

Le 16 septembre 2015

**DOSSIER ÉLECTRONIQUE**

Office national de l'énergie  
517 – 10<sup>e</sup> avenue S.-O.  
Calgary (Alberta) T2R 0A8

**Aux soins de : Mme Sheri Young, secrétaire de l'Office**

**Objet : Enbridge Pipelines Inc. (« Enbridge »)  
Projet d'inversion de la canalisation 9B et d'accroissement de la capacité de la  
canalisation 9  
Conditions 1 et 2 de l'ordonnance MO-045-2015 – Résultats des essais  
hydrostatiques**

Madame,

Conformément aux conditions 1 et 2 de l'ordonnance MO-045-2015 de l'Office national de l'énergie (« l'Office » ou « l'ONÉ ») et aux dispositions de la lettre de l'ONÉ du 18 juin 2015 (n° de dossier A70736) (ensemble, l'« ordonnance et la lettre »), veuillez trouver ci-joint les résultats des essais hydrostatiques réalisés sur les trois tronçons de la canalisation 9B.

Un essai de résistance minimal d'une heure et un essai d'étanchéité minimal de quatre heures ont été effectués sur chacun des trois tronçons afin de valider le programme sur l'intégrité d'Enbridge pour la canalisation 9B. Les trois essais, près de Mirabel au Québec et de Guananoque et Port Hope en Ontario, ont été menés avec succès les 22 août, 2 septembre et 11 septembre, respectivement. Ces résultats d'essai positifs sont conséquents avec ceux déjà communiqués à l'ONÉ, lors de la validation de la gestion de l'intégrité établie à l'aide du programme d'inspection interne.

Au moment de la préparation de l'inversion de la canalisation 9B, Enbridge a évalué l'intégrité du pipeline et dressé un diagnostic en utilisant les outils les plus avancés dont dispose l'industrie en matière d'intégrité et a réalisé 989 excavations de vérification de l'intégrité et procédé aux réparations, le cas échéant. Enbridge a déposé auprès de l'Office une preuve validant le fait que les diagnostics et les réparations allaient au-delà des normes et pratiques de l'industrie. La fiabilité du programme sur l'intégrité d'Enbridge a été bien démontrée et a, de plus, été portée à un haut degré de certitude par le biais d'une évaluation technique de toutes les données émanant d'un programme sur l'intégrité réalisé à si vaste échelle. Tout ceci a procuré l'assurance que toutes les anomalies restantes et les résultats faussement négatifs n'étaient pas préjudiciables. La réussite des essais hydrostatiques menés récemment atteint les objectifs poursuivis par l'ONÉ dans son ordonnance et dans sa lettre, et confirme la conviction que la canalisation peut être exploitée de façon sécuritaire.

Enbridge réitère son engagement précédent voulant qu'à la suite de l'approbation du dépôt de cette condition par l'Office, elle aille amorcer l'exploitation de la canalisation 9 à des niveaux de pression maximale inférieurs à la PMS actuelle. Enbridge va exploiter la canalisation à une pression maximale équivalant à 72 % de la LEMS, qui est habituellement fixée à 80 %. Cette

restriction de pression inférieure demeurera en vigueur jusqu'à ce qu'Enbridge réalise une reprise de l'évaluation de l'intégrité au cours de la première année d'exploitation. Les résultats de la reprise de ce diagnostic seront déposés auprès de l'Office sous la forme d'une mise à jour de l'évaluation technique. Cette étape additionnelle améliorera davantage la sécurité de la canalisation 9 et la fiabilité du programme sur l'intégrité.

Pour toute question, je vous invite à communiquer avec moi par courriel à l'adresse [jesse.ho@enbridge.com](mailto:jesse.ho@enbridge.com) ou par téléphone au numéro 403-767-4581, ou avec Margery Fowke, directrice, Droit réglementaire, par courriel à [margery.fowke@enbridge.com](mailto:margery.fowke@enbridge.com) ou par téléphone au numéro 403-266-7907.

Bien sincèrement,



Jesse Ho  
Conseiller, Droit et affaires réglementaires

Pièces jointes



**Enbridge Pipelines Inc.**  
**Canalisation 9B**  
**Acceptation des essais hydrostatiques**

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**TRONÇON DE MIRABEL**

**KM 3 580,71 au 3 601,64**

L'essai hydrostatique sur le tronçon ci-haut mentionné du pipeline existant (NPS30 canalisation 9B) a été réussi le 22 août 2015 à Mirabel au Québec, conformément aux exigences précisées par la lettre MO-045-2015 de l'ONÉ, la norme CSA Z662-15 et les spécifications d'Enbridge. L'essai hydrostatique a été réalisé par Trican.

Les critères suivants ont été observés pour que l'essai hydrostatique soit jugé acceptable :

- Un diagramme pression-volume (P-V) a été mis au point et accepté.
- Un essai de résistance minimal d'une heure a été réalisé et accepté.
- Un essai d'étanchéité minimal de quatre heures a été réalisé et accepté.
- Il n'y a eu aucune fuite.
- Tous les enregistreurs ont été calibrés.
- Pour des précisions complètes sur l'essai hydrostatique, référez-vous aux documents indiqués ci-après :
  - Calculs de pression de l'essai
  - Dessin des profils de l'essai et tableau des pressions
  - Rapport des données de pression de l'essai
  - Diagramme de rendement
  - Registre des instruments et certificats de calibration
  - Graphiques de pression et de température
- L'essai hydrostatique a été réalisé avec de l'eau potable provenant de la Ville de Montréal-Est. L'eau de l'essai hydrostatique a été remise à la Ville de Montréal pour traitement approprié et déversement ou élimination.
- L'essai a été réalisé en présence des superviseurs de l'essai d'Enbridge, Matias Rosselet et Richard Morrissey.

A handwritten signature in blue ink, appearing to read 'M. Rosselet', is written over a horizontal line.

Le 22 août 2015

Matias Rosselet, P. Eng.  
Enbridge Pipelines Inc



**HYDROSTATIC PRESSURE TEST  
TEST PRESSURE CALCULATIONS  
MIRABEL SEGMENT HYDROSTATIC TEST**

<b>Test Date :</b>	22-Aug-15	<b>Project :</b>	Line 9B
<b>Pipe Outside Diameter :</b>	762.0 mm	<b>AFE # :</b>	20001384 (LQW)
<b>Pipe Grade :</b>	359 MPa	<b>Reference :</b>	D-9-5.73-SKM06-1-640LQW (M6)
<b>Critical LP Wall Thickness :</b>	<b>6.35 mm</b>	<b>Test Number :</b>	MIRABEL
<b>Point Specific MOP :</b>	4,557 kPa (at KM 3601.647)	<b>Station :</b>	From KM 3580.71 To KM 3601.64

**SECTION FEATURES & TEST PRESSURES**

Wall Thickness (mm)	Length (m)	Volume (m <sup>3</sup> )	Offset Volume (m <sup>3</sup> )
6.1 to 6.30 mm	2,590.88 m	1,143 m <sup>3</sup>	
6.35 mm	2,117.60 m	934 m <sup>3</sup>	
7.14 mm	16,228.53 m	7,126 m <sup>3</sup>	
9.53 mm	33.12 m	14 m <sup>3</sup>	
12.7 mm	82.91 m	35 m <sup>3</sup>	
<b>TOTALS</b>	<b>21,053.04 m</b>	<b>9,252 m<sup>3</sup></b>	<b>18.50 m<sup>3</sup></b>

SMYS of Pipe @ Critical LP	
6,283 kPa	105%
5,983 kPa	100%

Pressure Reading @ Test Point	
1,499 kPa	25%
2,995 kPa	50%
3,593 kPa	60%

<b>MIN Pressure (-55kPa of AIM)</b>	5,641 kPa
<b>MAX Pressure - (Same as AIM)</b>	5,695 kPa

<b>Test Point El.</b>	38.80 m		
<b>High Point El.</b>	73.40 m	<b>ΔP (TP-HP)</b>	-339.4 kPa
<b>Critical LP El.</b>	39.10 m	<b>ΔP (TP-LP)</b>	-2.9 kPa
<b>Point MOP El.</b>	58.00 m	<b>ΔP (TP-MOP EL)</b>	-188.4 kPa

<b>MIN Pressure @ Test Point</b>	5,829 kPa
<b>AIM Pressure @ Test Point</b>	<b>5,884 kPa</b>
<b>MAX Pressure @ Test Point</b>	5,884 kPa

**SQUEEZE VOLUMES AND PRESSURES**

<b>ΔP / °C</b>	194.26	kPa/°C
<b>ΔV / °C</b>	1.733	m <sup>3</sup> /°C
<b>ΔP / ΔV</b>	112.1	kPa/m <sup>3</sup>
<b>ΔV / ΔP</b>	0.00892	m <sup>3</sup> /kPa
<b>ΔV / ΔP</b>	<b>892.1</b>	L/100kPa

<b>Water Temperature (START):</b>	20
<b>Water Temperature (END):</b>	21
<b>Average Water Temperature:</b>	20.5
<b>Temperature Change During Test:</b>	1
<b>Relative Volume of Water (Start Temp):</b>	1.00177
<b>Relative Volume of Water (End Temp):</b>	1.00198
<b>Coefficient of Expansion for H2O (β) :</b>	2.096E-04
<b>H<sub>2</sub>O Compressibility Factor :</b>	4.37E-07
<b>Youngs Modulus (E) :</b>	2.07E+08
<b>Poisson's ration (ν) :</b>	0.3

<b>Yield Squeeze Volume</b>	20,439.4 L
<b>Yield Squeeze Volume (with 0.2% Offset)</b>	38,943.9 L
<b>Total Volume with Squeeze</b>	52,493.4 L

**LEAK TEST**

LEAK TEST PRESSURES	
<b>MIN. PRESSURE @ TEST POINT</b>	5,201 kPa
<b>AIM PRESSURE @ TEST POINT</b>	<b>5,300 kPa</b>
<b>MAX PRESSURE @ TEST POINT</b>	5,565 kPa



**HYDROSTATIC PRESSURE TEST  
TEST PRESSURES SUMMARY SHEET  
MIRABEL SEGMENT HYDROSTATIC TEST**

<b>Test Date :</b> 22-Aug-15	<b>Project :</b> Line 9B
<b>Pipe Outside Diameter :</b> 762.0 mm	<b>AFE # :</b> 20001384 (LQW)
<b>Pipe Grade :</b> 359 MPa	<b>Reference :</b> D-9-5.73-SKM06-1-640LQW (M6)
<b>Critical LP Wall Thickness :</b> 6.35 mm	<b>Test Number :</b> MIRABEL
<b>Point Specific MOP :</b> 4,557 kPa (at KM 3601.647)	<b>Station :</b> From KM 3580.71 To KM 3601.64

**MAXIMUM PRE-PACK**

<b>~25% SMYS - AIM TEST PRESSURE</b>	<b>1,400 kPa</b>	HOLD UNTIL TEMPERATURE TIME PLOT IS ASYMPTOTIC TO THE GROUND TEMPERATURE
	<b>210 psi</b>	

**LEAK CHECK**

<b>~50% SMYS - AIM TEST PRESSURE</b>	<b>2,900 kPa</b>	HOLD FOR 30 MIN - NO PRESSURE DROP
	<b>430 psi</b>	

**YIELD PLOT**

**YIELD PLOT REQUIRED?**

**YES**

**~60% SMYS - AIM TEST PRESSURE**

**3,500 kPa**

**\*\*BEGIN YIELD PLOT\*\***

**520 psi**

**STRENGTH TEST**

**DURATION: Minimum 1-HRS**

<b>MIN. PRESSURE @ TEST POINT</b>	5,829 kPa	845 psi
<b>AIM PRESSURE @ TEST POINT</b>	<b>5,884 kPa</b>	<b>853 psi</b>
<b>MAX PRESSURE @ TEST POINT</b>	5,884 kPa	853 psi
<b>BUFFER to MAX. PRESSURE</b>	0 kPa	0 psi

**TARGET VOLUME PER 100 kPa**

**892.1 L / 100kPa**

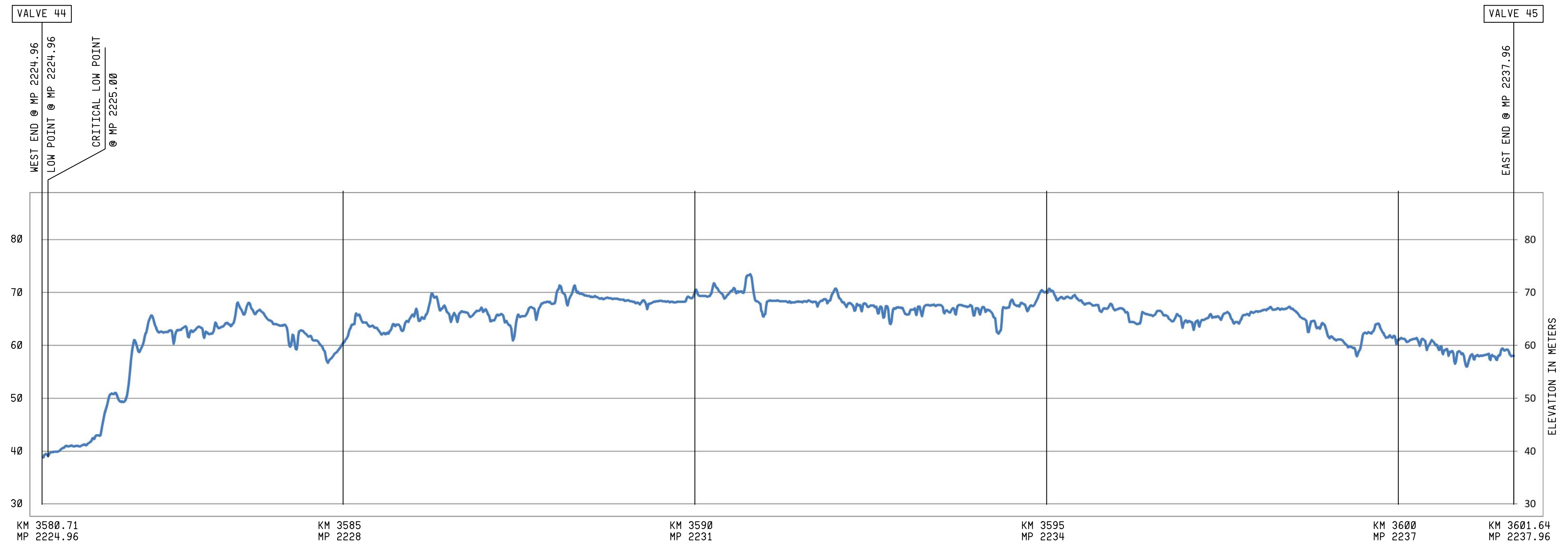
**YIELD SQUEEZE TOTAL VOLUME**

**20,439 L**

**LEAK TEST**

**DURATION: Minimum 4-HRS**

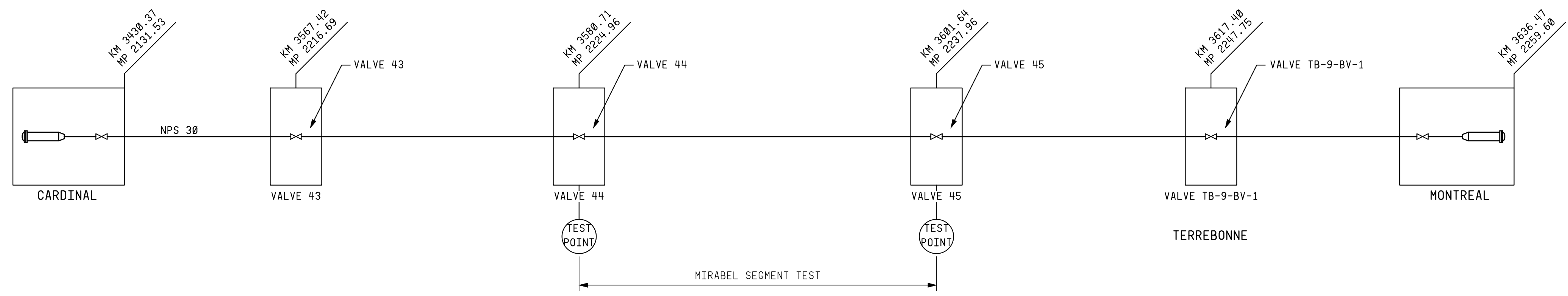
<b>MIN. PRESSURE @ TEST POINT</b>	5,201 kPa	754 psi
<b>AIM PRESSURE @ TEST POINT</b>	<b>5,300 kPa</b>	<b>769 psi</b>
<b>MAX PRESSURE @ TEST POINT</b>	5,565 kPa	807 psi
<b>BUFFER to MIN. PRESSURE</b>	99 kPa	14 psi



APPROX. ENBRIDGE MILE POST FROM EDMONTON TERMINAL

**ELEVATION PROFILE**

HORZ. = 1:40000  
VERT. = 1:500



**TEST POINT LOCATIONS - SCHEMATIC**  
NTS

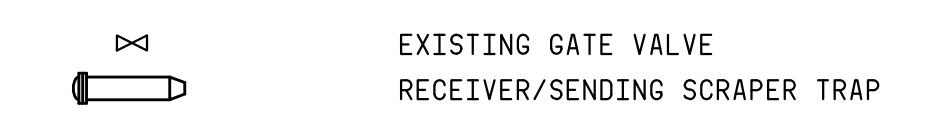
	SEGMENT	LOCATION	KM POST	MILE POST	ELEV. (m)	ELEV. (Ft.)	PIPE DIA (mm)	PIPE DIA (in)	WALL THICKNESS (mm)	WALL THICKNESS (in)	PIPE GRADE (MPa)	PIPE GRADE (psi)	PROPOSED STRENGTH TEST 125%MOP @ V-45 (KP3601.64) DURATION: 1 HOURS			PROPOSED LEAK TEST 110%MOP @ V-45 (KP3601.64) DURATION: 4 HOURS		
													(kPa)	(psi)	%SMYS	(kPa)	(psi)	%SMYS
VALVE 44 VALVE 45	MIRABEL	WEST END	3580.72	2224.96	38.8	127	762	30	12.7	0.5	359	52000	5884	854	49.2	5201	755	43.5
		EAST END	3601.64	2237.96	58	190	762	30	12.7	0.5	359	52000	5696	827	47.6	5013	727	41.9
		CRIT L POINT	3580.79	2225.00	39.1	128	762	30	6.35	0.25	359	52000	5881	854	98.3	5198	754	86.9
		HIGH POINT	3590.85	2231.25	73.4	241	762	30	7.14	0.281	359	52000	5545	805	82.4	4862	705	72.3
		LOW POINT	3580.72	2224.95	38.8	127	762	30	12.7	0.5	359	52000	5884	854	49.2	5201	755	43.5

**PROFILE DATA**

**GENERAL NOTES:**

- TEST MEDIUM = WATER
- PROPOSED STRENGTH TEST AND LEAK TEST ARE BASED ON LETTER OF THE NATIONAL ENERGY BOARD TO ENBRIDGE PIPELINES INC. DATED MARCH 5, 1999, SCHEDULE A (File No: 3400-E101-86), APPROVED MOP OF 4557 kPa AT KM 3601.647 (CEL: 58m)

**LEGEND:**



REV:	LINE 9B HYDROTEST			
0	AFE: 20001304 (LQW)	DATE: 09 JUL 15		
	BY:	APPR:		
	CHK:	APPR:		
NO	SUBSEQUENT REVISION	DATE/BY	APPR	
1	ISSUED FOR HYDROTEST	22 JUL 15 ZS	DBOYCE	
2	LEAK TEST PRESSURE UPDATE	29 JUL 15 ZS	DBOYCE	
3	TEST ELEVATION ADDED	10 AUG 15 ZS	DBOYCE	

NO	REVISION	DATE/BY	APPROVE

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KM 3580.71 TO KM 3601.64 (MP 2224.96 TO MP 2237.96)  
LINE 9B HYDROTEST  
VALVE 44 TO VALVE 45, MIRABEL TEST SEGMENT  
PROPOSED HYDROSTATIC TEST PRESSURE PROFILE

DRAWN	CHECK	APPROVE
ZS	AR	DBOYCE

DATE	SCALE	APPROVE
22 JUL 15	AS SHOWN	TELEY

D-9-5.73-SKM06-2-640LQW M6



**HYDROSTATIC PRESSURE TEST**  
**PRESSURE TEST DATA REPORT**  
**MIRABEL SEGMENT HYDROSTATIC TEST**

<p><b>Test Date :</b> 22-Aug-15  <b>Pipe Outside Diameter :</b> 762 mm  <b>Critical LP Wall Thickness :</b> 6.35 mm  <b>Grade :</b> 359 MPa  <b>Total Length :</b> 21,053.0 m</p>	<p><b>Project :</b> Line 9B  <b>AFE # :</b> 20001384 (LQW)  <b>Reference :</b> D-9-5.73-SKM06-1-640LQW (M6)  <b>Test Number :</b> MIRABEL  <b>Test Limit :</b> From KM 3580.71 To KM 3601.64</p>
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Time	Deadweight Pressure (kPa)	Temperature ( °C )		Remarks (Weather, Volumes, Added/Bled off)
		Ambient (Thermometer)	Pipe	
21-Aug	1,234 kPa			Line Pack Pressure
Gel Injection activities for Valve #44 & #45 Isolation Started at approximately 2:00PM and ended at approximately 7:30PM				
14:00	1,234 kPa			Water removal & Gel Injection Starting
19:30	2,561 kPa			Gel Injection Completed
Approximately 45% Strength Test pressure. Leack check performed on mechanical fittings. Pressure left on the section for the next couple hours to be ready for early start of to pressurize to Strength Test on Aug 22.				
22-Aug				
4:26	2,559 kPa			Start pressurizing to Strength Test pressure
4:30	2,602 kPa			Stop pressurization due to Trican software issue
4:43	2,600 kPa			Re-start pressurization
5:53	5,880 kPa			End of Yield Plot
6:00	5,880 kPa	20.5°C	18.8°C	<b>Start of Strength Test</b>
6:05	5,875 kPa	20.5°C	18.8°C	
6:10	5,878 kPa	20.5°C	18.8°C	
6:15	5,876 kPa	20.5°C	18.8°C	
6:20	5,876 kPa	20.5°C	18.9°C	
6:25	5,874 kPa	20.5°C	18.9°C	
6:30	5,874 kPa	20.0°C	18.9°C	
6:35	5,874 kPa	19.0°C	18.8°C	



**HYDROSTATIC PRESSURE TEST**  
**PRESSURE TEST DATA REPORT**  
**MIRABEL SEGMENT HYDROSTATIC TEST**

**Test Date :** 22-Aug-15  
**Pipe Outside Diameter :** 762 mm  
**Critical LP Wall Thickness :** 6.35 mm  
**Grade :** 359 MPa  
**Total Length :** 21,053.0 m

**Project :** Line 9B  
**AFE # :** 20001384 (LQW)  
**Reference :** D-9-5.73-SKM06-1-640LQW (M6)  
**Test Number :** MIRABEL  
**Test Limit :** From KM 3580.71 To KM 3601.64

Time	Deadweight Pressure (kPa)	Temperature (°C)		Remarks (Weather, Volumes, Added/Bled off)
		Ambient (Thermometer)	Pipe	
6:40	5,875 kPa	18.0°C	18.8°C	
6:45	5,874 kPa	17.5°C	18.8°C	
6:50	5,874 kPa	17.5°C	18.8°C	
6:55	5,874 kPa	17.5°C	18.9°C	
7:00	5,874 kPa	17.5°C	18.9°C	
7:05	5,873 kPa	18.0°C	18.9°C	<b>End of Strength Test</b>
7:08	5,874 kPa	18.0°C	18.9°C	Start Depressurizing to Leak Test
7:25	5,300 kPa	18.0°C	18.9°C	<b>Start of Leak Test</b>
7:45	5,301 kPa	18.0°C	18.9°C	
8:00	5,300 kPa	18.0°C	18.7°C	
8:15	5,300 kPa	18.5°C	18.9°C	
8:30	5,299 kPa	18.5°C	18.9°C	
8:45	5,298 kPa	19.5°C	18.3°C	
9:00	5,298 kPa	20.5°C	18.6°C	
9:15	5,298 kPa	21.5°C	19.7°C	
9:30	5,297 kPa	23.0°C	20.0°C	
9:45	5,297 kPa	24.5°C	20.2°C	
10:00	5,297 kPa	25.0°C	20.4°C	
10:15	5,297 kPa	26.0°C	20.6°C	
10:30	5,297 kPa	26.5°C	20.7°C	







HYDROSTATIC PRESSURE TEST  
**PRESSURE TEST REPORT**  
MIRABEL SEGMENT HYDROSTATIC TEST

Test Date : 22-Aug-15 Test Medium : Water Fill Volume : 9,252 m <sup>3</sup> Squeeze Volume : 53 m <sup>3</sup> Pipeline Contractor : NA Testing Contractor : TRICAN	Project : Line 9B AFE # : 20001384 (LQW) Reference : D-9-5.73-SKM06-1-640LQW (M6) Test Number : MIRABEL Facility Description : MAINLINE Station : From KM 3580.71 To KM 3601.64
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**TEST PRESSURES & PIPE DATA**

STRENGTH TEST PRESSURES	
MIN Pressure @ Test Point	5,829 kPa
AIM Pressure @ Test Point	<b>5,884 kPa</b>
MAX Pressure @ Test Point	5,884 kPa
TEST DURATION: Minimum 1 HRS	

LEAK TEST PRESSURES	
MIN Pressure @ Test Point	5,201 kPa
AIM Pressure @ Test Point	<b>5,300 kPa</b>
MAX Pressure @ Test Point	5,565 kPa
TEST DURATION: Minimum 4 HRS	

**PIPE DATA**

OD	WT	GRADE	LENGTH	MANUFACTURER	COATING TYPE
762.0 mm	6.35 mm	359 MPa	4,708.48 m	Stelco (Year of mill run : 1975)	PE TAPE
762.0 mm	7.14 mm	359 MPa	16,228.53 m	Stelco (Year of mill run : 1975)	PE TAPE
762.0 mm	9.53 mm	359 MPa	33.12 m	Stelco (Year of mill run : 1975)	PE TAPE
762.0 mm	12.7 mm	359 MPa	82.91 m	Stelco (Year of mill run : 1975)	PE TAPE

**INSTRUMENTATION**

	ELEVATION	LOCATION	PRESSURE
DEADWEIGHT/RECORDER	38.8 m	KM 3580.720	5,884 kPa
POINT MOP	58.0 m	KM 3601.647	5,696 kPa
LOW POINT	39.1 m	KM 3590.850	5,545 kPa

	REFERENCE INSTRUMENTS		TEST EQUIPMENT		
	DEADWEIGHT PRESSURE	LIQUID IN GLASS THERMOMETER	PRESSURE RECORDER	PRESSURE GAUGE (Analog)	TEMPERATURE RECORDER
MAKE/MODEL #	Crystal XP2i	AMS	Barton	Wika	Barton
RANGE	0 to 21,000 kPag	-35 to 50 °C	0 to 10,300 kPag	0 to 13,700 kPag	-30 to 50 °C
SERIAL NO.	543421	P99303	AMS 416	791881-1	AMS 322
CALIB. CERTIFICATE	S-28089:1439544440	See attached	See attached	ED 39557	See attached
CALIB. OFFSET (+/-)	0.1 % of Reading	+/- 0.5 °C	±1% full scale range	±0.5% full scale range	±2% full scale range

	CALIBRATION BEFORE STRENGTH TEST					CALIBRATION AFTER LEAK TEST				
	ZERO (0)	¼ SCALE	½ SCALE	¾ SCALE	FULL SCALE	FULL SCALE	¾ SCALE	½ SCALE	¼ SCALE	ZERO (0)
DEADWEIGHT	NA	1,234 kPa	2,559 kPa	4,410 kPa	5,880 kPa	5,297 kPa	3,973 kPa	2,649 kPa	1,000 kPa	NA
PRESSURE RECORDER	NA	1,262 kPa	2,587 kPa	4,347 kPa	5,796 kPa	5,292 kPa	3,969 kPa	2,646 kPa	1,000 kPa	NA
PRESSURE GAUGE	NA	1,235 kPa	2,560 kPa	4,463 kPa	5,950 kPa	5,350 kPa	4,013 kPa	2,675 kPa	1,000 kPa	NA

TEST SUPERVISOR : MATIAS ROSSELET

CONTRACTOR : SANDEEP SRA

M. Rosselet Aug 22/15

Sandeep Sra Aug 22/15

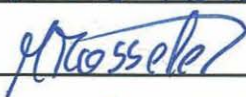



HYDROSTATIC PRESSURE TEST  
**INSTRUMENTATION LIST**


**MIRABEL SEGMENT HYDROSTATIC TEST**


Test Date : 22-Aug-15	Project : Line 9B
Diameter : 762 mm	AFE # : 20001384 (LQW)
Critical LP Wall Thickness : 6.35 mm	Reference : D-9-5.73-SKM06-1-640LQW (M6)
Grade : 359 MPa	Test Number : MIRABEL
Total Length : 21,053.0 m	Test Limit : From KM 3580.71 To KM 3601.64


TEST POINT (Valve #44)	AMS No.
Test Head #	NA
Pressure Dial Gauge	Wika (791881-1)
Pressure Recorder #1	AMS - 416
Pressure Recorder #2	NA
Digital Dead-Weight	Crystal XP2i - 543421
Brass Dead-Weights	AMS - 129
Temperature Recorder #1	AMS - 322
Flow Meter / Totalizer	2" Simark - 66840
MID-POINT	AMS No.
Temperature Recorder #2	NA
FAR END (Valve #45)	AMS No.
Test Head #	NA
Pressure Dial Gauge	NA
Pressure Recorder #3	AMS - 014
Temperature Recorder #3	AMS - 158

Test Supervisor : MATIAS ROSSELET  
  
 Aug 22 / 15

Contractor : SANDEEP SRA  
  
 Aug 22 / 15

 <p style="text-align: center;"><b>HYDROSTATIC PRESSURE TEST</b> <b>YIELD PLOT LOG</b> <b>MIRABEL SEGMENT HYDROSTATIC TEST</b></p>						
Test Date : 22-Aug-15 Diameter : 762 mm Critical LP Wall Thickness : 6.35 mm Grade : 359 MPa Total Length : 21,053.0 m			Project : Line 9B AFE # : 20001384 (LQW) Reference : D-9-5.73-SKM06-1-640LQW (M6) Test Number : MIRABEL Test Limit : From KM 3580.71 To KM 3601.64			
Pressure (kPa)	Volume (Litres)	Δ Volume (Litres)	Time	Δ Time	L/min (Litres)	Comments
3,500 kPa	0 L	0 L	05:03:13	00:00	0 L/min	
3,550 kPa	520 L	520 L	05:04:07	00:54	578 L/min	
3,600 kPa	952 L	432 L	05:05:01	00:54	480 L/min	
3,650 kPa	1,347 L	395 L	05:05:55	00:54	439 L/min	
3,700 kPa	1,758 L	411 L	05:06:47	00:52	474 L/min	
3,750 kPa	2,273 L	515 L	05:07:40	00:53	583 L/min	
3,800 kPa	2,684 L	411 L	05:08:33	00:53	465 L/min	
3,850 kPa	3,100 L	416 L	05:09:27	00:54	462 L/min	
3,900 kPa	3,588 L	488 L	05:10:19	00:52	563 L/min	
3,950 kPa	4,030 L	442 L	05:11:12	00:53	500 L/min	
4,000 kPa	4,434 L	404 L	05:12:05	00:53	457 L/min	
4,050 kPa	4,901 L	467 L	05:12:59	00:54	519 L/min	
4,100 kPa	5,364 L	463 L	05:13:51	00:52	534 L/min	
4,150 kPa	5,754 L	390 L	05:14:44	00:53	442 L/min	
4,200 kPa	6,240 L	486 L	05:15:37	00:53	550 L/min	
4,250 kPa	6,652 L	412 L	05:16:31	00:54	458 L/min	
4,300 kPa	7,104 L	452 L	05:17:23	00:52	522 L/min	
4,350 kPa	7,569 L	465 L	05:18:16	00:53	526 L/min	
4,400 kPa	7,991 L	422 L	05:19:09	00:53	478 L/min	
4,450 kPa	8,509 L	518 L	05:20:03	00:54	576 L/min	
4,500 kPa	8,903 L	394 L	05:20:55	00:52	455 L/min	
4,550 kPa	9,324 L	421 L	05:21:48	00:53	477 L/min	
4,600 kPa	9,776 L	452 L	05:22:41	00:53	512 L/min	
4,650 kPa	10,231 L	455 L	05:23:34	00:53	515 L/min	
4,700 kPa	10,647 L	416 L	05:24:27	00:53	471 L/min	
4,750 kPa	11,154 L	507 L	05:25:22	00:55	553 L/min	
4,800 kPa	11,567 L	413 L	05:26:15	00:53	468 L/min	
4,850 kPa	11,971 L	404 L	05:27:10	00:55	441 L/min	
4,900 kPa	12,406 L	435 L	05:28:01	00:51	512 L/min	
4,950 kPa	12,893 L	487 L	05:28:56	00:55	531 L/min	
5,000 kPa	13,282 L	389 L	05:29:48	00:52	449 L/min	
5,050 kPa	13,737 L	455 L	05:30:41	00:53	515 L/min	
5,100 kPa	14,219 L	482 L	05:31:37	00:56	516 L/min	
5,150 kPa	14,607 L	388 L	05:32:29	00:52	448 L/min	
5,200 kPa	15,051 L	444 L	05:33:22	00:53	503 L/min	
5,250 kPa	15,537 L	486 L	05:34:14	00:52	561 L/min	

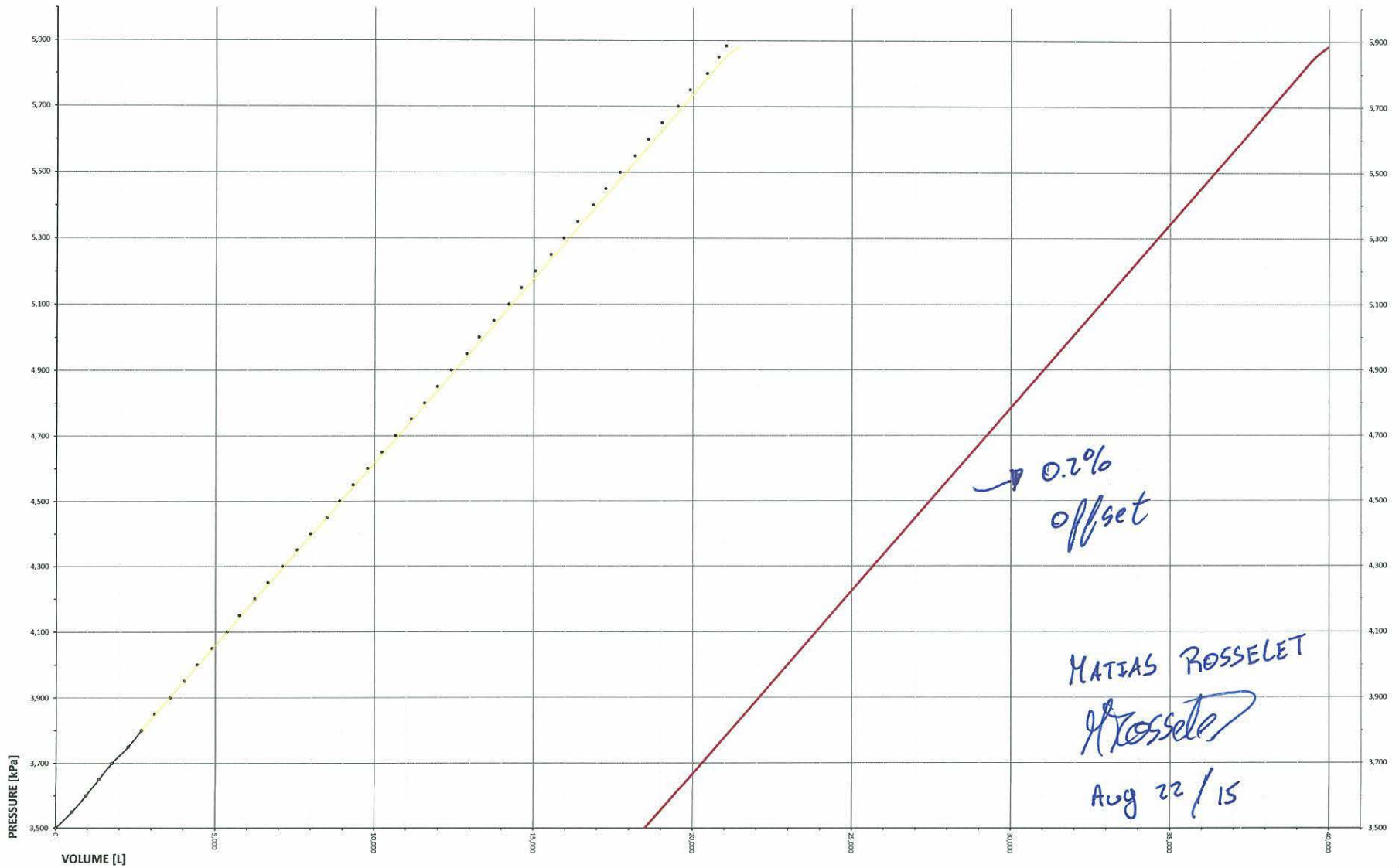
 <p style="text-align: center;"><b>HYDROSTATIC PRESSURE TEST</b> <b>YIELD PLOT LOG</b> <b>MIRABEL SEGMENT HYDROSTATIC TEST</b></p>						
<p>Test Date : 22-Aug-15 Diameter : 762 mm Critical LP Wall Thickness : 6.35 mm Grade : 359 MPa Total Length : 21,053.0 m</p>			<p>Project : Line 9B AFE # : 20001384 (LQW) Reference : D-9-5.73-SKM06-1-640LQW (M6) Test Number : MIRABEL Test Limit : From KM 3580.71 To KM 3601.64</p>			
Pressure (kPa)	Volume (Litres)	Δ Volume (Litres)	Time	Δ Time	L/min (Litres)	Comments
5,300 kPa	15,946 L	409 L	05:35:10	00:56	438 L/min	
5,350 kPa	16,375 L	429 L	05:36:01	00:51	505 L/min	
5,400 kPa	16,866 L	491 L	05:36:55	00:54	546 L/min	
5,450 kPa	17,251 L	385 L	05:37:49	00:54	428 L/min	
5,500 kPa	17,703 L	452 L	05:38:44	00:55	493 L/min	
5,550 kPa	18,178 L	475 L	05:39:38	00:54	528 L/min	
5,600 kPa	18,586 L	408 L	05:40:30	00:52	471 L/min	
5,650 kPa	19,015 L	429 L	05:41:22	00:52	495 L/min	
5,700 kPa	19,512 L	497 L	05:42:16	00:54	552 L/min	Reducing squeezing rate to approx. 300 l / min
5,750 kPa	19,899 L	387 L	05:43:20	01:04	363 L/min	
5,800 kPa	20,441 L	542 L	05:45:05	01:45	310 L/min	Reducing squeezing rate to approx. 150 l / min
5,850 kPa	20,799 L	358 L	05:47:18	02:13	162 L/min	Reducing squeezing rate to approx. 50 l / min
5,884 kPa	21,036 L	237 L	05:53:00	05:42	42 L/min	

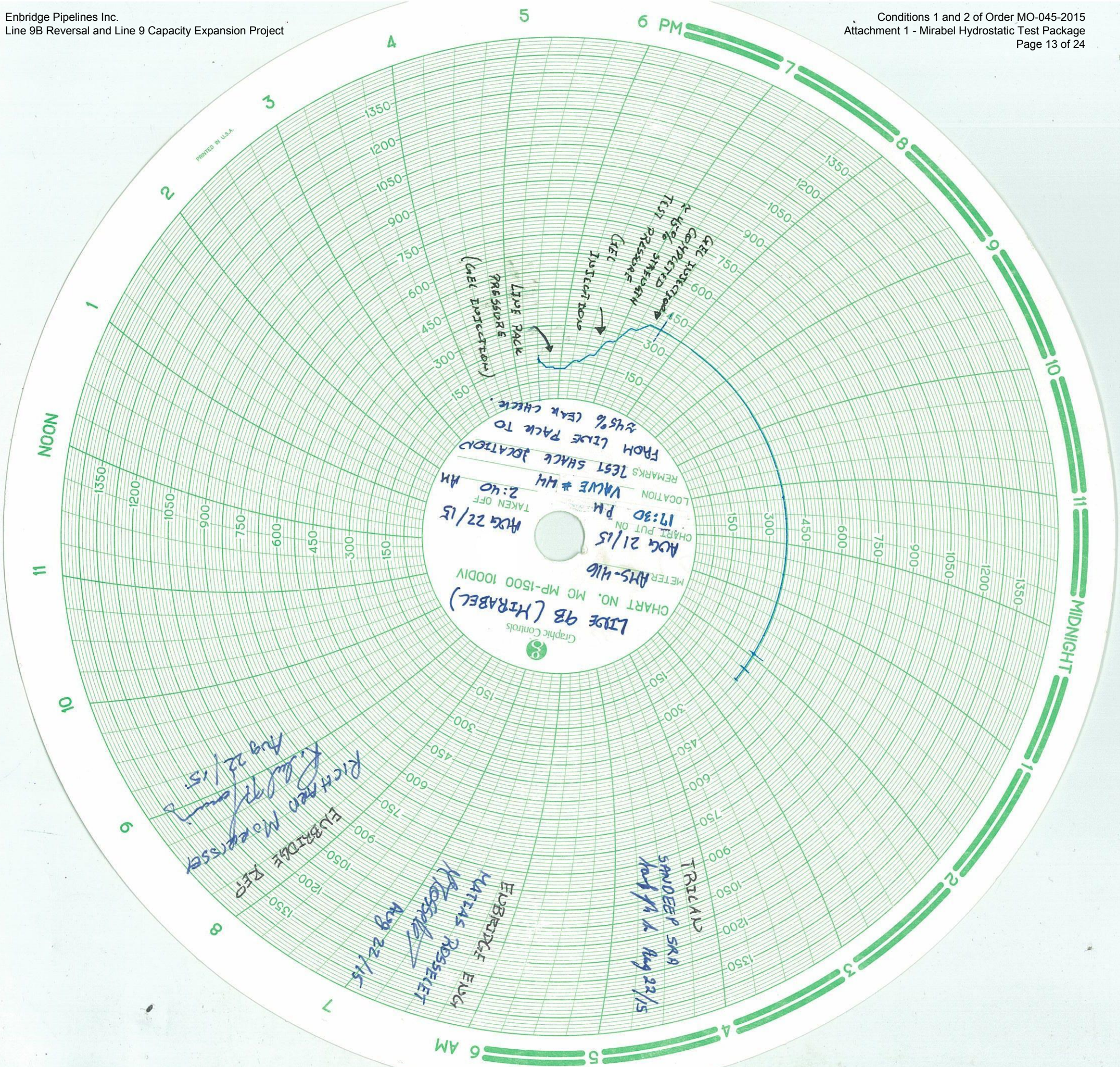
MATIAS ROSSELET  
  
 Aug 22 / 15

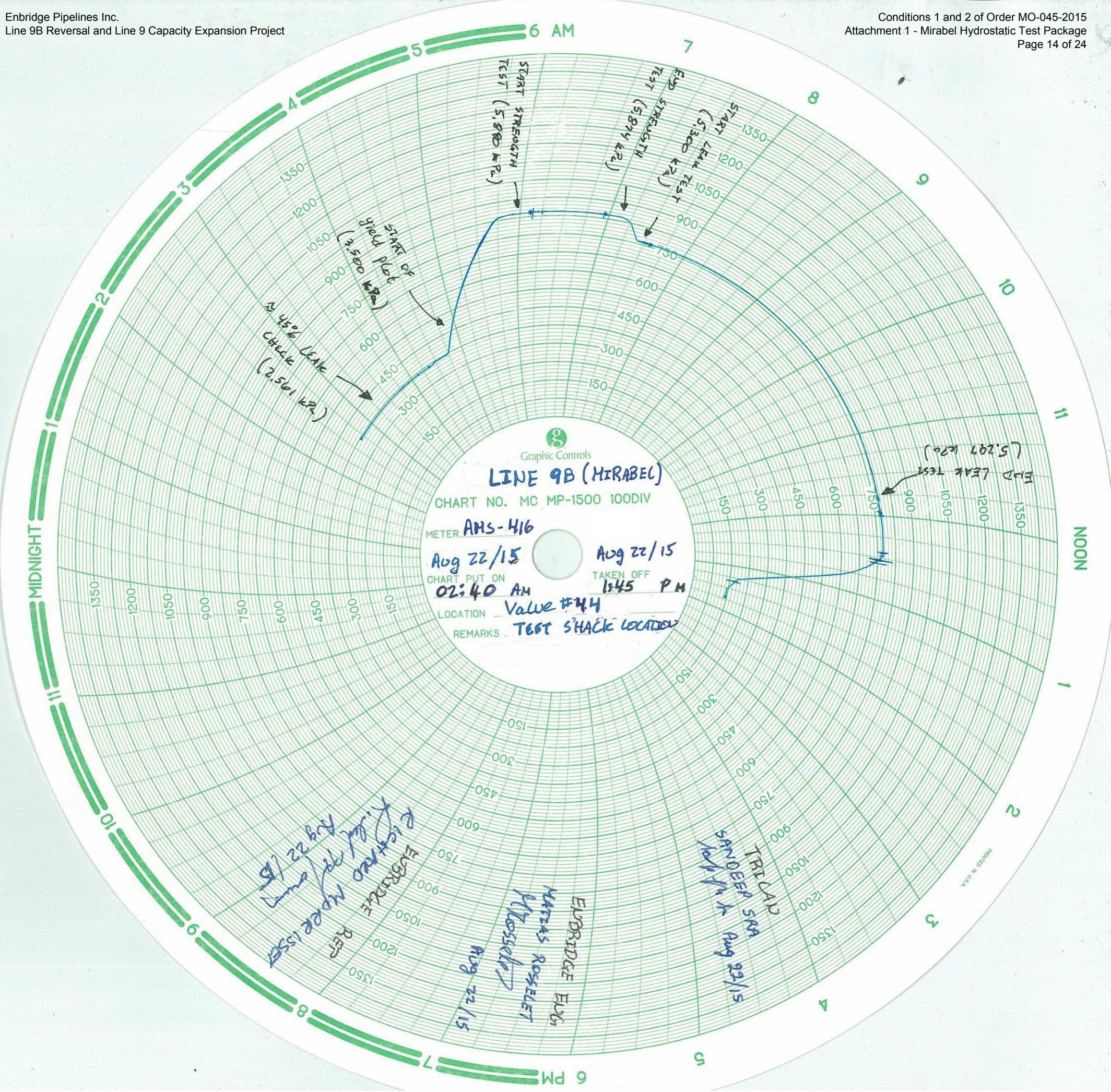


# HYDROSTATIC TEST - YIELD PLOT

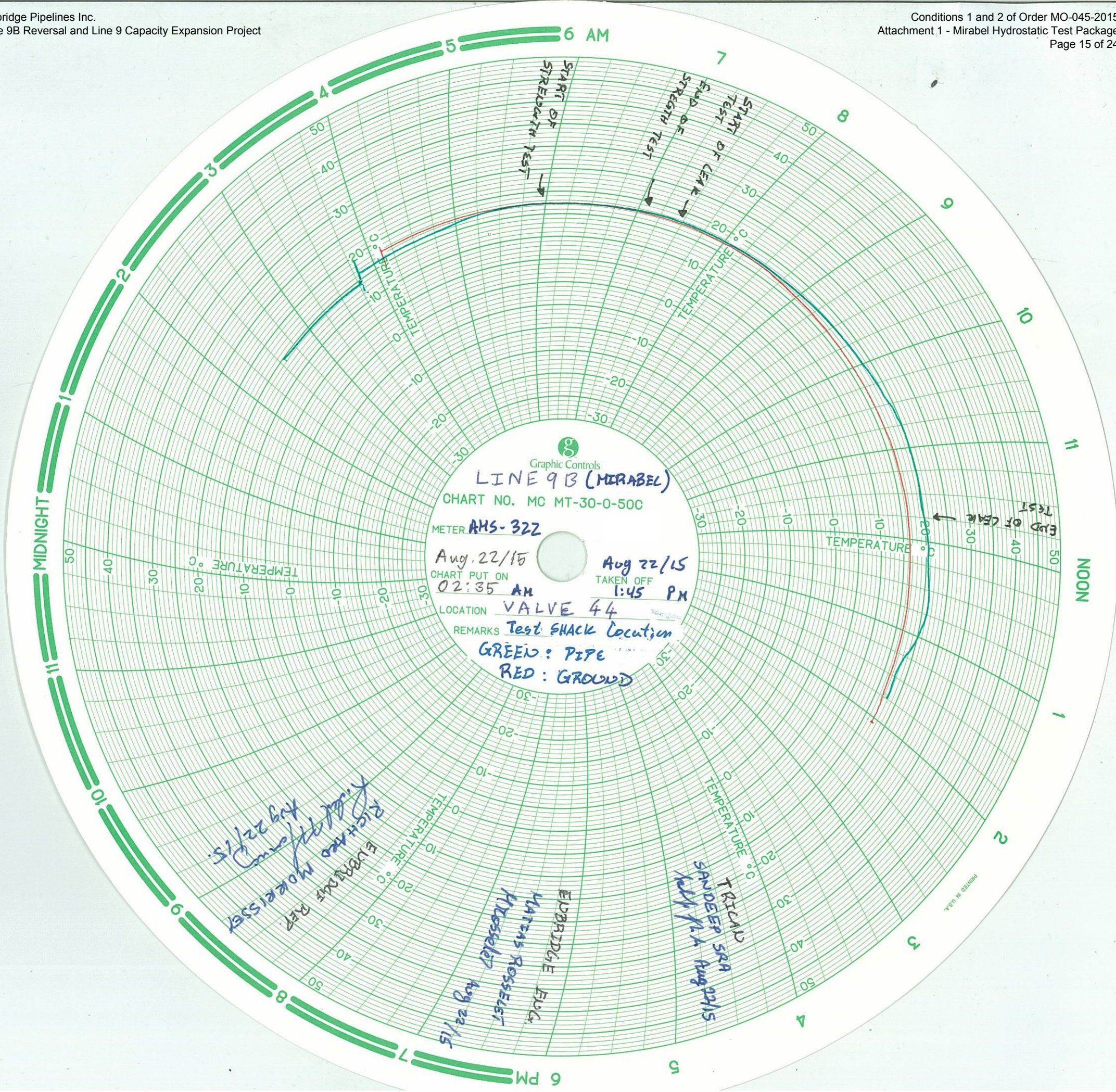
LINE 9B - TEST MIRABEL SEGMENT











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Phone {780} 468- 6387 ~ Fax {780} 462-9387

**RECORDER CALIBRATION CERTIFICATE**

**CUSTOMER:** Trican Well Service Ltd  
**MODEL:** Barton  
**RANGE:** 0 - 1500 PSI  
**DATE:** July 28, 2015

**AMBIENT TEMP:** 20C  
**ACCURACY:** ±1% F.S.  
**SERIAL NUMBER:** AMS-014  
**TECHNICIAN:** Jason Olszewski

<b>MASTER DEADWEIGHT READING</b>	<b>INSTRUMENT AS FOUND</b>	<b>INSTRUMENT AS LEFT</b>
0 PSI	N/A	0 PSI
375 PSI		375 PSI
750 PSI		750 PSI
1125 PSI		1125 PSI
1500 PSI		1500 PSI

**REMARKS: THIS RECORDER IS CERTIFIED TO MEET AND/OR EXCEED THE REQUIREMENTS AS OUTLINED IN API SPECIFICATION 6A, TWENTIETH EDITION, OCTOBER, 2010. IN COMPLIANCE WITH SECTION 7, PARAGRAPH 7.2.2, SUBPARAGRAPH 7.2.2.1, 7.2.2.2, 7.2.2.3.**

***THE ABOVE EQUIPMENT HAS BEEN COMPARED TO A RUSKA MODEL 5000 S/N 12342 DEADWEIGHT TESTER WHICH TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).***

**WITNESSED BY:**  **SIGNATURE:** 

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**RECORDER CALIBRATION CERTIFICATE**

**CUSTOMER:** Trican Well Service Ltd  
**MODEL:** Barton  
**RANGE:** -30 to 50°C  
**DATE:** July 28, 2015

**AMBIENT TEMP:** 20C  
**ACCURACY:** ±1% F.S.  
**SERIAL NUMBER:** AMS-322  
**TECHNICIAN:** Jason Olszewski

<b>MASTER INSTRUMENT READING</b>	<b>RED PEN AS FOUND</b>	<b>RED PEN AS LEFT</b>
-30°C	N/A	-30°C
-10°C		-10°C
10°C		10°C
30°C		30°C
50°C		50°C

<b>MASTER INSTRUMENT READING</b>	<b>GREEN PEN AS FOUND</b>	<b>GREEN PEN AS LEFT</b>
-30°C	N/A	-30°C
-10°C		-10°C
10°C		10°C
30°C		30°C
50°C		50°C

**REMARKS:** *THE ABOVE EQUIPMENT HAS BEEN COMPARED TO CRYSTAL NVISION S/N 361916/360331/360332 TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).*

WITNESSED BY: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_



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**RECORDER CALIBRATION CERTIFICATE**

**CUSTOMER:** Trican Well Service Ltd  
**MODEL:** Barton  
**RANGE:** -30 to 50°C  
**DATE:** July 28, 2015

**AMBIENT TEMP:** 20C  
**ACCURACY:** ±1% F.S.  
**SERIAL NUMBER:** AMS-158  
**TECHNICIAN:** Jason Olszewski

<b>MASTER INSTRUMENT READING</b>	<b>RED PEN AS FOUND</b>	<b>RED PEN AS LEFT</b>
-30°C	N/A	-30°C
-10°C		-10°C
10°C		10°C
30°C		30°C
50°C		50°C

<b>MASTER INSTRUMENT READING</b>	<b>GREEN PEN AS FOUND</b>	<b>GREEN PEN AS LEFT</b>
-30°C	N/A	-30°C
-10°C		-10°C
10°C		10°C
30°C		30°C
50°C		50°C

**REMARKS:** *THE ABOVE EQUIPMENT HAS BEEN COMPARED TO CRYSTAL NVISION S/N 361916/360331/360332 TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).*

**WITNESSED BY:**                     *Cam*                     **SIGNATURE:**

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**TURBINE FLOW METER COMPARISON REPORT**

**CUSTOMER: Trican Well Service Ltd.**  
**METER MODEL: 2" Simark**  
**SERIAL NUMBER: 66840**  
**DATE: July 27, 2015**

\*INITIAL PROVER VOLUME ALWAYS ZERO UNLESS OTHERWISE NOTED.

<u>METER TOTAL IN PULSES</u>	<u>PROVER VOLUME IN LITRES</u>
2317.975	160.535
2325.950	161.315
2325.950	161.535
2328.975	161.535

**K-Factor: 14.418641 Pulses/Litre**  
**14418.641 Pulses/Cubic Metre**  
**54.580504 Pulses/U.S. Gal.**

Alberta Measurement Services Ltd. volumetric prover is traceable to an ETCO s/n 85211 20 litre metal standard of volume. This metal standard of volume has been certified and calibrated in accordance with Part III of the Weights and Measures Regulations in relation to Measurement Canada's reference standards which in turn were calibrated in relation to Canada's Prototype for the kilogram whose calibration is traceable to the International Prototype for the kilogram in Sevres, France.

**SIGNATURE:** \_\_\_\_\_





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**CUSTOMER: Trican**  
**MODEL: Easy-Read**  
**RANGE: -35 TO 50°C**  
**DATE: August 11, 2015**

**AMBIENT TEMP: 20C**  
**ACCURACY: ±0.5°C**  
**SERIAL NUMBER: P99303**  
**TECHNICIAN: Shane Snider**

MASTER INSTRUMENT READING	CUSTOMER AS FOUND	THERMOMETER AS LEFT
-30.00°C	-30°C	-30°C
10.40°C	10°C	10°C
49.70°C	50°C	50°C

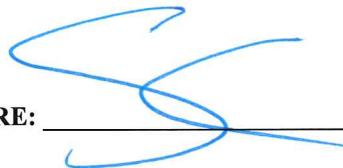
**REMARKS: THE ABOVE EQUIPMENT HAS BEEN COMPARED TO A FLUKE 7103 S/N B57220 TRACEABLE TO THE SI THROUGH RECOGNIZED NATIONAL MEASUREMENT INSTITUTES, RADIOMETRIC TECHNIQUES OR NATURAL PHYSICAL CONSTANTS.**

THE ABOVE INSTRUMENT WAS FOUND TO BE ACCURATE WITHIN THE MANUFACTURER'S SPECIFICATIONS FOR NON IMPROVED ACCURACY.

WITNESSED BY: \_\_\_\_\_



SIGNATURE: \_\_\_\_\_







**ACCUTECH**  
Quality is measurable.

9730-32 Avenue NW  
Edmonton, AB, Canada T6N 1L9  
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TF: 1-800-667-7368 • W: accutech.ca

## CERTIFICATE OF CALIBRATION

S-28089:1439544440

Certification Number

**CUSTOMER:**

Trican Industrial & Pipeline Services  
Building B, 1101 - 16 Avenue  
Nisku, AB T9E 0A8

**FILE No.:** S-28089

**Calibrated In:** Accutech Rentals Ltd.

### CALIBRATION INFORMATION

**UNIT UNDER TEST:** Crystal XP2i  
Pressure Gauge, Digital, 3KPSI

**ASSET NUMBER:** 543421

**SERIAL NUMBER:** 543421

**CLIENT ID/TAG:**

**TEST RESULT:** PASS

**CAL DATE:** 14 Aug 2015

**NEXT CAL DUE:** 12 Aug 2016

**DATA TYPE:** FOUND-LEFT

**TEMPERATURE:** 23.00 °C

**HUMIDITY:** 23 %RH

**PROCEDURE NAME:** Crystal XP2I XP2 DTG: (1Y) CAL VER /P3125

**PROCEDURE REV.:** 1.1

**REMARKS:**

Calibrated by LZ

**Technician:**

Jason Magee

**Calibration Approved By:**

Luc Claeys

Laboratory Manager

Accutech Rentals Ltd. certifies that the above instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted), or the technical requirements of the customer.

Accutech Rentals Ltd. calibrations, as applicable, are performed in compliance with requirements of ISO/IEC 17025:2005.

Accutech Rentals Ltd. will maintain and document the traceability of all its standards to the SI via the National Institute of Standards and Technology, NIST, or the National Research Council, NRC, of Canada, or to other recognized national or international standard bodies, or to measurable conditions created in our laboratory, or accepted fundamental and/or natural physical constraints, ratio type of calibration, or by comparison to consensus standards.

Complete records of work performed are maintained by Accutech Rentals Ltd. and are available for inspection. Laboratory assets used in performance of this calibration are listed on the next page.

This report applies only to the item calibrated or tested and shall not be reproduced, except in full, unless written permission for an approved abstract is obtained from Accutech Rentals Ltd.

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**DEADWEIGHT CALIBRATION CERTIFICATE**

**CUSTOMER:** Trican  
**MODEL:** Chandler  
**SERIAL:** AMS-129  
**DATE:** August 14, 2015

**AMBIENT TEMP:** 20C  
**RANGE:** 100 - 10000 kPa  
**TECHNICIAN:** Jason Olszewski

<b>MASTER DEADWEIGHT READING</b>	<b>WEIGHT #</b>	<b>CUSTOMER DEADWEIGHT READING</b>
--------------------------------------	-----------------	--

1)	5000 kPa	A	5000 kPa
2)	2000 kPa	B	2000 kPa
3)	2000 kPa	C	2000 kPa
4)	1000 kPa	D	1000 kPa
5)	500 kPa	E	500 kPa
6)	200 kPa	F	200 kPa
7)	200 kPa	G	200 kPa
8)	100 kPa	H	100 kPa
9)	50 kPa	I	50 kPa
10)	20 kPa	J	20 kPa
11)	20 kPa	K	20 kPa
12)	10 kPa	L	10 kPa
13)	5 kPa	M	5 kPa
14)	2 kPa	N	2 kPa
15)	2 kPa	O	2 kPa
16)	1 kPa	P	1 kPa

100 kPa

BASE WEIGHT

100 kPa

REMARK: DO NOT INTERCHANGE WEIGHTS WITH OTHER DEADWEIGHT TESTERS. DO NOT TIGHTEN PISTON.

THE ABOVE INSTRUMENT WAS FOUND TO BE ACCURATE WITHIN THE MANUFACTURER'S SPECIFICATIONS FOR NON IMPROVED ACCURACY OF  $\pm 0.1\%$  OF RATED PRESSURE.

***THE ABOVE EQUIPMENT HAS BEEN COMPARED TO A RUSKA MODEL 5000 S/N 12342 DEADWEIGHT TESTER TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).***

WITNESSED BY: 

SIGNATURE: 