Waskada Unit No. 6
Pressure Survey

July 13, 1992

Mr. Shing-Ming Chen
Senior Reservoir Engineer
Tundra Oil and Gas Ltd.
1313 - One Lombard Place
Winnipeg, Manitoba
R3B OX3

Dear Mr. Chen:

RE: WASKADA UNIT NO. 6
ANNUAL PRESSURE SURVEY

Your plan to conduct pressure surveys on eight wells in Waskada Unit No. 6 is hereby approved.

Please submit a copy of the pressure survey results and interpretation to the Branch as soon as possible after compilation of the testing.

Yours truly,

ORIGINAL SIGNED BY
JOHN N. FOX

John N. Fox, P. Eng
Chief Petroleum Engineer

cc: Virden Engineer

Tundra oil and gas ltd.

July 9, 1992

Department of Energy and Mines
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Attention: Mr. John Fox

Dear Mr. Fox:

RE: 1992 PRESSURE SURVEY
Waskada Unit No. 6

Attachment 1 shows a list of wells Tundra intends to include for the above survey. The survey is comprised of four producing wells, two injection wells and two shut-in wells. One Mission Canyon well is being included in order to determine the communication with Spearfish Formation. All the wells will be shut-in until static bottomhole pressures can be determined.

Attachment 2 lists all the historical pressure survey results. As most of the pressures obtained from the same wells showed consistent results (especially after the waterflood implementation - see Attachment 2), the 1992 survey candidates are selected with an objective of gaining additional information but not to duplicate the information which already exists. The survey results, in conjunction with other field data, will be analysed to assist our in-house waterflood optimization study currently being conducted.

Should you have any questions, please do not hesitate to contact us.

Sincerely,

S. M. Chen

Shing-Ming Chen
Senior Reservoir Engineer

SMC/bp

Enclosures

cc Robert G. Puchniak
Tim Howell

1313-One Lombard Place, Winnipeg, Manitoba, Canada R3B 0X3 Telephone: (204) 934-5850 Fax (204) 934-5820

ATTACHMENT 1: 1992 Pressure Survey Candidates
- Waskada Unit No.8

Well	Status	Estimated S.I Period (days)	Remarks
16-07-01-25	I	28 (or longer)	Inj. rate decreased from 50 m3/d in 1987 to 5 m3/d in 1992.
6-07-01-25	P	10-11	-
04-18-01-25	P	10-11	No response to water-flood.
06-18-01-25	PUSI?	-	-
01-12-01-26	P	10-11	-
02-12-01-26	P	7	-
07-12-01-26	I	28 (or longer)	Inj. rate decreased from 50 m3/d in 1987 to 7 m3/d in 1992.
2-07-01-25MC	PUSI?	-	Completed in Mission Canyon.

Remarks:- Acoustic survey or surface pressure measurement will be conducted.
- P : Producing well
I : Water injector
SI: Shut-in
MC: Mission Canyon well

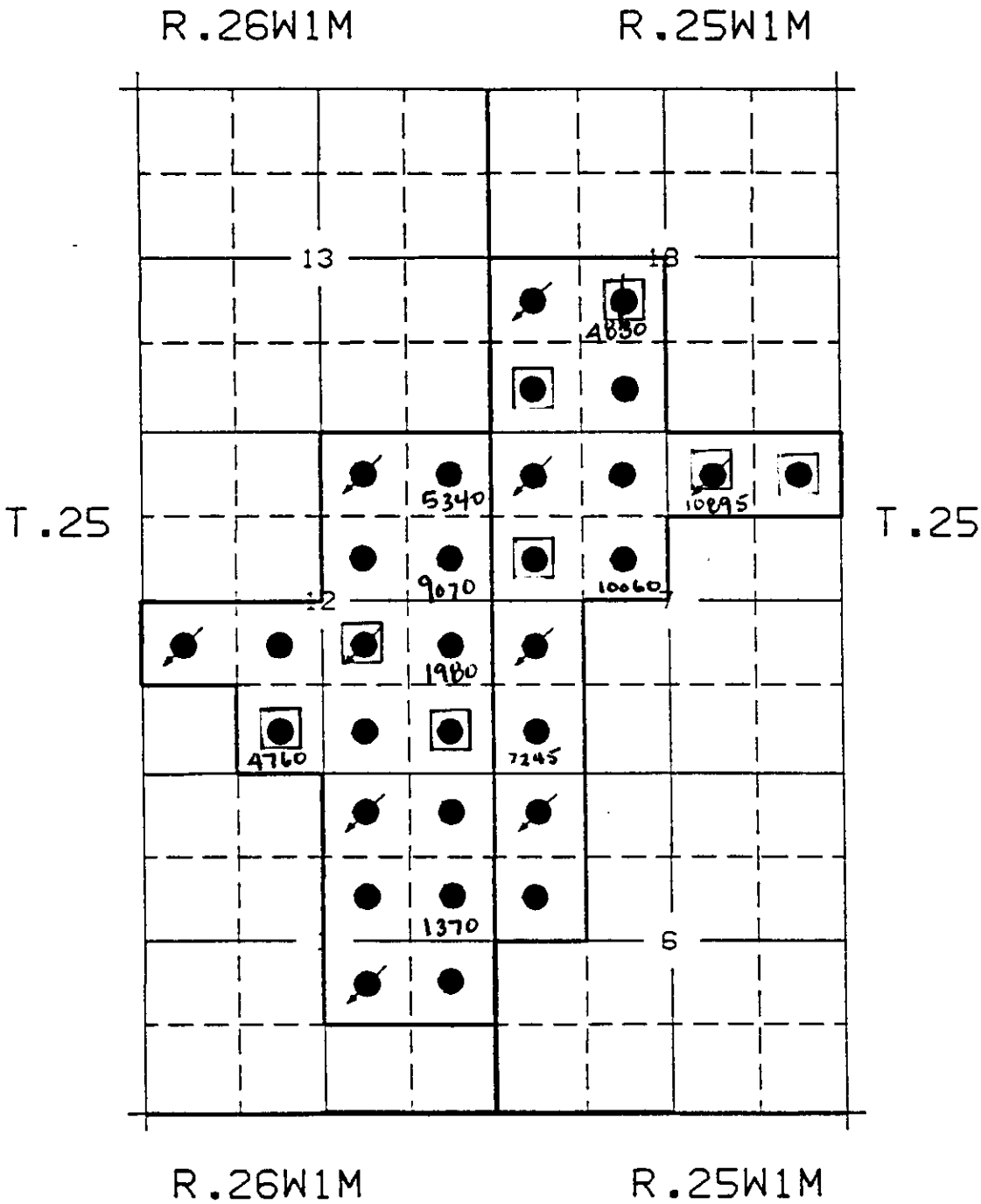
ATTACHMENT 2: Historical Pressure Data - WASKADA [illegible]

Well Name	Datum Pressure (kPa) 1988	1989	1990	1991
04-07-01-25	-	7011	7302	7215
05-07-01-25	6633	10416	-	-
11-07-01-25	5819	9099	9880	10060
12-07-01-25	6100	-	-	-
12-07-01-25	5963	-	-	-
11-07-01-25	7622	-	-	-
3-07-01-25	-	9653	10791	10895
03-18-01-25	5853	-	-	-
11-18-01-25	3748	-	-	-
03-18-01-25	3291	-	-	-
06-18-01-25	3536	1338	5091	1830
03-01-01-26	6180	-	-	-
07-01-01-26	6608	-	-	-
05-01-01-26	-	1152	956	1370
09-01-01-26	3145	-	-	-
16-01-01-26	1738	-	-	-
01-12-01-26	2908	-	-	-
03-12-01-26	-	3103	1893	1760
05-12-01-26	8676	-	-	-
07-12-01-26	2518	-	-	-
08-12-01-26	1748	-	1570	1980
09-12-01-26	-	8915	3125	5070
10-12-01-26	5054	5755	5381	5340

Remarks:
1. Local Datum= 1[illegible] m.ss
2. Waterflood commenced in 1987.09

FIGURE 1

WASKADA UNIT NO. 6
AREA MAP



7245 1991 PRESS. SURVEY RESULTS

OIL WELL

WATER INJECTION WELL

UNIT BOUNDARY

1992 PRESS. SURVEY

Chevron

Chevron Canada Resources

P.O. Box 100, Virden, Manitoba R0M 2C0
Phone (204) 748-1334 Fax (204) 748-6762

July 3, 1991

Waskada Unit #6 1991 Pressure Survey

Department of Energy and Mines
Petroleum Branch
Attention: Mr. John Fox
555 - 330 Graham Avenue
WINNIPEG, Manitoba
R3C 4E3

Dear Sir:

Enclosed are the results of the subject pressure survey. The results from 1989 and 1990 are also included for comparison purposes. Datum Depth pressures are indicating that the waterflood is maintaining pressures with slight increases noted at some wells. Two wells were excluded from the results, 5-7-1-25 because of a packer installation and 7-12-1-26 because the pressure chart fell to 0 kPa during the fall off test.

If you have any questions or concerns regarding the above, please contact Tom Ruml or Kevin Anderson at 748-1334 or at the letterhead address.

Yours truly,

for J. E. CAUSGROVE, P. Eng.
Area Superintendent
Virden

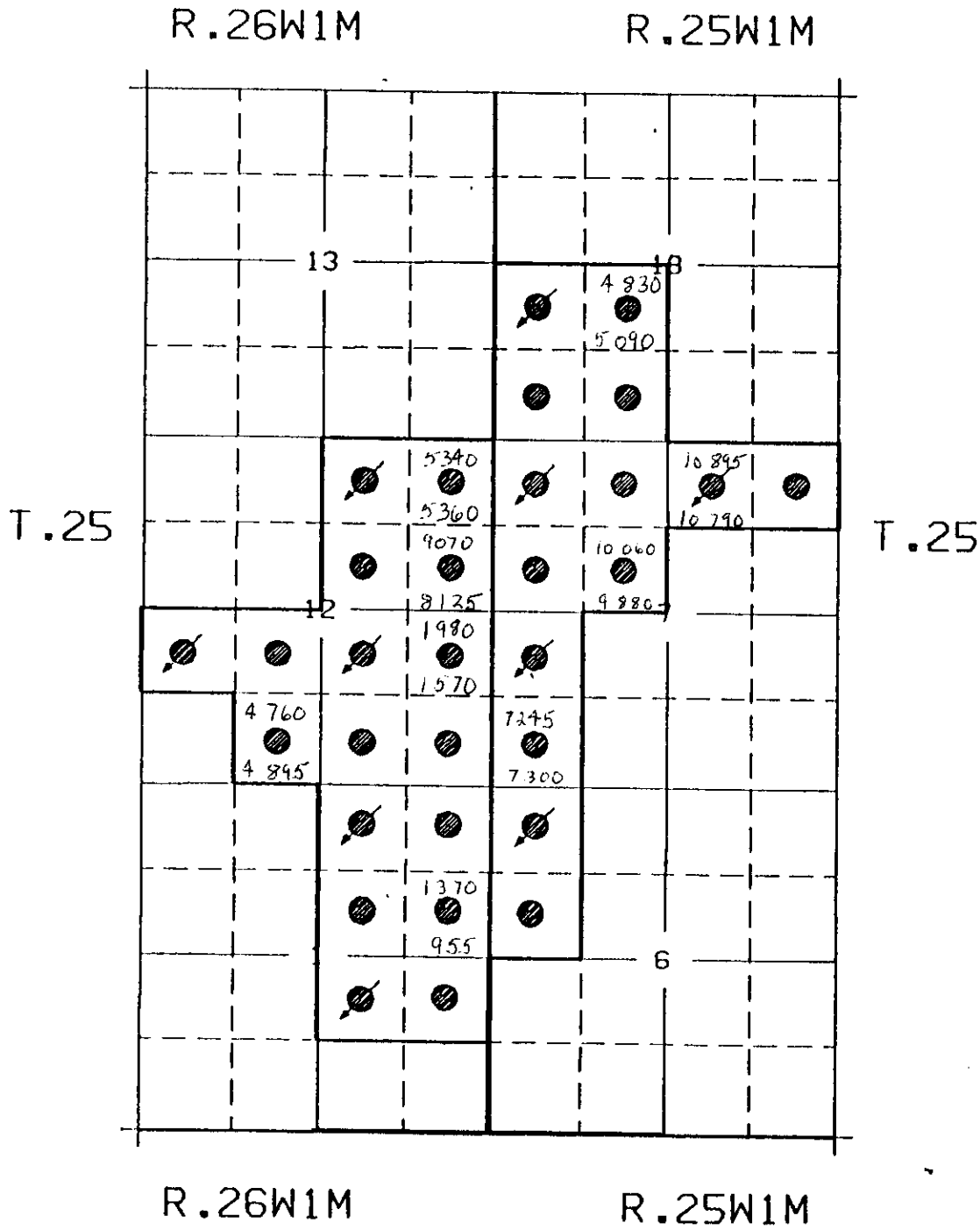
TJR/tjs
Enclosures

WASKADA UNIT #6 1991 PRESSURE SURVEY RESULTS

		Datum Depth Pressure (kPa)		
Well	Type of Survey	1989	1990	1991
4-7-1-25	Sonolog	7 040	7 300	7 245
11-7-1-25	Sonolog	9 700	9 880	10 060
15-7-1-25	Fall Off	9 655	10 790	10 895
6-18-1-25	Sonolog	4 340	5 090	4 830
9-1-1-26	Sonolog	1 150	955	1 370
3-12-1-26	Sonolog	-	4 895	4 760
8-12-1-26	Sonolog	-	1 570	1 980
9-12-1-26 MC-3	Sonolog	8 945	8 125	9 070
16-12-1-26 LAM	Sonolog	5 755	5 360	5 340

FIGURE I

WASKADA UNIT NO. 6
AREA MAP



7245 91 pressure

7300 90 pressure

OIL WELL

WATER INJECTION WELL

UNIT BOUNDARY

Chevron Canada Re
P.O. Box 100, Virden, Manitoba R0
Phone (204) 748-1334 Fax (204) 748-6762

~~REVIEW~~

FILE
WASKADA
UNIT No. 6
Pressure Surveys

January 9,1991

Department of Energy and Mines
Petroleum Branch
555 - 330 Graham Ave.
Winnipeg, Manitoba
R3C 4E3

Attention Mr. John Fox

Dear Sir:

RE: Waskada Unit #6
1990 Reservoir Pressure Survey

Please find enclosed the results of the above survey. The results have been tabulated on the following page with results from the 1989 survey for comparison purposes. For your convenience the results are also shown along with the 1989 results on the attached map. One well, 5-7-1-25 MC3, which was to be included in the survey was omitted due to logistic reasons.

If you have any questions regarding the above, please contact Steve Pierce or Kevin Anderson at 748-1334 or at the letterhead address.

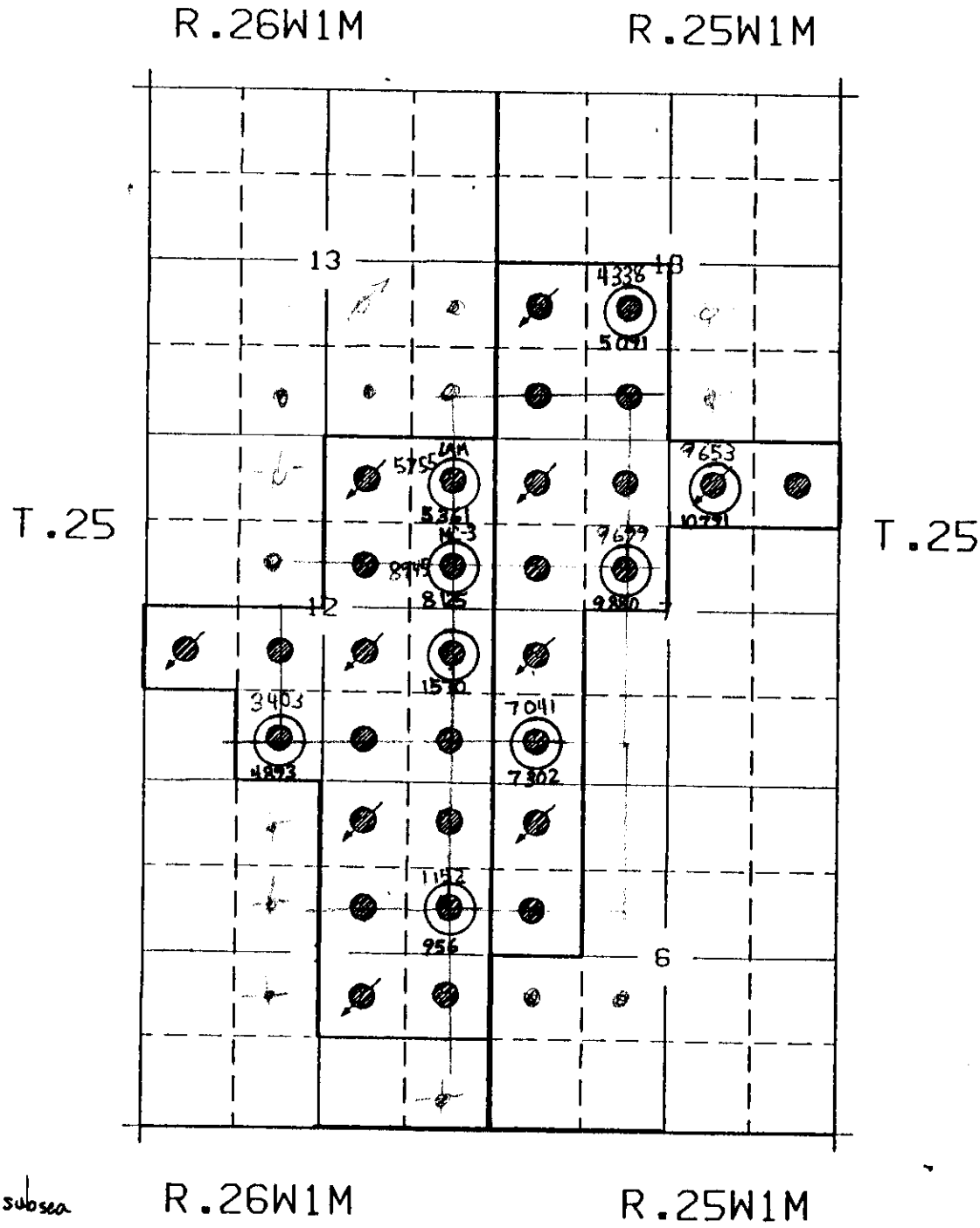
Yours Truly

FOR L.A. Martinson
Area Superintendent
Virden

WELL	TYPE OF SURVEY	DATUM DEPTH PRESSURE 1989	1990
4-7-1-25	SONOLOG	7 041	7 302
5-7-1-25 MC3	SONOLOG	10 416	
11-7-1-25	SONOLOG	9 699	9 880
13-7-1-25 LAM	FALL OFF	------	
15-7-1-25	FALL OFF	9 653	10 791
6-18-1-25	SONOLOG	4 338	5 091
7-1-1-26	FALL OFF	------	
9-1-1-26	SONOLOG	1 152	956
3-12-1-26	SONOLOG	3 403	4 893
7-12-1-26	FALL OFF	------	
8-12-1-26	SONOLOG		1 570
9-12-1-26 MC3	SONOLOG	8 945	8 125
16-12-1-26 LAM	SONOLOG	5 755	5 361

FIGURE I

WASKADA UNIT NO. 6
AREA MAP



Datum Depth 440 m subsea

Wells in 1990 survey

7302 1990 BHP (KPa)

3403 1989 BHP (KPa)

OIL WELL

WATER INJECTION WELL

UNIT BOUNDARY

Manitoba

Energy and Mines Petroleum

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

(204) 945-6577

July 13, 1990

Chevron Canada Resources
P.O. Box 100
Virden, Manitoba
R0M 2C0

Attention: Mr. L.A. Martinson, P.Eng.
Area Superintendent, Virden

Dear Lyle:

Re: Waskada Unit No. 6
1990 Reservoir Pressure Survey

Your letter outlining Chevron's plans for the Waskada Unit No. 6, 1990 annual pressure survey is hereby acknowledged.

Your plan to conduct a pressure build-up test on 9 wells and a fall-off test on one well using an AWS is approved.

Yours truly,

B. Steinhauer

for John N. Fox
Chief Petroleum Engineer

JNF:cvs

Chevron Canada Resources
P.O. Box 100, Virden, Manitoba R0M 2C0
Phone (204) 748-1334 Fax (204) 748-6762

1990-07-09

Department of Energy and Mines
Petroleum Branch
555-330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

ATTENTION: Mr. J. Fox
Chief Petroleum Engineer

RE: Waskada Unit #6
1990 Reservoir Pressure Survey

Attached is a list of wells Chevron intends to include for the above survey. The survey is comprised of six Spearfish producing wells, two Mission Canyon producing wells, one injection well and one suspended well. Two MC-3 wells are being included to determine if Spearfish water injection is providing pressure support for MC-3 wells.

The producing wells will be shut-in and sonologged weekly until pressure build-up is less than 5% per week. The injection well will be surveyed by surface fall off test.

If you have any questions regarding the above, please contact Steve Pierce or Kevin Anderson at 748-1334 or at the letterhead address.

Yours truly,

FOR Stephen Pierce

L.A. Martinson, P.Eng.
Area Superintendent
Virden

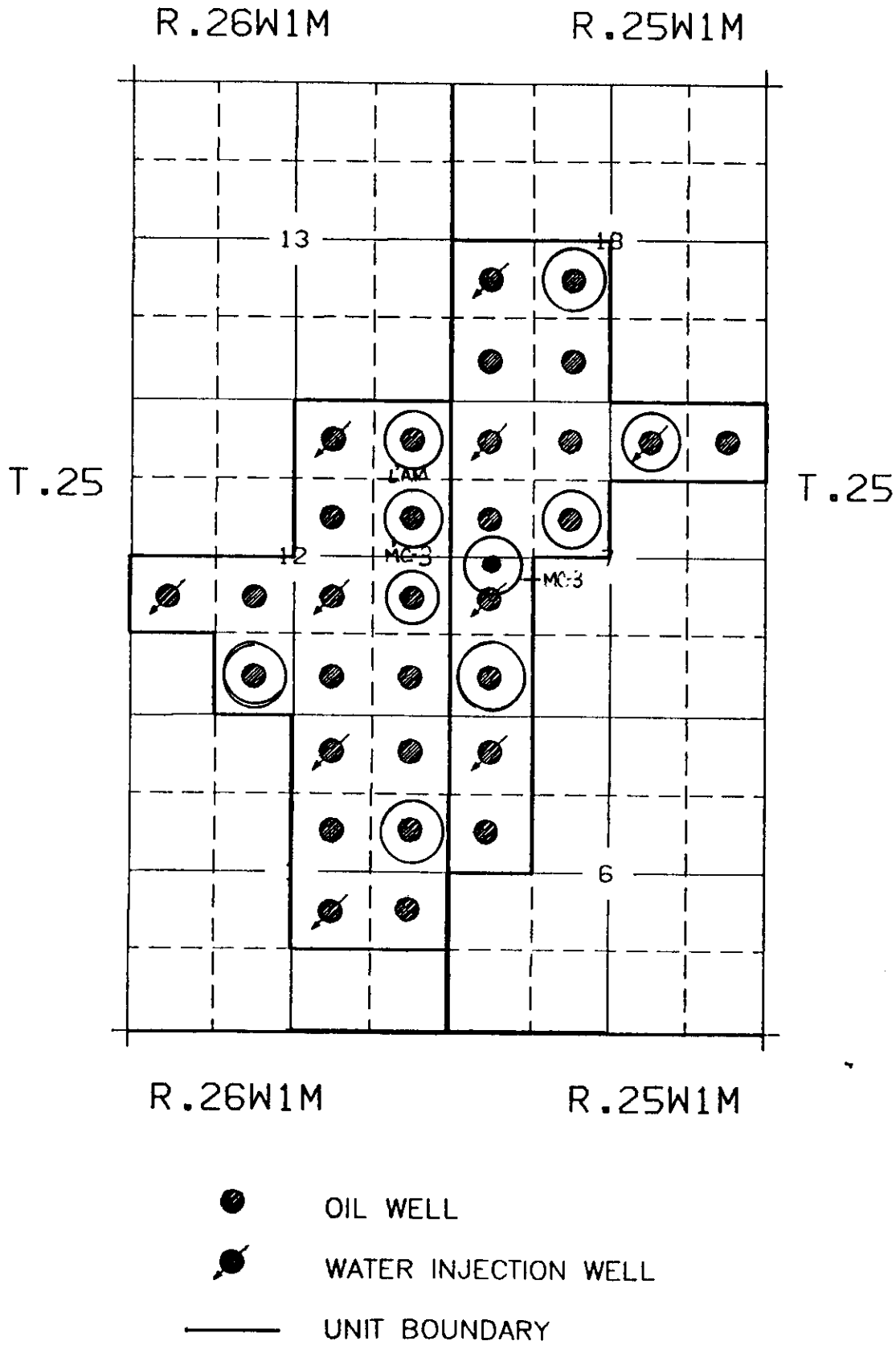
Waskada Unit #6

Proposed Wells For 1990 Pressure Survey

WELLS	TYPE OF SURVEY	WELL STATUS
4-7-1-25	Sonolog	Producing
5-7-1-25 MC-3	Sonolog	Producing
11-7-1-25	Sonolog	Suspended
15-7-1-25 WIW	Fall-off	Injection
6-18-1-25	Sonolog	Producing
9-1-1-26	Sonolog	Producing
3-12-1-26	Sonolog	Producing
8-12-1-26	Sonolog	Producing
9-12-1-26 MC-3	Sonolog	Producing
16-12-1-26 LAM	Sonolog	Producing

FIGURE I

WASKADA UNIT NO. 6
AREA MAP



Chevron

Chevron Canada Resour
P.O. Box 100, Virden, Manitoba R0M 2C0
Phone (204) 748-1334 Fax (204) 748-6762

FILE:
WASKADA
UNIT #6
PRESSURE
SURVEY 0329A

1989-10-31

Department of Energy and Mines
Petroleum Branch
555 - 330 Graham Avenue
WINNIPEG, Manitoba
R3C 4E3

ATTENTION: Mr. John Fox

Dear Sir:

RE: Waskada Unit #6 - 1989 Subsurface Pressure Survey

Chevron Canada Resources, as operator of Waskada Unit #6, submits the following information regarding the 1989 Annual Subsurface Pressure Survey:

1. List of wells and the method of survey used.

2. Calculated reservoir pressures from the 1989 Survey.

3. A map of Waskada Unit #6 showing the calculated pressures.

This was the initial pressure survey done in Waskada Unit #6 and as such is inconclusive. Future pressure surveys will assist in evaluating the waterflood.

Bottom hole pressures at three injectors (13-7, 7-1 and 9-1) could not be calculated as the wellhead pressures dropped to 0 kPa during the fall off survey.

Should you have any questions regarding the enclosed information, please contact Mr. T. J. Ruml or Mr. J. Cooke at 748-1334 or at the letterhead address.

Yours truly,

for Mr. L. A. Martinson, P. Eng.
Area Superintendent
Virden

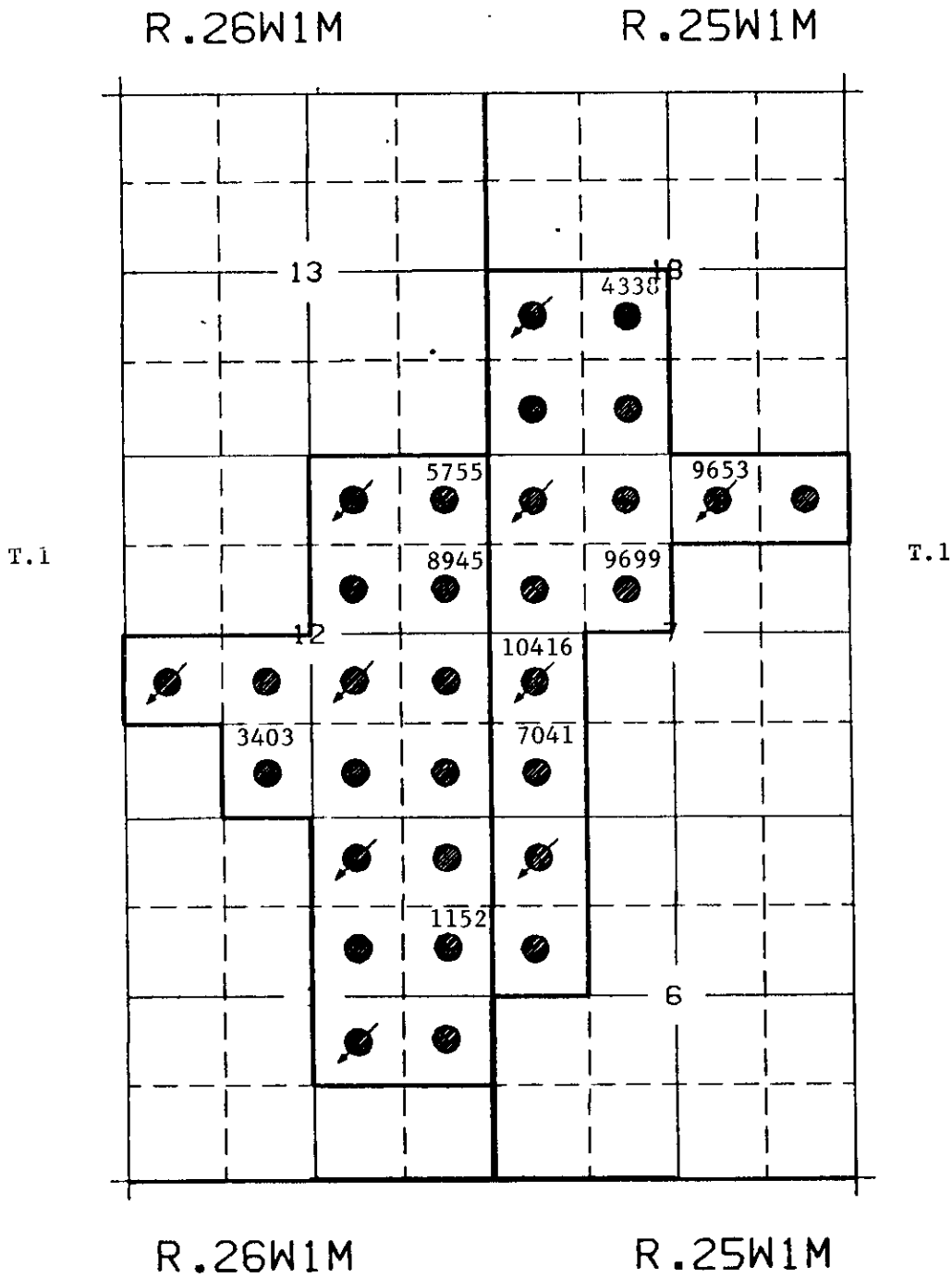
TJR/tjs
Enclosures

1989 Pressure Survey Results
Waskada Unit #6

Well	Type of Survey	Datum Depth Pressure (kPa)
4-7-1-25	Sonolog	7 041
5-7-1-25	Sonolog	10 416
11-7-1-25	Sonolog	9 699
13-7-1-25LAM WIW	Fall-off	-
15-7-1-25 WIW	Fall-off	9 653
6-18-1-25	Sonolog	4 338
7-1-1-26 WIW	Fall-off	-
9-1-1-26	Sonolog	1 152
3-12-1-26	Sonolog	3 403
7-12-1-26 WIW	Fall-off	-
9-12-1-26	Sonolog	8 945
16-12-1-26LAM	Sonolog	5 755

FIGURE 1

WASKADA UNIT NO. 6
AREA MAP



7041 1989 Pressures

OIL WELL

WATER INJECTION WELL

UNIT BOUNDARY

Manitoba

Energy and Mines Petroleum

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

(204) 945-6577

June 19, 1989

Chevron Canada Resources Ltd.
Box 100
Virden, Manitoba
R0M 2C0

Attention: Mr. L. A. Martinson, P. Eng.

Dear Sir:

Re: Waskada Unit No. 6 - 1989 Pressure Survey

Your letter dated June 8, 1989 outlining the proposed annual pressure survey for the Waskada Unit No. 6 is acknowledged.

Your proposal to conduct pressure fall-off tests on 4 injection wells and pressure build-up tests on 7 producing and 1 suspended well using a sonolog is hereby approved.

Yours sincerely,

L. R. Dubreuil
Director

LRD:jtb

0329A

Chevron Canada Resources
295 – 3rd Avenue S., P.O. Box 100, Virden, Manitoba R0M 2C0
Phone (204) 748-1334

1989-06-08

Department of Energy and Mines
Petroleum Branch
555 - 330 Graham Avenue
WINNIPEG, Manitoba
R3C 4E3

ATTENTION: Mr. J. Fox
Chief Petroleum Engineer

Dear Sir:

RE: Waskada Unit #6
1989 Reservoir Pressure Survey

Attached is a list of wells Chevron intends to include for the above survey. The survey is comprised of five Spearfish producing wells, two Mission Canyon producing wells, four injection wells, and one suspended well. Two MC3 wells are being included to determine if Spearfish water injection is communicating into the MC3 wells.

Chevron plans to survey the injection wells with surface fall-off tests while the producing wells will be shut-in and sonologged weekly until pressure build-up is less than 5% per week.

If you have any questions regarding the above, please contact Pat Osachuk or John Cooke at 748-1334 or at the letterhead address.

Yours truly,

Patrick Osachuk

For L. A. Martinson, P. Eng.
Area Superintendent
Virden

TNPO/tjs
Attachments

PROPOSED WELLS FOR 1989 PRESSURE SURVEY
WASKADA UNIT #6

Well	Type of Survey	Well Status
4-7-1-25	Sonolog	Producing
5-7-1-25 MC3	Sonolog	Producing
11-7-1-25	Sonolog	Suspended
13-7-1-25LAM WIW	Fall-off	Injection
15-7-1-25 WIW	Fall-off	Injection
6-18-1-25	Sonolog	Producing
7-1-1-26 WIW	Fall-off	Injection
9-1-1-26	Sonolog	Producing
3-12-1-26	Sonolog	Producing
7-12-1-26 WIW	Fall-off	Injection
9-12-1-26 MC3	Sonolog	Producing
16-12-1-26LAM	Sonolog	Producing

12 wells in total

FIGURE I

WASKADA UNIT NO. 6
AREA MAP

1989 PROPOSED PRESSURE SURVEY