURE 3

Mechanics of Secondary Oil Recovery



Prototype performance in a modelled five-spot water flood where two strata are in intimate contact (after Gaucher and Lindley¹⁰).

R.27W1M



(DATUM DEPTH = -237.7 m SS)

LEGEND

- OILWELL
- SUSPENDED OILWELL
- INJECTION WELL
- ABANDONED OILWELL
- UNIT OUTLINE

R.27W1M



(DATUM DEPTH = -237.7 m SS)

DALY UNIT NO. 3

FIGURE 5
Percentage Production
Increase/Decrease

1984 to 1989

LEGEND

OILWELL

SUSPENDED

♂ INJECTION

 ABANDONED

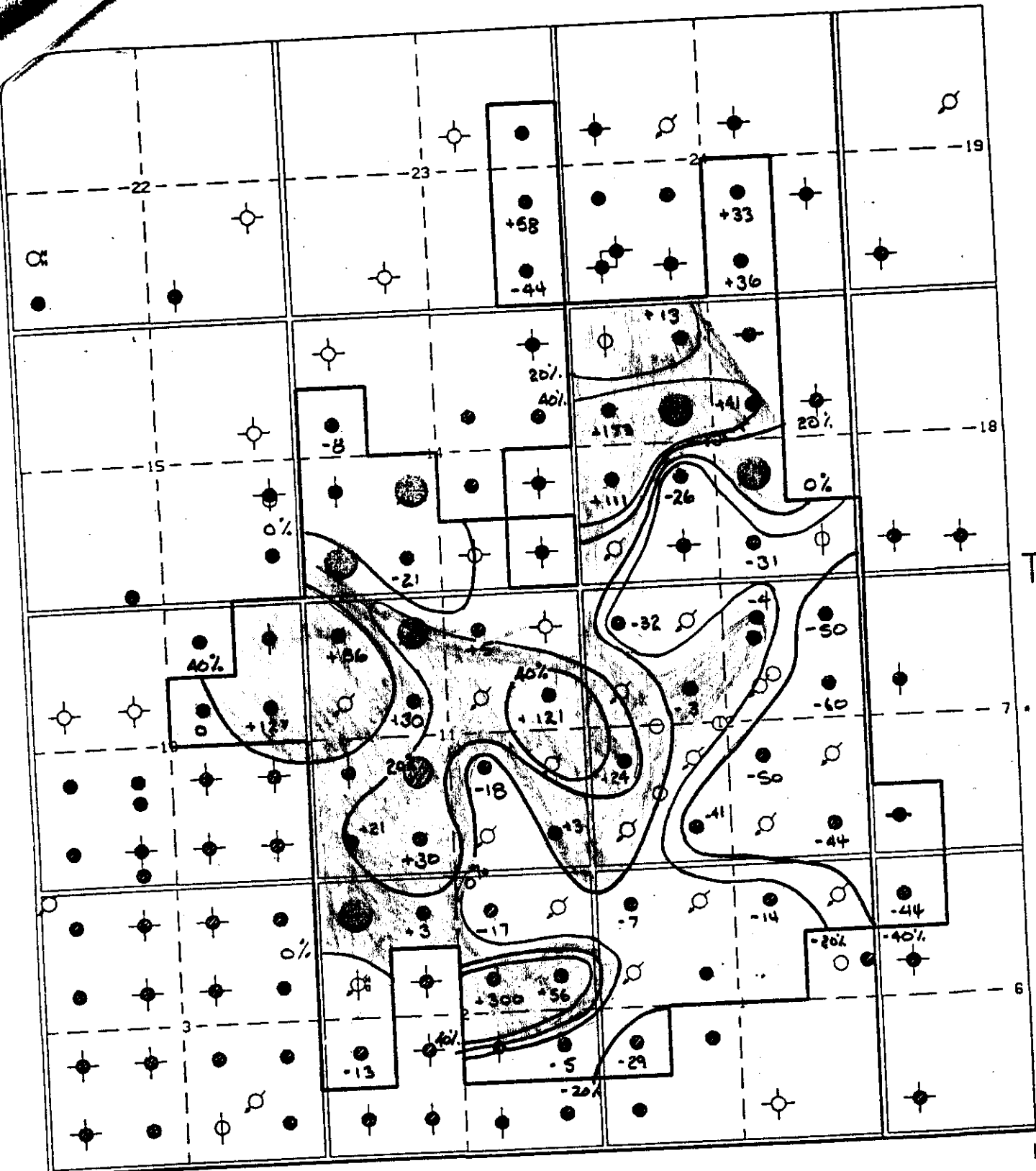
UNIT OUTLINE

**FAVOURABLE
RESPONSE**

GO:

R.28W1M

R.27W1M



LEGEND

- PROJECT CONVERSION
- PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE

Improvement
in production

- OILWELL
- SUSPENDED OILWELL
- ⊕ INJECTION WELL
- ⊕ ABANDONED OILWELL
- UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

603.

DALY UNIT NO. 3 - NEW OIL STATUS PREDICTED PRODUCTION PERFORMANCE



FIGURE 6

DALY UNIT NO. 3 - NEW OIL STATUS HISTORICAL PRODUCTION DECLINE

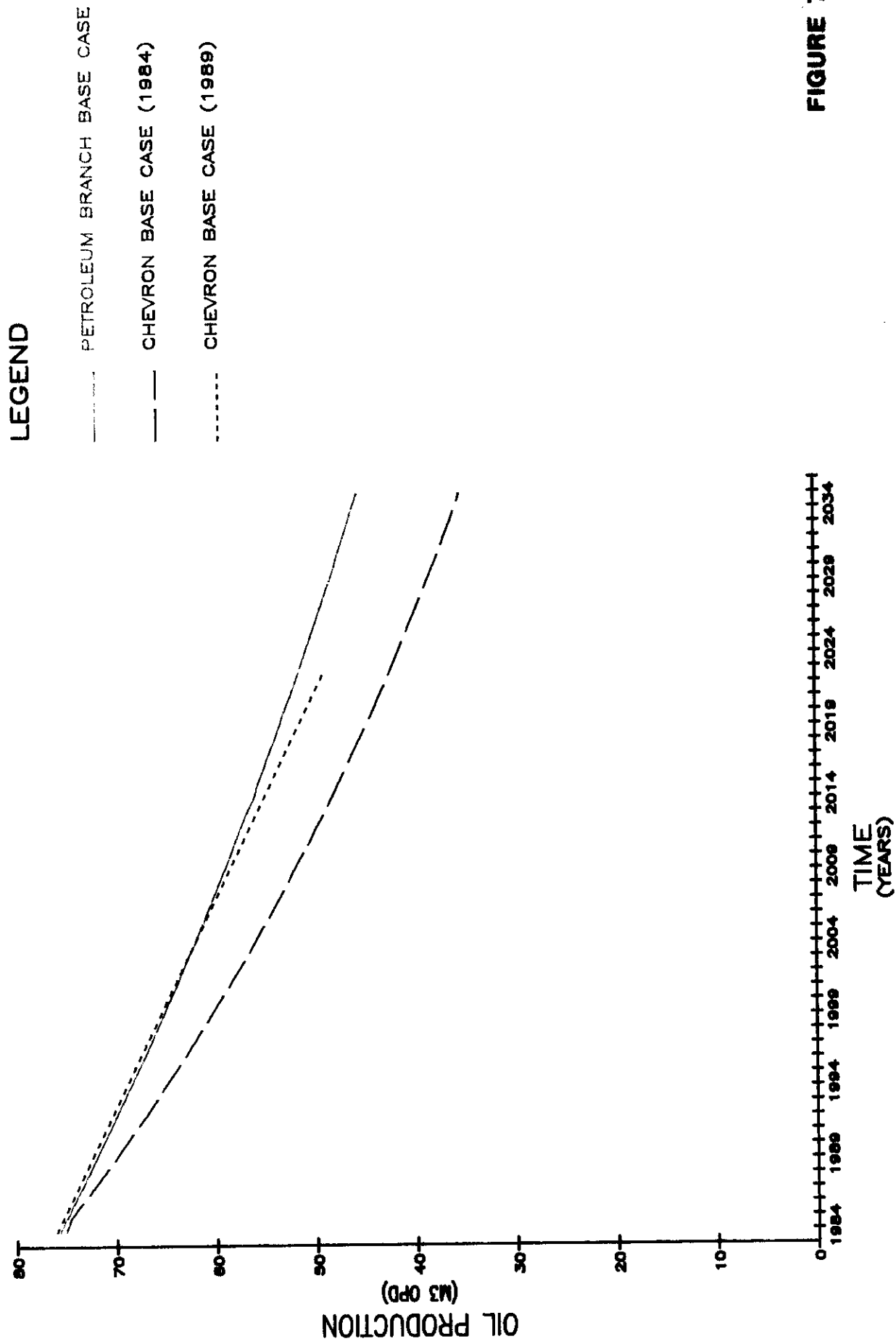


FIGURE 7

TITLE:

TABLET NO. 3 - NEW OIL STATUS
PETROLEUM PRODUCTION DECLINE

DATE LABEL:

1. TIME

(YEARS)

2. OIL PRODUCTION

(MM BBL)

VARIABLE 1: PETROLEUM BRANCH BASE CASE

Y-AXIS

Y-AXIS

1984

75.2

75

74.3

73.5

72.8

1989

72.1

71.4

70.7

70

69.3

1994

68.6

67.9

67.2

66.5

65.9

1999

65.2

64.6

63.9

63.3

62.7

2004

62

61.4

60.8

60.2

59.6

2009

59

58.4

57.9

57.3

56.7

2014

56

55.6

55

54.5

53.9

2019

53.4

52.9

52.3

51.8

51.3

2024

50.8

50.3

49.8

49.3

1987

48.8
48.3
47.8
47.4
46.9
46.4
46
45.5

1984

VARIABLE 2: CHEVRON BASE CASE (1984)

X-AXIS

Y-AXIS

1987

75.1
74.5
73.4
72.3
71.2
70.1
69.1
68.1
67
66

1989

65.1
64.1
63.1
62.2
61.3
60.4
59.5
58.6
57.7
56.8

1994

1999

56
55.2
54.3
53.5
52.7
52
51.2
50.4
49.7
48.7
48.2
47.5
46.8
46.1
45.4
44.7
44
43.4
42.7
42.1
41.5
40.9
40.3
39.7
39.1
38.5
37.9
37.3
36.8
36.2

2004

2009

2014

2019

2024

2029

VARIABLE 3: CHEVRON BASE CASE (1989)

X-AXIS	Y-AXIS
1983	76
	75.3
	74.6
	73.9
	73.2
1989	72.5
	71.8
	71.1
	70.4
	69.7
1994	69
	68.3
	67.6
	66.9
	66.2
1999	65.5
	64.8
	64.1
	63.4
	62.7
2004	62
	61.3
	60.6
	59.9
	59.2
2009	58.5
	57.8
	57.1
	56.4
	55.7
2014	55
	54.3
	53.6
	52.9
	52.2
2019	51.5
	50.8
	50.1
	49.4
	48.7
2024	NA
	NA
	NA
	NA
	NA
2029	NA
	NA
	NA
	NA
	NA
2034	NA
	NA

VARIABLE 4: CHEVRON PRODUCTION FORECAST (1984)

X-AXIS Y-AXIS

1984	76
	138.5
	200
	190
	180.5
1987	171.5
	162.9
	154.8
	147.1
	139.7
1994	132.7
	126.1
	119.8
	113.8
	108.1
1999	102.7
	97.6
	92.7
	88.1
	83.7
2004	79.5
	75.5
	71.7
	68.1
	64.7
2009	61.5
	58.4
	55.5
	52.7
	50.1
2014	47.6
	45.2
	42.9
	40.8
	38.8
2019	36.9
	35.1
	33.3
	31.6
	30
2024	NA
	NA
	NA
	NA
	NA
2029	NA
	NA
	NA
	NA
	NA
2034	NA
	NA

VARIABLE 5: CHEVRON PRODUCTION FORECAST (1989)

X-AXIS	Y-AXIS
1984	71.8
	80.9
	82.9
	85.2
	85.9
1989	87.3

	86
	84.7
	83.5
	82.2
1997	81
	79.8
	78.6
	77.4
	76.3
1999	75.1
	74
	72.9
	71.8
	70.7
2004	69.7
	68.7
	67.6
	66.6
	65.7
2009	64.7
	63.7
	62.8
	61.8
	60.9
2014	60
	59.1
	58.2
	57.4
	56.5
2019	55.7
	54.8
	54
	53.2
	52.4
2024	51.6
	50.9
	50.1
	49.4
	48.6
2029	47.9
	47.1
	46.5
	45.8
	45.1
2034	44.4
	43.8

Royalty & Prod. Tax Saving 1984-09 to 1989-06

$$\begin{aligned}\text{Royalty saving} &= \$127,262 \text{ (84-09 to 88-12)} \\ &+ 179.3 \times \$128.5/\text{m}^3 = \$23,040\end{aligned}$$

$$\begin{aligned}\text{Tax Savings} &= \$205,469 \text{ (84-09 to 88-12)} \\ &+ 289.25 \times \$128.5/\text{m}^3 = \$37,168\end{aligned}$$

$$\text{Total } \$393,000$$

Royalty & Prod Tax Saving 1989-07 to 1994-06

$$\text{Royalty Saving } 1597 \text{ m}^3 \times \$157.25/\text{m}^3 = \$251,143$$

$$\text{Tax Savings } 2567.5 \times \$157.25/\text{m}^3 = 403,732$$

$$\text{Total } \$655,000$$

Crown Benefits (assuming project never undertaken)

1984-09 to 1989-06

$$\begin{aligned}\text{incremental royalty} &= \$155,565 + \\ &+ 219.1 \times \$128.50/\text{m}^3 = 28,154\end{aligned}$$

$$\begin{aligned}\text{incremental tax} &= \$134,119 \\ &+ 189.6 \times \$128.50/\text{m}^3 = 24,363\end{aligned}$$

$$\text{Total } 342,000$$

CROWN BENEFITS

1989-07 to 1994-06

incremental royalty $1951.95 \times 157.25 = \$306,944$

incremental tax $1675.9 \times 157.25 = \$263,535$

Total 570,000

FREEHOLD BENEFITS

1984-09 to 1989-06

incremental royalty $\$141.182$
+ $197.85 \times 128.50 = 25423$

TOTAL \$167,000

1989-07 to 1994-06

incremental royalty

$1793.4 \times 157.25 = \$282,012$

1989 06 29

Daly #3

1988Charges

(41.74722)	(51.65258)	(5.37883)	(1.22137)	
Chercon	Chercon	Scurry R.	Federal	Total
Royalty	Prod. Tax	Prod. Tax	Crown	
\$	\$	\$?	

A	19,535.98	16,932.21	1726.16	38,194.35
M	19,398.97	16,129.27	1600.03	37,128.27
J	20,750.75	18,724.00	1919.71	41,394.46
J	20,111.05	18,704.60	1986.82	40,802.47
A	21,160.00	19,758.85	2051.83	42,965.68
S	18,825.25	17,110.68	1709.47	37,645.40
O	18,210.96	16,838.09	1748.16	36,797.21
N	16,775.88	15,194.45	1568.03	33,538.36
D	19,215.93	17,480.93	1806.33	38,503.19
	<u>172,984.77</u>	<u>156,868.08</u>	<u>16,116.54</u>	<u>346,969.39</u>

RUN DATE: 12/88
PRINT DATE: 89/01/11

DAILY UNIT NO. 3 CROWN ROYALTY

1988-12

PGM: FCREV20W

WELL	TRACT FACTOR &	BASE ROY. VOL.	ACTUAL ROY. VOL.	ACTUAL ROY. \$	BASE ROY. \$	DIFFERENCE	ROYALTY ADJUSTMENT	ROYALTY PAYABLE
1306	0.01618	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0910	0.97997	1.83	2.57	251.89	179.36	72.53	39.89	219.25
1010	1.50200	4.29	6.04	591.98	420.46	171.52	94.34	514.80
1610	0.00864	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0111	2.45346	11.73	16.36	1,603.44	1,149.66	453.78	249.58	1,399.24
0211	1.14999	2.51	3.53	345.98	246.01	99.97	54.98	300.99
0311	0.60268	0.69	0.98	96.05	67.63	28.42	15.63	83.26
0411	1.89342	6.82	9.61	941.88	668.43	273.45	150.40	818.83
0511	0.05433	0.01	0.01	0.98	0.98	0.00	0.00	0.98
0611	0.48240	0.44	0.62	60.77	43.12	17.65	9.71	52.83
0711	1.13485	2.45	3.44	337.15	240.12	97.03	53.37	293.49
0811	2.08095	8.27	11.86	1,162.40	810.54	351.86	193.52	1,004.06
0911	1.39662	3.72	5.22	511.61	364.60	147.01	80.86	445.46
1011	1.05654	2.12	2.98	292.07	207.78	84.29	46.36	254.14
1111	0.41786	0.33	0.46	45.08	32.34	12.74	7.01	39.35
1211	0.24683	0.11	0.16	15.68	10.78	4.90	2.70	13.48
1311	3.20655	19.38	25.36	2,485.53	1,899.43	586.10	322.36	2,221.79
1411	0.89688	1.52	2.16	211.70	148.98	62.72	34.50	183.48
1511	1.30393	3.24	4.54	444.97	317.59	127.42	70.08	387.63
1611	0.91258	1.59	2.23	218.56	155.84	62.72	34.50	190.34
0112	2.11323	8.51	12.27	1,202.58	834.07	368.51	202.68	1,036.75
0212	1.73832	5.77	8.09	792.90	565.52	227.38	125.06	690.58
0312	2.87039	15.96	21.36	2,093.49	1,564.24	529.25	291.09	1,855.33
0412	1.50999	4.34	6.10	597.86	425.36	172.50	94.88	520.24
0512	4.16933	29.10	36.93	3,619.51	2,852.09	767.42	422.08	3,274.17
0612	2.17411	9.02	12.99	1,273.15	884.05	389.10	214.01	1,098.06
0712	1.23795	2.92	4.11	402.82	286.19	116.63	64.15	350.34
0812	0.41011	0.32	0.45	44.10	31.36	12.74	7.01	38.37
0314	2.82838	15.55	20.82	2,040.57	1,524.06	516.51	284.08	1,808.14
0414	0.11702	0.03	0.04	3.92	2.94	0.98	0.54	3.48
0514	0.06822	0.01	0.01	0.98	0.98	0.00	0.00	0.98
0614	0.71371	0.97	1.36	133.29	95.07	38.22	21.02	116.09

19,215.93

3,186.39

5,793.35

16,029.54

21,822.89

222.66

163.55

TOTALS: 41.74722

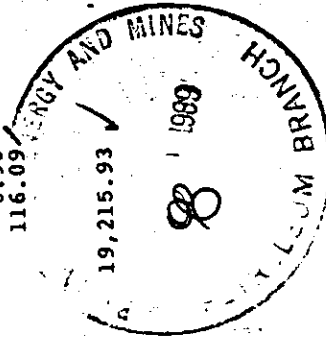
ACTUAL UNIT PRODUCTION:

BASE UNIT PRODUCTION:

AWF 898.01

2,663.60

2,247.00





Chevron Canada Resources

500 - Fifth Avenue S.W., Calgary, Alberta T2P 0L7 • Phone (403) 234-5000
Fax 234-5947
Calgary, Alberta
1989-06-19

K.E. Godard
Chief Engineer

Daly Unit No. 3 Extension of New Oil Status Additional Information

Oil and Natural Gas Conservation Board
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8

Attention: Mr. H. C. Moster, Deputy Chairman

Gentlemen:

Chevron Canada Resources, a Partnership by its managing partner, Chevron Canada Resources Limited, as Operator of the Daly Unit No. 3, submits the following information requested by the Manitoba Oil and Natural Gas Conservation Board in a letter dated 1989-05-23.

1. Project Economics

- a) The list of work conducted in conjunction with waterflood expansion and enhancement for the period 1987-01-01 to 1988-12-31 is contained in Table 1. The expenditures incurred for the work are also listed.
- b) A summary of revenue, operating costs, Chevron's Crown and freehold royalty payments, and Chevron's freehold production tax payments for the years 1984 to 1988 is contained in Table 2. The Board should have access to total Unit royalty and production tax information from the records of the Manitoba Minister of Energy and Mines.
- c)
 - i) Table 3 lists calculated total Unit Crown royalty and freehold production tax savings as a result of new oil status. Table 4 presents the same data for the proposed royalty calculation base case exponential decline rate of 1.5%.
 - ii) Table 5 lists the calculated total Unit Crown royalties and freehold production tax in excess of the base case under which expansion would not have taken place. An exponential decline rate of 1.0% for base case production and for new oil calculations is assumed. Table 6 presents the same data for the proposed royalty calculation base case exponential decline rate of 1.5%. Note that royalties and taxes paid are always higher in the expansion case than the base case.

- iii) Table 7 lists the calculated total Unit freehold royalties in excess of the base case under which expansion would not have taken place. An exponential decline rate of 1.0% for base case production is assumed. Table 8 presents the same data for the proposed royalty calculation base case exponential decline rate of 1.5%. Again, note that freehold royalties paid are higher in the expansion case than in the base case.
- iv) Table 9 is a summary table showing the benefits of the expansion project to all parties involved. The table illustrates that all parties gain from the project. This is particularly true for the 1.5% annual exponential decline rate which Chevron believes is correct. It should be emphasized that the table assumes no further expansion work beyond that which has already occurred. Undoubtedly, continued optimization work will occur (assuming new oil status is renewed) and will further contribute to the benefits of all parties.

2. Water Injection

- a) Injection curves for each injector are included as Figures 1 to 24.
- b) Chevron believes the portion of injection migrating out of zone is entering zones above and below the Lodgepole pay. Pressure information for the 6A-12-10-28 W1M location indicates uphole migration of water into the Jurassic Upper Amaranth. This is evidenced by the abnormally high pressure encountered in the zone during drilling. Profile logging at 14-1-10-28 W1M also indicates downward fluid migration, probably into the Cromer Shale. Fluid migration both upward and downward is suspected to be the result of rock failure and fracturing caused by the high pressures.

In general, the reservoir pressure has reached a maximum based on the limits of fracturing. The pre-project average reservoir pressure was approximately 5 900 kPag. Injector pressures were approximately 7 000 kPag (14 500 kPag bottomhole) which equates to a gradient of 19.7 kPa/m. The present reservoir pressure is approximately 7 000 kPag. Injector pressures are approximately 8 500 kPag (16 000 kPag bottomhole) which equates to a gradient of 21.0 kPa/m.

The reservoir fluid throughput has also reached a maximum. Further increase in injection rates is not possible into existing injectors. Infill drilling is the only way to increase fluid throughput in Daly Unit No. 3.

No remedial work is possible to prevent fracturing or the resultant migration of fluids out-of-zone. On the contrary, Chevron intends to lower injection rates where fracturing is suspected to balance voidage replacement.

3. Production Response

- a) The Board's statement that the average pressure in the Unit has increased little since 1984 is incorrect. The pre-project reservoir pressure was approximately 5 900 kPag

(close to discovery pressure of 5 850 kPag) as determined during the 1984 pressure survey. The post-project pressure has been approximately 7 000 kPag (close to normal gradient pressure of 7 500 kPag). This represents an increase of 20%.

The degree of reservoir pressure increase is almost exactly coincidental with the degree of total fluid production increase. The pre-project total fluid production rate was approximately 175 Rm³/d. The post-project value corrected for an 80 Rm³/d increase at a Unit boundary producer where an ESP was run is 210 Rm³/d. This represents a 20% producing rate increase. The 20% increase in reservoir pressure translates directly into a 20% increase in fluid production rate as predicted by Darcy's Law (rate and pressure drop are directly proportional).

Pressure variations throughout the Unit are the result of several factors. Wells located along the Unit boundary have generally lower pressures caused in part by a lack of confinement support. Variations within the Unit are related to rock property variations.

- b) Chevron continues to monitor fluid levels approximately three to four times each year. More frequent monitoring is done when a well is undergoing evaluation for pump or inflow problems. In general, every effort is put forth to ensure that wells are pumped off and that drawdown is maximized.

4. Future Development

Chevron's plans for future development and expenditures in Daly Unit No. 3 are very preliminary at this time. Potential future work includes well workovers (acidizing, fracturing, reperforating), well conversions, and infill drilling. New oil status will result in projects being implemented faster and, in addition, will be the difference between doing and not doing most projects. Therefore, new oil status directly translates into incremental recovery.

It is anticipated that well workovers would proceed roughly at the same rate as in the past. Projected spending should fall in the range of \$200 000 per year. However, without new oil status, spending on workovers would be reduced significantly.

At present, no plans exist for future conversions beyond the potential conversion of 1-13-10-28 W1M. The expense for each conversion is estimated to be approximately \$70 000 (1989 \$). An evaluation of the 1-13 conversion indicates the economics for conversion of the well are marginal. As a result of this evaluation, it is concluded that conversions cannot be justified in the current price environment if new oil status is not in place. Even with new oil status conversions are marginal at best.

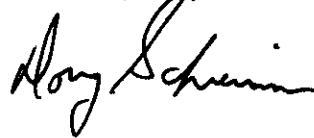
Chevron views infill drilling as the best way to accelerate recovery of the Daly Unit No. 3 reserves. Infill drilling will also achieve incremental recovery by improving continuity and sweep. Unfortunately, the economics have been and continue to be very marginal. Even with new oil royalty, infill drilling is difficult to justify. Should a project proceed, it is anticipated a four well pilot would initially occur at a cost of \$2 200 000 (1988 \$). The

anticipated a four well pilot would initially occur at a cost of \$2 200 000 (1988 \$). The pilot would add \$100 000 (1988 \$) to annual operating costs. Should full field infill drilling become attractive, as many as 90 potential infill locations would exist. Assuming half of those had economic potential, a \$20 000 000 (1989 \$) infill program could conceivably occur.

Chevron hopes this information is adequate for the Board's evaluation of the extension of new oil status. Again, we wish to reiterate the importance of new oil status as a necessary condition for ongoing work that will result in increased recovery. It is also stressed that current economics for most projects are very marginal and that a 1.5% base decline for new oil calculations, besides being technically correct, will improve project economics. It could provide the necessary improvement in economics to initiate much of the potential optimization work that exists. This in turn will result in incremental recovery which will benefit all parties involved.

Please contact Scott Robinson at (403) 234-5388 if there are any questions.

Yours very truly,

A handwritten signature in black ink, appearing to read "C. G. Folden".

C. G. FOLDEN, P.Eng.
Manager
Reservoir Engineering

DSR/kt

TABLE 1

Work Performed and Capital Expenditures

<u>Work</u>	<u>Date</u>	<u>Cost (E3\$)</u>	<u>Producers</u>	<u>Injectors</u>
Reactivation	87-01	43.1		6-11
Wellbore cleanout/acid job	87-01	13.0		4-12
Wellbore cleanout/acid job	87-02	12.7		12-12
Liner/perf/profile log	87-03	45.4		13-2
Acid job/profile log	87-06	23.0		14-1
Reactivation/liner/acid job	87-06	67.5		14-11
Reactivation/acid job	87-08	70.8		A10-1
Misc. acid jobs	87-01 to 10	24.0	3-12, 11-12, 3-14, 2-13 5-2, 15-13	
Liner/acid job	88-03	54.1		7-13
Liner/frac job	88-09	65.5		12-11
Frac job	88-03	26.6		16-2
Acid jobs	88-07	8.0	1-11, 7-24	

total 453.7

pre-87
capital
expenditures

1065.7

1519.0

TABLE 2

Revenue, Costs, and Royalty Data

Year	Total Revenue	Total Operating Costs	Chevron's Share Crown		Chevron's Share Freehold		Freehold Total Unit (m ³)	Prod'n Tax Chevron's Share (\$)	
			Royalties Paid (m ³)	Royalties Paid (\$)	Royalties Paid (m ³)	Royalties Paid (\$)			
1984	4 935 322	966 938	1 875.8	352 772	1 721.5	323 388	1 869	278 573	
1985	6 103 835	955 893	2 172.4	448 786	1 922.2	399 971	2 105	386 645	
1986	3 650 361	802 000	2 191.4	267 367	1 956.8	238 515	2 156	215 064	
1987	4 397 283	943 000	2 271.8	318 855	2 034.9	285 369	2 217	294 844	
1988	3 242 156	863 000	2 294.3	239 265	2 054.7	217 584	2 235	212 451	
total	22 329	4531		1667		1465		1388	
				1785*		1569*		1486*	# 11 4mm
capital inv.	1984-87	1065							
	1987-88	454							
		1519							

Chevron's royalty & tax share equivalent to their unit share = 93.4%

TABLE 3

**CALCULATED CROWN ROYALTY AND
PRODUCTION TAX SAVINGS TO WIO's (1.0% Base Decline)**

Year	Expansion Case Prod'n (E3 m ³)	Old Oil Treatment		%New Oil	New Oil Treatment		Savings for Unit			
		Crown Royalty (m ³)	Prod'n Tax (m ³)		Crown Royalty (m ³)	Prod'n Tax (m ³)	Crown Royalty (m ³)	\$	Prod'n Tax (m ³)	\$
1984	26.220	1 895.2	1 653.5	1	1 877.4	1 624.3	17.8	3 350	29.2	5 490
1985	29.531	2 358.9	2 207.4	7	2 221.6	1 984.7	137.3	28 454	222.7	46 167
1986	30.247	2 464.1	2 335.0	10	2 262.7	2 010.7	201.4	24 565	324.4	39 559
1987	31.097	2 589.9	2 487.1	14	2 315.3	2 044.3	274.6	38 523	442.8	62 126
1988	31.354	2 628.2	2 533.5	15	2 320.1	2 037.2	308.2	32 370	496.2	52 127
1989	31.863	2 704.5	2 625.9	17	2 346.0	2 047.5	358.5		578.5	
1990	31.389	2 633.3	2 539.7	17	2 291.0	1 988.5	342.4		551.1	
1991	30.921	2 563.8	2 455.4	17	2 237.1	1 929.0	326.7		526.4	
1992	30.461	2 495.6	2 372.9	16	2 184.3	1 873.2	311.4		499.7	
1993	30.007	2 428.8	2 291.5	16	2 132.3	1 816.5	296.4		475.0	
1994	29.560	2 363.3	2 212.7	15	2 081.4	1 760.7	281.9		452.0	
1995	29.120	2 299.0	2 135.4	15	2 031.4	1 706.2	267.7		429.2	
1996	28.687	2 236.4	2 059.7	14	1 982.4	1 653.5	254.0		406.2	
1997	28.260	2 175.6	1 987.1	14	1 934.8	1 601.4	240.8		385.7	
1998	27.839	2 116.5	1 916.6	14	1 888.4	1 550.7	228.0		365.9	
1999	27.424	2 059.0	1 848.0	13	1 843.1	1 501.3	215.8		346.8	
2000	27.016	2 003.0	1 781.3	13	1 798.9	1 451.1	204.1		330.2	
2001	26.614	1 948.3	1 716.2	12	1 755.6	1 403.5	192.7		312.7	
2002	26.217	1 894.8	1 653.1	12	1 713.1	1 358.6	181.7		294.5	
2003	25.827	1 842.5	1 591.2	11	1 671.5	1 314.0	171.0		277.2	
2004	25.442	1 791.3	1 532.0	11	1 630.7	1 270.1	160.6		262.0	
2005	25.064	1 741.3	1 474.7	11	1 590.7	1 228.3	150.6		246.4	
2006	24.690	1 692.3	1 419.1	10	1 551.5	1 188.4	140.8		230.7	
2007	24.323	1 644.7	1 365.1	10	1 513.2	1 150.9	131.5		214.2	
2008	23.961	1 598.6	1 312.8	9	1 475.9	1 113.1	122.6		199.7	
2009	23.604	1 553.4	1 261.2	9	1 439.4	1 075.4	114.1		185.8	
2010	23.252	1 509.4	1 211.7	8	1 403.6	1 039.0	105.8		172.7	
2011	22.906	1 466.3	1 164.5	8	1 368.6	1 004.1	97.7		160.4	
2012	22.565	1 424.1	1 118.7	7	1 334.4	969.5	89.7		149.2	
2013	22.229	1 383.0	1 074.3	7	1 301.2	937.0	81.8		137.3	
2014	21.898	1 342.7	1 031.2	6	1 268.6	906.1	74.1		125.1	
2015	21.572	1 303.4	988.1	6	1 236.7	877.6	66.7		110.5	
2016	21.251	1 265.0	946.8	5	1 205.4	848.7	59.5		98.1	
2017	20.934	1 228.0	907.0	5	1 175.2	820.0	52.8		87.0	
2018	20.623	1 192.6	869.5	5	1 146.0	792.8	46.7		76.7	
2019	20.316	1 158.1	833.2	4	1 117.4	766.4	40.7		66.9	
2020	20.013	1 124.5	797.3	4	1 089.5	741.0	35.1		56.3	
2021	19.715	1 091.8	763.6	3	1 062.2	716.0	29.6		47.6	
2022	19.421	1 059.8	730.9	3	1 035.5	692.8	24.4		38.1	
2023	19.132	1 028.7	699.3	2	1 009.4	668.7	19.3		30.7	
2024	18.847	998.3	668.5	2	984.0	644.7	14.3		23.8	
2025	18.567	969.1	638.4	1	959.5	620.9	9.6		17.6	
2026	18.290	940.9	608.0	1	935.7	599.6	5.2		8.4	
2027	18.018	913.5	579.9	0	912.5	578.2	1.1		1.7	
2028	17.750	886.8	553.8	0	886.8	553.8	0.0		0.0	
2029	17.485	860.9	528.5	0	860.9	528.5	0.0		0.0	
2030	17.225	835.6	504.2	0	835.6	504.2	0.0		0.0	
2031	16.969	811.0	480.7	0	811.0	480.7	0.0		0.0	
2032	16.716	787.1	458.0	0	788.1	458.0	0.0		0.0	
2033	16.467	763.8	436.1	0	764.8	436.1	0.0		0.0	
2034	16.222	741.1	415.0	0	741.1	415.0	0.0		0.0	
2035	15.980	719.0	394.6	0	719.0	394.6	0.0		0.0	
Total	1 231.101	83 526.8	70 169.9		77 042.5	59 677.1	6 486.7	10 493.3		

7.8%

Savings

15%

Production

TABLE 4

CALCULATED CROWN ROYALTY AND PRODUCTION TAX SAVINGS TO WIO'S (1.5% Base Decline)

Year	Expansion Case Prod'n (E3 m ³)	Old Oil Treatment		%New Oil	New Oil Treatment		Savings for Unit			
		Crown Royalty (m ³)	Prod'n Tax (m ³)		Crown Royalty (m ³)	Prod'n Tax (m ³)	Crown Royalty (m ³)	\$	Prod'n Tax (m ³)	\$
1984	26.220	1 895.2	1 653.5	1	1 875.5	1 621.4	19.7	3 695	32.1	6 034
1985	29.531	2 358.9	2 207.4	8	2 208.7	1 965.0	150.2	31 141	242.5	50 261
1986	30.247	2 464.1	2 335.0	11	2 241.7	1 976.7	222.4	22 125	358.4	43 702
1987	31.097	2 589.9	2 487.1	15	2 286.6	1 998.1	303.3	42 553	489.0	68 612
1988	31.354	2 628.2	2 533.5	17	2 283.9	1 978.5	344.3	36 168	554.9	58 294
1989	31.863	2 704.5	2 625.9	20	2 302.6	1 978.6	401.9		647.3	
1990	31.389	2 633.3	2 539.7	20	2 240.8	1 909.9	392.6		629.8	
1991	30.921	2 563.8	2 455.4	20	2 180.3	1 840.0	383.5		615.4	
1992	30.461	2 495.6	2 372.9	20	2 121.1	1 772.5	374.5		600.4	
1993	30.007	2 428.8	2 291.5	20	2 063.4	1 703.7	365.4		587.9	
1994	29.560	2 363.3	2 212.7	20	2 006.8	1 637.6	356.4		575.1	
1995	29.120	2 299.0	2 135.4	20	1 951.5	1 573.0	347.6		562.4	
1996	28.687	2 236.4	2 059.7	20	1 897.4	1 512.7	338.9		547.0	
1997	28.260	2 175.6	1 987.1	20	1 844.9	1 453.2	330.7		533.9	
1998	27.839	2 116.5	1 916.6	20	1 793.7	1 396.3	322.8		520.3	
1999	27.424	2 059.0	1 848.0	20	1 743.8	1 339.4	315.2		508.6	
2000	27.016	2 003.0	1 781.3	20	1 695.2	1 283.3	307.9		498.0	
2001	26.614	1 948.3	1 716.2	20	1 647.6	1 227.3	300.7		488.9	
2002	26.217	1 894.8	1 653.1	20	1 601.3	1 175.1	293.5		478.0	
2003	25.827	1 842.5	1 591.2	20	1 556.3	1 123.9	286.2		467.3	
2004	25.442	1 791.3	1 532.0	20	1 512.5	1 074.8	278.8		457.3	
2005	25.064	1 741.3	1 474.7	20	1 469.7	1 027.6	271.6		447.2	
2006	24.690	1 692.3	1 419.1	20	1 427.9	982.2	264.5		436.8	
2007	24.323	1 644.7	1 365.1	20	1 387.2	940.4	257.6		424.8	
2008	23.961	1 598.6	1 312.8	20	1 347.6	900.3	250.9		412.5	
2009	23.604	1 553.4	1 261.2	20	1 309.0	861.6	244.4		399.6	
2010	23.252	1 509.4	1 211.7	20	1 271.4	822.8	238.0		388.9	
2011	22.906	1 466.3	1 164.5	20	1 234.8	783.3	231.4		381.2	
2012	22.565	1 424.1	1 118.7	20	1 199.2	746.6	224.9		372.2	
2013	22.229	1 383.0	1 074.3	20	1 164.4	712.4	218.6		361.9	
2014	21.898	1 342.7	1 031.2	20	1 130.5	680.2	212.3		351.1	
2015	21.572	1 303.4	988.1	20	1 097.4	649.8	206.0		338.3	
2016	21.251	1 265.0	946.8	20	1 065.0	620.8	199.9		326.1	
2017	20.934	1 228.0	907.0	20	1 033.8	591.9	194.2		315.1	
2018	20.623	1 192.6	869.5	20	1 003.8	564.6	188.9		304.9	
2019	20.316	1 158.1	833.2	20	974.5	537.1	183.7		296.1	
2020	20.013	1 124.5	797.3	20	945.9	509.3	178.6		288.0	
2021	19.715	1 091.8	763.6	20	918.1	483.2	173.6		280.4	
2022	19.421	1 059.8	730.9	20	891.1	457.9	168.8		273.0	
2023	19.132	1 028.7	699.3	20	864.7	433.3	164.0		266.1	
2024	18.847	998.3	668.5	20	839.0	409.0	159.4		259.5	
2025	18.567	969.1	638.4	20	814.1	386.8	155.0		251.6	
2026	18.290	940.9	608.0	20	790.1	364.7	150.9		243.3	
2027	18.018	913.5	579.9	20	766.7	343.4	146.8		236.5	
2028	17.750	886.8	553.8	20	744.1	322.9	142.7		230.9	
2029	17.485	860.9	528.5	20	722.2	301.1	138.6		227.5	
2030	17.225	835.6	504.2	20	701.0	281.7	134.6		222.5	
2031	16.969	811.0	480.7	20	680.3	264.5	130.7		216.2	
2032	16.716	787.1	458.0	20	660.2	247.5	126.8		210.5	
2033	16.467	763.8	436.1	20	640.7	233.5	123.1		202.6	
2034	16.222	741.1	415.0	20	621.7	219.6	119.4		195.4	
2035	15.980	719.0	394.6	20	603.2	206.4	115.8		188.3	
Total	1 233.601	83 529.3	70 172.4		71 377.4	50 425.9	12 150.7		19 742.0	

14.5%
reduction

28.1% savings

Δ royalty & tax savings
between 1% decline & 15% decline

14913 m³

TABLE 5

**CALCULATED ADDITIONAL CROWN ROYALTY
AND PRODUCTION TAX PAID TO MANITOBA GOVERNMENT**

Year	Expansion Case ¹				Base Case ²				Incremental			
	Prod'n (E3 m ³)	% New	Crown Royalty (m ³)	Prod'n Tax (m ³)	Prod'n (E3 m ³)	% New Oil	Crown Royalty (m ³)	Prod'n Tax (m ³)	Crown Royalty (m ³)	\$	Prod'n Tax (m ³)	\$
1984	26.220	1	1 877.4	1 624.3	25.924	0	1 855.5	1 606.2	21.9	4 113	18.1	3 400
1985	29.531	7	2 221.6	1 984.7	27.387	0	2 053.8	1 841.9	167.8	34 779	142.8	29 594
1986	30.247	10	2 262.7	2 010.7	27.114	0	2 016.5	1 797.5	246.2	30 025	213.2	26 000
1987	31.097	14	2 315.3	2 044.3	26.845	0	1 979.7	1 753.5	335.6	47 084	290.8	40 800
1988	31.354	15	2 320.1	2 037.2	26.578	0	1 943.5	1 710.5	376.6	39 564	326.8	34 325
1989	31.863	17	2 346.0	2 047.5	26.313	0	1 907.7	1 668.3	438.2		379.2	
1990	31.389	17	2 291.0	1 988.5	26.051	0	1 872.5	1 626.9	418.4		361.6	
1991	30.921	17	2 237.1	1 929.0	25.792	0	1 837.9	1 585.8	399.3		343.3	
1992	30.461	16	2 184.3	1 873.2	25.535	0	1 803.7	1 546.3	380.6		326.9	
1993	30.007	16	2 132.3	1 816.5	25.281	0	1 770.0	1 507.6	362.3		309.0	
1994	29.560	15	2 081.4	1 760.7	25.030	0	1 736.9	1 469.6	344.5		291.0	
1995	29.120	15	2 031.4	1 706.2	24.781	0	1 704.1	1 432.5	327.2		273.7	
1996	28.687	14	1 982.4	1 653.5	24.534	0	1 672.0	1 396.1	310.4		257.5	
1997	28.260	14	1 934.8	1 601.4	24.290	0	1 640.6	1 360.4	294.3		241.1	
1998	27.839	14	1 888.4	1 550.7	24.048	0	1 609.7	1 325.4	278.7		225.3	
1999	27.424	13	1 843.1	1 501.3	23.809	0	1 579.4	1 291.1	263.8		210.1	
2000	27.016	13	1 798.9	1 451.1	23.572	0	1 549.5	1 256.8	249.5		194.3	
2001	26.614	12	1 755.6	1 403.5	23.338	0	1 520.0	1 223.4	235.6		180.1	
2002	26.217	12	1 713.1	1 358.6	23.106	0	1 491.0	1 191.6	222.1		167.0	
2003	25.827	11	1 671.5	1 314.0	22.876	0	1 462.5	1 160.4	209.0		153.6	
2004	25.442	11	1 630.7	1 270.1	22.648	0	1 434.4	1 129.8	196.3		140.3	
2005	25.064	11	1 590.7	1 228.3	22.423	0	1 406.7	1 099.8	184.1		128.5	
2006	24.690	10	1 551.5	1 188.4	22.200	0	1 379.4	1 070.4	172.1		117.9	
2007	24.323	10	1 513.2	1 150.9	21.979	0	1 352.5	1 041.8	160.7		109.1	
2008	23.961	9	1 475.9	1 113.1	21.760	0	1 326.1	1 013.2	149.9		99.9	
2009	23.604	9	1 439.4	1 075.4	21.543	0	1 300.0	984.5	139.4		90.9	
2010	23.252	8	1 403.6	1 039.0	21.329	0	1 274.3	956.6	129.3		82.4	
2011	22.906	8	1 368.6	1 004.1	21.117	0	1 249.3	930.7	119.4		73.5	
2012	22.565	7	1 334.4	969.5	20.907	0	1 224.8	930.7	109.6		38.8	
2013	22.229	7	1 301.2	937.0	20.699	0	1 201.2	878.6	100.0		58.4	
2014	21.898	6	1 268.6	906.1	20.493	0	1 178.0	854.1	90.6		52.0	
2015	21.572	6	1 236.7	877.6	20.289	0	1 155.2	830.1	81.5		47.5	
2016	21.251	5	1 205.4	848.7	20.089	0	1 132.7	806.6	72.7		42.1	
2017	20.934	5	1 175.2	820.0	19.887	0	1 110.6	783.0	64.6		37.0	
2018	20.623	5	1 146.0	792.8	19.689	0	1 088.9	760.7	57.0		32.1	
2019	20.316	4	1 117.4	766.4	19.493	0	1 067.6	738.9	49.8		27.5	
2020	20.013	4	1 089.5	741.0	19.299	0	1 046.6	717.5	42.8		23.4	
2021	19.715	3	1 062.2	716.0	19.107	0	1 026.0	696.6	36.2		19.4	
2022	19.421	3	1 035.5	692.8	18.917	0	1 005.7	676.1	29.8		16.7	
2023	19.132	2	1 009.4	668.7	18.729	0	985.8	655.7	23.6		12.9	
2024	18.847	2	984.0	644.7	18.543	0	966.6	635.9	17.4		8.8	
2025	18.567	1	959.5	620.9	18.358	0	947.8	614.9	11.7		5.9	
2026	18.290	1	935.7	599.6	18.176	0	929.3	596.4	6.4		3.2	
2027	18.018	0	912.5	578.2	17.995	0	911.2	577.6	1.3		0.6	
2028	17.750	0	886.8	553.8	17.816	0	893.3	560.1	-6.5		-6.4	
2029	17.485	0	860.9	528.5	17.638	0	875.8	543.1	-15.0		-14.5	
2030	17.225	0	835.6	504.2	17.463	0	858.7	526.4	-23.1		-22.2	
2031	16.969	0	811.0	480.7	17.289	0	841.8	510.1	-30.8		-29.5	
2032	16.716	0	787.1	458.0	17.117	0	825.2	494.2	-38.1		-36.2	
2033	16.467	0	763.8	436.1	16.947	0	808.9	478.7	-45.2		-42.6	
2034	16.222	0	741.1	415.0	16.778	0	792.9	463.5	-51.9		-48.5	
2035	15.980	0	719.0	394.6	16.611	0	777.2	448.7	-58.2		-54.1	
Total	1 231.101	77	1040.5	59 677.1	1 125.532	69	381.0	53 756.8	7 659.4	5 920.2		

1. New oil royalty and tax calculated above a nominal 1.0% base decline.
2. Base case production assumes an actual 1.0% production decline.

CROWN BENEFITS

13580 m³

105.569 m³
rec.

TABLE 6

**CALCULATED ADDITIONAL CROWN ROYALTY
AND PRODUCTION TAX PAID TO MANITOBA GOVERNMENT**

Year	Expansion Case ¹				Base Case ²				Incremental			
	Prod'n (E3 m ³)	% New	Crown Royalty (m ³)	Prod'n Tax (m ³)	Prod'n (E3 m ³)	% New Oil	Crown Royalty (m ³)	Prod'n Tax (m ³)	Crown Royalty (m ³)	\$	Prod'n Tax (m ³)	\$
1984	26.220	1	1 875.5	1 621.4	25.894	0	1 851.5	1 601.6	24.1	4 522	19.9	3 733
1985	29.531	8	2 208.7	1 965.0	27.177	0	2 025.0	1 807.7	183.6	38 062	157.3	32 597
1986	30.247	11	2 241.7	1 976.7	26.772	0	1 969.9	1 741.8	316.7	38 625	234.9	28 644
1987	31.097	15	2 286.6	1 998.1	26.374	0	1 915.9	1 677.9	368.0	51 036	320.2	44 924
1988	31.354	17	2 283.9	1 978.5	25.981	0	1 863.1	1 615.1	439.5	46 171	363.4	38 178
1989	31.863	20	2 302.6	1 978.6	25.594	0	1 811.5	1 555.2	429.3		423.4	
1990	31.389	20	2 240.8	1 909.9	25.213	0	1 761.0	1 497.2	419.3		412.6	
1991	30.921	20	2 180.3	1 840.0	24.838	0	1 711.6	1 440.9	409.5		399.1	
1992	30.461	20	2 121.1	1 772.5	24.468	0	1 663.3	1 386.3	400.1		386.2	
1993	30.007	20	2 063.4	1 703.7	24.103	0	1 616.7	1 333.3	390.1		370.4	
1994	29.560	20	2 006.8	1 637.6	23.745	0	1 571.2	1 281.9	380.3		355.7	
1995	29.120	20	1 951.5	1 573.0	23.391	0	1 526.7	1 230.8	370.7		342.2	
1996	28.687	20	1 897.4	1 512.7	23.043	0	1 483.2	1 183.0	361.7		329.7	
1997	28.260	20	1 844.9	1 453.2	22.700	0	1 440.7	1 136.7	353.0		316.5	
1998	27.839	20	1 793.7	1 396.3	22.362	0	1 399.2	1 091.7	344.6		304.5	
1999	27.424	20	1 743.8	1 339.4	22.029	0	1 358.6	1 048.1	336.6		291.3	
2000	27.016	20	1 695.2	1 283.3	21.701	0	1 318.9	1 005.5	328.7		277.8	
2001	26.614	20	1 647.6	1 227.3	21.378	0	1 280.1	962.7	321.2		264.7	
2002	26.217	20	1 601.3	1 175.1	21.059	0	1 242.5	923.1	313.8		252.0	
2003	25.827	20	1 556.3	1 123.9	20.746	0	1 206.5	884.2	306.0		239.6	
2004	25.442	20	1 512.5	1 074.8	20.437	0	1 171.7	847.5	298.0		227.3	
2005	25.064	20	1 469.7	1 027.6	20.132	0	1 137.7	811.9	290.1		215.7	
2006	24.690	20	1 427.9	982.2	19.833	0	1 104.6	776.8	282.5		205.4	
2007	24.323	20	1 387.2	940.4	19.537	0	1 072.4	743.8	275.2		196.6	
2008	23.961	20	1 347.6	900.3	19.246	0	1 040.9	711.7	268.1		188.6	
2009	23.604	20	1 309.0	861.6	18.960	0	1 010.2	680.7	261.1		180.9	
2010	23.252	20	1 271.4	822.8	18.678	0	980.5	650.2	254.4		172.5	
2011	22.906	20	1 234.8	783.3	18.399	0	952.0	619.1	247.2		164.1	
2012	22.565	20	1 199.2	746.6	18.125	0	924.3	590.5	240.2		156.1	
2013	22.229	20	1 164.4	712.4	17.856	0	897.3	564.0	233.2		148.4	
2014	21.898	20	1 130.5	680.2	17.590	0	871.1	538.4	226.3		141.8	
2015	21.572	20	1 097.4	649.8	17.328	0	845.5	513.7	219.5		136.1	
2016	21.251	20	1 065.0	620.8	17.070	0	820.7	489.9	213.2		130.9	
2017	20.934	20	1 033.8	591.9	16.816	0	796.5	466.9	207.3		125.0	
2018	20.623	20	1 003.8	564.6	16.565	0	772.9	444.7	201.6		119.9	
2019	20.316	20	974.5	537.1	16.319	0	750.0	423.3	196.0		113.9	
2020	20.013	20	945.9	509.3	16.076	0	727.7	402.6	190.5		106.7	
2021	19.715	20	918.1	483.2	15.836	0	706.0	382.7	185.1		100.5	
2022	19.421	20	891.1	457.9	15.600	0	684.8	363.5	179.9		94.5	
2023	19.132	20	864.7	433.3	15.368	0	664.2	344.9	174.7		88.3	
2024	18.847	20	839.0	409.0	15.139	0	644.2	327.1	169.9		81.9	
2025	18.567	20	814.1	386.8	14.914	0	624.7	309.8	165.4		77.7	
2026	18.290	20	790.1	364.7	14.692	0	605.7	293.2	161.0		71.5	
2027	18.018	20	766.7	343.4	14.473	0	587.2	277.2	156.9		66.2	
2028	17.750	20	744.1	322.9	14.258	0	569.6	261.8	152.6		61.1	
2029	17.485	20	722.2	301.1	14.045	0	552.8	244.9	148.2		56.2	
2030	17.225	20	701.0	281.7	13.836	0	536.5	230.9	143.9		50.8	
2031	16.969	20	680.3	264.5	13.630	0	520.6	217.6	139.6		46.9	
2032	16.716	20	660.2	247.5	13.427	0	505.2	205.8	135.5		41.7	
2033	16.467	20	640.7	233.5	13.227	0	490.3	194.4	131.4		39.1	
2034	16.222	20	621.7	219.6	13.030	0	475.8	183.4	127.4		36.2	
2035	15.980	20	603.2	206.4	12.836	0	461.7	172.1	-461.7		34.3	
Totals	1 231.101	✓	71 374.9	✓ 50 427.4	✓ 1 001.846		56 522.4	40 689.7	12 611.0		9 738.2	

1. New oil royalty and tax calculated above a nominal 1.5% base decline.
2. Base case production assumes an actual 1.5% production decline.

Handwritten: Crown Royalty, 2034-2035

Handwritten: 229,255 m³

TABLE 7

CALCULATED ADDITIONAL FREEHOLD ROYALTY PAID

Year	Expansion Case			Base Case ¹			Incremental	
	Prod'n (E3 m ³)	%New	Freehold Royalty (m ³)	Prod'n (E3 m ³)	% New Oil	Freehold Royalty (m ³)	Freehold Royalty (m ³)	\$
1984	26.220	1	1 869.2	25.924	0	1 848.1	21.1	3 966
1985	29.531	7	2 105.3	27.387	0	1 952.4	152.8	31 683
1986	30.247	10	2 156.3	27.114	0	1 933.0	223.4	27 238
1987	31.097	14	2 216.9	26.845	0	1 913.8	303.1	42 528
1988	31.354	15	2 235.2	26.578	0	1 894.7	340.5	35 767
1989	31.863	17	2 271.5	26.313	0	1 875.9	395.7	
1990	31.389	17	2 237.7	26.051	0	1 857.2	380.5	
1991	30.921	17	2 204.4	25.792	0	1 838.7	365.6	
1992	30.461	16	2 171.6	25.535	0	1 820.4	351.2	
1993	30.007	16	2 139.2	25.281	0	1 802.3	336.9	
1994	29.560	15	2 107.3	25.030	0	1 784.3	322.9	
1995	29.120	15	2 076.0	24.781	0	1 766.6	309.3	
1996	28.687	14	2 045.1	24.534	0	1 749.0	296.1	
1997	28.260	14	2 014.7	24.290	0	1 731.6	283.0	
1998	27.839	14	1 984.6	24.048	0	1 714.4	270.3	
1999	27.424	13	1 955.1	23.809	0	1 697.3	257.7	
2000	27.016	13	1 926.0	23.572	0	1 680.4	245.5	
2001	26.614	12	1 897.3	23.338	0	1 663.8	233.5	
2002	26.217	12	1 869.0	23.106	0	1 647.2	221.8	
2003	25.827	11	1 841.2	22.876	0	1 630.8	210.4	
2004	25.442	11	1 813.8	22.648	0	1 614.6	199.2	
2005	25.064	11	1 786.8	22.423	0	1 598.5	188.3	
2006	24.690	10	1 760.2	22.200	0	1 582.6	177.5	
2007	24.323	10	1 734.0	21.979	0	1 566.9	167.1	
2008	23.961	9	1 708.2	21.760	0	1 551.3	156.9	
2009	23.604	9	1 682.7	21.543	0	1 535.8	146.9	
2010	23.252	8	1 657.6	21.329	0	1 520.5	137.1	
2011	22.906	8	1 633.0	21.117	0	1 505.5	127.5	
2012	22.565	7	1 608.7	20.907	0	1 490.4	118.2	
2013	22.229	7	1 584.7	20.699	0	1 475.6	109.1	
2014	21.898	6	1 561.1	20.493	0	1 460.9	100.2	
2015	21.572	6	1 537.9	20.289	0	1 446.4	91.5	
2016	21.251	5	1 515.0	20.087	0	1 432.0	83.0	
2017	20.934	5	1 492.4	19.887	0	1 417.7	74.6	
2018	20.623	5	1 470.2	19.689	0	1 403.6	66.6	
2019	20.316	4	1 448.3	19.493	0	1 389.7	58.7	
2020	20.013	4	1 426.7	19.299	0	1 375.8	50.9	
2021	19.715	3	1 405.5	19.107	0	1 362.1	43.3	
2022	19.421	3	1 384.5	18.917	0	1 348.6	35.9	
2023	19.132	2	1 363.9	18.729	0	1 335.2	28.7	
2024	18.847	2	1 343.6	18.543	0	1 321.9	21.7	
2025	18.567	1	1 323.6	18.358	0	1 308.7	14.9	
2026	18.290	1	1 303.9	18.176	0	1 295.8	8.1	
2027	18.018	0	1 284.5	17.995	0	1 282.9	1.6	
2028	17.750	0	1 265.4	17.816	0	1 270.1	-4.7	
2029	17.485	0	1 246.5	17.638	0	1 257.4	-10.9	
2030	17.225	0	1 228.0	17.463	0	1 244.9	-17.0	
2031	16.969	0	1 209.7	17.289	0	1 232.5	-22.8	
2032	16.716	0	1 191.7	17.117	0	1 220.3	-28.6	
2033	16.467	0	1 173.9	16.947	0	1 208.2	-34.2	
2034	16.222	0	1 156.5	16.778	0	1 196.1	-39.6	
2035	15.980	0	1 139.2	16.611	0	1 184.2	-45.0	
Total	1 231.101		87 765.3	1 125.530		80 238.6	7 526.0	- Freehold R.O. benefit

1. Base case production assumes an actual 1.0% decline.

TABLE 8

CALCULATED ADDITIONAL FREEHOLD ROYALTY PAID

Year	Expansion Case		Freehold Royalty (m ³)	Base Case ¹		Freehold Royalty (m ³)	Incremental	
	Prod'n (E3 m ³)	%New		Prod'n (E3 m ³)	% New Oil		Freehold Royalty (m ³)	\$
1984	26.220	1	1 869.2	25.894	0	1 846.0	23.2	4 368
1985	29.531	8	2 105.3	27.177	0	1 937.4	167.8	34 786
1986	30.247	11	2 156.3	26.772	0	1 908.6	247.7	30 209
1987	31.097	15	2 216.9	26.374	0	1 880.2	336.7	47 242
1988	31.354	17	2 235.2	25.981	0	1 852.2	383.0	40 237
1989	31.863	20	2 271.5	25.594	0	1 824.6	446.9	
1990	31.389	20	2 237.7	25.213	0	1 797.4	440.3	
1991	30.921	20	2 204.4	24.838	0	1 770.7	433.7	
1992	30.461	20	2 171.6	24.468	0	1 744.3	427.3	
1993	30.007	20	2 139.2	24.103	0	1 718.3	420.9	
1994	29.560	20	2 107.3	23.745	0	1 692.7	414.6	
1995	29.120	20	2 076.0	23.391	0	1 667.5	408.4	
1996	28.687	20	2 045.1	23.043	0	1 642.7	402.4	
1997	28.260	20	2 014.7	22.700	0	1 618.3	396.4	
1998	27.839	20	1 984.6	22.362	0	1 594.2	390.5	
1999	27.424	20	1 955.1	22.029	0	1 570.4	384.6	
2000	27.016	20	1 926.0	21.701	0	1 547.0	378.9	
2001	26.614	20	1 897.3	21.378	0	1 524.0	373.3	
2002	26.217	20	1 869.0	21.059	0	1 501.3	367.7	
2003	25.827	20	1 841.2	20.746	0	1 479.0	362.3	
2004	25.442	20	1 813.7	20.437	0	1 456.9	356.8	
2005	25.064	20	1 786.8	20.132	0	1 435.2	351.6	
2006	24.690	20	1 760.2	19.833	0	1 413.9	346.3	
2007	24.323	20	1 734.0	19.537	0	1 392.8	341.2	
2008	23.961	20	1 708.2	19.246	0	1 372.1	336.1	
2009	23.614	20	1 683.4	18.960	0	1 351.6	331.8	
2010	23.252	20	1 657.6	18.678	0	1 331.5	326.1	
2011	22.906	20	1 633.0	18.399	0	1 311.7	321.3	
2012	22.565	20	1 608.7	18.125	0	1 292.2	316.5	
2013	22.229	20	1 584.7	17.856	0	1 272.9	311.8	
2014	21.898	20	1 561.1	17.590	0	1 254.0	307.1	
2015	21.572	20	1 537.9	17.328	0	1 235.3	302.6	
2016	21.251	20	1 515.0	17.070	0	1 216.9	298.1	
2017	20.934	20	1 492.4	16.816	0	1 198.8	293.6	
2018	20.623	20	1 470.2	16.565	0	1 180.9	289.3	
2019	20.316	20	1 448.3	16.319	0	1 163.4	285.0	
2020	20.013	20	1 426.7	16.076	0	1 146.0	280.7	
2021	19.715	20	1 405.5	15.836	0	1 129.0	276.5	
2022	19.421	20	1 384.5	15.600	0	1 112.2	272.4	
2023	19.132	20	1 363.9	15.368	0	1 095.6	268.3	
2024	18.847	20	1 343.6	15.139	0	1 079.3	264.3	
2025	18.567	20	1 323.6	14.914	0	1 063.2	260.4	
2026	18.290	20	1 303.9	14.692	0	1 047.4	256.5	
2027	18.018	20	1 284.5	14.473	0	1 031.8	252.7	
2028	17.750	20	1 265.4	14.258	0	1 016.4	249.0	
2029	17.485	20	1 246.5	14.045	0	1 001.3	245.2	
2030	17.225	20	1 228.0	13.836	0	986.4	241.6	
2031	16.969	20	1 209.7	13.630	0	971.7	238.0	
2032	16.716	20	1 191.7	13.427	0	957.2	234.5	
2033	16.467	20	1 173.9	13.227	0	943.0	231.0	
2034	16.222	20	1 156.5	13.030	0	928.9	227.5	
2035	15.980	20	1 139.2	12.836	0	915.1	224.1	
Total	1 231.111		87 765.9	1 001.846		71 421.4	16 344.5	

1. Base case production assumes an actual 1.5% decline.

TABLE 9

BENEFITS SUMMARY TABLE

1. Case: 1.0% decline in base case production
1.0% decline for new oil royalty and production
tax calculations

WIO's Benefits	16 980 m ³
Government Benefits	13 580 m ³
Freeholders Benefits	7 528 m ³

2. Case: 1.5% decline in base case production
1.5% decline for new oil royalty and production
tax calculations

WIO's Benefits	31 895 m ³
Government Benefits	22 349 m ³
Freeholders Benefits	16 344 m ³

FIGURE 1

DAILY UNIT NO. 3
INJECTION PLOT
A 10-01-010-28W1

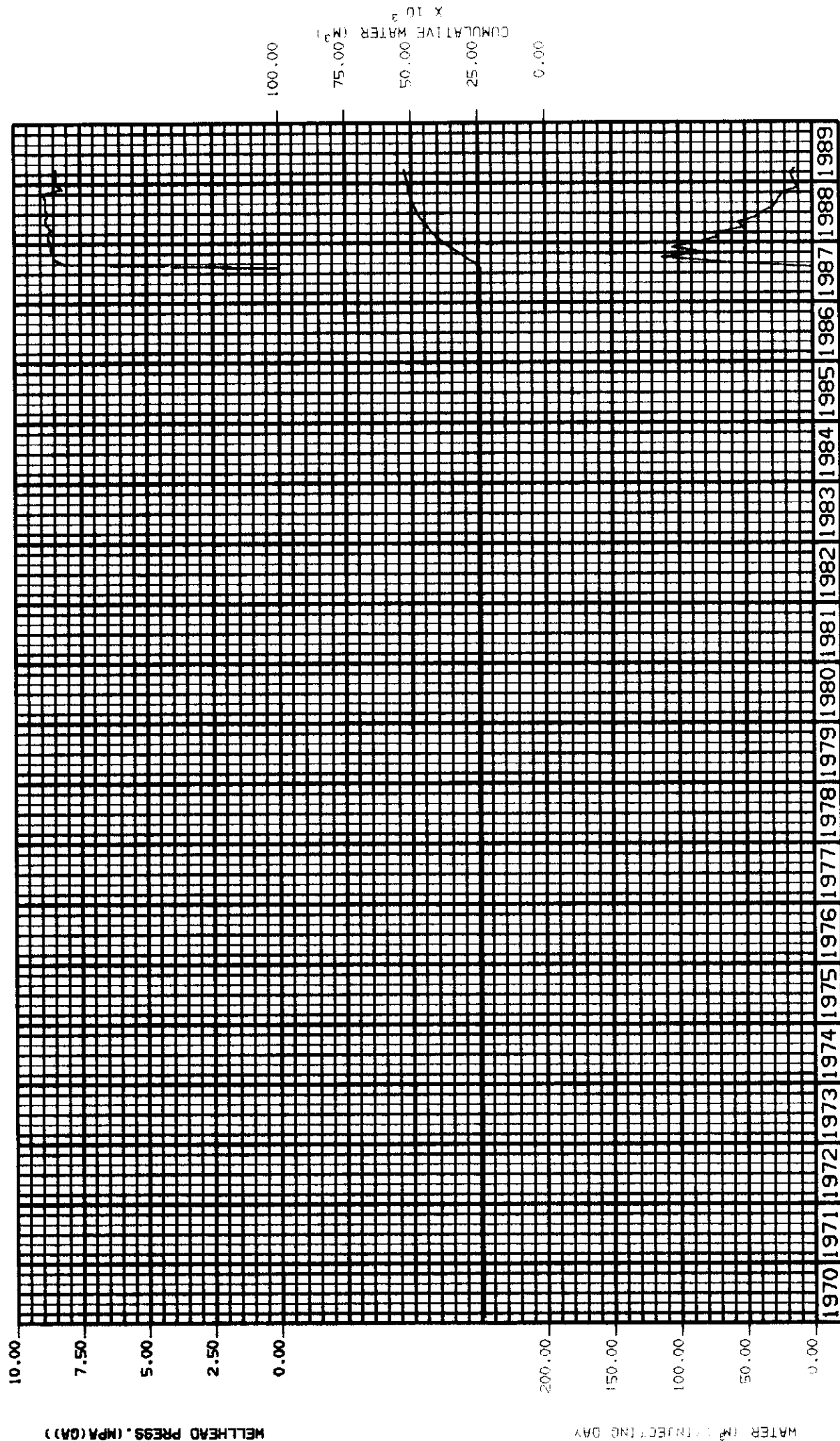


FIGURE 2

DALY UNIT NO. 3
INJECTION PLOT
12-01-010-28W1

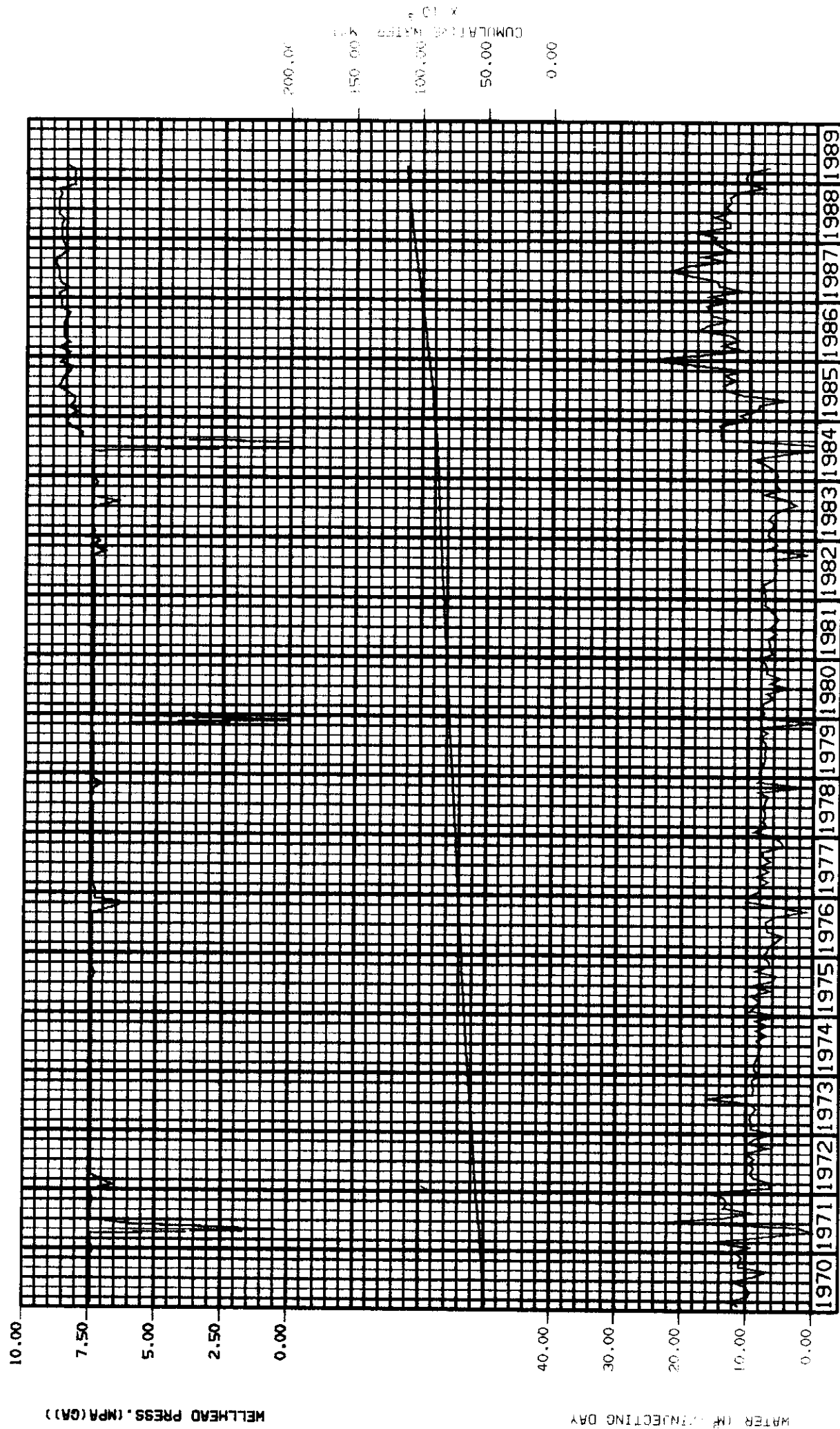
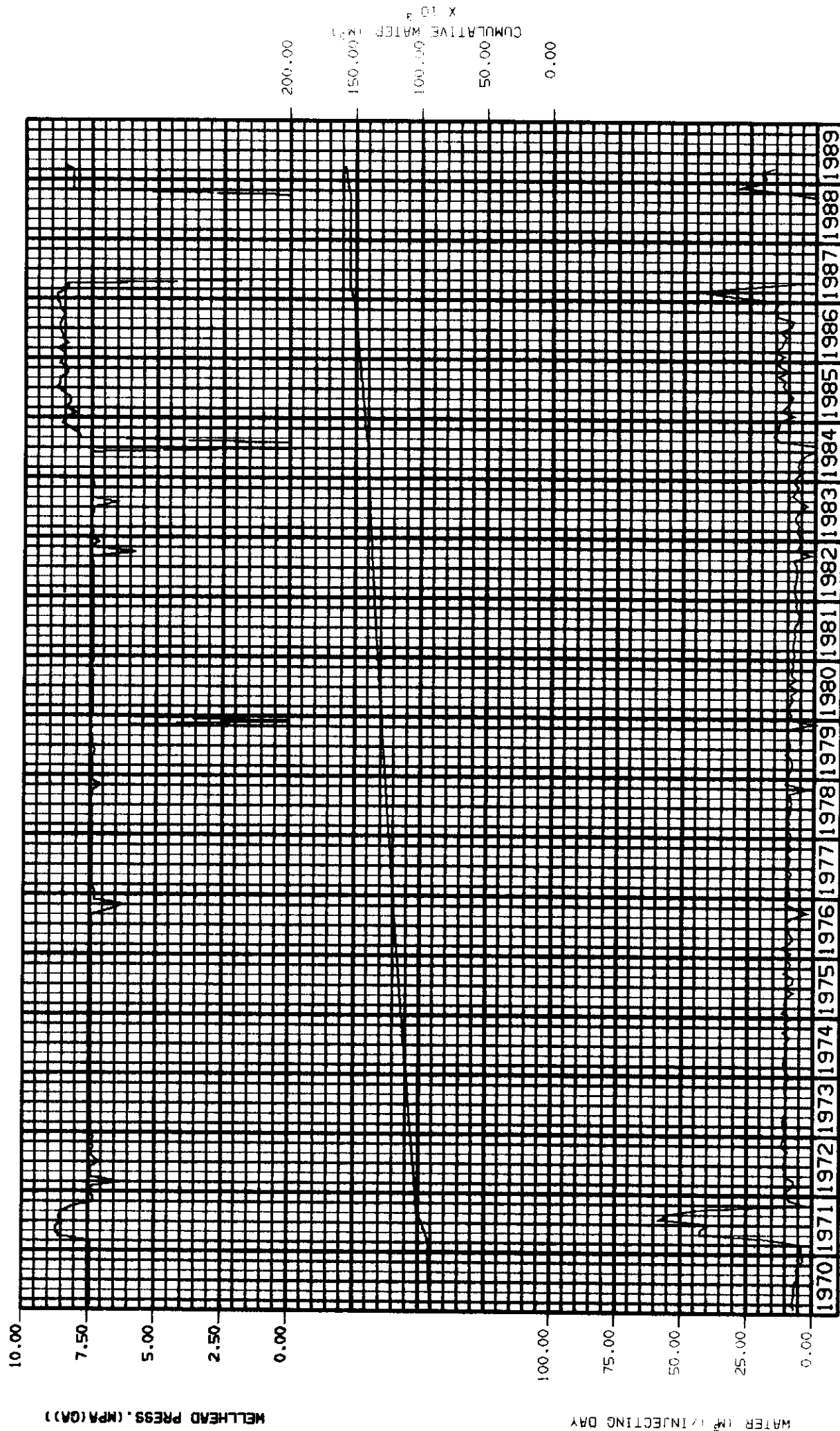


FIGURE 3

DALY UNIT NO. 3
INJECTION PLOT
14-01-010-28W1



DATE

FIGURE 4

DALY UNIT NO. 3
INJECTION PLOT
16-01-010-28W1

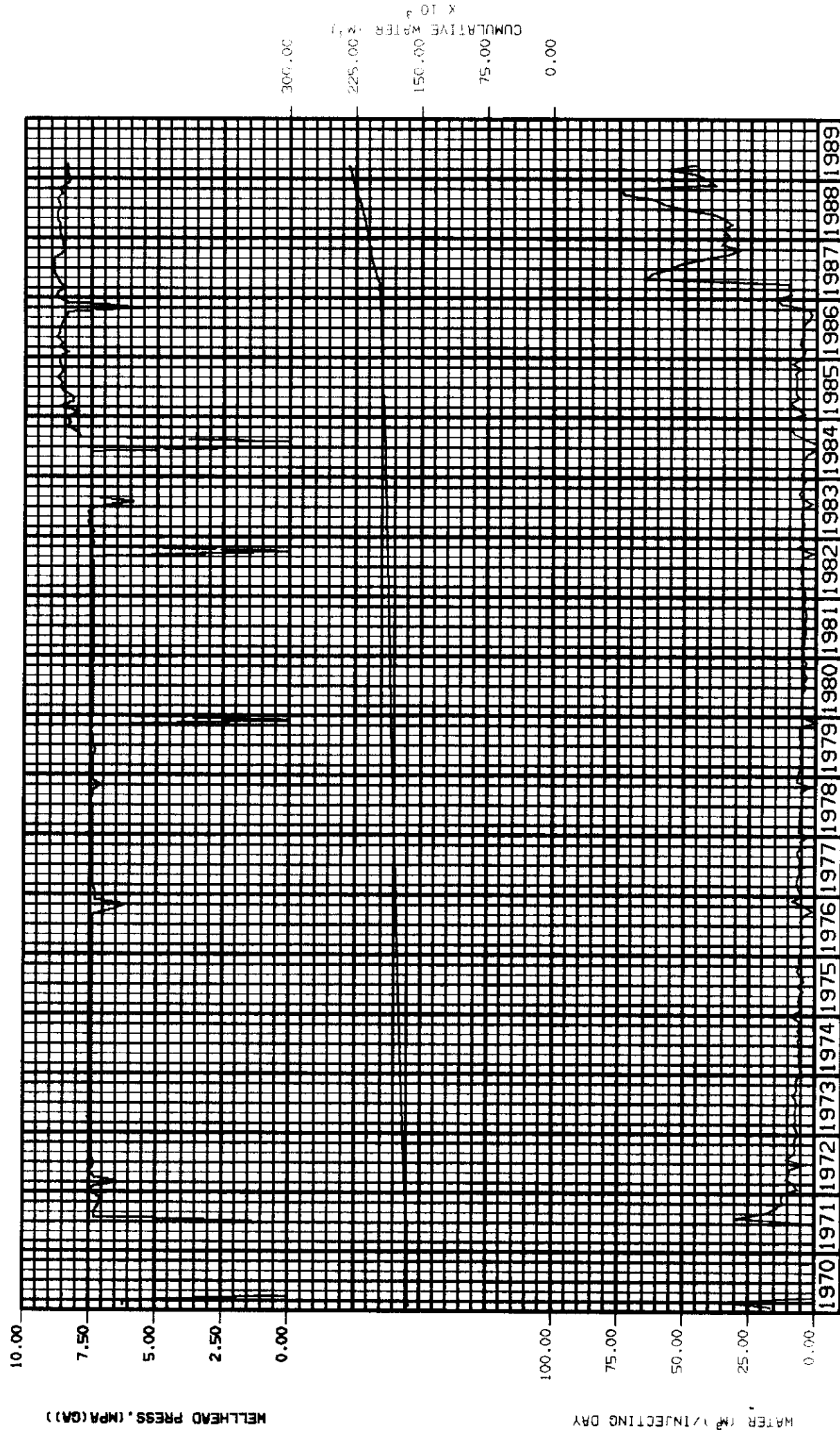


FIGURE 5

DALY UNIT NO. 3
INJECTION PLOT
13-02-010-28W1

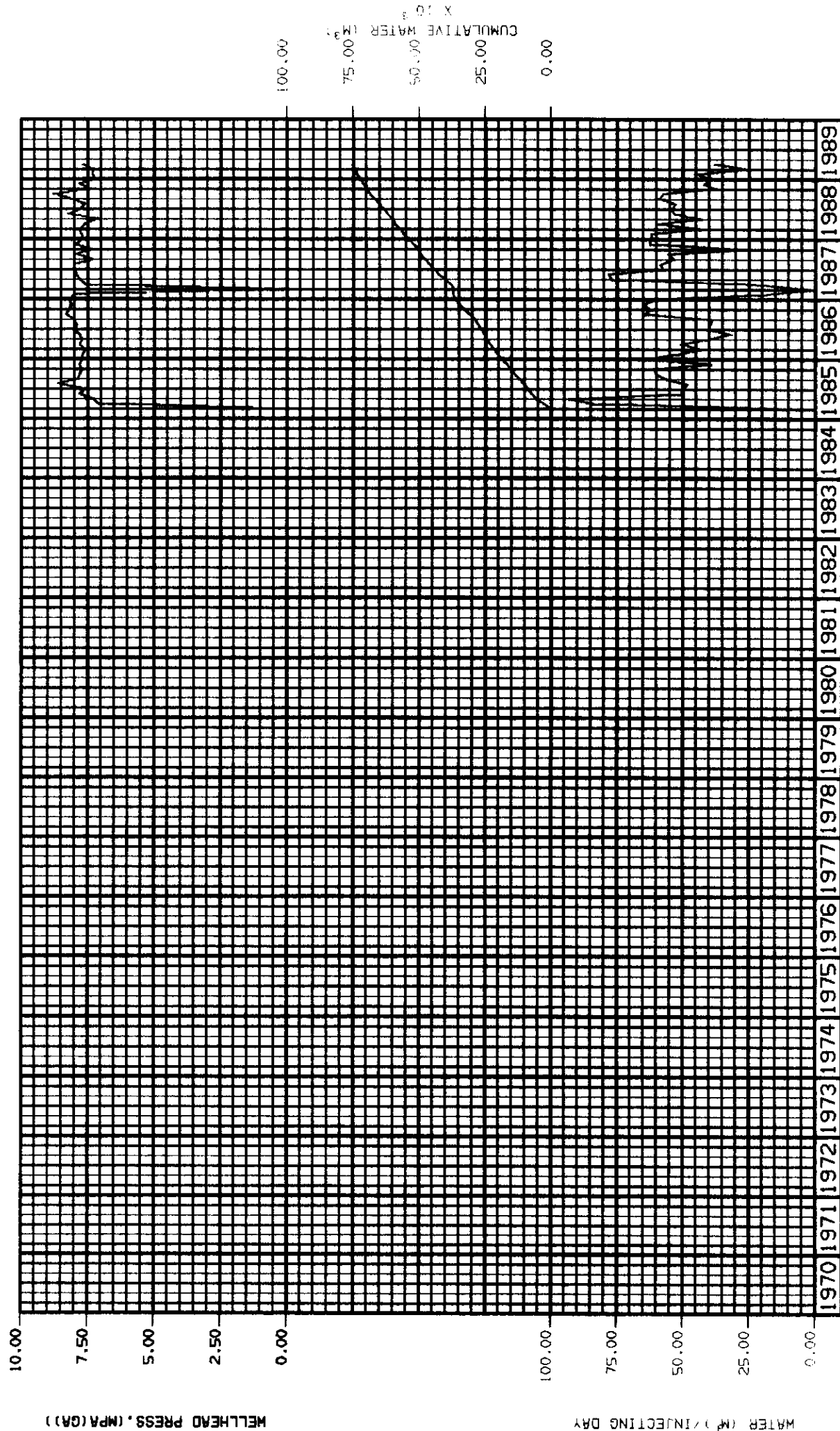


FIGURE 6

DALY UNIT NO. 3
INJECTION PLOT
16-02-010-28W1

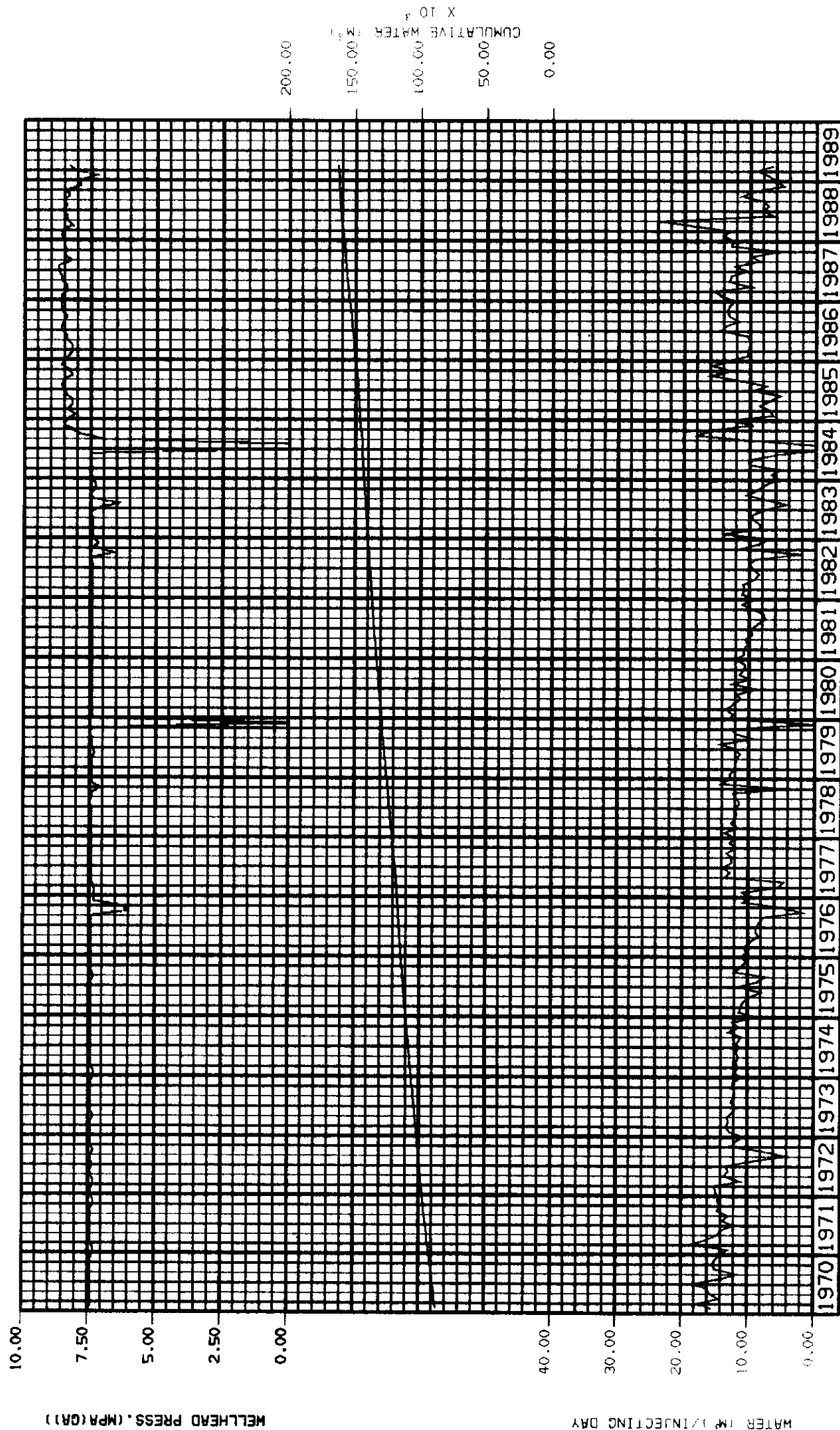
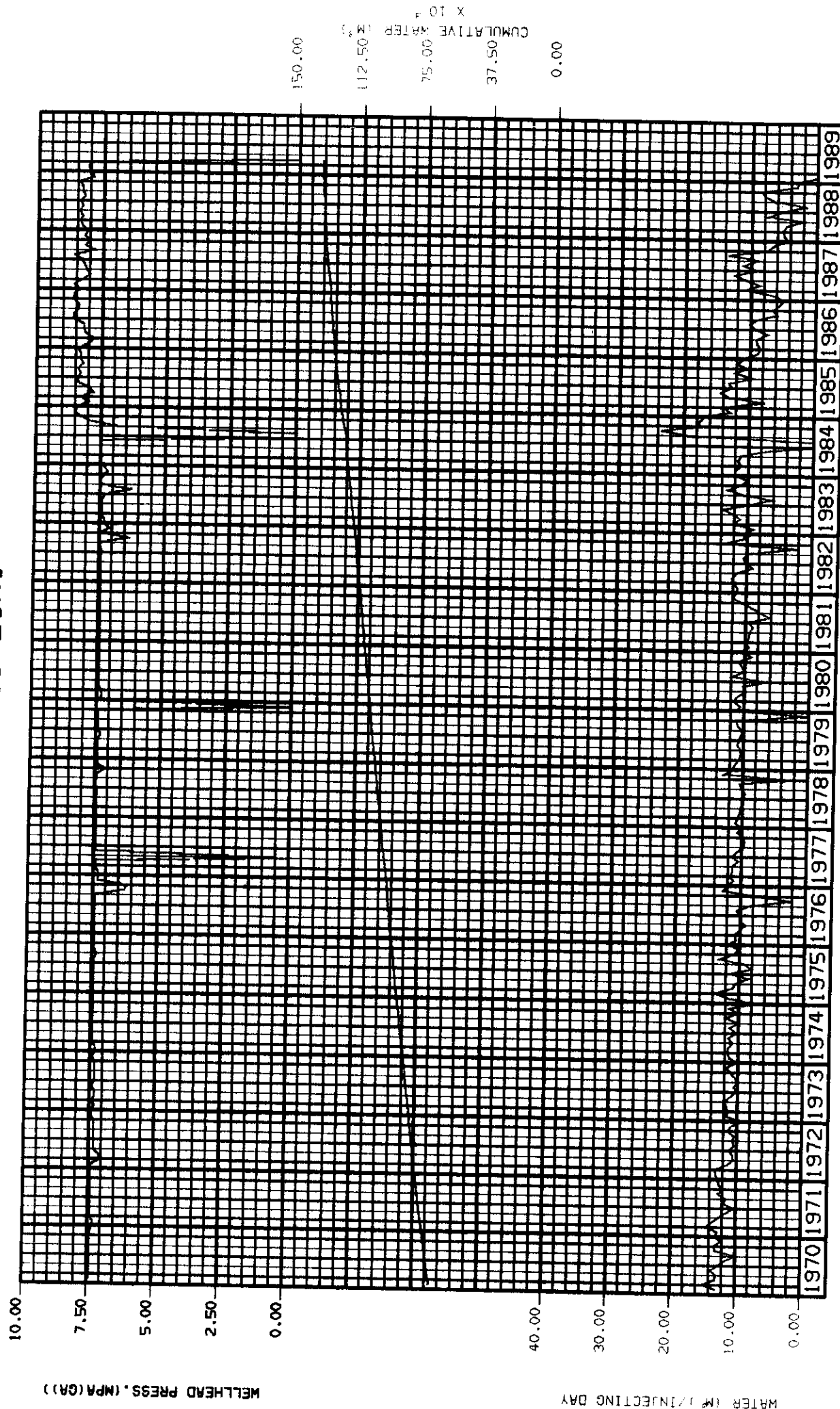


FIGURE 7

DAILY UNIT NO. 3
INJECTION PLOT
02-11-010-28W1



DATE

FIGURE 8

DALY UNIT NO. 3
INJECTION PLOT
06-11-010-28W1

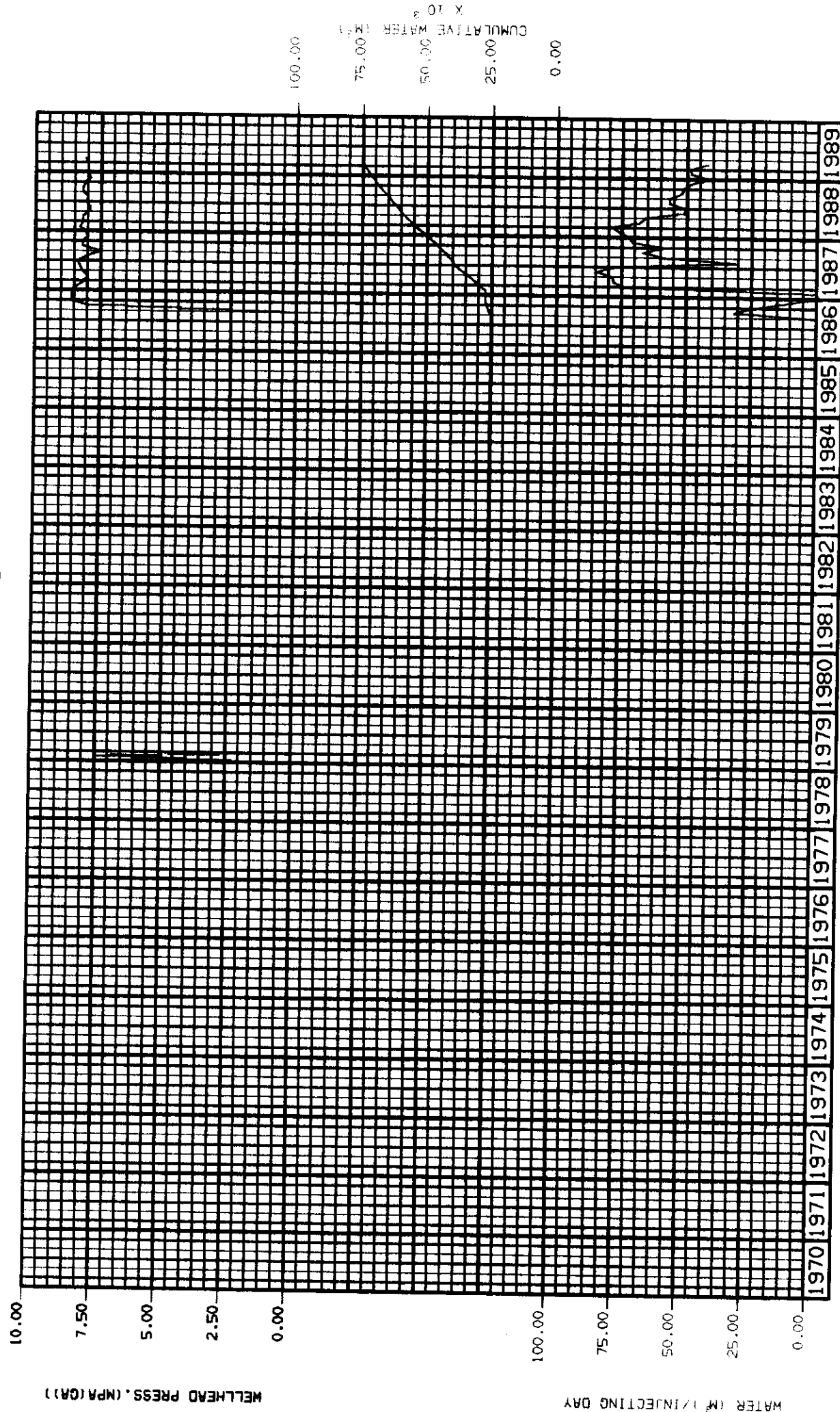


FIGURE 9

DALY UNIT NO. 3
INJECTION PLOT
08-11-010-28W1

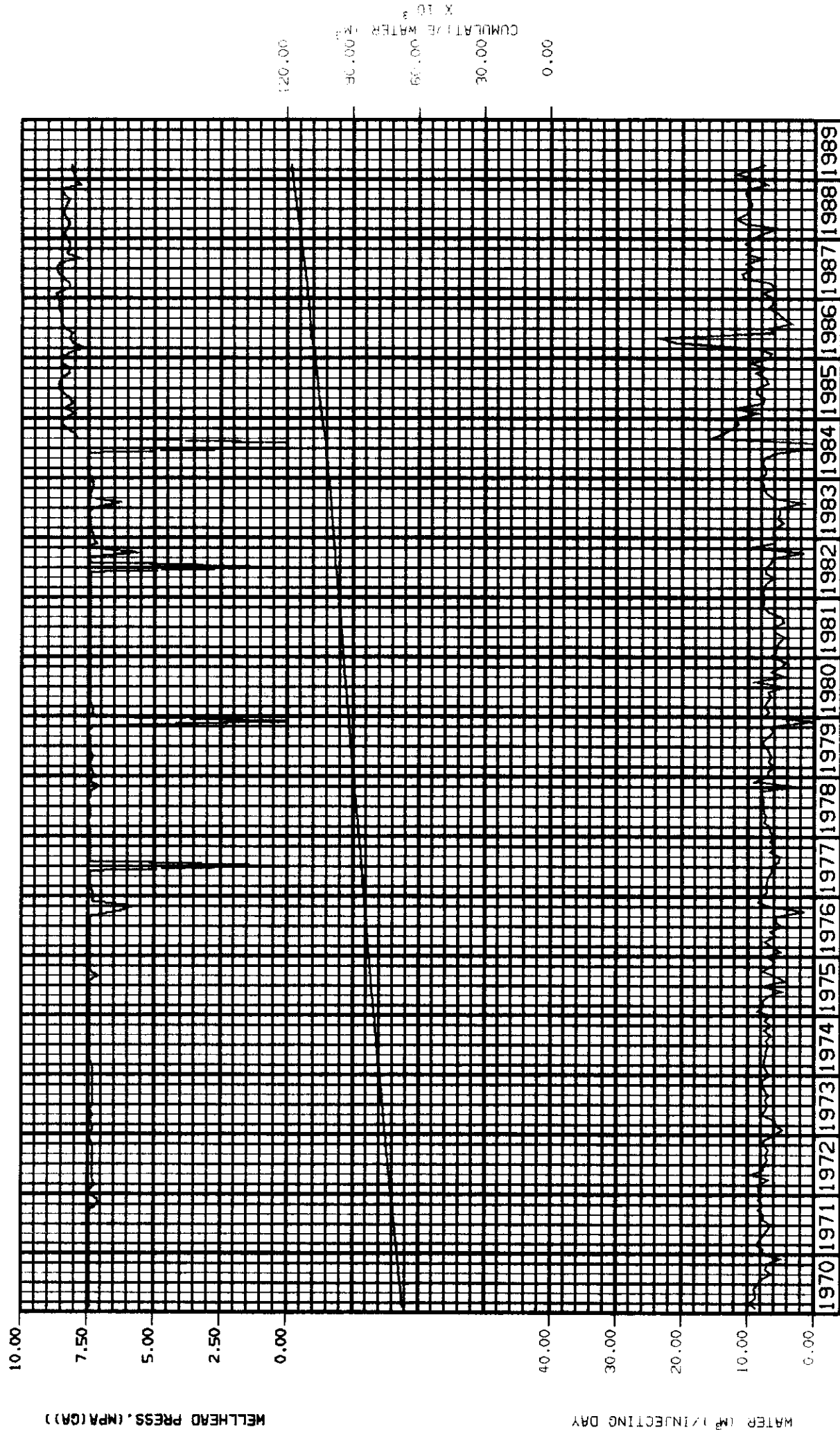


FIGURE 10

DALY UNIT NO. 3
INJECTION PLOT
10-11-010-28W1

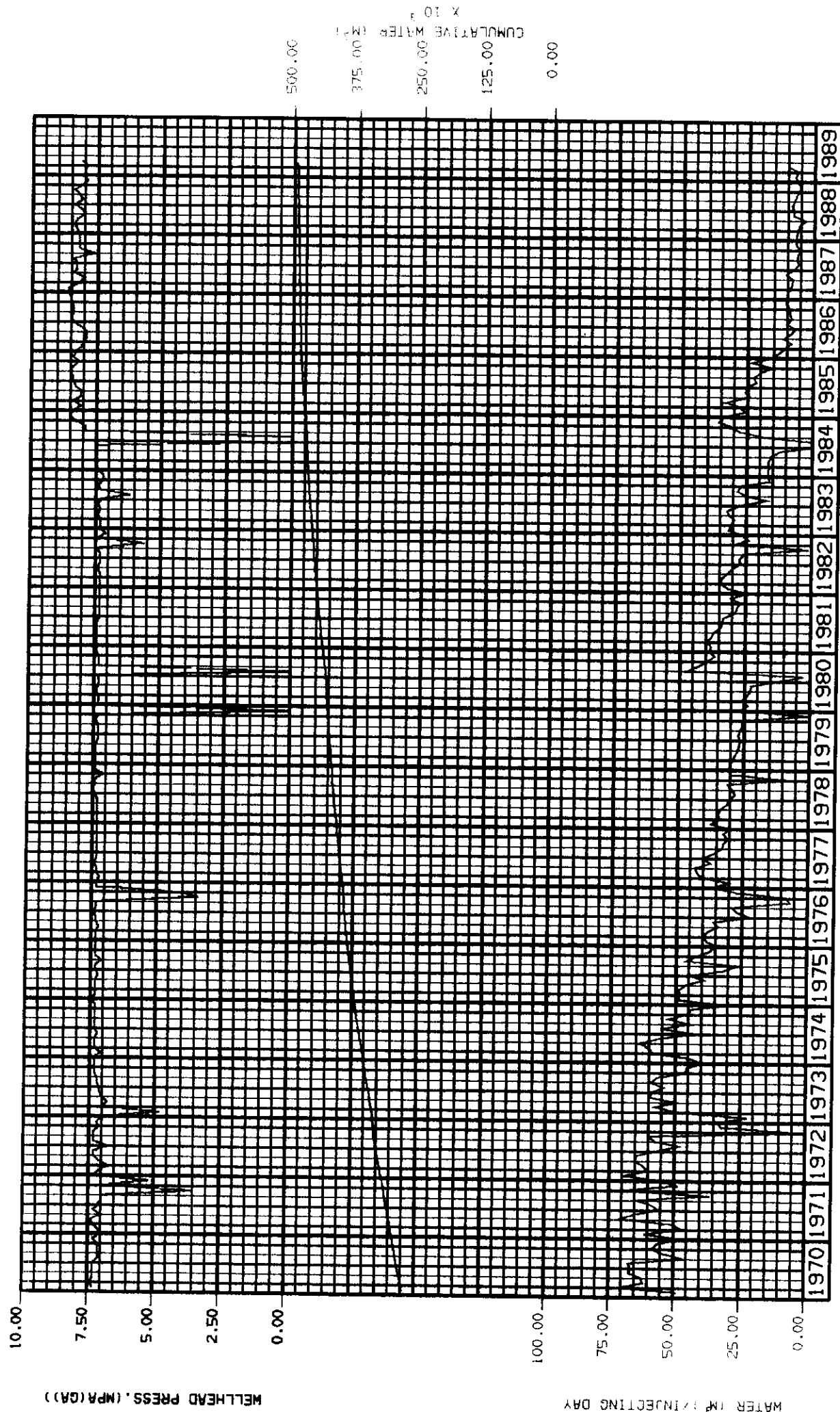


FIGURE 11

DALY UNIT NO. 3
INJECTION PLOT
12-11-010-28W1

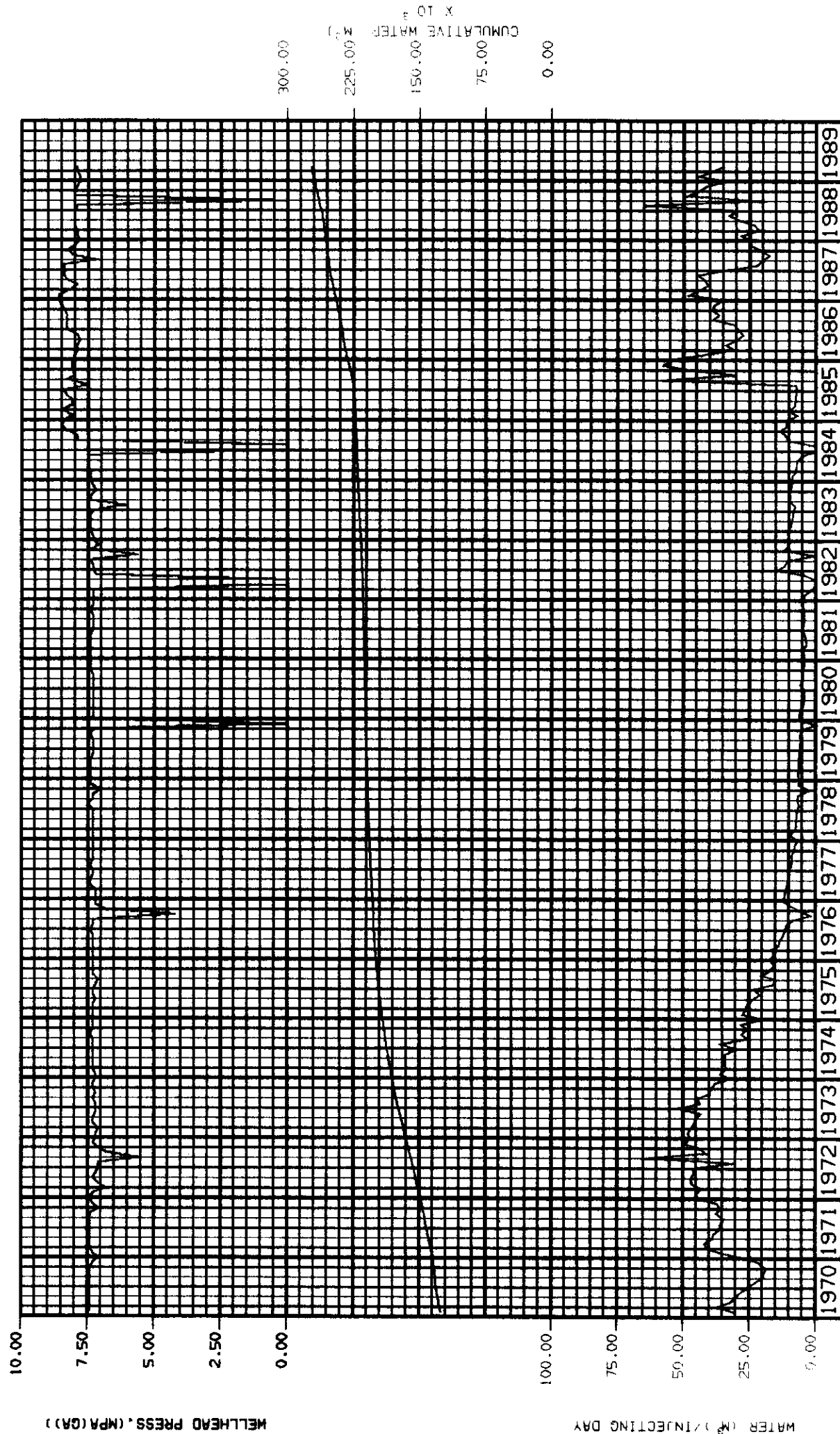


FIGURE 12

DALY UNIT NO. 3
INJECTION PLOT
14-11-010-28W1

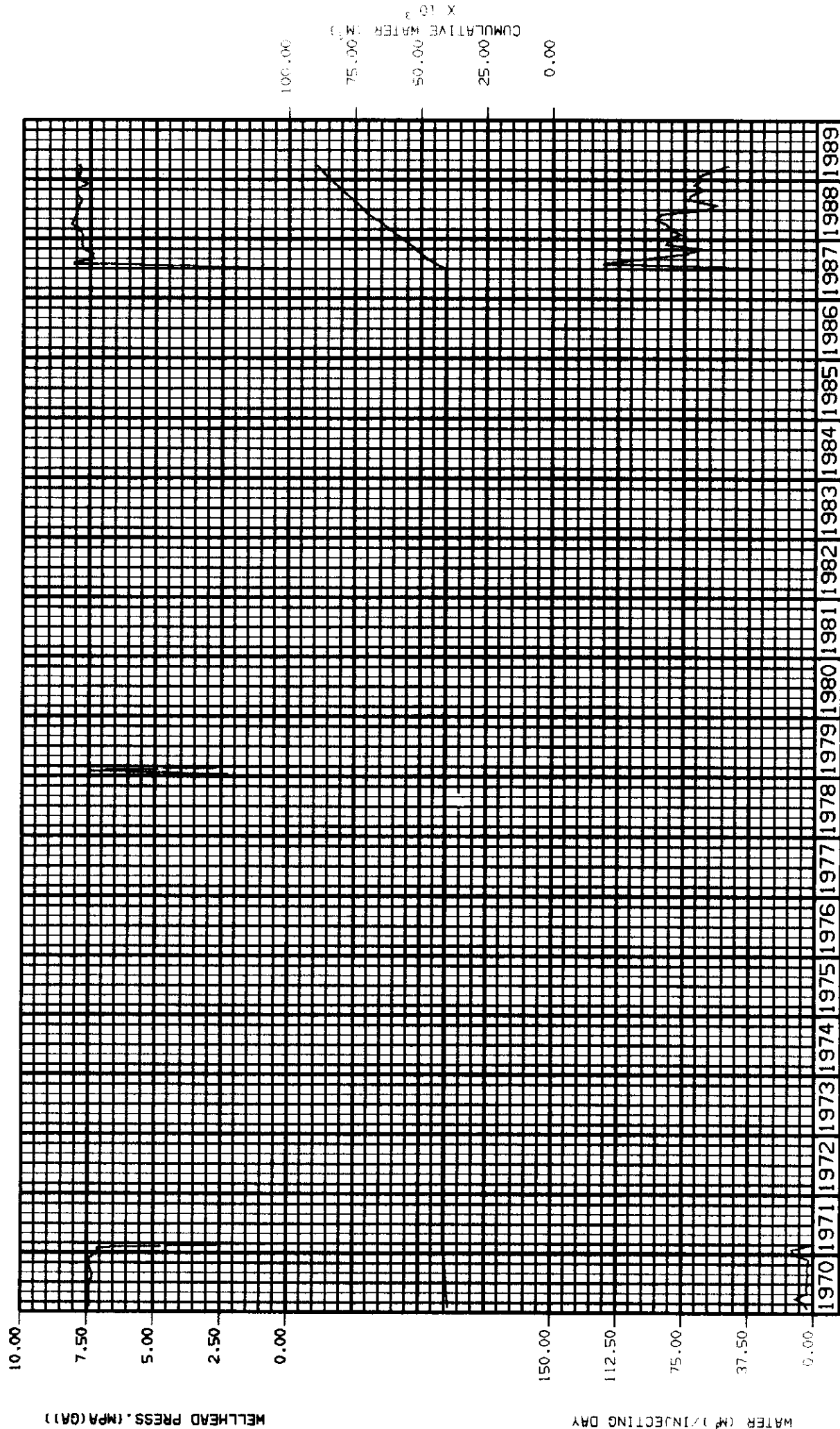


FIGURE 13
DALY UNIT NO. 3
INJECTION PLOT
02-12-010-28W1



FIGURE 14

DALY UNIT NO. 3
INJECTION PLOT
04-12-010-28W1



FIGURE 15

DALY UNIT NO. 3
INJECTION PLOT
06-12-010-28W1

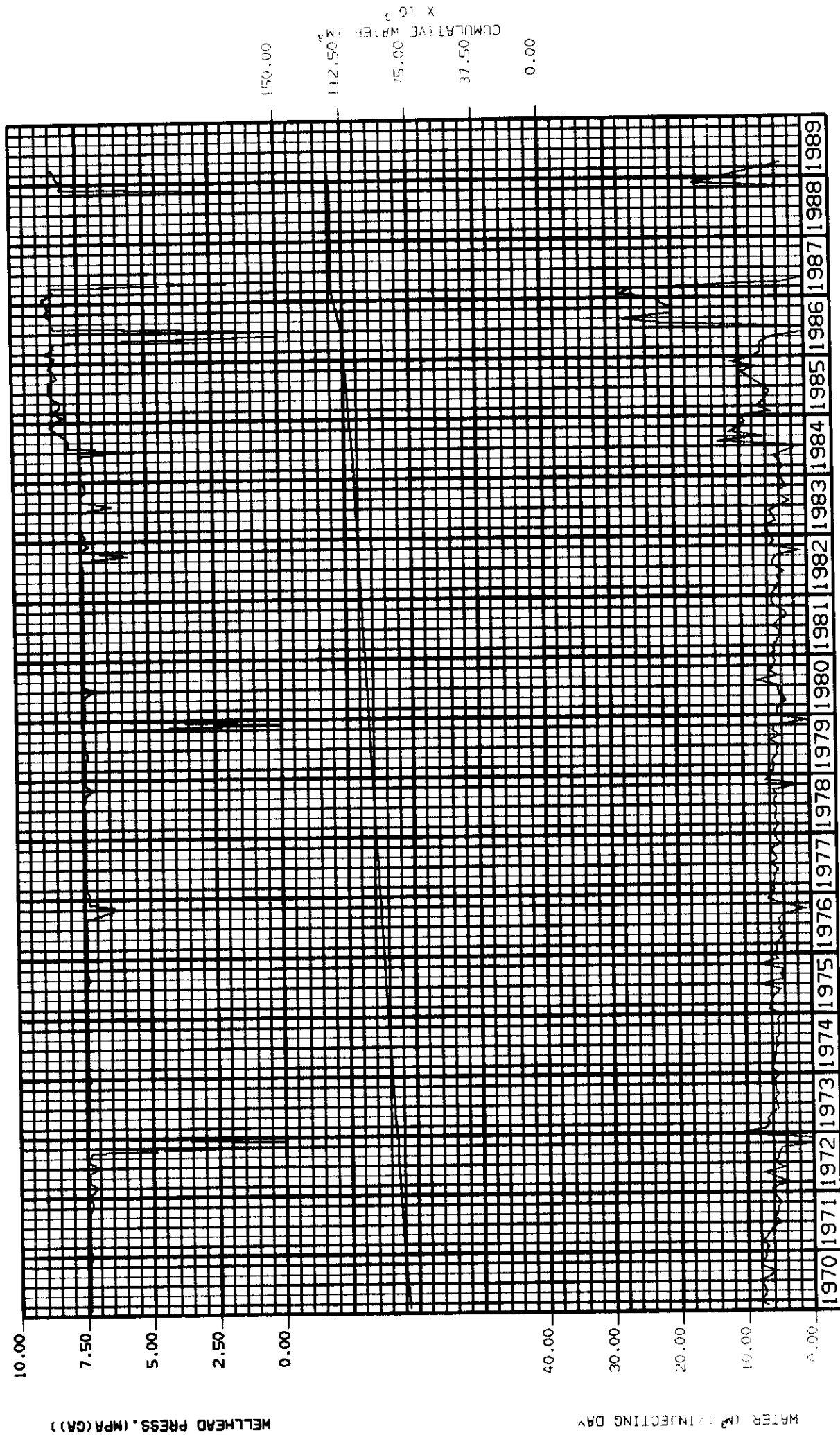


FIGURE 16

DALY UNIT NO. 3
INJECTION PLOT
08-12-010-28W1

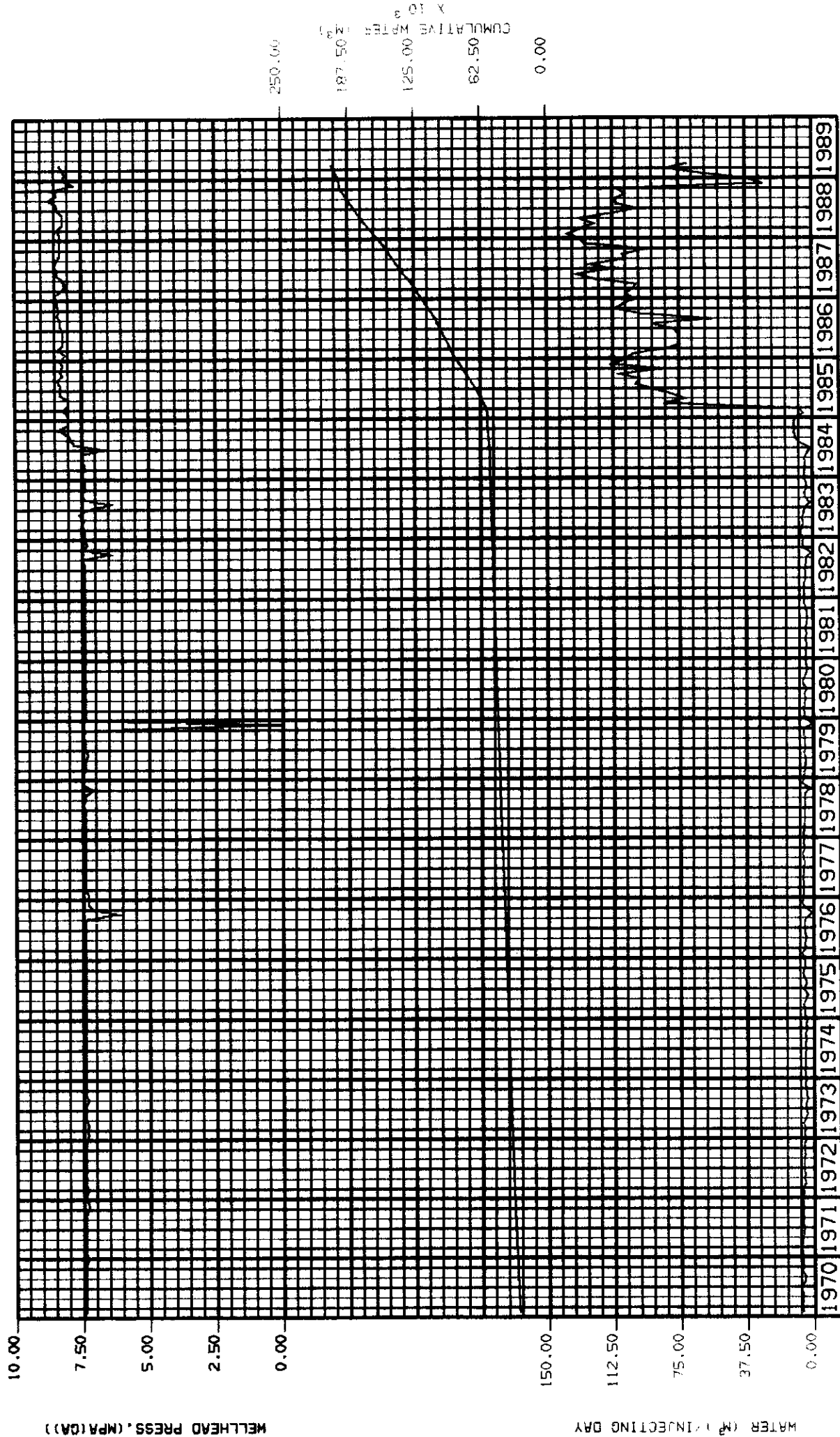


FIGURE 17

DALY UNIT NO. 3
INJECTION PLOT
10-12-010-28W1



FIGURE 18

DALY UNIT NO. 3
INJECTION PLOT
12-12-010-28W1

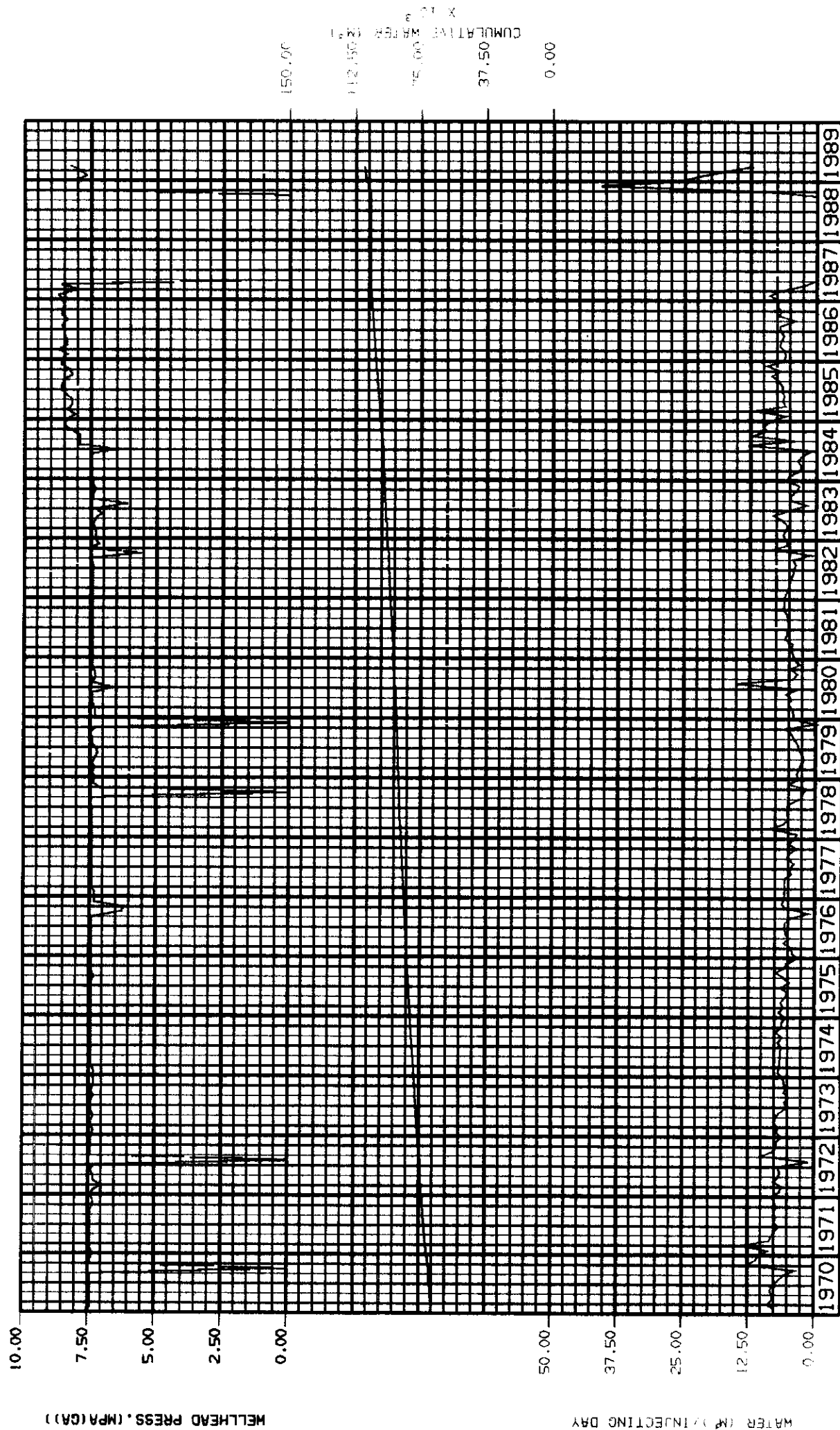


FIGURE 19
DALY UNIT NO. 3
INJECTION PLOT
14-12-010-28W1

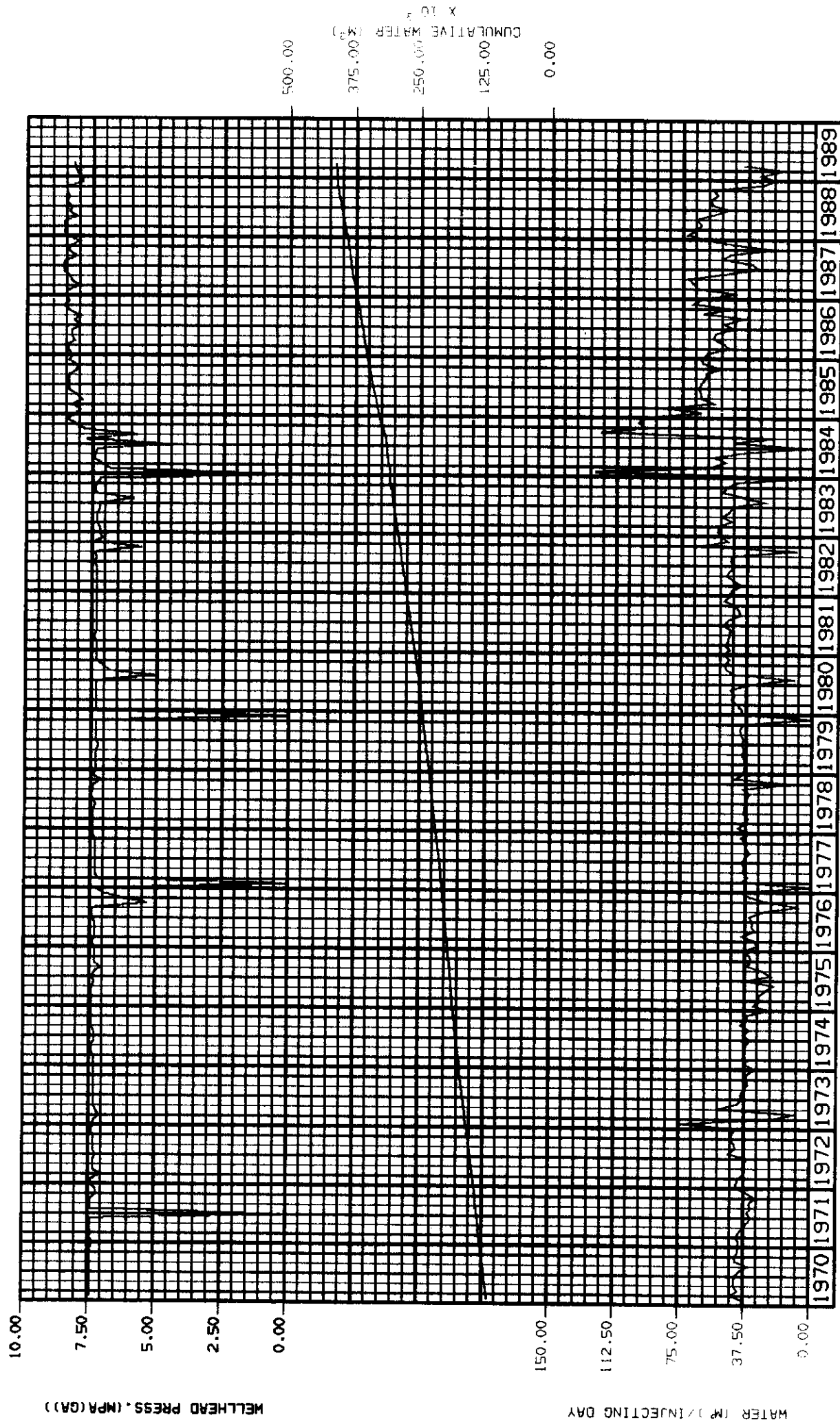


FIGURE 20
DALY UNIT NO. 3
INJECTION PLOT
04-13-010-28W1



FIGURE 21

DALY UNIT NO. 3
INJECTION PLOT
07-13-010-28W1

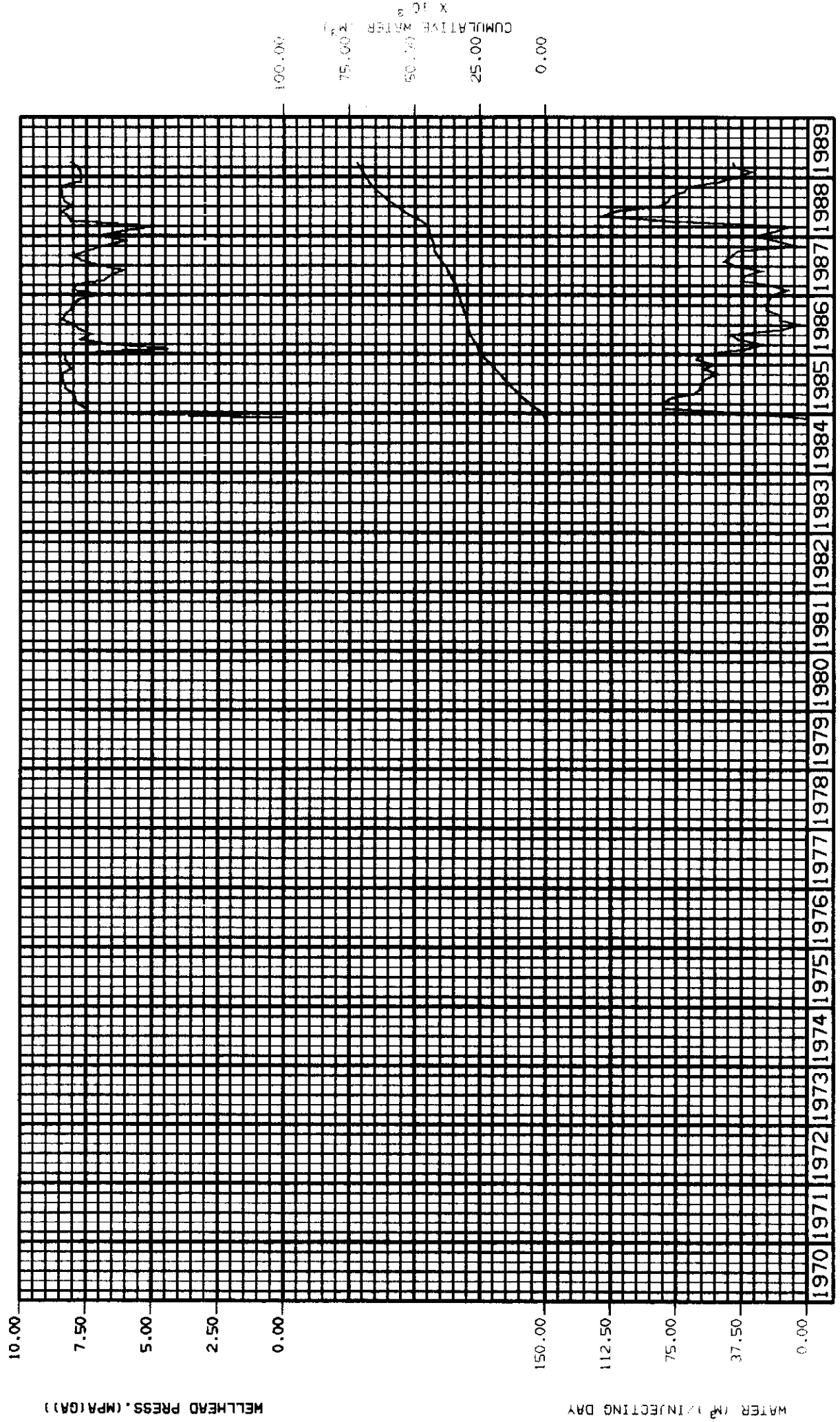


FIGURE 22

DALY UNIT NO. 3
INJECTION PLOT
11-13-010-28W1

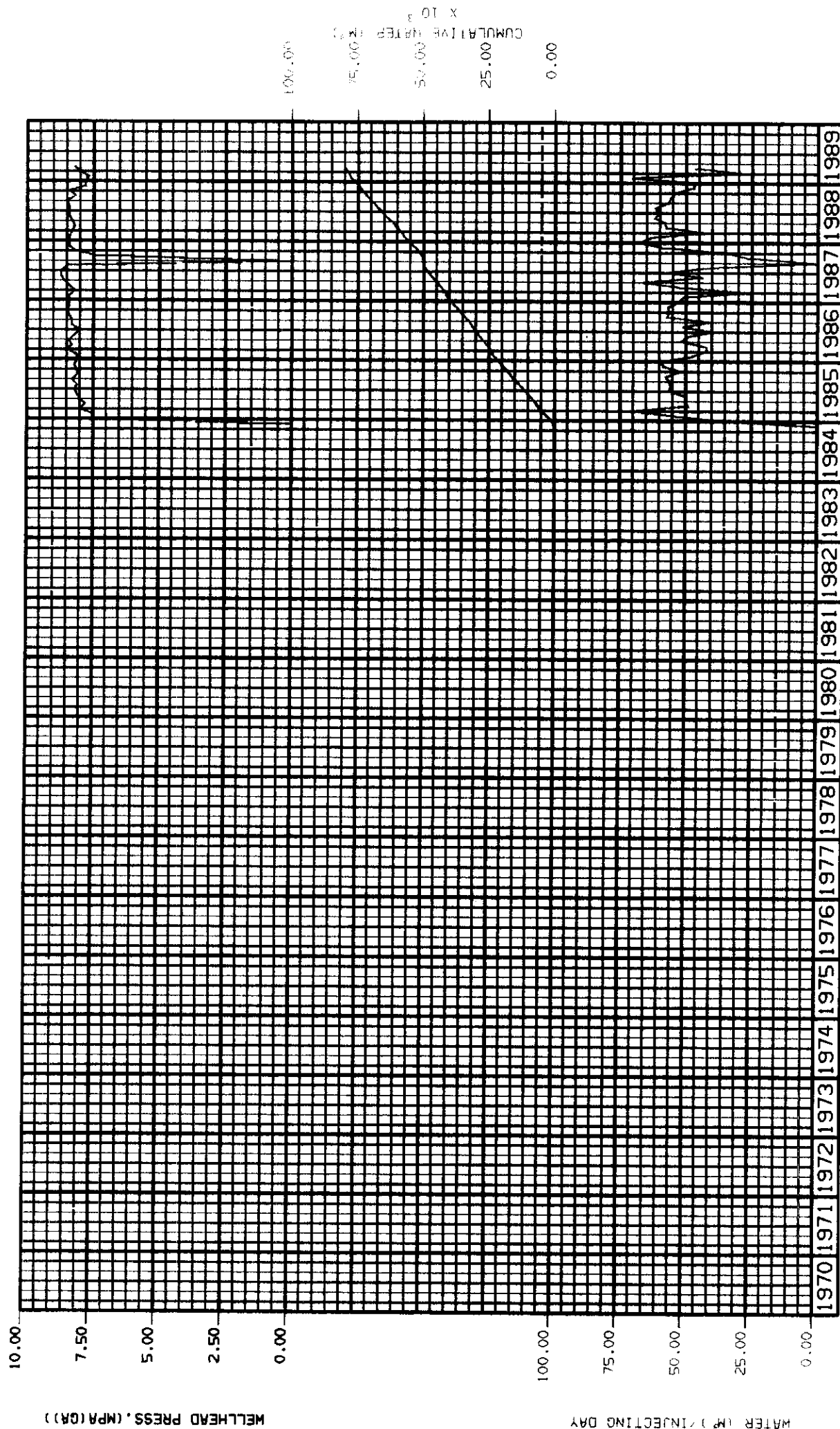


FIGURE 23

DALY UNIT NO. 3
INJECTION PLOT
04-14-010-28W1

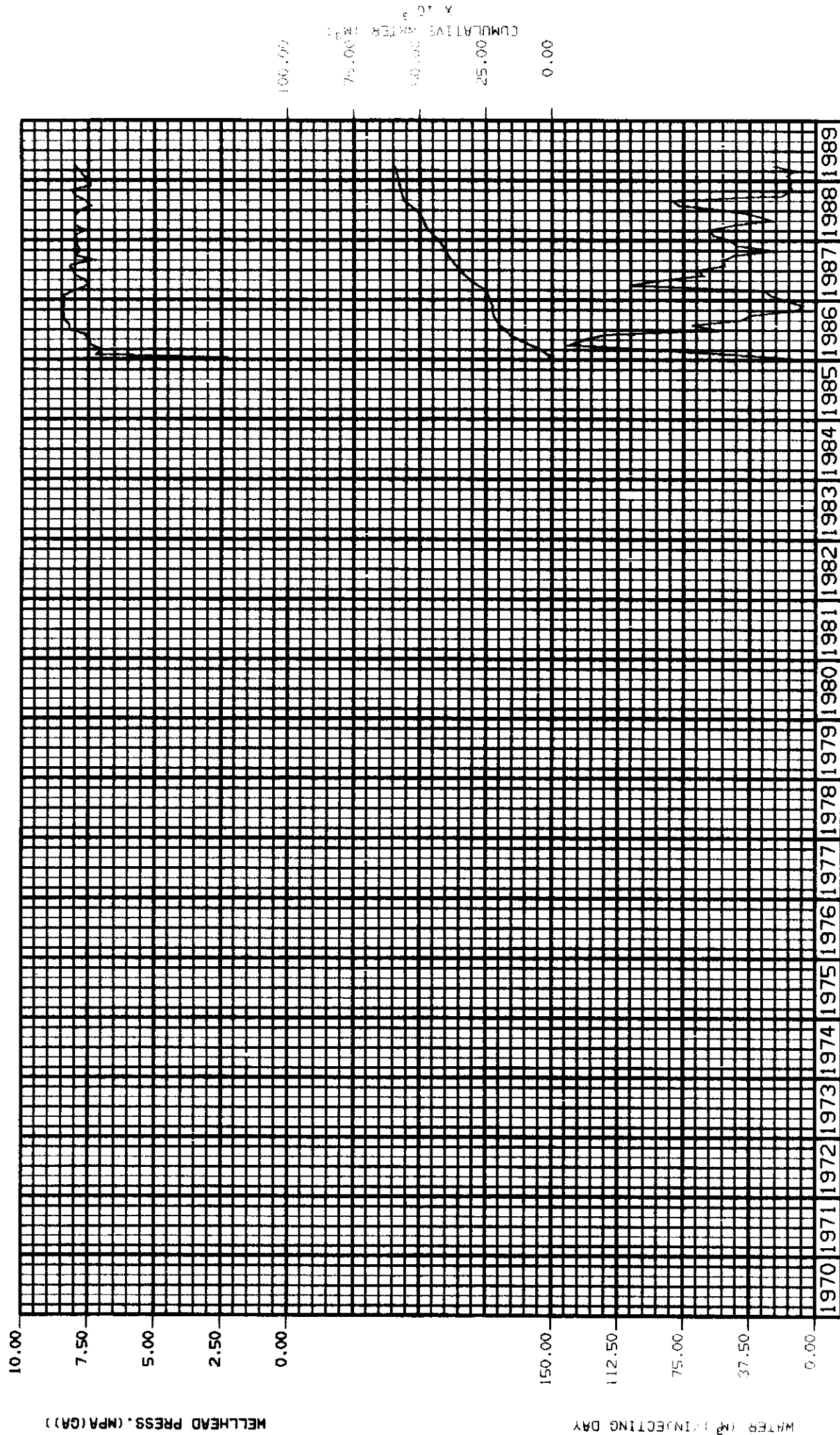
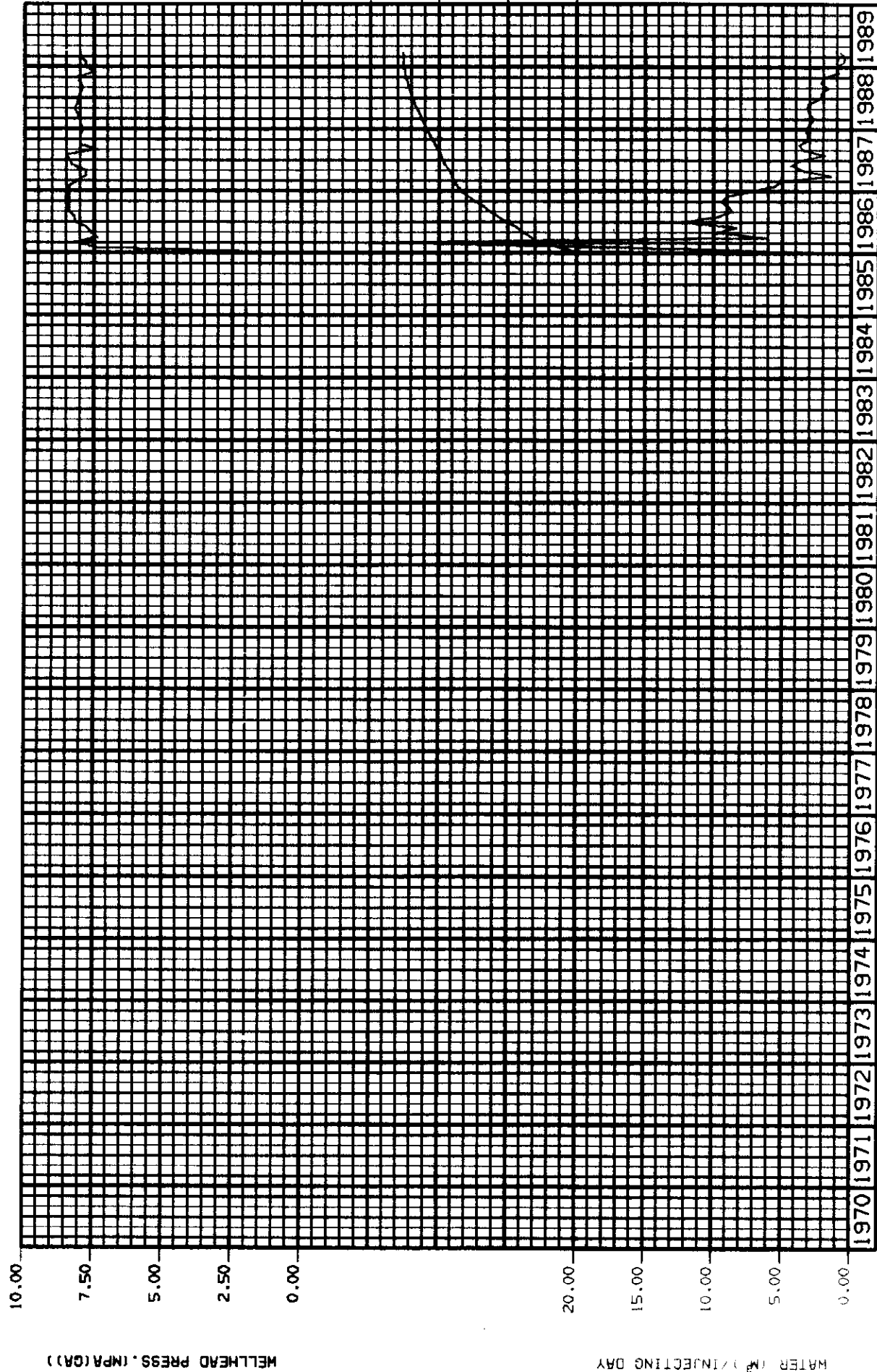


FIGURE 24

DALY UNIT NO. 3
INJECTION PLOT
06-14-010-28W1



DATE

Manitoba



Memorandum

Date May 23, 1989

To The Oil and Natural Gas
Conservation Board

From John N. Fox
Chief Petroleum Engineer
Petroleum Branch

Subject Ian Haugh - Chairman
H. Clare Moster - Deputy Chairman
Wm. McDonald - Member

Telephone

Re: Daly Unit No. 3
Extension of New Oil Status

Chevron Canada Resources has submitted a technical report on the Daly Unit No. 3 waterflood expansion project requesting:

- (1) continuation of new oil status for incremental production from the Unit, and
- (2) revision of the annual production decline rate used by the Petroleum Branch to determine the volume of incremental production, from 1% to 1.5%.

RECOMMENDATIONS

It is recommended that the attached letter, acknowledging the report and requesting further information and clarification, be sent to Chevron.

BACKGROUND

Chevron's technical report details the performance of Daly Unit No. 3 as it relates to waterflood modifications started, with the Board's approval, in 1984. The modifications include the conversion of wells to injection, reactivation of injection wells and an increase in the injection pressure.

Coincident with the Board's approval, the Minister granted new oil status for an interim period of 3 years on all oil produced from the Unit in excess of the Unit's historical production performance ("incremental production").

Chevron was required to submit a technical and economic review of the project after 3 years (June 30, 1987). The report proved inconclusive in determining whether new oil status should be continued for incremental production from the Unit. On the recommendation of the Petroleum Branch, new oil status was extended by Order in Council for 2 years to June 30, 1989 and Chevron was requested to submit a more detailed review of the project before that date.

The Petroleum Branch is presently evaluating Chevron's report to determine:

- (1) whether new oil status should be extended indefinitely or terminated on June 30, 1989, and
- (2) whether technical evidence warrants a change in the annual production decline rate used by the Branch to determine the volume of oil assigned new oil status.

For further background on this project, please refer to the letter (May 12, 1989) from L. R. Dubreuil, Director, Petroleum Branch to H. Clare Moster, Assistant Deputy Minister included as Attachment No. 1.

8

[REDACTED]

Chief Petroleum Engineer

JNF:jtb

Original Sign
L. R. DUBREUIL

Approved by:

L. R. Dubreuil, Director



Manitoba

Memorandum

Date May 12, 1989

To H. Clare Moster
ADMFrom L. R. Dubreuil
DirectorSubject Re: Daly Unit No. 3
New Oil Status

Telephone

In July 1984, Chevron applied to the Board for approval of modifications to the waterflood project in Daly Unit No. 3. The modifications included three elements.

- a) conversion of wells to injection
- b) reactivation of injection wells
- c) increase in injection pressure.

Concurrent with this application, Chevron applied to the Minister for granting of new oil status for all oil in excess of a historical production decline base. In analysis of the request, it was recognized that Chevron's proposal would result in a combination of incremental reserves (new injectors) and accelerated production (higher pressure). It was contended by the Petroleum Branch that only the incremental reserves aspect of the project should garner new oil royalties.

The relative importance of incremental and acceleration components could not be determined prior to project implementation. Consequently the Petroleum Branch proposed that Chevron's request be granted for a three year period (expiring June 30, 1987). Upon expiry an evaluation of the project would be made on which to base continuation or termination of new oil status. The Petroleum Branch's recommendation was accepted and approved by the Minister pursuant to the definition of "new oil" in The Oil and Gas Tax Act and the Crown Petroleum Royalty Regulations, 1984. The Minister was, in effect recognizing Chevron's program as an expanded pressure maintenance scheme albeit on an interim basis.

In April 1987, Chevron submitted a review of the project and indicated that continued new oil status (for incremental production) was needed to justify further field activities designed to maximize production. The review did not adequately address the relative importance of incremental and accelerated production. The Branch's review of the project provided no clear indication of the relative effect of the two components. It was recommended that the current new oil status be extended until June 30, 1989 and that Chevron be required to submit a comprehensive report on the project. The Branch's recommendation was approved and the extension was granted by Order in Council. Note that due to a change in the royalty/tax regulations, approval by the Minister was no longer sufficient.

First | Fold

The required report has been submitted by Chevron. It is anticipated that analysis of this report and Unit performance will lead to a recommendation to:

- a) Extend new oil status indefinitely. This would recognize that the majority or all of the production increase was due to incremental reserves. This being the case, the definition of "new oil" in the royalty/tax regulations would permit granting of new oil status. I would suggest that approval authority for this would be the Board through recognition of Chevron's project as a bonafide pressure maintenance expansion, or
- b) Allow new oil status to terminate June 30, 1989. This would recognize that a substantial part of the incremental production observed to date may be purely acceleration of production. The position that may be taken in this case would be that any incremental reserve would have already been recognized through new oil status over the past 5 years. Again, the Board should be the decision authority.

The report is being evaluated and appropriate recommendations will be made to the Board.

L. R. Dubreuil
Director

LRD:jtb

cc: John Fox
Brad Thiessen



The Oil and Natural Gas
Conservation Board

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

(204) 945-3130

May 23, 1989

Chevron Canada Resources
500 - 5th Avenue S.W.
CALGARY, Alberta
T2P 0L7

Attention: Mr. C.G. Folden, P. Eng.
Manager, Reservoir Engineering

Re: Daly Unit No. 3
Extension of New Oil Status

Dear Mr. Folden:

Your technical report dated May 5, 1989 on the Daly Unit No. 3 waterflood expansion project requesting continuation of new oil status for incremental production from the Unit is acknowledged.

The report has been reviewed and in general is well laid out and complete. There is, however, a need for further information and clarification on a few matters.

1. Project Economics

- / a) In Chevron's April 7, 1987 submission entitled Daly Unit No. 3 - Waterflood Expansion Performance, you provided a list of work performed and capital expenditures to January 1, 1987 (see Attachment No. 1). Please provide an updated list of work performed and capital expenditures from January 1, 1987 to January 1, 1989.
- / b) Please provide, in tabular form, a summary of the annual revenue generated from Unit operations, the associated operating costs, Crown and freehold royalties paid and freehold oil and gas production tax paid, for the years 1984 through 1988.
- c) Please provide a table showing:

- / i) the Crown royalty and freehold production tax savings as a result of new oil status being granted for incremental production from 1984 through 1988 (in \$'s and m³) and the estimated saving (in m³) over the remainder of the project,
- ii) the additional Crown royalties and freehold production tax paid the Crown on incremental production from 1984 through 1988 (in \$'s and m³) and estimated to be paid the Crown over the remainder of the project (in m³), assuming that without new oil status the project would not have been undertaken, and
- iii) the additional royalties paid freehold mineral owners on incremental production from 1984 through 1988 (in \$'s and m³) and estimated to be paid such owners over the remainder of the project (in m³), making the same assumption as in Clause (ii) above.

For comparison purposes the information required by Clauses (i) to (iii) above, should be provided for both Chevron's proposed base case annual exponential decline rate of 1.5% and the approved base case decline of 1.0%.

2. Water Injection

- / a) Please provide an historic plot of daily water injection and cumulative water injected for each injection well in the Unit.
- / b) Chevron has interpreted the imbalance between production and injection to be a result of water migration out of zone. Into which zone(s) is this migration occurring and how does it vary throughout the Unit? Is there any remedial work that can be done on the injection wells to reduce migration out of zone and improve the placement of injected fluids?

3. Production Response

- a) Though the average reservoir pressure in the Unit has increased little since 1984, in your detailed analysis of response wells, injection support is listed as one reason for the production increases. Please discuss the pressure response that has occurred in the Unit as a result of the waterflood expansion project and suggest an explanation of the large pressure variations within the Unit.
- b) Does Chevron continue to monitor producing well fluid levels on a regular basis?

4. Future Development

Chevron stated that additional waterflood optimization and enhancement is under consideration including the possible conversion of 1-13-10-28 WPM to injection and the reperforating of a number of wells. Please elaborate on your potential future waterflood optimization activities including an estimate of the cost of such activities.

If you have any questions in respect of this matter, please contact John Fox at (204) 945-6574.

Yours respectively,

ORIGINAL SIGNED BY
H. CLARE MOSTER

H. Clare Moster
Deputy Chairman

cc: Ian Haugh, Chairman
Wm. McDonald, Member

Re: Petroleum Branch

ATTACHMENT NO. 1

TABLE 1

DALY UNIT NO. 3
WORK PERFORMED AND CAPITAL EXPENDITURES

<u>Work</u>	<u>Date</u>	Cost <u>10³ \$</u>	<u>Producers</u>	<u>Injectors</u>
15-1 Water				
Plant Expansion	1985-01	210.5		
Upgrade Water				
Injection Pipelines	1985-01	281.0		
Conversion	1985-01	204.7		13-2, 7-13, 11-13
Conversion	1986-01	111.5		4-14, 6-14
Reactivation	1987-01	43.1		6-11
Reactivation	1986-01	65.2	11-1	
Cleanouts	1986-01	33.4		8-11, 12-11
	1987-01	39.7		16-1, 4-12, 12-12
Fracs	1987-01	25.4		6-12
Install Liner	1987-01	101.7		13-2, 5-12
Acid Jobs	1985-01	14.2	9-11, 5-13	
	1986-01	4.8	7-11	
	1987-01	<u>12.5</u>	11-11, 3-12	
		1 147.7		

GROUP NAME: DALY UNIT #3 - NEW OIL STATUS

LIST OF WELLS

(0)13-06-010-27 W1M(0)	(0)04-07-010-27 W1M(0)	(0)05-01-010-28 W1M(0)
(0)01-01-010-28 W1M(0)	(0)11-01-010-28 W1M(0)	(0)12-01-010-28 W1M(0)
(0)13-01-010-28 W1M(0)	(0)14-01-010-28 W1M(0)	(0)15-01-010-28 W1M(0)
(0)16-01-010-28 W1M(0)	(0)05-02-010-28 W1M(0)	(0)07-02-010-28 W1M(0)
(0)08-02-010-28 W1M(0)	(0)09-02-010-28 W1M(0)	(0)10-02-010-28 W1M(0)
(0)12-02-010-28 W1M(0)	(0)13-02-010-28 W1M(0)	(0)14-02-010-28 W1M(0)
(0)15-02-010-28 W1M(0)	(0)16-02-010-28 W1M(0)	(0)09-10-010-28 W1M(0)
(0)10-10-010-28 W1M(0)	(0)01-11-010-28 W1M(0)	(0)02-11-010-28 W1M(0)
(0)03-11-010-28 W1M(0)	(0)04-11-010-28 W1M(0)	(0)05-11-010-28 W1M(0)
(0)06-11-010-28 W1M(0)	(0)07-11-010-28 W1M(0)	(0)08-11-010-28 W1M(0)
(0)09-11-010-28 W1M(0)	(0)10-11-010-28 W1M(0)	(0)11-11-010-28 W1M(0)
(0)12-11-010-28 W1M(0)	(0)13-11-010-28 W1M(0)	(0)14-11-010-28 W1M(0)
(0)15-11-010-28 W1M(0)	(0)16-11-010-28 W1M(0)	(0)01-12-010-28 W1M(0)
(0)02-12-010-28 W1M(0)	(0)03-12-010-28 W1M(0)	(0)04-12-010-28 W1M(0)
(0)05-12-010-28 W1M(0)	(0)06-12-010-28 W1M(0)	(0)07-12-010-28 W1M(0)
(0)08-12-010-28 W1M(0)	(0)09-12-010-28 W1M(0)	(0)10-12-010-28 W1M(0)
(0)11-12-010-28 W1M(0)	(0)12-12-010-28 W1M(0)	(0)13-12-010-28 W1M(0)
(0)14-12-010-28 W1M(0)	(0)15-12-010-28 W1M(0)	(0)16-12-010-28 W1M(0)
(0)01-13-010-28 W1M(0)	(0)02-13-010-28 W1M(0)	(0)03-13-010-28 W1M(0)
(0)04-13-010-28 W1M(0)	(0)05-13-010-28 W1M(0)	(0)06-13-010-28 W1M(0)
(0)07-13-010-28 W1M(0)	(0)10-13-010-28 W1M(0)	(0)11-13-010-28 W1M(0)
(0)12-13-010-28 W1M(0)	(0)13-13-010-28 W1M(0)	(0)14-13-010-28 W1M(0)
(0)15-13-010-28 W1M(0)	(0)02-14-010-28 W1M(0)	(0)03-14-010-28 W1M(0)
(0)04-14-010-28 W1M(0)	(0)05-14-010-28 W1M(0)	(0)06-14-010-28 W1M(0)
(0)08-14-010-28 W1M(0)	(0)12-14-010-28 W1M(0)	(0)01-23-010-28 W1M(0)
(0)08-23-010-28 W1M(0)	(0)09-23-010-28 W1M(0)	(0)02-24-010-28 W1M(0)
(0)27-24-010-28 W1M(0)		

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*** STORE ***
DALY2
DALY UNIT #3 - NEW OIL STATUS

ManPB
89-06-12
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MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	I.WATER m3/M
1979-01	40	0 0	39	29497	2577.2	3063.0	83.1	1.19	1165851	0.0
1979-02	40	0 0	39	26880	2310.1	2690.6	82.5	1.16	1168161	0.0
1979-03	40	0 0	39	29424	2440.1	3648.1	78.7	1.50	1170601	0.0
1979-04	40	0 0	39	28560	2344.5	2798.8	78.2	1.19	1172946	0.0
1979-05	40	0 0	39	29304	2431.8	2675.1	78.4	1.10	1175378	0.0
1979-06	40	0 0	39	28248	2352.4	2491.3	78.4	1.06	1177730	0.0
1979-07	40	0 0	39	29664	2458.7	2601.5	79.3	1.06	1180189	0.0
1979-08	40	0 0	39	29520	2440.6	2516.8	78.7	1.03	1182629	0.0
1979-09	40	0 0	39	28368	2410.0	2232.2	80.3	0.93	1185039	0.0
1979-10	41	0 0	38	29568	2458.4	2718.7	79.3	1.11	1187498	0.0
1979-11	41	0 0	38	28896	2401.3	2714.5	80.0	1.13	1189899	0.0
1979-12	41	0 0	38	30456	2494.2	2739.0	80.5	1.10	1192393	0.0
1980-01	41	0 0	38	29976	2438.3	2856.0	78.7	1.17	1194831	0.0
1980-02	41	0 0	38	28296	2299.7	2609.5	79.3	1.13	1197131	0.0
1980-03	41	0 0	38	30216	2446.4	2773.5	78.9	1.13	1199578	0.0
1980-04	41	0 0	38	29136	2373.8	2748.7	79.1	1.16	1201951	0.0
1980-05	41	0 0	38	30192	2463.9	2823.8	79.5	1.15	1204415	0.0
1980-06	41	0 0	38	27984	2315.5	2232.9	77.2	0.96	1206731	0.0
1980-07	41	0 0	38	30432	2365.6	2773.9	76.3	1.17	1209096	0.0
1980-08	41	0 0	38	27768	2201.7	2399.8	71.0	1.09	1211298	0.0
1980-09	41	0 0	38	29184	2445.1	2829.9	81.5	1.16	1213743	0.0
1980-10	41	0 0	38	30360	2488.5	2856.1	80.3	1.15	1216232	0.0
1980-11	41	0 0	38	29304	2377.9	2654.8	79.3	1.12	1218610	0.0
1980-12	41	0 0	38	30264	2502.3	2849.3	80.7	1.14	1221112	0.0
1981-01	41	0 0	38	30432	2445.8	2914.6	78.9	1.19	1223558	0.0
1981-02	41	0 0	38	27432	2202.6	2624.4	78.7	1.19	1225760	0.0
1981-03	41	0 0	38	30120	2414.2	2854.6	77.9	1.18	1228174	0.0
1981-04	41	0 0	38	29184	2351.9	2704.1	78.4	1.15	1230526	0.0
1981-05	41	0 0	38	25320	1987.0	2343.4	64.1	1.18	1232513	0.0
1981-06	41	0 0	38	28512	2376.8	2918.2	79.2	1.23	1234890	0.0
1981-07	41	0 0	38	30408	2454.8	2820.9	79.2	1.15	1237345	0.0
1981-08	41	0 0	38	30216	2416.8	2618.7	78.0	1.08	1239762	0.0
1981-09	41	0 0	38	28560	2312.2	2478.2	77.1	1.07	1242074	0.0
1981-10	41	0 0	38	30312	2372.4	2699.5	76.5	1.14	1244446	0.0
1981-11	41	0 0	38	26448	2226.7	2553.5	74.2	1.15	1246673	0.0
1981-12	41	0 0	38	30408	2499.9	3021.9	80.6	1.21	1249173	0.0
1982-01	41	0 0	38	30420	2433.0	2957.4	78.5	1.22	1251606	0.0
1982-02	41	0 0	38	27216	2177.2	2894.4	77.8	1.33	1253783	0.0
1982-03	41	0 0	38	30312	2449.1	3652.0	79.0	1.49	1256232	0.0
1982-04	41	0 0	38	28632	2318.5	3297.5	77.3	1.42	1258551	0.0
1982-05	41	0 0	38	24696	1800.5	3056.3	58.1	1.70	1260351	0.0
1982-06	41	0 0	38	29304	2546.4	3679.4	84.9	1.44	1262898	0.0
1982-07	44	0 0	35	30936	2471.5	3260.7	79.7	1.32	1265369	0.0
1982-08	44	0 0	35	31176	2386.8	3067.9	77.0	1.29	1267756	0.0
1982-09	44	0 0	35	26736	2298.8	1132.9	76.6	0.49	1270055	0.0
1982-10	44	0 0	35	31224	2484.1	3147.1	80.1	1.27	1272539	0.0
1982-11	44	0 0	35	29712	2333.6	2769.1	77.8	1.19	1274872	0.0
1982-12	44	0 0	35	32496	2504.2	3156.7	80.8	1.26	1277377	0.0

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DALY2
DALY UNIT #3 - NEW OIL STATUS

ManPS
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MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	I.WATER m3/M
1983-01	44	16 0	19	32616	2451.5	3091.1	79.1	1.26	1279828	7230.0
1983-02	44	16 0	19	29472	2216.5	2915.5	79.2	1.32	1282045	6747.0
1983-03	44	16 0	19	32232	2409.9	2874.6	77.7	1.19	1284455	6640.0
1983-04	44	16 0	19	31656	2319.7	2670.3	77.3	1.15	1286774	7254.0
1983-05	44	16 0	19	32664	2362.3	2766.2	76.2	1.17	1289137	7356.0
1983-06	45	16 0	18	31656	2200.6	2720.5	73.4	1.24	1291337	6435.0
1983-07	45	16 0	18	31560	2176.6	2180.8	70.2	1.00	1293514	3694.0
1983-08	45	16 0	18	33288	2261.1	2754.9	72.9	1.22	1295775	5906.0
1983-09	45	16 0	18	32136	2257.0	2653.3	75.2	1.18	1298032	7233.0
1983-10	45	16 0	18	33336	2416.9	2899.8	78.0	1.20	1300449	6733.0
1983-11	45	16 0	18	31368	2337.1	2551.7	77.9	1.09	1302786	5743.0
1983-12	45	14 0	20	33144	2366.6	3721.6	76.3	1.15	1305152	4223.0
1984-01	45	16 0	18	33336	2420.0	2726.5	78.1	1.13	1307572	5069.0
1984-02	45	16 0	18	30984	2221.7	2589.7	76.6	1.17	1309794	6309.0
1984-03	45	16 0	18	33336	2277.2	2697.4	73.5	1.18	1312071	6682.0
1984-04	45	16 0	18	29448	2108.8	2376.9	70.3	1.13	1314180	6475.0
1984-05	31	16 0	32	22416	1661.3	1350.8	53.6	0.93	1315841	4639.0
1984-06	75	7 0	37	22200	1731.1	507.0	57.7	0.29	1317573	507.0
1984-07	44	7 0	28	29712	2186.4	2519.7	70.5	1.15	1319759	5170.5
1984-08	46	16 0	17	29376	2139.8	2000.6	69.0	0.93	1321899	6542.0
1984-09	46	16 0	17	32568	2329.1	3235.5	77.6	1.39	1324228	11956.0
1984-10	46	16 0	17	33048	2305.7	3270.7	74.4	1.42	1326534	11131.0
1984-11	46	16 0	17	33000	2438.4	3155.8	81.3	1.29	1328972	10761.0
1984-12	46	18 0	15	34080	2400.5	3110.1	77.4	1.30	1331372	12926.0
1985-01	45	18 0	16	33264	2397.5	3083.6	77.3	1.29	1333770	11870.0
1985-02	45	18 0	16	30144	2207.4	3066.1	78.8	1.39	1335977	13460.0
1985-03	45	19 0	15	33480	2388.6	3162.1	77.1	1.32	1338366	17614.0
1985-04	45	19 0	15	31512	2257.1	3008.2	75.2	1.33	1340623	15610.0
1985-05	41	19 0	19	30168	2489.7	3118.9	80.3	1.25	1343113	15488.0
1985-06	45	19 0	15	31896	2451.3	3890.2	81.7	1.59	1345564	17285.0
1985-07	46	19 0	14	33864	2590.9	4104.8	83.6	1.58	1348155	17101.0
1985-08	46	19 0	14	33600	2535.9	3917.8	81.9	1.54	1350691	18629.0
1985-09	46	19 0	14	32856	2670.9	5561.9	89.0	2.08	1353362	18871.0
1985-10	46	19 0	14	32928	2616.8	5104.0	84.4	1.95	1355979	17246.0
1985-11	46	19 0	14	32112	2572.7	4899.1	85.8	1.90	1358551	20338.0
1985-12	46	19 0	14	29472	2126.7	5035.5	68.6	2.37	1360678	21694.0
1986-01	44	20 1	14	30504	2411.1	4950.9	77.8	2.05	1363089	20385.0
1986-02	44	21 0	14	29208	2485.8	4490.7	88.8	1.81	1365575	18027.0
1986-03	44	21 0	14	28680	2234.3	4747.3	72.1	2.12	1367809	21106.0
1986-04	44	21 0	14	31656	2672.9	5015.8	89.1	1.88	1370482	20639.0
1986-05	44	20 0	15	31056	2644.8	5369.7	85.3	2.03	1373127	18908.0
1986-06	42	20 0	17	28992	2465.5	5470.0	82.2	2.22	1375592	16357.0
1986-07	44	21 0	14	32160	2467.5	5612.8	79.6	2.27	1378060	19106.0
1986-08	45	21 0	13	32352	2614.5	5534.8	84.3	2.12	1380674	16429.0
1986-09	46	22 0	11	32280	2531.8	5076.4	84.4	2.01	1383206	21329.0
1986-10	46	22 0	11	33264	2628.9	5549.2	94.8	2.11	1385835	21756.0
1986-11	46	22 0	11	32904	2510.0	4984.0	83.7	1.99	1388345	21376.0
1986-12	46	22 0	11	33984	2580.4	4572.2	83.2	1.77	1390925	20350.0

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DALY2
DALY UNIT #3 - NEW OIL STATUS

ManPB
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MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	I.WATER m3/M
1987-01	46	22 0	11	34152	2717.5	4684.7	87.7	1.72	1393643	20979.0
1987-02	46	21 0	12	30792	2451.9	4521.3	87.6	1.84	1396095	20219.0
1987-03	46	22 0	11	34176	2740.2	5324.6	88.4	1.94	1398835	20117.0
1987-04	46	16 0	17	29352	2350.6	5025.7	78.4	2.14	1401186	21902.0
1987-05	43	16 0	20	30672	2461.9	5746.9	79.4	2.33	1403647	21317.0
1987-06	45	16 0	18	31200	2512.4	5439.7	83.7	2.17	1406160	18578.0
1987-07	46	17 0	16	34176	2753.8	4510.7	88.8	1.64	1408914	20892.0
1987-08	46	17 0	16	33960	2653.1	5229.1	85.6	1.97	1411567	20643.0
1987-09	46	18 0	15	32760	2628.3	5786.6	87.6	2.20	1414195	21405.0
1987-10	46	18 0	15	33168	2575.3	4553.4	83.1	1.77	1416770	16066.0
1987-11	45	18 0	16	32328	2599.6	5341.0	86.7	2.05	1419370	22724.0
1987-12	45	18 0	16	33480	2652.2	5466.0	85.6	2.06	1422022	24187.0
1988-01	45	18 0	16	33456	2623.3	5500.2	84.6	2.10	1424645	24190.0
1988-02	45	18 0	16	31104	2451.9	5139.1	84.5	2.10	1427097	20866.0
1988-03	45	18 0	16	33384	2620.8	5615.9	84.5	2.14	1429718	23938.0
1988-04	45	18 0	16	30504	2432.6	5630.0	81.1	2.31	1432151	24049.0
1988-05	45	18 0	16	27816	2291.1	5795.4	73.9	2.53	1434442	23400.0
1988-06	42	18 0	19	30240	2615.8	5472.9	87.2	2.09	1437058	20890.0
1988-07	45	18 0	16	33000	2797.3	5925.8	90.2	2.12	1439855	24032.0
1988-08	45	18 0	16	33480	2815.1	6255.1	90.8	2.22	1442670	23275.0
1988-09	45	18 0	16	31752	2652.1	5423.3	88.4	2.04	1445322	21238.0
1988-10	45	22 0	12	33384	2758.7	5379.2	89.0	1.95	1448081	21450.0
1988-11	45	24 0	10	31632	2632.0	4607.3	87.7	1.75	1450713	21918.0
1988-12	44	24 0	11	32520	2663.6	5636.2	85.9	2.12	1453376	21578.0
1989-01	44	23 0	12	32688	2738.1	5373.7	88.3	1.96	1456115	24152.0
1989-02	44	24 0	11	29328	2439.4	4803.4	87.1	1.97	1458554	21175.7
1989-03	44	0 0	35	32424	2718.7	5543.9	87.7	2.04	1461273	0.0

WELL	INITIAL DATE	TEST OIL	DATA (1984) WATER	FINAL DATE	TEST OIL	DATA (1989) WATER	DIFFERENCE	
							OIL	WATER
11-12	84-08	3.7	0.2	88-05	3.6	0.1	-0.1 (-2.7)	-0.1
13-12	84-08	1.9	0.1	88-06	1.3	-	-0.6 (-31.6)	-0.1
15-12	84-06	2.3	4.9	88-06	2.2	4.3	-0.1 (-4.3)	-0.6
16-12	84-06	1.4	-	88-06	0.7	0.7	-0.7 (-50.0)	+0.7
2-13	84-08	4.9	-	88-08	3.4	1.9	-1.5 (-30.6)	+1.0
5-13	84-07	0.9	-	88-08	1.9	0.5	+1.0 (+111.1)	+0.5
6-13	84-07	6.6	1.7	88-08	4.9	1.3	-1.7 (-25.7)	-0.4
10-13	84-08	3.9	-	88-07	5.5	6.9	+1.6 (+41.0)	+0.9
12-13	84-08	1.1	5.6	88-07	3.0	8.5	+1.9 (+172.7)	+2.9
14-13	84-09	0.8	2.4	88-07	0.9	2.2	+0.1 (+12.5)	+0.2
15-13	84-09	0.5	2.0	SHUT-IN				
3-14	84-02	2.8	-	88-01	2.2	1.1	-0.6 (-21.4)	+1.1
5-14	84-08	0.1	2.7	SHUT-IN				
12-14	84-04	1.2	-	88-09	1.1	0.1	-0.1 (-8.3)	+0.1
1-23	84-08	0.9	14.4	88-07	0.5	17.6	-0.4 (-44.4)	+3.2
8-23	SHUT-IN			88-07	0.7	3.0	+0.7	+3.0
9-23	84-05	1.2	33.5	88-07	1.9	74.8	+0.7 (+58.3)	+41.3
2-24	84-09	1.1	0.4	88-06	1.5	0	+0.4 (+36.4)	-0.4
7-24	84-09	0.6	0.3	88-09	0.8	0.1	+0.2 (+33.3)	-0.2
		84.8			87.5			

89-01 PRODUCTION FACTORS oil 1.00051

Wh. 1.18071

• Chevron incremental response well

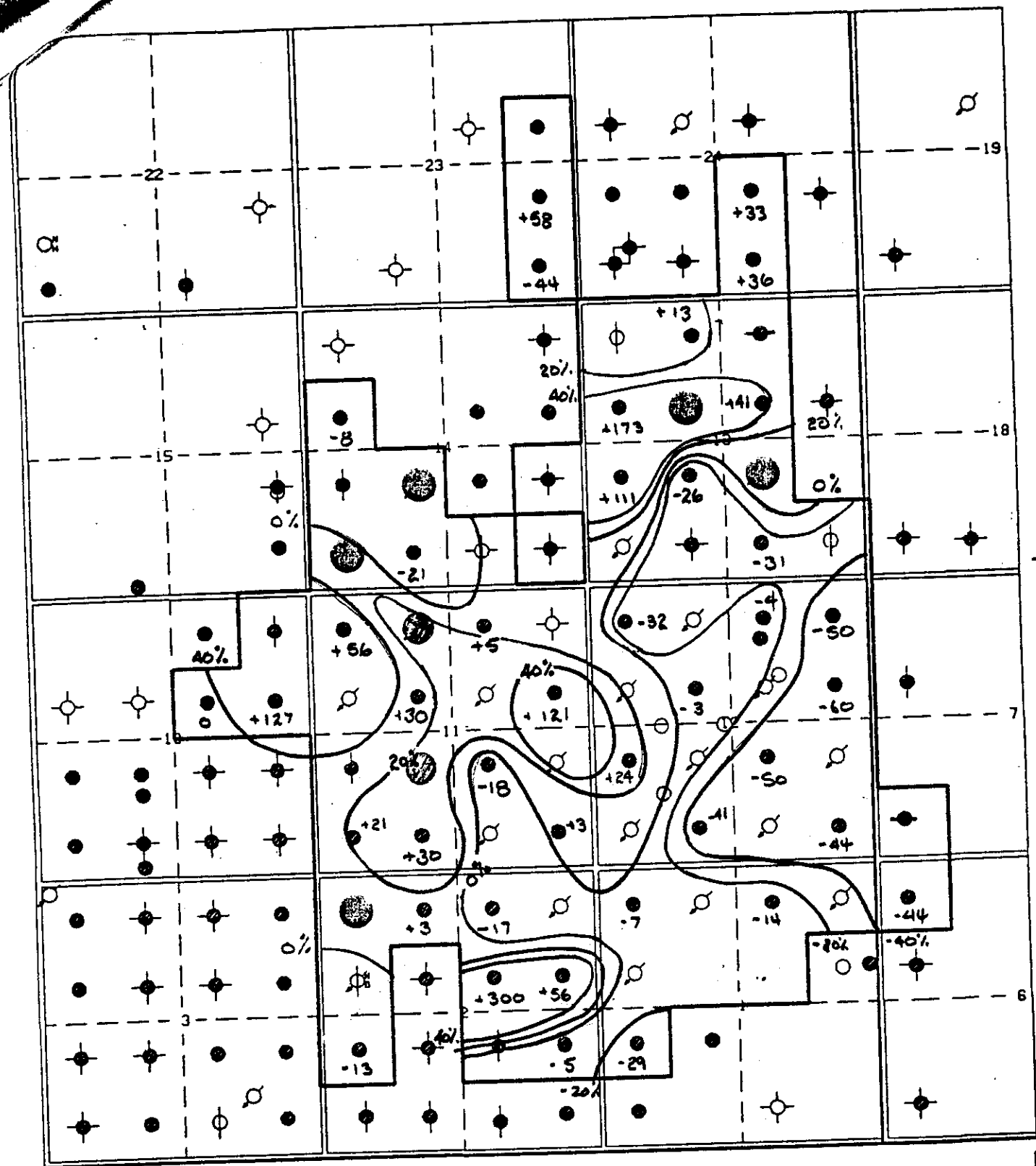
• Chevron acceleration response well

INDIVIDUAL WELL PRODUCTION TESTS - DAILY UNIT #3

WELL	INITIAL TEST DATA (1984)		FINAL TEST DATA (1989)		DIFFERENCE	
	DATE	OIL	DATE	OIL	OIL	WATER
Top 10-28 WPH						
5-1	84-09	0.7	88-05	0.5	-0.2	(-28.6) + 0.1
11-1	SHUT-IN		89-02	0.5	+0.5	*
13-1	83-05	4.3	88-04	4.0	-0.3	(-7.0) + 1.5
15-1	84-06	3.5	88-04	3.0	-0.5	(-14.2) + 0.4
5-2	84-07	0.8	88-08	0.7	-0.1	(-12.5) - 0.4
8-2	84-06	1.9	88-04	1.8	-0.1	(-6.3) + 0.2
9-2	84-09	1.6	88-05	2.7	+0.9	(+36.2) + 0.1
10-2	84-09	0.2	88-05	0.8	+0.6	(+30.0) - 0.6
14-2	84-07	2.9	88-05	3.0	+0.1	(+3.4) + 0.8
15-2	84-09	1.2	88-06	1.0	-0.2	(-16.7) + 0.3
13-6 - 10-27	84-02	0.9	88-09	0.5	-0.4	(-44.4) - 0.5
4-7 - 10-27	SHUT-IN		88-09	1.1	+1.1	2 + 0.9
9-10	84-05	1.7	89-02	3.1	+1.4	(+26.8) + 3.5
10-10	84-05	1.4	88-08	1.4	-	(0) + 0.2
1-11	84-04	3.4	89-03	3.5	+0.1	(+2.9) + 1.8
3-11	84-09	1.0	89-03	1.3	+0.3	(+3.0) + 0.2
4-11	84-09	1.9	89-04	2.3	+0.4	(+21.1) + 0.4
7-11	84-02	1.7	89-04	1.4	-0.3	(-12.6) + 0.2
9-11	84-04	1.4	89-04	3.1	+1.7	(+21.9) + 0.1
11-11	84-02	1.0	88-08	1.3	+0.3	(+3.0) + 3.4
13-11	84-03	1.6	89-04	2.5	+0.9	(+56.3) + 1.5
15-11	84-05	2.0	88-06	2.1	+0.1	(+3.0) + 0.2
1-12	84-07	2.5	88-09	1.4	-1.1	(-44) + 0.2
3-12	84-05	3.7	88-06	2.2	-1.5	(+40.5) - 0.1
5-12	84-08	3.4	88-06	4.2	+0.8	(+23.5) + 0.4
7-12	84-07	3.2	88-08	1.6	-1.6	(-50) + 0.5
9-12	84-10	1.0	88-06	0.4	-0.6	(-60) - 0.2

R.28W1M

R.27W1M



T.10

- PROJECT CONVERSION
 PROJECT REACTIVATION (INJECTION)

DALY UNIT NO. 3

FIGURE

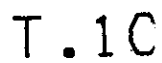
LEGEND

- OILWELL
 SUSPENDED OILWELL
 INJECTION WELL
 ABANDONED OILWELL
 UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

G03.

R.27W1M



DALY UNIT NO. 3

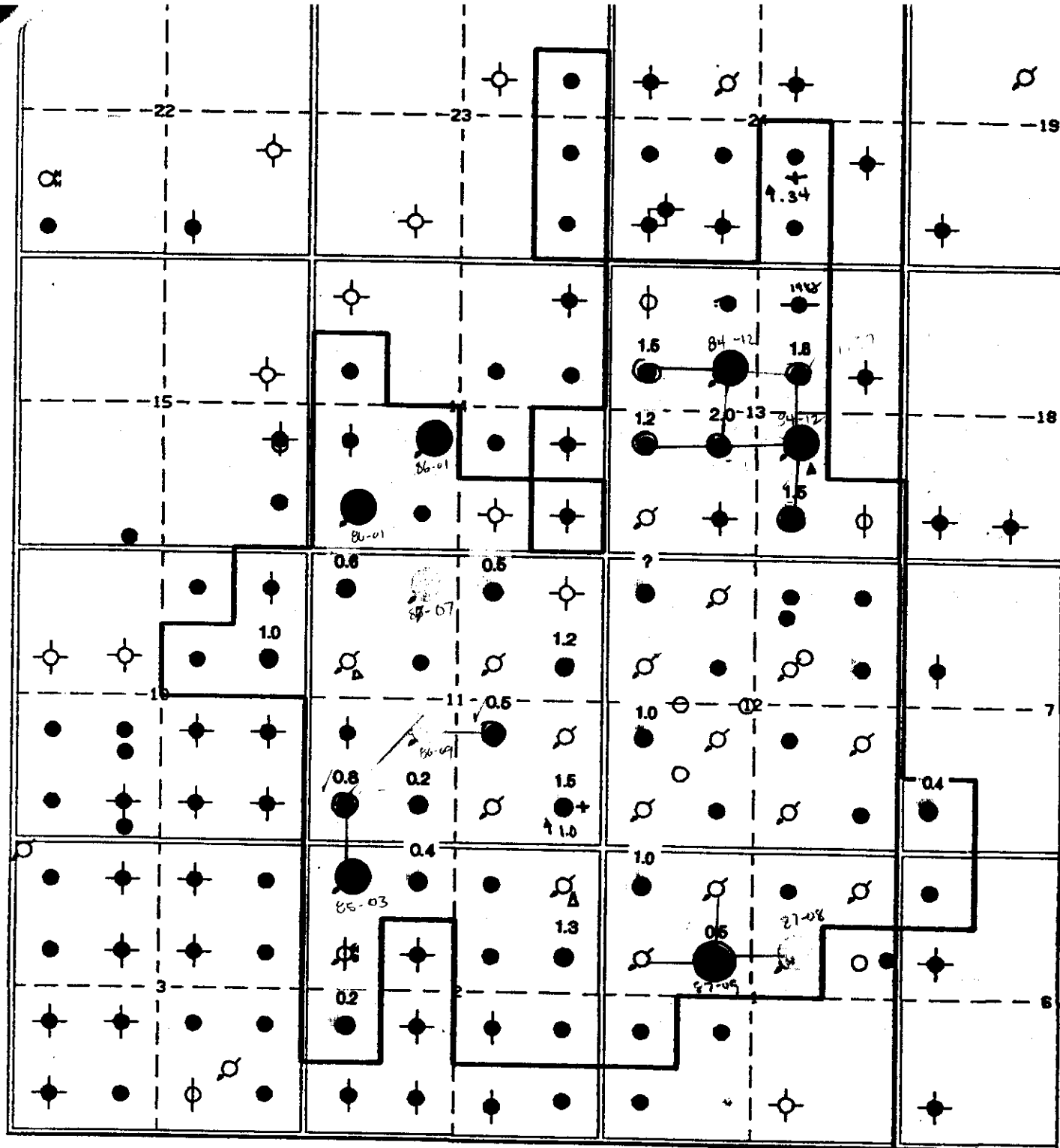
FIGURE 1

- OILWELL
- ⦿ SUSPENDED OILWELL
- ⊗ INJECTION WELL
- ⊕ ABANDONED OILWELL
- UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

UNIT OUTLINE

GO:



PROJECT CONVERSION

PROJECT REACTIVATION (INJECTION)

PROJECT REACTIVATION (PRODUCTION)

INCREMENTAL OIL RATE (m3opd)→X.X

(DATUM DEPTH = -237.7 m SS)

DALY UNIT NO. 3

Δ recompleted 1988

→ stimulation

FIGURE 6

RESPONSE WELL MAP

☒ RESPONSE WELL (INCREMENTAL)

● **RESPONSE WELL (ACCELERATION)**

LEGEND

OILWELL

SUSPENDED OILWELL

Ø INJECTION WELL

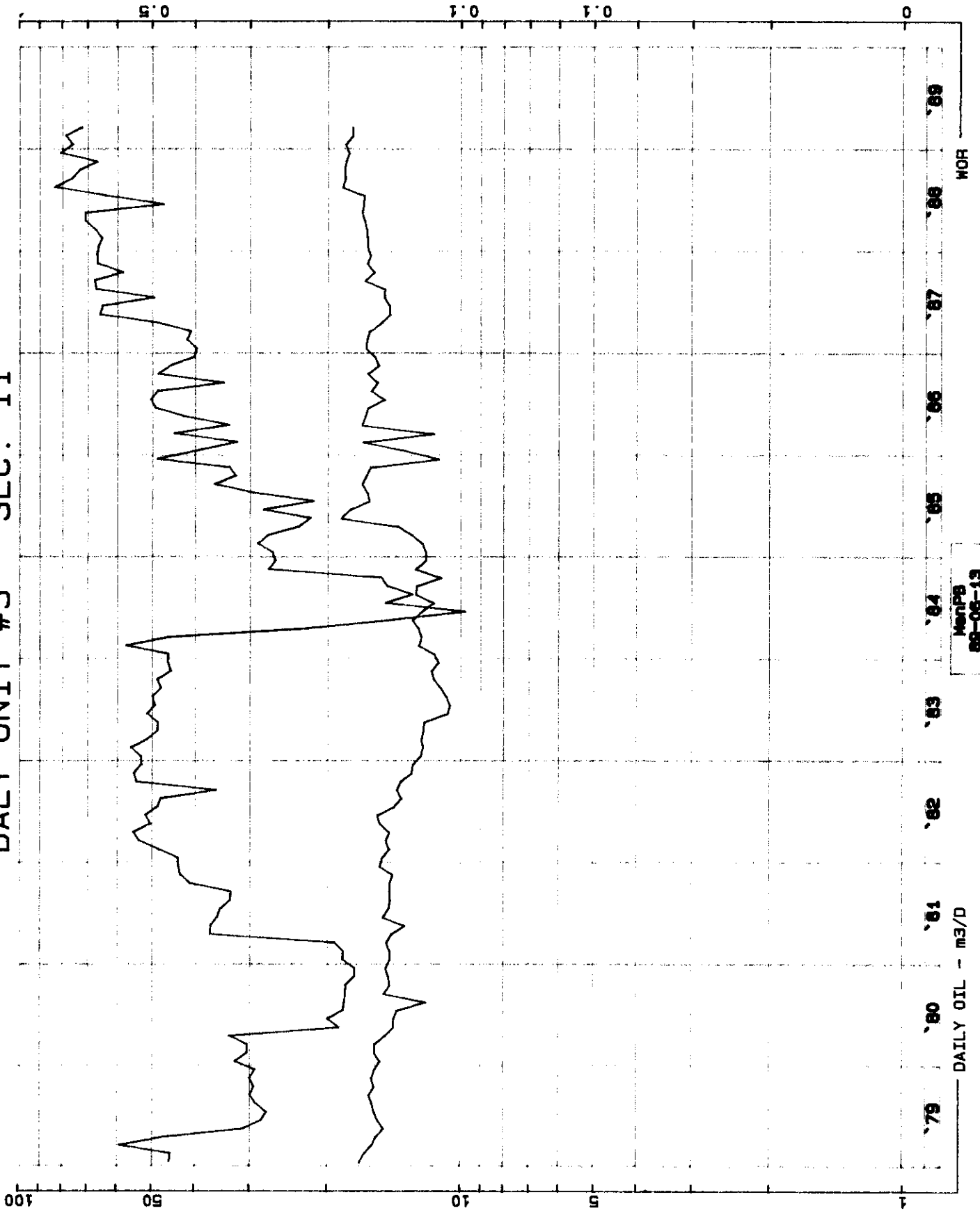
 ABANDONED OILWELL

~~UNIT~~ UNIT OUTLINE

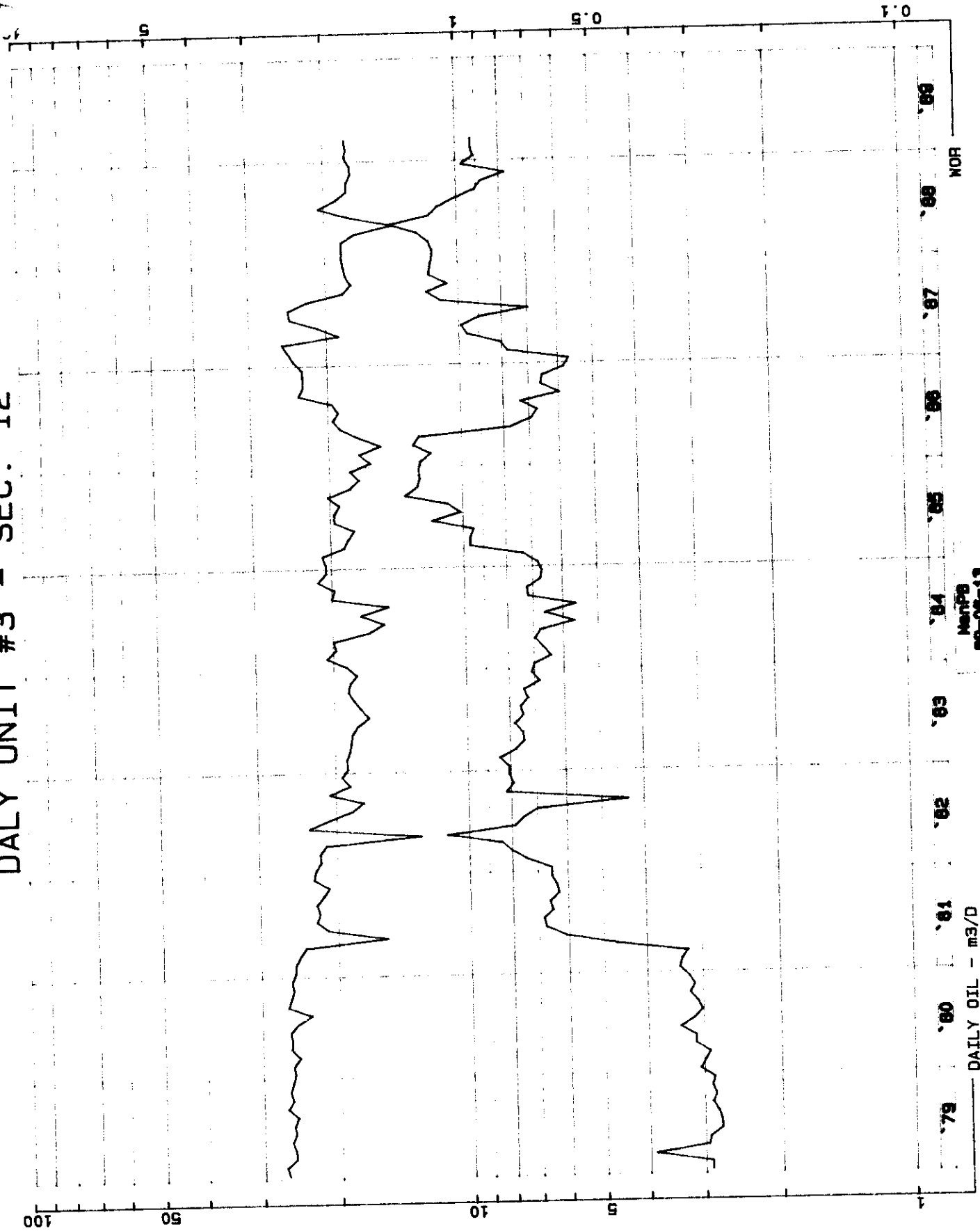
003434

CONFIDENTIAL

DALY UNIT #3 - SEC. 11



DAILY UNIT #3 - SEC. 12

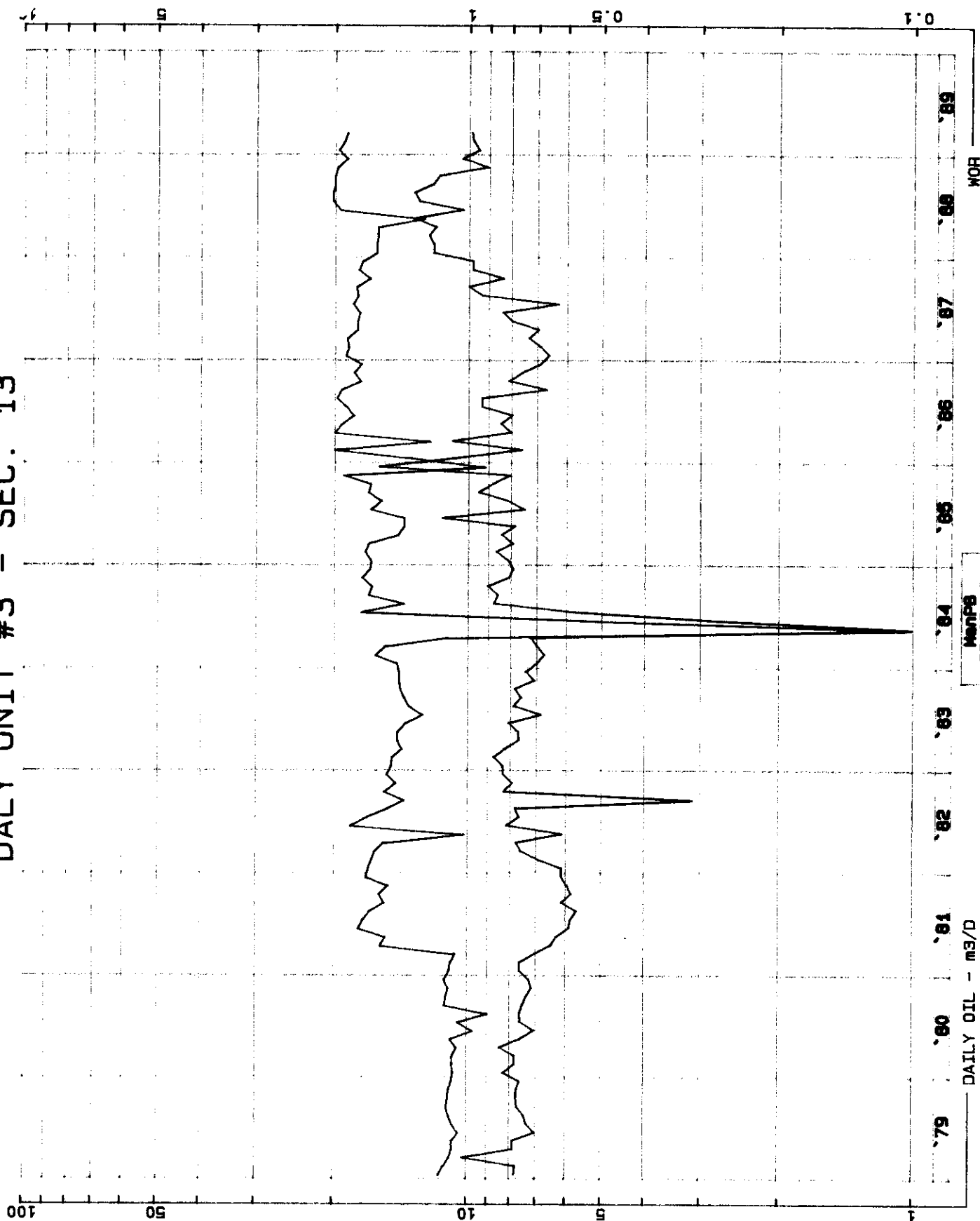


NonP8
89-08-13
10:53:55

DAILY OIL - m3/D

MOR

DALY UNIT #3 - SEC. 13



WOPB
 88-08-13
 10:36:43

DAILY OIL - m3/D

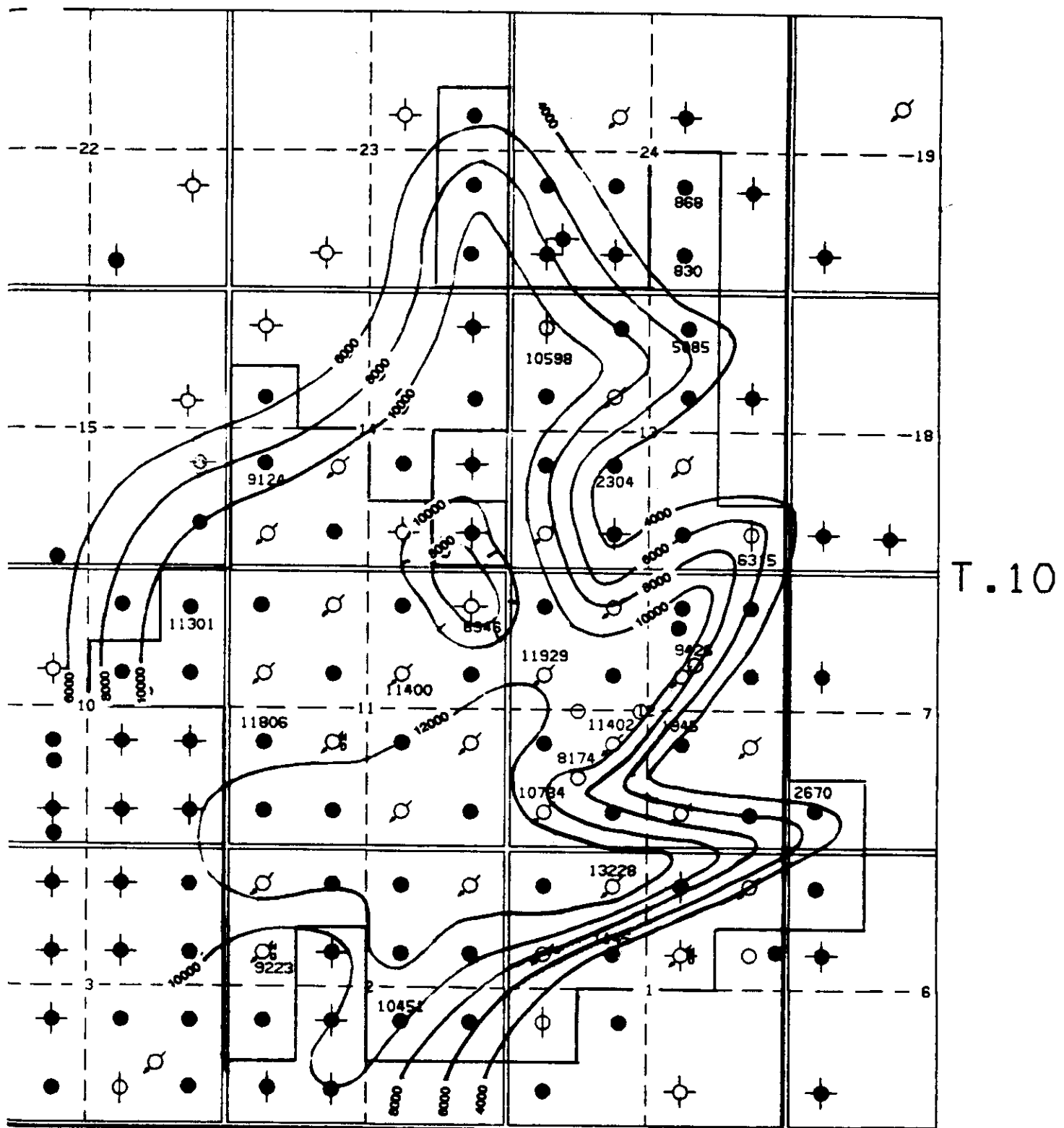
WOR

Pressure Response

- Pre-project reservoir press. 5900 kPa_g.
- 1988-89 reservoir press. 7000 kPa_g.
- though there continues to be a significant variation in pressure throughout the reservoir in general, all portions of the reservoir have experienced an increase in pressure
- variations related to variations in rock properties
- lower pressure along unit boundaries - lack of confinement support

R.28W1M

R.27W1M



DALY UNIT NO. 3

1988 SUBSURFACE
PRESSURE SURVEY

FIGURE IV

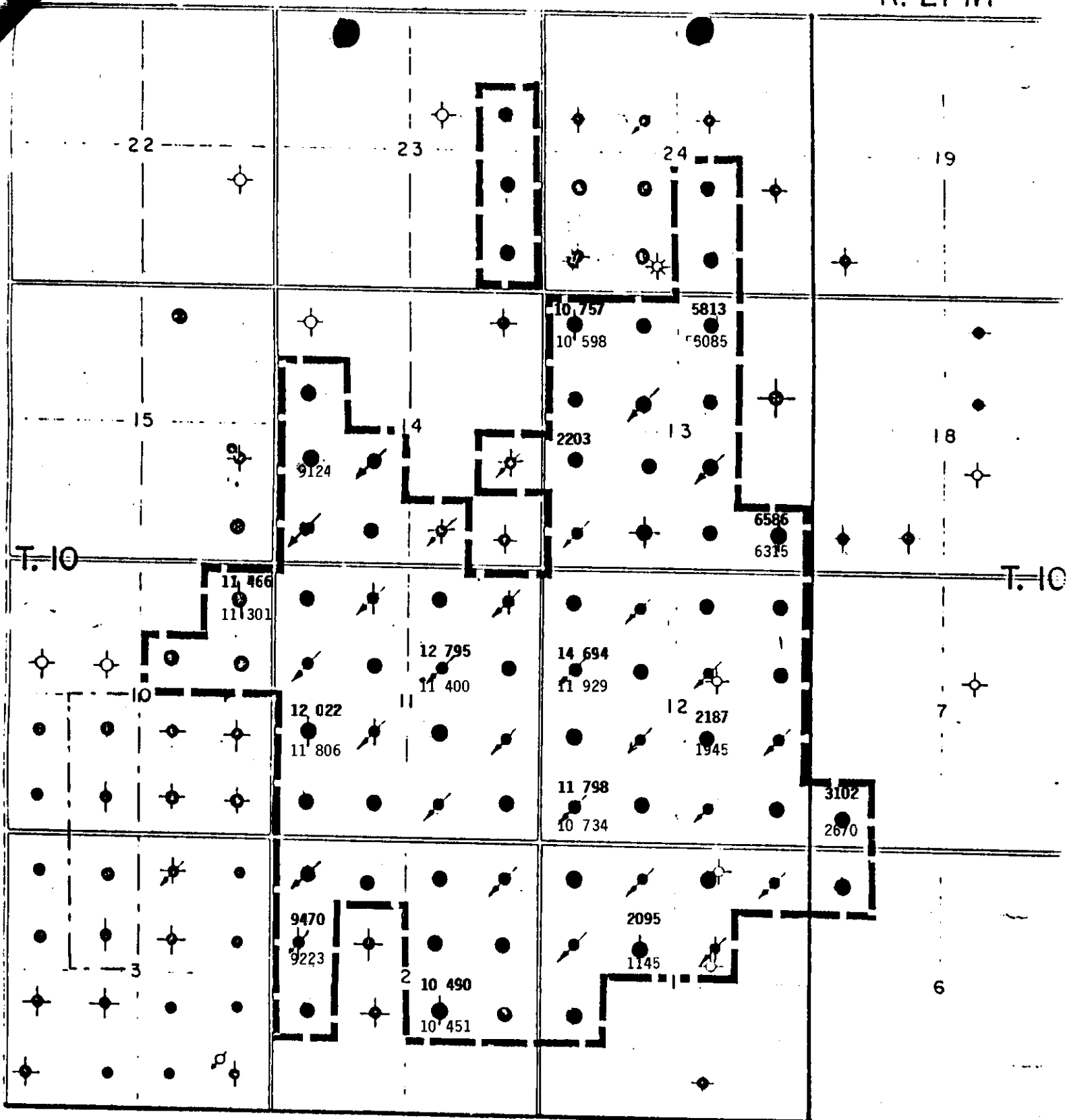
LEGEND

- OILWELL
- SUSPENDED OILWELL
- ⊗ INJECTION WELL
- ⊙ ABANDONED OILWELL

DEPTH = -237.7 m SS)

R. 28

R. 27 WP



LEGEND

1989 Pressure (kPa)

1988 Pressure (kPa)

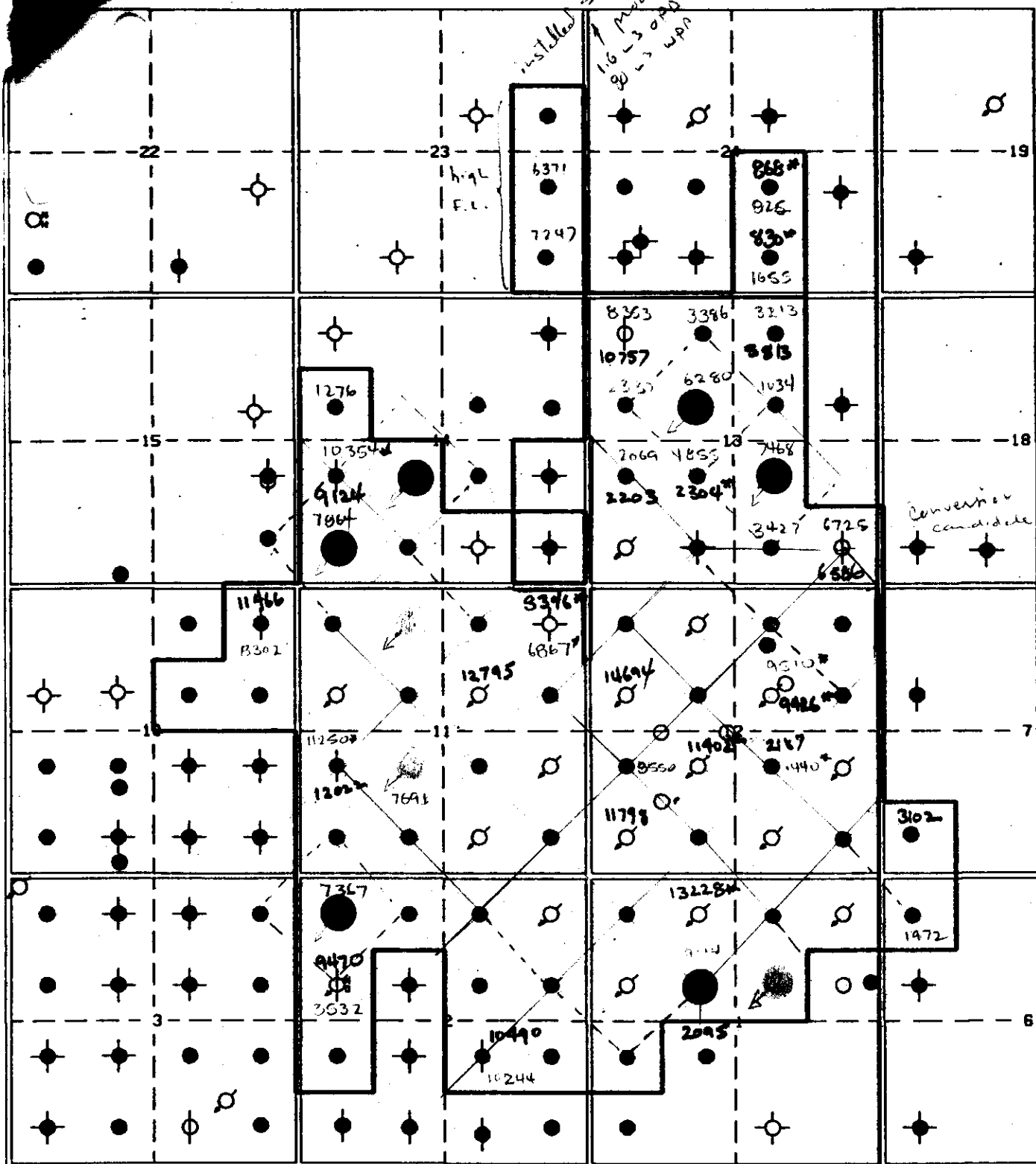
- OILWELL
- ⬮ SUSPENDED OILWELL
- ⬮ INJECTION WELL
- ⬮ ABANDONED OILWELL

DALY UNIT No.3

MAP OF AREA

R.28W1M

R.27W1M



T.10

- PROJECT CONVERSION
- ⊗ PROJECT REACTIVATION (INJECTION)
- PROJECT REACTIVATION (PRODUCTION)

DALY UNIT NO. 3

FIGURE 1

1986 Point
1984 Lower
1989
1988*

7-2
3-11 } communication
16-10 } oil zone

--- channels

LEGEND

- OILWELL
- ⊗ SUSPENDED OILWELL
- ⊗ INJECTION WELL
- ⊗ ABANDONED OILWELL
- UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)



Memorandum

Date May 12, 1989

To H. Clare Moster
ADM

From L. R. Dubreuil
Director

Subject Re: Daly Unit No. 3
New Oil Status

Telephone

In July 1984, Chevron applied to the Board for approval of modifications to the waterflood project in Daly Unit No. 3. The modifications included three elements.

- a) conversion of wells to injection
- b) reactivation of injection wells
- c) increase in injection pressure.

Concurrent with this application, Chevron applied to the Minister for granting of new oil status for all oil in excess of a historical production decline base. In analysis of the request, it was recognized that Chevron's proposal would result in a combination of incremental reserves (new injectors) and accelerated production (higher pressure). It was contended by the Petroleum Branch that only the incremental reserves aspect of the project should garner new oil royalties.

The relative importance of incremental and acceleration components could not be determined prior to project implementation. Consequently the Petroleum Branch proposed that Chevron's request be granted for a three year period (expiring June 30, 1987). Upon expiry an evaluation of the project would be made on which to base continuation or termination of new oil status. The Petroleum Branch's recommendation was accepted and approved by the Minister pursuant to the definition of "new oil" in The Oil and Gas Tax Act and the Crown Petroleum Royalty Regulations, 1984. The Minister was, in effect recognizing Chevron's program as an expanded pressure maintenance scheme albeit on an interim basis.

In April 1987, Chevron submitted a review of the project and indicated that continued new oil status (for incremental production) was needed to justify further field activities designed to maximize production. The review did not adequately address the relative importance of incremental and accelerated production. The Branch's review of the project provided no clear indication of the relative effect of the two components. It was recommended that the current new oil status be extended until June 30, 1989 and that Chevron be required to submit a comprehensive report on the project. The Branch's recommendation was approved and the extension was granted by Order in Council. Note that due to a change in the royalty/tax regulations, approval by the Minister was no longer sufficient.

The required report has been submitted by Chevron. It is anticipated that analysis of this report and Unit performance will lead to a recommendation to:

- a) Extend new oil status indefinitely. This would recognize that the majority or all of the production increase was due to incremental reserves. This being the case, the definition of "new oil" in the royalty/tax regulations would permit granting of new oil status. I would suggest that approval authority for this would be the Board through recognition of Chevron's project as a bonafide pressure maintenance expansion, or
- b) Allow new oil status to terminate June 30, 1989. This would recognize that a substantial part of the incremental production observed to date may be purely acceleration of production. The position that may be taken in this case would be that any incremental reserve would have already been recognized through new oil status over the past 5 years. Again, the Board should be the decision authority.

The report is being evaluated and appropriate recommendations will be made to the Board.

L. R. Dubreuil
Director

LRD:jtb

cc: John Fox
Brad Thiessen

DAILY UNIT No. 3

1989	Base Case	Actual Case	Incr. Prod.
Jan	2245.1	2738.1	493
Feb	2026.2	2439.4	413.2
Mar	2241.4	2718.7	477.3
Apr	2167.3	2570.3	403
May	2237.6	2553.7	316.1
			<hr/>
			2102.6 m ³

1984-89 to 88-12

14791 m³

16893.6



Chevron Canada Resources

500 - Fifth Avenue S.W., Calgary, Alberta T2P 0L7 • Phone (403) 234-5000
Fax 234-5947

K.E. Godard
Chief Engineer

1989-05-04

Daly Unit No. 3
Extension of New Oil Status
Performance Review

Oil and Natural Gas Conservation Board
Room 309
Legislative Building
Winnipeg, Manitoba

Attention: Mr. H. C. Moster, Deputy Chairman

Gentlemen:

Chevron Canada Resources, a Partnership by its managing partner, Chevron Canada Resources Limited, as Operator of the Daly Unit No. 3, hereby applies:

- 1) For continuation of New Oil status on incremental oil production as a result of the 1984 Waterflood Expansion Project.
- 2) To revise the base case annual exponential decline rate from 1.0% to 1.5%.

Unit performance to date clearly exhibits the generation of incremental oil production and supports continued recognition of New Oil status. New Oil status is necessary in order to provide economic justification for ongoing optimization and improved recovery measures. Without New Oil status, much of the remedial work conducted periodically to maintain injectivity and productivity would be uneconomic and could not be justified. New Oil status also provides the incentive to pursue new waterflood enhancement activities to further improve recovery. As an example, the suspended well at 1-13-10-28 W1M is presently being evaluated for conversion to injection based on the success of other conversions in the area.

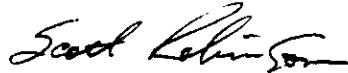
A review of Unit reserves and of the pre-project decline trend supports a base exponential decline rate of 0.015. Chevron requests that future New Oil calculations reflect this value applied to the 1984-01 production rate and declined to 1989-01. The new 1989-01 base case oil rate would be 70.635 m³ opd rather than 72.423 m³ opd.

A detailed Performance Review is submitted in support of our application. In summary, since project initiation in 1984-09, recovery of incremental oil has been accomplished in areas where conversions or injector reactivations were conducted. Incremental oil production has also been achieved from several wells in response to increased water injection rates throughout the Unit.

The total incremental oil identified at individual wells is 18.6 m³. This more than accounts for the difference between the Unit production and the base production.

If you have any questions regarding this Performance Review, please contact Scott Robinson at 403-234-5388.

Yours very truly,



for C. G. FOLDEN, P.Eng.
Manager
Reservoir Engineering

DSR/kt
Attach.

1.0 Summary

Chevron Canada Resources undertook a waterflood expansion project in the Daly Unit No. 3 commencing in 1984. The project objective was to generate incremental oil production from the existing waterflood scheme. A complete review of Unit performance from the time of implementation of the scheme to 1988-12-31 has been conducted. The review clearly identifies that the project objective has and continues to be achieved.

The scope of the expansion project included well reactivations, conversion of producers to injectors, and an increase in the Unit water injection rate. The reactivations and conversions were designed to improve waterflood sweep in low pressure areas of the Unit. The increase in water injection was intended to accelerate fluid production and oil recovery. By accelerating oil production, more oil would be recovered before the end of the Unit's economic life. The Unit's life is dictated by equipment and casing life rather than by minimum production rates. Expansion activities resulted in the expenditure of over \$1.3 million. ✓

The expansion project has exhibited mixed success to date. A review of the performance of the producers supported by the conversions and reactivations reveals successful incremental oil recovery. Production from those wells is largely responsible for the incremental production of 13.4 m³ opd above the Manitoba Petroleum Branch recognized base case production of 72.5 m³ opd in 1988-12. On the other hand, the general increase in water injection from approximately 200 m³ wipd to 700 m³ wipd as a result of increased injection pressures, has not resulted in the full magnitude of its intended productivity increase. Total fluid production increased from approximately 175 Rm³ pd to only 290 Rm³ pd. It should be noted a large part of the increase (80 m³/d) occurred at one well outside of the main waterflood area (9-23-10-28 W5M) where an ESP was run. The failure to affect a productivity increase comparable to the injectivity increase accounts for the expansion project falling short of initial forecasts presented to the Manitoba Oil and Natural Gas Conservation Board. Nevertheless, incremental recovery is being achieved as a direct result of the expansion project. Incremental recovery for the period 1984-09 to 1989-12 is estimated at 16 400 m³ above Chevron's base case and 14 800 m³ above the Manitoba Petroleum Branch recognized base case. This work would not have been performed and the incremental recovery would not have been realized had New Oil status not been granted for royalty and mineral tax purposes. ✓

2.0 Conclusions

- 2.1 Incremental oil recovery is being achieved at many Unit wells. In particular, notable oil production increases have been observed at wells offsetting project conversions or reactivations.
- 2.2 Voidage replacement exceeds production by a ratio of over 2:1; however, reservoir pressure has remained relatively constant for the past several years. Out-of-zone fluid migration is apparent.
- 2.3 Reservoir fluid throughput is at the maximum level possible. Further injection increases will not enhance reserve depletion under the existing scheme.

3.0 History

On 1984-07-03, Chevron applied to the Manitoba Oil and Natural Gas Conservation Board to expand the Daly Unit No. 3 waterflood scheme. An accompanying application to the Manitoba Minister of Energy and Mines (Petroleum Branch) for New Oil status for incremental oil from the scheme was submitted on 1984-07-04. The outlined work for the scheme included conversion of five wells to injection and reactivation of three injection wells as injectors. The application also sought to increase the maximum injection pressure to 10.0 MPa. The conversions and reactivations specified were:

Conversions: 13-02-10-28 WPM
07-13-10-28 WPM
11-13-10-28 WPM
04-14-10-28 WPM
06-14-10-28 WPM

Reactivations: 06-11-10-28 WPM
14-11-10-28 WPM
16-11-10-28 WPM

Chevron was granted approval for the proposed expansion. On 1984-09-17, approval was received from the Manitoba Oil and Gas Conservation Board for the five proposed conversions and for an increase in the maximum injection pressure to 10.0 MPa. Approval had already been received for the reactivations. On 1987-09-26, approval for New Oil status above a set base case was received from the Manitoba Minister of Energy and Mines. The base case established a 1984 start rate of 76.2 m³ opd declining at a 1.0% annual exponential decline rate. New oil status was effective 1984-09-01.

The work was initiated with expansion of the water plant which was completed by 1984-09 and upgrade of the injection pipe lines in 1985-01. This work resulted in an increase in wellhead injection pressure from approximately 7.5 MPa to approximately 8.5 MPa. Two conversions (7-13-10-28 and 11-13-10-28) were conducted in 1984-12, one (13-2-10-28) in 1985-03, and the final two (4-14-10-28 and 6-14-10-28) in 1986-01. The injectors at 6-11-10-28 and 14-11-10-28 were reactivated in 1986-09 and 1987-07, respectively. The other planned reactivation at 16-11-10-28 was not conducted because of complications caused by a stuck packer. Two other reactivations not discussed in the original application occurred at 10-1-10-28, an injector (1987-08) and 11-1-10-28, a producer (1987-09). Other miscellaneous work included numerous injection well clean-outs, two liner jobs, and several acid jobs. Figure 1 is a Unit map illustrating current well status and indicating which wells were reactivated or converted as part of the expansion project.

4.0 Performance Review

The performance of Daly Unit No. 3 was reviewed before and after the waterflood expansion work. A review of total Unit performance was conducted to investigate overall

production and injection trends. A second review entailed a detailed investigation of the performance of individual wells and the contribution each makes to the total Unit performance.

4.1 Unit Overview

Oil production from Daly Unit No. 3 had been on a steady decline since implementation of waterflooding in 1953. However, Figure 2 shows that the oil production decline terminated in late 1984 and oil production has been on a slight incline since that time. Oil production has risen from 76 m³ opd in 1983-12 to 86 m³ opd in 1988-12 as a result of the expansion project. Unit water production shows a sharp increase corresponding in time to the expansion project. However, the increase from 100 m³ wpd to 180 m³ wpd is the direct result of increasing fluid production at 9-23-10-28 W1M. This well experienced an 80 m³ wpd and 1.6 m³ opd increase in 1985-08 when a submersible pump was installed. Water production from the majority of the Unit producers has remained constant. The sharp increase in water rate in Figure 2 should not be misconstrued as early breakthrough or channelling as a result of increased bottomhole injection pressures.

Figure 3 is an enlarged graph of oil production from 1970 to present. The graph clearly illustrates a favourable change in the production trend after waterflood expansion measures were implemented. Oil production has yet to begin a decline as it continues to show an upward trend.

Water injection into the Daly Unit No. 3 was increased significantly as a result of the waterflood expansion project. As Figure 4 illustrates, water injection has increased from approximately 200 m³ wipd to 700 m³ wipd. The increase is the result of two factors:

- 1) an increase in injection system pressures combined with injector clean-outs and stimulations
- 2) conversion and reactivation of several injectors

Of the 500 m³ wipd increase, approximately 250 m³ wipd represents the injectivity increase at existing injectors because of the increased injection pressure. The remainder, 250 m³ wipd, represents injection into injectors that were reactivated (three reactivations - 120 m³ wipd) and injection into wells that were converted to injectors (five conversions - 130 m³ wipd). The conversions and reactivations are intended to sweep areas that otherwise would be poorly swept or not swept at all.

The 500 m³ wipd increase in water injection has only partially achieved its intended objective. A portion of the injection into the conversions and reactivations is accomplishing oil production response at offset producers. This response largely

accounts for the increase in the oil production rate experienced to date. A detailed review of individual response wells will be provided in the Section 4.2 of this document.

Much of the injection increase is having only minor impact on production. This includes a large part of the injection increase at previously existing injectors as well as a part of the injection into reactivations/conversions. While injection prior to expansion was approximately 200 m³ wipd and was balanced with fluid production of approximately 175 Rm³/d, current injection is approximately 700 m³ wipd as compared to current fluid production of 290 Rm³/d. Considering further the fact that an 80 m³ wipd increase occurred at producer 9-23-10-28 W1M outside of the waterflood area (ran ESP), the imbalance between injection and production is even more obvious. Figure 5 is a plot of the voidage replacement ratio which clearly illustrates the imbalance.

The imbalance between production and injection is interpreted to be the result of water migration out of zone. An initial imbalance is to be expected during reservoir fill-up in low pressure areas. However, the net pay weighted average reservoir pressure shows little change over the last three post-project years. The average pressure for the years 1985 through 1987 were 6 812, 6 581, and 6 977 kPag, respectively. Given that only a 35 Rm³/d fluid production rate increase has occurred, over 450 m³/d of the injection rate increase is going out of zone. The injection increase was a logical step in project optimization. However, recognizing now that it has had limited success, other measures such as infill drilling need to be pursued for optimization purposes.

4.2 Well Review

A review of each producer and injector in Daly Unit No. 3 was conducted to explore the effects of the expansion project on individual well performance. The producing wells were reviewed with particular attention to changes in production, pressure, and offset injection support. Wells showing production response have been identified and are discussed below. A total of eight wells were identified as showing incremental response as a result of the injector conversions/reactivations. The wells have a total incremental oil production rate of 9.8 m³ opd. An additional thirteen wells were identified as showing a small degree of response to increased injection rates at existing injectors. Those wells add an additional 8.8 m³ opd of incremental production. The total incremental production identified is 18.6 m³ opd, approximately 22% of the total Unit producing rate.

The identified response wells are shown on the map in Figure 6. A discussion of each follows. The wells showing response to injector conversions or reactivations are called incremental response wells and those showing response to an offset injection rate increases are called acceleration response wells. Because the incremental response wells are responding to newly implemented or reactivated injection and the oil would otherwise remain largely unswept, the response is truly incremental. It is important

to note that accelerated oil production is also incremental by virtue of the fact that it would otherwise not have been recovered at the end of the field's life. Production curves for each response well are included in the figures section and are referred to in the discussion. The production curves indicate incremental production above the decline rate established prior to the expansion project.

4.2.1 Response Wells (Incremental)

11-1-10-28 W1M The well at 11-1 was reactivated as a producer in 1985-09 and is being supported by the offset reactivated injector at 10-1 as well as the 12-1 and 14-1 injectors. The latter two injectors experienced a 20 to 30 m³ wipd increase as a result of increased injection pressures. All production from 11-1 (0.5 m³ opd) is considered incremental because the well would not have been reactivated had the expansion project not occurred. Figure 7 is a production plot for 11-1.

4-11-10-28 W1M The well at 4-11 is supported by injection at 13-2 which was converted to injection as part of the expansion and 6-11 which was reactivated to injection as part of the expansion. The additional injection support in the area from the conversion and reactivation has resulted in a substantial pressure increase. This is evidenced by a pre-project 1984 pressure of 7 691 kPag at 6-11 and post-project 1987 pressures of 11 750 and 10 480 kPag at 5-11 and 6-11. The production plot in Figure 8 shows a 0.8 m³ opd increase at 4-11 as a result of the additional support.

7-11-10-28 W1M The well at 7-11 is showing response to injection at the reactivated 6-11 injector. Other supporting injectors at 2-11, 8-11, and 10-11 have shown minimal injectivity increase from the project injection pressure increase. Therefore, the oil production increase at 7-11 as shown in Figure 9 is the result of the added support at 6-11. Incremental oil is approximately 0.5 m³ opd.

2-13-10-28 W1M The well at 2-13 is supported from injection at 7-13, a project injector conversion, and 14-12 an existing injector. Because only a small injectivity increase occurred at 14-12 as a result of the project, production changes at 2-13 are the result of the 7-13 conversion. The production plot in Figure 10 shows an incremental rate of 1.5 m³ opd. Response is considered to have begun in early 1985 with the production increase observed in 1984 attributable to poor well test data.

5-13-10-28 W1M The well at 5-13 receives support from the 11-13 project injector conversion and from the existing injector at 4-13. The latter well did not exhibit a significant injectivity increase as a result of the expansion project pressure increase and is believed to have an insignificant role in the oil production increase at 5-13. The incremental oil production rate of 1.2 m³ opd at 5-13 as shown in Figure 11 is believed to be the result of injection at the 11-13 conversion where improved reservoir sweep efficiency is being accomplished.

6-13-10-28 W1M The well at 6-13 receives support from the 7-13 and 11-13 project injector conversions and from the 4-13 existing injector. Increased pressure support as a result of the additional injection into the converted wells is evident by the increase from 1 855 kPag in 1984 to 2 300 kPag in 1988. As Figure 12 illustrates, a 2.0 m³ opd increase above base decline has occurred at 6-13.

10-13-10-28 W1M The well at 10-13 is supported by the 7-13 and 11-13 project injector conversions. Pressure support has increased as a result of the conversions as evidenced by an increase at 15-13 from 3 213 kPag in 1984 to 5 085 kPag in 1988. A 1.8 m³ opd increase in oil production has occurred at 10-13 as is shown in Figure 13.

12-13-10-28 W1M Pressure support at 12-13 is coming from the 11-13 project injector conversion. The pressure has risen at the offset 13-13 location from 8 550 kPag in 1984 to 10 590 kPag in 1988 giving evidence to the effectiveness of the injector conversion. Figure 14 shows that 12-13 has exhibited a 1.5 m³ opd increase in oil production above the base decline as a result of the additional support.

4.2.2 Response Wells (Acceleration)

Several wells throughout the Unit have exhibited minimal to fairly significant oil production increases as a result of increased injection rates at existing injectors. The wells are shown on the map in Figure 6 as acceleration response wells and are listed below. Production curves for each are included and referred to by the appropriate figure number.

<u>Well</u>	<u>Incremental Oil Rate (m³ opd)</u>	<u>Figure Number</u>
04-07-10-27 W1M	0.4	15
13-01-10-28 W1M	0.5	16
05-02-10-28 W1M	0.2	17
09-02-10-28 W1M	1.3	18
14-02-10-28 W1M	0.4	19
09-10-10-28 W1M	1.0	20
01-11-10-28 W1M	1.5	21
03-11-10-28 W1M	0.2	22
09-11-10-28 W1M	1.2	23
13-11-10-28 W1M	0.6	24
15-11-10-28 W1M	0.5	25
05-12-10-28 W1M	1.0	26
*13-12-10-28 W1M	<u>0.0</u>	27
Total	8.8	

* Well appears to be exhibiting response but has not been included because of the early response and uncertain well test data in late 1984.

5.0 Unit Production Decline Analysis

An evaluation of the Unit oil production trend was conducted using exponential decline analysis. Ultimate recovery and expansion project incremental oil were calculated. In summary, an ultimate Unit oil recovery of 29.1% is forecasted based on the pre-project decline and a recovery of 31.8% is forecasted based on present oil rates and an assumed decline rate. The improvement is the result of an improvement in waterflood sweep efficiency. Incremental oil recovery to 1988-12 is estimated at 16 400 m³ and projected incremental oil recovery to a field economic life in the year 2035 is projected to be 206 000 m³.

5.1 Pre-Project Decline

An evaluation of the production trend prior to 1984-06 was conducted to determine the oil decline rate. The exponential decline rate was calculated from oil production data by method of linear regression of the data over various periods:

<u>Period</u>	<u>Exp. Decline Rate</u>
1977-01 to 1984-06	0.016
1978-01 to 1984-06	0.019
1979-01 to 1984-06	0.021
1980-01 to 1984-06	0.024
1981-01 to 1984-06	0.031
1982-01 to 1984-06	0.059

As is evident, the decline rate has shown an increase indicating that the Board accepted value of 0.010 is low. Based on the established trend over the period of 1977-01 to 1984-06 as is shown in Figure 28, the exponential decline rate of 0.016 is most valid. Figure 28 shows how that rate, rounded off to 0.015, compares to the Board value of 0.010.

The incremental production since 1984-09 using a 0.015 exponential decline rate is 16 400 m³ as compared to 14 800 m³ using a 0.010 exponential decline rate.

5.2 Pre-Project Reserve Analysis

Calculations are presented for the project oil recovery as predicted from pre-project trends.

a) Unit OOIP = 7 887.9 10³ m³

b) Displacement Efficiency (E_D) = $\frac{S_{\alpha} - S_{\alpha w}}{S_{\alpha}} \times 100\%$
 = 53.7%

$$= 53.7\%$$

where $S_{oi} = 0.605$
 $S_{orw} = 0.280$

c) Cumulative Oil Production

	<u>To 1983-12-31 (m³)</u>
Active Wells	1 165 155
Inactive Wells	<u>124 114</u>
Total	1 289 269
	(16.3% OOIP)

d) Ultimate Recovery to Zero Rate (R/F)

This scenario is unrealistic as it extends beyond economic limits.

i) Exponential Decline = 0.010

Cum. Recovery to 1983-12-31	1 289 10 ³ M ³
Projected Recovery	<u>2 832 10³ m³</u>
	4 121 10 ³ m ³
	(52.2% OOIP)

ii) Exponential Decline = 0.0150

Cum. Recovery to 1983-12-31	1 289 10 ³ m ³
Projected Recovery	<u>1 888 10³ m³</u>
	3 177 10 ³ m ³
	(40.3% OOIP)

e) Continuity Factor

i) Exponential Decline = 0.010

$$C/F = R/F + E_o \times 100\%$$

$$= 97\%$$

ii) Exponential Decline = 0.015

$$C/F = R/F + E_o \times 100\%$$

$$= 75\%$$

f) Economic Recovery

- Based on Unit operating costs an economic limit of 32 m³/d (0.7 m³/d/well) is assumed (Rate Limit)
- A field life to 2035 is assumed based on expected equipment/casing life (Age Limit)

- In all cases, the age limit and not the rate limit determined the economic life.

i) Exponential Decline = 0.010	
Cum. Recovery to 1983-12-31	1 289 10 ³ m ³
Projected Economic Recovery	<u>1 132 10³ m³</u>
	2 421 10 ³ m ³
	(30.7% OOIP)
ii) Exponential Decline = 0.015	
Cum. Recovery to 1983-12-31	1 289 10 ³ m ³
Projected Economic Recovery	<u>1 010 10³ m³</u>
	2 299 10 ³ m ³
	(29.1% OOIP)

The pre-project exponential decline rate of 0.015 is believed more accurate based on the discussion in Section 6.1 and because a much more realistic continuity factor is predicted. The continuity factor is 75% as compared to an unrealistically high value of 97% for an exponential decline rate of 0.010. Figure 29 shows a comparison of the two exponential decline rates to a field life of 2035.

5.3 Post-Project Reserve Analysis

a) Cumulative Oil Recovery

	<u>To 1988-12-31 (m³)</u>
Active Wells	1 313 604
Inactive Wells	<u>124 114</u>
Total	1 437 718
	(18.2% OOIP)

b) Ultimate Recovery to Zero Rate (R/F)

The lack of an established post project decline rate requires that several assumptions be made. As a worst case scenario, it is assumed that Unit production begins a decline effective 1989-01-01. As has been discussed in Section 5.1, the Unit oil production is still on an upward trend. Therefore, this assumption is considered very conservative. Second, based on a paper by R. A. Purvis of the Alberta Energy Resources Conservation Board, a decline rate equivalent to the pre-project decline rate is assumed.¹ Purvis states in the conclusion section of his paper that the same rate of decline is often observed after productivity increases are accomplished by workover, drilling new wells, or initiating pressure maintenance.

1. Purvis, R. A., 'Analysis of Production Performance Graphs,' JCPT, July-August 1985, p.44.

Cum. Recovery to 1988-12-31	1 438 10 ³ m ³
Projected Recovery	<u>2 140 10³ m³</u>
	3 578 10 ³ m ³
	(45.4% OOIP)

- c) Continuity Factor
 $C/F = R/F + E_D \times 100\%$
 $= 85\%$

- d) Economic Recovery

- Field life to 2035 terminates production before economic limit of 32 m³/d is reached

Cum. Recovery to 1988-12-31	1 438 10 ³ m ³
Projected Economic Recovery	<u>1 067 10³ m³</u>
	2 505 10 ³ m ³
	(31.8% OOIP)

The post-project exponential decline rate of 0.015 is reasonable. The calculated improvement in continuity factor from 75% to 85% is consistent with the added production from and sweep in the areas where the injector conversions and reactivations occurred.

Σ - F_{cs}
 2738.1 2439.4

5.4 Incremental Oil

Table 1 presents a monthly tabulation of incremental production since 1984-09. As is apparent, the calculated incremental production to date for the exponential decline rate of 0.015 is 16 400 m³. This represents 12% of the total production since 1984-09 and is 0.2% OOIP. The value based on the Board exponential decline rate of 0.010 is 14 800 m³.

The total forecasted incremental oil recovery to the year 2035 is 206 000 m³. This represents an incremental recovery of 2.6% OOIP.

Σ_{pm}
 2718.7 2570.3

Σ_y
 2751.7

6.0 Waterflood Project Status

To date, waterflooding has proven successful in maintaining economic oil production from Daly Unit No. 3. Water injection has provided sufficient support to establish an average reservoir pressure of approximately 7 000 kPag. This is substantially higher than the discovery pressure of 5 850 kPag and the oil bubble point pressure of 3 000 kPag. Undoubtedly, without water injection and given the low gas content of the oil ($R_g = 21.6 \text{ m}^3/\text{m}^3$) and the low permeability of the reservoir ($k_r \approx 5 \text{ md}$), rapid decline would have occurred.

The low quality of the reservoir has played a major role in the rate at which the waterflood has progressed. Prior to the expansion project in 1984, the Unit injection rate was only 200 m³/d or 0.9% HCPV/yr. The low rate of fluid throughput is further emphasized by the fact that since waterflood implementation in 1953, only 54% HCPV of water has been injected (Figure 30). Over the same period, the amount of fluid withdrawn from the reservoir is only 34% HCPV (Figure 31). The low exponential decline rate of 0.015 is a natural consequence of the low fluid throughput.

Part of the waterflood expansion project was targeted at increasing the rate of fluid throughput. Injection was increased to 700 m³/d or 3.2% HCPV/yr. However, as was discussed in Section 5.1, the increase did not accomplish a comparable increase in fluid withdrawal. It is apparent that a limit has been reached. Other means for increasing reservoir fluid throughput are now under investigation.

7.0 Future Development

Chevron views infill drilling in Daly Unit No. 3 as a potential way to generate incremental recovery. Infill drilling will achieve improved waterflood continuity thereby resulting in recovery of otherwise unswept oil. It will also accelerate recovery of existing reserves because of increased reservoir fluid throughput. Accelerated recovery for the Unit is considered largely incremental because of equipment and casing life considerations. Chevron plans to reevaluate infill drilling in the second half of 1989.

New Oil status will also allow Chevron to continue to conduct well reworks and to evaluate further optimization measures. New Oil status results in a lower economic limit for individual wells and permits work to be done when otherwise it might be uneconomic. The result is prolonged well life and incremental oil recovery. Additional optimization work is also under consideration. The well at 1-13-10-28 W1M is being evaluated as a conversion candidate. Other wells are being considered for opening up additional pay through reperforation. New Oil status is necessary to justify this optimization work.

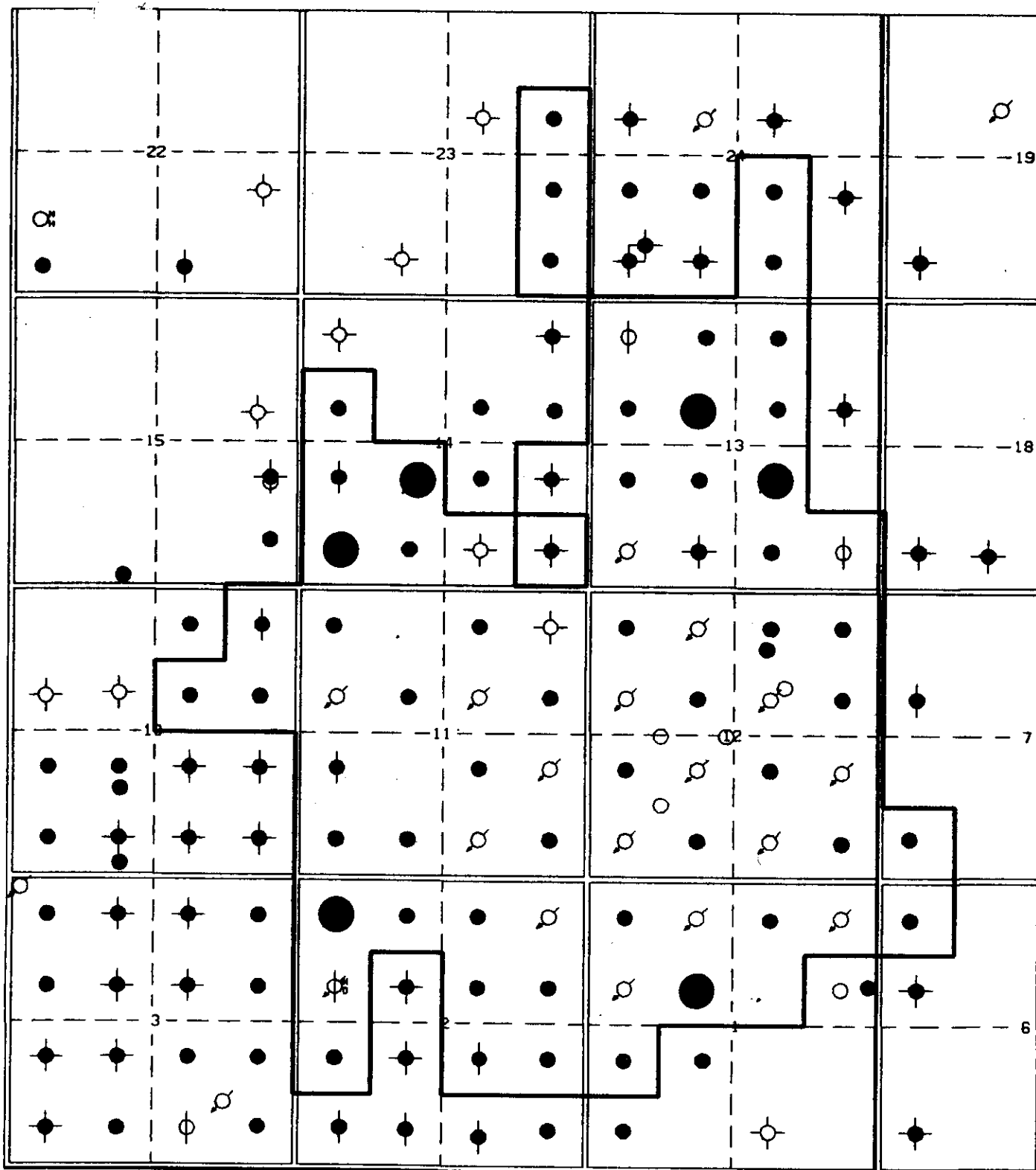
In summary, performance of the Daly Unit No. 3 waterflood indicates that incremental oil has been generated by the 1984 Waterflood Expansion Project. New Oil status should be continued for the life of the waterflood project to encourage ongoing project optimization activities that will increase recovery. In addition, recognition of an annual exponential decline rate of 1.5% is warranted based on both decline and reserve analyses.

TABLE 1
Incremental Oil

<u>Month</u>	<u>Act Oil (m³/mo)</u>	<u>P.Brch Base</u>		<u>Chevr Base</u>		<u>P.Brch New Oil (m³/mo)</u>	<u>Chevr New Oil (m³/mo)</u>
		<u>(m³/d)</u>	<u>(m³/mo)</u>	<u>(m³/d)</u>	<u>(m³/mo)</u>		
84-09	2 329.1	75.631	2 268.9	75.348	2 260.4	60.2	68.7
84-10	2 305.7	75.568	2 342.6	75.253	2 332.9	0.0	0.0
84-11	2 438.4	75.505	2 265.1	75.159	2 254.8	173.3	183.6
84-12	2 400.5	75.442	2 338.7	75.066	2 327.0	61.8	73.5
85-01	2 397.5	75.379	2 336.7	74.972	2 324.1	60.8	73.4
85-02	2 207.4	75.316	2 108.8	74.878	2 096.6	98.6	110.8
85-03	2 388.6	75.253	2 332.8	74.785	2 318.3	55.8	70.3
85-04	2 257.1	75.191	2 255.7	74.691	2 240.7	1.4	16.4
85-05	2 503.6	75.128	2 329.0	74.598	2 312.5	174.6	191.1
85-06	2 492.9	75.066	2 252.0	74.505	2 235.1	240.9	257.8
85-07	2 630.0	75.003	2 325.1	74.412	2 306.8	304.9	323.2
85-08	2 588.6	74.941	2 323.1	74.319	2 303.9	265.5	284.7
85-09	2 711.0	74.878	2 246.3	74.226	2 226.8	464.7	484.2
85-10	2 654.4	74.816	2 319.3	74.133	2 298.1	335.1	356.3
85-11	2 572.7	74.753	2 242.6	74.040	2 221.2	330.1	351.5
85-12	2 126.7	74.691	2 315.4	73.948	2 292.4	0.0	0.0
86-01	2 411.1	74.629	2 313.5	73.856	2 289.5	97.6	121.6
86-02	2 485.8	74.567	2 087.9	73.763	2 065.4	397.9	420.4
86-03	2 234.3	74.505	2 309.6	73.671	2 283.8	0.0	0.0
86-04	2 672.8	74.443	2 233.3	73.579	2 207.4	439.5	465.4
86-05	2 644.8	74.381	2 305.8	73.487	2 278.1	339.0	366.7
86-06	2 465.5	74.319	2 229.6	73.395	2 201.9	235.9	263.6
86-07	2 467.5	74.257	2 302.0	73.304	2 272.4	165.5	195.1
86-08	2 614.5	74.195	2 300.0	73.212	2 269.6	314.5	344.9
86-09	2 531.8	74.133	2 224.0	73.121	2 193.6	307.8	338.2
86-10	2 628.9	74.071	2 296.2	73.029	2 263.9	332.7	365.0
86-11	2 510.0	74.010	2 220.3	72.938	2 188.1	289.7	321.9
86-12	2 580.4	73.948	2 292.4	72.847	2 258.3	288.0	322.1
87-01	2 717.5	73.886	2 290.5	72.756	2 255.4	427.0	462.1
87-02	2 451.9	73.825	2 067.1	72.665	2 034.6	384.8	417.3
87-03	2 740.2	73.763	2 286.7	72.574	2 249.8	453.5	490.4
87-04	2 350.6	73.702	2 211.1	72.484	2 174.5	139.5	176.1
87-05	2 461.9	73.640	2 282.8	72.393	2 244.2	179.1	217.7
87-06	2 512.4	73.579	2 207.4	72.303	2 169.1	305.0	343.3
87-07	2 753.8	73.518	2 279.0	72.212	2 238.6	474.8	515.2
87-08	2 653.1	73.457	2 277.2	72.122	2 235.8	375.9	417.3
87-09	2 628.3	73.395	2 201.9	72.032	2 161.0	426.4	467.3
87-10	2 575.3	73.334	2 273.4	71.942	2 230.2	301.9	345.1
87-11	2 599.6	73.273	2 198.2	71.852	2 155.6	401.4	444.0
87-12	2 652.2	73.212	2 269.6	71.762	2 224.6	382.6	427.6
88-01	2 623.3	73.151	2 267.7	71.673	2 221.9	355.6	401.4
88-02	2 451.9	73.090	2 119.6	71.583	2 075.9	332.3	376.0
88-03	2 620.8	73.029	2 263.9	71.494	2 216.3	356.9	404.5
88-04	2 432.6	72.969	2 189.1	71.405	2 142.1	243.5	290.5
88-05	2 291.1	72.908	2 260.1	71.315	2 210.8	31.0	80.3
88-06	2 615.8	72.847	2 185.4	71.226	2 136.8	430.4	479.0
88-07	2 797.3	72.786	2 256.4	71.137	2 205.3	540.9	592.0
88-08	2 815.1	72.726	2 254.5	71.048	2 202.5	560.6	612.6
88-09	2 652.1	72.665	2 180.0	70.960	2 128.8	472.1	523.3
88-10	2 758.7	72.605	2 250.8	70.871	2 197.0	507.9	561.7
88-11	2 632.0	72.544	2 176.3	70.782	2 123.5	455.7	508.5
88-12	2 663.6	72.484	2 247.0	70.694	2 191.5	416.6	472.1
Totals	131 634.0	3 850.407	117 212.4	3 795.820	115 549.4	14 791.2	16 395.7

R.28W1M

R.27W1M



T.10

● PROJECT CONVERSION
 PROJECT REACTIVATION (INJECTION)
 ● PROJECT REACTIVATION (PRODUCTION)

DALY UNIT NO. 3

FIGURE 1

- LEGEND
- OILWELL
 - ⊕ SUSPENDED OILWELL
 - ⊙ INJECTION WELL
 - ⊕⊙ ABANDONED OILWELL
 - UNIT OUTLINE

(DATUM DEPTH = -237.7 m SS)

FIGURE 2
DALY UNIT #3
PRODUCTION HISTORY

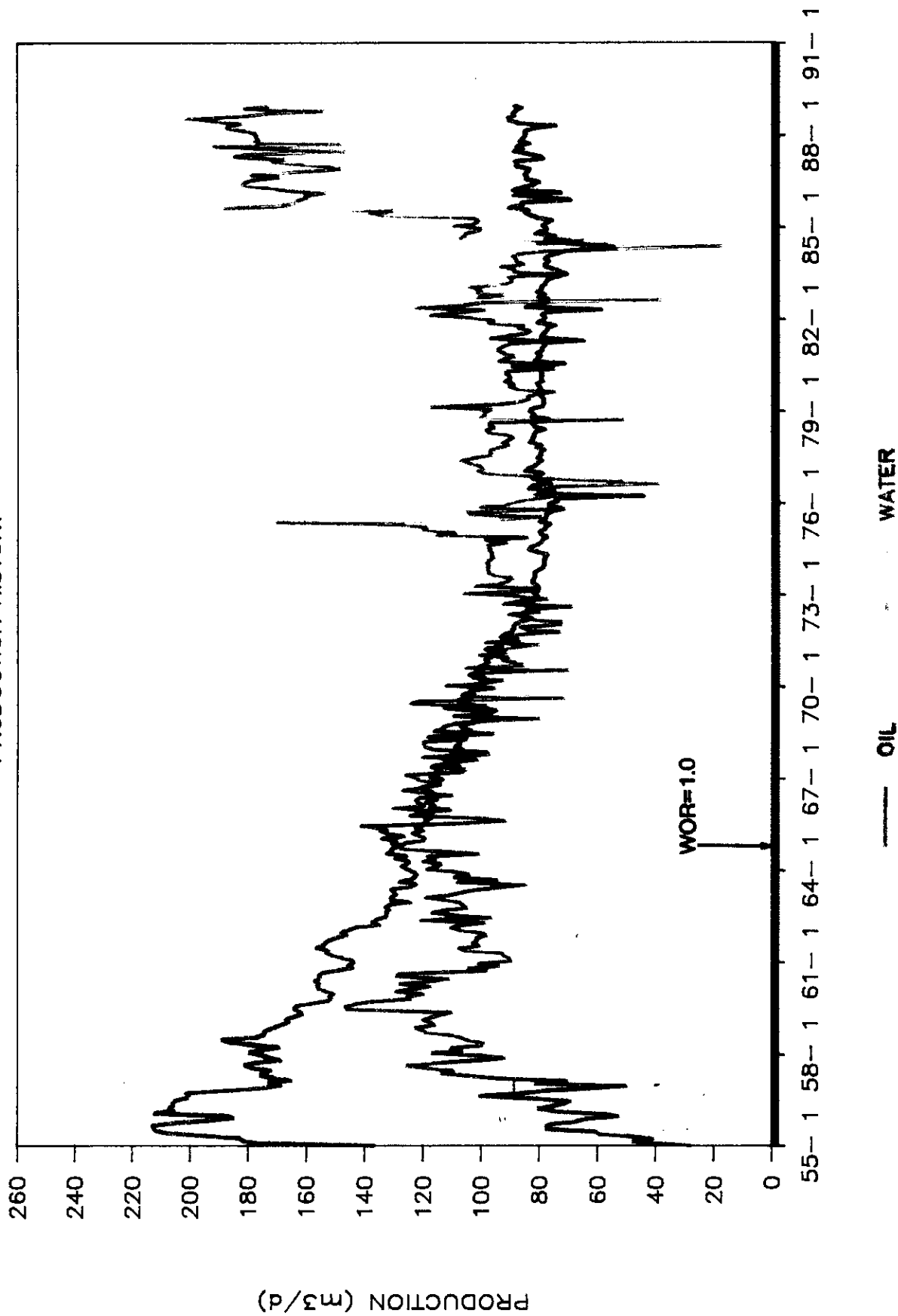


FIGURE 3

DALY UNIT #3
PRODUCTION HISTORY

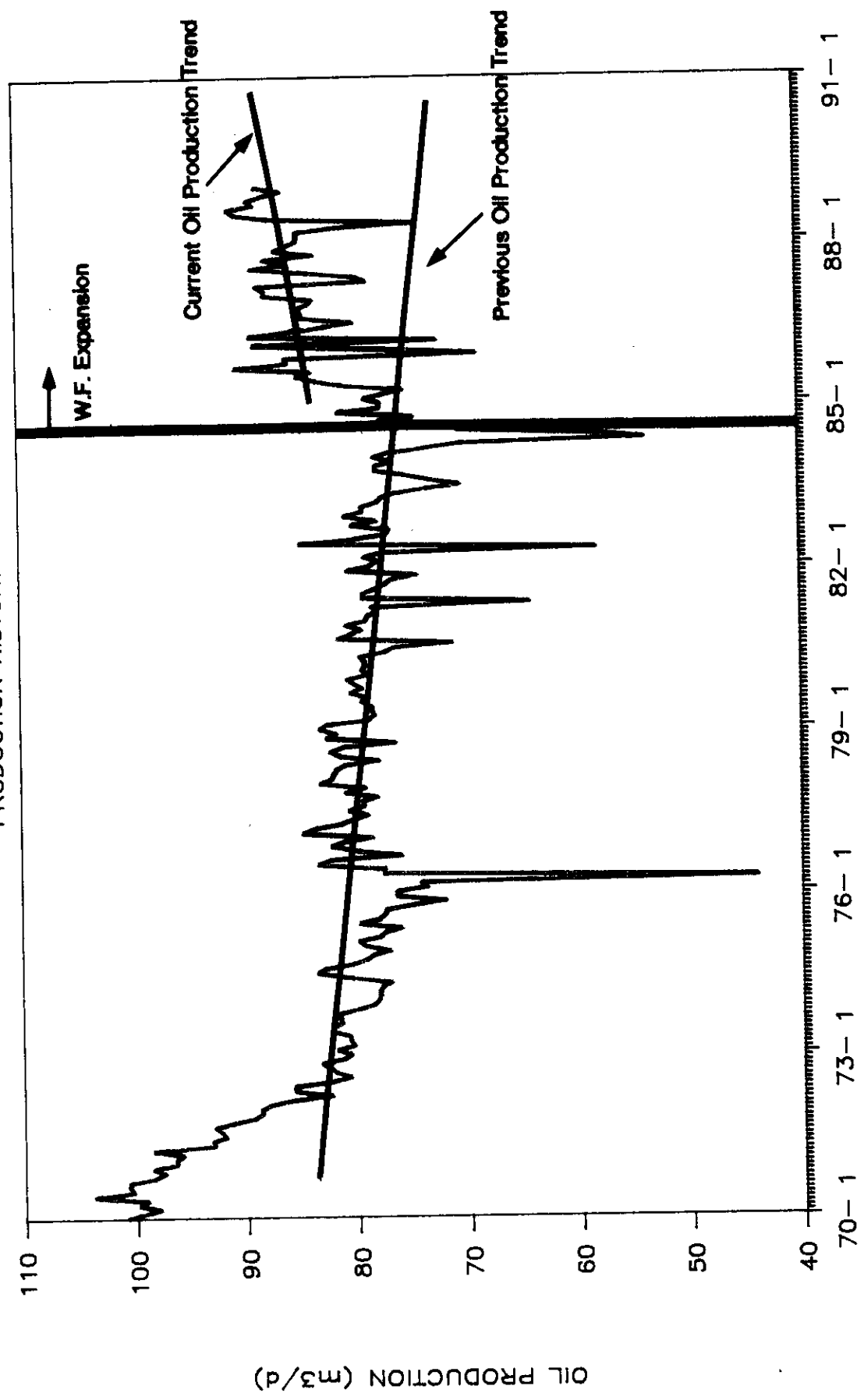


FIGURE 4

DALY UNIT #3

INJECTION HISTORY

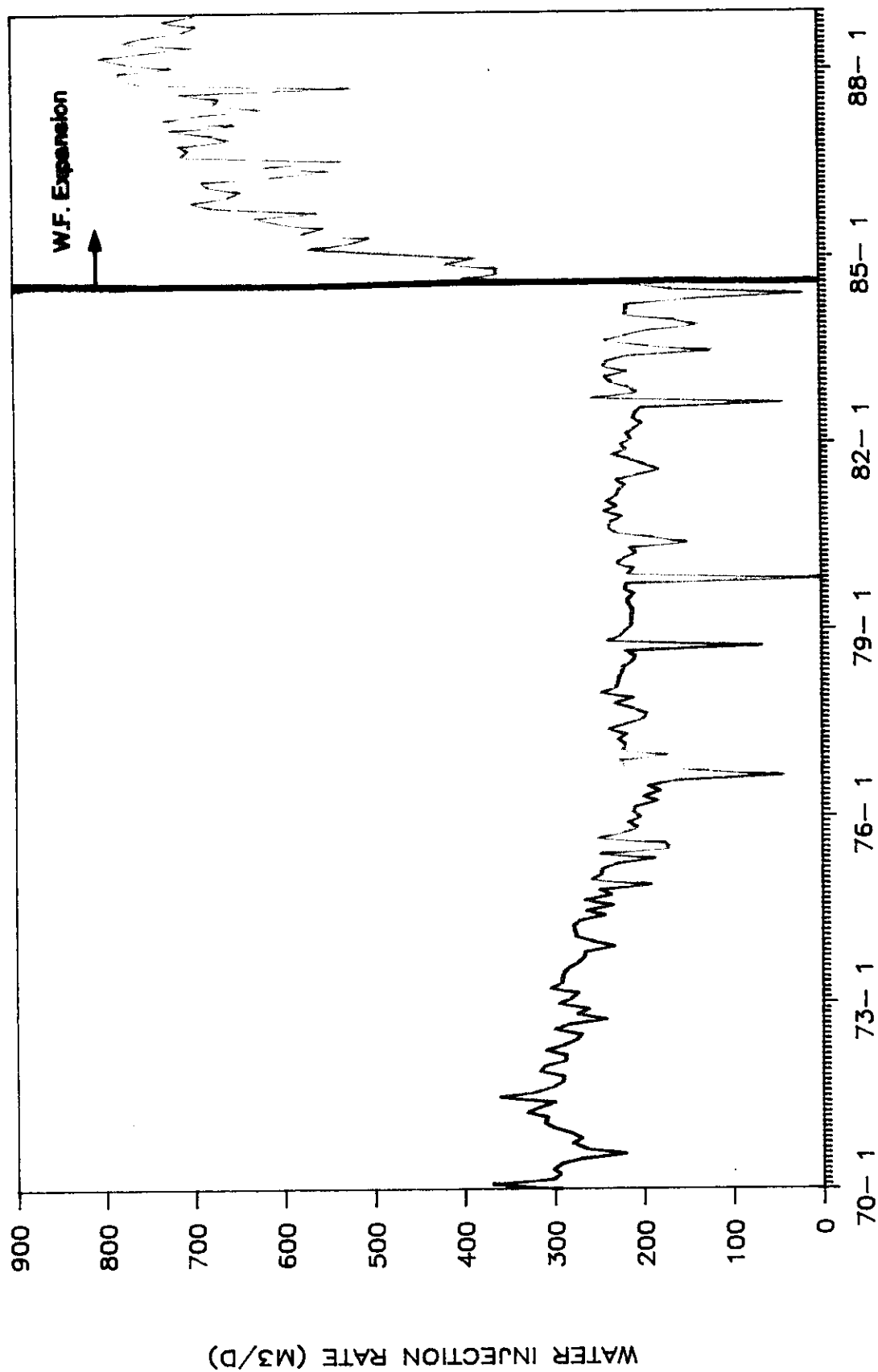
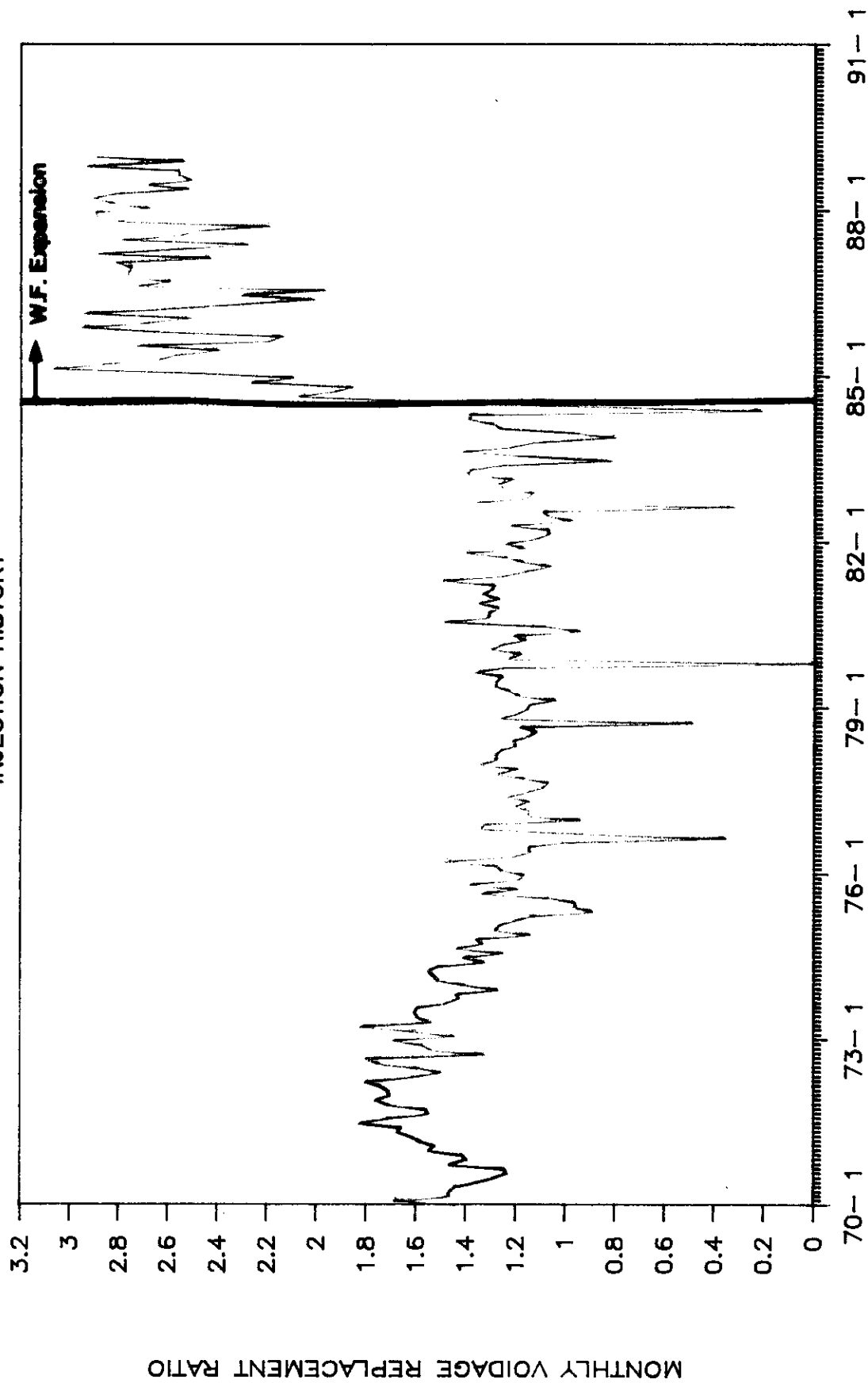
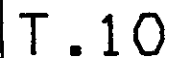


FIGURE 5

DALY UNIT #3
INJECTION HISTORY



R.27W1M



003434

(DATUM DEPTH = -237.7 m SS)

FIGURE 7
 DALY UNIT NO. 3
 PRODUCTION PLOT
 11-01-010-28W1

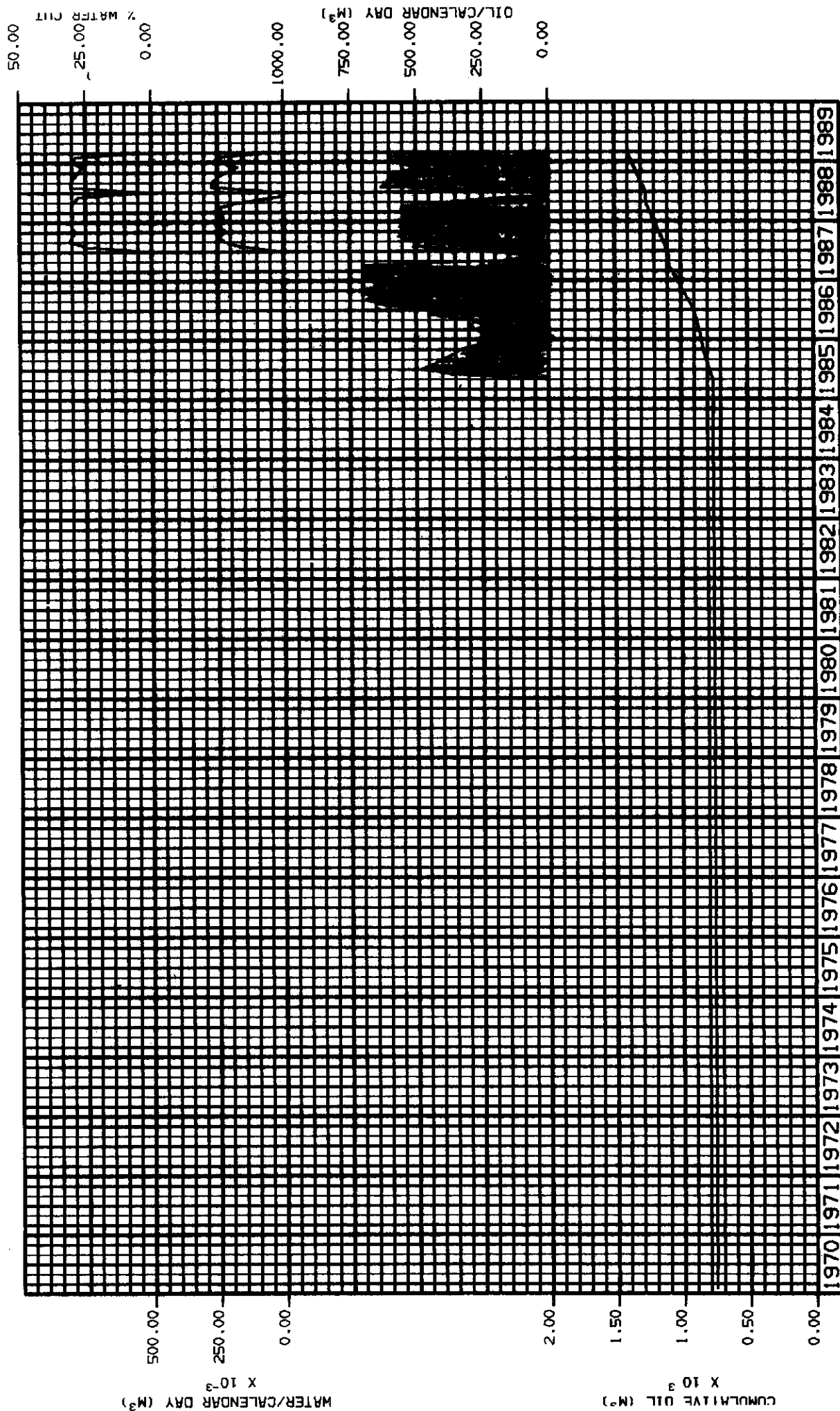


FIGURE 8
DALY UNIT NO. 3
PRODUCTION PLOT
04-11-010-28W1

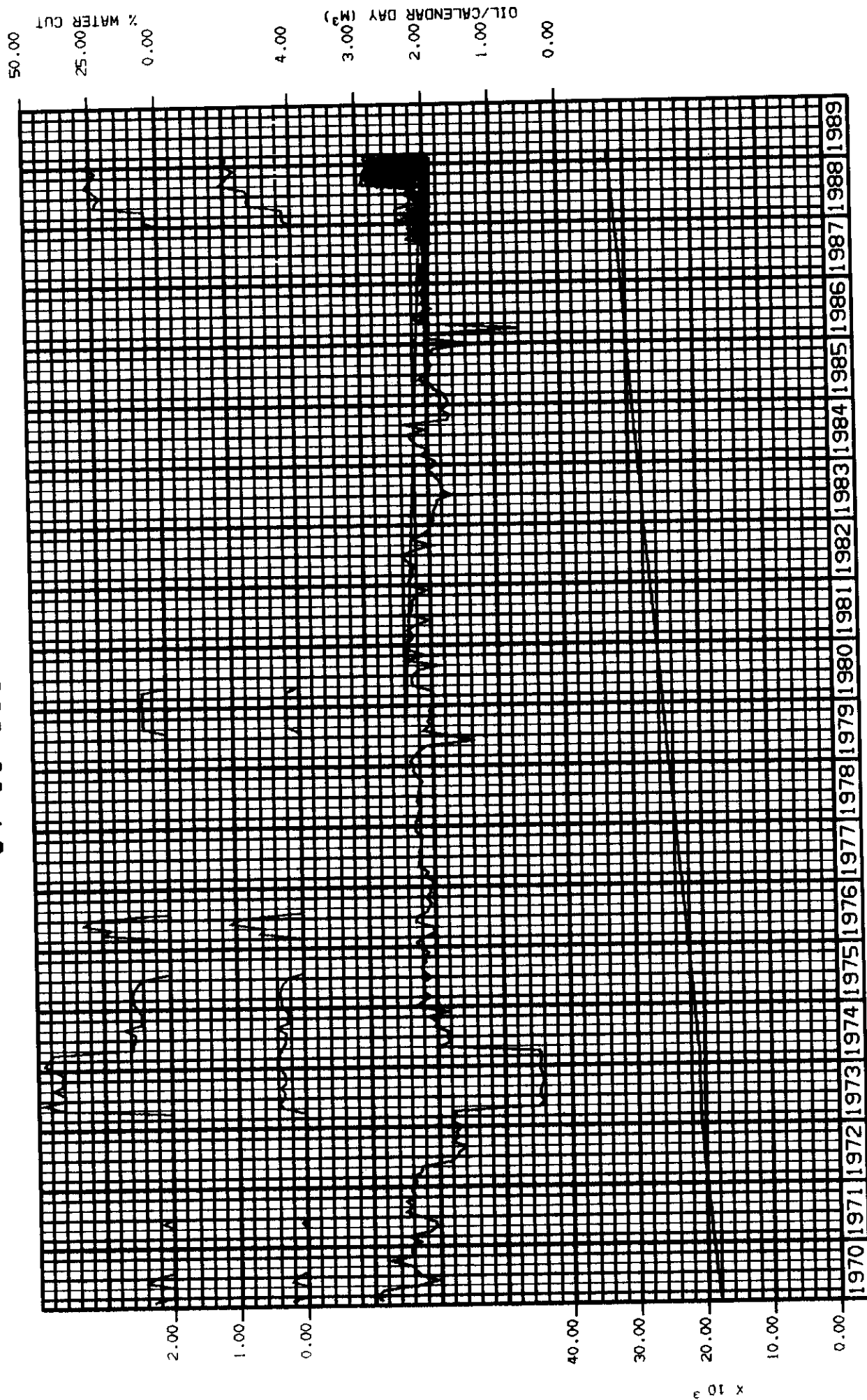


FIGURE 9

DALY UNIT NO. 3
PRODUCTION PLOT
07-11-010-28W1



FIGURE 10
DALY UNIT NO. 3
PRODUCTION PLOT
02-13-010-28W1

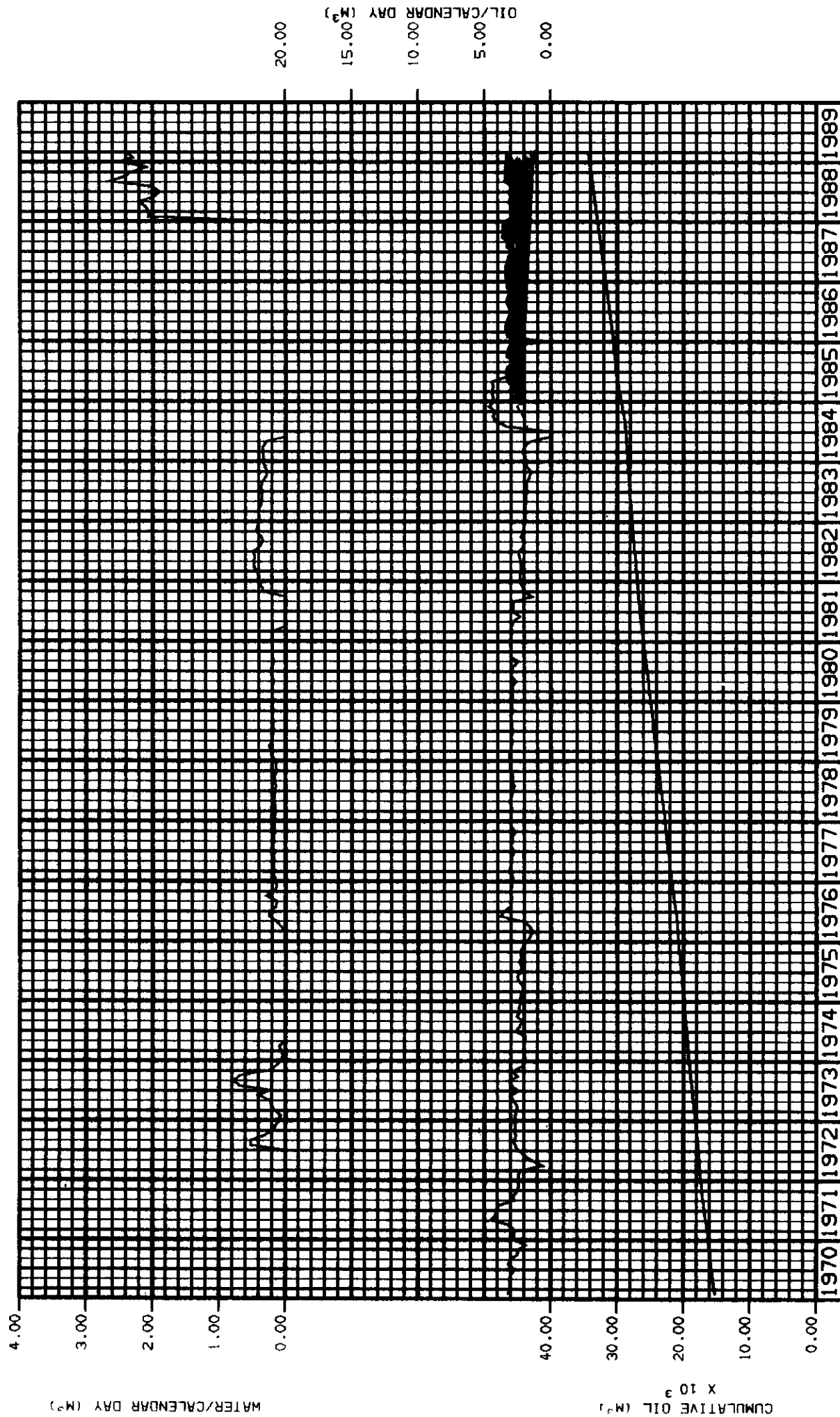


FIGURE 11
DAILY UNIT NO. 3
PRODUCTION PLOT
05-13-010-28W1

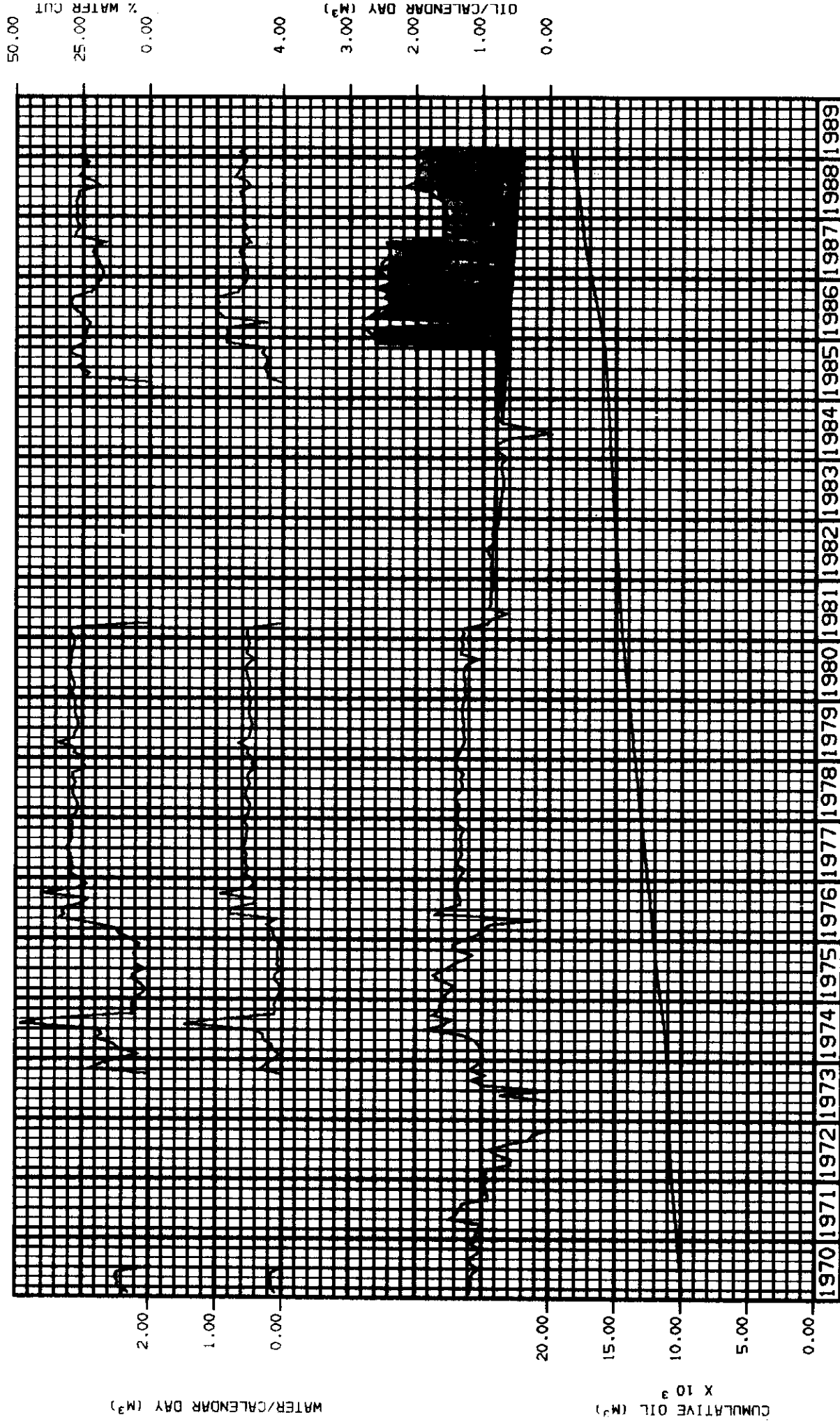


FIGURE 12
DALY UNIT NO. 3
PRODUCTION PLOT
06-13-010-28W1

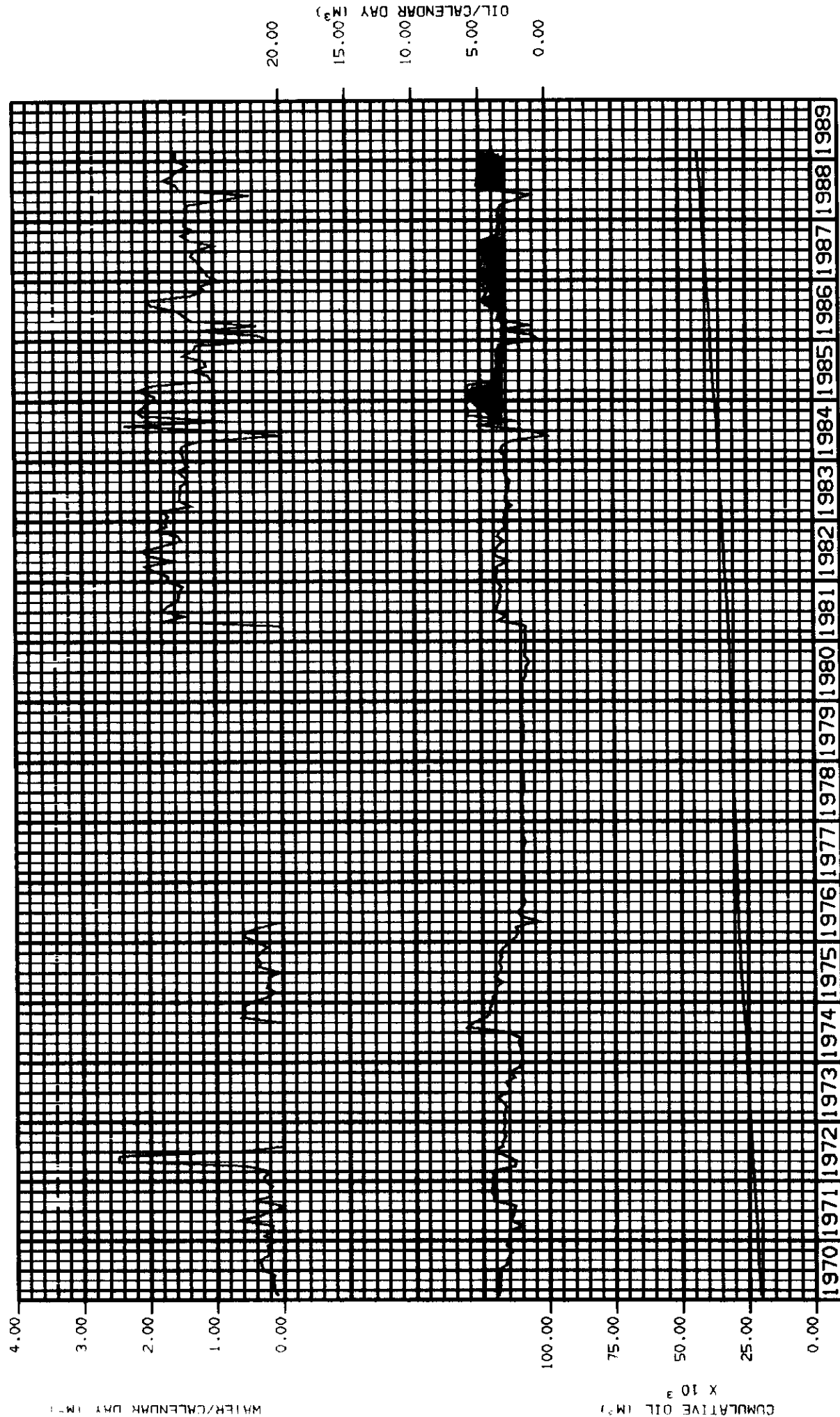


FIGURE 13
DAILY UNIT NO. 3
PRODUCTION PLOT
10-13-010-28W1

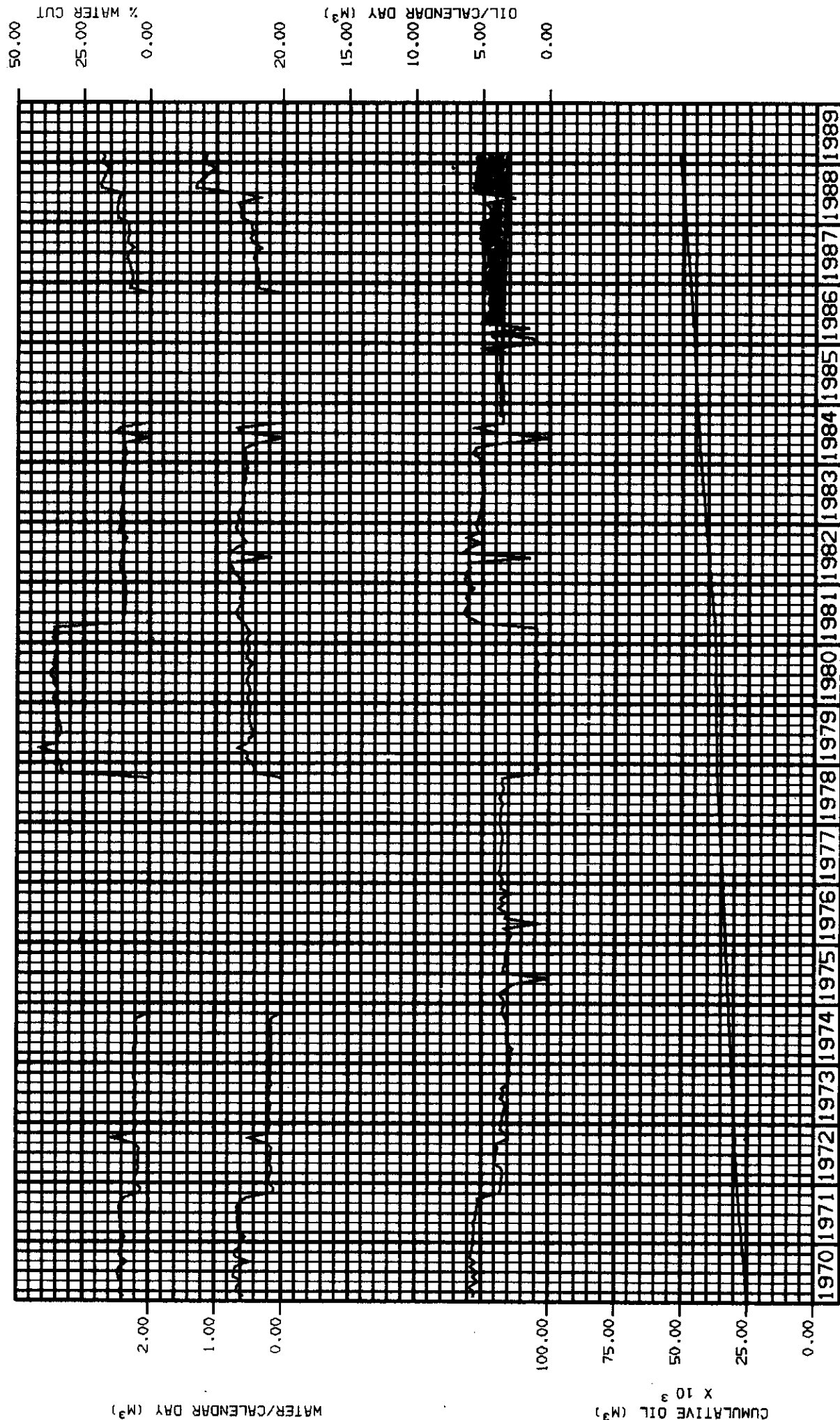


FIGURE 14
DALY UNIT NO. 3
PRODUCTION PLOT
12-13-010-28W1

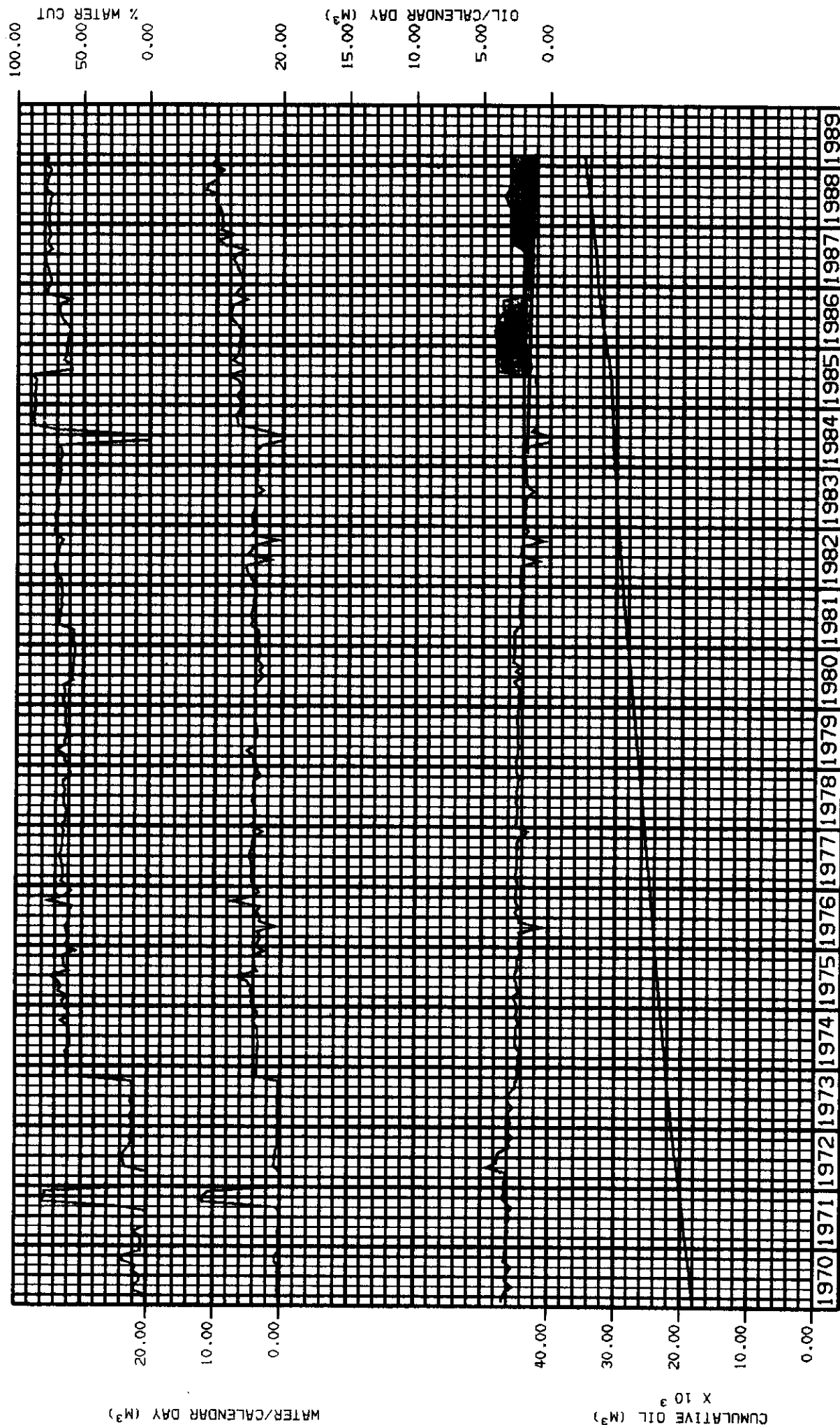


FIGURE 15

DALY UNIT NO. 3
PRODUCTION PLOT
04-07-010-27W1

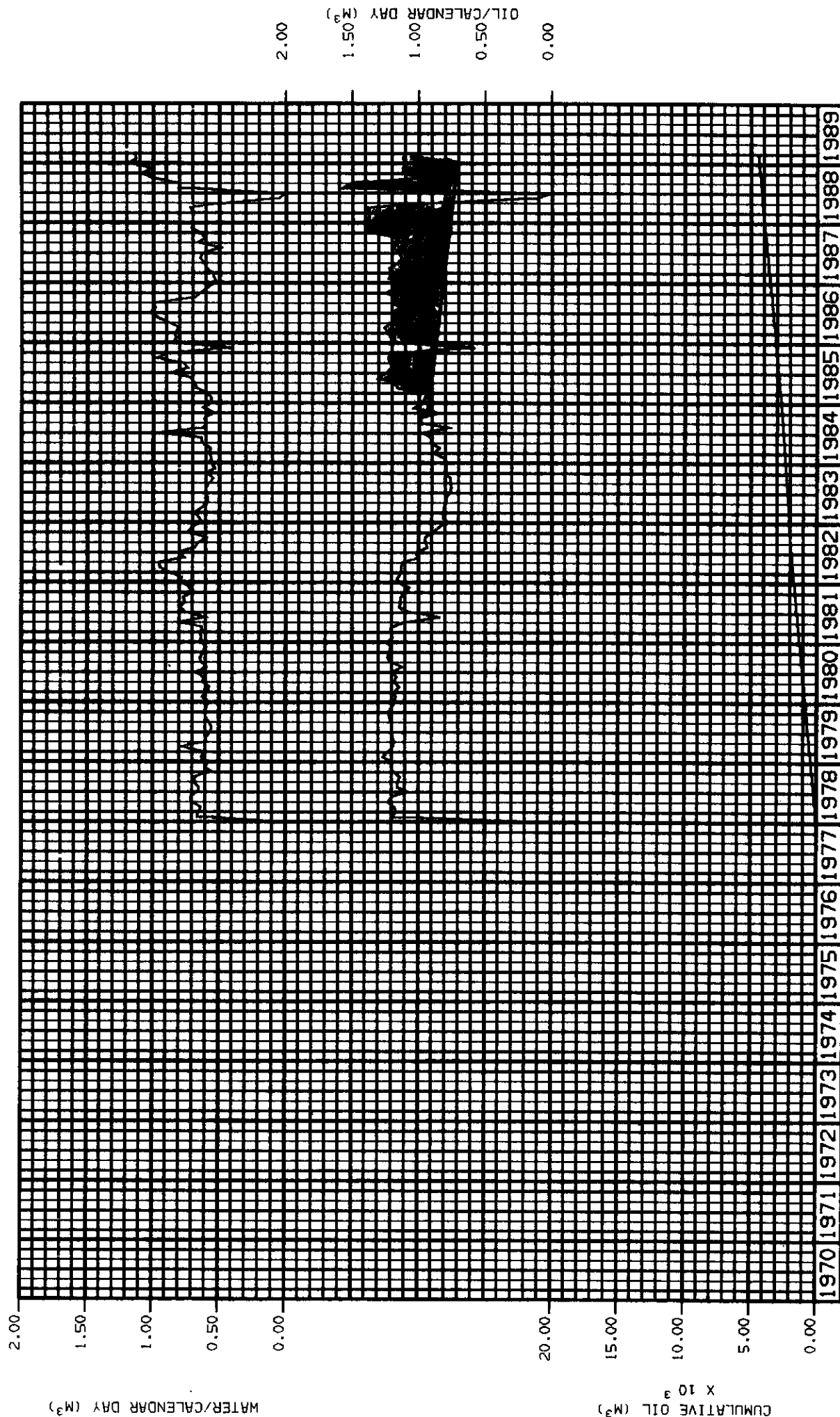


FIGURE 16
 DAILY UNIT NO. 3
 PRODUCTION PLOT
 13-01-010-28W1

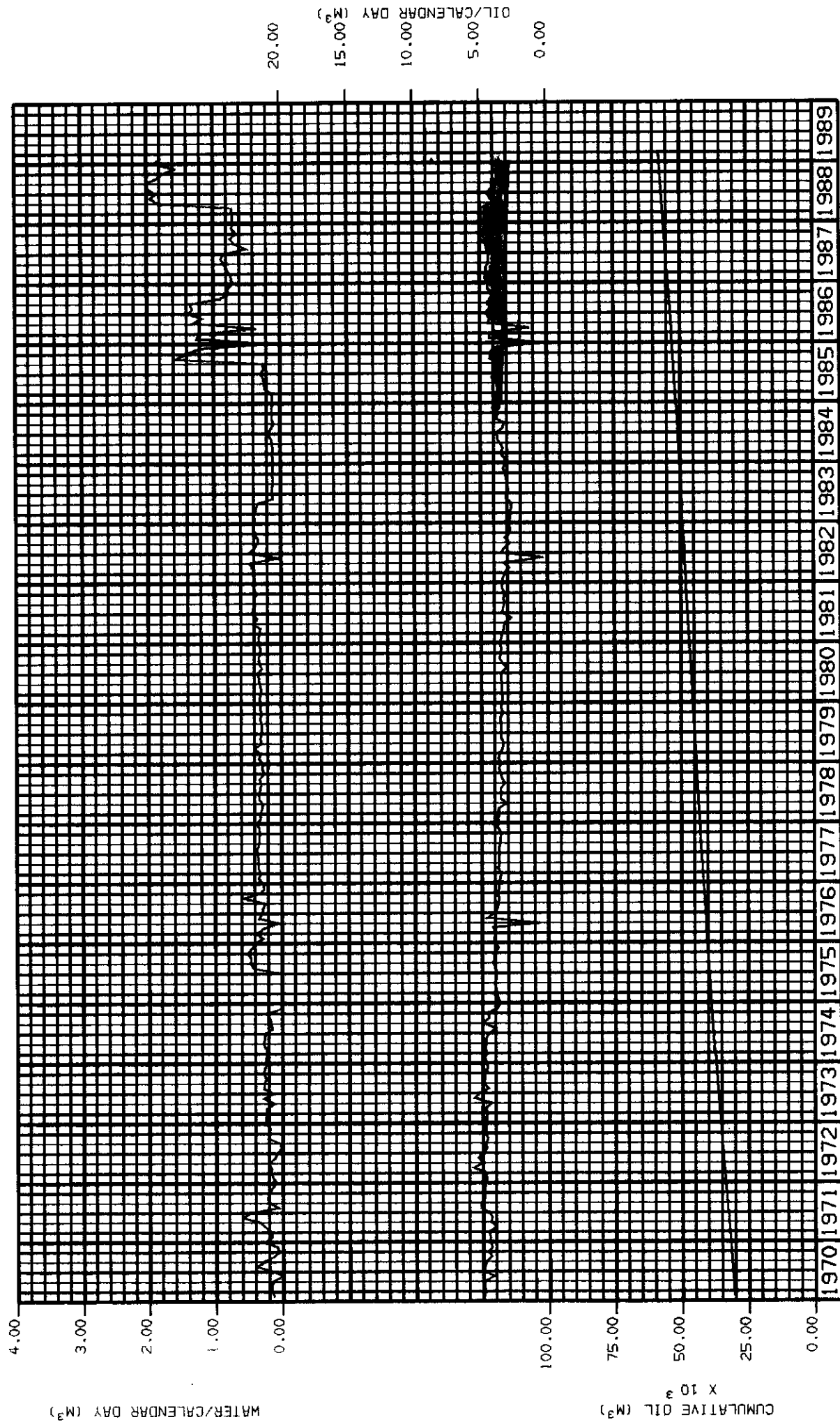


FIGURE 17
DALY UNIT NO. 3
PRODUCTION PLOT
05-02-010-28W1

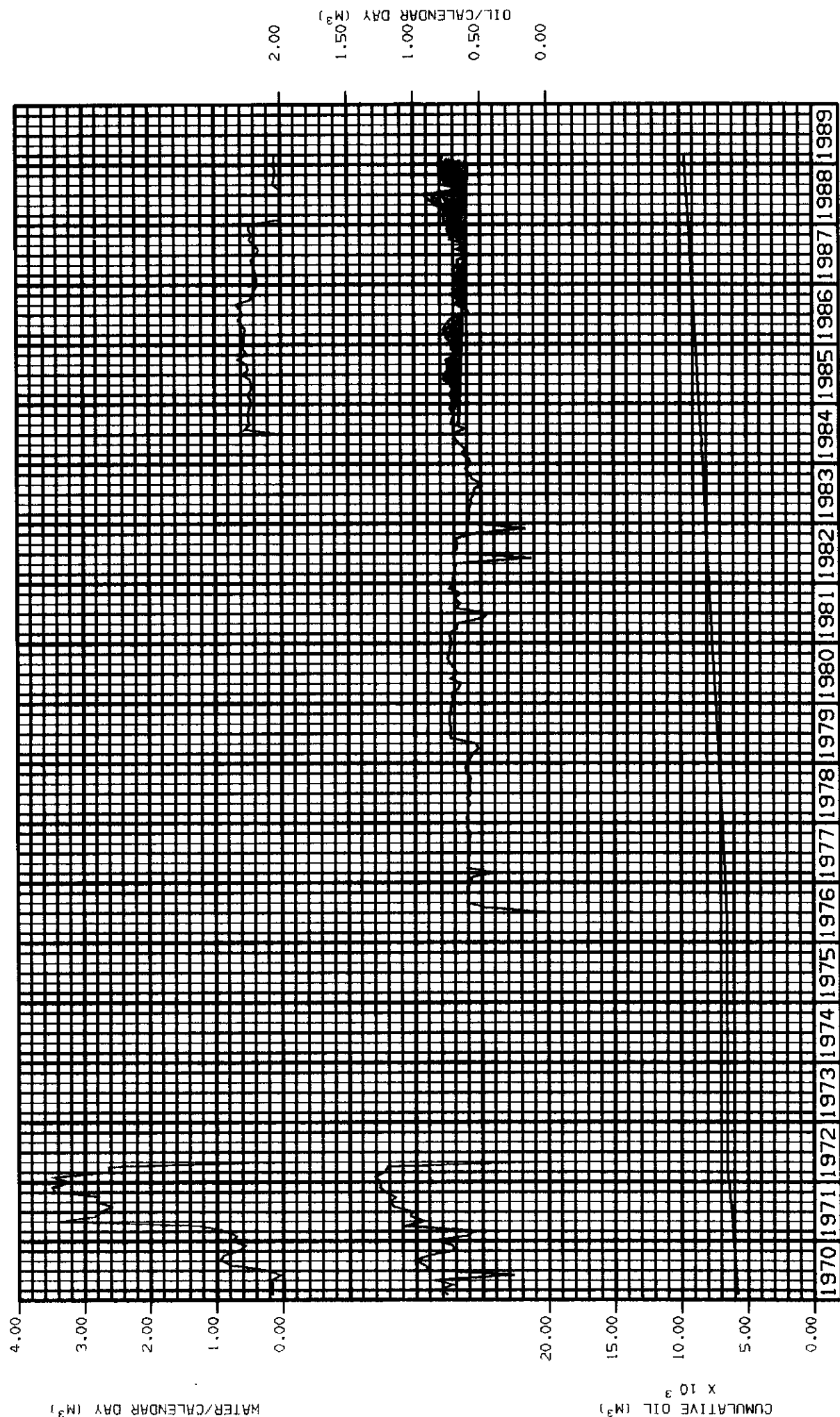


FIGURE 18

DALY UNIT NO. 3
PRODUCTION PLOT
09-02-010-28W1

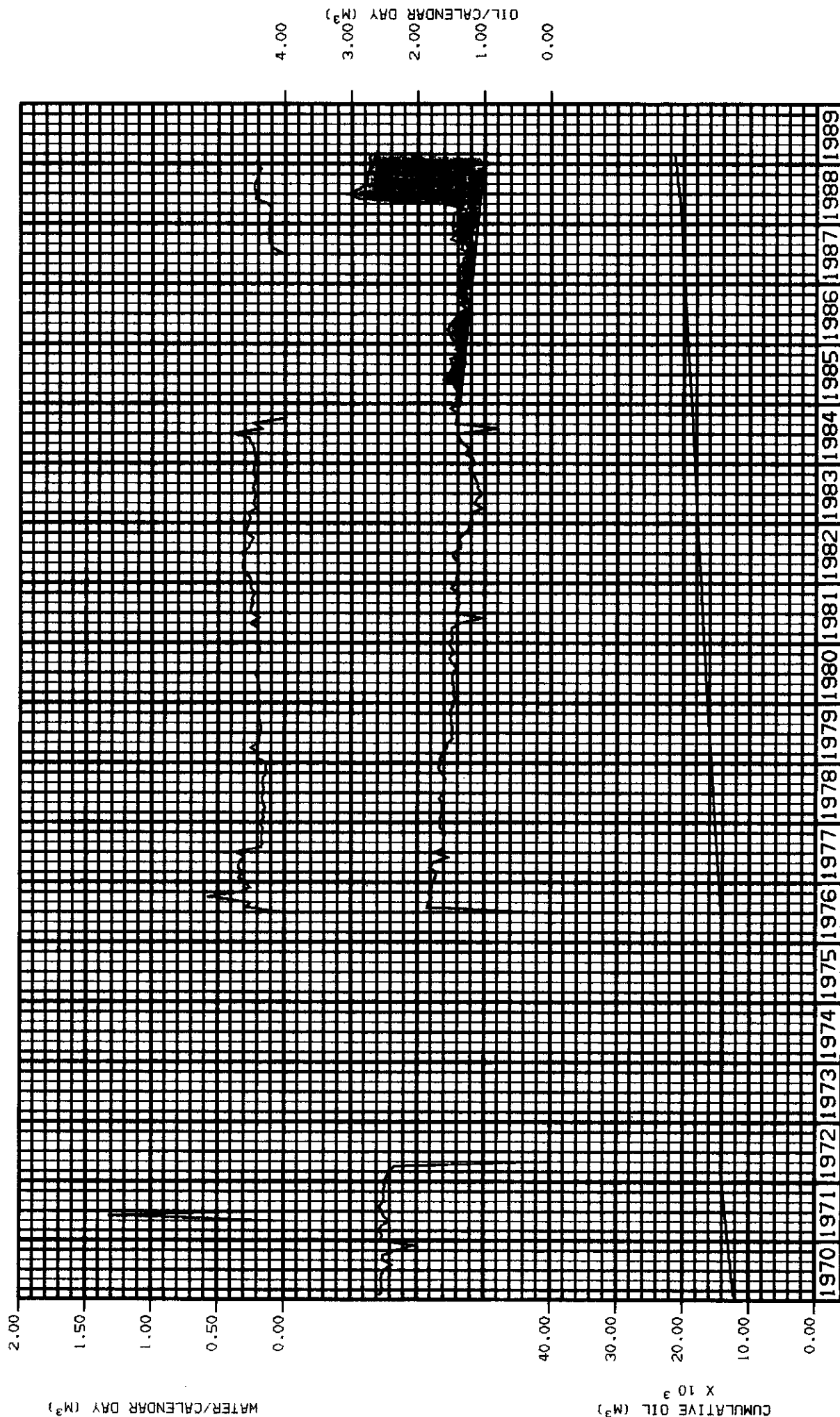


FIGURE 19

DALY UNIT NO. 3
PRODUCTION PLOT
14-02-010-28W1



DATE

FIGURE 20
DALY UNIT NO. 3
PRODUCTION PLOT
09-10-010-28W1

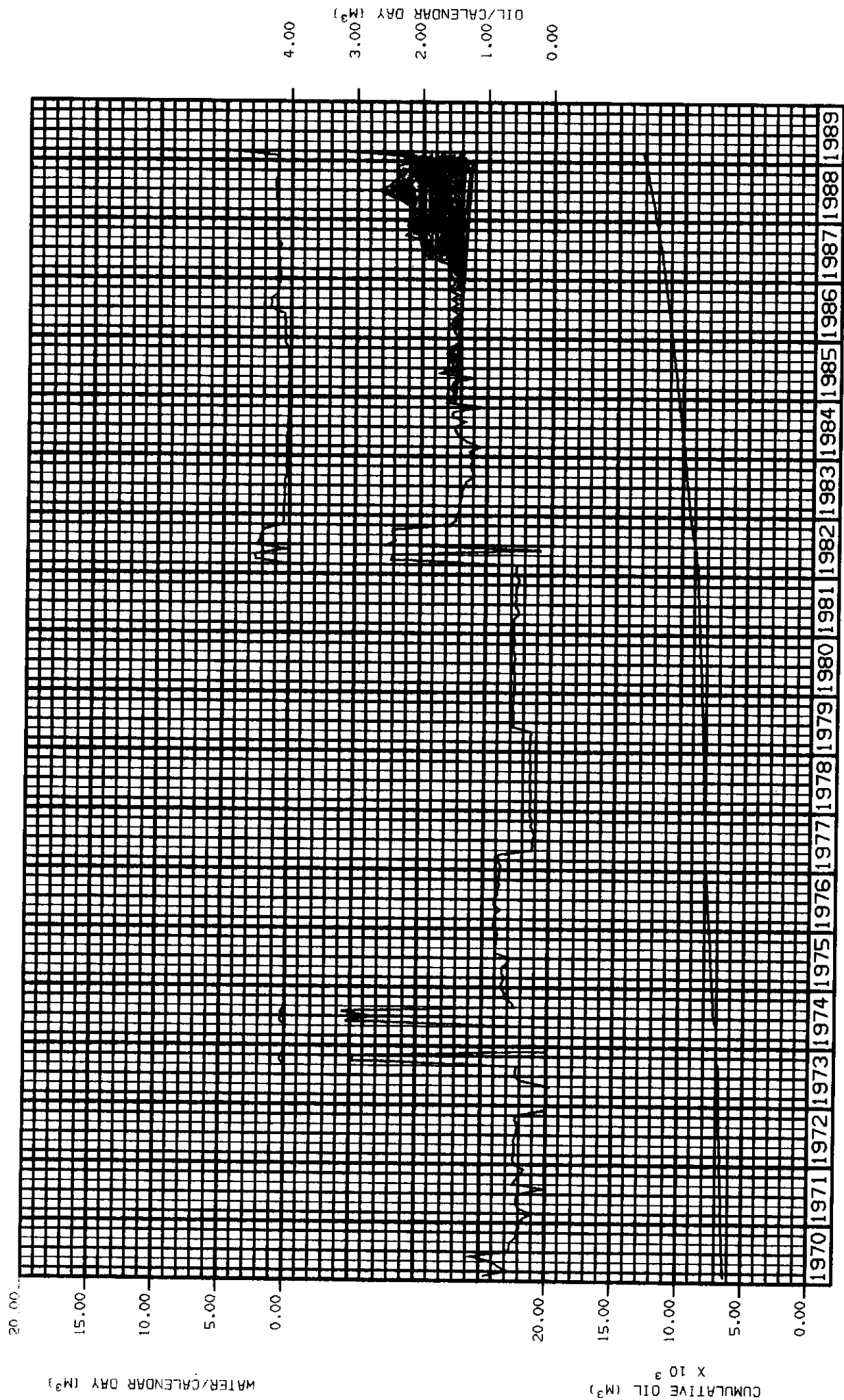


FIGURE 21

DALY UNIT NO. 3
PRODUCTION PLOT
01-11-010-28W1



DATE

FIGURE 22
DALY UNIT NO. 3
PRODUCTION PLOT
03-11-010-28W1

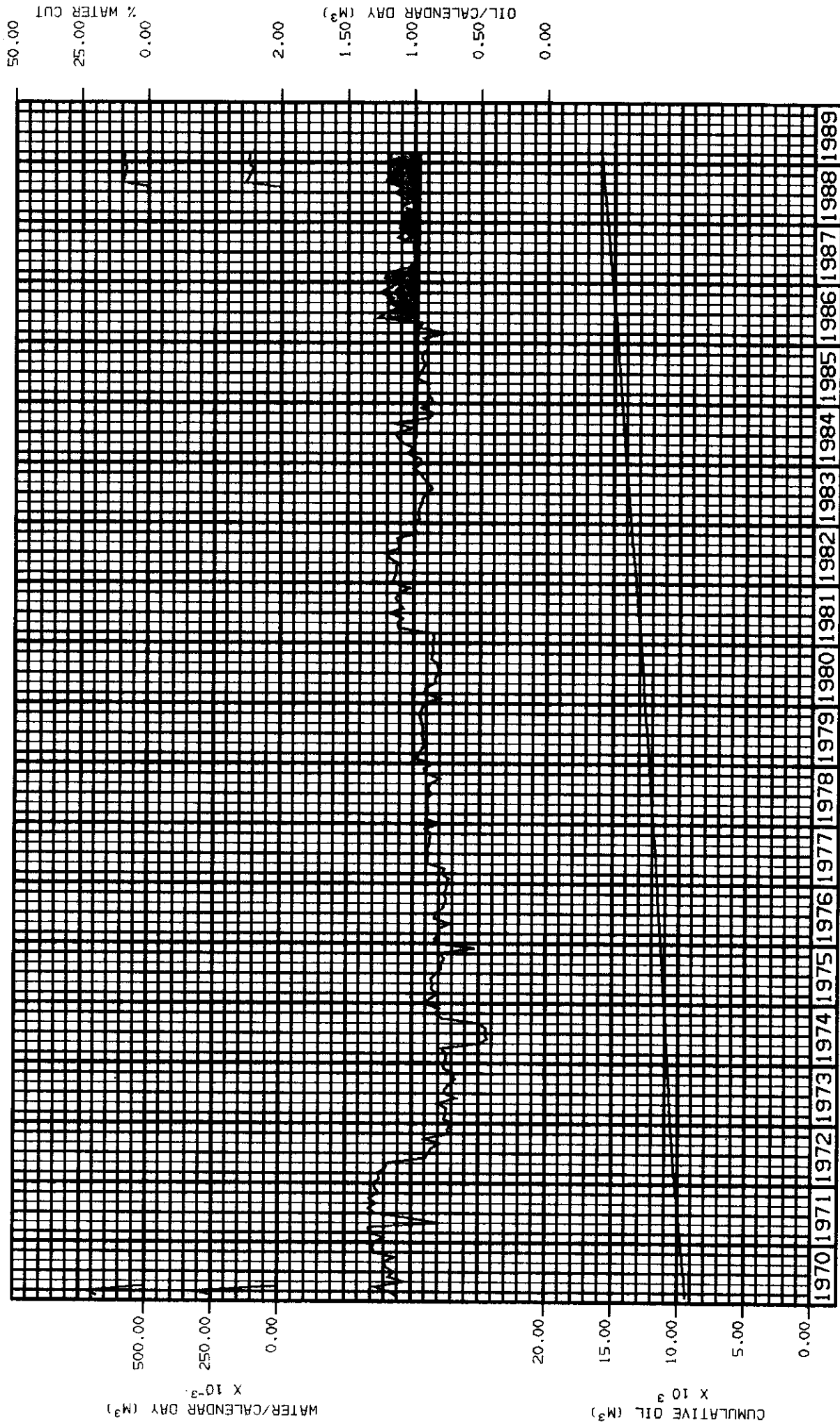


FIGURE 23
DALY UNIT NO. 3
PRODUCTION PLOT
09-11-010-28W1

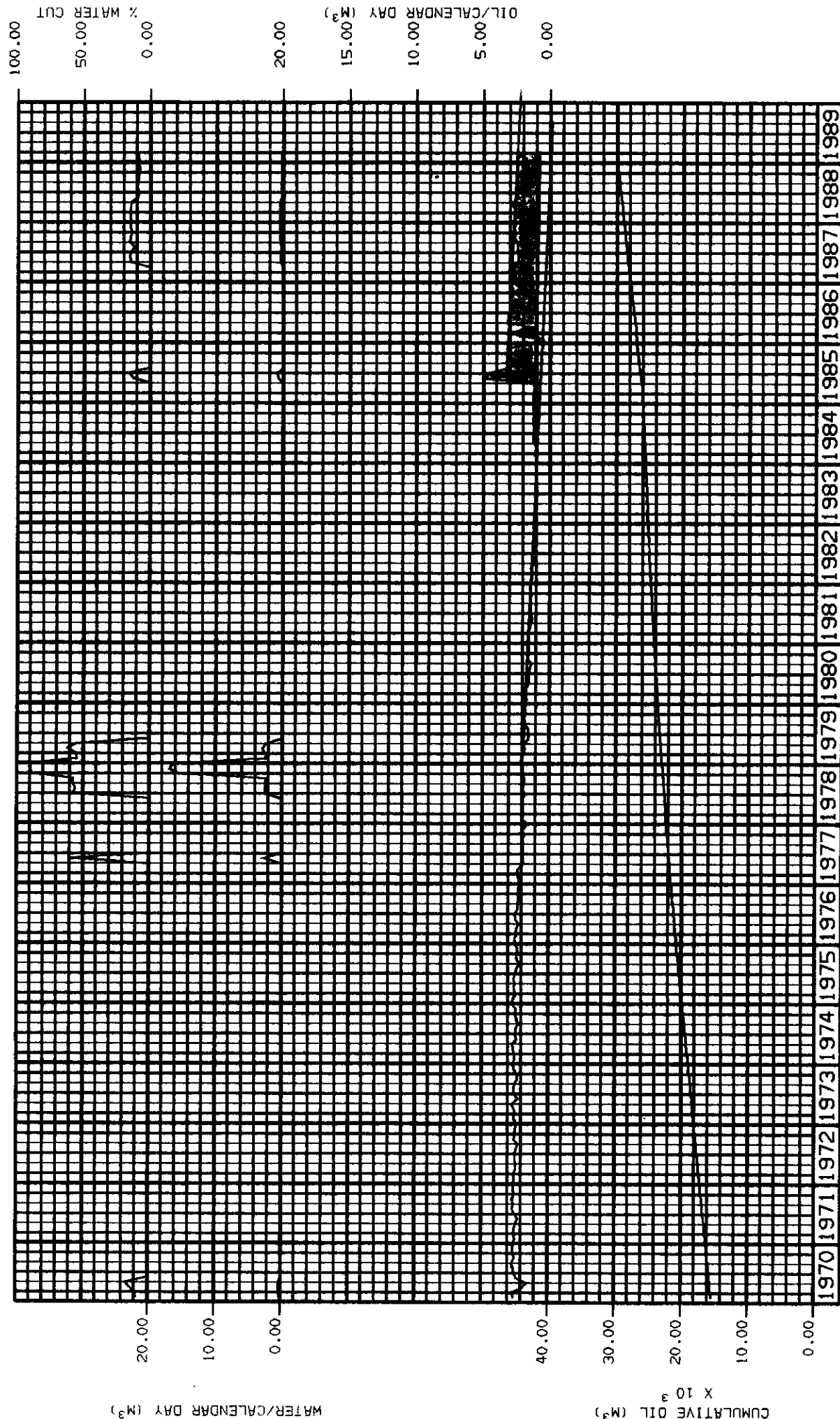


FIGURE 24
DALY UNIT NO. 3
PRODUCTION PLOT
13-11-010-28W1

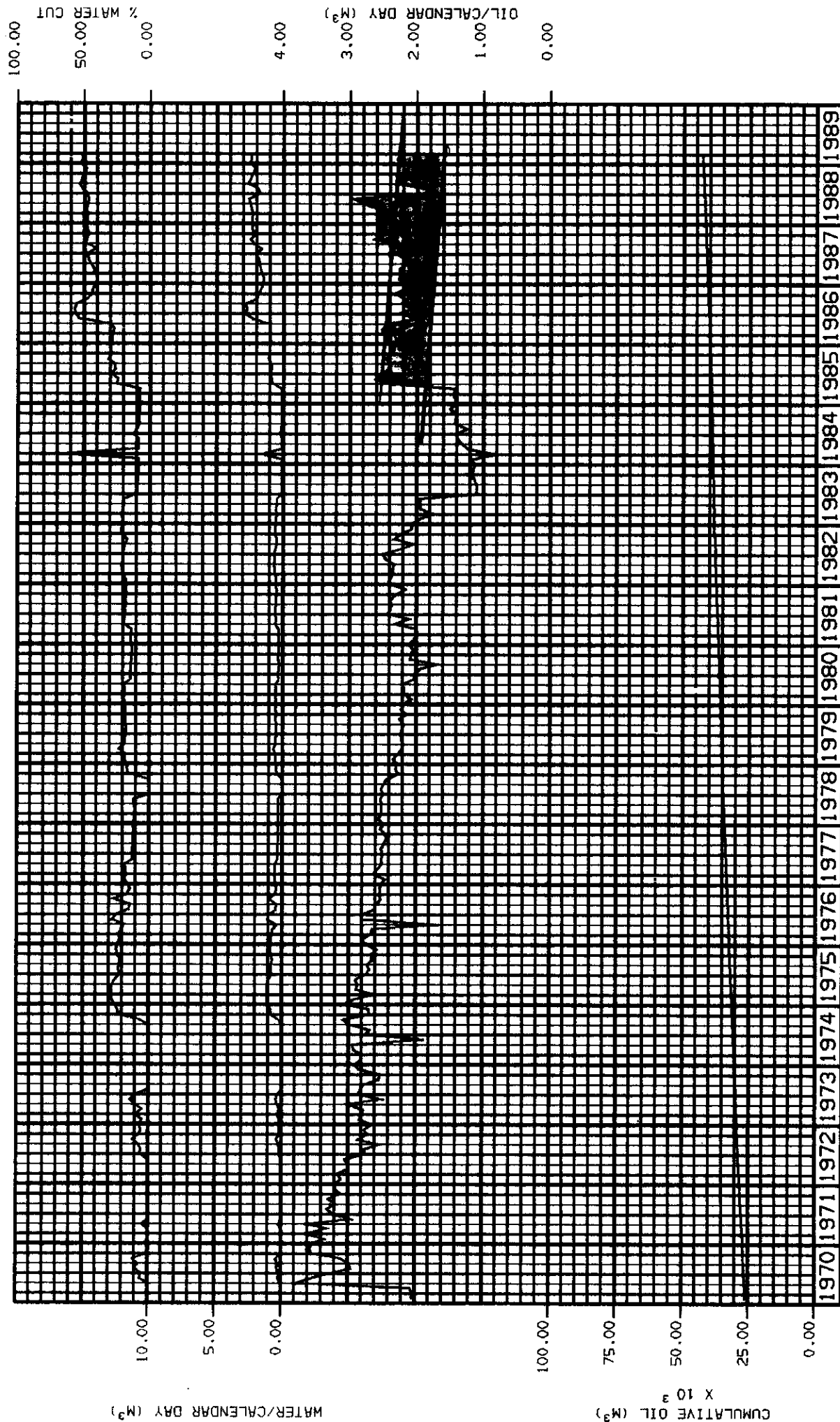


FIGURE 25
DALY UNIT NO. 3
PRODUCTION PLOT
15-11-010-28W1

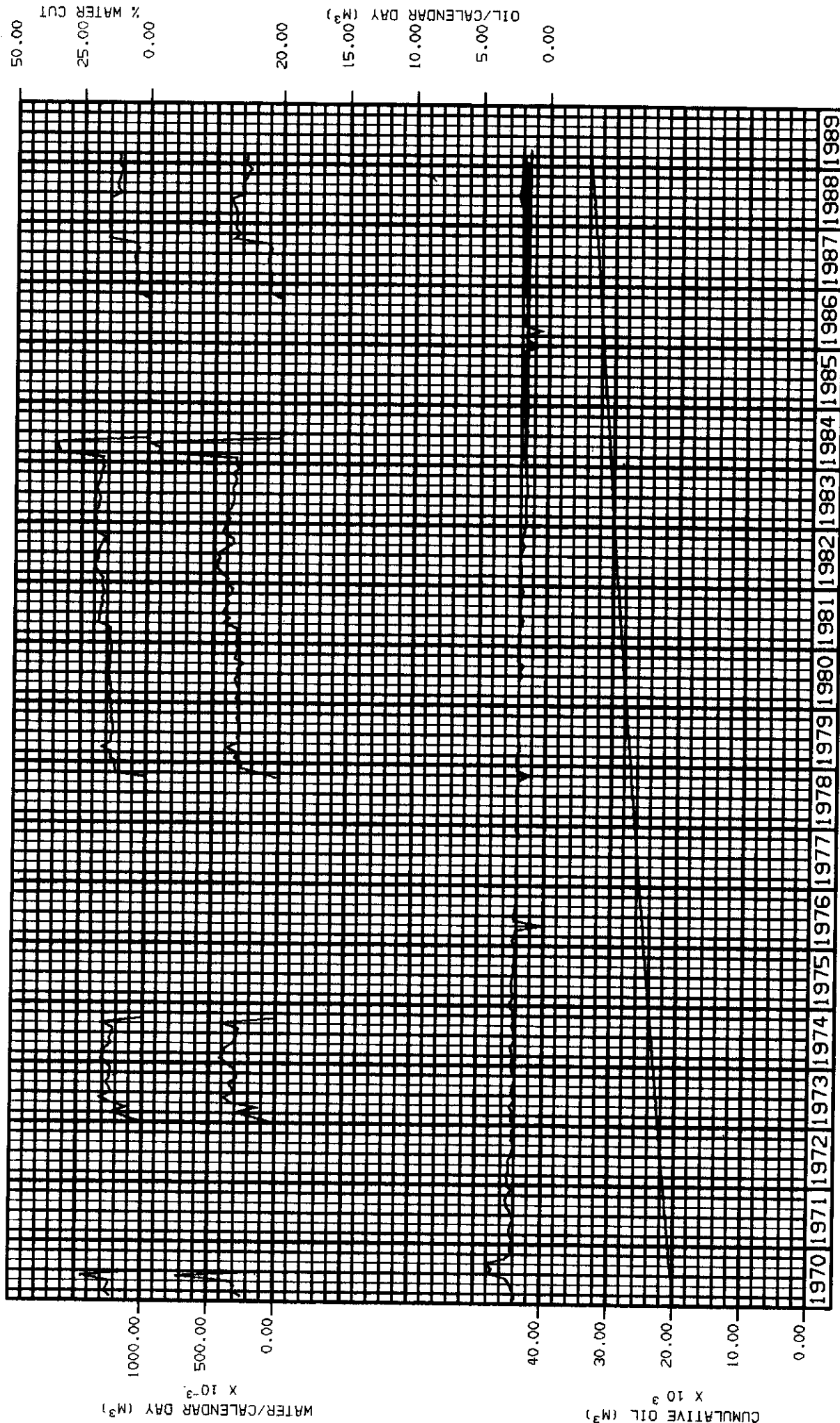


FIGURE 26
DALY UNIT NO. 3
PRODUCTION PLOT
05-12-010-28W1

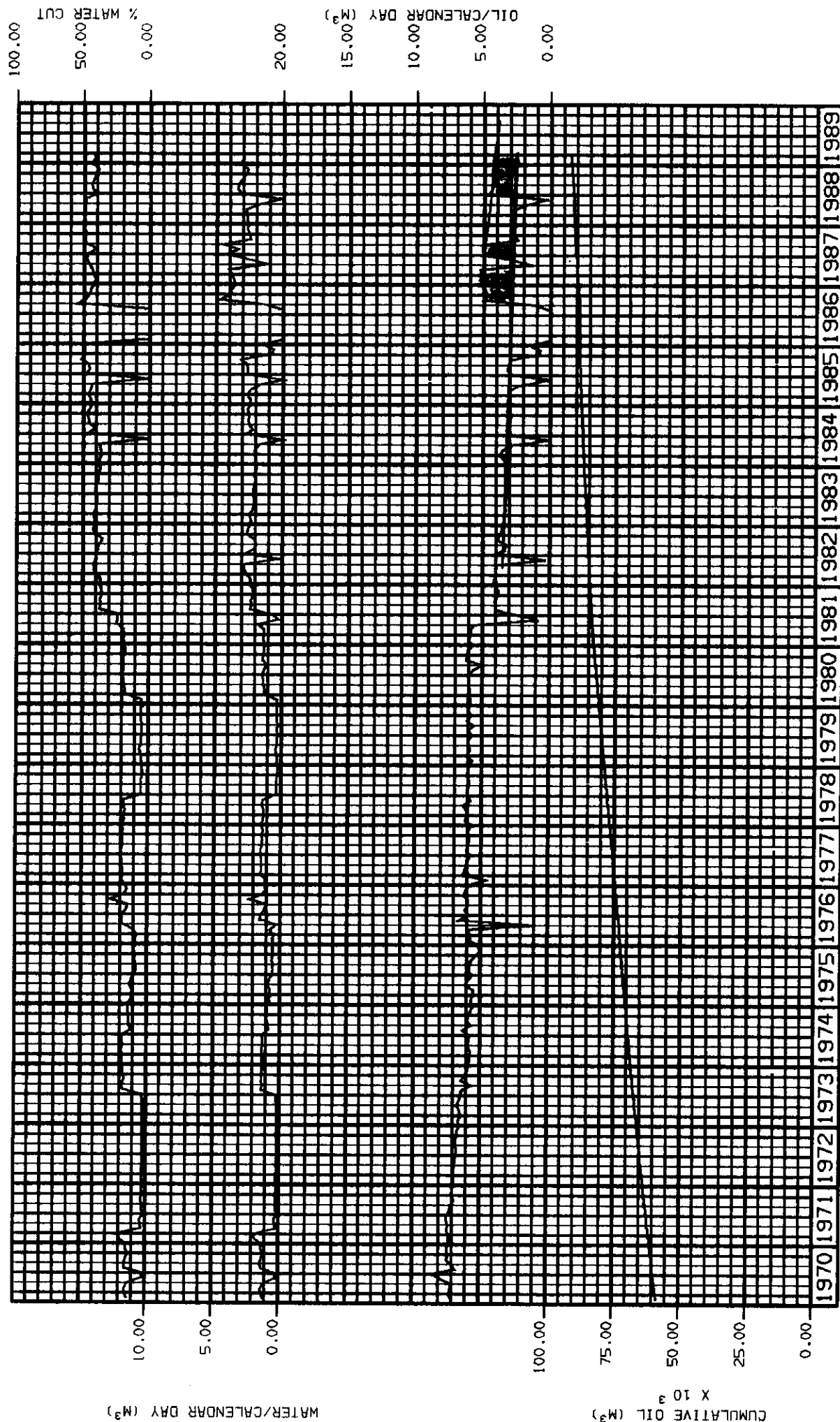


FIGURE 27
DALY UNIT NO. 3
PRODUCTION PLOT
13-12-010-28W1



FIGURE 28

**DALY UNIT #3
PRODUCTION HISTORY**

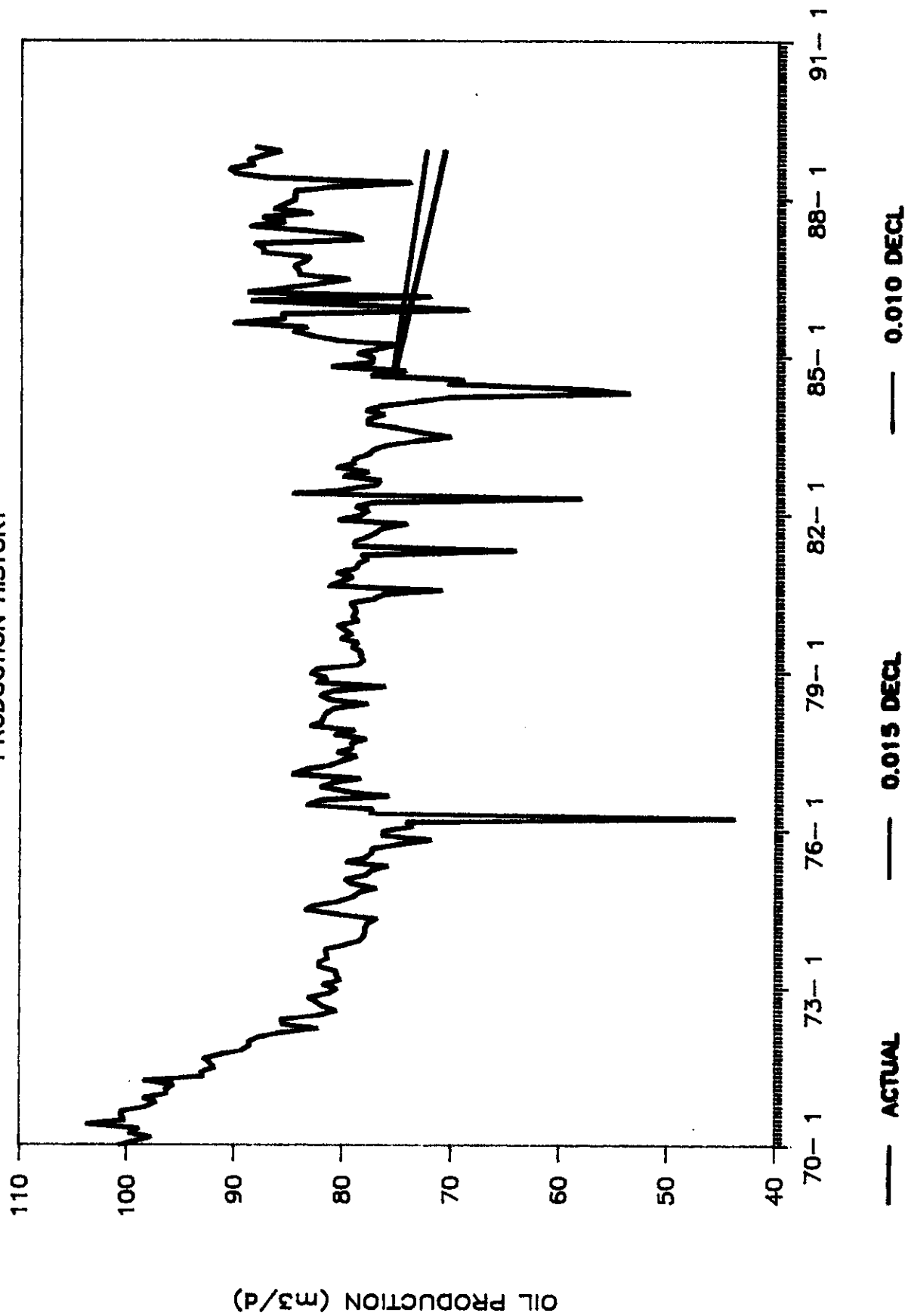


FIGURE 29

DALY UNIT #3

PRODUCTION HISTORY

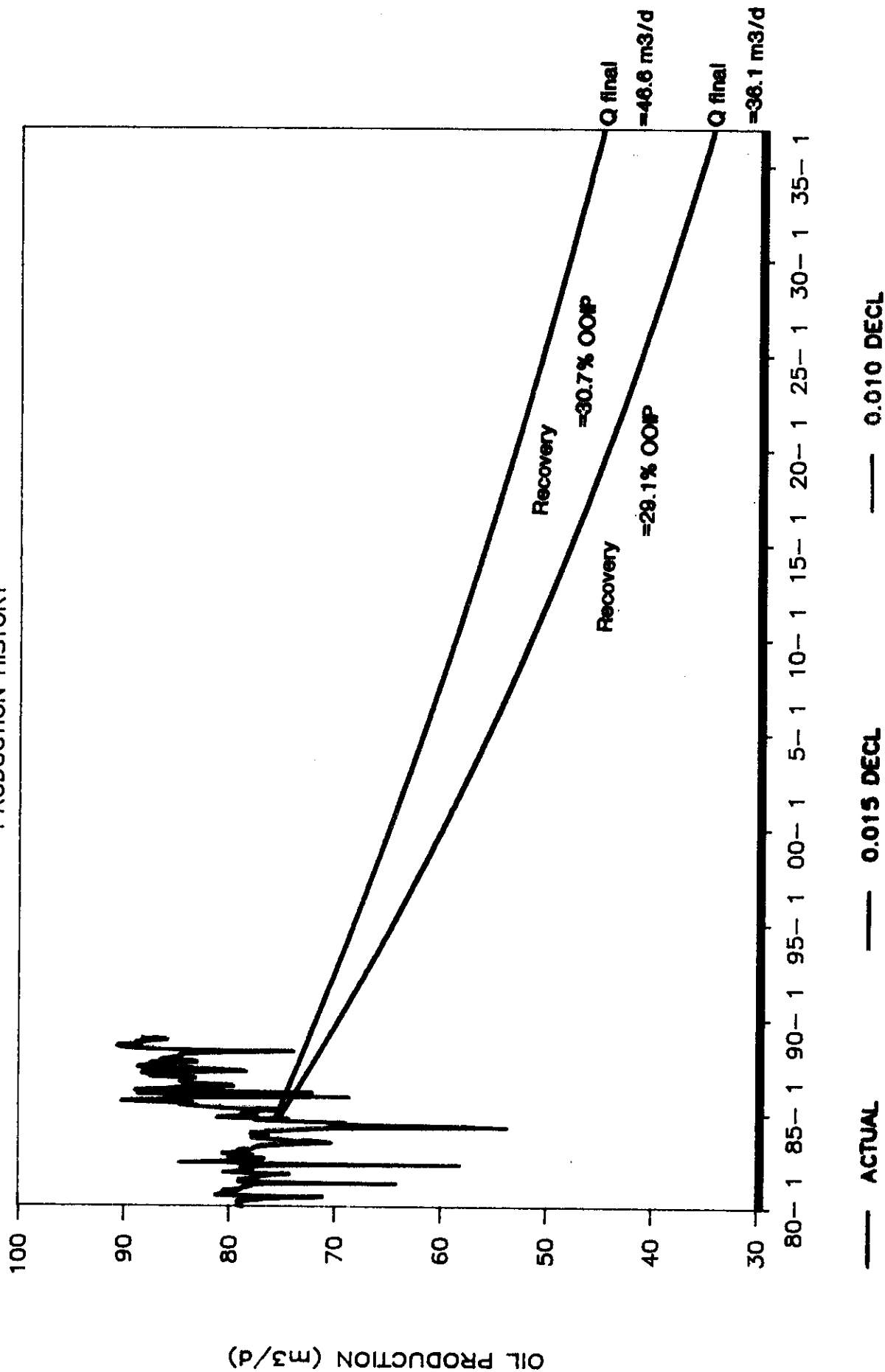


FIGURE 30
DALY UNIT #3
 INJECTION HISTORY

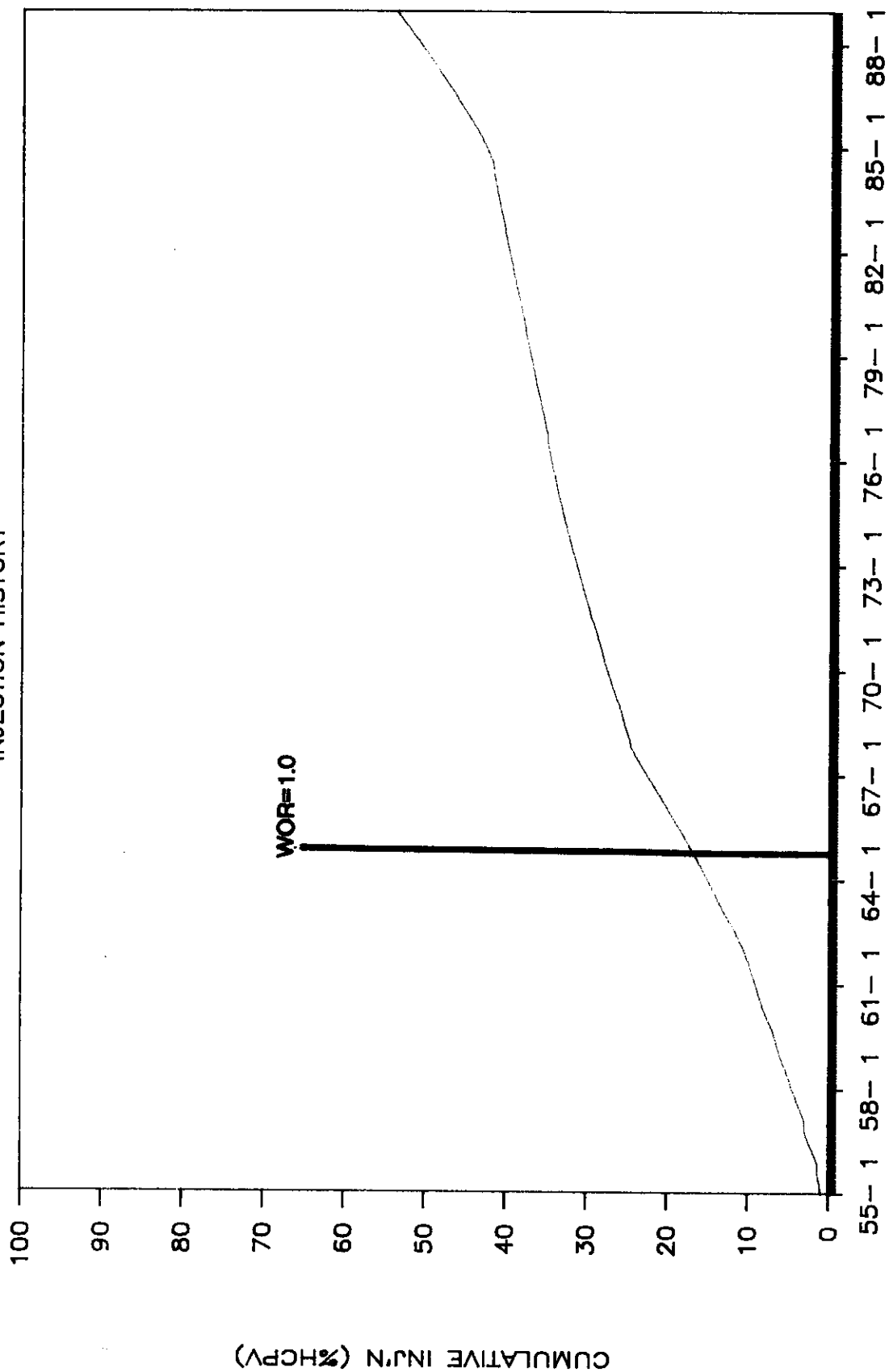
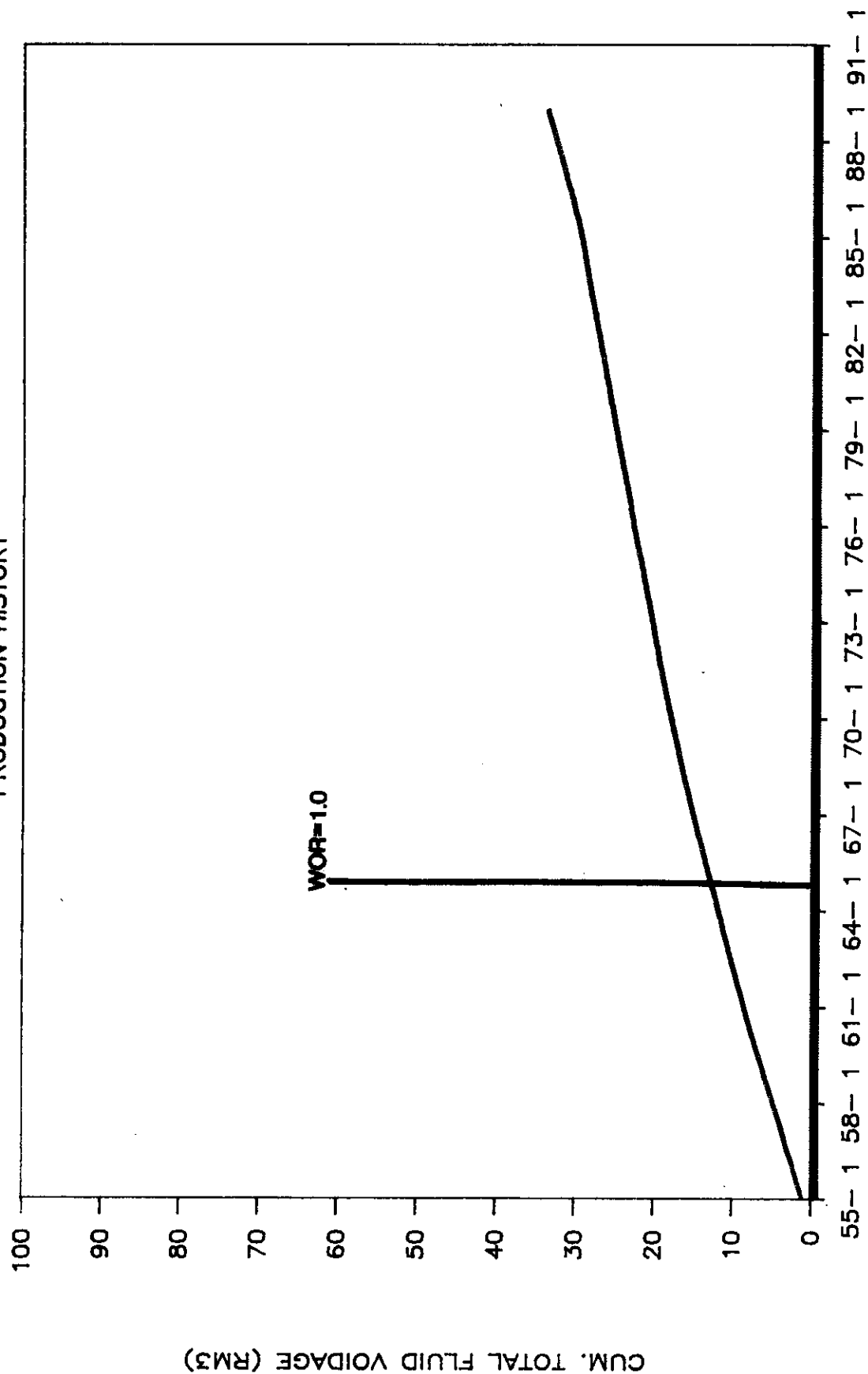


FIGURE 31

DALY UNIT #3

PRODUCTION HISTORY



Simultaneous info recorded in 1950 and 1951
to a distance of 1000 ft

DALY UNIT $\rightarrow 3$

- 1984 Chevron applied to modify WF project (WF expansion)
 - 1) convert wells to 100% (5)
 - 2) participate in 100% wells (3)
 - 3) increase 100% share to 100%
 all contributed to 2nd.
 - 3) accepted 100% share
 - 4) 100% share
 - 5) 100% share
- new oil status for 100% share
- recognized modification result
- recognized

- the maintenance of a high standard of quality and the safety of the product.

- new oil fields are being drilled off at - ongoing re-stimulation / remedial work to maintain production
- OPTIONS

- external force oil status - indefinitely - negatively price increases increase oil revenues - cause of expansion
- stimulate new oil flows - acceleration

CHEVRON'S SUBMISSION (analysis to 88-12-31)

→ present detailed technical & economic review

- introduction of new oil engines as technological production as a result of 1984 WF Expansion Project (WEP)

- Chevron decline rate 15% base case production

1994 to 1998.01 = 70.635 m³/d (not 72.423 m³/d)

NOTE: Case closed 28-12 Band 72.5 L³OPD

- increase in u_p 500 L/D to 700 L/D resulted in increase
fluid prod 115 RM^3/D only VRR = 2 no P_b increase
due to + of gas in fluid
longer.

- accelerated Sept 1984

estimated

movement recovery 24-00 to 29-12 16400 L³ (chevron base)
14800 L³ (Branch base)

- base case 1984-09-01 76.2 L³/wpd declining @ 1% annual exponential decline
- max inj. press. only 9.5 MPa
- definite & continued reversal of production decline occurred in 1984 - very quick recovery of prod. lost due to conversions in Dec/84 (2) & Mar/85 (1) also a noticeable increase in water prod. (significant) with a significant drop in gas prod. - a lot of gas is being produced but not entering the separator / unseparated oil - some / water
 $\Delta \text{oil } 76 \text{ to } 24 \text{ L}^3/\text{wpd}$
 $\Delta \text{gas } 100 \text{ to } 180 \text{ L}^3/\text{wpd}$
 $\Delta \text{water } 0 \text{ to } 5 \text{ L}^3/\text{wpd}$
Total recovery 1984-09-01 to 1985-03-01 = 16400 L³
- $\Delta 500 \text{ L}^3/\text{wpd}$ injection = 250 L³/wpd increase @ 2% decline in oil
Due to increase in WHIP
+ 120 L³/wpd @ 3% decline
+ 130 L³/wpd @ 2% decline
- Oil recovery is 20% of the original recovery in 1984-09-01 to 1985-03-01. The total recovery is 16400 L³ in oil prod. The total recovery is 16400 L³ in oil prod.

pre - 3 Y. am. 200 C³ up to 175 P³ up to 400 lbs.

1985 200 C³ up to 200 P³ up to 400 lbs.

3. $\Delta URR \approx 2$

- Volume of pond is 100 m³. Volume of water in pond is 400 m³ of water.

P_{max}	270	140	100	$P_{12} = 0.85 \text{ cm}^3$
P_{min}	60	60	30	$P_{\text{bet}} = 3000 \text{ l}$

- 4 daily sup. 50000 units 450 L3 wipd going out of zone

- review of conditions

2 balls starting at
 a and b - $a \cdot b = 1$
 - oil $\frac{1}{2}$ imply an abstract position
 - $a \cdot b = 1$ implies a and b are reciprocals

accelerated
 1000 wells = 12 wells 2 at 1 square of 10000 ft. 12 sq. miles of
 existing road. A pair 22 = 4 ft. = 10000 ft. because
 10000 ft. = 10000 ft.

Total Area 125.00 acres

1986
Mn pt -
1st

beginner notes → some cases difficult to answer why mod dev.
11-1 include various examples of economic & social development.

✓ 4-11 13-2 66-11 6-11 P₁₉₈₄ - 7691 P₁₉₈₇ A[†] 4059 + 2789 (L)

12/26

1933. Aug. 2. 1933. Aug. 2.

MSR - excludes posturing decline at construction
1984

* - 1984 use 1984 rate - 1984 rate pre-expansion

2-13 construction by 1984 - 4.11 used: 2-4.8-11, 10-11 - little

NOTE: full response indicated (in green) starting 2001

activation 6-11 2509

use limit (maximum sustainable rate) 1984 1.6 L²/d

- response may be as little as 0.3 L²/d based

1984 use 1984 rate

4-13 prod. slowly 84.06 to 85-05 why 85-05 data

prod. slowly 85-05 thru 89-01

1.5 L²/d increase if exclude 84.06 to 85-05

use 1984-84 MSR 2 - 1984 1984 use 3.15

5-13 MSR slowly 1984 pre-1984 use 0.8 L²/d
1988 use 1.65 L²/d

6-13 pers. support P₁₉₈₄ = 1925 KPa
P₁₉₈₈ = 2300 KPa

MSR 3 L²/d 1988 use 4.39

10-13 pers. support 15-13 P₁₉₈₄ = 3213
P₁₉₈₈ = 5025

MSR = 3.6 L²/d 1988 use 5.17 L²/d

12-13 pers. support 13-13 P₁₉₈₄ = 2500
P₁₉₈₈ = 10590

MSR = 1.5 L²/d 1988 use 3.0 L²/d
use 1983/84

Accretion

well	MSR	1988 Accr	Incremental (class)	
4-7	0.2	1.31	.51	(10.4)
1-1	3.5	4.26	.26	(1.0)
5-2	0.7	.81	.11	(0.2)
started 1985 4-2	1.4	2.39	.99	(1.2)
14-7	2.4	3	.6	(0.4)
9-10	1.0	2.38	.78	1.0
1-11	3.0	2.81	.27	1.5
percentage supplied 6-11 8-11	.9	1.16	.24	1.2
9-11	1.0	2.55	1.55	1.2
10-11	1.0	2.36	.98	1.0
11-11	1.8	2.00	.29	0
12-11	3	2.77	.77	1.0
13-12				
TOTALS			7.95	8.8

PAC - WF expansion project unit REULT = 29.12
 PUL - " " " " REULT = 31.8

Incremental revenue
 for 2001 16400
 projected 200000
 to 2035

pay out of initial WT expenditure required. (Inadequate
for this pl. as Chevron's agree with this) and we
need more oil relative to economic development & enhancement
industries etc.

INCREASE INJ RATE - 2% maximum initial output

30% optimistic 87-06, and if prod. & accumulation

Oleum expenditures (87-06) to upgrade facilities & recondition
wells \$1.15 BN (70% capital expend.)

- Royalty / Tax Regime - administratively complex - mixture old, new
holiday & incentive oil

more the due
long production life, domestic prod. may in fact result in
incremental reserves

Base Case Formula $y = 76.2 e^{-0.01t}$ ^{unit prod rate 87-12}

t = years elapsed since 1-1-84

original prediction - 1986 prod 6000 m³/year

actual 1986 prod 2520 m³/year

partly due failure to dramatically increase productivity

Chevron 97-04 submission Δ recovery 95000 L3

- Δ external cost
- approval demonstrate govt support for endowment recovery
- situation is that of legislation
- no great cost to govt

- original Chevron applⁿ 1984

- earliest of work 30 or 40 yrs. = y 2023 (no replacement wells recovered)

Δ recovery 430×10^3 L3

- 10³ assumptions regarding workovers & recompletions

- ① necessary to maintain base case production - little or no acceleration component - workovers
- ② recompletion - incremental and unpredictable under existing circumstances - little or no acceleration component
- ③ workovers purely constant - no growth

(4) As at other times of increasing season - there - though not now - are - in early to

Questions / answer ✓ (18) Chemical's expenditures

✓ (15) discussion on Types of ...

V0 VRR > 2, which is

✓(2) review suspect and call for reactivation or deactivation.

N/A : Continued regular
payments - L

Mr. [unclear] [unclear]

✓ 2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-2642-2643-2644-2645-2646-2647-2648-2649-2650-2651-2652-2653-2654-2655-2656-2657-2658-2659-2660-2661-2662-2663-2664-2665-2666-2667-2668-2669-2670-2671-2672-2673-2674-2675-2676-2677-2678-2679-2680-2681-2682-2683-2684-2685-2686-2687-2688-2689-2690-2691-2692-2693-2694-2695-2696-2697-2698-2699-2700-2701-2702-2703-2704-2705-2706-2707-2708-2709-2710-2711-2712-2713-2714-2715-2716-2717-2718-2719-2720-2721-2722-2723-2724-2725-2726-2727-2728-2729-2730-2731-2732-2733-2734-2735-2736-2737-2738-2739-2740-2741-2742-2743-2744-2745-2746-2747-2748-2749-2750-2751-2752-2753-2754-2755-2756-2757-2758-2759-2760-2761-2762-2763-2764-2765-2766-2767-2768-2769-2770-2771-2772-2773-2774-2775-2776-2777-2778-2779-2780-2781-2782-2783-2784-2785-2786-2787-2788-2789-2790-2791-2792-2793-2794-2795-2796-2797-2798-2799-2800-2801-2802-2803-2804-2805-2806-2807-2808-2809-2810-2811-2812-2813-2814-2815-2816-2817-28

... ..

[illegible]

✓ ③ You receive applications 5-11 all other candidates
are notified by 11:00 a.m. 2 weeks before
other candidates 16-18 other candidates
5-14 & 1-13, 13-13

6 4.11 2011 11/1/86

✓ In the above mentioned schedule for each small inspection
the cost of each inspection is Rs 150/-
and the cost of each inspection is Rs 150/-
and the cost of each inspection is Rs 150/-

Q.7 How frequently are health tests done every 6 months.

✓ 9 Sept 1961

-9. Pls of Sec. 13 mod. evidence of interest of community.

✓ (1) Δ is a linear operator for given α and β and γ is a positive constant

12

10/22 Dec 1000 0.00 0.00 0.00 0.00 0.00

- add 56 - 05 406 data

BoB 76.2 c - 0.01 t

+ starts @ Dec 31/83

CHEVRON'S ORIGINAL APPLN 1984 base prod. 76 c 3 OPD

incl declines .7 m 3 OP / yr constant

NOT exponential decline

Age of annual exponential declines

1984	0.925 %	} straight line constant slope
2022	1.427 %	

q vs. t
will up.

Chewron 1977-01 to 1984-06 d = .016

proposed 76.2 c - 0.015 t + starts @ Dec 31/83 as above

89-05 submission base case 20% recovery factor (2299 x 10³ m³)
 natural gas base 31.8, 200,000 m³ incremental
 - economic field life 2035

GOR = 7837.9 x 10³ m³

84-07	economic field life 2023	base case	2167282 m ³ - 27.5% OUP
	extrapolated to 2035	"	2360659 m ³ - 29.9% OUP
	extrapolated to Zero Rate	"	2767968 - 35.1% OUP
	WF max to 2023	2567835 m ³	32.8 % OUP
	extrapolated to 2035	2683502	34 % OUP
	extrapolated to Zero Rate	2791806	35.4 % OUP

Chosen assumption 75% continuity factor acceptable

sensitivity of continuity factor (CF) to estimates of
OOIP, S_{oi} , S_{orw}

$$+5\% S_{oi} \quad \text{vs} \quad S_{oi} = .655$$

$$E_D = 57.3\%$$

$$CF_{\text{new}} = 91\%$$

$$+5\% S_{oi}, -5\% S_{orw}$$

$$S_{oi} = .655 \quad S_{orw} = .23$$

$$E_D = 64.9\%$$

$$CF_{\text{new}} = 80\%$$

$$+10\% \text{ OOIP}$$

$$\text{OOIP} = 8676.7 \times 10^3 \text{ L}^3$$

$$RF_{\text{new}} = 47.5\%$$

$$CF = 47.5 / 53.7 \times 100\% = 88\%$$

$$+15\% \text{ OOIP}$$

$$\text{OOIP} = 9071.1 \times 10^3 \text{ L}^3$$

$$RF_{\text{new}} = .454 / .537 = 84.6\%$$

assume $+5\% S_{oi}$, $-5\% S_{orw}$, $+10\% \text{ OOIP}$

$$CF = .475 / .647 = 73\%$$

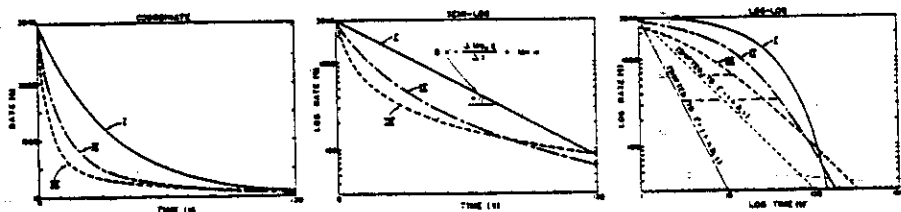
$$\text{using } d_{ec} = 1.1\% \\ = 1.2\%$$

$$RF_{\text{in}} = 48 \\ RF = 45.3$$

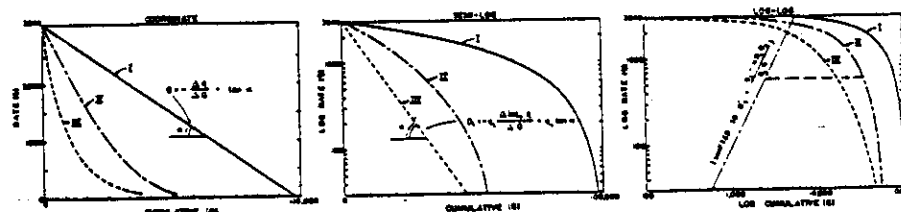
DECLINE TYPE	I. CONSTANT-PERCENTAGE DECLINE	II. HYPERBOLIC DECLINE	III. HARMONIC DECLINE
BASIC CHARACTERISTIC	DECLINE IS CONSTANT $n = 0$	DECLINE IS PROPORTIONAL TO A FRACTIONAL POWER (1/n) OF THE PRODUCTION RATE $0 < n < 1$	DECLINE IS PROPORTIONAL TO PRODUCTION RATE $n = 1$
	$Q = K \cdot q_1 \cdot e^{-\frac{D_1 t}{D}}$ $\int_0^t Q dt = - \int_0^t \frac{Q_1}{Q} \frac{dQ}{Q}$ $Q_1 = \log_e \frac{q_1}{Q_1}$	$Q = K \cdot q_1^{1-n} = \frac{K q_1}{n}$ <p>FOR INITIAL CONDITIONS: $K = \frac{Q_1}{q_1^{1-n}}$</p> $\int_0^t \frac{Q_1}{q_1^{1-n}} dt = - \int_0^t \frac{Q_1}{q_1^{1-n}} \frac{dQ}{Q}$ $\frac{n Q_1}{q_1^{1-n}} = q_1^{1-n} - Q_1^{1-n}$	$Q = K \cdot q_1 = \frac{K q_1}{n}$ <p>FOR INITIAL CONDITIONS: $K = \frac{Q_1}{q_1}$</p> $\int_0^t \frac{Q_1}{q_1} dt = - \int_0^t \frac{Q_1}{q_1} \frac{dQ}{Q}$ $\frac{Q_1}{q_1} = \frac{1}{Q_1} - \frac{1}{Q_1}$
RATE - TIME RELATIONSHIP	$Q_1 = q_1 \cdot e^{-D_1 t}$ $Q_1 = \int_0^t q_1 \cdot e^{-D_1 t} dt = \frac{q_1}{D_1} (1 - e^{-D_1 t})$ $Q_1 = \frac{q_1 - Q_1}{D_1}$ <p>Substitute From Rate - Time Equation: $q_1 \cdot e^{-D_1 t} = \frac{q_1 - Q_1}{D_1}$</p> <p>To Find:</p>	$Q_1 = q_1 (1 + n D_1 t)^{-\frac{1}{n}}$ $Q_1 = \int_0^t q_1 (1 + n D_1 t)^{-\frac{1}{n}} dt = \frac{q_1}{(1-n) D_1} [(1 + n D_1 t)^{\frac{1-n}{n}} - 1]$ $Q_1 = \frac{q_1}{(1-n) D_1} [(1 + n D_1 t)^{\frac{1-n}{n}} - 1]$ <p>Substitute From Rate - Time Equation: $(1 + n D_1 t) = (\frac{q_1}{Q_1})^{\frac{n}{1-n}}$</p> <p>To Find:</p>	$Q_1 = q_1 (1 + D_1 t)^{-1}$ $Q_1 = \int_0^t q_1 (1 + D_1 t)^{-1} dt = \frac{q_1}{D_1} [\log_e (1 + D_1 t)]$ $Q_1 = \frac{q_1}{D_1} [\log_e (1 + D_1 t)]$ <p>Substitute From Rate - Time Equation: $(1 + D_1 t) = \frac{q_1}{Q_1}$</p> <p>To Find:</p>
RATE - CUMULATIVE RELATIONSHIP	$Q_1 = \frac{q_1 - Q_1}{D_1}$	$Q_1 = \frac{q_1^n}{((1-n) D_1) (q_1^{1-n} - Q_1^{1-n})}$	$Q_1 = \frac{q_1}{D_1} \log_e \frac{q_1}{Q_1}$
<p>D_1 = Decline as a fraction of production rate Q_1 = Initial decline q_1 = (initial) production rate t = Time</p> <p>q_1 = Production rate at time 1 Q_1 = Cumulative oil production at time 1 K = Constant n = Exponent</p>			

FIG. 3—CLASSIFICATION OF PRODUCTION DECLINE CURVES.

RATE-TIME CURVES



RATE-CUMULATIVE CURVES



- I ——— CONSTANT PERCENTAGE DECLINE $n = 0$ $D = 0.05$
- II ——— HYPERBOLIC DECLINE $n = 1/2$ $Q_1 = 10$
- III ——— HARMONIC DECLINE $n = 1$ $Q_1 = 30$
- II' ——— HYPERBOLIC DECLINE (SHIFTED ON LOG-LOG)
- III' ——— HARMONIC DECLINE (SHIFTED ON LOG-LOG)

FIG. 4—THREE TYPES OF PRODUCTION DECLINE CURVES ON COORDINATE, SEMI-LOG AND LOG-LOG GRAPH PAPER.

DATE	MONTHLY PRODUCTION BBL	MONTHLY PRODUCTION M3	CUMULATIVE PRODUCTION M3	DAILY PRODUCTION M3/D	TIME	LN(M3/D)
			1040721			
JULY/76	16530	2626.769	1043347.	84.73451	0.08333	4.439522
AUG	16277	2586.565	1045934.	83.43760	0.16666	4.424099
SEP	14519	2307.203	1048241.	76.90677	0.24999	4.342594
OCT	15775	2506.793	1050748.	80.86430	0.33332	4.392772
NOV	15742	2501.549	1053249.	83.38497	0.41665	4.423468
DEC	16035	2548.109	1055797.	82.19708	0.49998	4.409119
JAN/77	15516	2465.635	1058263.	79.53664	0.58331	4.376217
FEB	15161	2409.223	1060672.	86.04368	0.66664	4.454855
MAR	16526	2626.134	1063298.	84.71400	0.74997	4.439280
APR	15513	2465.159	1065764.	82.17197	0.8333	4.408814
MAY	15855	2519.506	1068283.	81.27439	0.91663	4.397830
JUN	15092	2398.258	1070681.	79.94194	0.99996	4.381300
JUL	15953	2535.079	1073216.	81.77674	1.08329	4.403992
AUG	15671	2490.266	1075707.	80.33118	1.16662	4.386157
SEP	15188	2413.513	1078120.	80.45045	1.24995	4.387641
OCT	15426	2451.334	1080572.	79.07529	1.33328	4.370400
NOV	15493	2461.980	1083034.	82.06603	1.41661	4.407524
DEC	15608	2480.255	1085514.	80.00824	1.49994	4.382129
JAN/78	16231	2579.255	1088093.	83.20180	1.58327	4.421269
FEB	14459	2297.668	1090391.	82.05960	1.6666	4.407445
MAR	15959	2536.032	1092927.	81.80750	1.74993	4.404368
APR	15402	2447.520	1095374.	81.58400	1.83326	4.401633
MAY	15769	2505.839	1097880.	80.83354	1.91659	4.392392
JUN	14678	2332.469	1100213.	77.74899	1.99992	4.353485
JUL	15874	2522.525	1102735.	81.37178	2.08325	4.399028
AUG	16046	2549.857	1105285.	82.25347	2.16658	4.409805
SEP	15271	2426.703	1107712.	80.89010	2.24991	4.393091
OCT	14862	2361.709	1110073.	76.18416	2.33324	4.333153
NOV	15590	2477.395	1112551.	82.57983	2.41657	4.413765
DEC	15924	2530.470	1115087	81.62809	2.4999	4.402173
JAN/79		2577.2	1117664.	83.13548	2.58323	4.420471
FEB		2310.1	1119974.	82.50357	2.66656	4.412841
MAR		2440.1	1122414.	78.71290	2.74989	4.365807
APR		2344.5	1124758.	78.15	2.83322	4.358630
MAY		2431.8	1127190.	78.44516	2.91655	4.362399
JUN		2352.4	1129543.	78.41333	2.99988	4.361993
JUL		2458.7	1132001.	79.31290	3.08321	4.373400
AUG		2440.6	1134442.	78.72903	3.16654	4.366011
SEP		2410	1136852.	80.33333	3.24987	4.386184
OCT		2458.4	1139310.	79.30322	3.3332	4.373278
NOV		2401.3	1141712.	80.04333	3.41653	4.382568
DEC		2499.2	1144211.	80.61935	3.49986	4.389738
JAN/80		2438.3	1146649.	78.65483	3.58319	4.365069
FEB		2299.7	1148949.	79.3	3.66652	4.373238
MAR		2446.4	1151395.	78.91612	3.74985	4.368385
APR		2373.8	1153769.	79.12666	3.83318	4.371049
MAY		2463.9	1156233.	79.48064	3.91651	4.375513
JUN		2315.5	1158548.	77.18333	3.99984	4.346183
JUL		2365.6	1160914.	76.30967	4.08317	4.334799
AUG		2201.7	1163116.	71.02258	4.1665	4.262997
SEP		2445.1	1165561.	81.50333	4.24983	4.400643
OCT		2488.5	1168049.	80.27419	4.33316	4.385448

Regression Output:

Constant	4.412963
Std Err of Y Est	0.028126
R Squared	0.451546
No. of Observations	91
Degrees of Freedom	89

X Coefficient(s)	-0.01108
Std Err of Coef.	0.001295

data excluding
May/81, May/82
and Jun/82

$x = \text{time, yr.}$
 $y = \ln(q) \text{, } \text{m}^3/\text{d}$

Regression Output:

Constant	41636.16
Std Err of Y Est	795.2881
R Squared	0.458297
No. of Observations	91
Degrees of Freedom	89

X Coefficient(s)	-0.01106
Std Err of Coef.	0.001274

$x = \text{cum. prod, } Q, \text{ m}^3$
 $y = q \text{ m}^3/\text{yr.}$

all data

Regression Output:

Constant	4.413401
Std Err of Y Est	0.046378
R Squared	0.266924
No. of Observations	94
Degrees of Freedom	92

X Coefficient(s)	-0.0122449012
Std Err of Coef.	0.002115

$X = \text{time, years}$

$y = \ln(q) \text{ m}^3/\text{d}$

Regression Output:

Constant	10.31329
Std Err of Y Est	0.046378
R Squared	0.266924
No. of Observations	94
Degrees of Freedom	92

all data

X Coefficient(s)	-0.01224
Std Err of Coef.	0.002115

$x = \text{time, yrs.}$

$y = \ln(q) \text{ } \omega^3/\text{yr.}$

Regression Output:

Constant	42625.47
Std Err of Y Est	1227.161
R Squared	0.292085
No. of Observations	94
Degrees of Freedom	92
X Coefficient(s)	-0.0120040496
Std Err of Coef.	0.001948

all data

$$x = \text{cum prod. } Q \text{ m}^3$$

$$y = q \text{ m}^3/\text{yr.}$$

all data

Regression Output:

Constant	116.7821
Std Err of Y Est	3.362085
R Squared	0.292085
No. of Observations	94
Degrees of Freedom	92

X Coefficient(s)	-0.00003	* 365 = D
Std Err of Coef.	0.000005	

.0000328878

$x = \text{cum prod. } Q \text{ m}^3$

$y = q, \text{ m}^3/\text{d}$

Regression Output:

all data July 196
to Apr 1984

Constant	3573.202
Std Err of Y Est	113.7692
R Squared	0.256483
No. of Observations	94
Degrees of Freedom	92

X Coefficient(s)	-0.00101 * 12 * D
Std Err of Coef.	0.000180

$X = \text{cum prob. } Q \text{ m}^3$

$Y = q, \text{ m}^3/\text{month}$



**The Oil and Natural Gas
Conservation Board**

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

(204) 945-3130

April 11, 1989

Chevron Canada Resources
500 - 5th Ave S.W.
Calgary, Alberta
T2P 0L7

Attention: Mr. C. G. Folden, P. Eng.
Manager, Reservoir Engineering

Re: Daly Unit No. 3
Review of New Oil Status

Your request, dated March 29, 1989, for an extension until May 1, 1989, of the deadline for a performance review of the subject pressure maintenance project is hereby approved. As you have noted, the extension does not effect the current June 30, 1989 expiry date of new oil status for a portion of production from the subject Unit.

ORIGINAL SIGNED BY
H. CLARE MOSTER

H. Clare Moster
Deputy Chairman

cc: Charles S. Kang, Chairman

bc: Wm. McDonald, Member
Petroleum Branch



Date: April 4, 1989

April 5th

To: Clare Moster, ADM
Energy Division

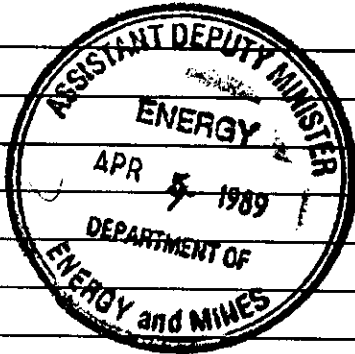
76th → Bob

Action / Route Slip

From: Office of the Deputy Minister
Manitoba Energy and Mines
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8

- ☐ May We Discuss
- ☐ Per Your Request
- ☐ Circulate, Initial and Return
- ☐ For Approval and Signature
- ☐ Make _____ Copies
- ☐ For Your Information
- ☐ Return With Comments or Revisions
- ☒ ~~Return With Comments or Revisions~~ **Return With Signature**
- ☐ Please File

Comments:



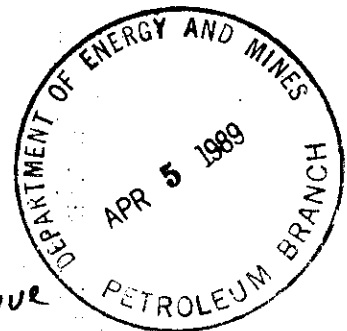
Thanks

Rose

*copies made: - 1. R. D. B. (initials)
- ADM Pending
5-4-89*

BRAD

If it is decided to extend the Daly Unit No 3 incentive, what would have to be done. regulation?
How much time would it take to get whatever approvals would be necessary?





Chevron Canada Resources

500 - Fifth Avenue S.W., Calgary, Alberta T2P 0L7 • Phone (403) 234-5000
Fax 234-5947

K E Godard
Chief Engineer

1989-03-29

Daly Unit #3
Review of Pool Performance
Extension of New Oil Status

Oil and Natural Gas Conservation Board
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8

Attention: Mr. C. S. Kang, Chairman

Gentlemen:

A review of Daly Unit #3 performance is due 1989-04-01. Chevron Canada Resources requests an extension of the deadline to 1989-05-01. This will allow time to complete the review and fully evaluate incremental recovery. Chevron understands this extension will not affect the 1989-06-30 expiry date for new oil status.

If there are any problems with this request please contact Bonnie Carnahan at (403) 234-5170.

Yours very truly,

for C. G. FOLDEN, P.Eng.
Manager,
Reservoir Engineering

BRC/gk



→ 205
Brad
file

JUL 23 1987

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Attention: Mr. C. G. Folden, P. Eng.
Supervising Engineer,
Reservoir Engineering

Dear Sirs:

Re: Daly Unit No. 3

Your application for extension of new oil status for incremental production from the subject Unit has been approved subject to an expiry date of June 30, 1989 and subject to the following conditions:

1. The base production rate defined in my letter of September 26, 1984 will continue to be used in determining incremental production. Table No. 1, attached, provides the base production rate for each month of the extended approval.
2. Upon enlargement of the Unit or expansion of the pressure maintenance project, this approval will be cancelled in favour of a less administratively complex incentive.
3. Unless the Unit is enlarged or the pressure maintenance project expanded, a detailed technical and economic review of the project's performance through 1988 shall be submitted prior to April 1, 1989. This review shall indicate the relative significance of acceleration and incremental reserve factors in the production increase.

Sincerely yours

ORIGINAL SIGNED BY
~~WILSON D. PARASIUKE~~

Charles KANG
Wilson Parasiuk

LRD/lk

Attachment

c.c. S. J. Puchniak
Director of Mining and Use Taxes Branch
Department of Finance
b.c. Charles S. Kang
Petroleum ✓

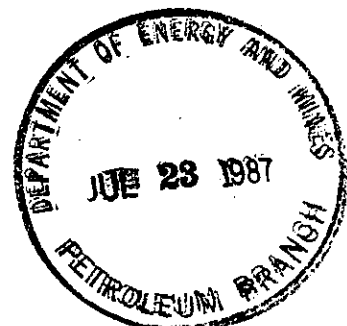


Table No. 1
Daly Unit No. 3
Base Production Rate

Year	Month	Daily Rate (m ³ /d)	Monthly Production (m ³)
1987	July	73.518	2 279.0
	Aug.	73.457	2 277.2
	Sept.	73.395	2 201.9
	Oct.	73.334	2 273.4
	Nov.	73.273	2 198.2
	Dec.	73.212	2 269.6
1988	Jan.	73.151	2 267.7
	Feb.	73.090	2 119.6
	Mar.	73.029	2 263.9
	Apr.	72.969	2 189.1
	May	72.908	2 260.1
	Jan.	72.847	2 185.4
	July	72.786	2 256.4
	Aug.	72.726	2 254.5
	Sept.	72.665	2 180.0
	Oct.	72.605	2 250.8
	Nov.	72.544	2 176.3
	Dec.	72.484	2 247.0
1989	Jan.	72.423	2 245.1
	Feb.	72.363	2 026.2
	Mar.	72.303	2 241.4
	Apr.	72.242	2 167.3
	May	72.182	2 237.6
	June	72.122	2 163.7



ON MATTERS OF STATE

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 subsection 9(1) of The Petroleum Crown Royalty and Incentives Regulation, being Manitoba Regulation 63/87 under The Mines Act provides as follows:

"9(1) Notwithstanding anything contained in section 3, the Lieutenant Governor in Council may, at any time and from time to time, approve the temporary or permanent reduction or exemption of the Crown royalty to be charged on any oil or natural gas produced or deemed to be produced from a location.";

AND WHEREAS Chevron Canada Resources Limited, operator of Daly Unit No. 3, ("the Unit") has made application requesting classification as new oil that production from the Unit which is considered by the Department of Energy and Mines attributable to expanded and improved enhanced recovery operations ("incremental production");

AND WHEREAS the Department of Energy and Mines has reviewed the application by Chevron Canada Resources Limited and has found it to be in the public interest to, on a temporary basis, classify as new oil incremental production from the Unit;

THEREFORE, he, the Minister, recommends:

THAT incremental production from the Unit during the period July 1, 1987 to June 30, 1989 be approved as new oil for Crown royalty and tax purposes.

Initiating Department/Agency	
Department/Agency	Authorized Officer
E + M	HEM
Approved By	
C.S.C.	Finance
Approved as to form by:	
L. F. Winton	
Litigation Branch:	Initials
Legislative Council	LD

Signature

Wilson D. Parment

IN THE EXECUTIVE COUNCIL CHAMBER, WINNIPEG

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

15 July 1987

Date

Howard Pawley
President or Presiding Member

AT GOVERNMENT HOUSE IN THE CITY OF WINNIPEG

Approved and Ordered this 15th day of July A.D. 1987

Berge Johnson
Lieutenant Governor

Manitoba

Action / Route Slip

Date: JULY 13, 1987

To: Clare Moster

Energy & Mines

Petroleum Branch

5th Floor - 330 Graham

From: S.J. Puchniak

Executive Director

Mining & Use Taxes Branch

Telephone: -3288

☐ Take Action

☐ May We Discuss

☐ Per Your Request

☒ For Your Information

☐ Circulate, Initial
and Return

☐ Return With Comments
or Revisions

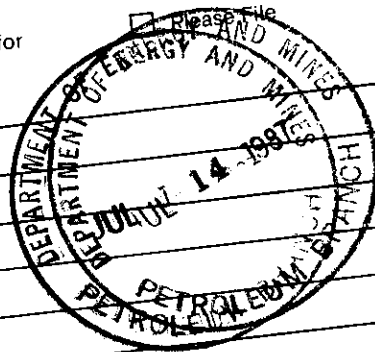
☐ For Approval and
Signature

☐ Draft Reply for
Signature

☐ Make _____ Copies

☐ Please File

Comments:





Memorandum

Date July 10, 1987

Honourable Eugene Kostyra
Minister of Finance
103 Legislative Bldg.

From Charles E. Curtis
Deputy Minister of Finance
109 Legislative Bldg.

Telephone

Subject CABINET SUBMISSION -
NEW OIL STATUS/CHEVRON CANADA RESOURCES LIMITED/DALY UNIT NO. 3

The above described cabinet submission by the Department of Energy and Mines has been reviewed by our staff. It is recommended that the request for reduction in taxes be approved (through the granting of new oil status) for a further two years to permit the company the opportunity of recouping part of a significant investment (\$1.15 million plus an additional investment over the next two years of approximately \$100,000) to obtain additional oil from this oil pool which will generate additional tax revenues.

At the end of the two year period it is recommended that a very careful review be done on any further request for new oil status for Daly No. 3 (we expect the company will make such an application) as by that time the company could have recouped their investment with an adequate return on capital.

At this time the Petroleum Division's opinion is that it is prudent to agree to the company's request and grant new oil status, and our staff has reviewed this issue with them and are of the opinion that their request is in the government's best interest relating to the efficient maximizing of oil production from Daly Unit No. 3 as well as continued tax revenues from this source over a number of years into the future.

Charles E. Curtis


cc: Hon. Eugene Kostyra
Charles E. Curtis

- SJP/hk

A.W. Roberts
Deputy Minister's file - DKI
S.J. Buchniak
P.L. Goyette
L.A. Ballegeer
Chrono - rak
Chrono - hk

Manitoba

COPY

→ Bob
"New Oil - Daily 3" file 

Memorandum

Date June 25th, 1987

To Craig Halwachs, Manager
Financial Services
Energy & Mines
607 - 330 Graham Avenue

From Robin P. Winters,
Crown Counsel
Civil Legal Services
6th Floor - 405 Broadway

Subject

PROPOSED ORDER-IN-COUNCIL UNDER THE

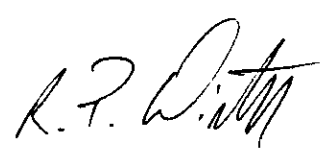
Telephone 945-2836

PETROLEUM CROWN ROYALTY AND INCENTIVES REGULATION

Further to your action/route slip dated June 24th, 1987, enclosed please find duplicate copies of the subject Order-in-Council with the writer's approval as to form noted on each copy.

In accordance with my telephone conversation of today's date with Clare Moster, it may be necessary to translate and/or gazette the subject Order-in-Council. However, in view that Gordon Carnegie of the Regulations Unit has assisted Clare Moster in developing the subject regulation, you or Mr. Moster may wish to contact Mr. Carnegie for his thoughts in this regard.

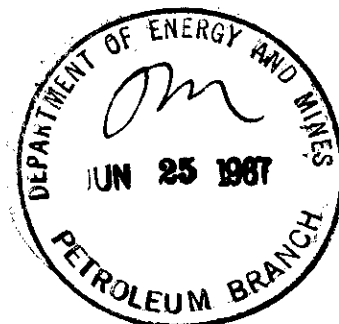
In view of the "rush/urgent" nature of your request for me to review the subject Order-in-Council, I obviously do not have sufficient time to explore this matter in more detail vis-a-vis translation and/or gazetting.


Robin P. Winters,
Crown Counsel

cc: H. Clare Moster

DELIVERED BY COURIER

3509g



LG in C
approval of
a "administrative"
nature.
No order/reg.
on gazetting
or translation.

first fold



Date: 1986 06 26

Action / Route Slip

To: BOB

From: Clare

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:

Re: "NEW OIL STATUS - Daily Unit No. 3"

- delivered to DM's office on June 26th
- may not get on June 30th Cabinet agenda
- should be dealt with at least on July 8th
- draft covering letter (Minister to Channon) spelling out details of approval (cc: Puckniak, M&UT's Smith)

DEPARTMENT OF ENERGY AND MINES
CABINET SUBMISSION

Date Typed: June 24, 1987

SUBJECT:

New Oil Status for incremental production from Daly Unit No. 3.

BACKGROUND:

In July 1984, Chevron Canada Resources Limited, as Unit Operator, applied for new oil status for projected incremental oil production from Daly Unit No. 3 expected to result from improvements in the waterflood pressure maintenance scheme. The application was conditionally approved by the Minister of Energy and Mines pursuant to his authority under the then existing legislation. The approval expires on June 30, 1987. Chevron applied on April 7, 1987 for an indefinite extension of new oil status on incremental production from the Unit.

DISCUSSION:

The definition of new oil in both The Oil and Natural Gas Tax Act and The Petroleum Crown Royalty and Incentives Regulation includes that portion of the oil produced from a well not classified as a new oil well which is reasonably attributed to an increase in reserves attributable to an enhanced recovery project.

Pressure maintenance improvements initiated by Chevron in the Unit over the past three years are of two types: those constituting expansion to the waterflood which should result in incremental reserves and those whose primary result is to accelerate production.

Because the projected remaining life of Daly Unit No. 3 is extremely long and because most wells in the Unit are some 35 years old, it can be argued that acceleration of production can prevent loss of oil reserves which may result if wells had to be abandoned prematurely due to mechanical deterioration. Under this scenario, incremental production due to acceleration could also be considered as incremental reserves.

Chevron has spent a total of \$1.15 million in modifications to the project over the last two years. Additional work planned for 1987 is estimated at \$10,000 plus possible future injection well reactivating and unit expansion at additional cost. The modifications have resulted in an increase in oil production from the unit of about 15% or 350 m³ per month.

As a result of the modifications to the scheme, additional revenues to the Crown (royalties and freehold taxes) were about \$166,000 since September 1984. Over the same period, savings to the operating companies due to "new oil" status were about \$178,000.

A review of the project's performance and economics by staff of the Petroleum Division has resulted in a recommendation to extend new oil status for incremental production for two years.

The intent of the "new oil" provisions of the legislation is to encourage operators to efficiently produce and maximize production. The proposed extension of new oil status is therefore consistent with this legislation.

FINANCIAL IMPLICATIONS:

Addition revenues to the Crown over the two year extension period are estimated at \$220,000. Savings to the operating companies are estimated at \$233,000. Due to the large capital investment which has already been made and the unfavourable pay out (12.8 years), it is quite likely that if new oil status were not approved, the planned project improvements would not be made.

COMMUNICATIONS STRATEGY:

Letter to Unit Operator (Chevron) outlining terms of the extended new oil status.

RECOMMENDATIONS:

That incremental production from Daly Unit No. 3 considered attributable to expansions and improvements to the pressure maintenance project be subject to new oil royalty and taxation rates for the period from July 1, 1987 to June 30, 1989.

Minister of Energy and Mines

subsection 9(1) of The Petroleum Crown Royalty and Incentives Regulation, being Manitoba Regulation 63/87 under The Mines Act provides as follows:

"9(1) Notwithstanding anything contained in section 3, the Lieutenant Governor in Council may, at any time and from time to time, approve the temporary or permanent reduction or exemption of the Crown royalty to be charged on any oil or natural gas produced or deemed to be produced from a location.";

AND WHEREAS Chevron Canada Resources Limited, operator of Daly Unit No. 3, ("the Unit") has made application requesting classification as new oil that production from the Unit which is considered by the Department of Energy and Mines attributable to expanded and improved enhanced recovery operations ("incremental production");

AND WHEREAS the Department of Energy and Mines has reviewed the application by Chevron Canada Resources Limited and has found it to be in the public interest to, on a temporary basis, classify as new oil incremental production from the Unit;

THEREFORE, he, the Minister ~~of Energy and Mines~~, recommends:

THAT incremental production from the Unit during the period July 1, 1987 to June 30, 1989 be ~~classified~~ ^{approved} as new oil for Crown royalty and tax purposes.

May 22, 1987

Charles S. Kang
Deputy Minister of Energy & Mines
309 Legislative Bldg.

H. Clare Moster
Executive Director
Petroleum Division

Daly Unit No. 3 - New Oil Status

Recommendation:

That the Minister be consulted to confirm he is prepared to recommend to cabinet conditional temporary approval of Chevron's application for "new oil" classification status for incremental oil production from Daly Unit No. 3 for a further 2 year period (July 1, 1987 to June 30, 1989).

On confirmation of the Minister's position, we will proceed to prepare the necessary documents.

Background:

The definition of "new oil" in The Oil and Natural Gas Tax Act 2.1(f.1) and in the Petroleum Crown Royalty and Incentive Regulation (MR 63/87) under The Mines Act includes oil produced from new oil wells (i.e. - drilled after April 1, 1974) and oil obtained as a result of an enhanced recovery scheme conducted pursuant to an order made under The Mines Act dated on or after January 1, 1979 and consisting of that portion of the oil obtained which in the opinion of the minister can be reasonably attributed to an increase in reserves recognized by The Oil and Natural Gas Conservation Board as resulting from the enhanced recovery scheme.

The wells in Daly Unit No. 3 were drilled prior to April 1, 1974 and the existing pressure maintenance order covering Daly Unit No. 3 is Order No. PM 31 (MR 51/77), dated prior to January 1, 1979.

Therefore the project does not qualify for "new oil" status under the standard definition of "new oil".

However, subsection 4.1(6) under The Oil and Natural Gas Tax Act currently permits, as did the previous Clause (iii) of the definition of "new oil" under Section 3 of Manitoba Regulation 149/84 under The Mines Act, that:

- the Minister of Energy and Mines may, if he deems it in the public interest, approve any specific oil production as "new oil" and also revoke any such approval.

In July, 1984 Chevron Canada Resources Limited applied for "new oil" status for proposed incremental oil production from Daly Unit No. 3 expected to occur as a result of planned improvements in the waterflood pressure maintenance project.

The application was conditionally approved by the Minister of Energy and Mines (letter dated September 26, 1984) pursuant to his authority under the then existing legislation. The approval expires on June 30, 1987.

In drafting the most recent changes to the Crown Royalty regulations (MR 63/87), staff of Legislative Counsel stated that the authority given to the minister under the previous regulation to change or alter royalty classifications was not supported by the authority under The Mines Act (only the LG in C by regulation or order may fix royalties). Therefore the previous Crown royalty regulation definition was changed and the current Regulation (MR 63/87) provides as follows:

"9(1)...the Lieutenant Governor in Council may, at any time and from time to time, approve the temporary or permanent reduction or exemption of the Crown royalty to be charged on any oil or natural gas produced....".

Discussion:

Chevron applied April 7, 1987 for an indefinite extension of the "new oil" status for the incremental oil produced in Daly Unit No. 3 as a result of the modifications they have already made and those planned for the project area.

A review of Chevron's application by Petroleum staff, copies attached, has resulted in a recommendation to approve the application for a further two (2) year period (expiring June 30, 1989).

Chevron's application indicates a total of \$1.15 million has been spent on the modifications over the last two years. Additional work planned for 1987 is estimated at \$10,000 plus possible future water injection well re-activations and unit expansion at additional cost.

The modifications have resulted in an increase in oil production from the Unit by about 15%, or 350 m³ per month.

To date, this incremental production has benefited the province through additional Crown royalty/tax revenue by about \$166,000 over the last 34 months, even at the depressed oil prices experienced over the last year.

The net royalty/tax benefit of the "new oil" classification to operating companies in the Unit over this same period has been about \$178,000.

Over the recommended 2 year extension period (July 1, 1987 - June 30, 1989), incremental production is forecast to be 9 600 m³. This will result in an additional \$220,000 (undiscounted) in production royalty and tax payments to the Crown at current and forecasted oil prices.

Companies operating in the Unit should realize a before tax netback of \$556,000 (undiscounted, after operating costs, freehold mineral royalties and old oil production royalties and taxes), or \$163,000 after tax netbacks (undiscounted and assuming maximum corporate income tax rates).

Should a two year "new oil" extension be granted, companies would see a royalty and tax savings of an additional \$233,000.

Initially, when this project was proposed (1984) Chevron had anticipated an average total production rate at a maximum of 6 000 m³/month in 1986. However, since that time average actual production for 1986 has only reached 42% of the expected rate.

With the expected cashflows from incremental production (Division's forecast) and a 10% discount rate, the Division has calculated a payout period on this project of somewhere between 5.4 to 12.8 years (with new oil status for the entire period) depending on the company's Corporate tax bracket (this compares with Chevron's calculated payout of 7.8 years at 10%).

Conclusion:

The intent of the "new oil" classification provision in the Legislation is to cover special situations which encourage companies to efficiently produce and maximize oil recovery. Therefore, authority for approval of this application for an extension of "new oil" status on incremental production from Daly Unit 3 is provided for under the legislation.

Given the capital investment which has already been made, the uncertainty in future total production, the investment that will occur in the future to keep the project active and the unacceptably long payout period (up to 12.8 years with indefinite new oil status), it seems reasonable that a two year extension of new oil status on incremental production be granted.

To satisfy the requirements of the current Crown royalty regulation and the proposed new Oil Tax Act, will require approval by the Lieutenant Governor in Council.

Original Signed by H. C. Moster

H. Clare Moster

HCM/1k

c.c. S. J. Puchniak

1231P



Memorandum

Date May 22, 1987

To H. Clare Moster
Executive Director
Petroleum Division

From A. Galarnyk
Petroleum Resource Analyst

Subject Daly Unit No. 3 -
New Oil Status

Telephone

Summary: After detailed calculations were made using actual and forecast production data for Daly Unit No. 3 it was determined that:

	Sept. 1/84 - June 30/87	July 1/87 - June 30/89	July 1/89 - Dec. 31/92
- Total Incremental Production (m ³)	7 564.40	9 605.50	14 501.00
- Net Royalty/Tax* Savings to Companies From New Oil Status	\$177,533.50	\$232,661.34	\$419,975.77
- Additional Royalty/Tax Revenue to Crown from Incremental Production From New Oil Status	\$166,385.74	\$219,357.51	\$395,589.58

* Assumes 12.5% Freehold Royalty

** Assumes 1987\$

With a capital investment of \$1.15 million and an additional investment of \$50,000 at the end of project year 3 (September 1/86 - August 31/87), the payout period on the project would be 5.1 years before tax and 10.7 years after tax (at an 8% discount rate or 5.4 years before tax or 12.8 years after tax (at a 10% discount rate) if new oil status were granted to all incremental production from September 1, 1984 to August 31, 1996.

Based on Chevron's calculation at a 10% discount rate, the payout period would be 7.8 years on the initial and additional capital investment.

Background:

In determining the effect of granting new oil royalty/tax status on incremental production from Daly Unit 3, a number of assumptions and factors were used in calculating payback period, royalty/tax savings to companies and additional royalty/tax revenue to the provincial government.

They include:

<u>Year</u>	<u>WHP \$/m³</u>	<u>(\$/bbl)</u>	<u>OP. Cost \$/m³</u>	<u>(\$/bbl)</u>
1984	187.61	(29.81)	30.08	(4.78)
1985	215.37	(34.22)	32.72**	(5.20)**
1986	112.18	(17.83)	35.37	(5.62)
1987*	141.60	(22.50)	38.20	(6.07)
1988	157.30	(25.00)	41.22	(6.55)
1989	170.00	(27.00)	44.99	(7.15)
1990	182.50	(29.00)	48.05	(7.64)
1991	195.00	(31.00)	51.89	(8.25)
1992	207.60	(33.00)	56.04	(8.91)

Note: 1987\$

* (January - February average price for Daly crude oil trucked = \$21.50/bbl).

** Based on actual operating cost for Daly Unit 3 (escalated at 8%/year)

The following example shows how the royalty/tax savings and revenues were calculated.

Example Freehold Tract

Total Allocated production to tract = 60.53 m³

Base Allocated production to tract = 58.53 m³

Incremental Production to tract = $\frac{2.00 \text{ m}^3}{\text{---}}$

Old Oil Tax on Total Production = 17.79% = \$2,021.53

Old Oil Tax on Base Production = 16.93% = \$1,860.24

New Oil Tax on Total Production = 5.81% = \$ 659.88

New Oil Tax on Base Production = 5.35% = \$ 587.85

WHP = \$187.73/m³

- Total-Base Tax (Old Oil) = \$2,021.53 - \$1,860.24 = \$161.29
- Total-Base Tax (New Oil) = \$ 659.88 - \$ 587.85 = \$ 72.03
- Total Tax payable (with new oil status) = \$1,860.24 + \$ 72.03 = \$1,932.27
- Savings to Chevron = \$2,021.53 - \$1,932.27 = \$ 89.26
- Additional Revenue to Crown from Incremental Production = \$72.03

A computer program was established and this methodology was applied to both freehold and Crown tracts. (Note: the proposed new tax formulae were used in calculating information on freehold tracts).

To support the accuracy of the computer program, the following figures show the net savings to Chevron as calculated by the Administrative Section of the Division and the computer program for selected months (for all Provincial Crown tracts in Daly Unit 3).

<u>Unit Savings Calculated by:</u>	<u>Administration</u>	<u>Computer</u>
September 1984	\$689.89	\$691.21
March 1985	\$656.05	\$655.47
October 1985	\$4,266.52	\$4,266.81
May 1986	\$2,382.02	\$2,383.01
August 1986	\$2,108.20	\$2,109.28

Given the crude oil prices and operating costs previously listed and assuming maximum federal and provincial corporate income tax rates along with the calculated production royalties and taxes to the province, the before and after tax netbacks were calculated (PGRT was not included for 1984 and 1985). The results of these calculations are shown on Table 1 where revenue distribution from incremental production is split between operating costs, freehold mineral owner royalties, federal and provincial government revenues and producer or company netbacks.

By discounting the new oil status netbacks to the operator at 8% and 10% and assuming a 5% decline in netbacks after 1992, a payback period of 5.1 years before tax and 10.7 years after tax and 5.4 years before tax and 12.8 years after tax was calculated (see attached payback graphs).

Chevron had earlier calculated a payback of 7.8 years (@ 10% discount) with new oil status. However, upon closer examination, it was discovered that Chevron's initial base production rate was lower than the Division's forecast rate. This resulted in a greater volume of incremental production being recorded and consequently a quicker payout. The reason for the inconsistency (between Chevron and the Department) in base rate production is unknown. Two other unknowns could also explain why our after tax payback period was greater than Chevron's. Both wellhead price and Chevron's corporate income tax rates were not stipulated in their analysis (see attached production and price forecast graph).

Based on the Division's payback calculations and Chevron's request for an extension to the new oil status on incremental production it would not seem unreasonable to provide a two year extension for new oil status on incremental production beginning on July 1, 1987 as recommended by the Division's Engineering Section.

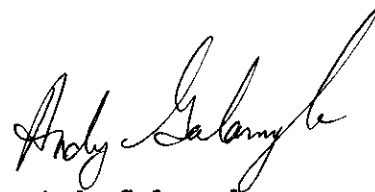
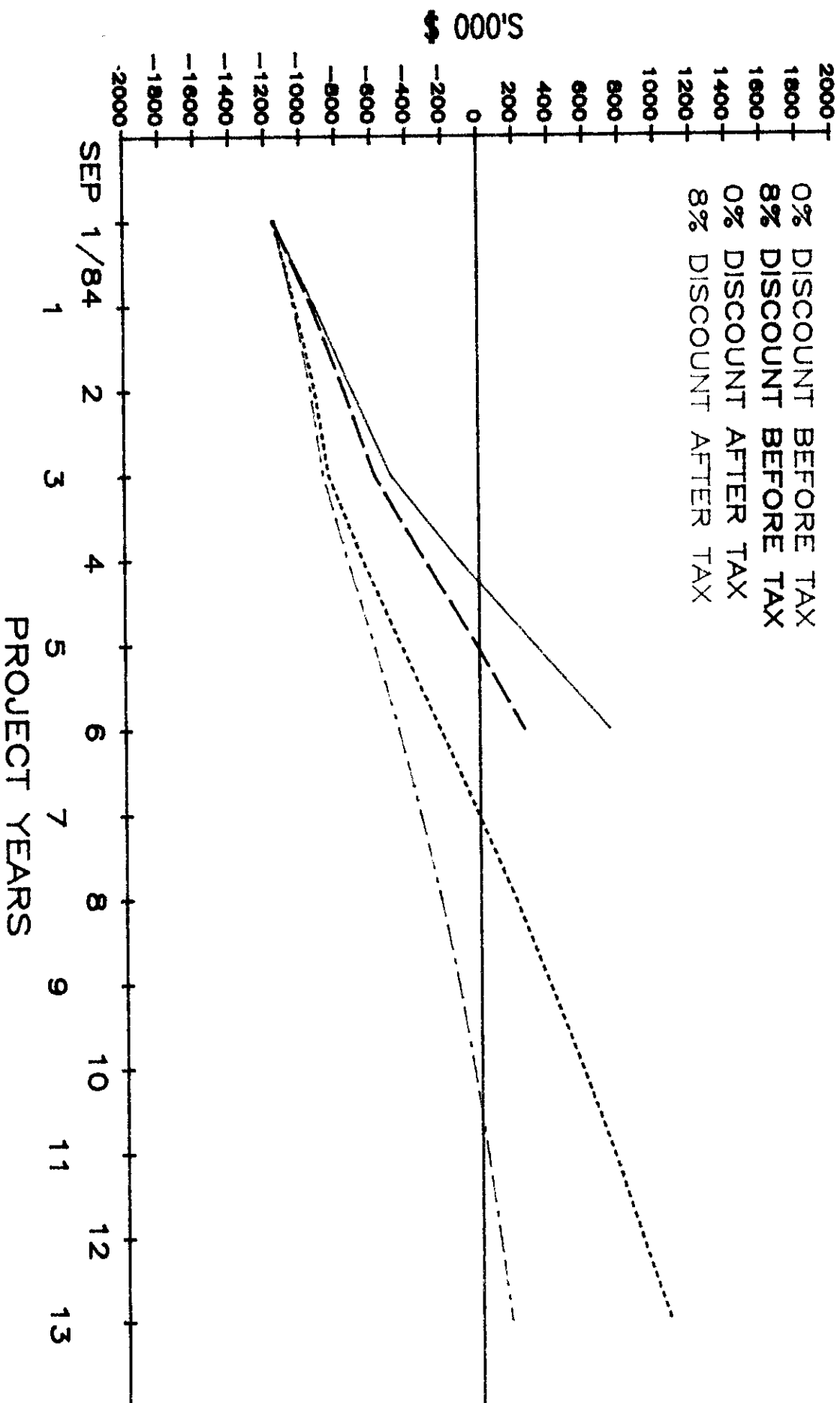

Andy Galarnyk

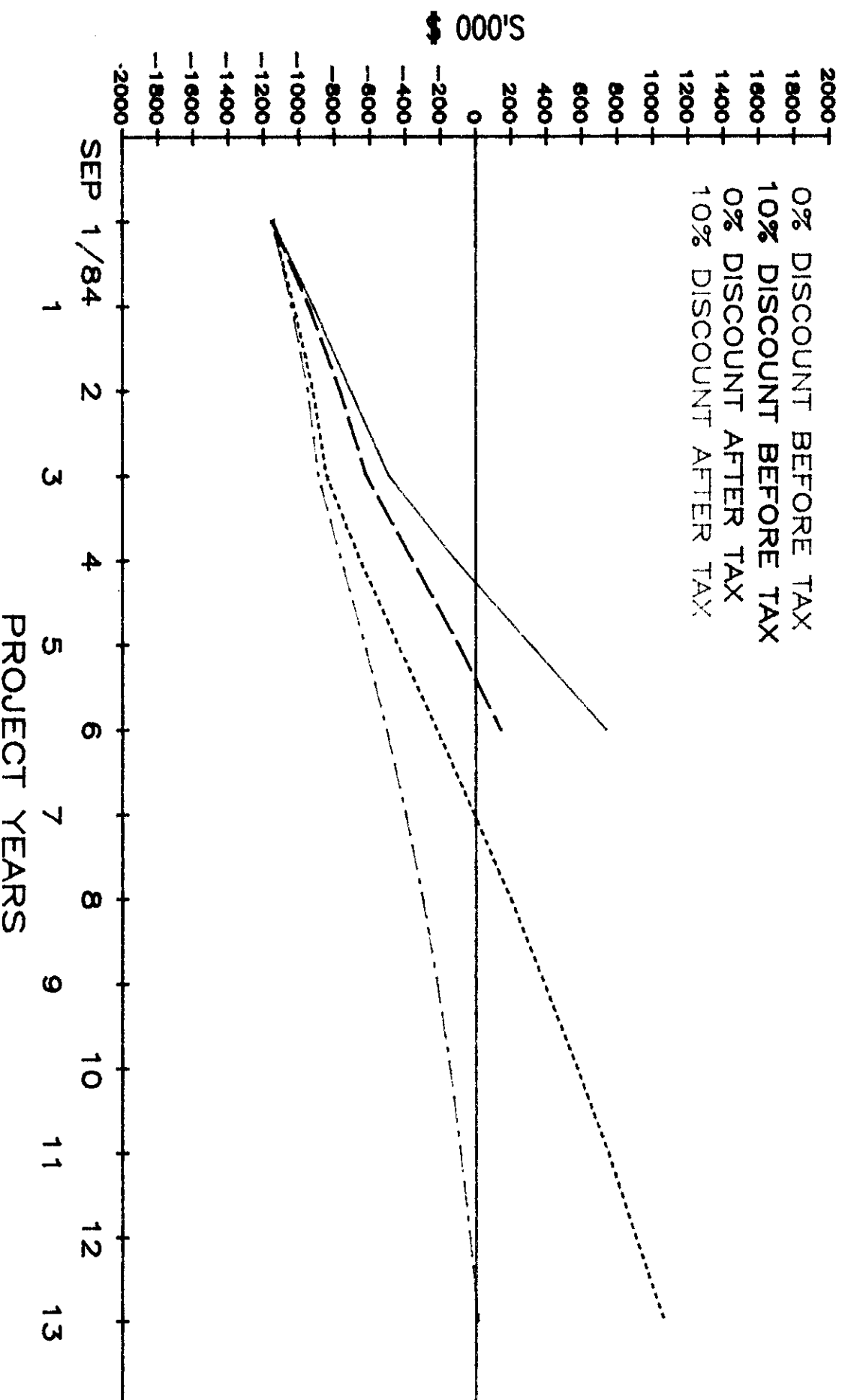
TABLE 1
Daily Unit # 3 Revenue Netbacks From Incremental Production
(1987 \$)

Year	Incremental Prod. Value\$ (4 mths)	Old Oil \$ (000's)					New Oil \$ (000's)				
		Op. Cost	Free. Min. Owner	Fed. Gov.	Prov. Gov.	Company	Op. Cost	Free. Min. Owner	Fed. Gov.	Prov. Gov.	Company
1984	\$55,401.05	8.9	1.9	12.0	22.5	10.1	8.9	2.6	12.0	13.3	18.5
(4 mths)	(100%)	(16.11%)	(3.4%)	(21.7%)	(40.6%)	(18.2%)	(16.1%)	(4.7%)	(21.7%)	(24.0%)	(33.4%)
1985	453,847.34	69.0	15.3	100.0	187.7	81.9	69.0	21.2	100.0	111.0	152.7
1986	359,896.88	113.5	12.2	63.5	142.8	28.0	113.5	16.8	63.5	82.3	83.8
1987	592,426.08	159.8	20.0	111.7	238.4	62.5	159.8	27.7	111.7	139.2	154.0
1988	782,945.02	205.2	26.3	149.3	316.6	85.5	205.2	36.6	149.3	185.1	206.8
1989	807,330.00	211.3	27.4	154.0	325.0	89.7	211.3	37.8	154.0	190.3	214.0
1990	803,967.25	211.7	27.4	153.0	322.1	89.8	211.7	37.7	153.0	188.6	213.0
1991	793,728.00	211.2	27.3	150.5	314.9	89.8	211.2	37.3	150.5	184.6	210.1
1992	762,784.68	205.9	26.4	143.8	299.9	86.7	205.9	36.0	143.8	175.8	201.3
	(100%)	(27.0%)	(3.5%)	(18.8%)	(39.3%)	(11.4%)	(27.0%)	(4.7%)	(18.8%)	(23.1%)	(26.4%)

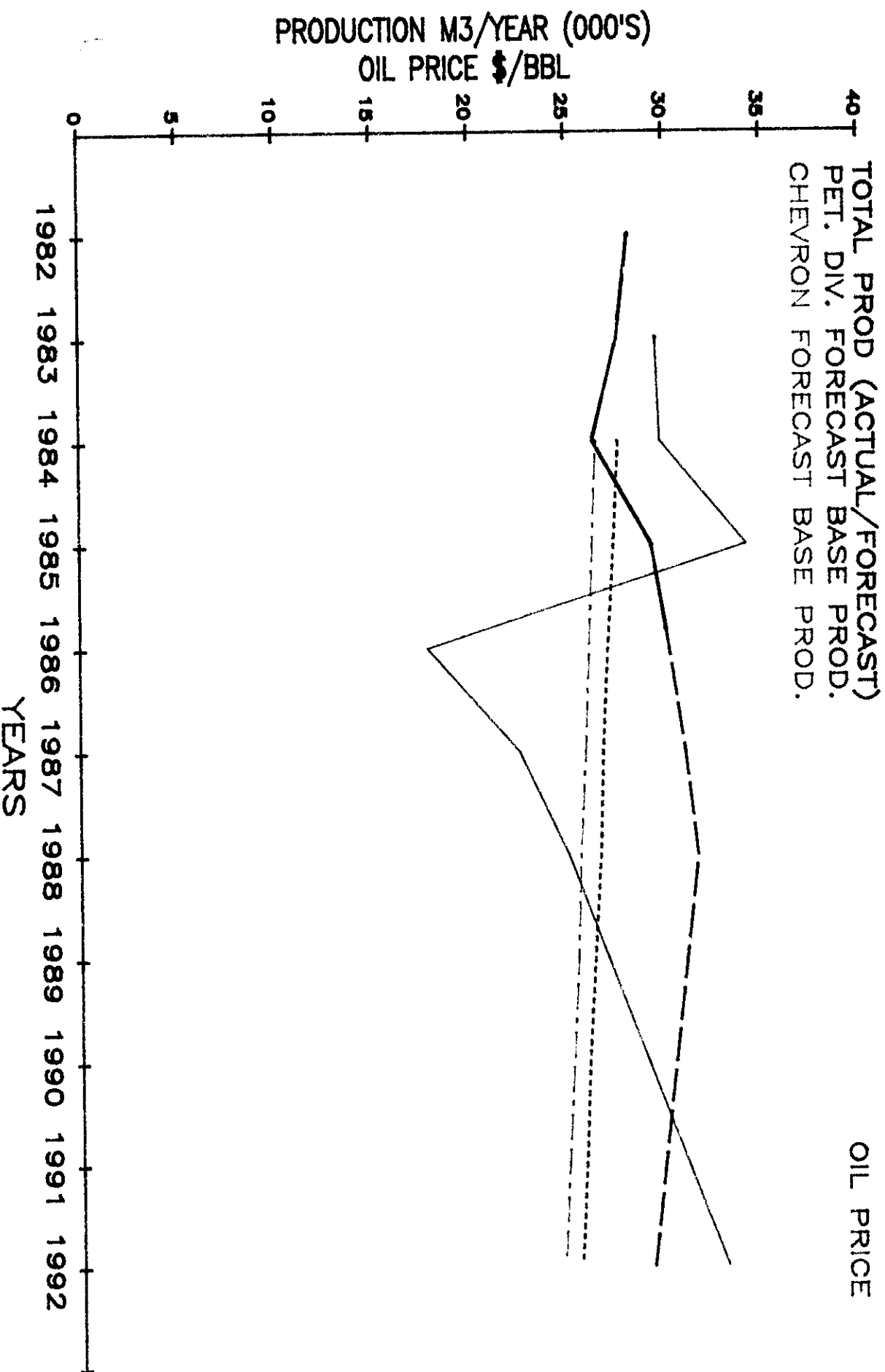
DALY UNIT 3 PAYBACK PERIOD NEW OIL STATUS - BEFORE AND AFTER TAX NETBACKS



DALY UNIT 3 PAYBACK PERIOD NEW OIL STATUS – BEFORE AND AFTER TAX NETBACKS



DALY UNIT 3 OIL PRODUCTION AND PRICE FORECAST





Memorandum

Date April 24, 1986

To H. Clare Moster

From L.R. Dubreuil

Subject Daly Unit No. 3 - New Oil Status

Telephone

Recommendations:

It is recommended that incremental production from the subject Unit above a base production rate (see Table No. 1) be classified as new oil for royalty and taxation purposes. Such classification of new oil would commence on July 1, 1987 and continue for two years or until the Unit is enlarged, whichever occurs first.

In the absence of Unit or pressure maintenance expansion, it is recommended that a detailed technical and economic analysis of the project's performance through 1988 be submitted prior to April 1, 1989. The report should indicate the relative significance of acceleration and incremental reserves factors in the production increase.

A proposed draft letter for the Minister's signature is attached.

Introduction

In 1984, Chevron proposed several modifications to its operations in Daly Unit No. 3 designed to increase production levels. It was anticipated that a portion of the increase would represent incremental ultimate reserves while the remainder would merely be acceleration of production.

Regulations under The Mines Act and The Oil and Natural Gas Tax Act make provision for classification as new oil for royalty and tax purposes of incremental production attributable to expanded enhanced recovery operations. However, increased production due to acceleration does not automatically qualify for new oil status.

Based on the postulation that some portion of the increased production would reflect incremental reserves and that due to the extremely long remaining production life of the Unit, acceleration would be required to realize ultimate recovery, Chevron requested that all production in excess of a base level (extrapolation of historical production) be classified as new oil.

Chevron's request for new oil status was approved by the Minister (see letter of approval attached). The approval was subject to an expiry date of June 30, 1987. As part of the approval, Chevron was required to submit prior to April 1, 1987, "a technical and economic analysis of the

project's performance through 1986 indicating the relative significance of accelerated depletion and incremental reserves". This report was to form a basis of any extensions of new oil status.

The required report has been received (April 13, 1987) and has been reviewed. The report is quite general in nature and while conceding that acceleration was a factor in the increased production makes no attempt to quantify this factor.

The report points out that predicted increases in production have not been achieved due to lack of injection capability. It also concludes that the project is sub marginal at today's oil prices even with new oil status.

The report requests an indefinite extension of the new oil status on incremental production.

The following discussion examines project performance to estimate the relative significance of acceleration and incremental reserves and presents a range of options that could be pursued.

Acceleration vs Incremental Reserves

The expansions to water injection operations in the Daly Unit No. 3 involved the following three components:

1. Increase in injection pressure from about 7 500 kPa to about 8 500 kPa.
2. Conversion of five wells to water injection.
3. Reactivation of one suspended water injector.

The increase in injection pressure is accompanied by an increase in injection rate. Fig. No. 1 shows the percentage change in injection rate (from May 1984 to Dec. 1986) resulting from a 13% increase in well head injection pressure. The Figure shows a wide variation in percent change. The wells showing a large increase have likely been fractured by the increase in pressure whereas the wells showing a decrease or a minor increase were probably injecting above the frac pressure prior to the increase in injection pressure.

The primary effect of increasing the injection rate in areas that are already pressure maintained is to accelerate recovery. Any incremental recovery would be minimal.

Conversion of five wells to water injection has provided additional pressure support in the northern part of the Unit (Section 13 and 14) and the western edge of the Unit (Lsd. 13-2-10-28).

Any production increase in wells offsetting these new injectors would clearly be incremental reserves resulting from additional pressure maintenance.

One suspended water injection well (6-11-10-28 WPM) has been reactivated in the expansion. However, the total injection in this well since reactivation is only 2 070 m³. Consequently, its effect on production of surrounding wells is probably minimal.

In estimating the relative importance of acceleration and incremental reserves, producing wells in the Unit were broken down into 4 classes:

1. Wells affected only by increased injection pressure.
2. Wells affected only by new injection.
3. Wells affected by both new injection and increased injection pressure.
4. Wells affected by neither new injectors nor increased injection.

In Daly Unit No. 3, individual well production rates are determined by prorating of total battery production on the basis of individual well tests. During the period just prior to the waterflood expansion, 43 wells were tested. In 1985, 1986 and 1987, 44 wells were tested (total of 83 tests).

A comparison of pre expansion test oil rates with most recent oil test rates is shown on Fig. No. 2. In total the most recent tests show an increase of 14.2 m³/d (432 m³ month) over the pre expansion well test rates. This total increment shows reasonable agreement with total Unit production increases (see Fig. No. 3). Also shown on Figure No. 2 are the general areas affected by new injection, by increased injection pressure and areas which may be affected by both factors. If it is assumed that where producing wells may be effected by both factors the factors have equal effects, it can be estimated that about 70% of the production rate increase is due to the accelerating process of increased injection rate.

Production data was also analysed to determine the relative timing of acceleration and incremental effects. Fig. No. 4 shows the ratio of increased production due to acceleration (from wells in Area A on Fig. 2 plus one half of production from wells on the boundaries between Area A and Area B) to the increased production due to incremental reserves (Area B wells and one half of production from boundary wells). This plot shows a gradual increase in the importance of incremental production over the first two years of the project. Most recent data, however, suggests that the importance of acceleration is again increasing.

In summary, analysis of production data indicates that the waterflood expansion has resulted in accelerated depletion and incremental reserves. Further the acceleration component is considerably more significant than the incremental component, and appears to be increasing in importance. Chevron's estimate of incremental reserves (95 000 m³) would appear to be somewhat optimistic.

Although acceleration does not add incremental reserves directly, it may prevent the loss of some reserves due to mechanical failure of wells. Most of the wells in the Unit are 35 years old and several have had severe mechanical problems. With an extremely lengthy base case production period (over 60 years) it is likely that additional failures would occur and if such failures occurred when productivities had declined, economic replacement wells may not be possible.

Other Considerations

1. Expenditures

Chevron has expended about \$1.15 million to upgrade facilities and condition wells. About 70% of this would be classified as capital while the remainder (cleanouts, liners acid jobs, etc.) should be classified as operating expenses. Economics generated indicate a payout of 7.8 years which is considered unacceptable. Although details of the economic analysis are not provided it is likely that the economics would have been much more favourable had oil prices not crashed in early 1986.

Chevron has indicated its plans to increase water injection capacity (larger transfer pump, reactivations and unit expansion).

2. Royalty and Taxes

Chevron has requested indefinite extension of the current regime where production in excess of a base case is classified as new oil. There are several concerns associated with an indefinite extension.

- a) The dominant factor in increased production is acceleration. Planned immediate expenditures are likely to increase the acceleration component.
- b) If oil prices return to pre 1986 levels, an incentive will not likely be necessary to make the project economically attractive.
- c) With the new incentive package, the possibility exists of development of an administratively complex royalty and tax regime. This could include old oil on the base production, new oil on incremental production, holiday oil for new reduced spacing wells and incentive oil for expanded pressure maintenance.

3. Options

Some of the options available at this time are as follows:

- a) Terminate new oil status on incremental production. This would provide no incentive for continued production enhancement which does have an incremental reserves element.
- b) Indefinite extension of the current new oil status. This would lead to potentially complex administrative concerns and should oil prices rise significantly, provide a possibly unneeded incentive.
- c) Provide a new oil incentive for the portion of increased production which represents incremental reserves. Although this may be the most fair approach, it would result in interpretational differences and possibly administrative complexities.

4. Proposal

Recognizing that Chevron has and plans to expend considerable money in the Daly Unit No. 3, that such expenditures are economically marginal at today's oil prices and that ultimate recovery is being enhanced to some degree, it is proposed that the current system of new oil royalty and taxation rates on incremental production be extended. It is proposed that

the extension be for a two year period (expiring June 30, 1989) or upon enlargement of the Unit. In the event of pressure maintenance or Unit enlargement, a review would be made to establish an administratively simple equivalent regime. As with the current incentive period, a summary report evaluating the relative effects of acceleration and incremental factors through year end 1988 would be required prior to April 1, 1989.


L.R. Dubreuil

D R A F T

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
CALGARY, Alberta T2P 0L7

Attention: Mr. C.G. Folden, P. Eng.

Re: Daly Unit No. 3 - New Oil Status

Dear Sir:

Your letter of April 7, 1987 reviewing the performance of the waterflood expansion in the subject Unit and requesting extension of new oil status for incremental production is acknowledged.

Upon detailed review of production data from the Unit, the Department is led to conclude that the most significant factor in the observed production increase is acceleration of production (caused by increased injection rates). It is, however, noted that conversion of five (5) wells to water injection has had a positive effect on production, which will presumably result in incremental recovery.

It is also concluded that the economics of the project have been hindered by failure of production increases to match predicted levels and by collapse of the price of oil.

The Department concurs with your comment that due to the extremely long remaining production life, accelerated production may in fact result in incremental reserves. It is noted, however, that the magnitude of such increment is difficult or impossible to assess.

The Department notes and fully supports your plans for further investment to maximize economic recovery from the Unit.

Having regard for the foregoing, your request for extension of the current new oil status is granted, subject to the following conditions:

1. Approval of new oil status for incremental production from the subject Unit expires on June 30, 1989.
2. If prior to June 30, 1989, an enlargement of the Unit or pressure maintenance project occurs; alternative, administratively simpler options, designed to provide similar incentives will be reviewed by the Department.
3. A second report shall be submitted to the Petroleum Division prior to April 1, 1989. As in your recent report, a detailed technical and economic review of the project through year end 1988 should be included. In addition, you are asked to attempt to quantify the relative effects of acceleration and incremental production.

Sincerely yours,

Wilson D. Parasiuk
Minister

LRD:HCM:dah

SEP 26 1984

Mr. C. G. Falden, F. Eng.
Virden Area Supervisor
Chevron Canada Resources Limited
Box 109
Virden, Manitoba
R0M 1C0

Dear Mr. Falden:

**Re: Dally Unit No. 3 Waterflood Expansion Application
for "New Oil" Status for Crown Royalty/Tax Calculations**

A review of your application dated July 4, 1984 and supporting data by Petroleum Branch staff suggests that some portion of expected future incremental production in excess of estimated base production rate forecasts may result from the expansion of the waterflood project area. However, some percentage of the incremental production will result from reactivation of previously suspended water injection wells and from recently approved higher injection pressures. Therefore, the percentage of the initial incremental production that may result in an increase in ultimate recovery of reserves from the Unit is difficult at present to estimate.

Pursuant to subsection 4.1(6) of The Oil and Natural Gas Tax Act and the definition of "new oil" under section 3 of The Crown Petroleum Royalty Regulations, 1984, approval is hereby granted to have incremental production produced between September 1, 1984 and June 30, 1987, in excess of base production estimated by the Petroleum Branch, to be classified as "new oil" for provincial Crown royalty and oil tax calculation purposes. The calculation procedures will be those provided in the current legislation. "Table 1" attached provides the base production rates on which "incremental production" will be determined.

....2

As a condition of this approval, Chevron is required to submit prior to April 1, 1987 a technical and economical analysis of the projects performance through 1986 indicating the relative significance of accelerated depletion and incremental reserves. The results of this analysis will form the basis for any future application to extend the "new oil" status approval.

Yours sincerely,

Original Signed by:
WILSON D. PARASIUK

Wilson D. Parasiuk

WDM/lk

s.c. S. J. Pechniak, Director
Mining & Use Taxes Branch

H. Clara Hoeter, Director
Petroleum Branch

b.c. Marc Eliassen
Dr. I. Raugh
Petroleum Branch ✓

"TABLE 1"

<u>YEAR</u>	<u>MONTH</u>	<u>DAILY RATE (m³/d)</u>	<u>MONTHLY PRODUCTION (m³)</u>
1984	Jan	76.136	2360.2
	Feb	76.073	2206.1
	Mar	76.010	2356.3
	Apr	75.946	2278.4
	May	75.883	2352.4
	Jun	75.820	2274.6
	Jul	75.757	2348.5
	Aug	75.694	2346.5
	Sep	75.631	2268.9
	Oct	75.568	2342.6
	Nov	75.505	2265.1
	Dec	75.442	2338.7
1985	Jan	75.379	2336.7
	Feb	75.316	2108.8
	Mar	75.253	2332.8
	Apr	75.191	2255.7
	May	75.128	2329.0
	Jun	75.066	2252.0
	Jul	75.003	2325.1
	Aug	74.941	2323.2
	Sep	74.878	2246.3
	Oct	74.816	2319.3
	Nov	74.753	2242.6
	Dec	74.691	2315.4
1986	Jan	74.629	2313.5
	Feb	74.567	2087.9
	Mar	74.505	2309.6
	Apr	74.443	2233.3
	May	74.381	2305.8
	Jun	74.319	2229.6
	Jul	74.257	2302.0
	Aug	74.195	2300.0
	Sep	74.133	2224.0
	Oct	74.071	2296.2
	Nov	74.010	2220.3
	Dec	73.948	2292.4
1987	Jan	73.886	2290.5
	Feb	73.825	2067.1
	Mar	73.763	2286.7
	Apr	73.702	2211.1
	May	73.640	2282.8
	Jun	73.579	2207.4
	Jul	73.518	2279.0
	Aug	73.457	2277.2
	Sep	73.395	2201.9
	Oct	73.334	2273.4
	Nov	73.273	2198.2
	Dec	73.212	2269.6

Further Calculations can be made using
the equation $y = 76.2e^{-0.01t}$

where y = production rate (m³/d)
 t = elapsed time since 1-1-84 (years)

257

FIG No. 1
DALY UNIT No. 3

Percent Increase
in Injection Rate
1984 05 to 1986 12
+ Wells cleaned out

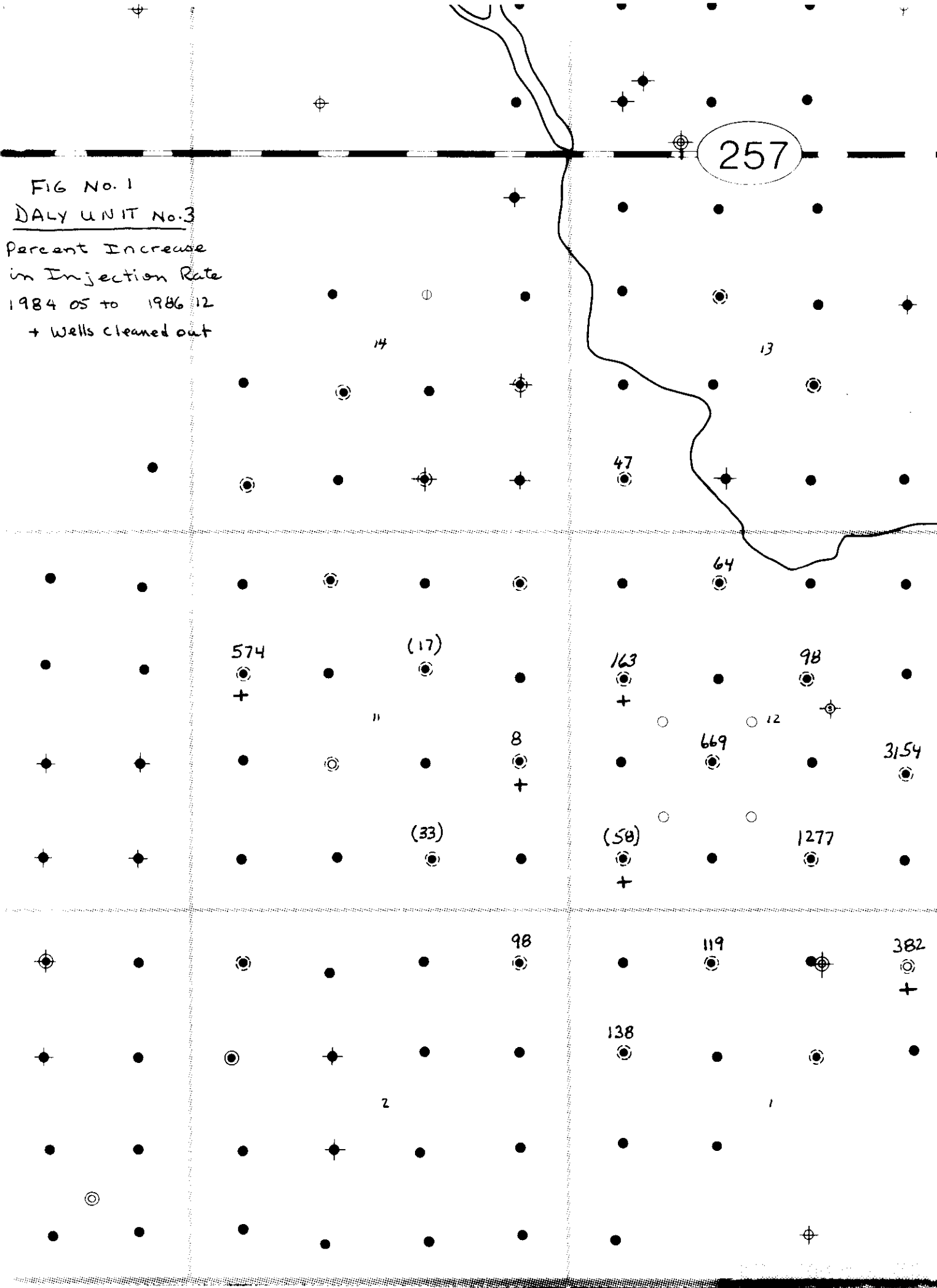


FIG No.2
 DAILY UNIT No.3
 CHANGE IN WELL TEST RATE
 (LATEST TEST - BASE TEST)
 (m³/d)

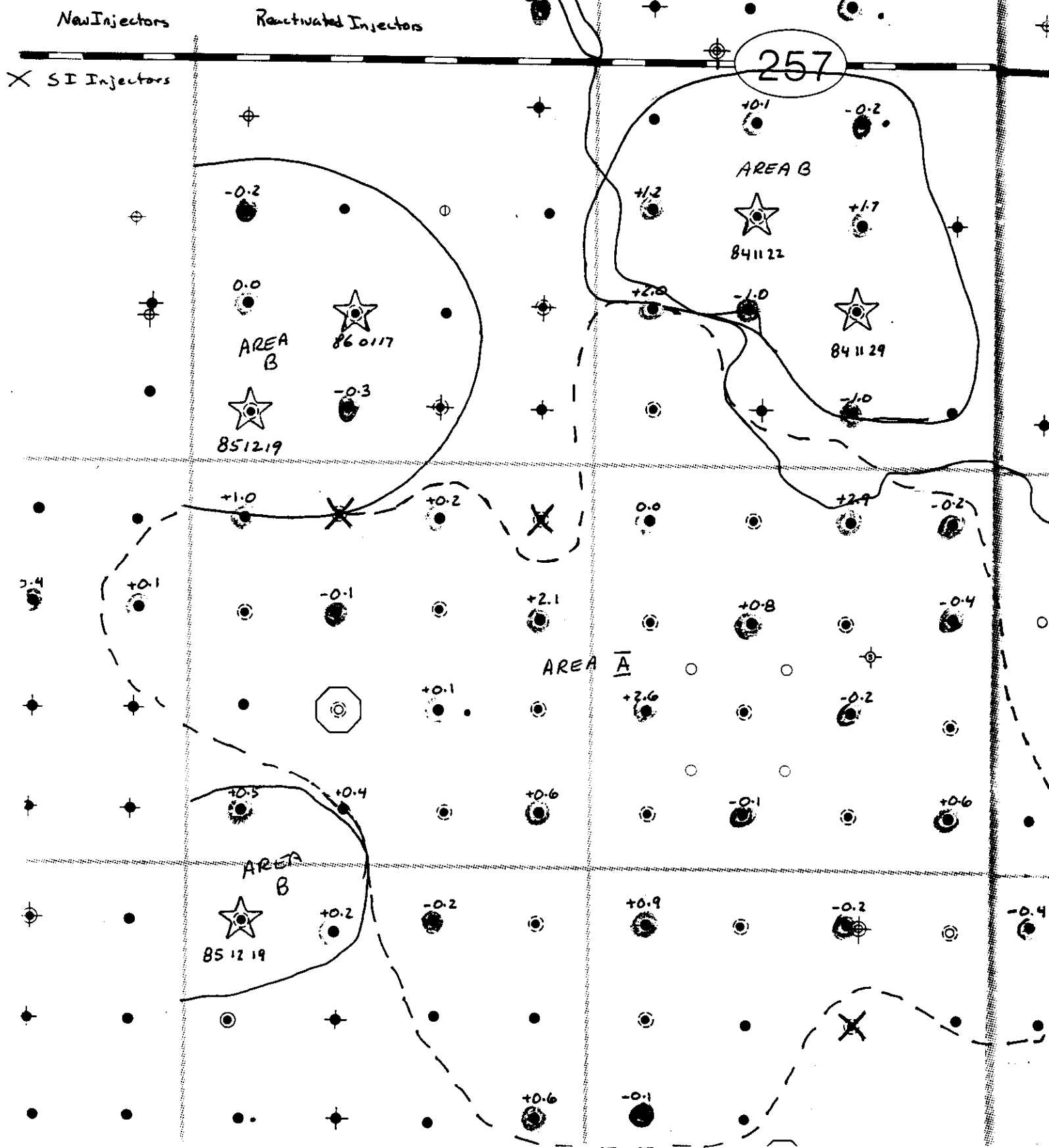


FIG No.3 DAILY UNIT NO. 3

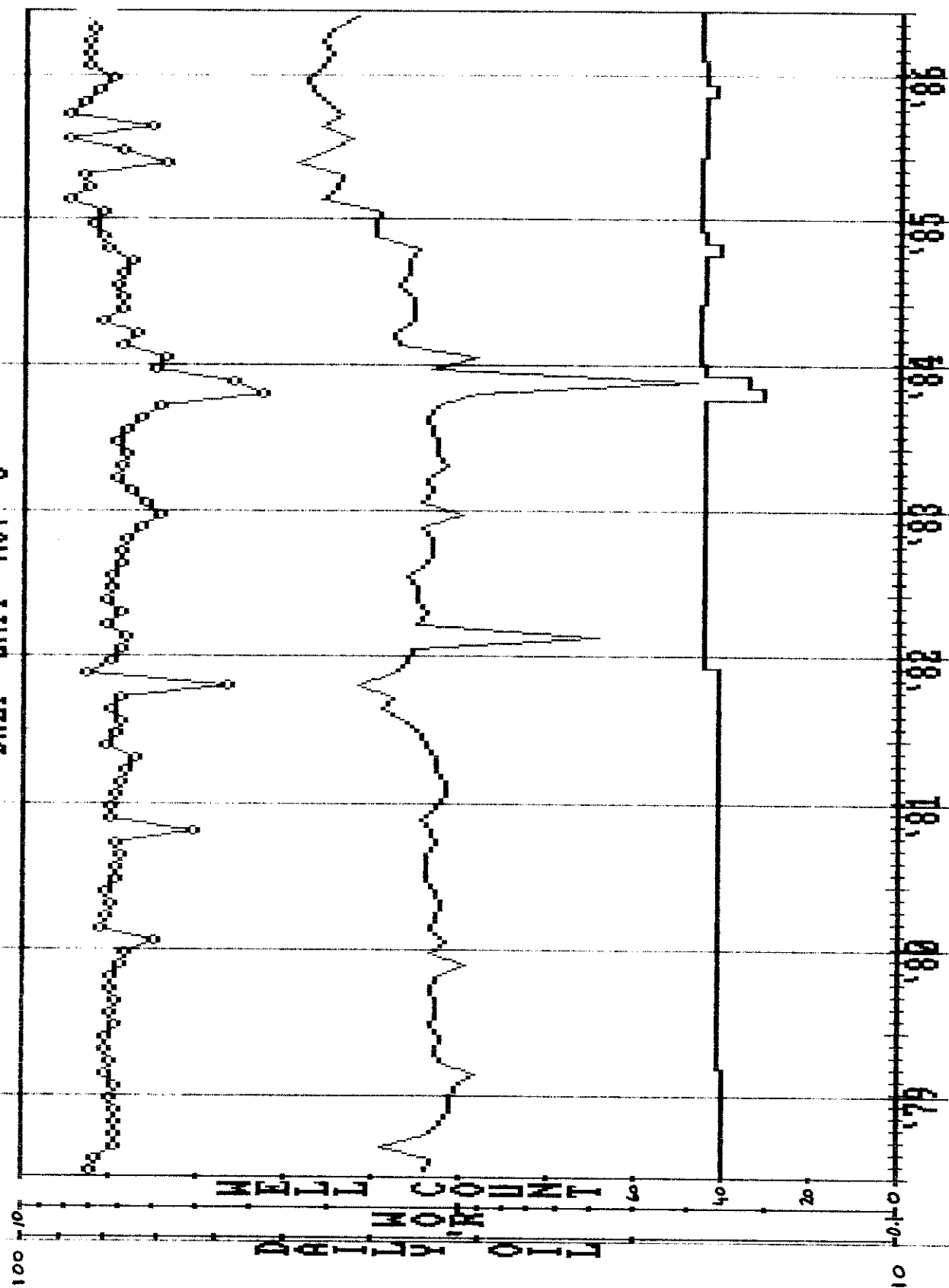
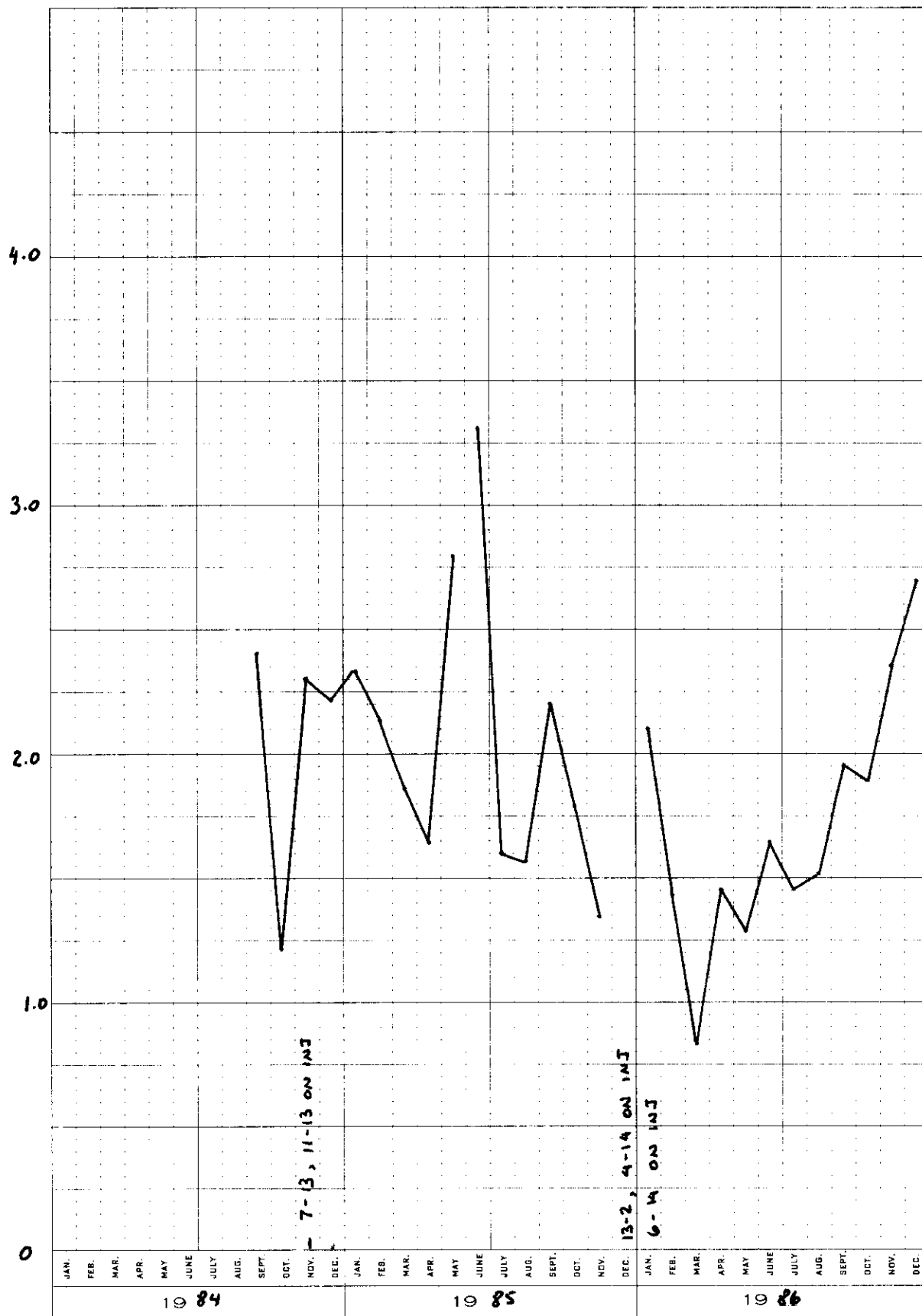


FIG No 4 DALY UNIT NO.3

RATIO OF $\frac{\text{INC. PROD DUE TO ACCL.}}{\text{INC PROD DUE TO NEW IN}}$ 



Chevron Canada Resources Limited

500 - Fifth Avenue S.W., Calgary, Alberta T2P 0L7

K.E. Godard
Chief Engineer

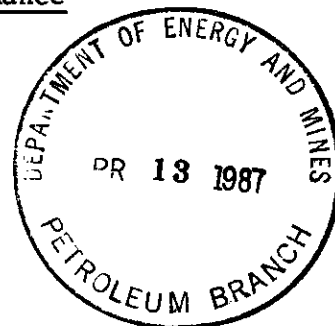
1987-04-07

Daly Unit No. 3
Waterflood Expansion Performance

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

Attention: Mr. H. C. Moster, Executive Director

Gentlemen:



1. On 1984-07-04, Chevron Canada Resources Limited, as Operator of Daly Unit No. 3 applied for new royalty and mineral tax status for the incremental production resulting from waterflood expansion.
2. On 1984-09-26, the Minister of Energy and Mines approved the application and requested that Chevron Canada Resources Limited submit a report on the waterflood expansion performance by 1987-04-01.
3. The production history for Unit No. 3 is shown on Figure 1. This plot indicates that the WOR increased from 1.2 to 2.1 in the period 1984-07 to 1985-09. About one-half of the increase in water production is due to a submissile pump being installed in Well 9-23 during 1985-07.
4. Capital expenditures and work performed since the waterflood expansion was initiated are shown on Table 1.
5. A comparison of actual and predicted production rates indicates a major shortfall has occurred (see Figure 2). The predicted production forecast from the Application has a maximum rate of 6 000 m³/month occurring in 1986. The average actual production rate in 1986 was 2 520 m³/mo.

6. A large increase in productivity did not materialize because injection rates did not increase as expected. Average injectivity at Daly Unit No. 3 is about 30 m³/d/injector while average injectivity at Daly Unit No. 1 is about 100 m³/d/injector. As shown on Figure 4, Unit No. 3 injectivity has increased from 7 500 to 21 000 m³/mo. About one-half of the injectivity increase came from the new injectors and the reactivation. Figures 5 to 16 to show the injection data for injectors which are part of the subject expansion or have received workovers. The graphs for the older injectors show that the waterflood expansion increased wellhead injection pressure from 7 500 kPa to 8 500 kPa.
7. Chevron has attempted to increase injectivity by performing cleanouts on some wells and also by refracing two injectors (see Table 1). In a further attempt to increase injectivity, a larger transfer pump will be installed at 12-29-9-28 Battery, to increase the volume of injection water available at the 15-1-10-28 water plant. This work will be done in 1987-05 and the estimated cost is \$10 000. Other plans for Unit No. 3 include reactivation of Injectors 10A-1 and 14-11, expansion of the Unit waterflood to include the Triton wells in Section 24, and installation of bigger injection pumps.
8. Post project profitability indicators have been generated. With 15% of the Unit production having new royalty and mineral tax status, a weighted average payout of 7.8 years was obtained. Table 2 shows the yearly production and after tax present value of production generated by Unit No. 3. With all of the Unit production having old royalty and mineral tax status, a weighted average payout of greater than ten years was obtained. Table 3 shows the yearly production and after tax present value of production generated by Unit No. 3.
9. Based on the production forecasts, the Daly waterflood expansion will generate 95 000 m³ of incremental oil. Oil production will also be accelerated. The accelerated portion of the production is becoming more important. If mechanical problems similar to those occurring at 14-11, 16-11, 5-12 and 3-13 continue, and the wells cannot be economically repaired or replaced, the production from the later years will not be realized.

10. In summary, the Daly Unit No. 3 waterflood expansion has not performed up to expectations and more work is required. The return on investment to date is also unacceptable. By extending the new royalty and mineral tax status for the incremental production, the Manitoba Government will provide the Working Interest Owners with the required incentive to provide more investment for increasing and accelerating Daly Unit No. 3 production.

Sincerely,

A handwritten signature in dark ink, appearing to read "C. G. Folden". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

C. G. FOLDEN, P.Eng.
Supervising Engineer
Reservoir Engineering

DS/ds

TABLE 1

DALY UNIT NO. 3

WORK PERFORMED AND CAPITAL EXPENDITURES

<u>Work</u>	<u>Date</u>	<u>Cost</u> <u>10³ \$</u>	<u>Producers</u>	<u>Injectors</u>
15-1 Water				
Plant Expansion	1985-01	210.5		
Upgrade Water				
Injection Pipelines	1985-01	281.0		
Conversion	1985-01	204.7		13-2, 7-13, 11-13
Conversion	1986-01	111.5		4-14, 6-14
Reactivation	1987-01	43.1		6-11
Reactivation	1986-01	65.2	11-1	
Cleanouts	1986-01	33.4		8-11, 12-11
	1987-01	39.7		16-1, 4-12, 12-12
Fracs	1987-01	25.4		6-12
Install Liner	1987-01	101.7		13-2, 5-12
Acid Jobs	1985-01	14.2	9-11, 5-13	
	1986-01	4.8	7-11	
	1987-01	<u>12.5</u>	11-11, 3-12	
		1 147.7		

TABLE 2

DALY UNIT NO. 3
OIL PRODUCTION AND AFTER TAX PRESENT VALUE AT 10%

YEAR	PRE- WATERFLOOD EXPANSION		POST- WATERFLOOD EXPANSION		INCREMENTAL	
	10^3 m^3	$10^3 \$$	10^3 m^3	$10^3 \$$	m^3	$10^3 \$$
1985	26.4 ^{72.3}	1 218	29.3	661	2 904	-557
1986	26.2 ^{71.6}	523	30.3	405	4 092	-117
1987	25.9	791	31.0 ^{1.9}	701	5 028	-89
1988	25.7	572	31.7	632	6 048	61
1989	25.5	643	31.1	692	5 640	49
1990	25.2	680	30.5	720	5 244	39
1991	25.0	747	29.9	807	4 860	60
1992	24.8	810	29.3	853	4 488	43
1993	24.6	799	28.7	846	4 128	47
1994	24.3	833	28.1	878	3 768	44
1995	24.1	814	27.6	865	3 420	51
1996	23.9	834	27.0 ^{1.92}	880	3 084	46
1997	23.7	791	26.5	825	2 760	34
1998	23.5	794	25.9	834	2 448	40
1999	23.3	795	25.4	815	2 136	20
2000	22.8 ^{62.5}	759	24.9	780	2 088	21
2001	22.4	744	24.4	766	2 040	22
2002	21.9	725	23.9	749	1 992	23
2003	21.5	705	23.4	739	1 956	34
2004	21.1	689	23.0	724	1 908	35
2005	20.7	662	22.5	696	1 860	34
2006	20.2	628	22.1	661	1 824	33
2007	19.8	607	21.6	629	1 788	22
2008	19.4	576	21.2	598	1 752	22
2009	19.1	547	20.8	576	1 716	29
2010	18.7	520	20.4	547	1 668	28
2011	18.3	493	19.9 ^{1.92}	520	1 632	26
2012	18.0	468	19.5	494	1 596	26
2013	17.6	445	19.2	469	1 560	24
2014	17.2	422	18.8	446	1 524	24
2015	16.9	406	18.4	424	1 488	17
2016	16.6	385	18.0	402	1 452	17
2017	16.2	366	17.7	387	1 428	21
2018	15.9	347	17.3	362	1 392	15
2019	15.6	329	17.0 ^{1.92}	349	1 368	20
2020	15.3 ^{41.9}	312	16.6	331	1 332	19
	<u>767.3</u>	<u>22 778</u>	<u>862.7</u>	<u>23 061</u>	<u>95 411</u>	<u>283</u>

1. 15% of Post Waterflood Expansion production has new royalty and mineral tax status.

TABLE 3

DALY UNIT NO. 3
OIL PRODUCTION AND AFTER TAX PRESENT VALUE AT 10%

YEAR	PRE- WATERFLOOD EXPANSION		POST- WATERFLOOD EXPANSION		INCREMENTAL	
	10^3 m^3	$10^3 \$$	10^3 m^3	$10^3 \$$	m^3	$10^3 \$$
1985	26.4	1 218	29.3	580	2 904	-638
1986	26.2	523	30.3	365	4 092	-158
1987	25.9	791	31.0	651	5 028	-140
1988	25.7	572	31.7	591	6 048	20
1989	25.5	643	31.1	650	5 640	8
1990	25.2	680	30.5	679	5 244	-2
1991	25.0	747	29.9	767	4 860	20
1992	24.8	810	29.3	813	4 488	3
1993	24.6	799	28.7	808	4 128	10
1994	24.3	833	28.1	840	3 768	7
1995	24.1	814	27.6	831	3 420	17
1996	23.9	834	27.0	846	3 084	12
1997	23.7	791	26.5	794	2 760	3
1998	23.5	794	25.9	805	2 448	11
1999	23.3	795	25.4	787	2 136	-8
2000	22.8	759	24.9	753	2 088	-6
2001	22.4	744	24.4	740	2 040	-4
2002	21.9	725	23.9	724	1 992	-2
2003	21.5	705	23.4	716	1 956	11
2004	21.1	689	23.0	702	1 908	13
2005	20.7	662	22.5	675	1 860	13
2006	20.2	628	22.1	641	1 824	13
2007	19.8	607	21.6	610	1 788	4
2008	19.4	576	21.2	580	1 752	4
2009	19.1	547	20.8	560	1 716	13
2010	18.7	520	20.4	532	1 668	13
2011	18.3	493	19.9	506	1 632	12
2012	18.0	468	19.5	480	1 596	12
2013	17.6	445	19.2	457	1 560	12
2014	17.2	422	18.8	434	1 524	12
2015	16.9	406	18.4	412	1 488	6
2016	16.6	385	18.0	391	1 452	6
2017	16.2	366	17.7	378	1 428	12
2018	15.9	347	17.3	353	1 392	6
2019	15.6	329	17.0	341	1 368	11
2020	15.3	312	16.6	323	1 332	11
	<u>767.3</u>	<u>22 778</u>	<u>862.7</u>	<u>22 115</u>	<u>95 411</u>	<u>-663</u>

1. All Post Waterflood Expansion production has old royalty and mineral tax status.

DALY UNIT #3 PRODUCTION PLOT SUMMARY

FIGURE 1

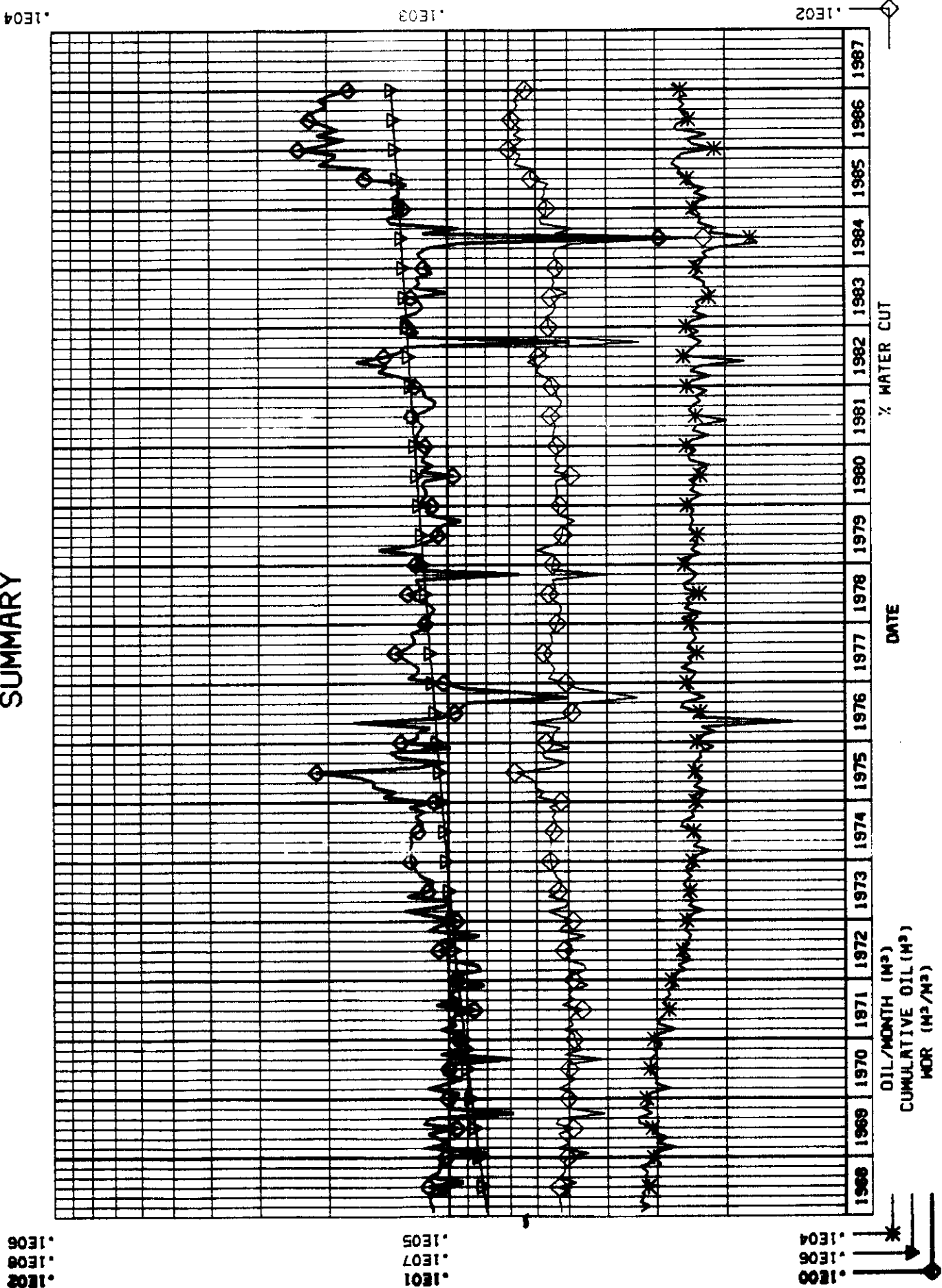
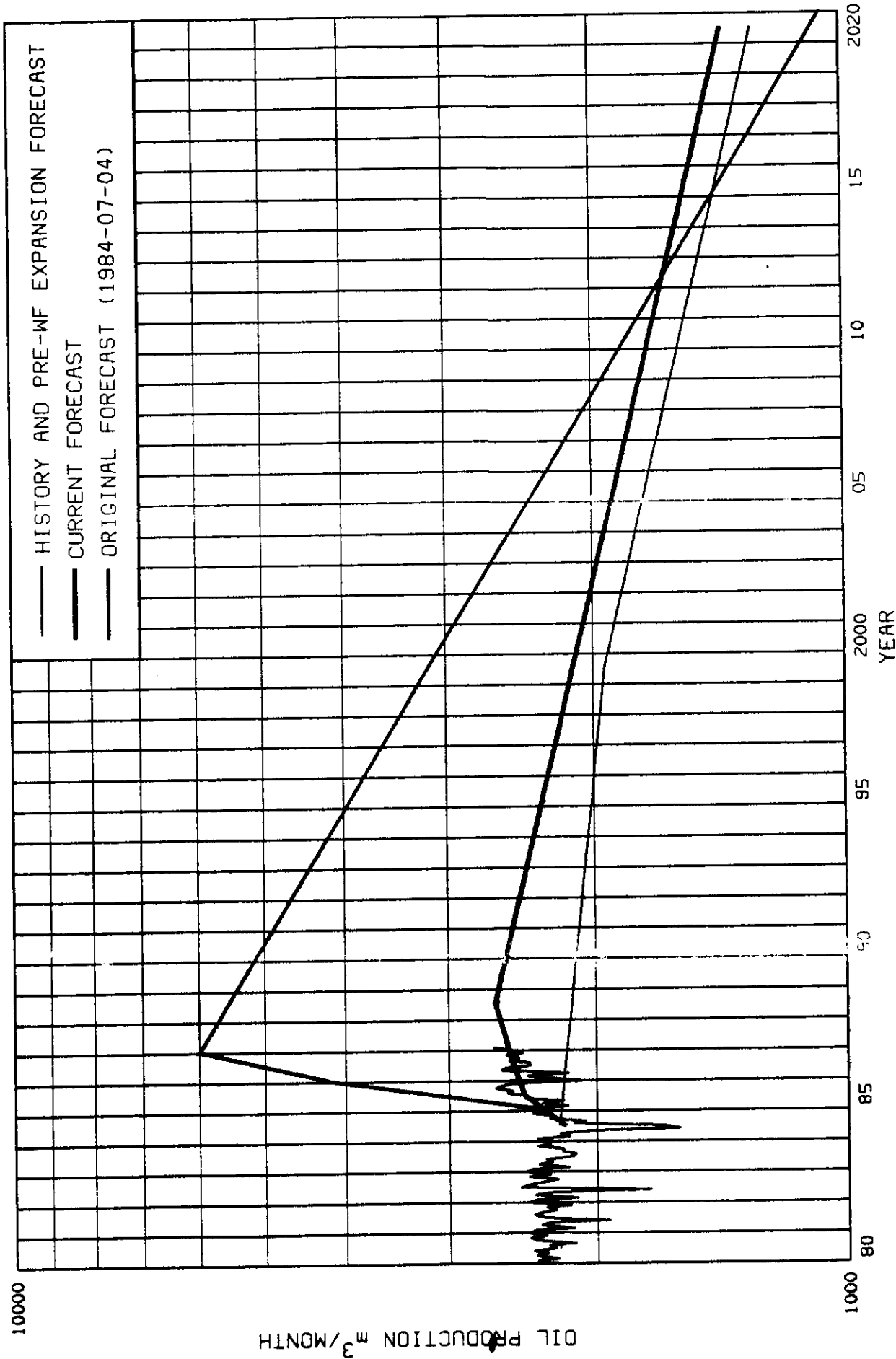


FIGURE 2

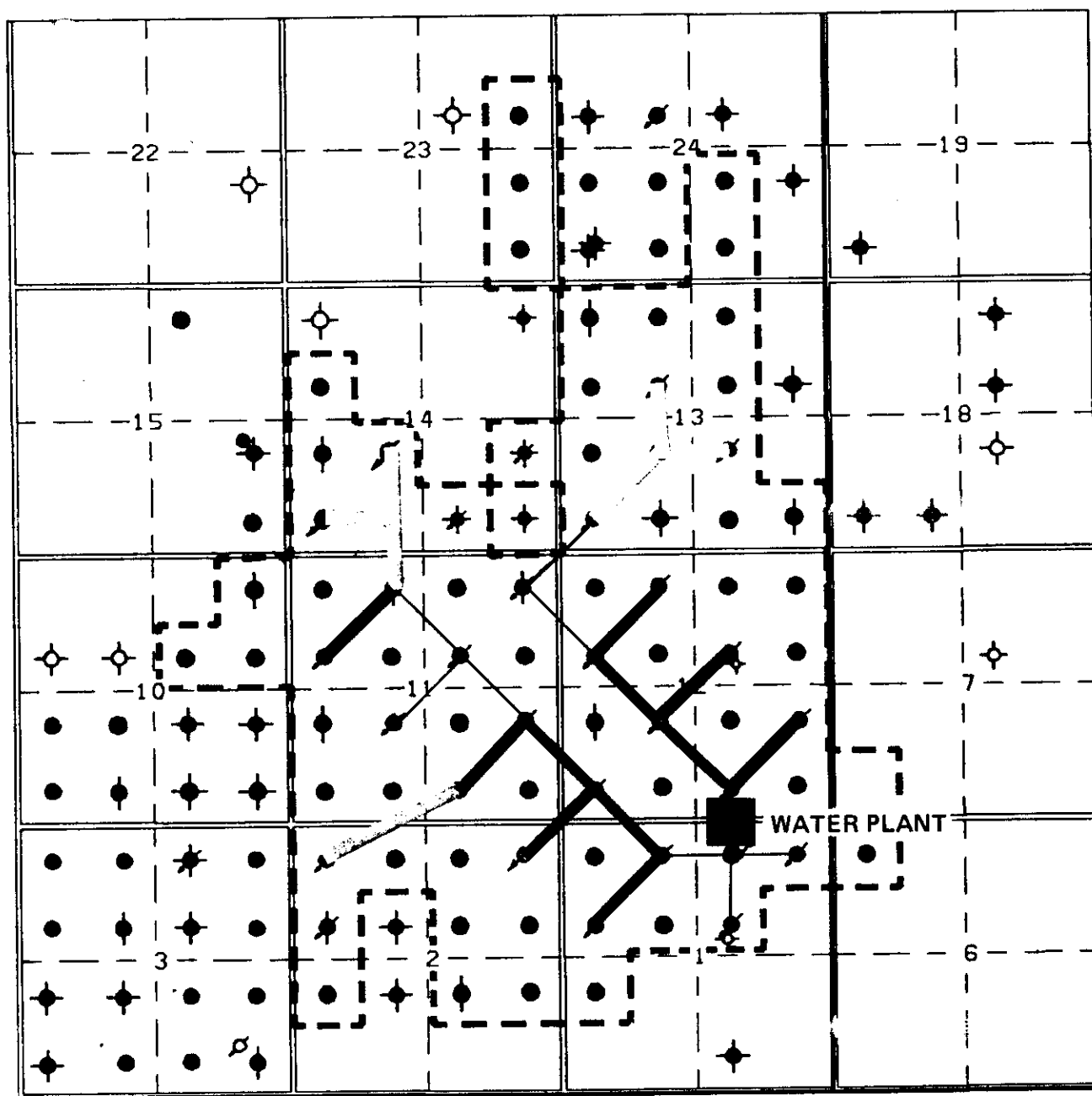
DAILY UNIT NO. 3
OIL PRODUCTION HISTORY AND FORECASTS

87-04-02



R.28

R.27W1M



T.10

FIGURE 3

DALY UNIT NO. 3 WATERFLOOD EXPANSION

NEW PIPELINES

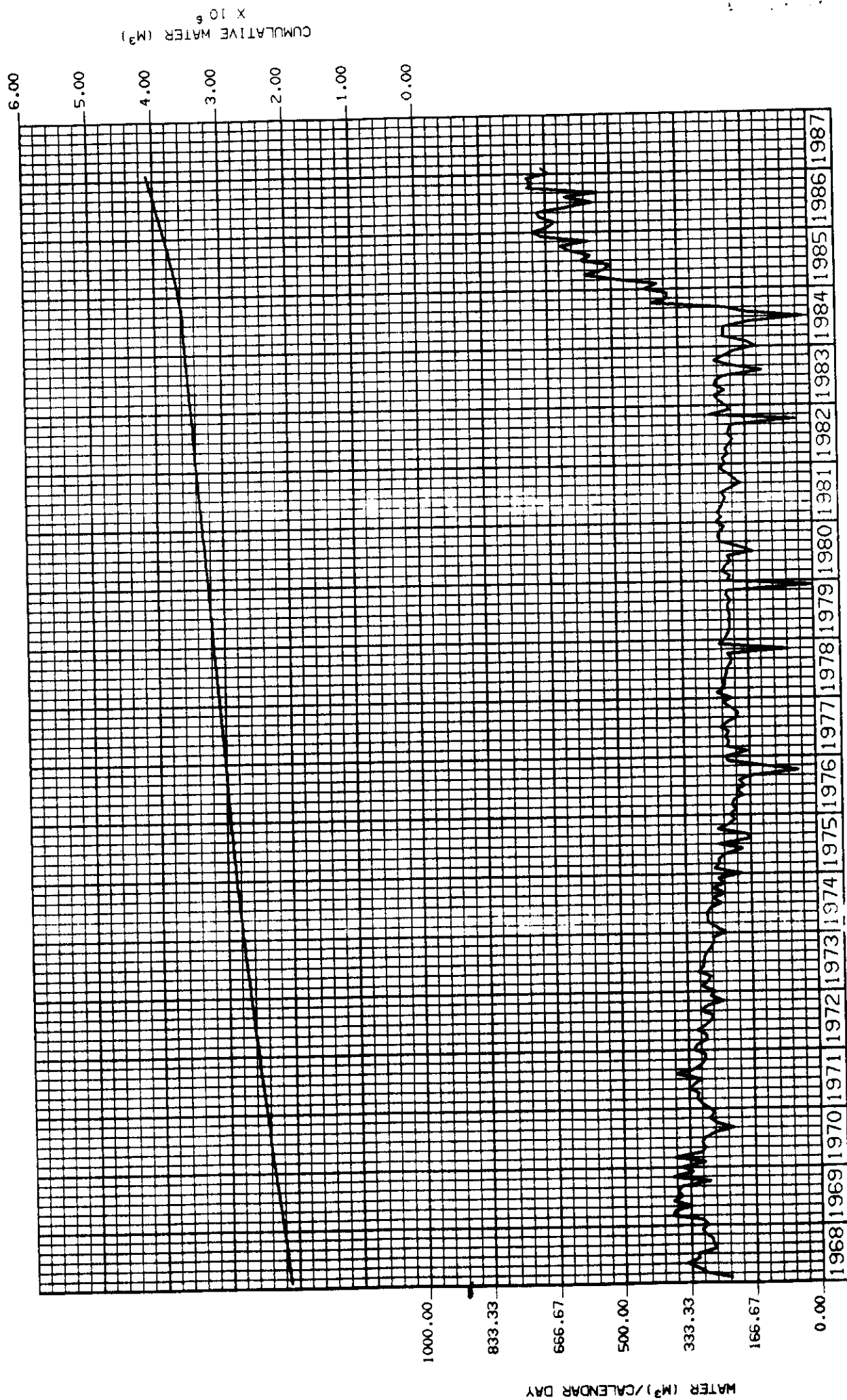
LEGEND

REPLACEMENT PIPELINES

- OILWELL
- ◆ SUSPENDED OILWELL
- ◆ INJECTION WELL
- ◆ ABANDONED OILWELL

FIGURE 4

DALY UNIT NO.3
INJECTION PLOT
SUMMARY



DATE

FIGURE 5

DAILY UNIT NO.3
INJECTION PLOT
16-01-010-28W1

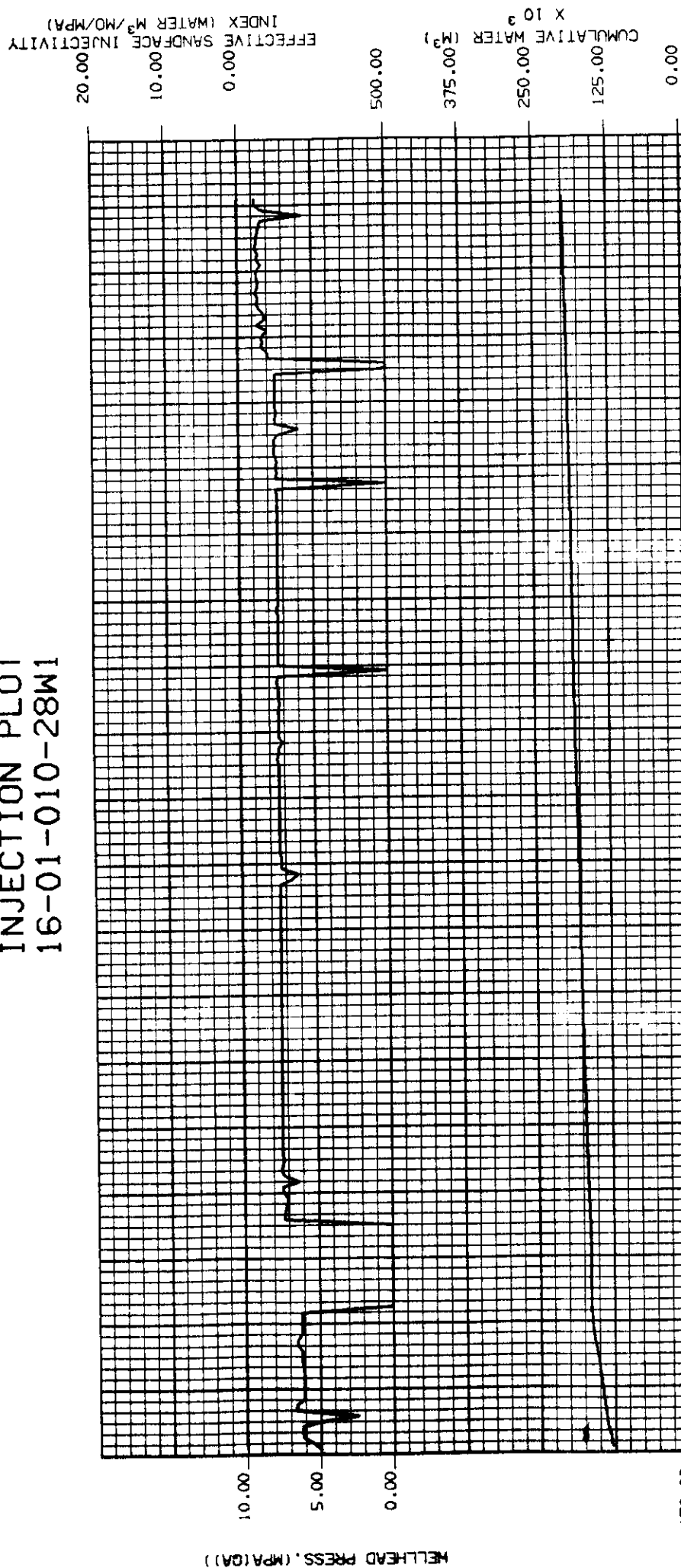


FIGURE 6

DALY UNIT NO.3
INJECTION PLOT
13-02-010-28W1

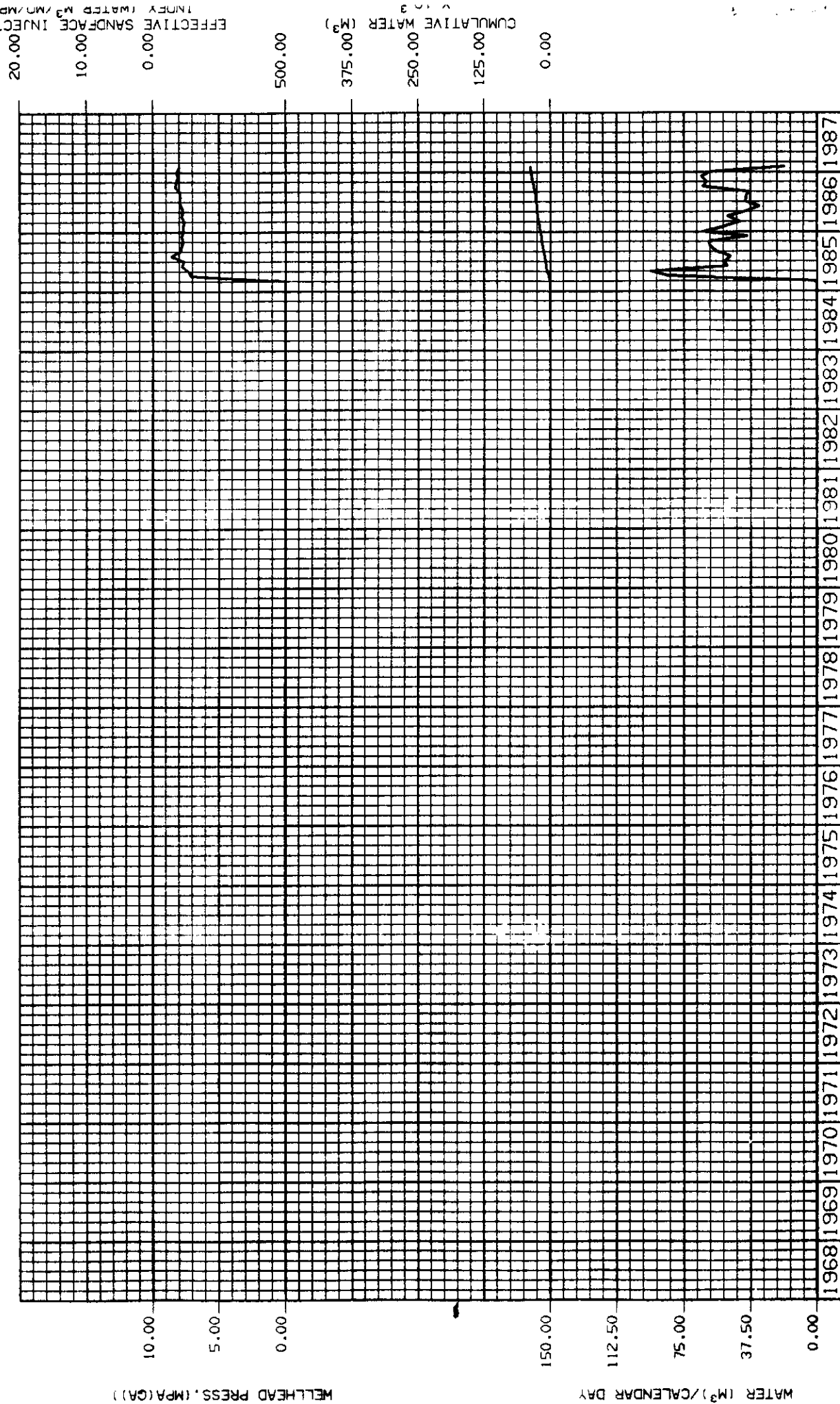


FIGURE 7

DALY UNIT NO.3
INJECTION PLOT
06-11-010-28W1

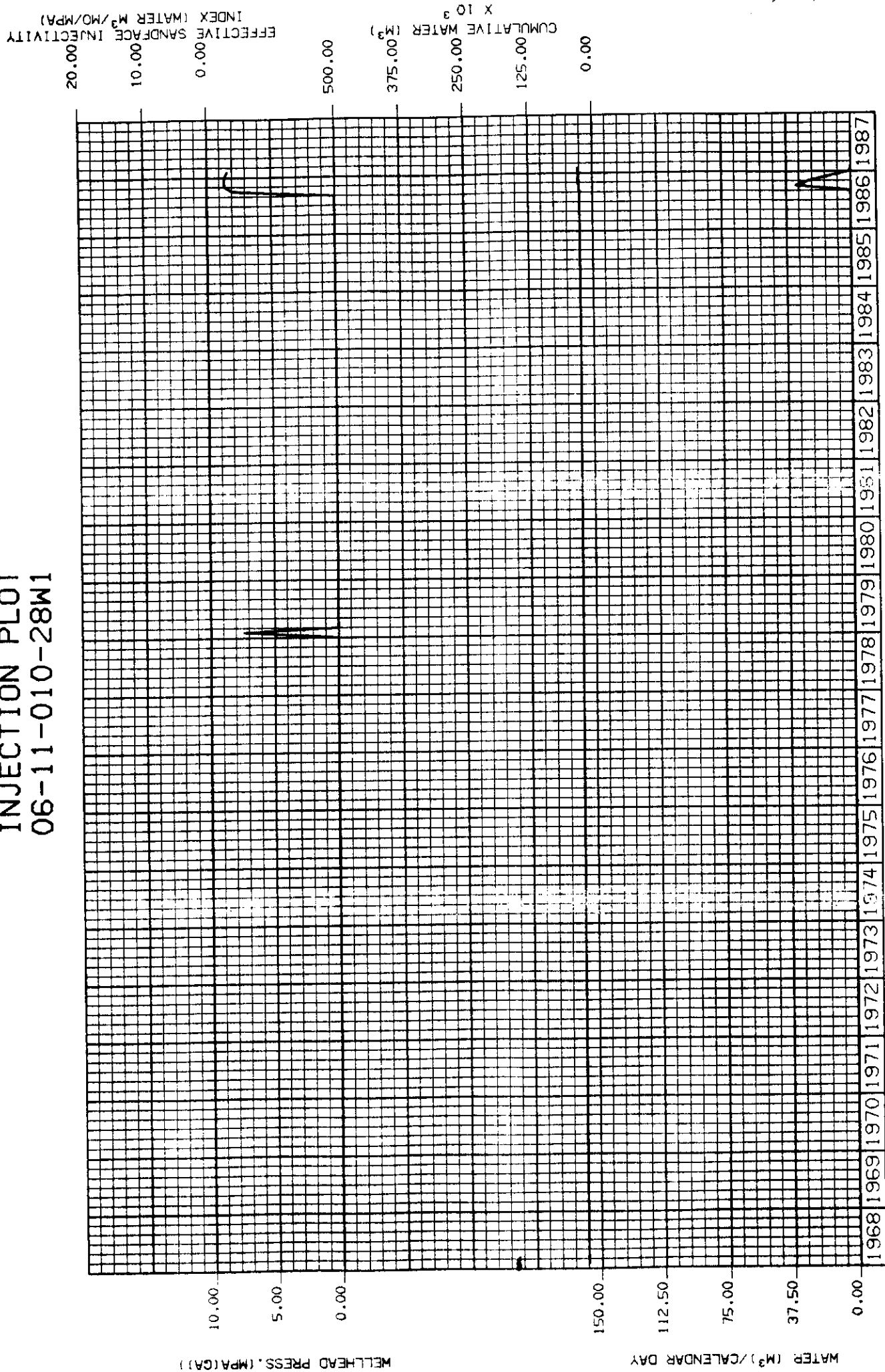


FIGURE 8

DALY UNIT NO.3
INJECTION PLOT
08-11-010-28W1

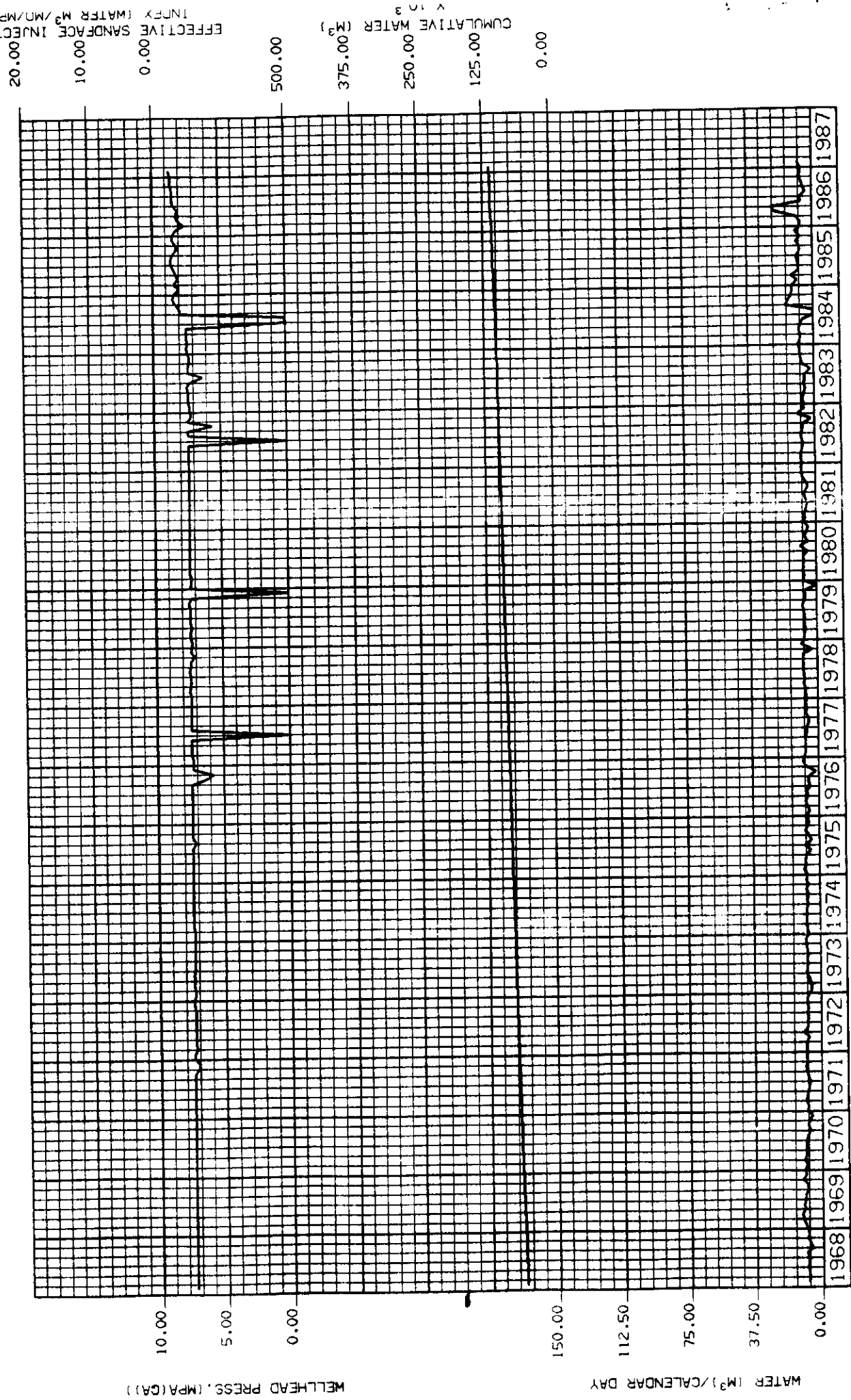


FIGURE 9

DALY UNIT NO.3
INJECTION PLOT
12-11-010-28W1

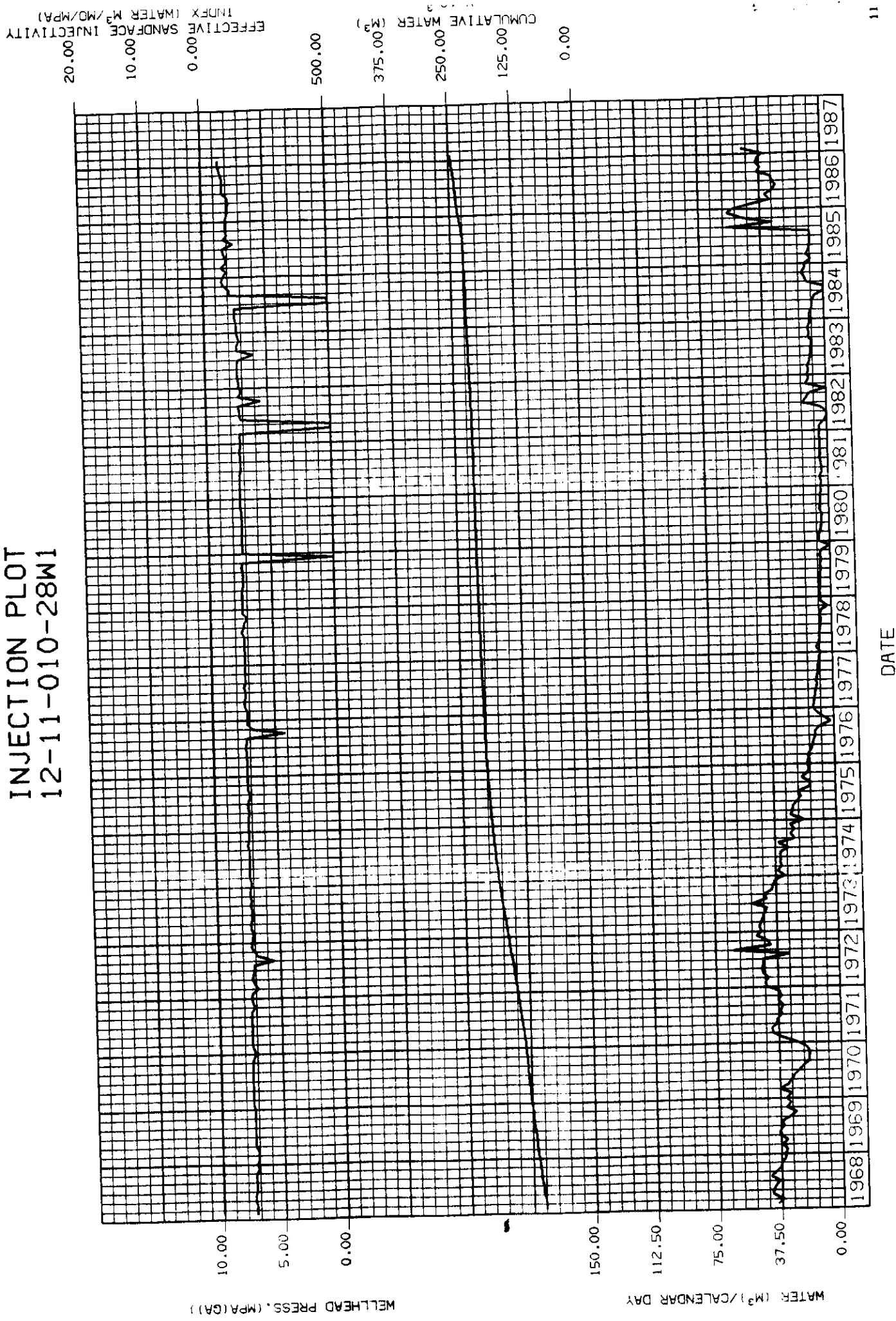


FIGURE 10

DALY UNIT NO.3
INJECTION PLOT
04-12-010-28W1



FIGURE 11

DALY UNIT NO.3
INJECTION PLOT
06-12-010-28W1



DALY UNIT NO.3
INJECTION PLOT
12-12-010-28W1

FIGURE 12

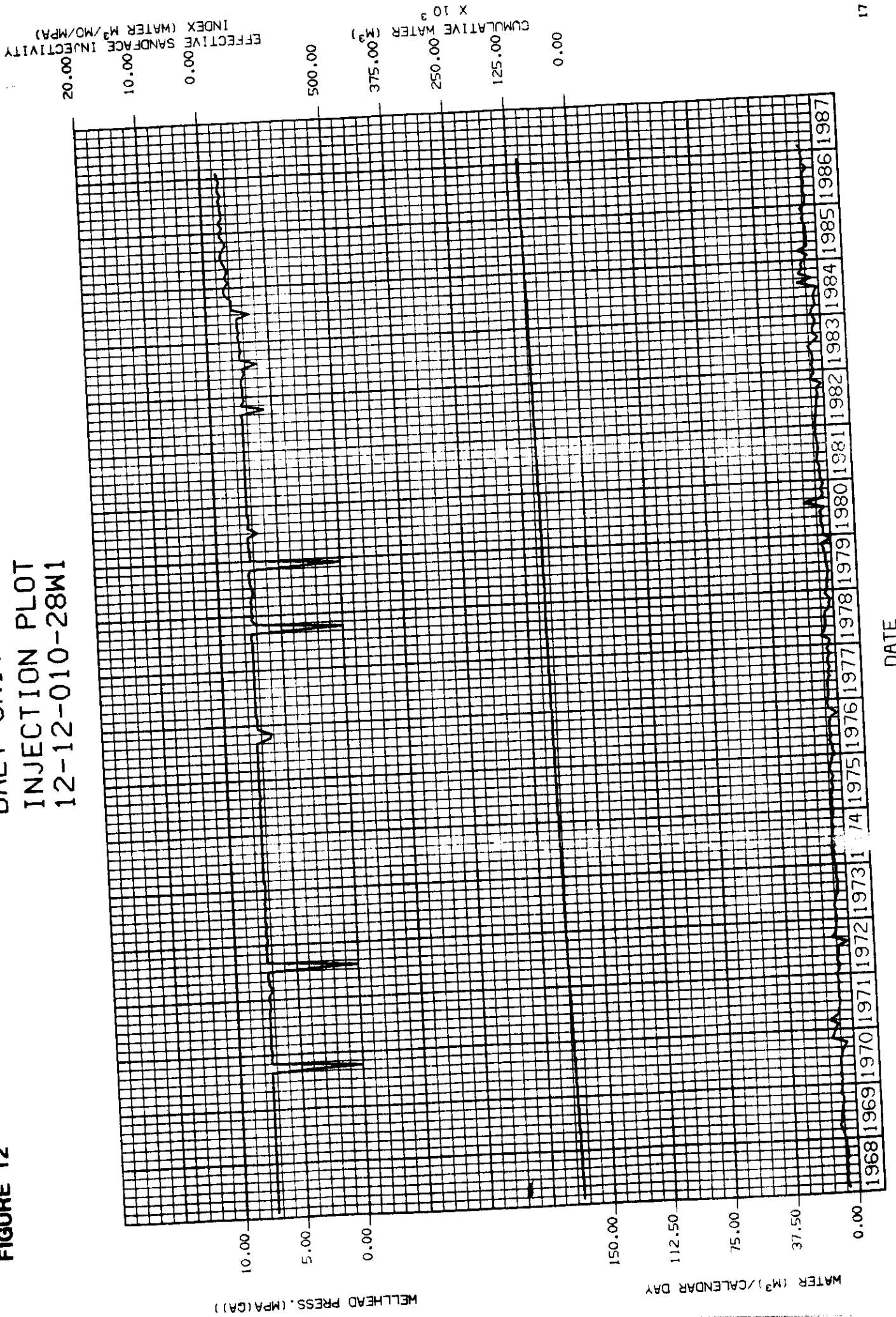
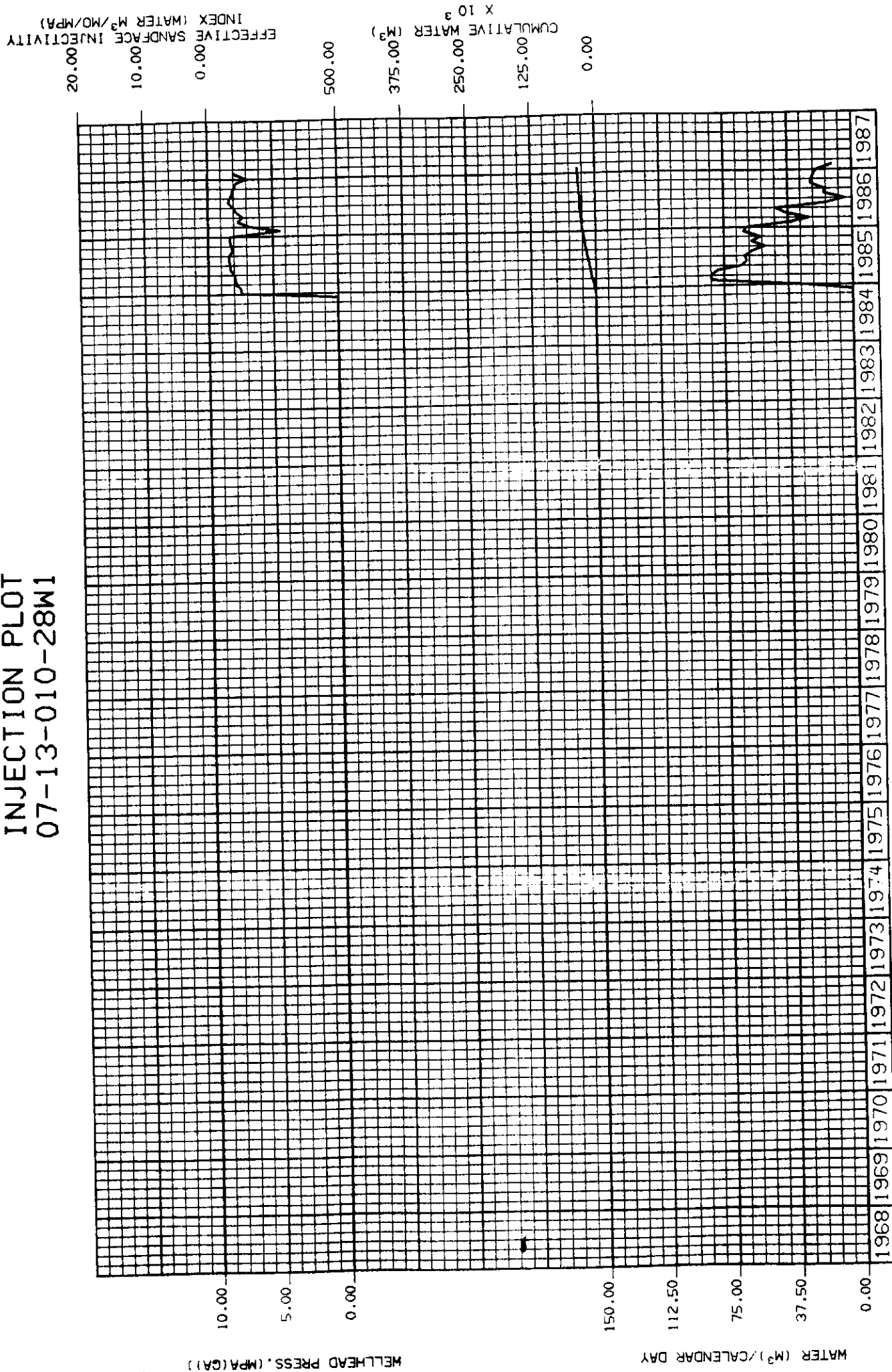


FIGURE 13

DALY UNIT NO.3
INJECTION PLOT
07-13-010-28W1



DALY UNIT NO.3
INJECTION PLOT
11-13-010-28W1

FIGURE 14

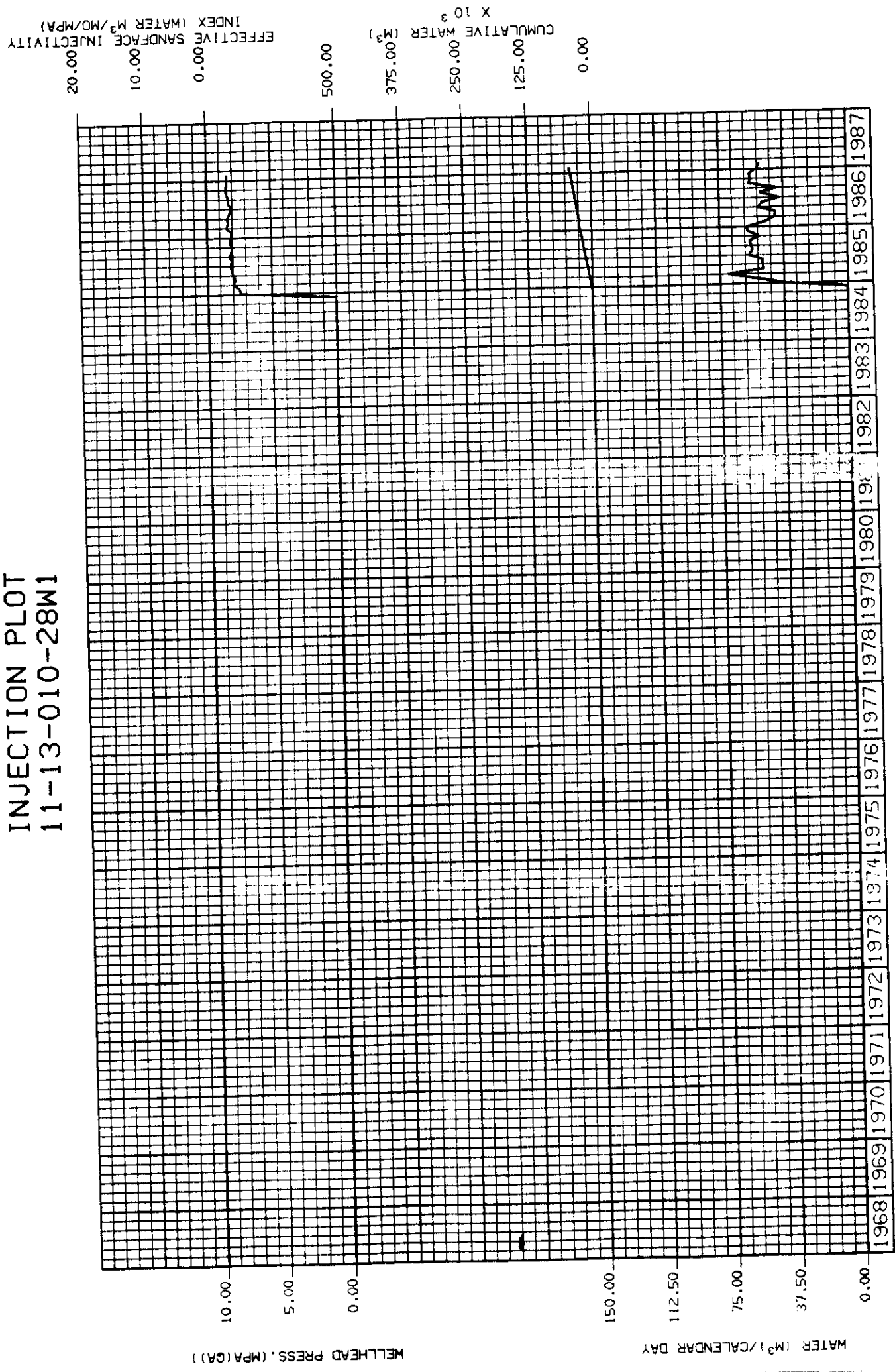
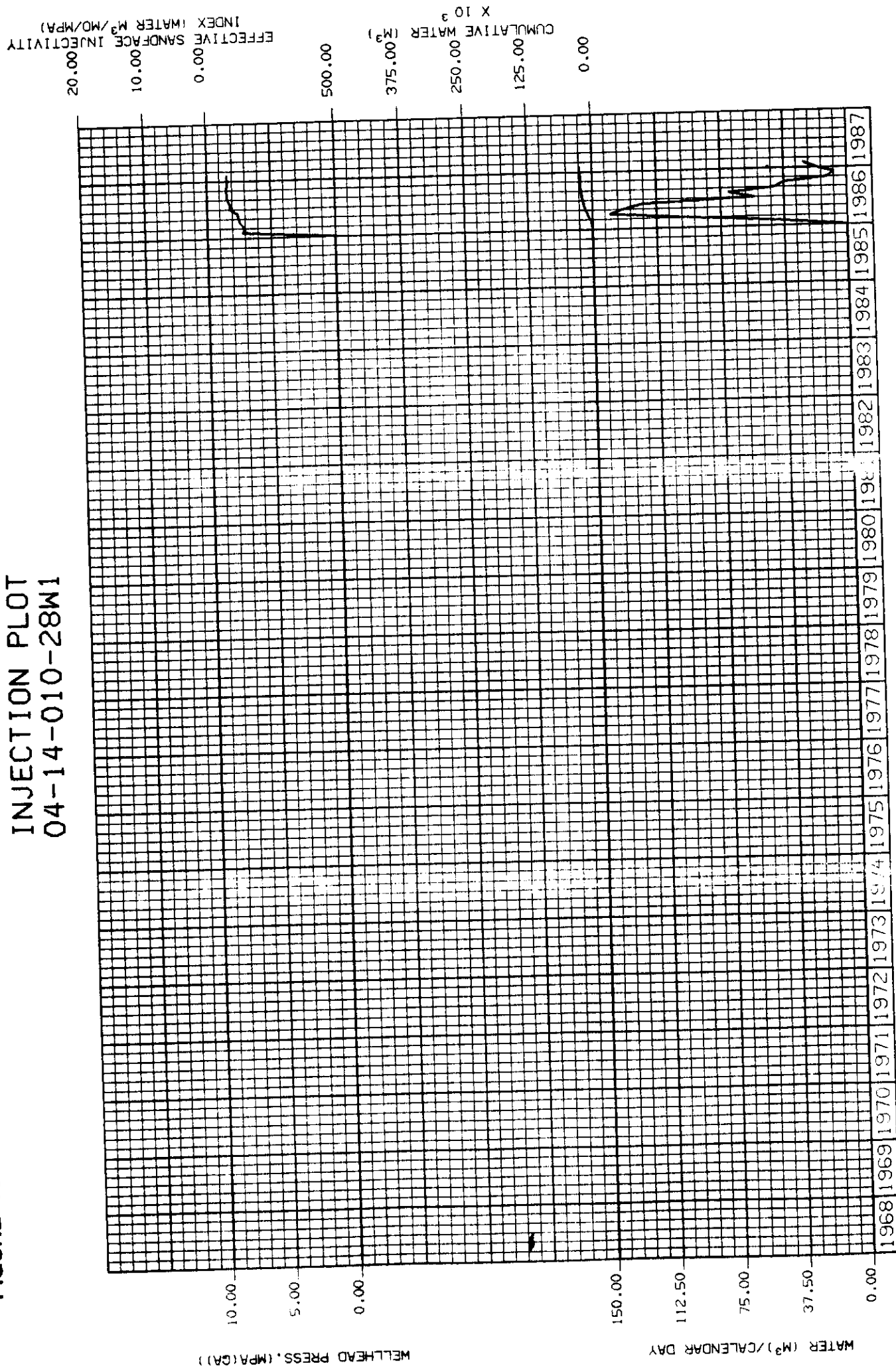


FIGURE 15

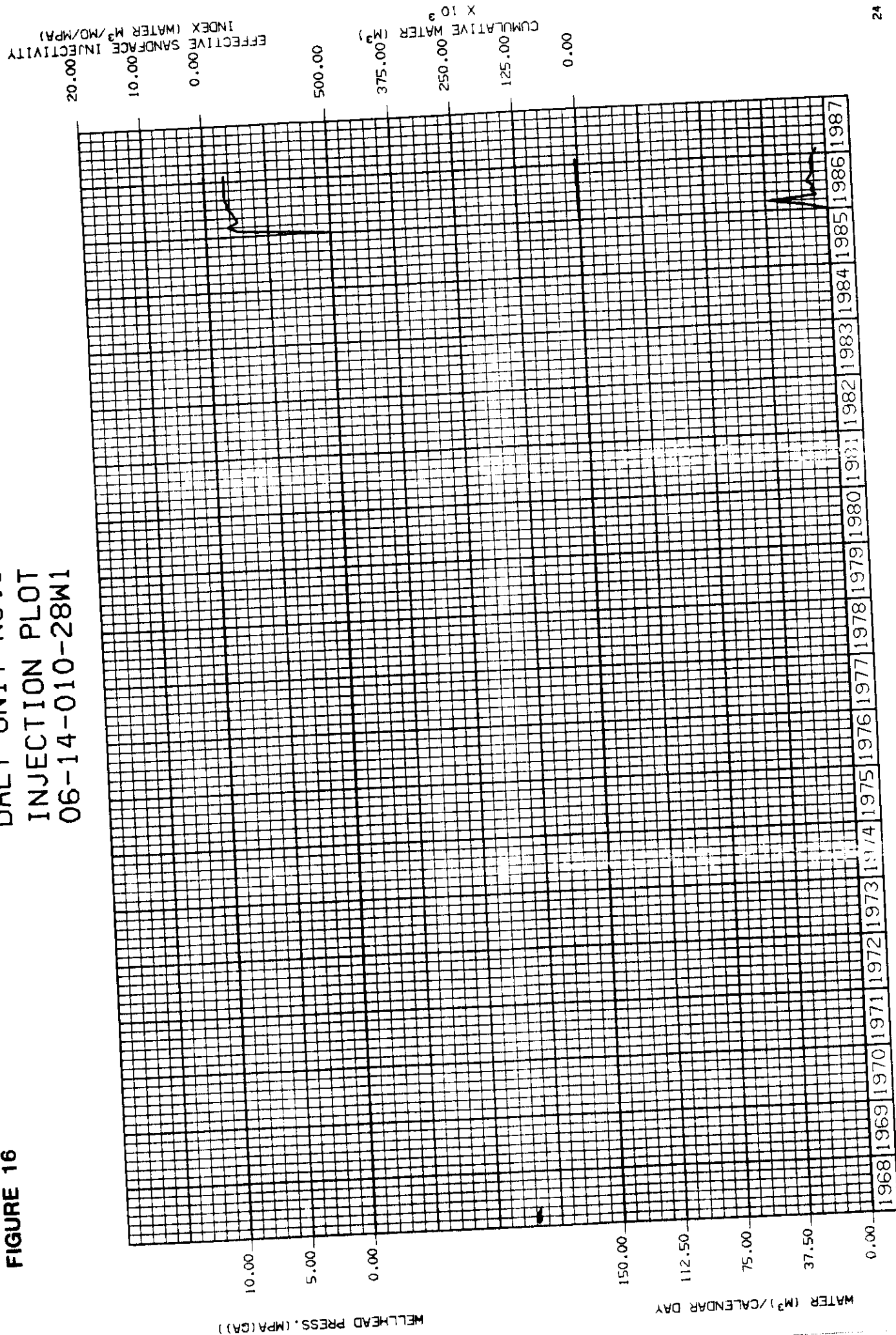
DALY UNIT NO.3
INJECTION PLOT
04-14-010-28W1



DATE

FIGURE 16

DALY UNIT NO.3
INJECTION PLOT
06-14-010-28W1



$$y = 76.2 e^{-0.01t}$$

$t = \text{time in years from 1-1-84}$

<u>Date</u>	<u>Base (m³/d)</u>	<u>Base (m³/mon)</u>	<u>t months</u>
Jan 88	73.151	2267.7	49
Feb 88	73.090	2119.6	50
Mar 88	73.029	2263.9	51
Apr 88	72.969	2189.1	52
May 88	72.908	2260.1	53
June 88	72.847	2185.4	54
July 88	72.768	2255.4	55
Aug 88	72.726	2254.5	56
Sept 88	72.665	2179.9	57
Oct 88	72.605	2250.7	58
Nov 88	72.544	2176.3	59
Dec 88	72.484	2247.0	60
Jan 89	72.423	2245.1	61
Feb 89	72.363	2026.2	62
Mar 89	72.303	2241.4	63
Apr 89	72.242	2167.3	64
May 89	72.182	2237.7	65
June 89	72.122	2163.7	66
July 89	72.062	2233.9	67
Aug 89	72.002	2232.1	68
Sept 89	71.942	2158.3	69
Oct 89	71.882	2228.3	70
Nov 89	71.822	2154.7	71
Dec 89	71.762	2224.6	72

CHEVRON PREDICTED PROD 198701 - 198806

Jan '80	87	84.128	2608.0	1
Feb	87	84.287	2360.0	2
Mar	87	84.446	2617.8	3
Apr	87	84.605	2538.1	4
May	87	84.764	2627.7	5
June	87	84.924	2547.7	6
July	87	85.084	2637.6	7
Aug	87	85.245	2642.6	8
Sept	87	85.405	2562.2	9
Oct	87	85.566	2652.6	10
Nov	87	85.728	2571.8	11
Dec	87	85.889	2662.6	12
Jan	88	86.051	2667.6	13
Feb	88	86.213	2500.2	14
Mar	88	86.376	2677.7	15
Apr	88	86.539	2596.2	16
May	88	86.702	2687.8	17
June	88	86.865	2606.0	18

$$y = 87.93 e^{0.0226t}$$

CHEVRON PREDICTED PRODUCTION JULY 88 - JUNE 89

July	88	86.723	2688.4	1
Aug	88	86.580	2684.0	2
Sept	88	86.438	2593.1	3
Oct	88	86.296	2675.2	4
Nov	88	86.155	2584.6	5
Dec	88	86.014	2666.4	6
Jan	89	85.872	2662.0	7
Feb	89	85.732	2400.5	8
Mar	89	85.591	2653.3	9
Apr	89	85.451	2563.5	10
May	89	85.310	2644.6	11
June	89	85.171	2555.1	12

1988 = 31627.2

$$y = 86.87 e^{-0.0197t}$$

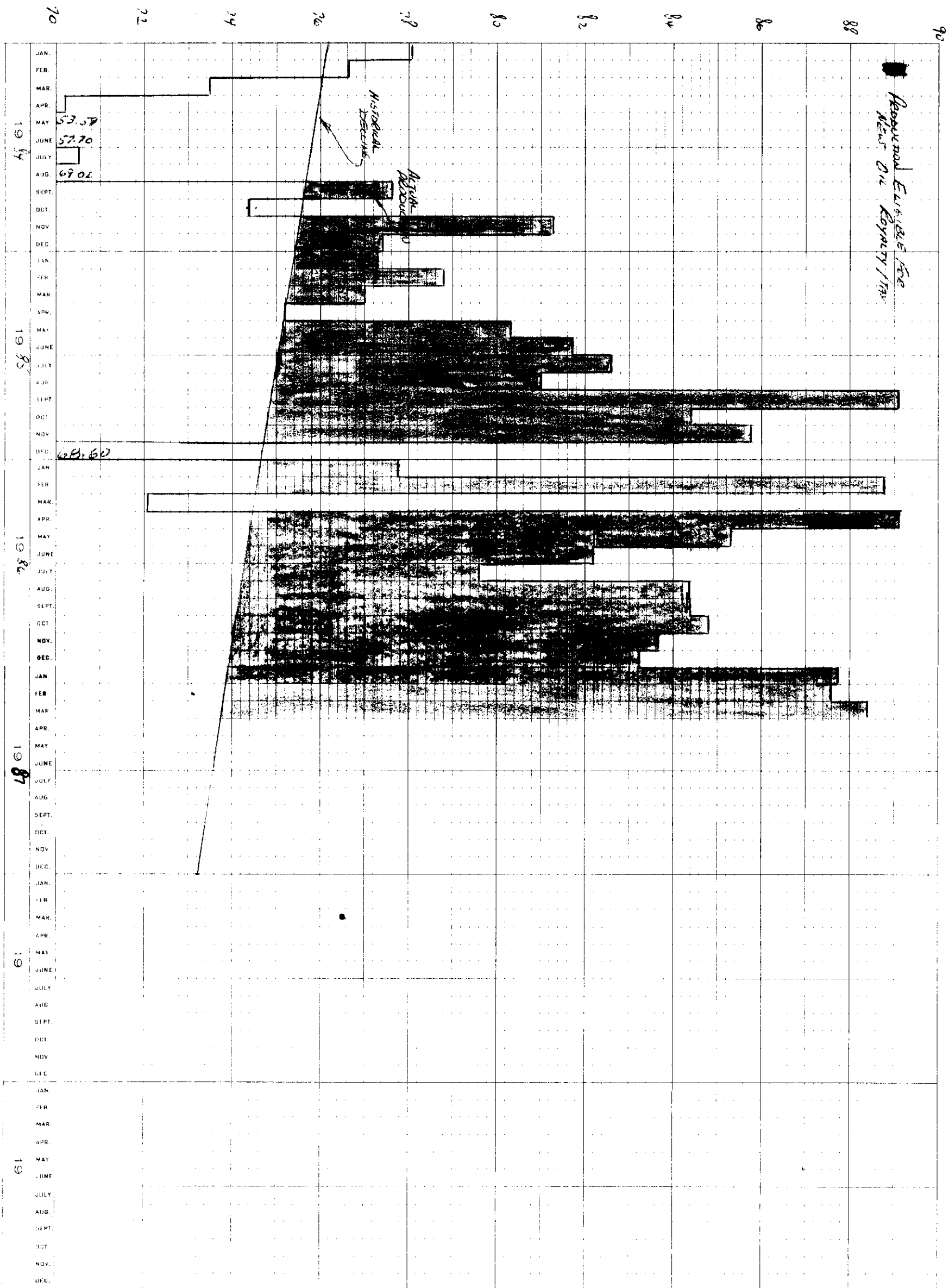
HP 67 program to calculate base rate

FLBI A
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 FLBI 1
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input months since 1-1-84
 daily rate displayed A
 for monthly rate hit ~~E~~
 B - 28 days
 C - 29 days
 D - 30 days
 E - 31 days

OIL RATE (M³/CUB DAY)

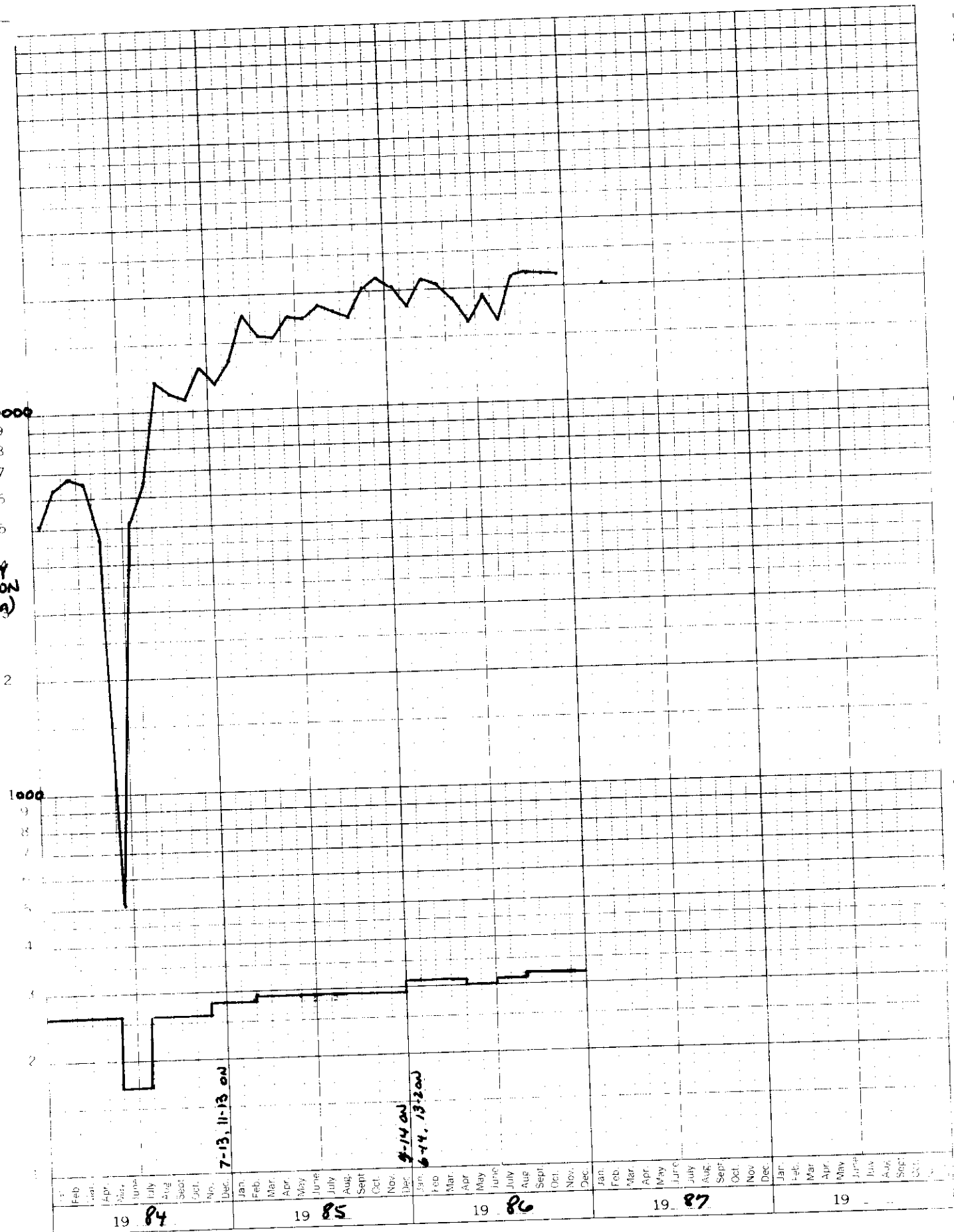


DAY UNIT No. 3
WATERFLOOD EXPANSION
OIL RATE (M³/D)

DALY UNIT NO. 3 INJECTION

46 5690
MONTHLY
INJECTION
(m3/mo)

WELL NO. 3
WELLS: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100



DAILY UNIT No. 3 WELL TEST DATA

016

INITIAL TEST

WELL

DATE	O	W	DATE	O	W	DATE	O	W	DATE	O	W
5-1-10-28	09 84	0.7	-	11 85	0.7	0.3	09 86	0.6	0.2		
11-1-10-28	SHUT IN		05 85	0.5	-	11 85	0.3	-	05 86	0.8	-
13-1-10-28	05 83	4.3	0.1	05 85	4.1	0.2	11 85	4.6	0.9	05 86	6.2
15-1-10-28	06 84	3.5	0.9	09 85	6.3	3.3	05 86	3.3	1.3		
5-2-10-28	07 84	0.8	0.4								
8-2-10-28	06 84	1.9	-	11 85	2.7	-	09 86	1.7		10 86	2.5
9-2-10-28	09 84	1.6	-								
10-2-10-28	09 84	0.2	0.8	03 85	0.8	0.2	09 86	0.7	0.3		
14-2-10-28	07 84	2.9	0.2	09 86	3.1	0.6					
15-2-10-28	09 84	1.2	-	07 85	1.2	-	09 86	1.0	0.2		
13-6-10-27	02 84	0.9	0.7	10 86	0.5	0.8					
4-7-10-27	-	-	-	03 85	1.3	0.6	06 86	1.4	0.6		
9-10-10-28	05 84	1.7	0.1	11 85	1.6	0.3	06 86	1.8	0.9		
10-10-10-28	05 84	1.4	-	07 85	1.3	0.1	06 86	1.0	-		
1-11-10-28	04 84	3.4	0.5	03 85	3.7	2.1	08 85	4.0	3.1	05 86	4.0
3-11-10-28	09 84	1.0	-	03 85	1.0	-	05 86	1.4	-		
4-11-10-28	09 84	1.9	-	03 85	2.1	-	05 86	2.4	-		
7-11-10-28	02 84	1.7	-	08 85	1.8	-					
9-11-10-28	04 84	1.4	-	07 85	3.4	-	05 86	3.5	-		
11-11-10-28	02 84	1.0	0.9	04 85	0.8	-	10 86	0.9	2.6		
13-11-10-28	03 84	1.6	0.1	04 85	2.6	0.7	05 86	2.6	1.7		
15-11-10-28	05 84	2.0	-	10 86	2.2	0.1					
1-12-10-28	07 84	2.5	-	06 86	3.1	0.1					
3-12-10-28	05 84	3.7	4.3	03 85	1.5	8.1	05 86	5.3	2.4	10 86	2.4
5-12-10-28	08 84	3.4	2.1	06 85	3.4	2.1	09 86	6.0	4.1		
7-12-10-28	07 84	3.2	-	10 86	2.8	0.2					
9-12-10-28	10 84	1.0	0.6	11 85	0.7	0.6	06 86	0.6	0.8		
11-12-10-28	08 84	3.7	0.2	06 86	4.0	0.2	02 87	4.5	0.2		
13-12-10-28	08 84	1.9	0.1	06 86	1.9	-					
15-12-10-28	06 84	2.3	4.9	09 85	3.7	5.1	06 86	5.2	4.0		
16-12-10-28	06 84	1.4	-	09 85	1.0	0.6	06 86	1.2	0.4		
2-13-10-28	08 84	4.9	-	05 85	3.5	-	07 86	3.9			
5-13-10-28	07 84	0.9	-	04 85	0.8	0.2	11 85	2.9	0.6		
6-13-10-28	07 84	6.6	1.7	04 85	3.9	0.9	07 86	5.6	1.2		
10-13-10-28	08 84	3.9	-	11 85	5.5	-	11 86	5.6	0.4		
12-13-10-28	08 84	1.1	5.6	07 85	4.3	4.7	10 86	2.3	6.8		
14-13-10-28	09 84	0.8	2.4	07 85	0.8	2.2	11 86	0.9	2.3		
15-13-10-28	09 84	0.5	2.0	06 85	0.5	2.0	11 85	0.3	2.5		
3-14-10-28	02 84	2.8	-	06 86	2.5	1.1					
5-14-10-28	08 84	0.1	2.7	10 86	0.1	8.0					
12-14-10-28	04 84	1.2	-	06 86	1.0	-					
1-23-10-28	08 84	0.9	14.4	07 85	1.2	14.0	09 86	0.6	14.1		
6-23-10-28	-	-	-	07 85	1.3	5.7	09 86	0.8	4.8		
7-23-10-28	05 84	1.2	33.5	07 85	2.5	59.5	09 86	2.0	97.3		

OIL RATE INCREASE	10 %	min	0.3 m ² /d
		"	0.5
OVER BASE	20 %	"	0.9
	30 %	"	0.3
OIL RATE DECREASE	10 %	min	0.3

W	DATE	O	W	DATE	O	W	DATE	O	W
0.2									
-	05 86	0.8	-						
0.9	05 86	6.2	0.8						
1.3									
	10 86	2.5	0.2						

0.3

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63

33

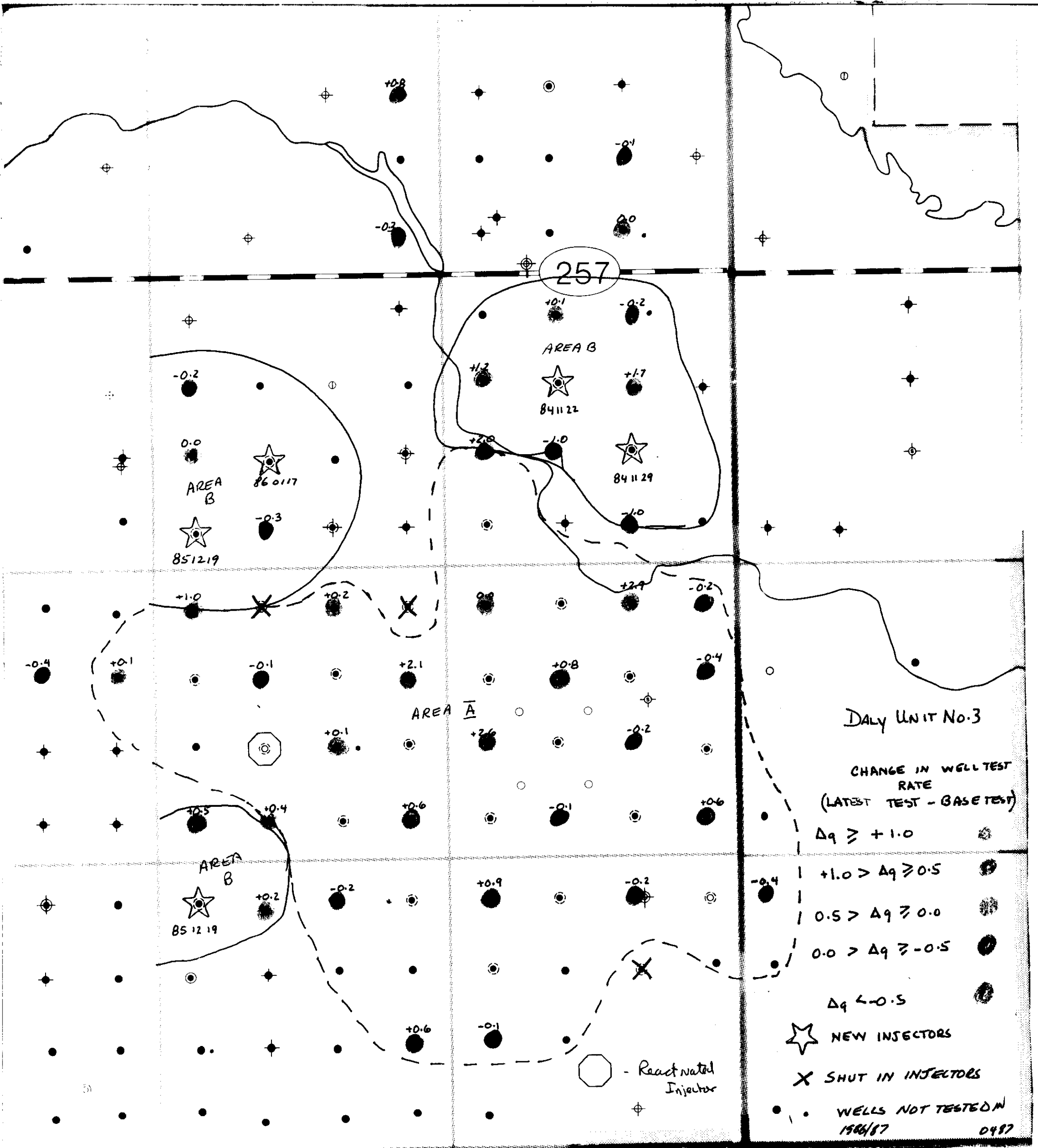
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97.

Well	INITIAL TEST			DATE	O	W	DATE	O	W
	DATE	O	W						
2-24-10-28	09 84	1.1	0.4	06 85	1.1	0.4			
7-24-10-28	09 84	0.6	0.3	06 85	0.6	0.3	10 86	0.5	0.3



Daily Unit No. 3
Ratio of Inc. Prod due to accel
Inc. Prod due to New inf.

* BASE RATES ARE
 FIRST 8 mos of 84
 DEDUDED AT 1%
 PER YEAR

Month	I (HIGHER I.P.)			II (NEW INF.)			III (COMB OF I & II) BASE *	IV			TOTAL ACCEL.	TOTAL NEW	ACCEL NEW
	BASE *	ACT	INC	BASE *	ACT	INC		BASE	INC	1/2			
Sept 84	40.8	43.7	2.9	13.7 13.6	13.3	-0.4	9.6	15.1	5.5	2.75	5.65	2.35	2.40
Oct 84	40.8	41.0	0.2	13.7	13.4	-0.3	9.6	14.7	5.1	2.55	2.75	2.25	1.22
Nov 84	40.7	45.8	5.1	13.7	14.2	0.5	9.6	15.7	6.1	3.05	8.15	3.55	2.30
Dec 84	40.7	43.5	2.8	13.7	13.5	-0.2	9.6	14.9	5.3	2.65	5.45	2.45	2.22
Jan 85	40.7	43.7	3.0	13.7	13.5	-0.2	9.6	14.8	5.2	2.60	5.60	2.40	2.33
Feb 85	40.6	44.1	3.5	13.6	13.7	0.1	9.6	15.4	5.8	2.90	6.40	3.00	2.13
Mar 85	40.6	43.0	2.4	13.6	13.6	-	9.6	15.2	5.6	2.80	5.20	2.80	1.86
Apr 85	40.6	42.3	1.7	13.6	13.8	0.2	9.6	13.9	4.3	2.15	3.85	2.35	1.64
May 85	40.5	47.6 46.7	7.1	13.6	14.1	1.2	9.5	13.7	4.2	2.10	4.20	3.30	2.79
June 85	40.5	48.2	7.7	13.6	14.6	1.0	9.5	13.3	3.8	1.90	9.60	2.90	3.31
July 85	40.5	46.9	6.4	13.6	16.9	3.3	9.5	13.0	3.5	1.75	8.15	5.05	1.61
Aug 85	40.4	46.5	6.1	13.6 13.5	17.0	3.4	9.5	12.1	2.6	1.30	7.40	4.70	1.57
Sept 85	40.4	51.4	11.0	13.5 13.5	17.5	4.0	9.5	13.2	3.7	1.85	12.85	5.85	2.20
Oct 85	40.4	47.8	7.4	13.5	16.9	3.4	9.5	12.9	3.4	1.70	9.10	5.10	1.78
Nov 85	40.3	46.9	6.6	13.5	17.8	4.3	9.5	14.4	4.9	2.45	9.05	6.75	1.34
Dec 85	40.3	40.4	0.1	13.5	13.1	-0.4	9.5	8.0	(1.5) (-75)		-0.65	-1.15	-
Jan 86	40.3	44.3	4.0	13.5	14.7	1.2	9.5	12.2	2.7	8.135	5.35	2.55	2.10
Feb 86	40.2	48.8	8.6	13.5	18.7	5.2	9.4	15.0	5.6	8.80	11.40	8.00	1.43
Mar 86	40.2	40.7	0.5	13.5	14.1	0.6	9.4	9.4	-		0.50	0.60	0.83
Apr 86	40.2	49.1	8.9	13.5	18.7	5.2	9.4	15.1	5.7	8.85	11.75	8.05	1.46
May 86	40.1	46.9	6.8	13.4	18.1	4.7	9.4	14.8	5.4	8.270	9.50	7.40	1.28
June 86	40.1	46.5	6.4	13.4	16.3	2.9	9.4	14.6	5.2	8.260	9.00	5.50	1.64
July 86	40.1	44.3	4.2	13.4	15.4	2.0	9.4	15.0	5.6	8.260	7.00	4.80	1.46
Aug 86	40.0	46.6	6.6	13.4	16.6	3.2	9.4	16.1	6.7	8.335	9.95	6.55	1.52
Sept 86	40.0	48.8	8.8	13.4 13.4	16.4	3.0	9.4	15.5	6.1	8.305	11.85	6.05	1.96
Oct 86	40.0	49.6	9.6	13.4	15.4	2.0	9.4	15.7	6.3	8.315	9.75	5.15	1.89
Nov 86	39.9	48.9	8.9	13.4	15.3	1.9	9.4	15.8	6.5	8.325	12.15	5.15	2.30
Dec 86	39.9	49.3	9.3	13.4	15.1	1.7	9.4	15.0	5.6	8.210	12.10	4.50	2.69

I Change entirely attributable to new injection

<u>Well</u>	<u>Δ Rate</u>
10-13	+ 1.7
12-13	+ 1.0
14-13	+ 0.1
15-13	- 0.2
12-14	- 0.2
12-14	- 0.2
3-14	- 0.3

$= + 2.3 \text{ m}^3/\text{d}$

II Change entirely attributable to increased injection pressure

5-1	- 0.1	13-12	0.0
13-1	+ 0.9	16-12	+ 2.9
15-1	- 0.2	16-12	- 0.2
8-2	+ 0.6	13-6	- 0.4
15-2	- 0.2		
1-11	+ 0.6		+ 9.60 m^3/d
7-11	+ 0.1		
9-11	+ 2.1		
11-11	- 0.1		
15-11	+ 0.2		
9-10	+ 0.1		
1-12	+ 0.6		
3-12	- 0.1		
5-12	+ 2.6		
7-12	- 0.2		
9-12	- 0.4		
11-12	+ 0.8		

III Changes attributable to either new injection or increased press.

14-2	+0.2	
3-11	+0.4	
4-11	+0.5	
13-11	+1.0	
2-13	-1.0	
5-13	+2.0	
6-13	-1.0	$\frac{2.10}{\cancel{2.10}} \text{ m}^3/\text{d}$

IV Areas effected by neither new injection or increased pressure

10-10	-0.4	
1-23	-0.3	
9-23	+0.8	
2-24	00	
7-24	-0.1	
	<hr/>	
	0-	NO CHANGE

% Due to increased injection pressure (i.e. acceleration)

$$= \frac{9.60 + (2.90 \div 2)}{9.60 + 2.90 + 2.90} = 77\%$$

% Due to ^{new} ~~increased~~ injection - (incremental reserves)

$$= 23\%$$

DALY UNIT No. 3 - Well Test DATA

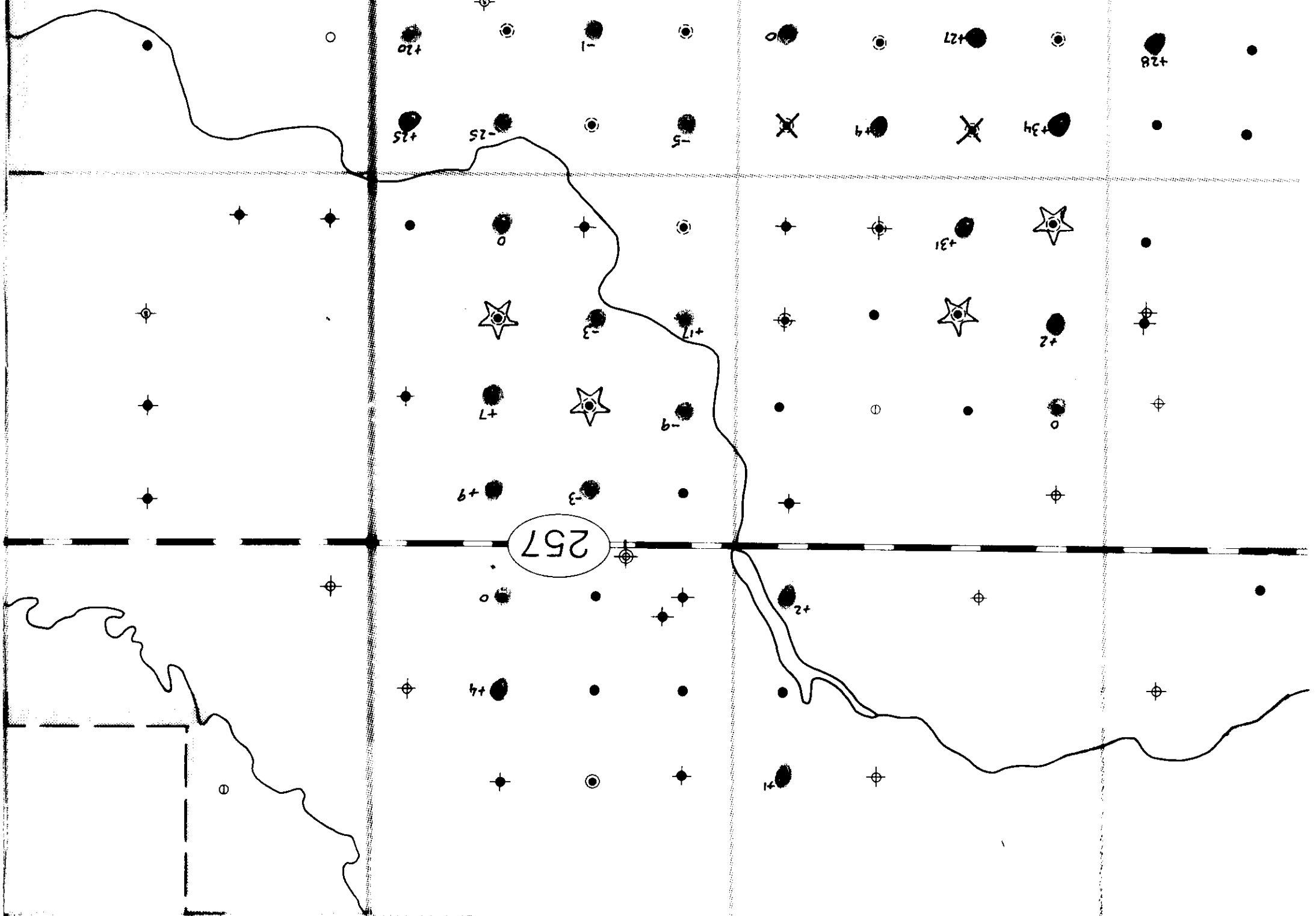
<u>Well</u>	Pre Project Test Rate		LATEST TEST RATE		Oil Rate Change (m ³ /d)	Water Cut Change (%)
	<u>O</u>	<u>W</u>	<u>O</u>	<u>W</u>		
13-6-10-27	0.9	0.7	0.5	0.8	-0.4	+18
4-7-10-27	-	-	1.4	0.6	-	-
5-1-10-28	0.7	-	0.	0.	-0.1	+25
11-1-10-28	-	-	0.8	-	-	-
13-1-10-28	4.3	0.1	5.2	0.8	+0.9	+11
15-1-10-28	3.5	0.9	3.3	1.3	-0.2	+8
5-2-10-28	0.8	0.4	-	-	-	-
8-2-10-28	1.9	-	2.5	0.2	+0.6	+7
9-2-10-28	1.6	-				
14-2-10-28	2.9	0.2	3.1	0.6	+0.2	+10
15-2-10-28	1.2	-	1.0	0.2	-0.2	+17
9-10-10-28	1.7	0.1	1.8	0.9	+0.1	+28
10-10-10-28	1.4	-	1.0	-	-0.4	-
1-11-10-28	3.4	0.5	4.0	2.9	+0.6	+29
3-11-10-28	1.0	-	1.4	-	+0.4	-
4-11-10-28	1.9	-	2.4	-	+0.5	-
7-11-10-28	1.7	-	1.8	-	+0.1	-
9-11-10-28	1.4	-	3.5	-	+2.1	-
11-11-10-28	1.0	0.9	0.9	2.6	-0.1	+27
13-11-10-28	1.6	0.1	2.6	1.7	+1.0	+34
15-11-10-28	2.0	-	2.2	0.1	+0.2	+4
1-12-10-28	2.5	-	3.1	0.1	+0.6	+3
3-12-10-28	3.7	4.3	3.6	10.7	-0.1	+21
5-12-10-28	3.4	2.1	6.0	4.1	+2.6	+2
7-12-10-28	3.2	-	2.8	0.2	-0.2	+7

9-12-10-28	1.0	0.6	0.6	0.8	-0.4	+20
11-12-10-28	3.7	0.2	4.5	0.2	+0.8	-1
13-12-10-28	1.9	0.1	1.9	-	0	-5
15-12-10-28	2.3	4.9	5.2	4.0	+2.9	-25
16-12-10-28	1.4	-	1.2	0.4	-0.2	+25
2-13-10-28	4.9	-	3.9	-	-1.0	-
5-13-10-28	0.9	-	2.9	0.6	+2.0	+17
6-13-10-28	6.6	1.7	5.6	1.2	-1.0	-3
10-13-10-28	3.9	-	5.6	0.4	+1.7	+7
12-13-10-28	1.1	5.6	2.3	6.8	+1.2	-9
14-13-10-28	0.8	2.4	0.9	2.3	+0.1	-3
15-13-10-28	0.5	2.0	0.3	2.5	-0.2	+9
3-14-10-28	2.8	-	2.5	1.1	-0.3	+31
5-14-10-28	0.1	2.7	0.1	8.0	0	+2
12-14-10-28	1.2	-	1.0	-	-0.2	-
1-23-10-28	0.9	14.4	0.6	14.1	-0.3	+2
8-23-10-28	-	-	0.8	4.8		
9-23-10-28	1.2	33.5	2.0	97.3	+0.8	+1
2-24-10-28	1.1	0.4	1.1	0.4	0	-
7-24-10-28	0.6	0.3	0.5	0.3	-0.1	+4

+14.2 m³/d.

431.7 m³/mon.

Daly Unit No. 3
Change in Water Cut
Latest wc - Base wc
(Based on Well Test)



DALY UNIT No. 3 - Pressure Data

<u>Well</u>	<u>P₁₉₈₄</u>	<u>P₁₉₈₅</u>	<u>P₁₉₈₆</u>	<u>$\Delta P(86-84)$</u>	<u>$\Delta P(86-85)$</u>
11-1-10-28	9114	8184	869	-8245	-7315
13-6-10-27	1972	2405	2141	+169	-264
7-2-10-28	10 244	10 471	10 583	+339	+112
12-2-10-28	8 532	8 484	8 853	+321	+369
16-10-10-28	8 302	8 703	10 073	+1771	
5-11-10-28	-	9 405	11 250	-	
6-11-10-28	7 691	7 783	7 978	+287	
16-11-10-28	-	-	6 867	-	-
5-12-10-28	8 550	9 135	7 134	-1416	
7-12-10-28	-	-	1 440	-	-
10-12-10-28	-	-	9 510	-	-
1-13-10-28	6 725	5 877	6 172	-553	+295
13-13-10-28	8 353	8 820	10 239	+1886	+1419
15-13-10-28	3 213	3 920	4 337	+1124	+417
5-14-10-28	-	6 660	10 354	-	+3694
7-24-10-28	-	840	712	-	-128

<u>Well</u>	<u>1984 05</u>	<u>1986 12</u>	<u>0% INCR</u> <u>Ratio</u>
10A-1	-		
12-1	168.0	400.0	138
14-1	119.0	436.0	266
16-1	99.0	477.0	382
16-2	194.0	384.0	98
2-11	228.0	153.0	(33)
6-11	-	7.0	-
8-11	179.0	194.0	8
10-11	389.0	322.0	(17)
12-11	162.0	1092.0	574
2-12	288.0	3965.0	1277
4-12	194.0	81.0	(58)
6-12	90.0	692.0	669
8-12	95.0	3091.0	3154
10-12	5500	1087.0 221.0	98
12-12	84.0	2008.0 221.0	163
14-12	1225.0	2008.0	64
4-13	575.0	847.0	47

AGE NO. 1

* * * S T O R E * * *
DALY2
NEW INJECTION

ManPB
87-04-21
14:42:48

MONTH	PRDN	WELL COUNT INJN	P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1961-01	0	0	0	10	10	0.0	0.0	0.0	0.00	200146	44518.8
SHUT IN											
1979-01	7	0	0	3	5208	402.1	281.0	13.0	0.70	200548	44799.8
1979-02	7	0	0	3	4704	354.2	245.8	12.7	0.69	200902	45045.6
1979-03	7	0	0	3	5208	380.7	348.6	12.3	0.92	201283	45394.2
1979-04	7	0	0	3	5040	360.8	256.0	12.0	0.71	201644	45650.2
1979-05	7	0	0	3	4944	351.6	259.1	11.3	0.74	201995	45909.3
1979-06	7	0	0	3	4560	339.9	215.9	11.3	0.64	202335	46125.2
1979-07	7	0	0	3	5208	374.9	240.5	12.1	0.64	202710	46365.7
1979-08	7	0	0	3	5208	371.1	254.3	12.0	0.69	203081	46620.0
1979-09	7	0	0	3	5040	366.4	258.1	12.2	0.70	203448	46878.1
1979-10	7	0	0	3	5136	368.4	265.2	11.9	0.72	203816	47143.3
1979-11	7	0	0	3	4992	355.3	253.9	11.8	0.71	204171	47397.2
1979-12	7	0	0	3	5208	367.8	255.6	11.9	0.69	204539	47652.8
1980-01	7	0	0	3	5208	364.9	276.7	11.8	0.76	204904	47929.5
1980-02	7	0	0	3	4872	344.0	245.7	11.9	0.71	205248	48175.2
1980-03	7	0	0	3	5208	367.1	262.3	11.8	0.71	205615	48437.5
1980-04	7	0	0	3	5040	373.5	250.3	12.5	0.67	205989	48687.8
1980-05	7	0	0	3	5208	397.2	238.6	12.8	0.60	206386	48926.4
1980-06	7	0	0	3	4368	348.0	187.0	11.6	0.54	206734	49113.4
1980-07	7	0	0	3	5208	382.1	229.7	12.3	0.60	207116	49343.1
1980-08	7	0	0	3	4488	339.1	197.1	10.9	0.58	207455	49540.2
1980-09	7	0	0	3	5040	396.1	234.8	13.2	0.59	207851	49775.0
1980-10	7	0	0	3	5136	397.8	235.9	12.8	0.59	208249	50010.9
1980-11	7	0	0	3	5040	387.4	219.4	12.9	0.57	208636	50230.3
1980-12	7	0	0	3	5208	410.3	236.2	13.2	0.58	209047	50466.5
1981-01	7	0	0	3	5208	398.8	240.6	12.9	0.60	209445	50707.1
1981-02	7	0	0	3	4632	353.1	215.3	12.6	0.61	209799	50922.4
1981-03	7	0	0	3	5184	397.6	236.5	12.8	0.59	210196	51158.9
1981-04	7	0	0	3	4872	466.7	265.8	15.6	0.57	210663	51424.7
1981-05	7	0	0	3	4800	472.4	265.0	15.2	0.56	211135	51689.7
1981-06	7	0	0	3	4992	521.4	272.3	17.4	0.52	211657	51962.0
1981-07	7	0	0	3	5208	524.0	272.1	16.9	0.52	212181	52234.1
1981-08	7	0	0	3	5184	514.0	257.3	16.6	0.50	212695	52491.4
1981-09	7	0	0	3	4992	505.9	250.3	16.9	0.49	213201	52741.7
1981-10	7	0	0	3	5184	506.0	241.2	16.3	0.48	213707	52982.9
1981-11	7	0	0	3	4320	458.2	227.1	15.3	0.50	214165	53210.0
1981-12	7	0	0	3	5184	533.0	270.6	17.2	0.51	214698	53480.6
1982-01	7	0	0	3	5148	486.0	259.6	15.7	0.53	215184	53740.2
1982-02	7	0	0	3	4704	470.2	267.5	16.8	0.57	215654	54007.7
1982-03	7	0	0	3	5184	512.8	319.2	16.5	0.62	216167	54326.9
1982-04	7	0	0	3	5040	499.8	315.1	16.7	0.63	216667	54642.0
1982-05	7	0	0	3	3192	278.5	125.2	9.0	0.45	216945	54767.2
1982-06	7	0	0	3	5040	559.4	389.3	18.6	0.70	217504	55156.5
1982-07	8	0	0	2	5616	569.7	346.3	18.4	0.61	218074	55502.8
1982-08	8	0	0	2	5640	552.3	323.4	17.8	0.59	218626	55826.2
1982-09	8	0	0	2	4032	491.3	85.7	16.4	0.17	219118	55911.9
1982-10	8	0	0	2	5760	559.7	340.6	18.1	0.61	219677	56252.5

* * * S T O R E * * *
DALYZ
NEW INJECTION

ManPB
87-04-21
14:42:48

MONTH	PRDN	WELL COUNT			HOURS	OIL	WATER	DIL	WOR	CUM.OIL	CUM.WAT
		INJN	P/IN	S/AB		m3/M	m3/M	m3/D		m3	m3
1982-11	8	0	0	2	5400	501.8	295.0	16.7	0.59	220179	56547.5
1982-12	8	0	0	2	5952	550.5	340.6	17.8	0.62	220730	56888.1
1983-01	8	0	0	2	5928	532.2	333.8	17.2	0.63	221262	57221.9
1983-02	8	0	0	2	5376	483.4	313.8	17.3	0.65	221745	57535.7
1983-03	8	0	0	2	5904	527.0	318.7	17.0	0.60	222272	57854.4
1983-04	8	0	0	2	5760	504.3	287.3	16.8	0.57	222777	58141.7
1983-05	8	0	0	2	5952	483.8	298.3	15.6	0.62	223260	58440.0
1983-06	8	0	0	2	5640	442.7	291.3	14.8	0.66	223703	58731.3
1983-07	8	0	0	2	5304	430.9	223.3	13.9	0.52	224134	58954.6
1983-08	8	0	0	2	5928	460.9	290.5	14.9	0.63	224595	59245.1
1983-09	8	0	0	2	5760	461.9	276.1	15.4	0.60	225057	59521.2
1983-10	8	0	0	2	5952	493.9	301.8	15.9	0.61	225551	59823.0
1983-11	8	0	0	2	5616	475.8	263.6	15.9	0.55	226027	60086.6
1983-12	8	0	0	2	5952	484.6	284.8	15.6	0.59	226511	60371.4
1984-01	8	0	0	2	5832	487.6	270.5	15.7	0.55	226999	60641.9
1984-02	8	0	0	2	5448	484.6	260.0	16.7	0.54	227483	60901.9
1984-03	8	0	0	2	5856	495.0	275.0	16.0	0.56	227978	61176.9
1984-04	8	0	0	2	4704	405.9	197.1	13.5	0.49	228384	61374.0
1984-05	3	0	0	7	2232	208.3	0.0	6.7	-0.00	228593	61374.0
1984-06	5	0	0	5	2712	320.1	17.9	10.7	0.06	228913	61391.9
1984-07	8	0	0	2	5184	471.4	245.5	15.2	0.52	229384	61637.4
1984-08	9	0	0	1	6048	459.2	404.8	14.8	0.88	229843	62042.2
1984-09	9	0	0	1	6408	399.3	471.9	13.3	1.18	230243	62514.1
1984-10	9	0	0	1	6696	415.2	504.5	13.4	1.22	230658	63018.6
1984-11	9	0	0	1	6480	426.6	465.5	14.2	1.09	231084	63484.1
1984-12	9	0	0	1	6600	417.2	435.0	13.5	1.04	231502	63919.1
1985-01	8	0	0	2	5952	417.0	363.4	13.5	0.87	231919	64282.5
1985-02	8	0	0	2	5376	384.1	357.9	13.7	0.93	232303	64640.4
1985-03	8	0	0	2	5952	422.8	356.9	13.6	0.84	232725	64997.3
1985-04	8	0	0	2	5568	415.1	329.9	13.8	0.79	233141	65327.2
1985-05	7	0	0	3	5208	458.2	303.9	14.8	0.66	233599	65631.1
1985-06	8	0	0	2	5664	438.2	434.5	14.6	0.99	234037	66065.6
1985-07	8	0	0	2	5904	523.9	346.6	16.9	0.66	234561	66412.2
1985-08	8	0	0	2	5928	525.9	359.7	17.0	0.68	235087	66771.9
1985-09	8	0	0	2	5712	524.0	431.5	17.5	0.82	235611	67203.4
1985-10	8	0	0	2	5880	524.3	408.1	16.9	0.78	236135	67611.5
1985-11	8	0	0	2	5760	534.9	403.7	17.8	0.75	236670	68015.2
1985-12	8	0	0	2	5088	406.2	424.1	13.1	1.04	237076	68439.3
1986-01	8	0	0	2	5400	455.3	412.1	14.7	0.91	237531	68851.4
1986-02	8	0	0	2	5376	523.9	371.6	18.7	0.71	238055	69223.0
1986-03	8	0	0	2	4944	435.8	397.7	14.1	0.91	238491	69620.7
1986-04	8	0	0	2	5760	561.2	420.6	18.7	0.75	239052	70041.3
1986-05	8	0	0	2	5664	561.6	437.8	18.1	0.78	239614	70479.1
1986-06	7	0	0	3	4920	489.3	419.0	16.3	0.86	240103	70898.1
1986-07	9	0	0	1	6408	476.5	624.0	15.4	1.31	240580	71522.1
1986-08	9	0	0	1	6696	516.0	659.6	16.6	1.28	241096	72181.7
1986-09	9	0	0	1	6384	493.1	456.5	16.4	0.93	241589	72638.2
1986-10	9	0	0	1	6576	478.5	698.0	15.4	1.46	242067	73336.2

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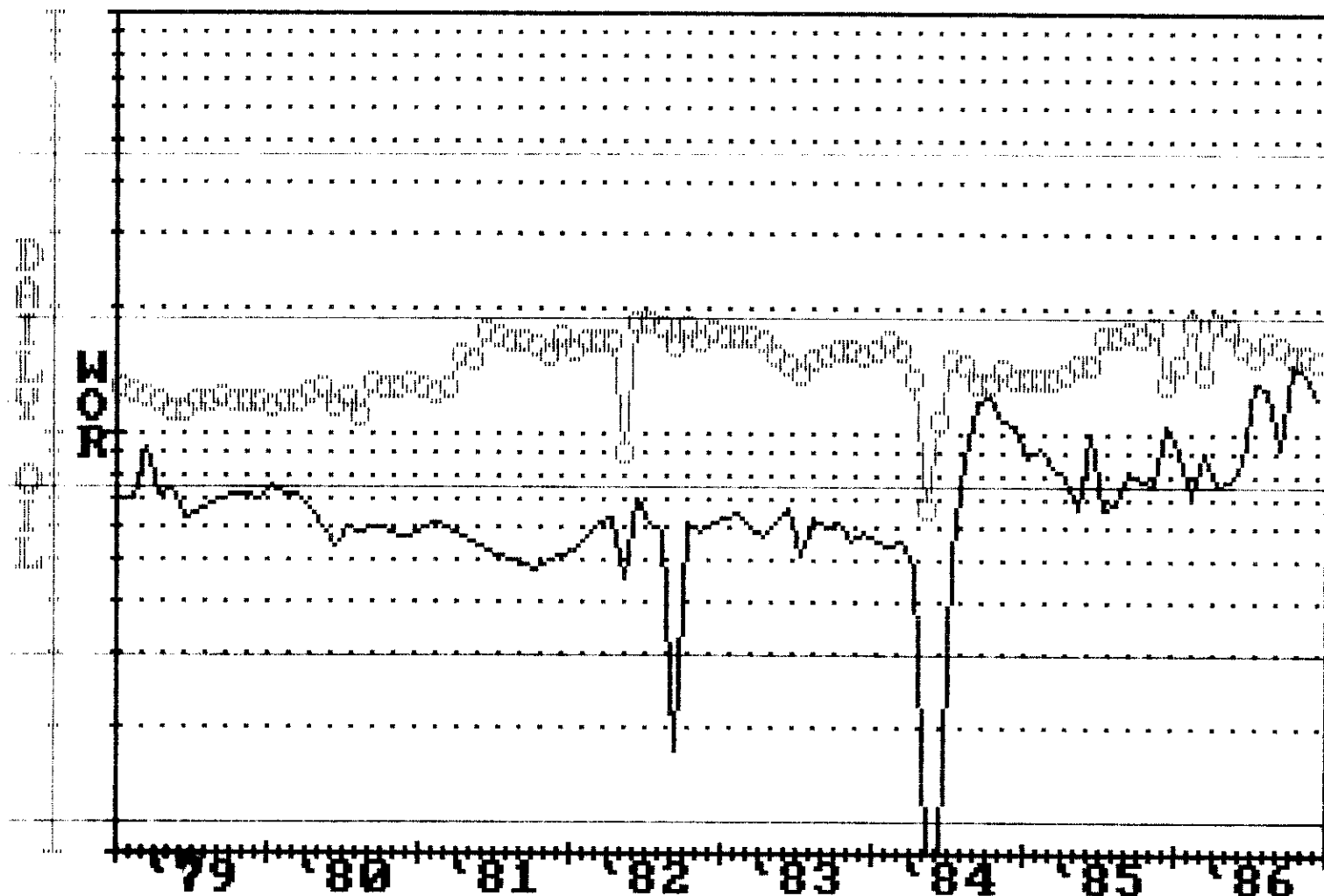
PAGE NO. 3

*** S T O R E ***
DALY2
NEW INJECTION

ManPB
87-04-21
14:42:48

MONTH	PRDN	WELL COUNT INJN	P/IN	S/AB	HOURS	DIL m3/M	WATER m3/M	DIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1986-11	9	0	0	1	6480	460.3	644.0	15.3	1.40	242528	73980.2
1986-12	9	0	0	1	6648	469.5	581.7	15.1	1.24	242997	74561.9
1987-01	7	0	0	3	5208	344.4	587.5	11.1	1.71	243342	75149.4

NEW INJECTION



(O) 14-02-010-28 W1M(O)
 (O) 12-13-010-28 W1M(O)
 (O) 15-13-010-28 W1M(O)
 (O) 12-14-010-28 W1M(O)

(O) 04-11-010-28 W1M(O)
 (O) 13-13-010-28 W1M(O)
 (O) 03-14-010-28 W1M(O)

(O) 10-13-010-28 W1M(O)
 (O) 14-13-010-28 W1M(O)
 (O) 05-14-010-28 W1M(O)

PAGE 1

*** STORE ***

ManPB

DALY2

87-04-21

INC. PRES. & NEW INJECTION

08:44:04

MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1961-01	0	0 0	6	6	0.0	0.0	0.0	0.00	139568	11259.5
SHUT IN										
1979-01	6	0 0	0	4464	377.4	39.1	12.2	0.10	139945	11298.6
1979-02	6	0 0	0	4032	332.5	34.2	11.9	0.10	140278	11332.8
1979-03	6	0 0	0	4464	357.5	48.6	11.5	0.14	140635	11381.4
1979-04	6	0 0	0	4320	338.6	35.7	11.3	0.11	140974	11417.1
1979-05	6	0 0	0	4176	327.5	36.9	10.6	0.11	141301	11454.0
1979-06	6	0 0	0	4176	329.9	33.5	11.0	0.10	141631	11487.5
1979-07	6	0 0	0	4416	351.3	34.4	11.3	0.10	141982	11521.9
1979-08	6	0 0	0	4464	351.5	40.9	11.3	0.12	142334	11562.8
1979-09	6	0 0	0	4320	346.1	41.8	11.5	0.12	142680	11604.6
1979-10	6	0 0	0	4392	348.6	41.6	11.2	0.12	143029	11646.2
1979-11	6	0 0	0	4320	341.7	41.3	11.4	0.12	143370	11687.5
1979-12	6	0 0	0	4464	347.5	41.4	11.2	0.12	143718	11728.9
1980-01	6	0 0	0	4368	338.6	43.9	10.9	0.13	144056	11772.8
1980-02	6	0 0	0	4176	325.2	39.7	11.2	0.12	144382	11812.5
1980-03	6	0 0	0	4464	347.0	42.5	11.2	0.12	144729	11855.0
1980-04	6	0 0	0	4248	333.9	36.7	11.1	0.11	145063	11891.7
1980-05	6	0 0	0	4464	342.4	32.9	11.0	0.10	145405	11924.6
1980-06	6	0 0	0	4296	330.4	34.4	11.0	0.10	145735	11959.0
1980-07	6	0 0	0	4464	329.5	31.7	10.6	0.10	146065	11990.7
1980-08	6	0 0	0	3864	285.9	27.2	9.2	0.10	146351	12017.9
1980-09	6	0 0	0	4320	341.6	32.4	11.4	0.09	146692	12050.3
1980-10	6	0 0	0	4392	341.9	32.5	11.0	0.10	147034	12082.8
1980-11	6	0 0	0	4320	334.2	30.3	11.1	0.09	147368	12113.1
1980-12	6	0 0	0	4464	354.2	32.7	11.4	0.09	147723	12145.8
1981-01	6	0 0	0	4464	343.8	33.0	11.1	0.10	148066	12178.8
1981-02	6	0 0	0	4032	307.4	29.5	11.0	0.10	148374	12208.3
1981-03	6	0 0	0	4416	341.5	9.8	11.0	0.03	148715	12218.1
1981-04	6	0 0	0	4320	391.1	70.9	13.0	0.18	149106	12289.0
1981-05	6	0 0	0	3912	350.0	60.7	11.3	0.17	149456	12349.7
1981-06	6	0 0	0	4320	409.0	71.0	13.6	0.17	149865	12420.7
1981-07	6	0 0	0	4440	410.1	70.0	13.2	0.17	150276	12490.7
1981-08	6	0 0	0	4440	404.4	64.1	13.0	0.16	150680	12554.8
1981-09	6	0 0	0	3912	347.6	62.0	11.6	0.18	151028	12616.8
1981-10	6	0 0	0	4392	375.8	72.7	12.1	0.19	151403	12689.5
1981-11	6	0 0	0	3744	347.0	69.1	11.6	0.20	151750	12758.6
1981-12	6	0 0	0	4464	403.7	83.1	13.0	0.21	152154	12841.7
1982-01	6	0 0	0	4440	397.0	81.1	12.8	0.20	152551	12922.8
1982-02	6	0 0	0	4032	353.7	81.5	12.6	0.23	152905	13004.3
1982-03	6	0 0	0	4464	390.5	97.2	12.6	0.25	153295	13101.5
1982-04	6	0 0	0	4152	349.5	81.0	11.7	0.23	153645	13182.5
1982-05	6	0 0	0	4464	408.2	94.6	13.2	0.23	154053	13277.1
1982-06	6	0 0	0	4320	403.3	96.7	13.4	0.24	154456	13373.8
1982-07	6	0 0	0	4440	376.0	83.9	12.1	0.22	154832	13457.7
1982-08	6	0 0	0	4176	343.7	71.1	11.1	0.21	155176	13528.8
1982-09	6	0 0	0	4320	375.9	71.5	12.5	0.19	155552	13606.3
1982-10	6	0 0	0	4416	364.1	90.8	11.7	0.25	155916	13691.1

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INC. PRES. & NEW INJECTION

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MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1982-11	6	0 0	0	4272	328.0	81.2	10.9	0.25	156244	13772.3
1982-12	6	0 0	0	4464	343.1	83.5	11.1	0.24	156587	13855.8
1983-01	6	0 0	0	4464	331.2	80.5	10.7	0.24	156918	13936.3
1983-02	6	0 0	0	3936	293.8	74.9	10.5	0.25	157212	14011.2
1983-03	6	0 0	0	4320	313.4	68.7	10.1	0.22	157525	14079.9
1983-04	6	0 0	0	4320	314.6	70.5	10.5	0.22	157840	14150.4
1983-05	6	0 0	0	4464	323.9	72.8	10.4	0.22	158164	14223.2
1983-06	6	0 0	0	4248	272.3	59.2	9.1	0.22	158436	14282.4
1983-07	6	0 0	0	4416	282.0	61.7	9.1	0.22	158718	14344.1
1983-08	6	0 0	0	4416	280.4	57.2	9.0	0.20	158999	14401.3
1983-09	6	0 0	0	4224	277.7	56.0	9.3	0.20	159276	14457.3
1983-10	6	0 0	0	4320	291.0	60.2	9.4	0.21	159567	14517.5
1983-11	6	0 0	0	4176	293.0	54.3	9.8	0.19	159860	14571.8
1983-12	6	0 0	0	4368	296.4	59.3	9.6	0.20	160157	14631.1
1984-01	6	0 0	0	4464	305.1	59.1	9.8	0.19	160462	14690.2
1984-02	6	0 0	0	4152	300.9	100.2	10.4	0.33	160763	14790.4
1984-03	6	0 0	0	4464	319.1	59.9	10.3	0.19	161082	14850.3
1984-04	6	0 0	0	3816	281.6	48.9	9.4	0.17	161363	14899.2
1984-05	3	0 0	3	2232	146.8	4.1	4.7	0.03	161510	14903.3
1984-06	5	0 0	1	2520	186.9	29.3	6.2	0.16	161697	14932.6
1984-07	6	0 0	0	4368	417.7	76.9	13.5	0.18	162115	15009.5
1984-08	6	0 0	0	3960	377.0	28.0	12.2	0.07	162492	15037.5
1984-09	6	0 0	0	4320	452.6	66.0	15.1	0.15	162944	15103.5
1984-10	6	0 0	0	4416	456.6	70.1	14.7	0.15	163401	15173.6
1984-11	6	0 0	0	4320	469.9	64.7	15.7	0.14	163871	15238.3
1984-12	6	0 0	0	4440	463.0	62.4	14.9	0.13	164334	15300.7
1985-01	6	0 0	0	4440	459.8	62.2	14.8	0.14	164794	15362.9
1985-02	6	0 0	0	4032	430.8	63.6	15.4	0.15	165225	15426.5
1985-03	6	0 0	0	4464	472.4	63.0	15.2	0.13	165697	15489.5
1985-04	6	0 0	0	4320	417.5	61.8	13.9	0.15	166114	15551.3
1985-05	6	0 0	0	4440	425.9	66.7	13.7	0.16	166540	15618.0
1985-06	6	0 0	0	4320	399.9	78.9	13.3	0.20	166940	15696.9
1985-07	6	0 0	0	4464	402.5	68.7	13.0	0.17	167343	15765.6
1985-08	6	0 0	0	4272	373.6	70.1	12.1	0.19	167716	15835.7
1985-09	6	0 0	0	4320	394.6	87.0	13.2	0.22	168111	15922.7
1985-10	6	0 0	0	4416	399.8	79.8	12.9	0.20	168511	16002.5
1985-11	6	0 0	0	4320	431.4	92.7	14.4	0.21	168942	16095.2
1985-12	6	0 0	0	2928	246.9	62.7	8.0	0.25	169189	16157.9
1986-01	6	0 0	0	3912	377.2	65.9	12.2	0.17	169566	16223.8
1986-02	6	0 0	0	3888	421.3	86.3	15.0	0.20	169988	16310.1
1986-03	6	0 0	0	2952	292.3	47.5	9.4	0.16	170280	16357.6
1986-04	6	0 0	0	4320	452.7	96.9	15.1	0.21	170733	16454.5
1986-05	6	0 0	0	4344	457.6	144.9	14.8	0.32	171190	16599.4
1986-06	6	0 0	0	4320	437.5	165.6	14.6	0.38	171628	16765.0
1986-07	6	0 0	0	4464	466.4	174.3	15.0	0.37	172094	16939.3
1986-08	6	0 0	0	4464	500.5	181.8	16.1	0.36	172595	17121.1
1986-09	6	0 0	0	4296	464.9	119.3	15.5	0.26	173059	17240.4
1986-10	6	0 0	0	4296	487.4	111.9	15.7	0.23	173547	17352.3

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MONTH	PRDN	WELL COUNT			HOURS	OIL	WATER	OIL	WOR	CUM.OIL	CUM.WAT
		INJN	P/IN	S/AB		m3/M	m3/M	m3/D		m3	m3
1986-11	6	0	0	0	4320	473.0	103.2	15.8	0.22	174020	17455.5
1986-12	6	0	0	0	4344	465.6	91.1	15.0	0.20	174485	17546.6
1987-01	3	0	0	3	2232	336.4	50.1	10.9	0.15	174822	17596.7

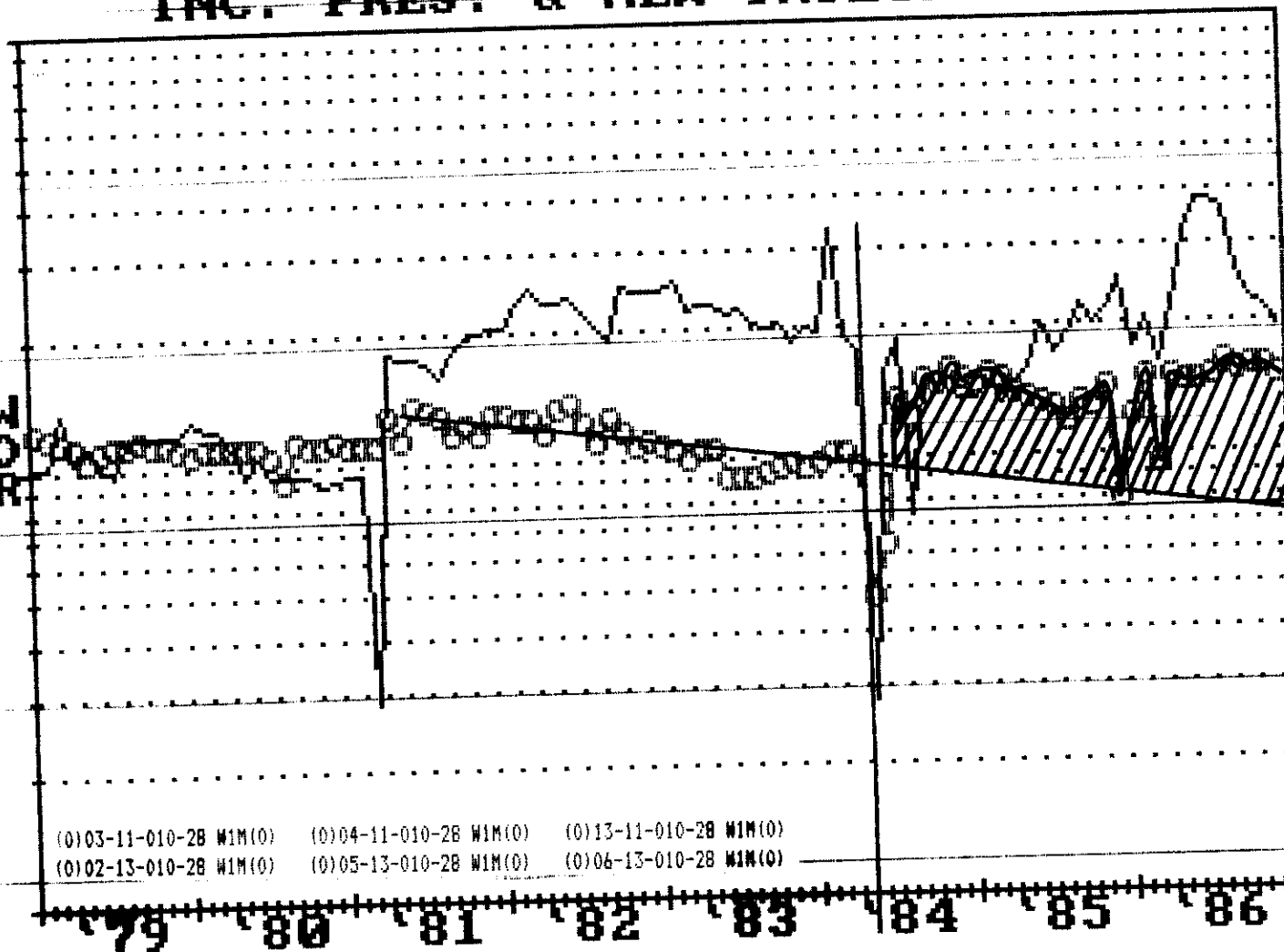
INC. PRES. & NEW INJECTION

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INCREASED INJECTION PRESSURE

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MONTH	PRDN	WELL COUNT INJN	P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1979-01	22	0	0	4	16105	1631.7	521.3	52.6	0.32	643304	132460
1979-02	22	0	0	4	14784	1477.3	467.7	52.8	0.32	644781	132927
1979-03	22	0	0	4	16248	1561.5	654.9	50.4	0.42	646342	133582
1979-04	22	0	0	4	15600	1493.3	484.2	49.8	0.32	647836	134066
1979-05	22	0	0	4	16296	1577.0	409.9	50.9	0.26	649413	134476
1979-06	22	0	0	4	15816	1516.8	369.3	50.6	0.24	650930	134846
1979-07	22	0	0	4	16320	1571.5	382.7	50.7	0.24	652501	135228
1979-08	22	0	0	4	16200	1563.8	386.0	50.4	0.25	654065	135614
1979-09	22	0	0	4	15840	1563.1	399.1	52.1	0.26	655628	136013
1979-10	23	0	0	3	16368	1576.4	405.4	50.9	0.26	657204	136419
1979-11	23	0	0	3	15984	1543.6	408.2	51.5	0.26	658748	136827
1979-12	23	0	0	3	17064	1620.4	428.2	52.3	0.26	660368	137255
1980-01	23	0	0	3	16800	1582.3	445.3	51.0	0.28	661951	137700
1980-02	23	0	0	3	15768	1477.6	387.3	51.0	0.26	663428	138088
1980-03	23	0	0	3	16872	1572.1	400.5	50.7	0.25	665000	138486
1980-04	23	0	0	3	16392	1523.8	427.6	50.8	0.28	666524	138916
1980-05	23	0	0	3	16848	1566.2	378.7	50.5	0.24	668090	139295
1980-06	23	0	0	3	16416	1521.8	397.6	50.7	0.26	669612	139692
1980-07	23	0	0	3	17040	1497.7	372.1	48.3	0.25	671110	140064
1980-08	23	0	0	3	15960	1427.4	339.6	46.0	0.24	672537	140404
1980-09	23	0	0	3	16224	1545.4	375.3	51.5	0.24	674083	140779
1980-10	23	0	0	3	17040	1575.1	390.3	50.8	0.25	675658	141169
1980-11	23	0	0	3	16344	1497.8	361.3	49.9	0.24	677156	141531
1980-12	23	0	0	3	16896	1571.6	389.8	50.7	0.25	678727	141921
1981-01	23	0	0	3	17040	1540.2	400.0	49.7	0.26	680267	142321
1981-02	23	0	0	3	15408	1391.1	356.6	49.7	0.26	681658	142677
1981-03	23	0	0	3	16872	1514.4	385.7	48.9	0.25	683173	143063
1981-04	23	0	0	3	16488	1396.6	554.0	46.6	0.40	684569	143617
1981-05	23	0	0	3	13800	1099.4	495.5	35.5	0.45	685669	144112
1981-06	23	0	0	3	15888	1350.4	646.5	45.0	0.48	687019	144759
1981-07	23	0	0	3	17112	1422.0	693.9	45.9	0.49	688441	145453
1981-08	23	0	0	3	17088	1401.5	669.3	45.2	0.48	689843	146122
1981-09	23	0	0	3	16344	1368.0	665.9	45.6	0.49	691211	146788
1981-10	23	0	0	3	17040	1387.9	678.1	44.8	0.49	692599	147466
1981-11	23	0	0	3	15168	1323.8	649.8	44.1	0.49	693922	148116
1981-12	23	0	0	3	17040	1454.0	748.7	46.9	0.51	695376	148865
1982-01	23	0	0	3	17112	1443.5	737.4	46.6	0.51	696820	149602
1982-02	23	0	0	3	15120	1262.5	726.4	45.1	0.58	698082	150328
1982-03	23	0	0	3	17016	1460.4	960.9	47.1	0.66	699543	151289
1982-04	23	0	0	3	16032	1390.4	944.8	46.3	0.68	700933	152234
1982-05	23	0	0	3	13944	1046.1	765.5	33.7	0.73	701979	153000
1982-06	23	0	0	3	16344	1493.5	950.8	49.8	0.64	703473	153950
1982-07	24	0	0	2	17040	1410.0	849.5	45.5	0.60	704883	154800
1982-08	24	0	0	2	16824	1307.8	765.1	42.2	0.59	706191	155565
1982-09	23	0	0	3	15048	1255.0	502.1	41.8	0.40	707446	156067
1982-10	23	0	0	3	17064	1346.6	855.2	43.4	0.64	708792	156922
1982-11	23	0	0	3	15840	1172.5	743.9	39.1	0.63	709965	157666
1982-12	23	0	0	3	16080	1247.0	779.0	40.2	0.63	711212	158445

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INCREASED INJECTION PRESSURE

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MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1983-01	23	0 0	3	17016	1224.5	759.3	39.5	0.62	712436	159204
1983-02	23	0 0	3	16456	1112.0	724.7	39.7	0.65	713549	159929
1983-03	23	0 0	3	16872	1207.5	726.4	39.0	0.60	714757	160656
1983-04	23	0 0	3	16536	1156.5	663.3	38.6	0.57	715913	161319
1983-05	23	0 0	3	17040	1211.4	681.8	39.1	0.56	717124	162001
1983-06	24	0 0	2	16680	1157.2	707.4	38.6	0.61	718282	162708
1983-07	24	0 0	2	17376	1162.6	726.2	37.5	0.62	719444	163434
1983-08	24	0 0	2	17808	1189.0	750.4	38.4	0.63	720633	164185
1983-09	24	0 0	2	17136	1184.0	722.0	39.5	0.61	721817	164907
1983-10	24	0 0	2	17856	1270.5	789.9	41.0	0.62	723088	165697
1983-11	24	0 0	2	16704	1227.5	706.3	40.9	0.58	724315	166403
1983-12	24	0 0	2	17616	1230.0	728.5	39.7	0.59	725545	167131
1984-01	24	0 0	2	17856	1274.9	746.9	41.1	0.59	726820	167878
1984-02	24	0 0	2	16512	1295.1	646.3	44.7	0.50	728115	168525
1984-03	24	0 0	2	17808	1320.2	687.0	42.6	0.52	729435	169212
1984-04	24	0 0	2	16608	1310.2	606.7	43.7	0.46	730746	169818
1984-05	21	0 0	5	15336	1259.2	495.2	40.6	0.39	732005	170313
1984-06	21	0 0	5	14256	1158.7	447.9	38.6	0.39	733164	170761
1984-07	23	0 0	3	15648	1168.7	514.0	37.7	0.44	734332	171275
1984-08	23	0 0	3	14904	1167.5	404.0	37.7	0.35	735500	171679
1984-09	24	0 0	2	16800	1311.1	594.7	43.7	0.45	736811	172274
1984-10	24	0 0	2	16872	1271.0	603.5	41.0	0.47	738082	172878
1984-11	24	0 0	2	17256	1375.1	646.5	45.8	0.47	739457	173524
1984-12	24	0 0	2	17832	1349.9	623.0	43.5	0.46	740807	174147
1985-01	24	0 0	2	17784	1354.2	637.1	43.7	0.47	742161	174784
1985-02	24	0 0	2	16032	1235.1	631.2	44.1	0.51	743396	175415
1985-03	24	0 0	2	17856	1333.0	755.4	43.0	0.57	744729	176171
1985-04	24	0 0	2	16752	1270.2	682.6	42.3	0.54	745999	176853
1985-05	23	0 0	3	16800	1474.2	689.0	47.6	0.47	747474	177542
1985-06	24	0 0	2	17064	1447.1	893.4	48.2	0.62	748921	178436
1985-07	25	0 0	1	18336	1453.3	787.3	46.9	0.54	750374	179223
1985-08	25	0 0	1	18504	1442.1	862.4	46.5	0.60	751816	180085
1985-09	25	0 0	1	17784	1541.5	1244.0	51.4	0.81	753358	181329
1985-10	25	0 0	1	17496	1481.3	1094.2	47.8	0.74	754839	182424
1985-11	25	0 0	1	17040	1405.5	1019.4	46.9	0.73	756244	183443
1985-12	25	0 0	1	16152	1253.6	1075.7	40.4	0.86	757498	184519
1986-01	24	0 0	2	16320	1373.1	1021.5	44.3	0.74	758871	185540
1986-02	24	0 0	2	15936	1365.4	927.9	48.8	0.68	760236	186468
1986-03	24	0 0	2	15816	1261.6	970.7	40.7	0.77	761498	187439
1986-04	24	0 0	2	17256	1472.8	1051.6	49.1	0.71	762971	188490
1986-05	24	0 0	2	16848	1452.9	786.1	46.9	0.54	764424	189277
1986-06	23	0 0	3	15624	1396.2	764.6	46.5	0.55	765820	190041
1986-07	23	0 0	3	16848	1372.0	745.1	44.3	0.54	767192	190786
1986-08	24	0 0	2	16776	1446.1	806.3	46.6	0.56	768638	191593
1986-09	25	0 0	1	17328	1464.9	683.7	48.8	0.47	770103	192276
1986-10	25	0 0	1	17904	1537.5	819.0	49.6	0.53	771640	193095
1986-11	25	0 0	1	17784	1465.6	758.0	48.9	0.52	773106	193853
1986-12	25	0 0	1	18528	1528.7	702.0	49.3	0.44	774635	194555

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*** S T O R E ***

DALY2

INCREASED INJECTION PRESSURE

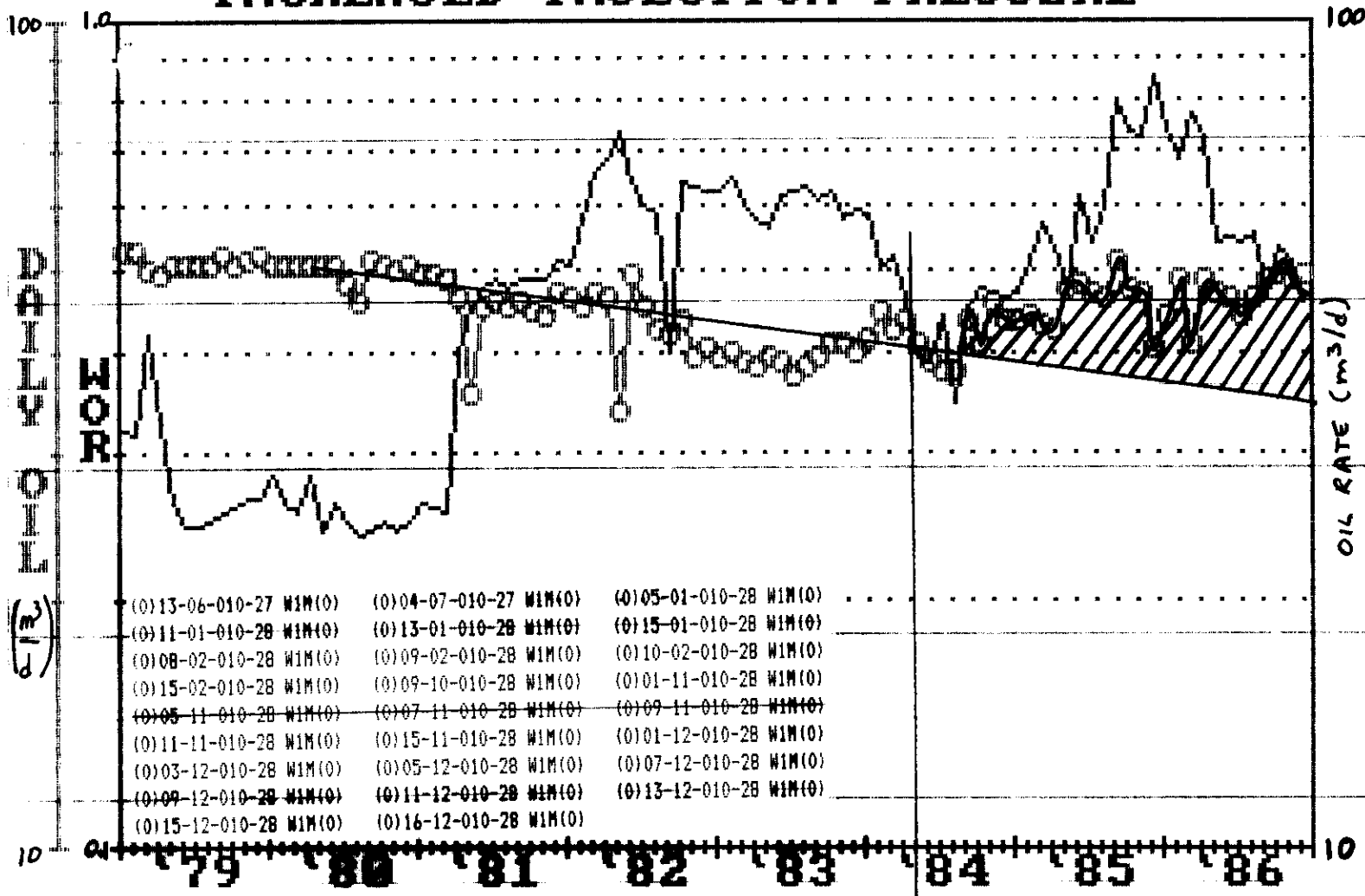
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MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1987-01	2	0 0	24	1488	73.2	97.5	2.4	1.33	774708	194653

INCREASED INJECTION PRESSURE



*** STORE ***
DALY2
NOT AFFECTED

ManPB
87-04-21
08:51:08

MONTH	PRDN	WELL COUNT INJN P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1961-01	0	0 0	6	6	0.0	0.0	0.0	0.00	73592.6	480096
SHUT IN										
1979-01	4	0 0	2	2976	202.2	2221.6	6.5	10.99	73794.8	482317
1979-02	4	0 0	2	2688	178.1	1942.9	6.4	10.91	73972.9	484260
1979-03	4	0 0	2	2784	175.6	2596.0	5.7	14.78	74148.5	486856
1979-04	4	0 0	2	2880	182.5	2022.9	6.1	11.08	74331.0	488879
1979-05	4	0 0	2	2880	178.7	1969.2	5.8	11.02	74509.7	490848
1979-06	4	0 0	2	2832	179.5	1872.6	6.0	10.43	74689.2	492721
1979-07	4	0 0	2	2976	187.6	1943.9	6.4	10.36	74876.8	494665
1979-08	4	0 0	2	2904	177.5	1841.3	5.7	10.37	75054.3	496506
1979-09	4	0 0	2	2448	157.4	1539.0	5.2	9.78	75211.7	498045
1979-10	4	0 0	2	2904	186.8	2012.2	6.0	10.77	75398.5	500057
1979-11	4	0 0	2	2880	183.2	2016.8	6.1	11.01	75581.7	502074
1979-12	4	0 0	2	2976	186.5	2019.6	6.0	10.83	75768.2	504094
1980-01	4	0 0	2	2856	175.3	2096.3	5.7	11.96	75943.5	506190
1980-02	4	0 0	2	2784	174.4	1942.3	6.0	11.14	76117.9	508132
1980-03	4	0 0	2	2976	184.6	2074.1	6.0	11.24	76302.5	510206
1980-04	4	0 0	2	2808	175.1	2034.1	5.8	11.62	76477.6	512241
1980-05	4	0 0	2	2928	184.1	2170.5	5.9	11.79	76661.7	514411
1980-06	4	0 0	2	2232	141.8	1610.6	4.7	11.36	76803.5	516022
1980-07	4	0 0	2	2976	181.2	2137.4	5.8	11.80	76984.7	518159
1980-08	4	0 0	2	2592	162.2	1832.7	5.2	11.30	77146.9	519992
1980-09	4	0 0	2	2880	187.9	2184.3	6.3	11.62	77334.8	522176
1980-10	4	0 0	2	2976	192.4	2194.3	6.2	11.40	77527.2	524370
1980-11	4	0 0	2	2880	183.8	2040.9	6.1	11.10	77711.0	526411
1980-12	4	0 0	2	2976	193.9	2187.4	6.3	11.28	77904.9	528599
1981-01	4	0 0	2	2976	189.2	2237.8	6.1	11.83	78094.1	530836
1981-02	4	0 0	2	2688	172.7	2020.1	6.2	11.70	78266.8	532857
1981-03	4	0 0	2	2976	190.1	2219.5	6.1	11.68	78456.9	535076
1981-04	4	0 0	2	2784	118.3	1813.4	3.9	15.33	78575.2	536889
1981-05	4	0 0	2	2184	86.5	1522.2	2.8	17.60	78661.7	538412
1981-06	4	0 0	2	2832	125.3	1928.4	4.2	15.39	78787.0	540340
1981-07	4	0 0	2	2904	120.5	1784.9	3.9	14.81	78907.5	542125
1981-08	4	0 0	2	2784	119.8	1628.0	3.9	13.59	79027.3	543753
1981-09	4	0 0	2	2592	111.5	1500.0	3.7	13.45	79138.8	545253
1981-10	4	0 0	2	2976	124.4	1707.5	4.0	13.73	79263.2	546960
1981-11	4	0 0	2	2496	113.4	1607.5	3.8	14.18	79376.6	548568
1981-12	4	0 0	2	2976	131.4	1919.5	4.2	14.61	79508.0	550487
1982-01	4	0 0	2	2976	128.6	1879.3	4.1	14.61	79636.6	552367
1982-02	4	0 0	2	2688	110.3	1819.0	3.9	16.49	79746.9	554186
1982-03	4	0 0	2	2904	107.0	2274.7	3.5	21.26	79853.9	556460
1982-04	4	0 0	2	2688	99.5	1956.6	3.3	19.66	79953.4	558417
1982-05	4	0 0	2	2952	108.8	2071.0	3.5	19.03	80062.2	560488
1982-06	4	0 0	2	2880	113.2	2242.6	3.8	19.81	80175.4	562731
1982-07	5	0 0	1	3096	136.8	1981.0	4.4	14.48	80312.2	564712
1982-08	5	0 0	1	3720	195.7	1908.3	6.3	9.75	80507.9	566620
1982-09	6	0 0	0	2616	197.4	473.6	6.6	2.40	80705.3	567094
1982-10	6	0 0	0	3336	236.8	1860.5	7.6	7.86	80942.1	568954

MONTH	WELL COUNT				HOURS	OIL	WATER	OIL	WOR	CUM.DIL	CUM.WAT
	PRDN	INJN	P/IN	S/AB		m3/M	m3/M	m3/D		m3	m3
1982-11	6	0	0	0	3984	363.1	1649.0	12.1	4.54	81305.2	570603
1982-12	6	0	0	0	4440	382.5	1953.6	12.3	5.11	81687.7	572557
1983-01	6	0	0	0	4464	382.1	1917.5	12.3	5.02	82069.8	574474
1983-02	6	0	0	0	4032	343.3	1802.1	12.3	5.25	82413.1	576276
1983-03	6	0	0	0	4392	380.4	1760.8	12.3	4.63	82793.5	578037
1983-04	6	0	0	0	4320	361.8	1649.2	12.1	4.56	83155.3	579686
1983-05	6	0	0	0	4464	370.0	1713.3	11.9	4.63	83525.3	581400
1983-06	6	0	0	0	4320	348.8	1662.6	11.6	4.77	83874.1	583062
1983-07	6	0	0	0	3720	326.7	1169.6	10.5	3.58	84200.8	584232
1983-08	6	0	0	0	4464	358.4	1656.8	11.6	4.62	84559.2	585889
1983-09	6	0	0	0	4296	358.9	1599.2	12.0	4.46	84918.1	587488
1983-10	6	0	0	0	4464	389.4	1747.9	12.6	4.49	85307.5	589236
1983-11	6	0	0	0	4176	369.3	1527.5	12.3	4.14	85676.8	590763
1983-12	6	0	0	0	4464	382.6	1649.0	12.3	4.31	86059.4	592412
1984-01	6	0	0	0	4440	379.7	1650.0	12.2	4.35	86439.1	594062
1984-02	6	0	0	0	4176	169.4	1583.2	5.8	9.35	86608.5	595645
1984-03	6	0	0	0	4464	171.4	1675.5	5.5	9.78	86779.9	597321
1984-04	6	0	0	0	3600	141.1	1524.2	4.7	10.80	86921.0	598845
1984-05	3	0	0	3	1872	79.0	1051.5	2.5	13.31	87000.0	599897
1984-06	3	0	0	3	1992	97.0	11.9	3.2	0.12	87097.0	599908
1984-07	6	0	0	0	3768	157.8	1666.4	5.1	10.56	87254.8	601575
1984-08	6	0	0	0	3456	169.5	1081.0	5.5	6.38	87424.3	602656
1984-09	6	0	0	0	4320	179.5	2088.2	6.0	11.63	87603.8	604744
1984-10	6	0	0	0	4320	176.8	2077.1	5.7	11.75	87780.6	606821
1984-11	6	0	0	0	4248	181.6	1964.7	6.1	10.82	87962.2	608786
1984-12	6	0	0	0	4464	184.1	1975.8	5.9	10.73	88146.3	610762
1985-01	6	0	0	0	4344	180.3	2006.6	5.8	11.13	88326.6	612768
1985-02	6	0	0	0	4032	170.2	1999.3	6.1	11.75	88496.8	614768
1985-03	6	0	0	0	4464	179.7	1972.8	5.8	10.98	88676.5	616740
1985-04	6	0	0	0	4152	173.4	1920.2	5.8	11.07	88849.9	618661
1985-05	4	0	0	2	2976	147.8	2044.9	4.8	13.84	88997.7	620705
1985-06	6	0	0	0	4128	180.5	2465.9	6.0	13.66	89178.2	623171
1985-07	6	0	0	0	4416	225.6	2886.9	7.3	12.80	89403.8	626058
1985-08	6	0	0	0	4296	212.7	2609.7	6.9	12.27	89616.5	628668
1985-09	6	0	0	0	4320	225.0	3780.1	7.5	16.80	89841.5	632448
1985-10	6	0	0	0	4464	229.2	3506.3	7.4	15.30	90070.7	635954
1985-11	6	0	0	0	4296	215.3	3366.6	7.2	15.64	90286.0	639321
1985-12	6	0	0	0	4416	218.0	3455.3	7.0	15.85	90504.0	642776
1986-01	6	0	0	0	4464	230.3	3434.2	7.4	14.91	90734.3	646210
1986-02	6	0	0	0	4008	209.9	3089.2	7.5	14.72	90944.2	649300
1986-03	6	0	0	0	4464	239.3	3314.8	7.7	13.85	91183.5	652614
1986-04	6	0	0	0	4320	222.9	3429.0	7.4	15.38	91406.4	656043
1986-05	6	0	0	0	4200	217.8	3981.0	7.0	18.28	91624.2	660024
1986-06	6	0	0	0	4224	187.9	4103.6	6.3	21.84	91812.1	664128
1986-07	6	0	0	0	4464	193.3	4050.8	6.2	20.96	92005.4	668179
1986-08	6	0	0	0	4416	194.5	3866.3	6.3	19.88	92199.9	672045
1986-09	6	0	0	0	4272	148.9	3803.1	5.0	25.54	92348.8	675848
1986-10	6	0	0	0	4464	167.4	3906.9	5.4	23.34	92516.2	679755

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PAGE NO. 3

*** STORE ***
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NOT AFFECTED

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MONTH	PRDN	INJN	P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	OIL m3/D	WOR	CUM.OIL m3	CUM.WAT m3
1986-11	6	0	0	0	4320	151.6	3466.9	5.1	22.87	92667.8	683222
1986-12	6	0	0	0	4440	155.9	3186.5	5.0	20.44	92823.7	686409
1987-01	6	0	0	0	4464	162.7	3255.1	5.2	20.01	92986.4	689664

NOT AFFECTED

DAILY
OIL

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O
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W O R

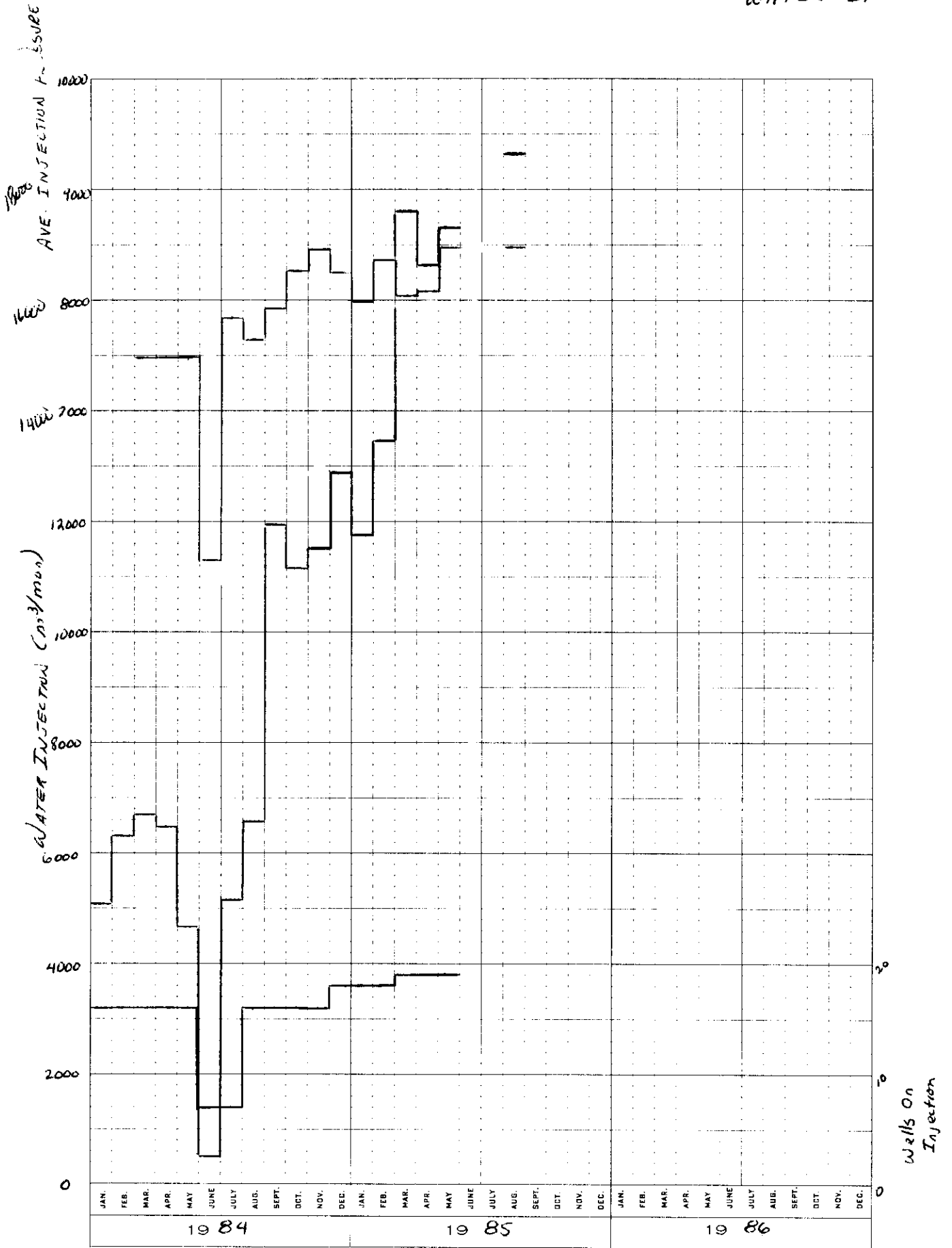
(0)10-10-010-28 W1M(0) (0)01-23-010-28 W1M(0) (0)08-23-010-28 W1M(0)
(0)09-23-010-28 W1M(0) (0)02-24-010-28 W1M(0) (0)07-24-010-28 W1M(0)

79 80 81 82 83 84 85 86

DAILY UNIT NO 3 WATER INJECTION

DIETZGEN CORPORATION
MADE IN U.S.A.

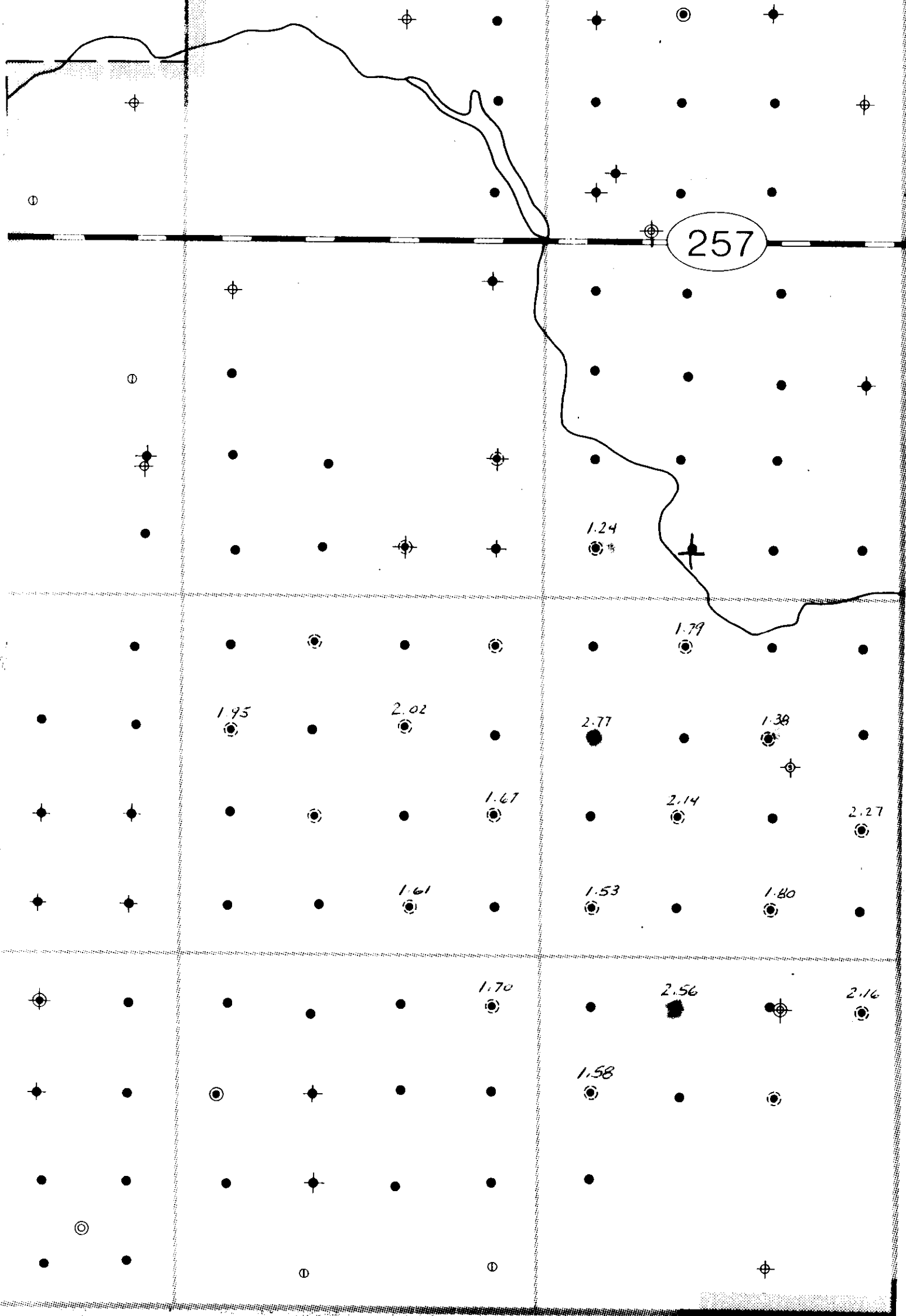
NO. 341-130 DIETZGEN GRAPH PAPER
3 YEARS BY MONTHS



Wells On
Injection

DALY UNIT No. 3
WATER INJECTION VOLUME

OCT 84
MAY 84



Ratio ≥ 2.50
 $1.50 \leq \text{Ratio} \leq 2.50$
 $\text{Ratio} \leq 1.50$

Well

INJ. ~~MAY~~ ^{APR} 84 (m³)INJ OCT 84 (m³)

DWH

~~MAY~~ ^{OCT} APR

12-1-10-28	280.0	441.0	318.0	1.58
14-1-10-28	180.0	461.0	420.0	2.56
16-1-10-28	139.0	300.0	300.0	2.16
16-2-10-28	294.0	500.0	400.0	1.70
2-11-10-28	336.0	541.0	525.0	1.61
8-11-10-28	228.0	381.0	367.0	1.67
10-11-10-28	474.0	959.0	1060.0	2.02
12-11-10-28	209.0	408.0	343.0	1.95
2-12-10-28	415.0	749.0	814.0	1.80
4-12-10-28	276.0	422.0	383.0	1.53
6-12-10-28	140.0	300.0	300.0	2.14
8-12-10-28	132.0	300.0	300.0	2.27
10-12-10-28	800.0	1100.0	1100.0	1.38
12-12-10-28	106.0	294.0	268.0	2.77
14-12-10-28	1677.0	3000.0	3000.0	1.79
4-13-10-28	789.0	925.0	928.0	1.24

DAILY UNIT 3
PRE WATER FLOOD EXPANSION
WELL TEST DATA

0584 - month/year
1.2/01 OIL RATE (m3/d) / WATER RATE (m3/d)

0584 0785
2.5/54.5
1.2/33.5

0785
1.3/57

0984 0685
0.6/0.3 0.6/0.3

0884 0785
1.2/14.0
0.9/14.4

0984 0685
1.1/0.4 1.1/0.4

257

0984 0785 0984 0685
0.8/2.2 0.5/7.0
0.8/2.4 0.5/2.0

0884 0785
1.1/5.6 4.3/4.7

0884
3.9/-

0494
1.2/-

0384 0585
0.1/2.7 0.6/- 0.8/-

0784 0485 0784 0485
0.9/- 0.8/0.2 0.6/1.7 3.7/0.4

0884 0585
4.9/- 3.5/0

0884 0284
-1.0/- 2.8/-

0384 0485
1.2/0.1 2.6/0.7

0584
2.0/-

0884
1.9/0.1

0684
2.3/4.9

0684
1.4/-

0584 0785 0584
1.4/- 0.1/- 7/0.1

0284 0485
1.0/0.9 0.8/-

0484 0785
1.4/- 3.4/-

0884
3.7/0.2

1084
1.0/0.6

0284 0485
1.7/- 1.6/-

0884 0685
3.4/2.1 3.4/2.1

0784
3.2/-

0984 0385 0984 0385
1.4/- 2.1/- 1.0/- 1.0/-

0484 0385
3.4/0.5 3.7/2.1

0584 0385
3.7/4.3 1.5/0.1

0784
2.5/-

0585
1.3/0.6

0784
2.9/0.2

0984
1.2/-

0583 05/85
4.3/0.1 4.1/2

0684
3.5/0.9

0284
0.9/0.7

0984 0385 0984
0.2/0.8 0.8/0.2 1.6/-

0585
0.5/-

0784
0.8/0.4

0684
1.9/-

0984
0.7/-

SEP 26 1984

Mr. C. C. Felden, P. Eng.
Virden Area Supervisor
Chevron Canada Resources Limited
Box 100
Virden, Manitoba
S4T 1C0

Dear Mr. Felden:

Re: Daily Unit No. 3 Waterflood Expansion Application
for "New Oil" Status for Crown Royalty/Tax Calculations

A review of your application dated July 4, 1984 and supporting data by Petroleum Branch staff suggests that some portion of expected future incremental production in excess of estimated base production rate forecasts may result from the expansion of the waterflood project area. However, some percentage of the incremental production will result from reactivation of previously suspended water injection wells and from recently approved higher injection pressures. Therefore, the percentage of the initial incremental production that may result in an increase in ultimate recovery of reserves from this Unit is difficult at present to estimate.

Pursuant to subsection 4.1(5) of The Oil and Natural Gas Tax Act and the definition of "new oil" under section 3 of The Crown Petroleum Royalty Regulations, 1984, approval is hereby granted to have incremental production produced between September 1, 1984 and June 30, 1987, in excess of base production estimated by the Petroleum Branch, to be classified as "new oil" for provincial Crown royalty and oil tax calculation purposes. The calculation procedures will be those provided in the current legislation. "Table 1" attached provides the base production rates on which "incremental production" will be determined.

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As a condition of this approval, Chevron is required to submit prior to April 1, 1967 a technical and economical analysis of the projects performance through 1966 indicating the relative significance of accelerated depletion and incremental reserves. The results of this analysis will form the basis for any future application to extend the "new oil" status approval.

Yours sincerely,

Original Signed by:
WILSON D. PARASIUK

Wilson D. Parasiuk

RCV/lk

c.c. S. J. Facknick, Director
Mining & Use Taxes Branch

M. Clara Foster, Director
Petroleum Branch

b.c. Marc Eliason
Dr. I. Naugh
Petroleum Branch ✓

"TABLE 1"

<u>YEAR</u>	<u>MONTH</u>	<u>DAILY RATE (m³/d)</u>	<u>MONTHLY PRODUCTION (m³)</u>
1984	Jan	76.136	2360.2
	Feb	76.073	2206.1
	Mar	76.010	2356.3
	Apr	75.946	2278.4
	May	75.883	2352.4
	Jun	75.820	2274.6
	Jul	75.757	2348.5
	Aug	75.694	2346.5
	Sep	75.631	2268.9
	Oct	75.568	2342.6
	Nov	75.505	2265.1
	Dec	75.442	2338.7
1985	Jan	75.379	2336.7
	Feb	75.316	2108.8
	Mar	75.253	2332.8
	Apr	75.191	2255.7
	May	75.128	2329.0
	Jun	75.066	2252.0
	Jul	75.003	2325.1
	Aug	74.941	2323.2
	Sep	74.878	2246.3
	Oct	74.816	2319.3
	Nov	74.753	2242.6
	Dec	74.691	2315.4
1986	Jan	74.629	2313.5
	Feb	74.567	2087.9
	Mar	74.505	2309.6
	Apr	74.443	2233.3
	May	74.381	2305.8
	Jun	74.319	2229.6
	Jul	74.257	2302.0
	Aug	74.195	2300.0
	Sep	74.133	2224.0
	Oct	74.071	2296.2
	Nov	74.010	2220.3
	Dec	73.948	2292.4
1987	Jan	73.886	2290.5
	Feb	73.825	2067.1
	Mar	73.763	2286.7
	Apr	73.702	2211.1
	May	73.640	2282.8
	Jun	73.579	2207.4
	Jul	73.518	2279.0
	Aug	73.457	2277.2
	Sep	73.395	2201.9
	Oct	73.334	2273.4
	Nov	73.273	2198.2
	Dec	73.212	2269.6

Further Calculations can be made using
the equation $y = 76.2e^{-0.01t}$

where y = production rate (m³/d)

t = elapsed time since 1-1-84 (years)

MEMORANDUM

TO: Minister of Energy & Mines
 FROM: Assistant Deputy Minister
 Mineral Resources Division

DATE: September 18, 1984
 FROM: Ian Haugh
 Assistant Deputy Minister
 Mineral Resources Division

SUBJECT: **NEW OIL PRODUCTION**

Telephone

SUMMARY:

An application by Chevron Canada Resources Limited, as Unit Operator of Daly Unit No. 3, to have certain additional production from the subject Unit classified as "new oil" for calculation of Crown oil royalties under The Mines Act and Crown oil taxes under The Oil and Natural Gas Tax Act.

BACKGROUND:

Oil production that is classified as "new oil" is subject to reduced Crown oil royalty and tax rates.

The definition of "new oil" pursuant to section 3 of "The Crown Petroleum Royalty Regulations, 1984" under The Mines Act and subsection 4.1(6) of The Oil and Natural Gas Tax Act authorizes the Minister of Energy and Mines to approve any oil production as "new oil" if he deems it to be in the public interest. The definition of "new oil" also includes "that portion of oil obtained which, in the opinion of the minister, is attributable to an increase in reserves which has been recognized by the board as resulting from an enhanced recovery scheme conducted under an order made by the Board after January 1, 1979."

The staff of the Petroleum Branch has for a number of years been encouraging Chevron to determine the feasibility of expanding waterflood pressure maintenance operations in the older portion of Daly Unit No. 3, for which Chevron is the Unit Operator.

Chevron made application to The Oil and Natural Gas Conservation Board in July 1984 for approval to expand their waterflood operations in the Unit by the conversion of five (5) additional wells to water injection plus to increase the maximum allowable injection pressure. The Board approved Chevron's application on September 17, 1984.

Related to the technical waterflood expansion application was a second application from Chevron to the Minister dated July 4, 1984 requesting that the Minister approve all incremental production above a basic decline rate provided by Chevron as "new oil" for Crown royalty and tax purposes. The reason given

is "that without New Oil status the economics are marginal and do not meet guidelines for capital investment".

Based on Chevron's initial application and subsequent information dated July 26, 1984 provided in response to a deficiency letter, Petroleum Branch staff conclude that some portion of the expected increase in oil production rates from the Unit will be a result of the expanded waterflood operations and therefore qualify as "new oil" for royalty/tax purposes. However, the volume of production that may relate to "an increase in reserves" is impossible to predict with any degree of accuracy until the modified project has been in operation for some time and additional data has been obtained and analysed (e.g. - production data, reservoir pressures, etc.).

It is concluded however, that the application be approved, in part, subject to the following conditions:

1. The current oil production decline rate which will be used to determine the incremental production that will qualify as "new oil" for royalty/tax purposes will be the production schedule prepared by the Petroleum Branch.

This schedule is similar but not identical to the base production decline rate proposed by Chevron.

2. The approval will cover the production period from September 1, 1984 to June 30, 1987. Extension of the approval past that date will require a future application.

Chevron's application was to have the approval extend for the life of the Unit.

3. A condition of the approval will be to require Chevron to submit a technical and economical analysis of the project's performance prior to April 1, 1987.

The results of this analysis will determine if any further extension of the approval shall be granted, on application.

Conditional approval of this application will

- satisfy the provisions and intent of the existing legislation,
- assist the Petroleum Branch in encouraging similar projects by showing the government's support of enhanced recovery projects,
- result in additional royalty/tax revenue to the Province, if successful,
- not result in decreased royalty/tax revenue to the Province if unsuccessful, and

- provide additional technical and economical data on which to assess this and other similar type enhanced recovery projects.

The Mining and Use Taxes Branch of the Department of Finance has been consulted regarding the application and has acknowledged that Department's support to the conditional approval recommended.

RECOMMENDATION:

That the application for "new oil" by Chevron Canada Resources Limited be approved, in part.

A draft letter of approval is attached and recommended for the Minister's signature.

ORIGINAL SIGNED BY
IAN HAUGH

Ian Haugh

HCM/lk

Approved:

Original Signed by
WILSON D. PARASIUK

Wilson D. Parasiuk
Minister

b.c. Petroleum Branch ✓



Inter-Departmental Memo

To • H. Clare Moster
Director, Petroleum Branch
Department of Energy & Mines
555 - 330 Graham Avenue

Date September 13, 1984
From S.J. Puchniak
Director, Mining & Use Taxes
Department of Finance
700 Norquay Bldg.

Subject • DALY UNIT NO. 3 - CHEVRON CANADA RESOURCES LIMITED CLASSIFICATION OF

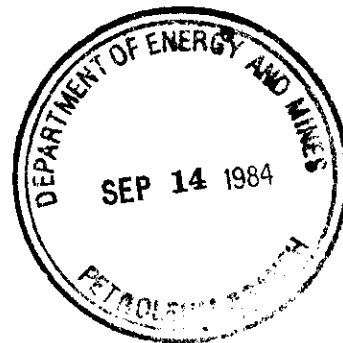
Telephone

INCREMENTAL PRODUCTION AS "NEW OIL"

Please be advised that after a review of your memo dated August 22, 1984, we are in agreement with your recommendations concerning Chevron's application for new oil status for the incremental oil production resulting from the modification and expansion of the Waterflood at Daly Unit No. 3.


S.J. Puchniak

x.c. Dr. I. Haugh - Sept. 14/84 - lk



Inter-Departmental Memo

Date August 22, 1984

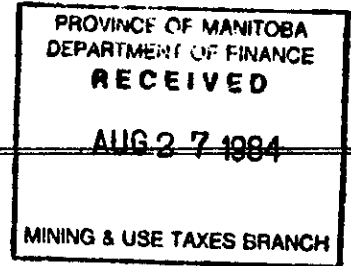
To Dr. I. Haugh
Assistant Deputy Minister
Mineral Resources Division

From H. Clare Moster
Director, Petroleum Branch

Subject Daly Unit No. 3 - Chevron Canada Resources Limited

Telephone

Classification of Incremental Production as "New Oil"



Chevron Canada Resources Limited, Unit Operator of Daly Unit No. 3, applied on July 4, 1984 to expand and modify waterflood pressure maintenance operations in the subject Unit and to have the "incremental production" resulting from the project expansion and modification to be classified as "new oil" for provincial Crown royalty/tax purposes.

My memo to The Oil and Natural Gas Conservation Board dated August 16, 1984 recommended approval of the application to expand and modify the waterflood project.

Recommendation:

It is recommended that the application by Chevron for classification of "incremental production" as "new oil" for Crown royalty/tax purposes be recommended to the Minister for approval in part.

A draft letter outlining the conditional approval is attached.

I suggest we await a formal response from the Dept. of Finance to the proposed recommendations before proceeding to make our final recommendations to our Minister.

Discussion:

In response to a deficiency letter from this Branch dated July 18, 1984 (copy attached) additional information in support of Chevron's application was received in a letter from Chevron dated July 26, 1984 (copy attached).

An internal review of this information was carried out by Branch staff and recommendations submitted to me in a memo from L. R. Dubreuil dated August 15, 1984 (copy attached).

A copy of Chevron's initial application was forwarded to S. J. Puchniak, Director, Mining & Use Taxes Branch, Dept. of Finance for comment on July 6, 1984. A copy of memo in response dated August 10, 1984 is attached. By copy of this memo and attached material that Branch, which is responsible for administration of The Oil and Natural Gas Tax Act, will be made aware of our recommendations.

First Fold

Conclusion:

- Current legislation was designed to provide for this type of situation and application.
- Some portion of the expected "incremental production" automatically qualifies for "new oil" classification due to its being as a result of an "expansion" of a previously effective pressure maintenance project.
- An unknown portion of the expected "incremental production" will only be as a result of accelerated production rates and will not result in an increase in ultimate recovery from the Unit.
- The suggested conditional approval of the application for the period, Sept. 1st, 1984 to June 30, 1987, will provide a reasonable incentive to meet the provisions of the legislation, will encourage this and similar enhanced recovery projects and will provide additional information on which to evaluate the success of the project and whether the approval should be further extended, on application.

Original Signed by H. C. Moster

H. Clare Moster

c.c. S. J. Puchniak, Director
Mining & Use Taxes Branch
Dept. of Finance

Recommended For Approval:

Ian Haugh
Assistant Deputy Minister
Mineral Resources Division

DRAFT

August 22, 1984

Chevron Canada Resources Limited
Box 100
Virden, Manitoba
ROM 2C0

Attention: Mr. C. G. Folden, P. Eng.
Virden Area Supervisor

Dear Mr. Folden:

Re: Daly Unit No. 3 Waterflood Expansion Application
for "New Oil" Status for Crown Royalty/Tax Calculations

A review of your application dated July 4, 1984 and supporting data by Petroleum Branch staff suggests that some portion of expected future incremental production in excess of estimated base production rate forecasts may result from the expansion of the waterflood project area. However, some percentage of the incremental production will result from reactivation of previously suspended water injection wells and from recently approved higher injection pressures. Therefore, the percentage of the initial incremental production that may result in an increase in ultimate recovery of reserves from the Unit is difficult at present to estimate.

Pursuant to subsection 55(2) of The Crown Petroleum Royalty Regulations, 1984 and clause 4.1(6) of The Oil and Natural Gas Tax Act, approval is hereby granted to have incremental production produced between September 1, 1984 and June 30, 1987, in excess of base production estimated by the Petroleum Branch, to be classified as "new oil" for provincial Crown royalty and oil tax calculation purposes. The calculation procedures will be those provided in the current legislation. "Table 1" attached provides the base production rates

on which "incremental production" will be determined.

As a condition of this approval Chevron is required to submit prior to April 1, 1987 a technical and economical analysis of the projects performance through 1986 indicating the relative significance of accelerated depletion and incremental reserves. The results of this analysis will form the basis for any future application to extend the "new oil" status approval.

Yours sincerely,

Wilson D. Parasiuk

HCM/lk

c.c. S. J. Puchniak, Director
Mining & Use Taxes Branch

H. Clare Moster, Director
Petroleum Branch

"TABLE 1"

<u>YEAR</u>	<u>MONTH</u>	<u>DAILY RATE (m³/d)</u>	<u>MONTHLY PRODUCTION (m³)</u>
1984	Jan	76.136	2360.2
	Feb	76.073	2206.1
	Mar	76.010	2356.3
	Apr	75.946	2278.4
	May	75.883	2352.4
	Jun	75.820	2274.6
	Jul	75.757	2348.5
	Aug	75.694	2346.5
	Sep	75.631	2268.9
	Oct	75.568	2342.6
	Nov	75.505	2265.1
	Dec	75.442	2338.7
1985	Jan	75.379	2336.7
	Feb	75.316	2108.8
	Mar	75.253	2332.8
	Apr	75.191	2255.7
	May	75.128	2329.0
	Jun	75.066	2252.0
	Jul	75.003	2325.1
	Aug	74.941	2323.2
	Sep	74.878	2246.3
	Oct	74.816	2319.3
	Nov	74.753	2242.6
	Dec	74.691	2315.4
1986	Jan	74.629	2313.5
	Feb	74.567	2087.9
	Mar	74.505	2309.6
	Apr	74.443	2233.3
	May	74.381	2305.8
	Jun	74.319	2229.6
	Jul	74.257	2302.0
	Aug	74.195	2300.0
	Sep	74.133	2224.0
	Oct	74.071	2296.2
	Nov	74.010	2220.3
	Dec	73.948	2292.4
1987	Jan	73.886	2290.5
	Feb	73.825	2067.1
	Mar	73.763	2286.7
	Apr	73.702	2211.1
	May	73.640	2282.8
	Jun	73.579	2207.4
	Jul	73.518	2279.0
	Aug	73.457	2277.2
	Sep	73.395	2201.9
	Oct	73.334	2273.4
	Nov	73.273	2198.2
	Dec	73.212	2269.6

Further Calculations can be made using
the equation $y = 76.2e^{-0.01t}$

where y = production rate (m³/d)

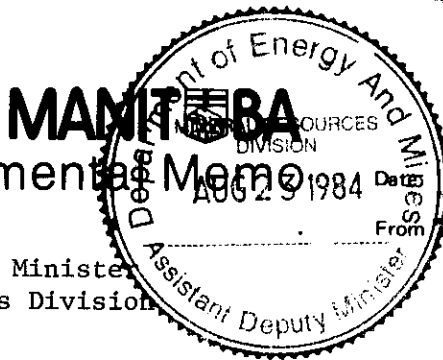
t = elapsed time since 1.1.84

Inter-Departmental Memo

To . Dr. I. Haugh
Assistant Deputy Minister
Mineral Resources Division

August 22, 1984

H. Clare Moster
Director, Petroleum Branch



Subject

Daly Unit No. 3 - Chevron Canada Resources Limited

Telephone

Classification of Incremental Production as "New Oil"

Chevron Canada Resources Limited, Unit Operator of Daly Unit No. 3, applied on July 4, 1984 to expand and modify waterflood pressure maintenance operations in the subject Unit and to have the "incremental production" resulting from the project expansion and modification to be classified as "new oil" for provincial Crown royalty/tax purposes.

My memo to The Oil and Natural Gas Conservation Board dated August 16, 1984 recommended approval of the application to expand and modify the waterflood project.

Recommendation:

It is recommended that the application by Chevron for classification of "incremental production" as "new oil" for Crown royalty/tax purposes be recommended to the Minister for approval in part.

A draft letter outlining the conditional approval is attached.

I suggest we await a formal response from the Dept. of Finance to the proposed recommendations before proceeding to make our final recommendations to our Minister.

Discussion:

In response to a deficiency letter from this Branch dated July 18, 1984 (copy attached) additional information in support of Chevron's application was received in a letter from Chevron dated July 26, 1984 (copy attached).

An internal review of this information was carried out by Branch staff and recommendations submitted to me in a memo from L. R. Dubreuil dated August 15, 1984 (copy attached).

A copy of Chevron's initial application was forwarded to S. J. Puchniak, Director, Mining & Use Taxes Branch, Dept. of Finance for comment on July 6, 1984. A copy of memo in response dated August 10, 1984 is attached. By copy of this memo and attached material that Branch, which is responsible for administration of The Oil and Natural Gas Tax Act, will be made aware of our recommendations.

First | Fold

Conclusion:

- Current legislation was designed to provide for this type of situation and application.
- Some portion of the expected "incremental production" automatically qualifies for "new oil" classification due to its being as a result of an "expansion" of a previously effective pressure maintenance project.
- An unknown portion of the expected "incremental production" will only be as a result of accelerated production rates and will not result in an increase in ultimate recovery from the Unit.
- The suggested conditional approval of the application for the period, Sept. 1st, 1984 to June 30, 1987, will provide a reasonable incentive to meet the provisions of the legislation, will encourage this and similar enhanced recovery projects and will provide additional information on which to evaluate the success of the project and whether the approval should be further extended, on application.



H. Clare Moster

c.c. S. J. Puchniak, Director
Mining & Use Taxes Branch
Dept. of Finance

Recommended For Approval:

OK to proceed on basis of above recommendation

Ian Haugh Sep 14/84

Ian Haugh
Assistant Deputy Minister
Mineral Resources Division

Inter-Departmental Memo

Date August 15, 1984

To
H. Clare Moster
Director
Petroleum Branch

From
L. R. Dubreuil
Chief Petroleum Engineer

Telephone

Subject

Re: Daly Unit No. 3 - Additional Injection - Classification of Incremental Production as "New Oil".

Chevron Canada Resources Limited has applied to have classified as "new oil" all that portion of future oil production from Daly Unit No. 3 which exceeds the historical decline rate. This application is being made in conjunction with Chevron's application, currently before The Oil and Natural Gas Conservation Board, to modify and enlarge pressure maintenance activities in the subject Unit.

Recommendations:

It is recommended that:

1. Effective on the first day of the month following approval of Chevron's application to modify its pressure maintenance activities in the subject Unit, all production from Daly Unit No. 3 obtained prior to July 1, 1987 exceeding the historical decline curve shown on Figure No. 1 of this memo be classified as "new oil" pursuant to subsection 55(2) of The Crown Petroleum Royalty Regulations, 1984 and clause 4.1(6) of The Oil and Natural Gas Tax Act.
2. Chevron be required to submit, not later than April 1, 1987, a technical analysis of the project's performance indicating the relative significance of accelerated depletion and incremental reserves as components of any production response observed. The analysis should be based on production performance data through 1986.
3. Based on review of Chevron's analysis as well as other related factors (i.e.: economics, technical success of the scheme, etc.) a decision be made to:
 - a) extend new oil status for incremental production past July 1, 1987 (either indefinitely or for a specified term)
 - b) terminate new oil status for incremental production at July 1, 1987 or,
 - c) extend new oil status for a portion of the incremental production from the project.

Discussion:

Chevron Canada Resources Limited, Unit Operator of Daly Unit No. 3, in an application to The Oil and Natural Gas Conservation Board, has requested approval to expand and modify pressure maintenance operations in the subject Unit. Chevron's proposal involves conversion of five (5) wells to water injectors, reactivation of three (3) suspended injection wells and increasing the wellhead injection pressure.

Conversion of additional wells to water injectors is likely to have a positive affect on total ultimate recovery from the Unit. In addition, reactivation of previous injectors will have a positive, although probably minimal affect on ultimate recovery. However, increasing the wellhead injection pressure is likely to provide no direct increase in recoverable reserves but will accelerate production of such reserves.

As noted above, Chevron's plans will result in an increase in production rate that is partially due to accelerated depletion of existing reserves. Consequently, a portion of the incremental recovery resulting from the scheme is eligible for "new oil" status pursuant to definition of new oil in The Crown Petroleum Royalty Regulations, 1984 and The Oil and Natural Gas Tax Act. The portion of the incremental recovery attributable to enhanced recovery, however, is very difficult to predict. Consequently, it is recommended that "new oil" status be granted for all incremental production for a period of time related to the pay out period on the required investment for the project.

At the request of the Branch, Chevron has submitted economic data indicating a payout of 1.3 years if new oil status is granted and of 2.6 years assuming old oil status. However, due to the predicted rapid increase in production rate plus the probability that injection response in areas of expanded injection may be delayed somewhat, a minimum of two years of production and pressure data is required to properly evaluate project performance.

Based on the above, it is recommended that Chevron be required to submit a technical report, prior to April 1, 1987, which would analyse performance through year end 1986 to determine the relative proportions of the observed incremental production due to acceleration and to increased reserves. Such a review would be primarily based on well test and reservoir pressure data. Depending on the results of Chevron's report and the Branch's analyses, a recommendation would be made prior to July 1, 1987 regarding extension, termination or modification of "new oil" status for incremental production from the Unit.

. . . . 3

Decline Rate:

In order to administer the above program, it is necessary to define a historical decline and extend this decline into the future. It is generally found that production declines on an exponential basis (i.e.: a straight line on a plot of log production rate vs time). Figure No. 1 is a plot of production rate since the Unit became effective in mid-1976. Using this data, the best fit straight line indicates a decline rate of approximately 1%/year. This decline may be predicted into the future using the equation $P = 76.2e^{-0.01 t}$ where 76.2 is the Unit rate in m³/d at year end 1983 and t is the time in years from year end 1983. Using this equation, a table of average daily rates for the base case has been developed and is attached.

Note that the predicted decline included by Chevron in its application is very similar to the proposal decline although Chevron's decline is plotted as an arithmetic function instead of an exponential function.

Royalty Tax Calculation:

The method of royalty calculation proposed by Chevron in its application appears to be correct.

The Oil and Natural Gas Tax Act prescribes a specific method of calculation of a "blended" mill rate (Schedule D). As you are aware, this method provides only a very limited incentive.



Bob Dubreuil

LRD/sb

Att:

cc: - A. Galarnyk
- B. Thiessen

"TABLE 1"

<u>YEAR</u>	<u>MONTH</u>	<u>DAILY RATE (m³/d)</u>	<u>MONTHLY PRODUCTION (m³)</u>
1984	Jan	76.136	2360.2
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	Apr	75.946	2278.4
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	Dec	73.212	2269.6

Further Calculations can be made using
the equation $y = 76.2e^{-0.01t}$

where y = production rate (m³/d)
 t = elapsed time since 1-1-84 (years)

DAILY OIL PRODUCTION

WELLS PRODUCING

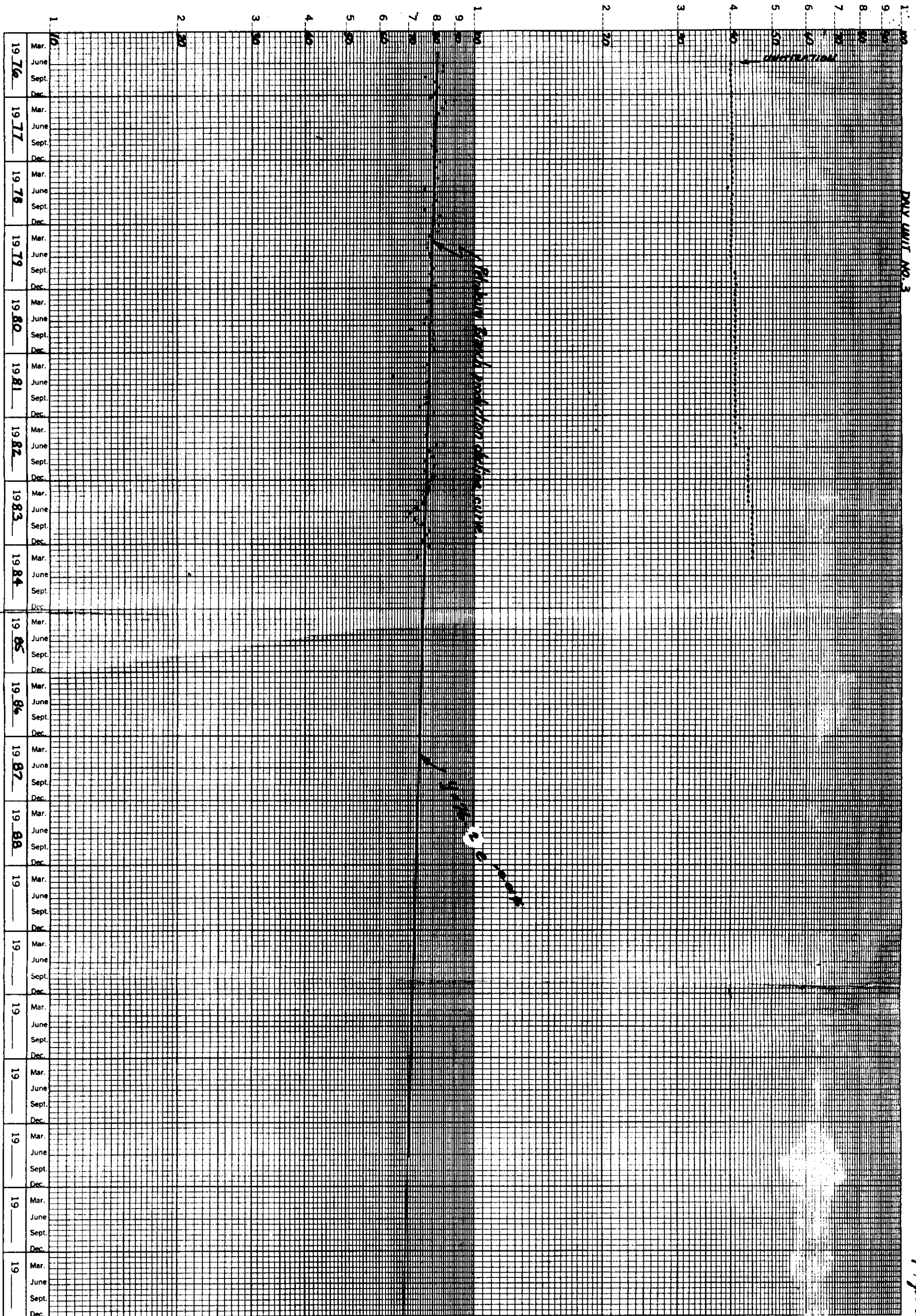


Figure No. 1



Inter-Departmental Memo

Date August 10, 1984

To

H. Clare Moster
Director
Petroleum Branch
Department of Energy & Mines
555 - 330 Graham Avenue

From S.J. Puchniak

Director
Mining & Use Taxes Branch
Department of Finance
700 Norquay Building

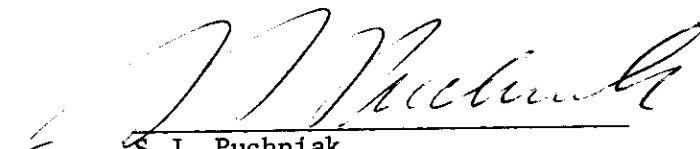
Telephone 945-3288

Subject

NEW OIL STATUS - CHEVRON; DALY UNIT NO. 3

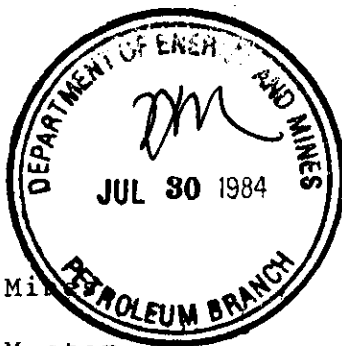
From the information provided in Chevron Canada Resources Limited's submission dated July 4, 1984, the proposed expansion and modification of the existing waterflood at Daly Unit No. 3 should result in increased oil production in Manitoba, and in additional Oil and Natural Gas Tax revenues. Would you please provide us with a copy of your recommendations to your Minister concerning Chevron's submission.

After a review of your recommendations we will be pleased to comment on Chevron's submission.


S.J. Puchniak



Chevron Canada Resources Limited



Box 100
Virden, Manitoba
ROM 2C0

1984-07-26

Minister of Energy & Mines
Province of Manitoba
Attention: Mr. H. C. Moster
Director - Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

DALY UNIT #3 WATERFLOOD EXPANSION
APPLICATION FOR NEW OIL STATUS FOR
ROYALTY AND MINERAL TAX CALCULATIONS

Dear Sir:

In response to your letter of 84-07-18 the following comments and attached information is submitted.

- 1) Oil Price Forecast: We regard our oil price forecast as confidential but as requested we have attached our price forecast for the next five years. (See Attachment No.1)
- 2) Payout Calculation: Payout is when the cumulative undiscounted net profit (net profit after tax - investment) equals 0. In this case it is the cumulative undiscounted incremental net profit and was calculated to be 1.3 years in the Incremental New Oil Status case (See Attachment No.1). This was inadvertently rounded to 2 years in our 1984-07-04 submission. For the Old Oil Case payout was calculated at 2.6 years and rounded to 3 years.
- 3) Incremental Net Backs: The incremental net backs are given on Attachment No. 1 and are incremental profit divided by incremental production on an annual basis. It should be noted this does not account for payout of the 1984 investment.
- 4) Assumptions:
 - a) Production forecasts
 - base case is based on the current decline
 - incremental case is based on R. Trimble's 1982-09 report, response noted at Daly Unit #1 and good voidage balance to date. The forecast is optimistic in that it assumes substantial response within a year.

b) Investment

- the investment used does not include any risk, therefore the economics required have to be adequate to account for the very real risk of increased costs and/or lack of injection response at some wells.

c) Taxes

- same as current rates

d) Operating costs

- continue at current levels
- adjusted for inflation in the future
- 4.1¢ / m3 (26¢ /barrel) of injected water
- \$ 29 / producing well / day
- costs are given in Attachment No. 2

e) The unit consists of present wells in the unit

f) Project termination

- the rate of water oil ratio increase was based on current trends. A terminal WOR of 30 was assumed. A maximum resevoir life of 40 years was assumed because projections beyond that are difficult to justify. In both cases the 40 year life restriction occurred before a WOR of 30 was reached.

g) Replacement wells

- no replacement wells were included in either case because they would be the same in both cases and may not be economically justified. Any replacement wells would reduce the economics of both cases.

h) All investment was depreciated at 30% declining balance for income tax calculation.

i) Then current dollars are used (increasing oil prices and inflation affects were included)

5) Taxes and Royalties: Federal Income Tax - 36%
P G R T - 16%
Freehold Royalty - 12.5%
Provincial Income Tax - 16%

- 6) Economics: In a project like this with a significant acceleration of cash flow in general results in the incremental annual profit being initially negative, turning positive with time and then turning negative. A more detailed discussion on acceleration is given in Attachment No. 3 which is a portion of an internal report. In general acceleration can result in the cumulative incremental profit versus time appearing like Figure No.1 in Attachment No.3 which shows you can have 2 apparent payouts. In fact both cases evaluated cross the 0 cumulative profit line twice making the payouts that have been calculated somewhat nebulous. Similarly rate of return can have 2 apparent rates as shown by Figure No. 2 in Attachment No. 3 in comparison to a normal rate of return plot shown by Figure No. 4. To evaluate acceleration projects Chevron has developed another economic index because rate of return and payout generally aren't defined. This index is based on a ratio of discounted Present Worth Profit divided by dicounted Present Worth Investment.
- 7) Investment: Very little investment would have been required at the present time as all the old facilities were functioning when they were shut in. At the current approved lower operating pressures they may have lasted for several more years.

In summary the calculated economics of this project without New Oil Royalty status are favorable but are not deemed adequate for the following reasons:

- 1) The acceleration nature of the project makes the calculated payout nebulous.
- 2) The investment costs assume no workover problems but there is a substantial risk of increased well rework costs (ie - 3-13-10-28).
- 3) No replacement wells were included in the investment costs. These would have to be included in both cases and would reduce the economics in both cases.

- 4) Response to the increased injection maybe delayed or minimal as has been the case in some areas of Daly (ie. 6-11, 14-11 & 16-11 injectors and Daly Unit #2). The injection well conversions considered in this project are fringe area wells and are more likely to have a delayed response because of the poorer quality of the resevoir.

The New Oil Status is necessary for this project to give some economic incentive to take the necessary risks to recover an estimated 420 10m³ of incremental oil. New Oil Status for this project still does financially benefit all parties sharing in the oil revenue. It also substantially increases cash flow for all parties in the near future.

If you need any additional information please give me a call.

Yours truly,



C. G. Folden, P. Eng.
Area Supervisor
Virden

CGF/rm

Attachments

- PAYOUT CALCULATION

<u>il Case</u>	Incremented Base Invest. Before Tax	Incremental Profit	Incremental Net Back \$/m3	Incremental \$/Bbl	Cumulative Incremental Profit
750 000		-639 800			-639 800
201 000		147 000	6.23	.99	-492 800
		454 600	9.75	1.55	-38 100
		438 200	10.13	1.61	400 100
		446 600	11.19	1.78	846 700
<u>Status</u>					
750 000		-639 800			-639 800
201 000		850 200	36.16	5.75	210 400
		2048 600	43.90	6.98	2259 100
		2007 100	46.42	7.38	4266 200
		1973 700	49.43	7.86	6240 000

ATTACHMENT NO.2 - OPERATING COSTS

Year No.	Total Well Operating Costs	Injection System Operating Costs	Total Project Operating Costs
		<u>Base Case</u>	
1984	476 300	48 000	524 300
1985	504 900	53 100	558 000
1986	533 500	58 600	592 000
1987	554 200	65 200	619 500
1988	586 800	72 000	658 800
		<u>Incremental Case</u>	
1984	476 300	48 000	524 300
1985	504 900	364 600	869 500
1986	521 600	586 800	1108 400
1987	554 200	624 600	1178 800
1988	573 500	663 500	1237 000

Attachment No. 3

(6) Acceleration Economics

Example Problem No. 5

Assume that the annual revenue earned by the half-ton truck during the three-year contract described in Example Problem 1, could instead be earned over just two years by buying the larger 3/4-ton truck. The operating costs for the larger unit are expected to be \$7,000 in year 1 and \$8,300 in year 2. Is it profitable to accelerate earnings by spending the extra \$2,700?

$$C_A = \$12,700$$

	1	2	3
Accelerated Case	OC ₁ =\$7,000	OC ₂ =\$8,300	-
	A ₁ =\$15,000	A ₂ =\$15,000	-

$$C_B = \$10,000$$

	1	2	3
Base Case	OC ₁ =\$5,000	OC ₂ =\$6,000	OC ₃ =\$7,000
	A ₁ =\$10,000	A ₂ =\$10,000	A ₃ =\$10,000

$$C = \$2,700$$

	1	2	3
Acceleration Effect	OC ₁ =\$2,000	OC ₂ =\$2,300	OC ₃ =(\$ 7,000)
	A ₁ =\$5,000	A ₂ =\$5,000	A ₃ =(\$10,000)

Accelerated Case Cash Flow:

	0	1	2	3	Total
Annual Income	-	15,000	15,000	-	30,000
Operating Cost	-	7,000	8,300	-	15,300
Net Income after Op. Cost	-	8,000	6,700	-	14,700
Investment	12,700	-	-	-	12,700
Net Profit	(12,700)	8,000	6,700	-	2,000
Less Base Case Net Profit	(10,000)	5,000	4,000	3,000	2,000
Acceleration Net Profit	(2,700)	3,000	2,700	(3,000)	0

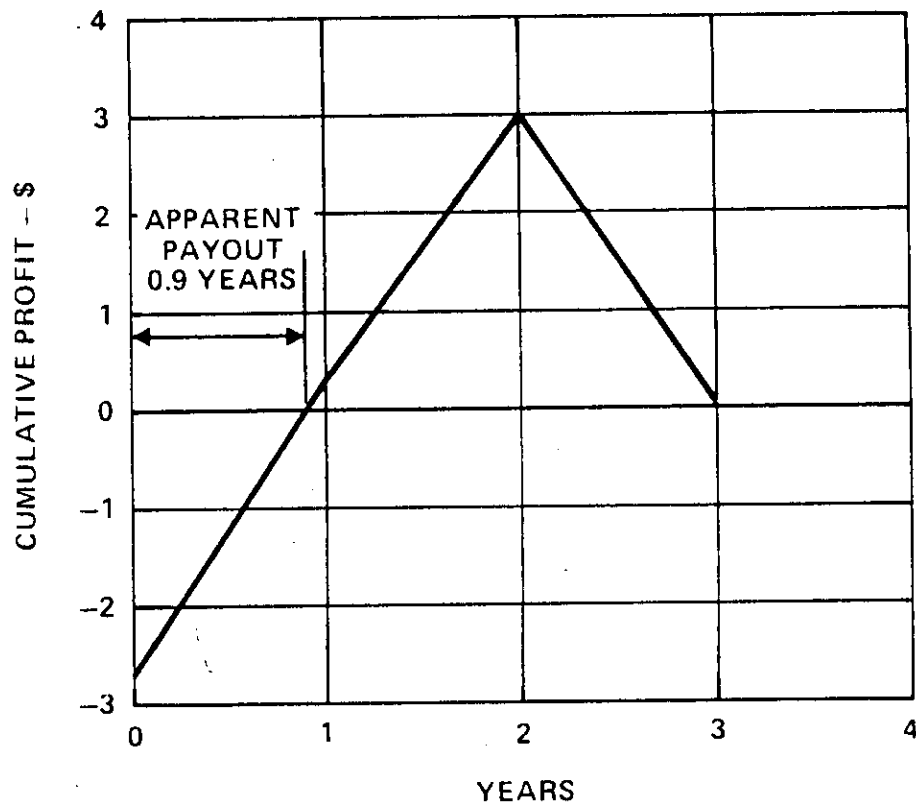
As indicated by the bottom line in example problem No. 5, the total acceleration net profit over the three year period is exactly zero. There was not a single extra dollar of net profit generated by the \$2700 used to accelerate income. Does this mean the exercise was futile?

Look at the standard measures of profitability. Payout of the acceleration capital is shown on the Acceleration Cash Flow Diagram, and it would appear that payout occurs after 0.9 years. But unhappily, the cash flow curve touches the zero base line again at the end of year 3, and if it had been necessary to buy even one extra spark-plug, the cumulative cash flow would have concluded in a net loss position. A project that is viewed as having paid out should not end in a net loss. In situations where the cash flow indicates that payout has occurred but later returns to debt and stays there, no true payout exists and the payout measure is viewed as meaningless.

We have all of the data needed to generate a rate of return and we can do this by fitting the acceleration investment and the acceleration net profit into a discount factor table. Upon completing the appropriate calculations we find that the behaviour of the present worth profit is unlike that which we have seen before. Instead of a maximum at zero discount rate followed by a declining series as the rate increases, we have a zero value at zero discount rate followed by a series which increases to a maximum and then decreases.

Figure # 1

EXAMPLE PROBLEM NO. 5
ACCELERATION CASH FLOW DIAGRAM



DISCOUNT FACTOR TABLE
(MID - YEAR)

	TIME ZERO	YEAR 1	YEAR 2	YEAR 3	TOTAL PRESENT WORTH OF NET PROFIT
DISCOUNT FACTORS AT 0%	1.0				
P.W. OF NET PROFIT AT 0%	(2700)	3000	2700	(3000)	0
DISCOUNT FACTORS AT 5%	1.0	0.9759	0.9294	0.8852	
P.W. OF NET PROFIT AT 5%	(2700)	2928	2509	(2656)	81
	1.0	0.9535	0.8668	0.7880	
10%	(2700)	2860	2340	(2364)	136
	1.0	0.9325	0.8109	0.7051	
15%	(2700)	2797	2189	(2115)	171
	1.0	0.9129	0.7607	0.6339	
20%	(2700)	2734	2054	(1902)	186
	1.0	0.8771	0.6747	0.5190	
30%	(2700)	2631	1822	(1557)	196
	1.0	0.8452	0.6037	0.4312	
40%	(2700)	2536	1630	(1294)	172
	1.0	0.8165	0.5443	0.3629	
50%	(2700)	2449	1470	(1089)	130
	1.0	0.7670	0.4512	0.2654	
70%	(2700)	2301	1218	(796)	23
	1.0	0.7071	0.3536	0.1768	
100%	(2700)	2121	955	(530)	(154)

The plot of present worth profit against rate of return for an acceleration case is very different from the curves indicated for regular rate of return or incremental rate of return projects. Most importantly, it demonstrates the curious property of intersecting the zero base line twice, once at 0% and once at 74% indicating that the acceleration rate of return is simultaneously 0% and 74%. Since this is an impossible situation, dual rates of return associated with acceleration cases are regarded as meaningless. Some other method must be used to measure the profitability of accelerating cash flows.

Figure #3

EXAMPLE PROBLEM No 5
DETERMINATION OF ACCELERATION
PROJECT RATE OF RETURN

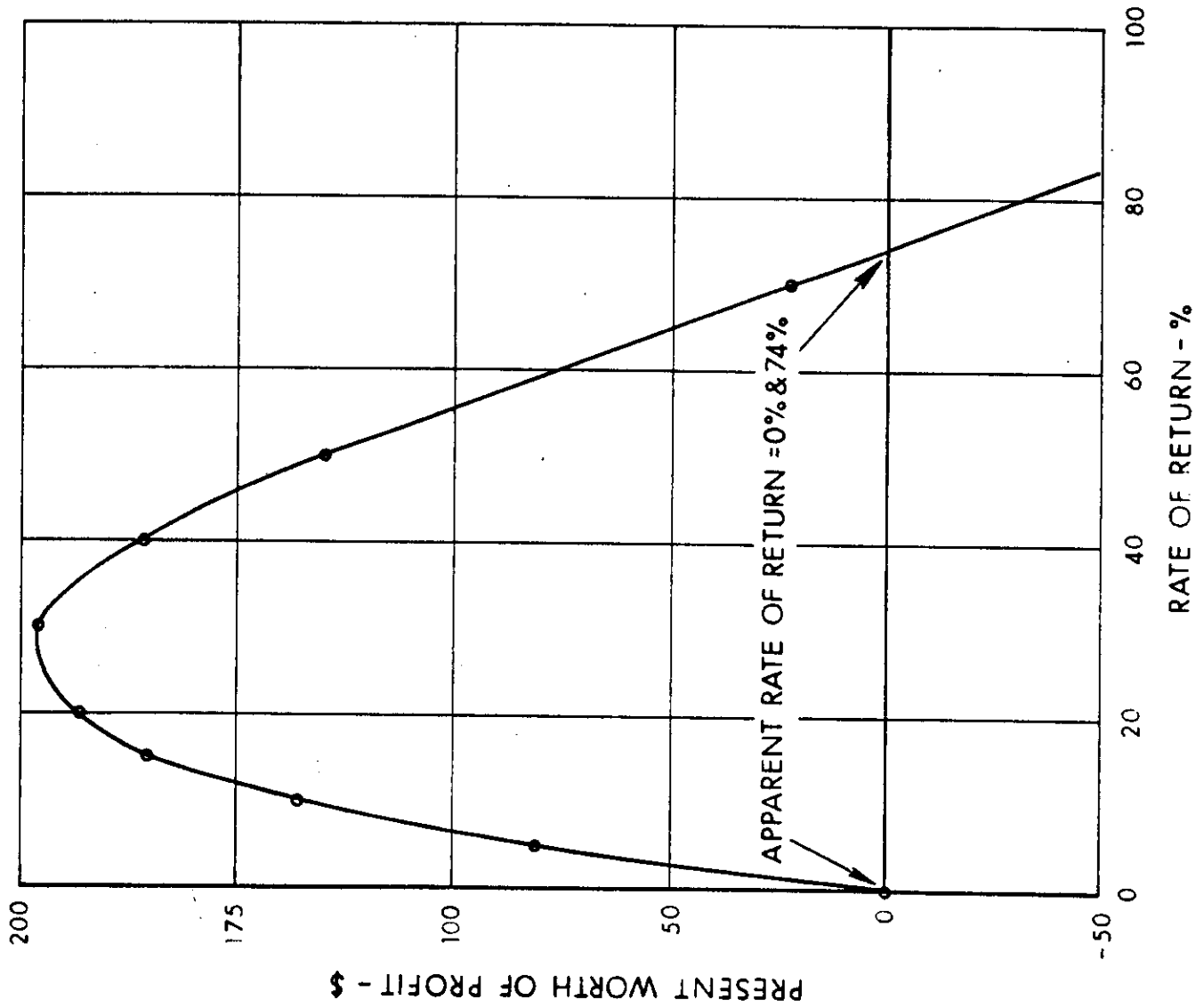
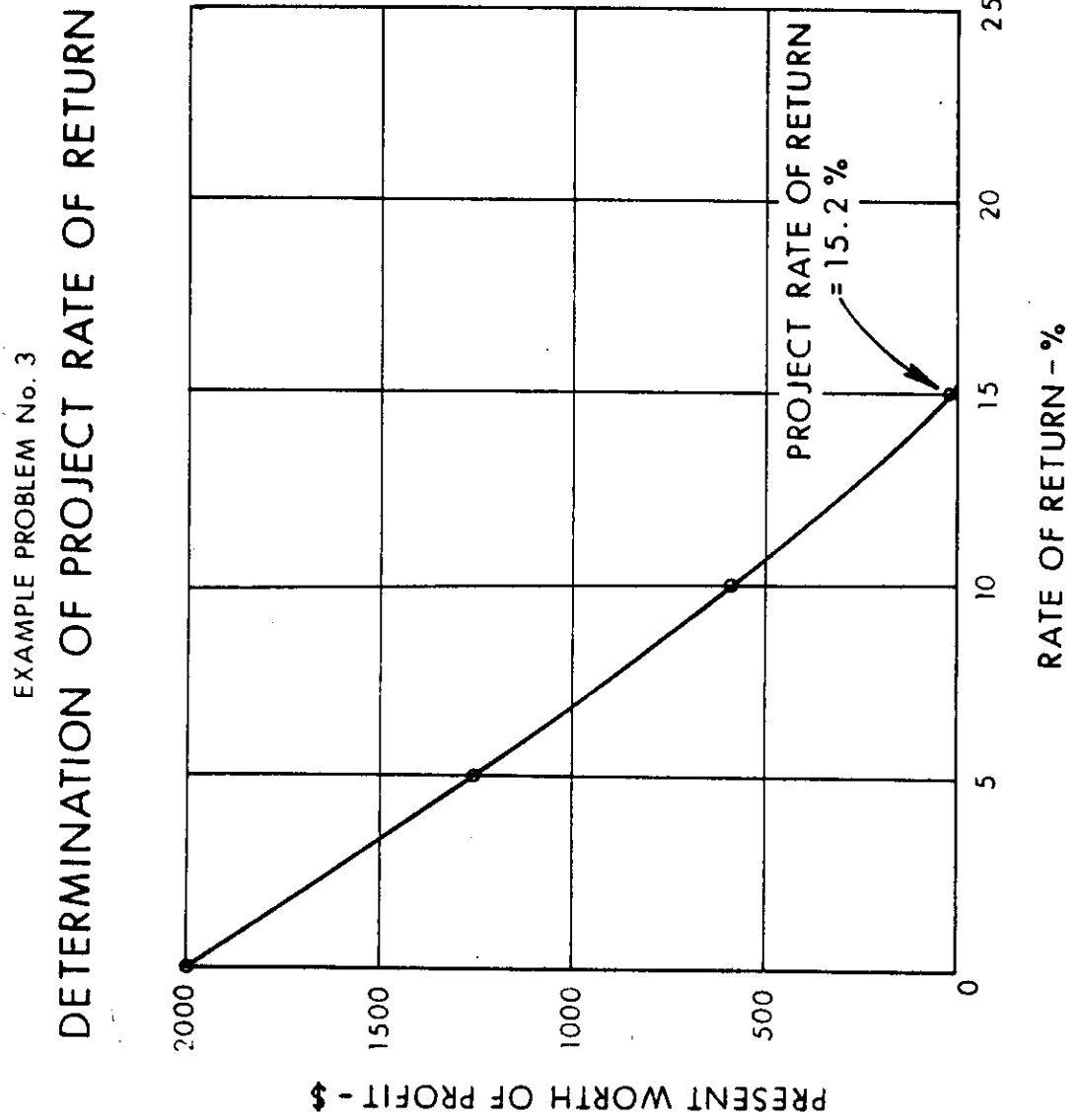
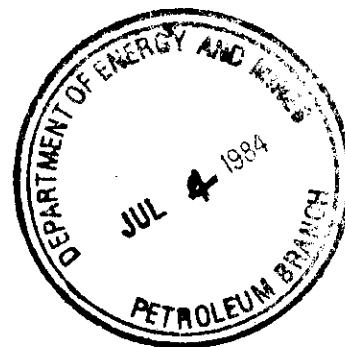


Figure # 4





Chevron Canada Resources Limited



Box 100
Virden, Manitoba
R0M 2C0

1984-07-04

Minister of Energy & Mines
Province of Manitoba
Attention: Mr. H. C. Moster
Director - Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

DALY UNIT #3 WATERFLOOD EXPANSION
APPLICATION FOR NEW OIL STATUS FOR
ROYALTY AND MINERAL TAX CALCULATIONS

Dear Sir:

Chevron Canada Resources Limited as operator of Daly Unit #3 hereby applies to the Minister of Energy and Mines for New Oil status for the calculation of Crown royalty and incremental mineral tax on the production above the projected present decline rate as shown by Figure No. 1. The reason for this application is that without New Oil status the economics are marginal and do not meet guidelines for capitol investment.

Expansion and modification of the existing waterflood is planned and has been applied for with a separate application to The Oil and Natural Gas Conservation Board. These changes are:

- 1) increased injection rates (at higher pressure)
- 2) convert 5 wells (1984) and 2 wells (1985) to injection
- 3) reactivate 3 injection wells

The Incremental case production forecast as shown by Figure No. 1 is based on a 1982 report by R. Trimble, the results of a similar project in Daly Unit #1 and anticipated response to 10 additional injection wells. The Incremental case has a higher production rate then the Base case for the first 25 years. The Base case forecast is projected on the stable present decline rate as shown by Figure No. 2. The production forecasts were terminated in the year 2023 because production beyond that is difficult to justify (downhole well equipment has a limited life and over 40 years is a long time to project). Theoretically, based on a terminal water-oil ratio of 30, the Base case should be extended to the year 2050 and the Incremental case to 2030.

The economics of the proposed project with New Oil status are a 2 year payout and present worth of incremental profit of \$10 million discounted at 15%. A rate of return is not defined because of the acceleration of oil production. Considering the nature of the Daly reservoir and condition of the wells (substantial risk of expensive and/or unsuccessful reworks), these economics are deemed satisfactory.

The investments used in calculating the above economics are:

	Investment (\$1000)
- 1984: upgrade water plant & injection system	465
: 8 additional injection wells (reactions and conversions)	285
- 1985: 2 additional injection wells (conversions)	90
: upgrade battery & water plant	100
	<hr/> \$940

The economics of the proposed project without New Oil status are a 3 year payout (undiscounted incremental profit of -\$30 million and \$1.5 million discounted at 15%) with incremental production of $420 \times 10^3 \text{ m}^3$. a negative undiscounted incremental profit resulting from the incremental production indicates the need for New Oil status to provide an economic incentive for the project. The above economics could easily be reduced by increased rework costs and possible limited or delayed waterflood response. An example of rework problems is the recent unsuccessful rework of 3-13-10-28 at a cost of \$90 000 which resulted in the well being abandoned.

This project is beneficial to all interested parties in that oil recovery is increased resulting in higher oil production rates in the immediate future and present worth value (\$) is increased. The attached Figure No. 3 shows the financial benefit to the Province of Manitoba resulting from Mineral Taxes, Crown Royalties and Provincial Income Tax received.

The recommended procedure to handle the calculation of Crown royalties and incremental mineral tax is:

- 1) calculate royalties and mineral tax for the projected Base case (Figure No. 1)
- 2) calculate royalties and mineral taxes for actual production rates using old oil rates
- 3) calculate incremental payments (i.e. (2) - (1))
- 4) calculate incremental payments with New Oil status (i.e. (3) x .55)
- 5) calculate total blended royalty and mineral tax payable (i.e. (1) + (4))

This procedure would only apply while the actual production was greater than the Base case (forecasted until 2010). The Daly Unit #3 decline curve may have to be adjusted upwards to account for unit enlargement which is presently being negotiated with affected parties of the waterflood expansion.

If new and replacement lines are to be installed this year they will have to be done during the summer and therefore an early approval on this application would be appreciated.

Yours truly

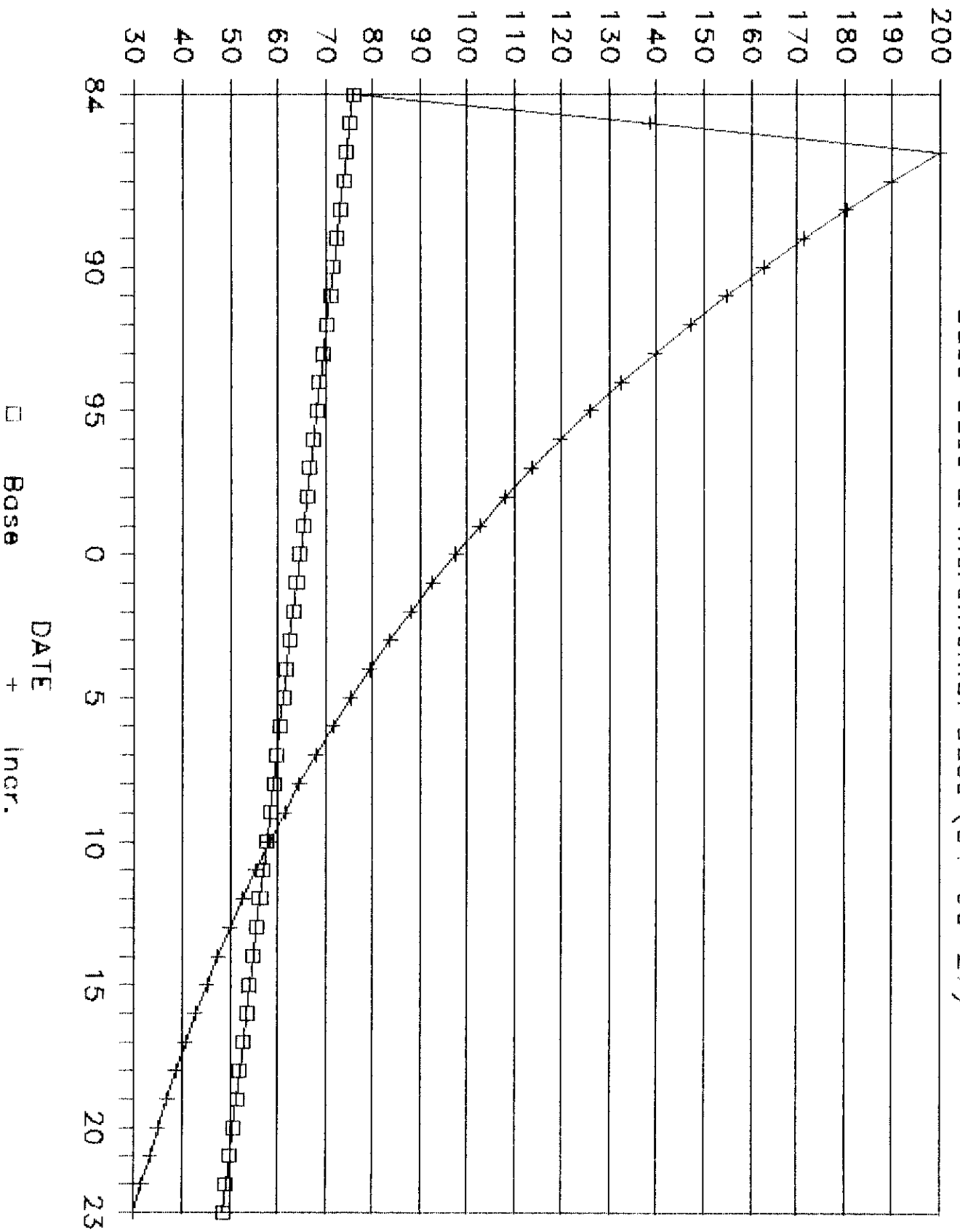


C. G. Folden, P. Eng.
Area Supervisor
Virden

DAILY UNIT #3 - PRODUCTION FORECAST

Base Case & Incremental Case (84-06-27)

TOTAL UNIT OIL PROD. RATE (m³/day)



July 18, 1984

Mr. Cal. Folden, P. Eng.
Area Supervisor
Chevron Canada Resources Limited
Box 100
Virden, Manitoba
R0M 2C0

Dear Mr. Folden:

As Andy Gararnyk mentioned to you in a telephone conversation on July 18, 1984, we have reviewed your proposal to have New Oil Status granted for the calculation of Crown royalty and incremental mineral tax on the production which exceeds the projected present decline rate in Daly Unit #3.

However, in order for the Branch to properly evaluate your proposal, we are requesting the following additional information.

1. What are the projections used for wellhead prices over the next five year period?
2. Detailed calculations on how payout was derived.
3. What is the expected incremental annual netback to the producer both with and without New Oil Status for the next five years?
4. A list of the assumptions used in preparing the Daly Unit #3 proposal.
5. In addition to the Summary of Provincial Income & Royalty Tables supplied, what other charges have been assessed against profit (i.e.: federal taxes, PGRT, operating costs, freehold royalties, etc.).

6. Why is it not possible to define a rate of return with the type of acceleration project proposed?
7. How much of the capital cost investment would have been required without the proposed modifications to the waterflood (i.e., upgrading of water plant, injection system and battery).

Your attention to this request is appreciated.

Yours sincerely,

Original Signed By

L. R. DUBREUIL

H. Clare Foster, P. Eng.
Director, Petroleum Branch

AG/lk

b.e. LRS.

Inter-Departmental Memo

To

S. J. Buchalak
Director
Mining & Use Taxes Branch
Dept. of Finance
Room 700, Herquay Bldg.

Date July 5, 1984

From

H. Clare Master
Director
Petroleum Branch
Dept. of Energy & Mines

Telephone

Subject

Re: New Oil Status - Chevron, Daly Unit No. 3

Attached is a copy of an application from Chevron Canada Resources Limited, dated 1984-07-04, relating to New Oil status under The Oil and Natural Gas Tax Act.

This Branch is reviewing the application with respect to Crown royalties and would appreciate any comments you might wish to present.

We shall be making recommendations to our Minister when our review is completed.

Original Signed by H. C. Master

H. Clare Master

HCM/sb

cc: - W. Parasiuk
- M. Eliassen
- I. Haugh

First Fold

Daly Unit #3 - PRODUCTION FORECAST

Base Case and Incremental Case (due to expanded waterflood)
1984-06-27

YEAR	BASE PRODUCTION CUBIC M./DAY	INCREMENTAL PRODUCTION CUBIC M./DAY
------	------------------------------------	---

1984	76	76	m ³
1985	75.3	138.5	
1986	74.6	200	
1987	73.9	190	220643
1988	73.2	180.5	
1989	72.5	171.5	
1990	71.8	162.9	
1991	71.1	154.8	244441
1992	70.4	147.1	
1993	69.7	139.7	
1994	69 291088	132.7	
1995	68.3	126.1	
1996	67.6	119.8	242871
1997	66.9	113.8	
1998	66.2	108.1	
1999	65.5	102.7	
2000	64.8	97.6	
2001	64.1	92.7	
2002	63.4	88.1	220095
2003	62.7	83.7	
2004	62 237798	79.5	
2005	61.3	75.5	
2006	60.6	71.7	
2007	59.9	68.1	
2008	59.2	64.7	
2009	58.5	61.5	184216
2010	57.8	58.4	
2011	57.1	55.5	
2012	56.4	52.7	
2013	55.7	50.1	
2014	55 212248	47.6	
2015	54.3	45.2	
2016	53.6	42.9	
2017	52.9	40.8	
2018	52.2	38.8	
2019	51.5	36.9	
2020	50.8	35.1	
2021	50.1	33.3	
2022	49.4	31.6	
2023	48.7 169178	30	
total	48		

(cum 2024-2035)
193377 m³

916312
1256970

2167282 - 27,56001P

46.3

2035

total 2560659 - 29.9 % W.P.
cum to 2035

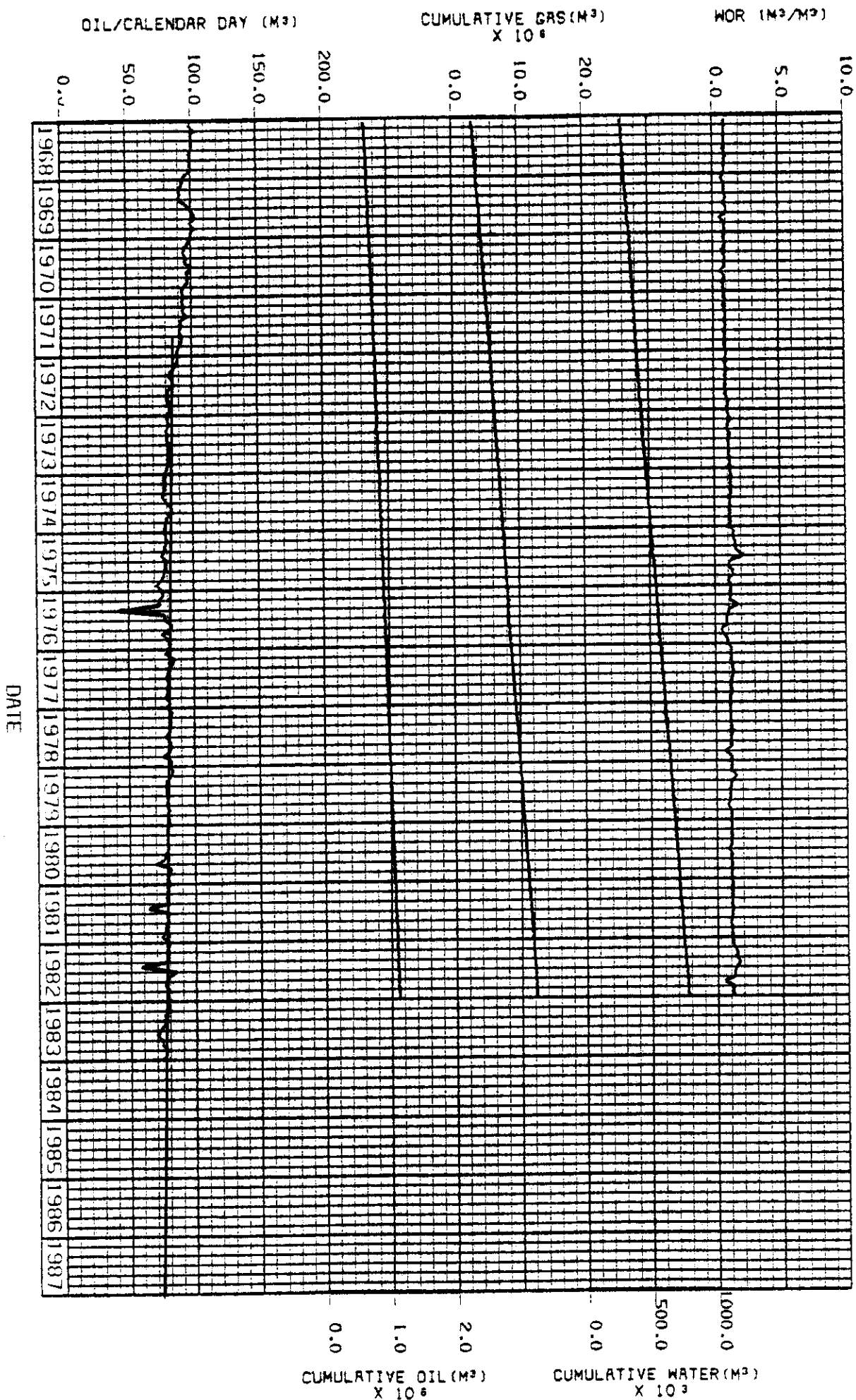
218599
1,330,865
+ 1,256,970 prod to 43-12-31
2,587,835 - 32.86001P

cum 2024-2035 = 95668 m³

cum
to 2035 2693562 - 34.6 W.P.

~ decline 5.16/yr

DALY UNIT NO. 3
PRODUCTION PLOT
SUMMARY



Daly Unit #3 - SUMMARY OF PROVINCIAL INCOME FROM PROPOSED WATERFLOOD EXPANSION

(A). BASE CASE - NO WATERFLOOD EXPANSION

YEAR	PROVINCIAL INCOME TAX (Undiscounted) \$1000	CROWN ROYALTY INCL. MIN. TAX (Undiscounted) \$1000	TOTAL PROV. INCOME (Undiscounted) \$1000	CUM. TOTAL PROV. INCOME (Undiscounted) \$1000
1984	478	745	1,223	1,223
1985	451	710	1,161	2,384
1986	479	740	1,219	3,603
1987	514	785	1,299	4,902
1988	541	812	1,353	6,255
1989	569	845	1,414	7,669
1990	611	904	1,515	9,184
1991	635	927	1,562	10,746
1992	680	977	1,657	12,403
1993	741	1,053	1,794	14,197
1994	779	1,092	1,871	16,068
1995	839	1,156	1,995	18,063
1996	910	1,236	2,146	20,209
1997	1,000	1,321	2,321	22,530
1998	1,098	1,430	2,528	25,058
1999	1,197	1,541	2,738	27,796
2000	1,299	1,635	2,934	30,730
2001	1,404	1,735	3,139	33,869
2002	1,522	1,868	3,390	37,259
2003	1,634	1,952	3,586	40,845
2004	1,758	2,068	3,826	44,671
2005	1,893	2,184	4,077	48,748
2006	2,009	2,275	4,284	53,032
2007	2,163	2,409	4,572	57,604
2008	2,302	2,551	4,853	62,457
2009	2,447	2,646	5,093	67,550
2010	2,622	2,771	5,393	72,943
2011	2,802	2,944	5,746	78,689
2012	3,007	3,087	6,094	84,783
2013	3,185	3,187	6,372	91,155
2014	3,263	3,216	6,479	97,634
2015	3,362	3,242	6,604	104,238
2016	3,431	3,268	6,699	110,937
2017	3,553	3,318	6,871	117,808
2018	3,625	3,343	6,968	124,776
2019	3,737	3,366	7,103	131,879
2020	3,815	3,427	7,242	139,121
2021	3,896	3,365	7,261	146,382
2022	2,792	2,829	5,621	152,003
2023	2,922	2,843	5,765	157,768
Total	75,965	81,803	157,768	

(B). INCREMENTAL CASE WITH OLD ROYALTY & MINERAL TAX

YEAR	PROVINCIAL INCOME TAX (Undiscounted) \$1000	CROWN ROYALTY INCL. MIN. TAX (Undiscounted) \$1000	TOTAL PROV. INCOME (Undiscounted) \$1000	CUM. TOTAL PROV. INCOME (Undiscounted) \$1000
1984	464	745	1,209	1,209
1985	824	2,211	3,035	4,244
1986	1,321	4,161	5,482	9,726
1987	1,350	4,152	5,502	15,228
1988	1,371	4,110	5,481	20,709
1989	1,374	4,038	5,412	26,121
1990	1,412	4,044	5,456	31,577
1991	1,411	3,938	5,349	36,926
1992	1,438	3,918	5,356	42,282
1993	1,497	3,933	5,430	47,712
1994	1,511	3,869	5,380	53,092
1995	1,549	3,839	5,388	58,480
1996	1,606	3,844	5,450	63,930
1997	1,678	3,875	5,553	69,483
1998	1,769	3,900	5,669	75,152
1999	1,849	3,896	5,745	80,897
2000	1,912	3,883	5,795	86,692
2001	1,985	3,825	5,810	92,502
2002	2,045	3,756	5,801	98,303
2003	2,108	3,666	5,774	104,077
2004	2,189	3,579	5,768	109,845
2005	2,231	3,481	5,712	115,557
2006	2,286	3,335	5,621	121,178
2007	2,335	3,228	5,563	126,741
2008	2,384	3,093	5,477	132,218
2009	2,443	2,985	5,428	137,646
2010	2,500	2,839	5,339	142,985
2011	2,558	2,717	5,275	148,260
2012	2,630	2,616	5,246	153,506
2013	2,681	2,454	5,135	158,641
2014	2,634	2,214	4,848	163,489
2015	2,593	2,050	4,643	168,132
2016	2,547	1,871	4,418	172,550
2017	2,503	1,747	4,250	176,800
2018	2,444	1,583	4,027	180,827
2019	2,407	1,434	3,841	184,668
2020	2,363	1,314	3,677	188,345
2021	2,281	1,165	3,446	191,791
2022	1,496	811	2,307	194,098
2023	1,469	767	2,236	196,334
Total	77,448	118,886	196,334	

(C). INCREMENTAL CASE WITH NEW ROYALTY & MINERAL TAX FOR INCR. PROD.

YEAR	PROVINCIAL INCOME TAX (Undiscounted) \$1000	CROWN ROYALTY INCL. MIN. TAX (Undiscounted) \$1000	TOTAL PROV. INCOME (Undiscounted) \$1000	CUM. TOTAL PROV. INCOME (Undiscounted) \$1000
1984	464	745	1,209	1,209
1985	824	1,508	2,332	3,541
1986	1,321	2,566	3,887	7,428
1987	1,350	2,583	3,933	11,361
1988	1,371	2,583	3,954	15,315
1989	1,374	2,553	3,927	19,242
1990	1,412	2,581	3,993	23,235
1991	1,411	2,541	3,952	27,187
1992	1,438	2,545	3,983	31,170
1993	1,497	2,585	4,082	35,252
1994	1,511	2,567	4,078	39,330
1995	1,549	2,586	4,135	43,465
1996	1,606	2,613	4,219	47,684
1997	1,678	2,667	4,345	52,029
1998	1,769	2,736	4,505	56,534
1999	1,849	2,779	4,628	61,162
2000	1,912	2,818	4,730	65,892
2001	1,985	2,828	4,813	70,705
2002	2,045	2,859	4,904	75,609
2003	2,108	2,832	4,940	80,549
2004	2,189	2,845	5,034	85,583
2005	2,231	2,840	5,071	90,654
2006	2,286	2,813	5,099	95,753
2007	2,335	2,804	5,139	100,892
2008	2,384	2,789	5,173	106,065
2009	2,443	2,776	5,219	111,284
2010	2,500	2,745	5,245	116,529
2011	2,558	2,717	5,275	121,804
2012	2,630	2,616	5,246	127,050
2013	2,681	2,454	5,135	132,185
2014	2,634	2,214	4,848	137,033
2015	2,593	2,050	4,643	141,676
2016	2,547	1,871	4,418	146,094
2017	2,503	1,747	4,250	150,344
2018	2,444	1,583	4,027	154,371
2019	2,407	1,434	3,841	158,212
2020	2,363	1,314	3,677	161,889
2021	2,281	1,165	3,446	165,335
2022	1,496	811	2,307	167,642
2023	1,469	767	2,236	169,878
Total	77,448	92,430	169,878	

(D). SUMMARY OF DISCOUNTED TOTAL PROVINCIAL INCOME CALCULATIONS

DISCOUNT RATE (%)	PRESENT WORTH OF TOTAL PROVINCIAL INCOME		
	BASE CASE, i.e. NO EXPANSION	INCR. CASE W/ OLD ROYALTIES & MINERAL TAX	INCR. CASE W/ NEW ROYALTIES & MINERAL TAX
	\$1000	\$1000	\$1000
0	157,768	196,334	169,878
10	21,122	47,286	37,100
15	11,757	30,744	23,574
20	7,815	22,079	16,741

DAILY OIL PRODUCTION

WELLS PRODUCING

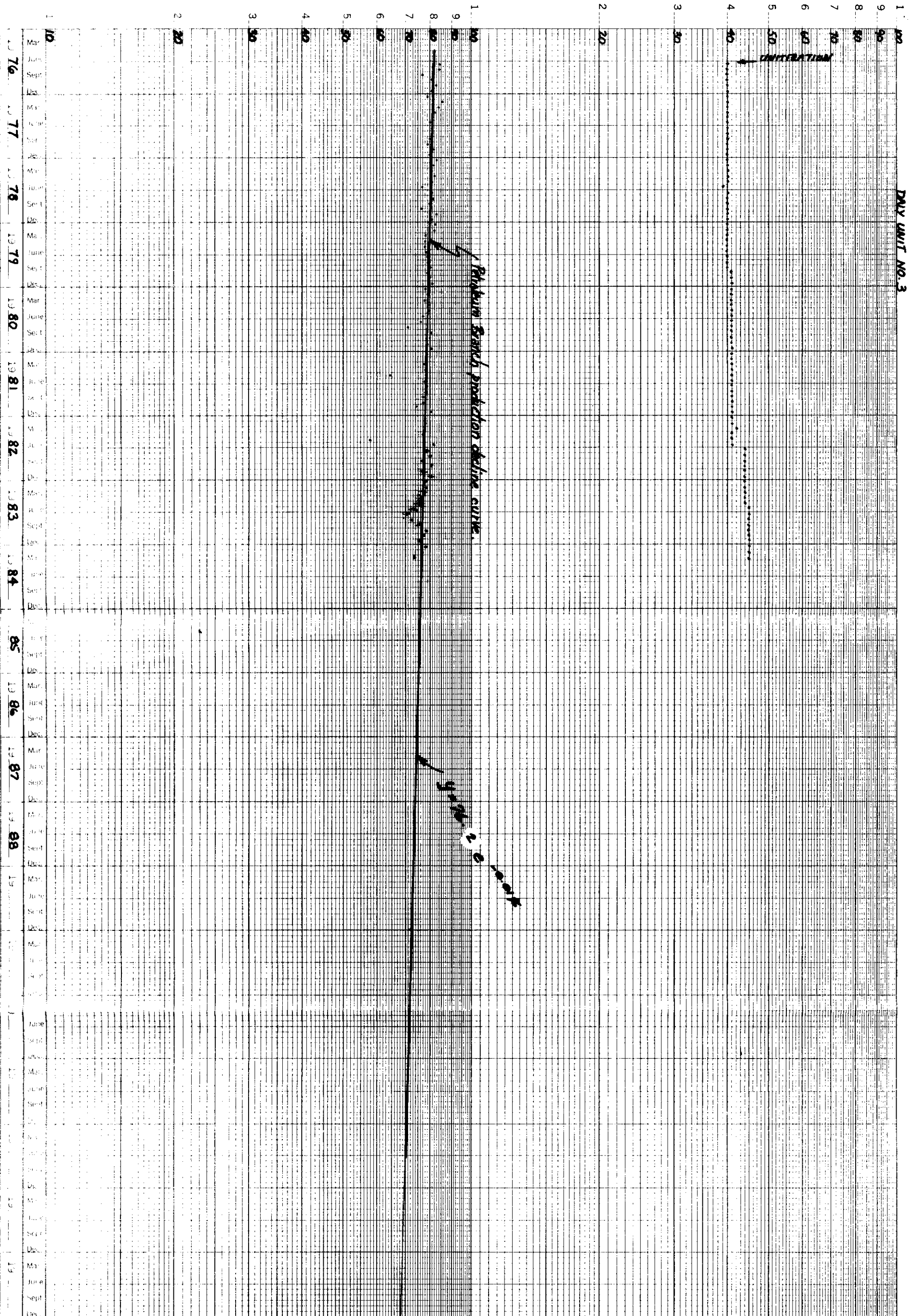


FIGURE No. 1

SCHEDULE D

(Sec. 4.1)

The mill rate for the tax imposed under section 4.1 in respect of assessment based on oil will depend upon the number of cubic metres, to the nearest 1/10 of a cubic metre, produced per month from the unit of minerals and, if the well on the parcel of land in respect of which the unit of minerals exists is a developed well, will be the mill rate shown under the 2nd column opposite to the production rate shown in the 1st column; if the well is a new well, or a developed well the production of which is approved under subsection 4.1(6) as new oil, will be the mill rate shown in the 3rd column opposite the production rate shown in the 1st column; if the well is a new well within its production incentive period, will be the mill rate shown in the 4th column opposite the production rate shown in the 1st column; and, where a part of the oil from a developed well is new oil within the meaning of sub-clause 2(1)(f.1)(ii) or is approved under subsection 4.1(6) as new oil, the mill rate in respect of that well will be a combination of the appropriate mill rate shown in the 2nd column and the appropriate mill rate shown in the 3rd column, calculated in accordance with the following formula:

Formula

$$\text{Mill Rate} = \frac{(\text{OP} \quad)}{(\text{TP} \quad)} \times (\text{MR2}) + \frac{(\text{NP} \quad)}{(\text{TP} \quad)} \times (\text{MR3})$$

In this formula

OP is the cubic metres of oil, to the nearest 1/10 of a cubic metre, other than new oil, produced per month.

TP is the total cubic metres of oil, to the nearest 1/10 of a cubic metre, produced per month.

MR2 is the mill rate shown in the 2nd column opposite the total production per month shown in the 1st column.

NP is the cubic metres of new oil, to the nearest 1/10 of a cubic metre, produced per month.

MR3 is the mill rate shown in the 3rd column opposite the total production per month shown in the 1st column.

Where the mill rate obtained by this formula includes a fraction, if the fraction is less than 1/2 the fraction will be dropped but if the fraction is 1/2 or more the fraction will be dropped and the mill rate increased to the next whole number.

DALY UNIT 3 ROYALTY AND MINERAL TAX

1984-04-30

CROWN ROYALTY & MINERAL TAX - M³/DAY

