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VIA RESS, EMAIL AND COURIER

November 29, 2017

Ms. Kirsten Walli Ontario Energy Board P.O. Box 2319 2300 Yonge Street, 27th Floor Toronto, ON M4P 1E4

Re: Enbridge Gas Distribution Inc. ("Enbridge") Application to Drill Well TD 26, Moore 8-23-XII (TD 26) TD 28H (Horiz. # 1), Moore 2-21-XII (TD28H) TD 29H (Horiz. # 1), Moore 3-21-XII (TD 29H)

On November 28, 2016, Enbridge Gas Distribution Inc. ("Enbridge") applied to the Ministry of Natural Resources ("MNR") for permission to drill three wells within the Dow Designated Storage Area. Pursuant to section 40 of the Ontario Energy Board Act, 1998, S.O. 1998 c.15, Schedule B, the Minister of Natural Resources is obligated to refer the application for the granting of a licence related to a well in a designated storage area to the Ontario Energy Board for a report.

The two horizontal gas storage wells are needed to replace deliverability lost due to the abandonment of five gas storage wells and one observation well. The observation well is required to monitor the gas content and pressure in the underground storage area. Details can be found in Enbridge's letter to the MNR.

Enclosed please find the drilling applications filed by Enbridge with the MNR.

For further information about the project, please visit the Other Regulatory Proceedings tab on the Enbridge website at: <u>www.enbridgegas.com/ratecase</u>.

Please contact the undersigned if you have any questions.

Sincerely,

(Original Signed)

Joel Denomy Technical Manager, Regulatory Applications, Regulatory Affairs



Enbridge Gas Distribution Inc. Gas Storage Operations 3501 Tecumseh Road Mooretown, ON, N0N 1M0

November 28, 2017

Ministry of Natural Resources Petroleum Operations Section 659 Exeter Road London, Ontario N6E 1L3

Attention: Ms. Sherry Pineo, Manager, Petroleum Operations Section

Subject: Submittal of Drilling Application for: TD 26, Moore 8-23-XII (TD 26) TD 28H (Horiz. # 1), Moore 2-21-XII (TD 28H) TD 29H (Horiz. # 1), Moore 3-21-XII (TD 29H)

Enclosed, please find the drilling applications for the three proposed wells – one observation well (TD 26) and two gas storage wells (TD 28H and TD 29H) – to be located in the Dow Designated Storage Area. The application includes two copies of the Form 1, two copies of the Wellsite Survey, two copies of the Drilling Program and the well application fee. It is our hope to start the drilling of the wells by April 1st, 2018. We would be pleased to meet with you to review or clarify any portion of the applications.

The two horizontal gas storage wells are needed to replace 30% of the deliverability lost due to the abandonment of 5 gas storage wells and 1 observation well and the conversion of 1 gas storage well to an observation well¹ and will not result in an increase in storage capacity. The observation well is required to monitor the gas content and pressure in the underground storage area which will assist with the continued safe and reliable delivery of natural gas to our existing and future customers.

The proposed drilling is scheduled to occur in the first half of 2018. The drilling will take place in previously disturbed lands. The landowner of the parcel of the land where the gas storage wells will be drilled is Enbridge and the owner of the land where the observation well will be drilled is Pembina Infrastructure and Logistics LP ("Pembina").

^{T.} Wells abandoned in 2017: TD 7 (Obs), TD 8, TD 9, TD 21 & TD 22 (Lot 21, Con. 12, Moore Twp.) and TD 12 (Lot 22, Con.12, Moore Twp.). Storage well converted to observation well in 2017 – TD 25 (Lot 21, Con. 12, Moore Twp.)

An Environmental Screening has also been initiated and will be submitted to the Ontario Energy Board (OEB) and the MNRF upon completion, targeted by the middle of December.

It is our understanding that the drilling application will be forwarded to the OEB by your office and we are requesting your earliest attention to this application. For your information, Enbridge has also submitted a package containing the drilling applications to the OEB.

If any further information is required please contact the undersigned at 519-862-6032.

Yours truly,

mall.

Kathy McConnell, P.Geo Manager Reservoir Development 3501 Tecumseh Road Mooretown, ON, N0N 1M0

Enclosures: TD 26 – 2 copies Form 1, 2 copies Well Survey, 2 copies Drilling Program TD 27 – 2 copies Form 1, 2 copies Well Survey, 2 copies Drilling Program TD 28 – 2 copies Form 1, 2 copies Well Survey, 2 copies Drilling Program



Oil, Gas and Salt Resources Act

Application for a Well Licence

Form 1 The unders the followin	signed oper	ator applies	for a well with the a	T licence und oplication f	o the Minls ler the Oil, iee of \$100	ster of Natural I Gas and Salt). Make cheque	Resources and F Resources Act a es payable to "Mi	orestry nd the Regulation inister of Finance	s thereunder	and submits	v.2015-12-15
1. WELL,	NAME			TD 20	6, Moore 8	-23-XI		Target Fo	mation	A-1 Cart	oonate
Purpose of	Proposed	Well (Well 1	Гуре)				Observation \	Well - Gas Storag	e		
2. OPERA		unumme	Ē	nbridge Ga	s Distributi	on Inc.		Tel #519-86	2-1473	Fax #5	19-862-1168
Street Add	ress		350	1 Tecumse	h Road	141410-100-100-100-10	City	Mooretown	Prov. ON	Postal Code	NON 1MO
Mailing Ad	dress		350	1 Tecumse	eh Road		City	Mooretown	Prov. ON	Postal Code	NON 1MO
Contact Na	ame			Ka	athy McCo	nnell		Contact T	el.#	519-862-	6032
En	nail		kat	hy.mccor	nell@er	nbridge.com					
3. LOCAT	ION	County_		La	mbton		Township		Моо	re	
Tract	8 Lo	t23	Co	incession		12	Offshore	Block Tr	act Lic	ence/Lease No.	
Surface lo metres fro	cation, m aries	190.8 59:3	m Nor m Ea	th X S	iouth	Latitude _	42 ⁰ 54' 05 82 ⁰ 23' 59 9	.450" Botti 902" Botti	om-hole Lat. om-hole Long.	42 ⁰ 5 820 2	4' 05.450" 3' 59.902"
Within 1.6	km of Desi	ionated Stor	ane Area?	2 Ye	es X	No		Off-target	? Yes	No X	22 MMANY
4. WELL	PARTICUL	ARS	Vertic	alX	Horizon	ital C	Directional	Deepening	Re-en	try L	ateral
Rig Type:	Rotary	xl∗ c	able X *	Well	to be core	d? Yes	NoX	Formation at T	D	A-1 Evapo	rite
Ground El	evation	 189.4	Propose	ed Depth	780.0	Propose	d Depth TVD	780.00 P	roposed Start	Date	1-Apr-18
5. POOLI	NG		,								
Pooling of has been	the Spacin completed ING CONT	ig Unit or un (see Ont. Ri RACTOR	itization of eg. 245/97	the Unit A definitions	rea shown : for "poole	on the attache d spacing unit" Unknown	d well location pl and "unitize")	lan Yes[}	No Tel #	99 90 90	
Address		-					Gity		Prov.	Postal C	xde
7. PROP	OSED CAS	ING AND C	EMENTIN	IG PROGR	AM						
Hole. Síze	Casing	Weight	Grade	New Used or	Setting Depth	Setting Depth	Setting Fo	ormation	CASING How	SETTING IN Cement	FORMATION Cement Top
(mm)	(mm)	(kg/m)		in-hole	TVD	Meas.			Set	Type	KB/RF
340*	340*	96.42* 48.06	US*	New*	3/* 52	52	Kettle	Point	Cement	Class 'G'	surface
222	178	29,76	J55	New	427	427	F. Sh	iale	Cement	Class 'G'	surface
159	114	15.62	J55	New	736,5	736.5	A-2 Ani	hydrite	Cement	Class 'G'	surface
	<u>}</u>	<u>}</u> {		<u>}</u>	·					÷ .	·
8. BLOW	-OUT PRE	VENTION E		NT 9" 2/ 7" 2/	3M Annula 3M Annula	ir Preventor ir Preventor an	d Double Gate (p	pipe and blind)	****		
9. WEĽL	SECURITY	Y Name of	f Trustee		Harrison P	ensa LLP	Total # U	Jnplugged Wells	145 C	urrent Baland	e \$70K
10. REM	ARKS D	epending up Rotary Ric. c	oon availal	bility the we	ill will be d	rilled using cab ** If well is	le tool or rotary r drilled by Rotary	ig. / Rig, hole size fo	r 244mm casir	ıg will be 270	mm
11. ENCI	LOSURES	Fe	e X		Locatio	n Pian X	(Land wells only)		Drilling Progr	am X	·····
12. NOTI The Ministry this applica if you have quest	ICE OF CO y of Natural R lition will be u	LLECTION	Forestry is o ingrand, law, ion, please voorae	coffecting your enforcement 1 the Policy and Pro	r personal în i L'purposes c _{Rem} Ojiler, Per	ormation under th Inly and will be pr vicum Operation Societ	e authority of the Ori otected in accordar Ministry of National Resource	I, Gas and Salt Reso nce with the Freedo and Foresey, 659 Exeter Ro	iurces Act. Any p m ot Information mil London Welstla, fil	ersonal informa and Protection 9:37:3-4638	tion provided on of Privacy Act,
The unde	rsigned cei e location,	tifies that th and he/she	e informat has autho	ion provide rity to bind	d herein is the operat	complete and or.	accurate, the op	perator has the rig	int to drill or or	erate a well i	n
Date (d/m/	8	13.Nov.17	Nan	18		Kathy McCon	nell	Signature	54/Ce	One	el ·
			Con	npany ·	Enb	ridge Gas Dísti	ibution Inc.	Title	Manager, F	eservoir Dev	elopment





TD 26, Moore 8-23-XII

DRILLING PROGRAM

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SECTION 1.0 - GENERAL DATA

Section 1.1 - Well Summary

Well Name:	TD 26 Moore 8-23-XII
Operator:	Enbridge Gas Distribution Inc.
Surface Location:	Tract 8, Lot 23, Con. 12, Moore Twp, Lambton County
Surface Coordinates:	190.8m North; 59.30m West
Ground Elevation:	191.33m
RF Elevation:	191.6m (Cable Tool Rig)
KB Elevation:	192.7m (Rotary Rig)
Total Depth:	780m
Target Formation:	A-1 Carbonate
Logging Program:	Gamma Ray / Neutron from TD to base of Surface Casing Porosity / Density Log A-2 Anhydrite to TD CBL-GR – 114mm casing Vertilog – 114mm casing
Spud Date:	April 1, 2018
Duration:	120 days (Cable Tool); 21 days (Rotary)

Section 1.2 – Special Notes

- 1. Depending upon the availability of equipment, the well will be drilled with cable tool or rotary rig. The drilling program has been designed to cover both potential drilling methods and where the instructions apply to only one method it has been so noted.
- 2. Safety of personnel and environment is our primary concern. Section 6.1 of this program, outlines Enbridge's general safety requirements which obliges all personnel on the wellsite to follow the Occupational Health and Safety Act and Regulations (Ministry of Labour (MOL)) and the Oil, Gas & Salt Resources Act and Regulations (Ministry of Natural Resources & Forestry (MNRF)). Safety and/or environmental ("tailgate") meetings shall be conducted as per Section 6. Wellsite Supervisor shall conduct daily 'walk around' inspections of the equipment on site and record the

results on the daily reports. Please refer to Section 5.2 for the procedure to be followed if a worker injury occurs.

- 3. The Wellsite Supervisor has authority over all activities conducted on the drilling location. The Wellsite Supervisor shall ensure that all applicable regulations and policies (MNRF, MOL, Ministry of the Environment & Climate Change (MOECC), and Enbridge) are followed and that all permits are kept on site and/or signed off as required.
- 4. All operations are to be to MNRF standards.
- 5. BOPs are to be installed, maintained and used as per MNRF requirements. Testing of the BOPs must be in accordance with Section 6.2 of this program.
- 6. Tower sheets must be completed daily and will include the information listed in Section 5.1 of this program. The Wellsite Supervisor will complete daily reports and forward the reports to Enbridge's office by 10am the following day.
- 7. The production casing will be set in the A-2 Anhydrite to allow for an effective cement job and successful pressure testing, prior to penetrating the A-1 Carbonate formation.

Section 1.3 - Contact Numbers

Emergency Numbers:

Police, Fire & Ambulance:* 911

911 Address: 795 Lasalle Line, Sarnia, Ontario

* For 911 Map and Map and Directions to Nearest Hospital see attached Map at end of Section 1.3

Enbridge Gas Distribution Inc.

Rob Carlson	Reservoir Field Supervisor	Office: 519-862-6036 Fax: 519-862-1168 Cell: 519-312-4863 robert.carlson@enbridge.com
Kathy McConnell	Manager Reservoir Development	Office: 519-862-6032 Fax: 519-862-1168 Cell: 519-312-2168 kathy.mcconnell@enbridge.com

Chris Pincombe	Land Administrator	Office: Fax: Cell: chris.pin	519-862-6092 519-862-1168 519-381-1408 ncombe@enbridge.com
Control Room		Office:	519-862-6012
Drilling Supervisor:			
Steve Thompson	Omni Services Ltd. President	Cell: 5 omnicor	19-383-5404 nsulting@rogers.com
Geologist:			
Neil Hoey		Office: Fax: Cell: peil bog	519-472-4776 519-472-4776 519-649-6918 ey@hotmail.com
Cable Tool Rig:		nen_not	e notinani.com
Terry Marsh	Terry Marsh Well Drilling & Servicing Owner / Operator	Office: Fax: Mobile: twmarsh	519-695-6060 519-695-6464 519-359-9804 nca@yahoo.com
Rotary Rig:			
Unknown – this section	will be completed upon reward	d of the d	rilling contract
Cementing:			
Ian Veen	Black Creek Well Service President	Office: Fax: Cell:	519-882-4732 519-834-2466 519-383-4645
Jeff Luckovitch	Integral Pumping Services Business Devel Manager	Office: Fax: Cell:	519-882-4732 519-834-2466 519-383-4645
Casing, Wellheads & V	<u>alves:</u>		
Brian DeJaegher	Wellmaster Pipe &Supply Sales Representative	Office: Fax: bdejaeg	519-688-0500 519-688-0563 her@wellmaster.ca

Graham Shone	DNow Manager	Office: 519-336-9797 Fax: 519-336-9733 graham.shone@dnow.com
Karen Derrick	Stream-Flo Ltd. Technical Sales Rep.	Office: 832-647-0710 Fax: 519-688-0563
Drill Bits:		Kdeffick@Streamfo.com
Brad Takenaka	Varel Rock Bits Canada Sales Manager	Office: 403-968-9369 Cell: 403-303-2533 btakenaka@varelintl.com
Mike Kellar	Trendon Bit Service Ltd. Director, Sales	Office: 403-990-1299 mkellar@trendoninc.com
Wireline Services:		
Gord Mackenzie	Baker Atlas Station Manager	Office: 519-332-8030 Fax: 519-332-4714 Cell: 519-339-6783 gord.mackenzie@bakerhughes.com
Dave Tipping	Weatherford Canada – Wireline & Logging Services Station Manager	Office: 519-683-2010 Fax: 519-683-2577 Cell: 519-436-3541 dave.tipping@canada.weatherford.com
Water Hauling:		
Keith McKeegan	President McKeegan Trucking Limited	Office:519-864-1037Fax:519-864-1036Cell:519-490-4042
Denis Marcus	President Harold Marcus Limited	Office: 519-695-3735 Fax: 519-695-2249 Cell: 519-380-5238 dmarcus@haroldmarcus.com
Rental Equipment:		unarcus@naroiunarcus.com
Dale Holland	Wheatley Wireline Services Ltd.	Office:519-825-3680Fax:519-825-9348Cell:519-322-8015
Keith Davis	Ecan Energy Services Inc.	Office: 519-627-3824 Fax: 519-627-5306 Cell: 519-437-7038 kmecanen@kent.net

Vern Anger	Canfish Services Inc. Fishing Supervisor	Office: Cell:	780-955-2600 403-845-0012
Orval Beam	Orval L. Beam Limited Operations Manager Tank Rentals	Office: Fax: Cell:	519-436-0164 519-436-0164 519-436-4801
Welders:			
John Dawson	St. Clair Mechanical President	Office: Fax: Cell:	519-864-0927 519-864-0801 519-330-9672
Government & Other A	gencies		
MNRF	Petroleum Resources Centre	Office: Fax: ogsr.mn	519-873-4634 519-873-4645 r.gov.on.ca
MOECC	Spill Reporting	1-800-2	68-6060
MOL	Health & Safety	1-800-2	65-1676
Oil, Gas & Salt Resourc	ees Library	Office: Fax:	519-686-2772 519-686-7225

911 Map & Directions to Nearest Hospital:



4/5/2016		795 Lasalle Line, Sarnia, ON N7T 7H5 to Bluewater Health, Sarnia, ON - Google Maps	
795 Sarni	Las a, ON	salle Line I N7T 7H5	
t	1.	Head west on Lasalle Line toward Degurse Rd	
		59 s (9:	50 m)
Cont	inue	on ON-40 N. Take Vidal St S and Hwy 40B/Brock St S to London Rd/Route 16 in Sarnia	
**	2	11 min (9.	2 km)
P	Ζ.	2	.8 km
1	3.	ON-40 N turns left and becomes Churchill Rd	
۲	4.	Turn right onto Tashmoo Ave	-50 m
41	5.	1 Turn left onto Kenny St	.0 km
			39 m
L,	б.	Turn right onto Vidal St S	
t	7.	1 Vidal St S turns slightly right and becomes Hwy 40B/Brock St S	.6 km
		2	.4 km
r	8.	Turn right onto London Rd/Route 16	
		8	50 m

Blue Water Health

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Google Maps

https://www.google.ca/maps/dir/795+Lasalle+Line,+Sarnia,+ON+N7T+7H5/Bluewater+Health,+Sarnia,+ON/@42.9452382,-82.4315615,13z/am=t/data... 2/2

SECTION 2.0 - GEOLOGICAL PROGNOSIS

County: Lambton Township: Moore							
Concession: XII	Lot: 23	Tract: 8					
Survey Co-ordinates:	150.0 m North	150.0 m West	Estimated				
Elevation: 189.4m	Estimated						
Formation	Тор	Elevation	Thickness	Gas	Oil	Water	Pressure
K.B.	0.0	190.9	1.5				
Drift	1.5	189.4	35.5				
Kettle Point	37.0	153.9	47.0			fresh 37m	
Hamilton	84.0	106.9	87.0				
Dundee	171.0	19.9	32.0				
Lucas	203.0	-12.1	83.0			sulphur 203m	
Amherstburg	286.0	-95.1	47.0				
Bois Blanc	333.0	-142.1	22.0				
Bass Islands	355.0	-164.1	60.0				
G-Shale	415.0	-224.1	7.0				
F-Shale	422.0	-231.1	28.0				
F-Salt	450.0	-259.1	29.0				
E-Carbonate	479.0	-288.1	80.0				
D-Salt	559.0	-368.1	10.0				
C-Shale	569.0	-378.1	20.0				
B-Salt	589.0	-398.1	78.0				
A-2 Carbonate	667.0	-476.1	34.0				
A-2 Shale	701.0	-510.1	11.0				
A-2 Salt	712.0	-521.1	24.0				
A-2 Anhydrite	736.0	-545.1	1.0				
A-1 Carbonate	737.0	-546.1	40.0	XXX	XXX		7000 kPa (est)
A-1 Evaporite	777.0	-586.1	3.0				
TD	780.0	-590.6					
***Note: Proanosis with	TVD tops.						
***Note: used T005399 to	poild prog						
***Note: Prognosis KB b	uilt for Cable To	ol					

Section 3.1	-	Summary
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Hole Size (mm)	Casing Size (mm)	Casing Grade	Casing Weight (kg/m)	Setting Depth (mKB)	How Set
340	340	LS	81.10	37	Driven – cement squeeze if necessary. If a rotary rig is used for the drilling of the well, conductor casing will not be run.
312 (CT) 270 (Rot)	244	H40	48.06	52	Cemented to surface with 100% excess Class G 0-1-0 cement + 2 – 3% CaCl ₂
222	178	J55	29.76	427	Cemented to surface with Class 'G' 0-1-8% plus 1 to 3% CaCl ₂ , followed by Class 'G' neat cement plus 1 to 3% CaCl ₂ . Cement volumes will be calculated with a 50% excess- gel cement and 30% excess – neat cement. Depending upon hole conditions, consideration may be given to running thixotropic cement plus additional loss circulation materials, across porous zone(s).
159	114	J55	15.62	736.5	Cemented to surface with Class 'G' 0-1-0% plus 1 to 2% CaCl ₂ plus 10% NaCl. Cement volumes will be calculated with a 50% excess on the open hole section and 30% excess on the cased hole section.

Main Hole: 98mm open hole will be drilled from 736.5m to 780m



Section 3.2 - Wellbore Diagram – Cable Tool



Section 3.2 - Wellbore Diagram – Rotary

Section 3.3 - Wellhead Summary

Weatherford 13.8 MPa Wellhead:

244mm x 279mm slip on weld on casing bowl for BOP installation
178mm x 229mm slip on weld on casing bowl
229mm x 179mm spool c/w 2 gate valves on side outlets
179mm 13.MPa x 179mm x 20.7 MPa double studded adapter
152mm ANSI 900 Cameron Grove full port ball valve



SECTION 4.0 - DRILLING PROCEDURES

Section 4.1 - Pre Spud

1. Fresh Water Well Samples

Obtain samples from all fresh water wells located within a minimum radius of 750 metre of the proposed well. Have routine water analysis done on all water samples by an independent laboratory in Sarnia. Ensure that copies of these reports are placed in the well files in Enbridge's office

2. Site Preparation

Prepare drilling location as follows:

- a. Locate all drainage tiles crossing lease area
- b. Strip and properly stock pile all soil from the lease
- c. Cut, block and divert drainage tiles as required
- d. Construct adequate berms around lease and access road as required
- 3. Government Notification of Spud

48 hours prior to spud, notify the Ministry of Natural Resources & Forestry – Petroleum Resources Section by fax @ (519) 873 – 4645 of the date of commencement of drilling operations

4. Signs

Install rig signs on access road to lease.

5. Safety Meeting

Conduct a pre-spud safety meeting for all crews. Rig Manager and all crewmembers must be present. A similar meeting shall be conducted with the remaining crew(s) as they come on duty. Additional safety meetings shall be conducted at the Wellsite Supervisor's discretion.

Section 4.2 - Conductor Casing – Cable Tool

1. Drilling Method

Move in and rig up Cable Tool Rig. Measure and record the distance from RF to ground and the RF elevation – include these measurements on the tower sheets and the daily report. Drill and drive 340mm casing to bedrock, to an approximate depth of 37m. Note any occurrence of water and record type of water, depth encountered, and static level of water and/or flow rate. If fresh water is encountered during

drilling, the well must be bail tested for at least 15 minutes, after the casing is landed, to ensure that the fresh water has been shut-off. If the fresh water has not been shut-off, contact Enbridge's office and be prepared to perform a cement squeeze as per Enbridge's requirements.

2. Cement Squeeze (if necessary)

If fresh water is found in the drift and is not shut-off by the conductor casing, a flow rate will be established and a cement squeeze will be performed, using the cement volumes determined by Enbridge. Wait on cement 12 hours and bail the hole dry and monitor the well for at least 15 minutes to determine if the water has been shut-off. If necessary, the process will be repeated until the water is shut-off.

Section 4.3a - Surface Hole & Surface Casing

1. Drilling Method – Cable Tool

Drill a 312mm hole 15 metres \pm into the Kettle Point formation, to an approximate depth of 52m. Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources & Forestry. The sample bags must be labeled with the well name, Township, Lot, Concession and Enbridge's name. Record on daily drilling reports any influx of fluids and/or hydrocarbons, static levels, pressures and any unusual hole conditions.

2. Drilling Method – Rotary

Move in and rig up Rotary rig. Measure and record the distance from KB to ground and the KB elevation – include these measurements on the tower sheets and the daily report. Drill a 270 hole using water based bentonite gel/mud, $15 \pm$ metres into the Kettle Point formation, to an approximate depth of 52m. Ensure that drill cutting samples are taken when bedrock is encountered and then every 3 metres to casing depth and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. The sample bags must be labeled with the well name, Township, Lot, Concession and Enbridge's name. Record on daily drilling reports any influx of fluids and/or hydrocarbons, static levels, pressures and any unusual hole conditions.

3. Casing Installation – Cable Tool and Rotary

Depending upon hole conditions encountered, the 244mm casing will be run in the following manner:

- Texas Shoe on bottom of first joint
- Centralizers on the top and bottom of the first joint and for the cable tool rig coincident with the shoe of the conductor casing and for the rotary rig coincident with bedrock surface
- 244mm casing to surface

4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures. Establish circulation using pump truck. The casing and the hole will be circulated with fresh water for 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14 MPa. Ensure that preflush and mix water are from a clean source and that the water trucks are uncontaminated. Pump $2.0m^3$ citric preflush followed by $1.0m^3$ of fresh water, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples are taken and represent the cement at the beginning, middle and end of the cement job. Ensure that the cement samples are labelled with the wellname and time sample was taken - samples must be stored in a dry and clean location. Mix and pump sufficient Class 'G' 0-1-0% cement plus 2 to 3% CaCl₂ with a density of 1901 kg/m³ to cement the casing to surface with 100% excess. Displace cement with fresh water – ensure that cement is under displaced and that the bottom joint of casing is full of cement. Shut-in cementing valve at surface and wait on cement at least 12 hours and if cement samples indicate the cement is competent then slack off casing.

5. Install 244mm x 279mm slip on weld on casing bowl for BOP installation. Arrange to have surface hole cuttings solidified and disposed in an approved manner.

Section 4.4 - Intermediate Hole & Intermediate Casing

1. BOP Installation and Pressure Testing

Install Class A BOPs as per MNRF requirements. After BOPs are installed and the cement samples indicate that the cement is competent, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

2. Drilling Method

Drill a 222mm hole with fresh water to $5m \pm into the F$ Shale formation, to an approximate depth of 427m. Notify Geologist 12 hours in advance of reaching intermediate casing point, so that they can be on site to determine the proper casing setting depth.

If the geology indicates full reefal development, the TD and target zone could be changed to the Guelph formation or consideration may be given to abandoning the well upon completion. Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources & Forestry. Record on daily tower sheets any influx of fluids and static levels (water and/or hydrocarbons), gas and/or any unusual hole conditions.

3. Casing Installation

Ensure that the threads are protected while hoisting casing to the floor. Drift all casing prior to running the casing in the well and apply proper API make-up torque to each connection.

Depending upon hole conditions encountered, the 178mm casing will be run in the following manner:

- Guide shoe
- 178mm joint of casing
- 178mm Float Insert or Float Collar
- Tack weld guide shoe, float collar and bottom 2 joints and use API modified pipe dope on all connections
- Centralizers will be installed one metre above the guide shoe, over the bottom of the first 2 collars and every 5 joints to surface
- 178mm casing to surface

4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures. Fill hole and establish circulation using pump truck. The casing and the hole will be circulated with fresh water for 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14MPa for 10 minutes. Preflush and mix water must be obtained from a clean source and the water trucks must be uncontaminated. Pump $2.0m^3$ citric preflush followed by $1.0m^3$ of fresh water, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples are taken and represent the cement at the beginning, middle and end of the cement job. Ensure that the cement samples are labelled with the wellname and time sample was taken – samples must be stored in a dry and clean location. Mix and pump sufficient 0-1-8 Class 'G' cement plus 1 to 3% CaCl₂ (50% excess) followed by 0-1-0 Class 'G' cement plus 1 to 3% CaCl₂ (30% excess) to cement casing to surface. Depending upon the severity of the loss circulation zones, thixotropic cement with additional loss circulation materials may be used to cover the loss zone. If there are no cement returns to surface, a feed rate will be established and the annulus will be grouted to surface. Drop wiper plug and displace cement and bump plug to 3.5 Mpa over final pumping pressure – do not exceed 60% of internal yield pressure of casing. Once plug is bumped bleed off pressure to check if the float is holding. If the float is holding shut-in the well and wash out BOPs. If the float is not holding, re-bump the plug, then bleed off the differential pressure and shut-in the well. Wait on cement 24 hours and if cement samples are competent slack off casing. Remove 244mm x 279mm casing bowl and install 178mm x 229mm casing bowl on the 178mm casing.

Section 4.5 - Production Hole & Production Casing

1. Pressure Testing

Check cement samples for hardness – if cement samples are set to the satisfaction of the Wellsite Supervisor, proceed with installation of the BOPS. Install Class B BOPs as per MNR requirements on 178mm casing bowl. After BOPs are installed and the cement samples indicate that the cement is competent, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

2. Drilling Method

Drill a 159mm hole $1 \pm$ metres into the A-2 Anhydrite formation, to an approximate depth of 736.5m. Rotary rig will use brine to drill this section of the well. The final casing point will be determined by the Wellsite Geologist. Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources & Forestry. Record on daily tower sheets any influx of fluids and static levels (water and/or hydrocarbons), gas and any unusual hole conditions.

Prior to penetrating the A-2 Carbonate, the Wellsite Geologist and Wellsite Supervisor must be on-site and a BOP drill shall be completed to familiarize all on-site personnel with the proper procedures.

If the geology indicates full reefal development, the TD and target zone may be changed to the Guelph formation or the well may be abandoned upon completion. This decision will be made in consultation with the Wellsite Geologist and the Enbridge Reservoir Development Group.

If the reef pressure is above 7000kPa, drilling will be suspended and the rig will be moved off location after the 114mm casing is installed and cemented. The rig will be brought back onto location to complete the drilling of the well when the reef pressure is below 7000kPa.

3. Casing Installation

Ensure that the threads are protected while hoisting casing to the floor. Drift all casing prior to running the casing in the well and apply proper API make-up torque to each connection.

Depending upon hole conditions encountered, the 114mm casing will be run in the following manner:

- Guide shoe
- 114mm joint of casing
- Float Insert or Float Collar
- Tack weld guide shoe, float collar and bottom 4 joints and use API modified pipe dope on all connections
- Centralizers will be installed on bottom 5 joints of casing on every 5th joint to surface
- 114mm casing to surface
- 4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures.

Establish circulation using pump truck. The casing and the hole will be filled with brine and circulated for 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14 MPa for 10 minutes. Preflush and mix water must be obtained from a clean source and the water trucks must be uncontaminated. Pump 2.0m³ citric preflush, followed by 1.0m³ of clean brine, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples are taken and represent the cement at the beginning, middle and end of the cement job. Ensure that the cement samples are labelled with the wellname and time sample was taken – samples must be stored in a dry and clean location. Mix and pump sufficient Class 'G' 0-1-0 cement plus 10% NaCl, to cement the 114mm casing to surface plus 50% excess over open hole and 30% excess in cased hole. Drop wiper plug and displace cement with fresh water and bump plug to 3500 kPa over final pumping pressure – do not exceed 60% of internal yield pressure of casing. Once plug is bumped bleed off pressure to check if the float is holding. If the float is holding shut-in the well and bleed down surface lines. If the float is not holding, re-bump the plug, then bleed off the differential pressure and shut-in the well. Wash out BOPs and split BOP stack at 229mm flange, install 114mm slips and set slips in casing bowl. Wait on cement 24 hours and cut casing and remove BOPs. Cut and bevel 114mm casing and install primary and secondary seals. Install 229mm x 179mm spool piece and test wellhead seals to 14 Mpa for 10 minutes. Install 179mm 14MPa x 21MPa double studded adapter and ANSI 900 Master Valve and shut-in well. 48 hours after cementing operations have been completed - pressure test casing, wellhead and master valve to 12,410kPa for a minimum of 4 hours – ensure that a digital pressure gauge is installed. Report results to the Enbridge Office - do not proceed with BOP installation until the pressure test has been successfully completed.

If the Master Valve is too high above the drill floor, the BOPs will be installed on the top of the spool piece and when the well is completed, a WR-1 plug will be set in the base of the casing and successfully pressure tested to 8300 kPa. The BOPs will then be removed and the Master Valve installed. Once the Master Valve has been installed and successfully pressure tested to 12,410kPa, the plug will be retrieved with a Wireline Service company.

Section 4.6 - Main Hole

1. Installation of the BOPs

Check cement samples for hardness – if cement samples are set to the satisfaction of the Wellsite Supervisor, proceed with installation of the BOPS. Install Class B BOPs as per MNR requirements. If a cable tool rig is being used, a lubricator must also be installed. After BOPs are installed and a minimum of 48 hours 'wait-on-cement-time' has passed and the cement samples indicate that the cement is competent, a cement bond log will be run on the 114mm casing.

2. Logging

Move in and rig up Wireline Company. With hole full of fresh water, run a Cement Bond Log, both a non-pressure and pressure pass. Run a Gamma-Ray / Neutron Log from TD to the base of the surface casing. Rig out Wireline Company and release.

3. Drilling Method

Each component of the BOPs, including the lubricator for the cable tool rig, plus the casing and the shoe will be pressure tested as per Section 6.2. Upon successful completion of the pressure testing of the BOPs, the cement, shoe and 0.5m of new formation will be drilled out and a PIT will be conducted, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

Drill a 98mm hole through the A-1 Carbonate and 1 metre into the A-1 Evaporite Formation – final TD will be determined by the Wellsite Geologist. Rotary rig will use fresh water to drill this portion of the well. While drilling the main hole ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources & Forestry. Record on daily tower sheets any influx of fluids and static levels (water and/or hydrocarbons), gas and any unusual hole conditions.

Drilling of the well may be suspended if sufficient permeability and porosity are encountered prior to reaching the proposed TD. If drilling is suspended, the rig will be moved off location and a variety of pressure tests will be performed on the well during withdrawal / injection operations. If the testing of the well shows that the porosity and permeability of the well are not suitable, a rig will be moved back onto location and the well will be drilled to the original TD - 1 metre into the A-1 Evaporite.

4. Logging

Move in and rig up Wireline Company to run a Gamma-Ray/Neutron/Density Log over the open hole section of the well and run a Casing Inspection Log over the 114mm casing.

5. BOP Removal

Close master valve and nipple down BOPs and install 152mm (6") blind flange. If the master valve was not used for the drilling of the well – move in and rig up Wireline and Tool Companies and install 2 WR-1 plugs at the base of the 114mm casing. Bleed down and fill the well with fresh water and pressure test the plug to 8300 kPa. Upon successful completion of the pressure test, remove BOPs and install master valve. Install a digital pressure recorder and pressure test casing, wellhead and master valve, with the hole full of fresh water to a surface pressure of 12,410kPa for a minimum of 4 hours. Report results to Enbridge Office. Do not rig down until well passes the pressure test. Move in Wireline Company to retrieve WR-1 plug.

- 6. Rig down cable tool or rotary rig and move off of location.
- 7. Restore wellsite to Enbridge's specifications.

SECTION 4.7 - LOSS CIRCULATION PROCEDURE

- 1. Before drilling out the casing shoe:
 - a. Identify sources and location of fresh water and/or brine, loss circulation materials and weight materials
 - b. Ensure BOPs and manifold are properly installed
 - c. Ensure auxiliary tanks are connected to the pumping system and a standby mud pump is hooked up for annular injection in case of severe loss circulation (so that fluid can be pumped down both the drill pipe and annulus simultaneously)
 - d. Pressure test BOPs prior to drill out
- 2. After drilling out shoe:
 - a. Alert water suppliers and haulers
 - b. Ensure adequate amounts of fresh water and/or brine are readily available prior to penetrating the Detroit River formation.

- c. Mechanically test BOPs and perform BOP drill prior to penetrating the Detroit River formation.
- 3. Drilling Blind Detroit River formations:
 - a. In an attempt to maintain or re-establish circulation, pump fluid down both the annulus and the drill pipe simultaneously
 - b. Should severe loss circulation occur while drilling, the thief zone may be plugged with cement and/or loss circulation material at Enbridge's discretion.

SECTION 5.0 - REPORTING PROCEDURES

Section 5.1 - Tower Sheets

Shall be completed daily and shall include:

- 1. Bit size, jars, depth at the beginning of the shift and end of each shift.
- 2. Casing size, grade, weight, and number of joints, centralizers, cement baskets, total length and setting depth.
- 3. Cementing information Service Company, cement type, amount, slurry density, additives, annular fluid returns, volume of displacement fluid and plug down time.
- 4. Water, gas or oil type, depth encountered depth of sample collected and the static level and/or rate of flow.
- 5. Pressure tests individually, surface pressures, fluid density used in the tests, bleed-off rate and duration of test.
- 6. Logging Details type and interval.
- 7. Abandonment details intervals, amount and type of cement, top of plug and time felt.
- 8. Rig release date and time.

Section 5.2 – Worker Injury

Immediately provide first aid to the injured party and ensure that all personnel are removed from harm's way. Secure the area and ensure that the site is preserved in case an investigation is required.

Every work related accident or injury shall be reported immediately to the Wellsite Supervisor. The Supervisor shall immediately contact the Enbridge Gas Distribution Inc. Office, specifically the Manager, Reservoir Development followed by the Reservoir Field Supervisor. The verbal report shall be followed with a written report, including but not limited to, the Contractor's Accident/Incident Investigation form. The affected Contractor is responsible to contact the proper authorities concerning the accident.

SECTION 6.0 - SAFETY AND PROCEDURES

Section 6.1 - General Safety

- 1. All works at the wellsite shall be in compliance with the Occupational Health and Safety Act and the Oil, Gas & Salt Resources Act and all associated legislation. In addition, all work at the wellsite shall be done in compliance with good oil field practices. All verbal notifications given to and approvals received from government agencies shall be recorded on the tower sheets.
- 2. The Enbridge 'Job Safety Analysis Form' (JSA) shall be thoroughly reviewed by the Wellsite Supervisor with all worker(s) that arrive on location that have not previously reviewed the JSA. Upon completion of the review, the worker(s) will sign the JSA as acknowledgement of their understanding of the hazards and the steps that will be taken to mitigate the hazards where possible.
- 3. Daily safety ('tailgate') meetings are to be conducted with each shift and recorded on a Task Analysis Safety Card (TASC). Additional safety meetings are to be held with each crew, at the start of the well and safety meetings shall also be held prior to cementing and upon arrival of the logging company and prior to penetrating the Detroit River formations and the A-2 Carbonate formation.
- 4. The Wellsite Supervisor shall ensure that the operations are in compliance with all applicable government regulations and shall complete daily walk around rig inspections.

Section 6.2 – Well Control

All blowout prevention systems are to be in strict compliance with MNR regulations. The function and pressure testing guidelines required by the regulatory bodies (such as daily function testing of the pipe rams) will be strictly adhered to.

- 1. All pressure tests of blowout prevention equipment will be conducted with fresh water and will be conducted in 2 stages low and high pressure. It is essential that the low pressure test be done first, to prevent the high pressure test from healing leaks that would have been noted at low pressures.
- 2. The following pressure tests will be conducted with fresh water prior to drilling out each casing string and the results recorded on the tower sheets and daily reports:
 - a. The blind rams, kill lines and casing will be tested individually for 10 minutes each to:
 - i. Intermediate casing 2000 kPa low & 8000 kPa high
 - ii. Production casing 2000 kPa low and 10000 kPa high

- b. Function test the pipe rams / shear rams, safety valves, etc. individually for 10 minutes each to:
 - i. Intermediate casing 2000kPa low & 8000 kPa high
 - ii. Production casing 2000 kPa low and 10000 kPa high
- c. The annular preventor will be tested for 10 minutes to
 - i. Surface casing 1400 kPa low and 3500 kPa high
 - ii. Intermediate casing 2000 kPa low & 8000 kPa high
 - iii. Production casing 2000 kPa low and 10000 kPa high
- d. The lubricator system will be tested for 10 minutes to
 - i. Production casing 2000 kPa low and 8000 kPa high
- 3. If a cable tool rig is used, a full lubricator system will be required when:
 - a. gas is encountered with H_2S content greater than 100ppm,
 - b. when crude oil flows to surface or is capable of unloading during bailing operations, or
 - c. when flows of natural gas exceed 7.0 10^3 m³/D (250Mcfd).
- 4. Upon drilling out the casing, drill 0.5m to 1.0m of new hole and test the formation, with the hole full of fresh water, to a minimum bottom hole pressure of 18 kPa per metre.
- 5. After one day of drilling below the casing shoe, check the entire blowout prevention system and tighten all bolts.
- 6. Crews should be kept alert and familiar with the blowout prevention equipment. At least one member of the crew who has been trained in blowout prevention and well control procedures must be on the floor at all times.
- 7. Conduct blowout prevention drills prior to drilling out casing and once per week thereafter. Ensure that the drills are recorded in the tour book.
- 8. The blowout preventors are to be function tested once per tour. Ensure that the function test is recorded on the tower sheets.



Oil, Gas and Salt Resources Act

Application for a Well Licence

Form 1	cianod one	rator applice	for a well	To the Minister of Natural Resources and Forestry v.2015-1:					v.2015-12-15		
the following	ng informat	ion, together	with the a	application	fee of \$10	0. Make cheque	es payable to "M	inister of Financ	e".		
1. WELL	NAME			TD 28H (F	loriz 1), Me	oore 2-21-XII		Target Formation			ph
Purpose o	f Proposed	Well (Well]	Гуре)				Natural Ga	as Storage Well			1
2. OPER/	TOR		E	nbridge Ga	s Distribut	ion Inc.		Tel #519-8	362-1473	Fax #5	19-862-1168
Street Add	Iress		350	01 Tecums	eh Road		City	Mooretown	Prov. C	N Postal Code	NON 1MO
Mailing Ad	Idress		350	01 Tecums	eh Road		City	Mooretown	Prov. C	N Postal Code	NON 1MO
Contact N	ame			K	athy McCo	nnell		Contact	Tel #	519-862-6	6032
Er	nail		<u>kat</u>	hy.mcco	nnell@ei	nbridge.com	L				
3. LOCAT	ΓΙΟΝ	County_		Li	ambton		Township		Мо	ore	
Tract	2 La	ot <u>21</u>	Co	oncession		12	Offshore:	Block	Fract L	icence/Lease No.	
Surface lo metres fro	cation, m	135.20	_m Nor	rth S	South	Latitude	42 ⁰ 54' 37.8	376" Bot	ttom-hole Lat.	42 ⁰ 54	30.784"
Lot Bound	aries	189.35	_m Ea	ist X	West	Longitude	82 ⁰ 23' 19.8	323" Bot	tom-hole Long	g. <u>82⁰ 23</u>	51.196"
Within 1.6	km of Des	ignated Stor	age Area	? Y	esX	No		Off-targe	et? Yes	NoX	
4. WELL	PARTICUI	ARS	Vertic	cal	Horizon	ital X D	lirectional	Deepening	Re-e	ntry La	ateral
Rig Type:	Rotary	X Ca	able	Well	to be core	d? Yes	NoX	Formation at 1	rd	Guelph	
Ground El	evation	189.67	Propose	ed Depth	1400.0	Propose	d Depth TVD	733.00	Proposed Star	t Date	1-Apr-18
5. POOLI	NG										
Pooling of	the Spacir	ng Unit or un	itization of	f the Unit A	rea shown	on the attache	d well location pl	an			
has been	completed	(see Ont. Re	eg. 245/97	definitions	for "poole	d spacing unit"	and "unitize")	Yes	X No		
6. DRILLI	ING CONT	RACTOR _			AMMA	Unknown			Tel #		
Address							City		Prov.	Postal Co	de
7. PROP		ING AND C	EMENTIN		AM	Cotting		1000 Table 2 and 100 all 100 al	CARING		
Size (mm)	O.D. (mm)	Weight (kg/m)	Grade	Used or in-hole	Depth TVD	Depth Meas.	Setting Fo	ormation	How	Cement Type	Cement Top KB / RF
508	406	96.42	LS	New	55	55	Kettle	Point	Cement	Class 'G'	surface
375 270	298 219	69.94 47.62		New	423 679	423 700	F UI A-2 Ant	nit	Cement	Class 'G' Class 'G'	surface
· · · · · · · · · · · · · · · · · · · ·								**********		<u></u>	
8. BLOW	-OUT PRE	VENTION E	QUIPMEN	IT 16" 2 11" 2	2/3M Annul 2/3M Annul	ar Preventor ar Preventor ar	nd Double Gate (pipe and blind)			
9. WELL	SECURITY	/ Name of	Trustee	-	Harrison P	ensa LLP	Total # U	Inplugged Wells	145 (Current Balance	e\$70K
10. REM	ARKS	Rotating Co	ontrol Devi	ice 11" x 2/	′3000 psi w	ill be used for a	drilling in the reel	f		•	
11. ENCL	OSURES	Fe	e X		Locatior	Plan X (Land wells only)		Drilling Prog	ram X	
12. NOTI The Ministry	CE OF CO	LLECTION esources and F	Forestry is c	ollecting your	personal info	ormation under the	authority of the <i>Oil</i> ,	Gas and Salt Reso	<i>purces Act</i> . Any	personal informati	on provided on
If you have questi	ons about use of ye	ur personal informatio	on, please contact	the Policy and Prop	gram Officer, Petro	leum Operations Section, I	Ministry of Natural Resource	s and Forestry, 659 Exeter R	oad, London N6E1L3, 5	19-873-4638.	may not
13. AUTH	ORITY										
The under	rsigned cer e location, a	tifies that the and he/she h	informati as author	on provide ity to bìnd t	d herein is he operato	complete and a	accurate, the ope	erator has the rig	ght to drill or o	perate a well in	
Date (d/m/y)	21/11/17	Nam	е		Kathy McConn	ell	Signature	Kolf	Alan.	reel.
			Com	pany	Enbr	idge Gas Distri	bution Inc.	Title	Manager, F	Reservoir Deve	lopment



TIMOTHY J. O'ROURKE C.S.T. A.C. AUTHORIZED BY THE MINISTER DI UNDER THE PETROLEUM RESOURCE	PREPARED ENBRIDGE GAS DIS FILE ND. 17-5102 PI	OFFICE (519) 3 CELL (519) 36 FAX (519) 35 PD.BDX 327 - 1 CHATHAM , DN	PREPARED BRISCO AND C SERVING THE PETROL THROUGHOUT C WELLS,CONSTRUCTION AND T DIGITAL MAF LAND AND LEASE	U.T.M. CD-ORDINATES ARE GEODET DRIGINALY AND REFERRED TO MOT No.S 693749 AND 693767 NOTE METR DISTANCES SHOWN ON THIS PLA CAN BE CONVERTED TO FEET B	NOTE BENCH REFERENCE BENCH MARK BEING ND. 81U138 SARNIA ELEVATION = 180,512	LATITUDE N.42°54'37.876 LENGIT U.T.M. N.4 751 814 E.386 63 WELL NAME TD 28H (HORIZ # 1) - MOO	CALE 1:5000 NOTE (WELL SITE) CO-0	CONCESSION 12 CONCESSION 12 COMNSHIP OF ST. CI COWNSHIP OF ST. CI COUNTY OF LAMBTO	LAN OF PROPO
NOV. 23 ,2017 E.T. F NATURAL RESOURCES ES ACT OF ONTARIO	FOR TIRIBUTION INC. LAN ND. ENB6850.DWG	851-5073 50-2134 51-3119 N7M-5K4 NTARID	BY)'ROURKE LEUM INDUSTRY INTARID ECHNICAL SURVEYING PPING PPING SURVEYS	ONTAL CONTROL TIC (DATUM NAD 83 NUMENTS 21C AN ARE IN METERS AND Y DIVEDING BY 0.3048	MARK Geodetic Datum And	UDE W.82°23'19,823"	RDINATES	N N N	SED WELL

TD 28H (HORIZ 1) MOORE 2-21-XII

DRILLING PROGRAM

Drilling Program

TD 28H (HORIZ 1) MOORE 2-21-XII

Enbridge Gas Distribution Inc.

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Drilling Program TD 28H (HORIZ 1) MOORE 2-21-XII

Enbridge Gas Distribution Inc.

SECTION 1.0 - GENERAL DATA

Section 1.1 - Well Summary

Well Name:	TD 28H (Horiz 1) Moore 2-21-XII
Operator:	Enbridge Gas Distribution Inc.
Surface Hole Location:	Tract 2, Lot 21, Con. 12, Moore Twp., Lambton County
Surface Hole Coordinates:	N 4 751 814; E 386 633
Bottom Hole Location:	Tract 3, Lot 22, Con. 12, Moore Twp., Lambton County
Bottom Hole Coordinates:	N 4 751 607; E 385 918
Ground Elevation:	189.67 m
KB Elevation:	193.67 m
Total Depth:	733mTVD; 1400mMD
Target Formation:	Guelph
Logging Program:	CBL-GR – 219mm casing Vertilog – 219mm casing
Spud Date:	April 1, 2017
Duration:	21 days

Section 1.2 – Special Notes

1. Safety of personnel and environment is our primary concern. Section 6.1 of this program, outlines Enbridge's general safety requirements which obliges all personnel on the wellsite to follow the Occupational Health and Safety Act and Regulations (Ministry of Labour (MOL)) and the Oil, Gas & Salt Resources Act and Regulations (Ministry of Natural Resources and Forestry (MNRF)). Safety and/or environmental ("tailgate") meetings shall be conducted as per Section 6. Wellsite Supervisor shall conduct daily 'walk around' inspections of the equipment on site and record the results on the daily reports. Please refer to Section 5.2 for the procedure to be followed if a worker injury occurs.
- 2. The Wellsite Supervisor has authority over all activities conducted on the drilling location. The Wellsite Supervisor shall ensure that all applicable regulations and policies (MNRF, MOL, Ministry of the Environment and Climate Change (MOECC), and Enbridge) are followed and that all permits are kept on site and/or signed off as required.
- 3. All operations are to be to MNRF standards.
- 4. BOPs are to be installed, maintained and used as per MNRF requirements. Testing of the BOPs must be in accordance with Section 6.2 of this program.
- 5. Tower sheets must be completed daily and will include the information listed in Section 5.1 of this program. The Wellsite Supervisor will complete daily reports and forward the reports to Enbridge's office by 10am the following day.
- 6. The well will be drilled with fresh water or formation brine, hauled to location by an approved contractor. The fresh water will be obtained from local municipal water systems, located at Brigden, Corruna and other available water systems. The brine used will be Guelph formation brine obtained from Enbridge's existing operations.
- 7. The production casing will be set in the A-2 Anhydrite to allow for an effective cement job and successful pressure testing, prior to penetrating the Guelph formation
- 8. A minimum of two 500 barrel temporary storage tanks will be spotted on location prior to the drilling of the Detroit River formation. The tanks will be filled with fresh water / brine as reserve for the drilling of potential loss circulation zones. Potential loss circulation zones exist in the Detroit River formation (intermediate hole) and the Guelph formation (main hole).

Enbridge Gas Distribution Inc.

Section 1.3 - Contact Numbers

Emergency Numbers:

- Police, Fire & Ambulance:* 911
- 911 Address: 963 Lasalle Line, Sarnia, Ontario

* For 911 Map and Map and Directions to Nearest Hospital see attached Map at end of Section 1.3

Rob Carlson	Reservoir Field Supervisor	Office: Fax: Cell: robert.car	519-862-6036 519-862-1168 519-312-4863 rlson@enbridge.com
Kathy McConnell	Manager Reservoir Development	Office: Fax: Cell: kathy.mc	519-862-6032 519-862-1168 519-312-2168 connell@enbridge.com
Chris Pincombe	Land Agent	Office: Fax: Cell: chris.pine	519-862-6092 519-862-1168 519-381-1408 combe@enbridge.com
Control Room		Office:	519-862-6012
Drilling Supervisor:			
Steve Thompson	Omni Consulting Ltd. President	Cell: 51 omnicons	9-383-5404 sulting@rogers.com
Geologist:			
Neil Hoey		Office: Fax: Cell: neil_hoey	519-472-4776 519-472-4776 519-649-6918 y@hotmail.com

Enbridge Gas Distribution Inc.

Rotary Rig:

Clayton Landry	Predator Drilling Inc. Rig Manager	Office: 403-346-0870 Fax: 403-346-0860 Mobile: 403-740-3765 kmecanen@kent.net
Directional Drillers:		
Danny Brown	Account Manager - Weatherford	Office: 403-693-7831 Fax: 403-510-1995 daniel.brown@ca.weatherford.com
Craig Dalziel	Drilling Technologist - Weatherford	Office: 780-979-4539 Craig.dalziel@ca.weatherford.com
Cementing:		
Ian Veen	Black Creek Well Service President	Office:519-882-4732Fax:519-834-2466Cell:519-383-4645
Jeff Luckovitch	Integral Pumping Services	Office: 519-689-4692 Cell: 226-234-5362
Casing, Wellheads & I	ESDs:	
Brian DeJaegher	Wellmaster Pipe &Supply Sales Representative	Office: 519-688-0500 Fax: 519-688-0563 bdejaegher@wellmaster.ca
Graham Shone	DNow Manager	Office: 519-336-9797 Fax: 519-336-9733 graham.shone@dnow.com
Karen Derrick	Stream-Flo Ltd. Technical Sales Rep.	Office: 832-647-0710 Fax: 519-688-0563 kderrick@streamflo.com

Enbridge Gas Distribution Inc.

Drill Bits:

Brad Takenaka	Varel Rock Bits Canada Sales Manager	Office: Cell: btakena	403-968-9369 403-303-2533 ka@varelintl.com
Mike Kellar	Trendon Bit Service Ltd. Director, Sales	Office: mkellar	403-990-1299 @trendoninc.com
Wireline Services:			
Gord Mackenzie	Baker Atlas Station Manager	Office: Fax: Cell: 51 gord.mac	519-332-8030 519-332-4714 9-339-6783 kenzie@bakerhughes.com
Dave Tipping <u>Water Hauling:</u>	Weatherford Canada – Wireline & Logging Services Station Manager	Office: Fax: Cell: 51 dave.tippin	519-683-2010 519-683-2577 9-436-3541 ng@canada.weatherford.com
Keith McKeegan	President McKeegan Trucking Limited	Office: Fax: Cell:	519-864-1037 519-864-1036 519-490-4042
Denis Marcus	President Harold Marcus Limited	Office: Fax: Cell: dmarcus	519-695-3735 519-695-2249 519-380-5238 @haroldmarcus.com
Rental Equipment:			
Dale Holland	Wheatley Wireline Services Ltd.	Office: Fax:	519-825-3680 519-825-9348

		Cell.	519-522-6015
Keith Davis	Ecan Energy Services Inc.	Office:	519-627-3824
		Fax:	519-627-5306
		Cell:	519-437-7038
		kmecar	nen@kent.net

Enbridge Gas Distribution Inc.

Vern Anger	Canfish Services Inc.	Office:	780-955-2600
	Fishing Supervisor	Cell:	403-845-0012
Orval Beam	Orval L. Beam Limited	Office:	519-436-0164
	Operations Manager	Fax:	519-436-0164
	Tank Rentals	Cell:	519-436-4801
Welders:			
John Dawson	St. Clair Mechanical President	Office: Fax: Cell:	519-864-0927 519-864-0801 519-330-9672

Government & Other Agencies

MNRF	Petroleum Resources Centre	Office: Fax: ogsr.mn	519-873-4634 519-873-4645 rf.gov.on.ca
MOECC	Spill Reporting	1-800-2	68-6060
MOL	Health & Safety	1-800-2	65-1676
Oil, Gas & Salt Resource	ces Library	Office: Fax:	519-686-2772 519-686-7225

Enbridge Gas Distribution Inc.

911 Map & Directions to Nearest Hospital:



Bluewater Health

Sarnia, ON N7T 4W8

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Enbridge Gas Distribution Inc.

Section 2.0 - Geological Prognosis

County: Lambton	Township: Mo	oore					
Concession: XII	Lot: 21	Tract: 2					
Elevation: 189.3m	Estimated						
Formation	Тор	Elevation	Thickness	Gas	Oil	Water	Pressure
K.B.	0.0	193.3	4.0				
Drift	4.0	189.3	36.0			37m Fresh	
Kettle Point	40.0	153.3	31.5				
Hamilton	71.5	121.8	87.0				
Dundee	158.5	34.8	36.6				
Lucas	195.1	-1.8	92.0			197m Sulphur	
Amherstburg	287.1	-93.8	33.0				
Bois Blanc	320.1	-126.8	26.5				
Bass Islands	346.6	-153.3	64.0				
G-Shale	410.6	-217.3	7.0				
F-Shale	417.6	-224.3	24.0				
F-Salt	441.6	-248.3	90.0				
E-Carbonate	531.6	-338.3	25.0				
D-Salt	556.6	-363.3	8.7				
C-Shale	565.3	-372.0	20.0				
B-Salt	585.3	-392.0	60.8				
A-2 Carbonate	646.1	-452.8	25.2				
A-2 Shale	671.3	-478.0	6.0				
A-2 Anhydrite	677.3	-484.0	6.8				
Guelph (Reef)	684.1	-490.8	100.0+	XXX			4200 Kpa+

***Note: Prognosis with TVD tops.

Note: used "TEC DOW 7" Lic. T007292 to build prognosis

Drilling Program

TD 28H (HORIZ 1) MOORE 2-21-XII

Enbridge Gas Distribution Inc.

Section 3.0 - Casing and Cementing Summary

Section 3.1 - Summary

Hole Size (mm)	Casing Size (mm)	Casing Grade	Casing Weight (kg/m)	Setting Depth (mKB)	How Set
508	406	LS	96.42	55	Cemented to surface with 100% excess Class G 0-1-0 cement + $2 - 3\%$ CaCl ₂
375	298	J-55	69.94	423	Cemented to surface with Class 'G' 0-1-8% plus 1 to 3% CaCl ₂ , followed by Class 'G' neat cement plus 1 to 3% CaCl ₂ . Cement volumes will be calculated with 50% excess- gel cement and 30% excess – neat cement. Depending upon hole conditions, consideration may be given to running thixotropic cement plus additional loss circulation materials, across porous zone(s).
270	219	J-55	47.62	679m TVD / 700m MD	Cemented to surface with Class 'G' 0-1-0% plus 1 to 2% CaCl ₂ plus 10% NaCl. Cement volumes will be calculated with a 50% excess on the open hole section and 30% excess on the cased hole section.

Main Hole: 200mm open hole will be drilled from 700mMD (679mTVD) at 52^{0} and will reach 90^{0} at 842mMD (733mTVD) and will be drilled horizontally for approximately 558m to a TD of 1400mMD (733mTVD) at 90^{0} .



TD - 733mTVD/1400mMD

Enbridge Gas Distribution Inc.

Section 3.3 - Wellhead Summary

Universal Wellhead Systems Inc. 13.8 MPa Wellhead:

406mm x 425.5mm slip on casing bowl (for BOP installation) 298mm x 340mm slip on casing bowl 340mm x 228.6mm spool c/w 2 gate valves on side outlets 203.2mm ANSI 900 master valve (full port)



Enbridge Gas Distribution Inc.

Section 3.4 - Directional Planning Report





Enbridge Gas Distribution Inc.

Wellpath created	uning minimu	im curvature.												
Tie Point: MD: 0.00m		Inclination:	0.00	Azimuti	h: 0.00°	L	TVD:	0.00m	North Of	fset: 0.00m	L	East Offset:	0.00m	L
Salient Points: (R	elative to Slo	t centre)(TVD relativ	e to Drill Floc	5	I	I	I	l	l	l	I		I	
Comment	£ŝ	a Sec Sec Sec Sec Sec Sec Sec Sec Sec Sec	¢8	6 G 8 8 9 9 9 9	m)	N.Officet (m)	E.Officet	Northing (m)	Easting (m)	S (ii	DLS (m05(Y)	1Face	B.Rate (1/3 Om)	T.Rate (%3.0m)
	00'0	0.00 0.01	0	00	8.00	0.00	0.0	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.0
KOP	543.55	0.00 0.00	543	.55 -34	5.55	0.00	0.00	4751814.00	386633,00	00'0-	0.00	0.00	0.00	0.00
219 mm CASING	699.55	52.00 253.(0 679	.00	1.00	-19.31	-63.18	4751795.73	386569.51	66.06	10.00	253.00	10.00	0.00
START 2ND BUTLD	728.07	52.00 253.0	969 00	-49	6.56	-25.89	-84.67	4751789.52	386547.92	88.54	0.00	0.00	0.00	0.00
HE B.	842.10	90.00 252.1	733	.01 -53	5.01	-57.82	-185.59	4751759.25	386446,48	194.39	10.00	358,38	10.00	-0.26
	852.02	90.00 252.A	9 733	.01 -53	5.01	-60.80	-195.05	4751756.42	386436.97	204.31	3.00	89.95	0.00	3.00
TD 28H TD	1392.08	90.00 252.0	8	-53	5.00	-218.77	-711.49	4751607.00	385918/00	744.36	0.00	0.00	0.00	0.00
Interpolated Poin	ts: (Relative	to Slot centre)(TVD r	dative to Dri	Eloor)	I	I	I		I		I		I	
Comment	£ŝ	inc (C)	52	800	m)	MORE (m)	E Office	Northing (m)	Easting (m)	S (ji	DLS (730m)	11 Bee	B.Rate (1/3 0m)	T.Rate (*/3.0m)
	00'0	0.00 0.00	0	00 196	9.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	10,00	0.00 0.00	10	00 185	8,00	0.00	0.00	4751814,00	386633.00	00'0-	0.00	0.00	0.00	0.00
	20.00	0.00 0.00	8	00	8,00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	30,00	0.00 0.00	8	00 16	8,00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	40.00	0.00 0.00	04	00 15	8,00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	50.00	0.00	8	00	8.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	00'09	0.00 0.00	8	00	8.00	0.00	0.00	4751814/00	386633.00	00'0-	0.00	0.00	0.00	0.00
	70.00	0.00 0.00	Ŕ	00 128	8.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	00'08	0.00	8	311 000	8,00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
	00'06	0.00 0.00	8	00 106	8.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
	100,00	0.00 0.00	100	86	007	0.00	0.00	4751814.00	386633,00	00'0-	0.00	0.00	0.00	0.00
	110,00	0.00	110	00 [,]	00'	0.00	0.00	4751814/00	386633.00	00'0-	0.00	0.00	0.00	0.00
	12 0.00	0.00	021	82	00;	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
	13 0.00	0.00	130	99	8	0.00	0.00	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
	140.00	0.00	140	8	8	0.0	0.0	4751814.00	386633.00	00'0-	0.0	0.00	8.0	0.0
	15 0.00	0.00	150	00 [,]	8	0.00	0.0	4751814,00	386633.00	-0,00	0.00	0.00	0.00	0.00
	160.00	0.00	160	8	8	0.00	0.0	4751814/00	386633.00	00'0-	0.00	0.00	0.00	0.00
	170.00	0.00	170	00, 28	8	0.00	0.00	4751814,00	386633.00	-0,00	0.00	0.00	0.0	0.00
	180.00	0.00	180	00,	8	0.00	0.00	4751814.00	386633.00	00.0-	0.00	0.00	0.00	0.00
	19 0.00	0.00	190	8	8	8.0	8	4751814.00	386633,00	0,0	8	0.00	8.0	0.0
	200'002	0.00	200	8	00	0.0	0.0	4751814.00	386633.00	0.00	8.0	0.00	0.0	0.00
	210,00	0.00	210	00 12 71 12	2,00	8 2	0.0	4751814,00	386633.00	0,00	8 6	0.0	8 1	0.0
	22 0,00	0.00	2220	7- 00	2,00	0.00	0.0	4751814/00	386633.00	00'0-	0.0	0.00	0.0	0.00
	23 0.00	0.00	230	.00	2.00	0.00	0.00	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
Weatherford In	ternational	Limited								5D 8.1.26 (64 bit): 1	19 September 20	117, 13:56	:13 UTC-6

5D Plan Report

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Enbridge Gas Distribution Inc.

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£Ê	3ă	¥E	£€	SS Elevation (m)	N.Offiset (m)	E.Offset	Northing (m)	Easting (m)	S €	DLS (m0E(*)	3 TFee	B.Rate (*/30m)	T.Refe (*/30m)
240,00	0.00	0.00	240.00	-42.00	0.00	0.0	4751814/00	386633.00	00'0-	0.00	0.0	0.0	0.00
250,00	0.00	0.00	250.00	-52,00	0.00	0.00	4751814.00	3 8663 3,00	00'0-	0.00	0.00	0.00	0.00
260.00	0.00	0.00	260.00	-62.00	0.00	0.0	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
270.00	0.00	0.00	270.00	-72.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
280.00	0.00	0.00	280.00	-82.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
290.00	0.00	0.00	290.00	-92.00	0.00	0.00	4751814,00	386633.00	00'0-	0.00	0.00	0.00	0.00
300,00	0.00	0.00	300,000	-102.00	0.00	0.0	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
310,00	0.00	0.00	310.00	-112.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
32.0.00	0.00	0.00	320.00	-122.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
330,00	0.00	0.00	330,00	-132.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
340,00	0.00	0.00	340,00	-142.00	0.00	0.00	4751814.00	386633.00	-0,00	00.00	0.00	0.00	0.00
350,00	0.00	0.00	350,00	-152,00	0.00	0.0	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
360.00	0.00	0.00	360,00	-162.00	0.00	0.00	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
37 0.00	0.00	0.00	370.00	-172.00	0.00	0.0	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
380,00	0.00	0.00	380.00	-182.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
39 0.00	0.00	0.00	390.000	-192.00	0.00	0.0	4751814.00	386633.00	00'0-	0.0	0.00	0.0	0.00
40 0.00	0.00	0.00	400,00	-2.02,00	0.00	0.0	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
410,00	0.00	0.00	410.00	-212.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
42 0.00	0.00	0.00	420.00	-2.22.00	0.00	0.0	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
43 0.00	0.00	0.00	430,00	-232.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
440.00	0.00	0.00	440.00	-2.42.00	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
450.00	0.00	0.00	450.00	-252.00	0.00	0.0	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
460.00	0.00	0.00	460.00	-2.62,00	0.00	0.0	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
47 0.00	0.00	0.00	470,00	-272.00	0.00	0.00	4751814.00	386633.00	-0.00	0.00	0.00	0.00	0.00
480,00	0.00	0.00	480,00	-282.00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
49 0.00	0.00	0.00	490,00	-292.00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	200,000	-3 02,00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.0	0.00
510,00	0.00	0.00	510,00	-312,00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
52 0.00	0.00	0.00	520,00	-322.00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
530.00	0.00	0.00	530,00	-332,00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
540.00	0.00	0.00	540,00	-3.42.00	0.00	0.00	4751814.00	386633.00	-0,00	0.00	0.00	0.00	0.00
543.55	0.00	0.00	543.55	-3.45,55	0.00	0.00	4751814.00	386633.00	00'0-	0.00	0.00	0.00	0.00
550,00	2.15	253.00	550.00	-352,00	-0.04	-0.12	4751813.97	386632.88	0.12	10.00	253.00	10.00	0.00
560.00	5.48	253.00	559.97	-361.97	-0.23	-0.75	4751813.78	386632.24	6 [.] '0	10.00	0.00	10.00	0.00
57 0.00	8.82	253.00	569.90	-371.90	-0.59	-1.94	4751813,44	386631.05	2.03	10.00	0.00	10.00	0.00
580,00	12.15	253.00	579.73	-381.73	-1.13	-3,68	4751812.94	386629.30	3.85	10.00	0.00	10.00	00'0-
590.00	15.48	253.00	589.44 289.44	-391.44	-1.82	-5.97	4751812.27	386627.01	6.24	10.00	0.00	10.00	0.00
600.00	18,82	253.00	598.99	-400.99	-2.69	-8.79	4751811.46	386624.17	9.19	10.00	0.00	10.00	00'0-
610.00	22.15	253.00	909,36	-410.36	-3.71	-12.13	4751810,49	386620.81	12.69	10.00	0.00	10.00	0.00
62 0.00	25.48	253.00	617.50	-419.50	-4,89	-15.99	4751809.38	386616.93	16.72	10.00	0.00	10.00	00.0-
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Drilling Program TD 28H (HORIZ 1) MOORE 2-21-XII

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SECTION 4.0 - DRILLING PROCEDURES

Section 4.1 - Pre Spud

1. Fresh Water Well Samples

Obtain samples from all fresh water wells located within a minimum 750 metre radius of the proposed well. Have routine water analysis done on all water samples by an independent laboratory in Sarnia. Ensure that copies of these reports are placed in the well files in Enbridge's office

2. Site Preparation

Prepare drilling location as follows:

- a. Locate all drainage tiles crossing lease area
- b. Strip and properly stock pile all soil from the lease
- c. Cut, block and divert drainage tiles as required
- d. Construct adequate berms around lease and access road as required
- 3. Government Notification of Spud

48 hours prior to spud, notify the Ministry of Natural Resources and Forestry – Petroleum Operations Section by fax @ (519) 873 – 4645 of the date of commencement of drilling operations

4. Signs

Install rig signs on access road to lease.

5. Safety Meeting

Conduct a pre-spud safety meeting for all crews. Rig Manager and all crewmembers must be present. A similar meeting shall be conducted with the remaining crew(s) as they come on duty. Additional safety meetings shall be conducted at the Wellsite Supervisor's discretion.

Section 4.2 - Surface Hole & Surface Casing

1. Drilling Method

Drill a 508mm hole using water based bentonite gel/mud, 15 metres into the Kettle Point formation, to an approximate depth of 55m. Ensure that drill cutting samples are taken when bedrock is encountered and then every 3 metres to casing depth and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. The sample bags must be labeled with the well name,

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Township, Lot, Concession and Enbridge's name. Record on daily drilling reports any influx of fluids and/or hydrocarbons, static levels, pressures and any unusual hole conditions.

2. Casing Installation

Depending upon hole conditions encountered, the 406mm casing will be run in the following manner:

- Texas Shoe on bottom of first joint
- Centralizers on the top and bottom of the first joint and at the bedrock contact point
- 406mm casing to surface
- 3. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures. Establish circulation using pump truck. The casing and the hole will be circulated with fresh water for a minimum of 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14 MPa. Ensure that preflush and mix water are from a clean source and that the water truck are also clean. Pump preflush of 2.0m³ of fresh water, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples are taken and represent the cement at the beginning, middle and end of the cement job. Mix and pump sufficient Class 'G' 0-1-0% cement plus 2 to 3% CaCl₂ with a density of 1901 kg/m³ to cement the casing to surface with 100% excess. Displace cement with fresh water – under displace cement such that the bottom joint of 406mm casing is full of cement. Shut-in cementing value at surface and set casing on bottom. Wait on cement a minimum of 24 hours before installing the BOPs.

4. Arrange to have surface hole cuttings solidified and then disposed in an approved manner.

Section 4.3 - Intermediate Hole & Intermediate Casing

1. BOP Installation and Pressure Testing

Install 406mm x 425.5mm slip on weld on casing bowl. Install Class A (Rotary) BOPs as per MNRF requirements. After BOPs are installed and the cement samples indicate that the cement is competent, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

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2. Drilling Method

Drill a 375mm hole with fresh water, $5m \pm into the F$ Shale formation, to an approximate depth of 423m. Notify Geologist 12 hours in advance of reaching intermediate casing point, so that they can be on site to determine the proper casing setting depth. When casing setting depth has been determined, circulate the hole clean and run a deviation survey. Perform a flow check prior to tripping and strap out of the hole. Fast tripping of the drill string is to be avoided in order to eliminate high annular velocities, pressure surges and swabbing. Keeping hole full of fluid, trip out of hole with bottom hole assembly, drill collars and drill pipe.

The potential for loss circulation exists while drilling through the Detroit River formations (Lucas and Amherstburg formations). If loss circulation is encountered use the loss circulation contingency program located in Section 4.6. Note all lost circulation intervals and monitor and record fluid loss volumes. If fluid must be hauled to disposal, keep solid content to a minimum to reduce costs.

Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. Surveys are to be taken every 100 metres. Deviation shall not exceed 1 degree per 100 metres and shall not exceed 2 degrees at any point. Record on daily tower sheets any influx of fluids (water and/or hydrocarbons), loss circulation (rate and depth) and/or any unusual hole conditions.

3. Casing Installation

Ensure that the threads are protected while hoisting casing to the floor. Drift all casing prior to running the casing in the well and apply proper API make-up torque to each connection.

Depending upon hole conditions encountered, the 298mm casing will be run in the following manner:

- Guide shoe
- 298mm joint of casing
- 298mm Float Insert or Float Collar
- Tack weld guide shoe, float collar and bottom 2 joints and use API modified pipe dope on all connections
- Centralizers will be installed one metre above the guide shoe, over the bottom of the first 2 collars and every 5 joints to surface
- 298mm casing to surface
- 4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and

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procedures. Establish circulation using pump truck. The casing and the hole will be circulated with fresh water for a minimum of 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14MPa for 10 minutes. Preflush and mix water must be obtained from a clean source and the water trucks must be uncontaminated. Pump 3.0m³ citric preflush with a 1.0m³ fresh water spacer, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples is taken and represent the cement at the beginning, middle and end of the cement job. Mix and pump sufficient 0-1-8% Class 'G' plus 1 to 3% CaCl₂ (50% excess) followed by 0-1-0% Class 'G' cement plus 1 to 3% CaCl₂ (30% excess) to cement casing to surface. Depending upon the severity of the loss circulation zones, thixotropic cement with additional loss circulation materials may be used to cover the loss zone. If there are no cement returns to surface, a feed rate will be established and the annulus will be grouted to surface. Drop wiper plug and displace cement and bump plug to 3.5 Mpa over final pumping pressure - do not exceed 60% of internal yield pressure of casing. Once plug is bumped, bleed off casing pressure, close casing valves and bleed off surface line pressure and wash out BOPs. Wait on cement a minimum of 24 hours before slacking off casing. Remove 406mm x 425.5mm casing bowl and install the 298mm x 346.1mm casing bowl on the 298mm casing.

Section 4.4 - Production Hole & Production Casing

1. Pressure Testing

Check cement samples for hardness – if cement samples are set to the satisfaction of the Wellsite Supervisor, proceed with installation of the BOPS. Install Class B (Rotary) BOPs as per MNRF requirements on 298mm casing bowl. Stump test BOPs prior to installation. After BOPs are installed and the cement samples indicate that the cement is competent, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

2. Drilling Method

Drill a 270mm conventional hole to the kick-off point. Brine will be used to drill this portion of the well, to prevent the dissolution of the salt layers. Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. Record on daily tower sheets any influx of fluids (water and/or hydrocarbons), loss circulation (rate and depth) and any unusual hole conditions.

At the kick-off point, circulate the hole clean, run a deviation survey and strap out of the hole. Pick up directional equipment and run in the hole with the directional bottom hole assembly. Prior to penetrating the A-2 Carbonate, the Wellsite Geologist and Wellsite Supervisor must be on-site and a BOP drill shall be completed to familiarize all on-site personnel with the proper procedures.

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Drill a 270mm directional hole a minimum of 2 metres into the A-2 Anhydrite formation, at an approximate depth of 679mTVD at an angle of 52^{0} . The final casing point will be determined by the Wellsite Geologist. At casing total depth, circulate the hole clean and perform a flow check prior to tripping. Fast tripping of the drill string is to be avoided in order to eliminate high annular velocities, pressure surges and swabbing. Keeping hole full of brine, trip out of hole – laydown bottom hole assembly, drill pipe and drill collars.

3. Casing Installation

Ensure that the threads are protected while hoisting casing to the floor. Drift all casing prior to running the casing in the well and apply proper API make-up torque to each connection.

Depending upon hole conditions encountered, the 219mm casing will be run in the following manner:

- Guide shoe
- 219mm joint of casing
- Float Insert or Float Collar
- Bottom 150 metres of 219mm casing shall have solid stand-off centralizers run on every other joint above and below the collar
- Tack weld guide shoe, float collar and bottom 4 joints and use API modified pipe dope on all connections
- Centralizers will be installed on remaining casing on every 5th joint to surface
- 219mm casing to surface
- 4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures.

Establish circulation using pump truck. The casing and the hole will be circulated with brine for a minimum of 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14 MPa for 10 minutes. Preflush and mix water must be obtained from a clean source and the water trucks must be uncontaminated. Pump preflush of 3.0m³ of clean brine, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples is taken and represent the cement at the beginning, middle and end of the cement job. Mix and pump sufficient Class 'G' 0-1-0% cement plus 10% NaCl, to cement the 219mm casing to surface plus 50% excess over open hole and 30% excess in cased hole. Drop wiper plug and displace cement with fresh water and bump plug to 3500 kPa over final pumping pressure – do not exceed 60% of internal yield pressure of casing. Once plug is bumped, bleed off casing pressure, close casing valves and bleed off surface line pressure. Wash out BOPs and split BOP stack at

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346mm flange, install 219mm slips and set slips in casing bowl. Wait on cement a minimum of 48 hours and cut casing and remove BOPs.

Section 4.5 - Main Hole

1. Installation of the BOPs and Cement Bond Log

Check cement samples for hardness – if cement samples are set to the satisfaction of the Wellsite Supervisor, proceed with installation of the BOPS. Install Class B (Rotary) BOPs as per MNRF requirements on 228.6mm flange. After BOPs are installed and the cement samples indicate that the cement is competent, move in and rig up the Wireline Company and run a cement bond log (both pressure (7000kPa) and non-pressure pass) over the 219mm casing. After the cement bond log is completed and the cement job is deemed successful, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

2. Logging

Move in and rig up Wireline Company. With hole full of fresh water, run a casing inspection log over the 219mm casing. Rig out Wireline Company and release.

3. Drilling Method

Drill a 200mm hole with fresh water system – ensure that the temporary storage tanks are full of fresh water and water trucks have been put on alert. After drilling each length of drill pipe, work the newly drilled hole to ensure that there will not be any issues running in and out of the open hole. A high vis sweep with floc will be added at each connection to assist with hole cleaning. Drill from 700mMD (679mTVD) at 52^{0} to 90^{0} at 842mMD (733mTVD) and continue drilling to a depth of 1400mMD (733mTVD) for a horizontal distance of approximately 558m.

Ensure that Wellsite Geologist is on site to monitor cuttings and liaise with Directional Drillers concerning the path of the horizontal well. Drill to TD indicated by Wellsite Geologist. At TD pump a final sweep and if possible, circulate hole until clean returns are observed at surface.

The potential for loss circulation exists while drilling through the Guelph formation. If loss circulation is encountered, use the loss circulation contingency program located in Section 4.6. Note all lost circulation intervals and monitor and record fluid loss volumes.

Pull out of hole with drilling assembly and laydown drill pipe, drill collars and bottom hole assembly. Move in and rig up Wireline Company complete with full lubricators. Run in hole with gauge ring to ensure clear hole to bridge plug setting depth. Run in hole with wireline set,

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retrievable 219mm bridge plug and place as deep as possible in the 219mm casing and pull out of hole with the setting tool. Fill hole with fresh water and pressure test plug to 7000 kPa for 10 minutes. If the plug does not hold pressure, be prepared to set another 219mm retrievable bridge plug. Release Wireline Company and release Directional Drilling Company.

Nipple down BOPs. Cut and bevel 219mm casing and install primary and secondary seals. Install 346mm x 228.6mm spool piece and install 315mm x 900 ANSI full port ball (master) valve and test wellhead seals to 14 Mpa for 10 minutes. Close master valve and install 315mm blind flange. Install pressure recorder, ensure that the well is full of fresh water and pressure test casing, wellhead and master valve to a surface pressure of 11,000 kPa for a minimum of 4 hours. Call Enbridge Office with the results.

- 4. Rig down rotary rig and move off of location.
- 5. Restore wellsite to Enbridge's specifications.

Section 4.6 - Loss Circulation Procedure

- 1. Before drilling out the casing shoe:
 - a. Identify sources and location of fresh water and/or brine, loss circulation materials and weight materials
 - b. Ensure BOPs and manifold are properly installed
 - c. Ensure auxiliary tanks are connected to the pumping system and a standby mud pump is hooked up for annular injection in case of severe loss circulation (so that fluid can be pumped down both the drill pipe and annulus simultaneously)
 - d. Pressure test BOPs prior to drill out
- 2. After drilling out shoe:
 - a. Alert water suppliers and haulers
 - b. Ensure adequate amounts of fresh water and/or brine are readily available prior to penetrating the Detroit River and Guelph formations
 - c. Mechanically test BOPs and perform BOP drill prior to penetrating the Detroit River and Guelph formations.
- 3. Drilling Blind Detroit River formations:
 - a. In an attempt to maintain or re-establish circulation, pump fluid down both the annulus and the drill pipe simultaneously
 - b. Should severe loss circulation occur while drilling, the thief zone may be plugged with cement and/or loss circulation material at Enbridge's discretion.
- 4. Drilling Blind Guelph

Drilling Program

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- a. In an attempt to maintain or re-establish circulation, pump fluid down both the annulus and the drill pipe simultaneously
- b. Make wiper trips or reciprocate the drill pipe to maintain a clean hole every joint or two as directed by the Wellsite Supervisor
- c. Sweep the hole every 1 to 3 joints
- d. Use a. and b. in combination
- e. At TD conduct a final sweep and then trip out BHA

SECTION 5.0 - REPORTING PROCEDURES

Section 5.1 - Tower Sheets

Shall be completed daily and shall include:

- 1. Bit size, fluid type and weight, weight on bit, deviation surveys, depth at the beginning of the shift and end of each shift.
- 2. Casing size, grade, weight, and number of joints, centralizers, other casing attachments, total length and setting depth.
- 3. Cementing information Service Company, cement type, amount, slurry density, additives, annular fluid returns, volume of displacement fluid and plug down time.
- 4. Water, gas or oil type, depth encountered depth of sample collected and the static level and/or rate of flow.
- 5. Pressure tests individually, surface pressures, fluid density used in the tests, bleed-off rate and duration of test.
- 6. Logging Details type and interval.
- 7. Abandonment details intervals, amount and type of cement, top of plug and time felt.
- 8. Rig release date and time.

Section 5.2 – Worker Injury

Immediately provide first aid to the injured party and ensure that all personnel are removed from harm's way. Secure the area and ensure that the site is preserved in case an investigation is required.

Every work related accident or injury shall be reported immediately to the Wellsite Supervisor. The Supervisor shall immediately contact the Enbridge Gas Distribution Inc. Office, specifically the Manager, Reservoir Development followed by the Reservoir Field Supervisor. The verbal report shall be followed with a written report, including but not limited to, the Contractor's Accident/Incident Investigation form. The affected Contractor is responsible to contact the proper authorities concerning the accident.

SECTION 6.0 - SAFETY AND PROCEDURES

Section 6.1 - General Safety

- 1. All works at the Wellsite shall be in compliance with the Occupational Health and Safety Act and the Oil, Gas & Salt Resources Act and all associated legislation. In addition, all work at the Wellsite shall be done in compliance with good oil field practices. All verbal notifications given to and approvals received from government agencies shall be recorded on the tower sheets.
- 2. Safety meetings are to be held with each crew, at the start of the well and periodically while drilling meetings shall also be held prior to cementing and upon arrival of the logging company, prior to commencement of directional drilling operations and prior to penetrating the Detroit River formations and the A-2 Carbonate formation.
- 3. The Wellsite Supervisor shall ensure that the operations are in compliance with all applicable government regulations and shall complete daily walk around rig inspections.

Section 6.2 – Well Control

All blowout prevention systems are to be in strict compliance with MNRF regulations. The function and pressure testing guidelines required by the regulatory bodies (such as daily function testing of the pipe rams) will be strictly adhered to.

- 1. All pressure tests of blowout prevention equipment will be conducted with fresh water and will be conducted in 2 stages low and high pressure. It is essential that the low pressure test be done first, to prevent the high pressure test from healing leaks that would have been noted at low pressures.
- 2. The following pressure test will be conducted with fresh water prior to drilling out each casing string and the results recorded on the tower sheets and daily reports:
 - a. The blind rams, kill lines and choke manifold will be tested individually for 10 minutes each to:
 - i. Intermediate casing 2000 kPa low & 9000 kPa high
 - ii. Production casing 2000 kPa low and 10000 kPa high
 - b. Run in hole with BHA, drill pipe and drill collars and pressure test the casing string, pipe rams, kelly cock, stand pipe, swivel, safety valves, etc. will be tested individually for 10 minutes each to:
 - i. Surface casing 1400 kPa low and 3500 kPa high (using AP)
 - ii. Intermediate casing 2000kPa low & 9000 kPa high
 - iii. Production casing 2000 kPa low and 10000 kPa high

- c. The annular preventer will be tested for 10 minutes to
 - i. Surface casing 1400 kPa low and 3500 kPa high
 - ii. Intermediate casing 2000 kPa low & 9000 kPa high
 - iii. Production casing 2000 kPa low and 10000 kPa high
- 3. Upon drilling out the casing, drill 0.5m to 1.0m of new hole and test the formation, with the hole full of fluid, to a minimum bottom hole pressure of 18 kPa per metre.
- 4. After one day of drilling below the casing shoe, check the entire blowout prevention system and tighten all bolts.
- 5. Crews should be kept alert and familiar with the blowout prevention equipment. At least one member of the crew who has been trained in blowout prevention and well control procedures must be on the floor at all times.
- 6. Conduct blowout prevention drills prior to drilling out casing and once per week thereafter. Ensure that the drills are recorded in the tour book.
- 7. The blowout preventers are to be function tested once per tour. Ensure that the function test is recorded on the tower sheets.



Oil, Gas and Salt Resources Act

Application for a Well Licence

Form 1 The unders the followin	signed oper	rator applies ion, togethe	s for a well r with the a	T licence un application	o the Mini der the Oil fee of \$10	ster of Natura , Gas and Sa 0. Make chec	al Resources and F It Resources Act a ques payable to "M	Forestry and the Regulatior linister of Finance	ns thereunder a	and submits	v.2015-12-15
1. WELL M				TD 29H (H	oriz.#1), M	loore 3-21-XI	1	Target For	rmation	Guel	oh
Purpose of	Proposed	Well (Well	Type)				Natural G	as Storage Well			
2. OPERA	TOR		E	nbridge Ga	s Distribut	ion Inc.		Tel #519-86	62-1473	Fax #5	19-862-1168
Street Add	ress		350	01 Tecums	eh Road		City	Mooretown	Prov. ON	Postal Code	NON 1MO
Mailing Add	dress		350	01 Tecums	eh Road		City	Mooretown	Prov. ON	Postal Code	NON 1MO
Contact Na	ame			K	athy McCo	nnell		Contact T	el #	519-862-6	032
En	nail		<u>kat</u>	hy.mccoi	nnell@ei	nbridge.co	<u>m</u>				
3. LOCAT	ION	County		La	ambton		Township _		Моо	re	
Tract	3 Lo	it 21	Co	oncession		12	Offshore:	Block Tra	act. Lic	ence/Lease No.	
Surface loc metres fror Lot Bounda	cation, m aries	355.70 144.15	m Noi m Ea	rth S	South X	Latitude Longitude	42 ⁰ 54' 30.7	750" Botto 045" Botto	om-hole Lat. om-hole Long.	42 ⁰ 54 82 ⁰ 22	' 41.403" ' 58.998"
Within 1.6	km of Des	ignated Sto	rage Area	? Y	es X	No		Off-target	? Yes	NoX	
4. WELL	PARTICUL	ARS	Vertic	cal	Horizon	ital X	Directional	Deepening] Re-en	try La	ateral
Rig Type:	Rotary	x c	able	Well	to be core	d? Yes	NoX	Formation at TI	D	Guelph	
Ground Ele	evation	189.67	Propos	ed Depth	1413.0	Propos	sed Depth TVD	758.00 P	roposed Start	Date	1-Apr-18
5. POOLII	NG					,					
Pooling of has been of 6. DRILLI	the Spacin completed NG CONT I	ig Unit or ur (see Ont. R RACTOR	itization of eg. 245/97	f the Unit A 7 definitions	rea shown i for "poole	on the attacl d spacing un Unknov	ned well location p it" and "unitize") vn	lan Yes X	No Tel #		
Address		-					City		Prov.	Postal Co	de.
7. PROPO	DSED CAS	ING AND C	EMENTIN	IG PROGR	АМ						
Hole Size	Casing O.D.	Weight	Grade	New Used or	Setting Depth	Setting Depth	Setting Fo	ormation	CASING How	SETTING INF	ORMATION Cement Top
(mm) 508	(mm) 406	(kg/m) 96.42	LS	in-hole New	TVD 55	Meas. 55	Kettle	Point	Set Cement	Type Class 'G'	KB / RF surface
375 270	298 219	69.94 47.62	J55 J55	New New	422 683	422 704	F U A-2 Anl	nit nydrite	Cement Cement	Class 'G' Class 'G'	surface surface
8. BLOW-	OUT PRE			IT 16".2	2/3M Annul	ar Preventor			·	· · ·	·
				11" 2	2/3M Annul	ar Preventor	and Double Gate	(pipe and blind)			
9. WELL	SECURITY	Name o	f Trustee		Harrison P	ensa LLP	Total # U	Jnplugged Wells	145Ci	urrent Balance	\$70K
10. REMA	RKS	Rotating C	ontrol Dev	ice 11" x 2/	′3000 psi v	/ill be used fo	or drilling in the ree	f			
11. ENCL	OSURES	Fe	e X		Locatior	n Plan X	(Land wells only)		Drilling Progra	am X	
12. NOTIO The Ministry this applicat	CE OF CO of Natural Re ion will be us	LLECTION esources and sed for licensi ur personal informati	Forestry is c ng and law ion, please contact	ollecting your enforcement the Policy and Proj	personal info purposes of gram Officer, Petro	ormation under nly and will be j vleum Operations Secti	the authority of the <i>Oil</i> protected in accordar on, Ministry of Natural Resource	', Gas and Salt Resol nce with the Freedon 28 and Forestry, 659 Exeter Roc	<i>urces Act</i> . Any pe n of Information a wd, London N6E1L3, 519-	ersonal informati and Protection c 1873-4638.	on provided on f Privacy Act.
13. AUTH	IORITY signed cer	tifies that th	e informat	ion provide	d herein is	complete an	d accurate, the op	erator has the righ	nt to drill or op	erate a well in	
Date (d/m/y))	21/11/17	Nam	e		Kathy McCo	nnell	Signature 9	El le	dana	eer
			Com	pany	Enbr	idge Gas Dis	tribution Inc.	Title	Manager, Re	eservoir Deve	lopment



AUTHORIZED BY THE MINISTER OF NATURAL RESOURCES UNDER THE PETROLEUM RESOURCES ACT OF ONTARIO	THOME I O'DOTIDE COM ACEM	FILE ND. 17-5102 PLAN ND. ENB6852.DWG	PREPARED FOR ENBRIDGE GAS DISTRIBUTION INC.	DFFICE (519) 351-5073 CELL (519) 360-2134 FAX (519) 351-3119 PD.BDX 327 - N7M-5K4 CHATHAM , DNTARID	PREPARED BY BRISCO AND O'ROURKE SERVING THE PETROLEUM INDUSTRY THROUGHOUT ONTARIO WELLS,CONSTRUCTION AND TECHNICAL SURVEYING DIGITAL MAPPING LAND AND LEASE SURVEYS	NOTE METRIC DISTANCES SHOWN ON THIS PLAN ARE IN METERS AND CAN BE CONVERTED TO FEET BY DIVEDING BY 0.3048	NOTE GEODETIC HORIZONTAL CONTROL U.T.M. CO-ORDINATES ARE GEODETIC (DATUM NAD 83 DRIGINAL) AND REFERRED TO MONUMENTS No. 693749 AND 693767	NOTE BENCH MARK ELEVATIONS ARE REFERRED TO GEODETIC DATUM AND REFERENCE BENCH MARK BEING ND. 81U138 SARNIA ELEVATION = 180.512	WELL NAME TD 29H (HORIZ. # 1) – MOORE – 3 – 21 – 12	U.T.M. N. 4 751 595 E, 386 579	NOTE (WELL SITE) CO-ORDINATES	SCALE 1.5000	GEOGRAPHIC TOWNSHIP OF MOORE TOWNSHIP OF ST. CLAIR COUNTY OF LAMBTON	PLAN OF PROPOSED WELL
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TD 29H (HORIZ 1) MOORE 3-21-XII

DRILLING PROGRAM

Drilling Program

TD 29H (HORIZ 1) MOORE 3-21-XII

Enbridge Gas Distribution Inc.

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Enbridge Gas Distribution Inc.

SECTION 1.0 - GENERAL DATA

Section 1.1 - Well Summary

Well Name:	TD 29H (Horiz 1) Moore 3-21-XII
Operator:	Enbridge Gas Distribution Inc.
Surface Hole Location:	Tract 3, Lot 21, Con. 12, Moore Twp., Lambton County
Surface Hole Coordinates:	N 4 751 595; E 386 579
Bottom Hole Location:	Tract 2, Lot 20, Con. 12, Moore Twp., Lambton County
Bottom Hole Coordinates:	N 4 751 915; E 387 107
Ground Elevation:	189.67m
KB Elevation:	193.67 m
Total Depth:	758mTVD; 1413mMD
Target Formation:	Guelph
Logging Program:	CBL-GR – 219mm casing Vertilog – 219mm casing
Spud Date:	April 1, 2017
Duration:	21 days

Section 1.2 – Special Notes

1. Safety of personnel and environment is our primary concern. Section 6.1 of this program, outlines Enbridge's general safety requirements which obliges all personnel on the wellsite to follow the Occupational Health and Safety Act and Regulations (Ministry of Labour (MOL)) and the Oil, Gas & Salt Resources Act and Regulations (Ministry of Natural Resources and Forestry (MNRF)). Safety and/or environmental ("tailgate") meetings shall be conducted as per Section 6. Wellsite Supervisor shall conduct daily 'walk around' inspections of the equipment on site and record the results on the daily reports. Please refer to Section 5.2 for the procedure to be followed if a worker injury occurs.

- 2. The Wellsite Supervisor has authority over all activities conducted on the drilling location. The Wellsite Supervisor shall ensure that all applicable regulations and policies (MNRF, MOL, Ministry of the Environment and Climate Change (MOECC), and Enbridge) are followed and that all permits are kept on site and/or signed off as required.
- 3. All operations are to be to MNRF standards.
- 4. BOPs are to be installed, maintained and used as per MNRF requirements. Testing of the BOPs must be in accordance with Section 6.2 of this program.
- 5. Tower sheets must be completed daily and will include the information listed in Section 5.1 of this program. The Wellsite Supervisor will complete daily reports and forward the reports to Enbridge's office by 10am the following day.
- 6. During the well will be drilled with fresh water or formation brine, hauled to location by an approved contractor. The fresh water will be obtained from local municipal water systems, located at Brigden, Corruna and other available water systems. The brine used will be Guelph formation brine obtained from Enbridge's existing operations.
- 7. The production casing will be set in the A-2 Anhydrite to allow for an effective cement job and successful pressure testing, prior to penetrating the Guelph formation
- 8. A minimum of two 500 barrel temporary storage tanks will be spotted on location prior to the drilling of the Detroit River formation. The tanks will be filled with fresh water / brine as reserve for the drilling of potential loss circulation zones. Potential loss circulation zones exist in the Detroit River formation (intermediate hole) and the Guelph formation (main hole).

Enbridge Gas Distribution Inc.

Section 1.3 - Contact Numbers

Emergency Numbers:

- Police, Fire & Ambulance:* 911
- 911 Address: 963 LaSalle Line, Sarnia, Ontario

* For 911 Map and Map and Directions to Nearest Hospital see attached Map at end of Section 1.3

Rob Carlson	Reservoir Field Supervisor	Office: Fax: Cell: robert.ca	519-862-6036 519-862-1168 519-312-4863 arlson@enbridge.com
Kathy McConnell	Manager Reservoir Development	Office: Fax: Cell: kathy.me	519-862-6032 519-862-1168 519-312-2168 cconnell@enbridge.com
Chris Pincombe	Land Agent	Office: Fax: Cell: chris.pin	519-862-6092 519-862-1168 519-381-1408 ncombe@enbridge.com
Control Room		Office:	519-862-6012
Drilling Supervisor:			
Steve Thompson	Omni Consulting Ltd. President	Cell: 5 omnicor	19-383-5404 nsulting@rogers.com
Geologist:			
Neil Hoey		Office: Fax: Cell: neil_hoe	519-472-4776 519-472-4776 519-649-6918 ey@hotmail.com

Enbridge Gas Distribution Inc.

Rotary Rig:

Clayton Landry	Predator Drilling Inc. Rig Manager	Office: 403-346-0870 Fax: 403-346-0860 Mobile: 403-740-3765 kmecanen@kent.net
Directional Drillers:		
Danny Brown	Account Manager - Weatherford	Office: 403-693-7831 Fax: 403-510-1995 daniel.brown@ca.weatherford.com
Craig Dalziel	Drilling Technologist - Weatherford	Office: 780-979-4539 Craig.dalziel@ca.weatherford.com
Cementing:		
Ian Veen	Black Creek Well Service President	Office:519-882-4732Fax:519-834-2466Cell:519-383-4645
Jeff Luckovitch	Integral Pumping Services	Office: 519-689-4692 Cell: 226-234-5362
Casing, Wellheads & I	ESDs:	
Brian DeJaegher	Wellmaster Pipe &Supply Sales Representative	Office: 519-688-0500 Fax: 519-688-0563 bdejaegher@wellmaster.ca
Graham Shone	DNow Manager	Office: 519-336-9797 Fax: 519-336-9733 graham.shone@dnow.com
Karen Derrick	Stream-Flo Ltd. Technical Sales Rep.	Office: 832-647-0710 Fax: 519-688-0563 kderrick@streamflo.com

Enbridge Gas Distribution Inc.

Drill Bits:

Brad Takenaka	Varel Rock Bits Canada Sales Manager	Office: 403-968-9369 Cell: 403-303-2533 btakenaka@varelintl.com
Mike Kellar	Trendon Bit Service Ltd. Director, Sales	Office: 403-990-1299 mkellar@trendoninc.com
Wireline Services:		
Gord Mackenzie	Baker Atlas Station Manager	Office: 519-332-8030 Fax: 519-332-4714 Cell: 519-339-6783 gord.mackenzie@bakerhughes.com
Dave Tipping	Weatherford Canada – Wireline & Logging Services Station Manager	Office: 519-683-2010 Fax: 519-683-2577 Cell: 519-436-3541 dave.tipping@canada.weatherford.com
Water Hauling:		
Keith McKeegan	President McKeegan Trucking Limited	Office:519-864-1037Fax:519-864-1036Cell:519-490-4042
Denis Marcus	President Harold Marcus Limited	Office: 519-695-3735 Fax: 519-695-2249 Cell: 519-380-5238 dmarcus@haroldmarcus.com
Rental Equipment:		
Dale Holland	Wheatley Wireline Services Ltd.	Office: 519-825-3680 Fax: 519-825-9348

		Cell.	519-522-6015
Keith Davis	Ecan Energy Services Inc.	Office:	519-627-3824
		Fax:	519-627-5306
		Cell:	519-437-7038
		kmecar	en@kent.net

Enbridge Gas Distribution Inc.

Vern Anger	Canfish Services Inc.	Office:	780-955-2600
	Fishing Supervisor	Cell:	403-845-0012
Orval Beam	Orval L. Beam Limited	Office:	519-436-0164
	Operations Manager	Fax:	519-436-0164
	Tank Rentals	Cell:	519-436-4801
Welders:			
John Dawson	St. Clair Mechanical President	Office: Fax: Cell:	519-864-0927 519-864-0801 519-330-9672

Government & Other Agencies

MNRF	Petroleum Resources Centre	Office: Fax: ogsr.mn	519-873-4634 519-873-4645 rf.gov.on.ca
MOECC	Spill Reporting	1-800-2	68-6060
MOL	Health & Safety	1-800-2	65-1676
Oil, Gas & Salt Resource	ces Library	Office: Fax:	519-686-2772 519-686-7225
Enbridge Gas Distribution Inc.

911 Map & Directions to Nearest Hospital:



Bluewater Health

Sarnia, ON N7T 4W8

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Drilling Program

TD 29H (HORIZ 1) MOORE 3-21-XII

Enbridge Gas Distribution Inc.

Section 2.0 - Geological Prognosis

County: Lambton Township: Moore Concession: XII Lot: 21 Tract: 3

Elevation: 189.3 Estimated

Formation	Тор	Elevation	Thickness	Gas	Oil	Water	Pressure
K.B.	0.0	193.3	4.0				
Drift	4.0	189.3	36.0			37m Fresh	
Kettle Point	40.0	153.3	33.0				
Hamilton	73.0	120.3	87.0				
Dundee	160.0	33.3	34.0				
Lucas	194.0	-0.7	92.0			197m Sulphur	
Amherstburg	286.0	-92.7	33.0				
Bois Blanc	319.0	-125.7	26.5				
Bass Islands	345.5	-152.2	64.0				
G-Shale	409.5	-216.2	7.0				
F-Shale	416.5	-223.2	22.5				
F-Salt	439.0	-245.7	93.0				
E-Carbonate	532.0	-338.7	25.5				
D-Salt	557.5	-364.2	8.5				
C-Shale	566.0	-372.7	20.0				
B-Salt	586.0	-392.7	63.7				
A-2 Carbonate	649.7	-456.4	25.3				
A-2 Shale	675.0	-481.7	6.4				
A-2 Anhydrite	681.4	-488.1	10.0				
Guelph (Reef)	691.4	-498.1	100.0+	XXX			6600 Kpa+

***Note: Prognosis with TVD tops.

Note: used "Dow Moore 3-21-XII" Lic. T004335 to build prognosis

Drilling Program

TD 29H (HORIZ 1) MOORE 3-21-XII

Enbridge Gas Distribution Inc.

Section 3.0 - Casing and Cementing Summary

Section 3.1 - Summary

Hole Size (mm)	Casing Size (mm)	Casing Grade	Casing Weight (kg/m)	Setting Depth (mKB)	How Set
508	406	LS	96.42	55	Cemented to surface with 100% excess Class G 0-1-0 cement + $2 - 3\%$ CaCl ₂
375	298	J-55	69.94	422	Cemented to surface with Class 'G' 0-1-8% plus 1 to 3% CaCl ₂ , followed by Class 'G' neat cement plus 1 to 3% CaCl ₂ . Cement volumes will be calculated with 50% excess- gel cement and 30% excess – neat cement. Depending upon hole conditions, consideration may be given to running thixotropic cement plus additional loss circulation materials, across porous zone(s).
270	219	J-55	47.62	683m TVD / 704m MD	Cemented to surface with Class 'G' 0-1-0% plus 1 to 2% CaCl ₂ plus 10% NaCl. Cement volumes will be calculated with a 50% excess on the open hole section and 30% excess on the cased hole section.

Main Hole: 200mm open hole will be drilled from 704mMD (683mTVD) at 52[°] and will reach 88[°] at 842mMD (737mTVD) and will be drilled horizontally at 88[°] for approximately 571m to a TD of 1413mMD (758mTVD) at 88[°].

Enbridge Gas Distribution Inc.

Section 3.2 - Wellbore Diagram



TD - 758mTVD/1413mMD

Enbridge Gas Distribution Inc.

Section 3.3 - Wellhead Summary

Universal Wellhead Systems Inc. 13.8 MPa Wellhead:

406mm x 425.5mm slip on casing bowl (for BOP installation) 298mm x 340mm slip on casing bowl 340mm x 228.6mm spool c/w 2 gate valves on side outlets 203.2mm ANSI 900 master valve (full port)



Enbridge Gas Distribution Inc.

Section 3.4 - Directional Planning Report

SD Ptan Report



Enbridge Gas Distribution Inc.



Enbridge Gas Distribution Inc.

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Enbridge Gas Distribution Inc.

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0.00 420,00 -117,00 0.00 420,00 -122,00 0.01 440,00 -124,00 0.00 440,00 -142,00	0010	0.00	4752556.00	3063759,00	10.0	0.00	0.00	000	1.00
0.00 430.00 -322.00 0.00 430.00 -332.00 0.00 440.00 -342.00	0.40	8010	001309/10/2	301417940	80.0	0.00	000	0000	1.00
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	0.00	0.06	4750586.00	2010/2010	80.0		000	0000	1.00
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0000 +60,00 -362.00	0.00	800	4151586.00	3968 TB-20	2010	0.00	08/0	0.00	1.00
000 450,00 -172,000	0010	8010	4751595.00	306579.00	1010	0.00	0.00	0.00	0.00
0.05 481.00 -382.00	0.00	E.C.	47923994.00	DOLFT BARE	D.DB	3.80	000	0/00	01.0
0108 480,00 -292,00	0.00	0.08	4751595.80	306579.06	0.06	07.0	0.00	0.00	1.80
000 BB100 -10200	80	0.00	4791595.80	306773-00	1010	0.00	0.00	0.00	0.00
0.00 540,00 -312.00	000	0.06	4750595.00	2018/2018	80.0	00.0	00/0	0.08	08.0
001281- 001285 B010	80	100	4712305-80	206315-00	0,00	0.80	0000	0.00	0.80
000 530.00 -132.00	0.00	0.00	4754595.80	305279,00	2010	2.60	000	8010	04.0
oute tenos -serve	E C	804	47515951.80	308519.00	8070	08.0	000	90.0	01.0
000 S41/20 -140/20	0.00	800	4751585.80	100579-04	80.8	0.01	000	9010	04.0
100 2012- 001085 BOT	100	0.00	4751585.82	807512906	1000	10.00	100	10.00	00.0
101 S6146- 461465	1940	1074	47%13/06/14/1	2010/10/000	878	10/01	000	10,400	-0.80
4074E 407685 80'T	3	000	4751586.46	206579.05	5.40	10.01	000	10/00	00.0
10/101- 10/145 BOT	101	8014	4791,5966,855	306079-30	1.67	10.00	000	10.00	0.00
ASTRE- ASTRE 1011	5.21	0.00	4751680.21	812302	2.46	10.01	000	10,00	0.00
41'ID9- ST1688 D0'I	1.1	10.0	4751082.94	306375.27	171	10.00	000	10.00	0.00
1.00 600.04 -410.04	11.22	12.1	4751606.21	205275.30	171	10.00	000	10,000	08/0-
1.00 04730 -419.00	13,04	870	4751000.94	15.612906	123	10.00	000	10,00	0.00
1.00 626.07 -428.00	104-00	1	475140-A.39	Distrates.	10901	00'81	000	00/07	00/0-

Enbridge Gas Distribution Inc.

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COD LD MMP MMP COD LD LD MMP	11.17 10.01 10.020		10/1991529	101101	10.14	08/04	1.60	007.011	0.06	
1110 121 <th 121<="" t<="" td=""><td>10 Not 10 Not 10</td><td>L8 1.81 2.82 2.83 2.84 2.84 2.84 2.84 2.84 2.84 2.84 2.84</td><td>4051066-10</td><td>290231.42</td><td>36.82</td><td>000</td><td>1.00</td><td>0.00</td><td>000</td></th>	<td>10 Not 10 Not 10</td> <td>L8 1.81 2.82 2.83 2.84 2.84 2.84 2.84 2.84 2.84 2.84 2.84</td> <td>4051066-10</td> <td>290231.42</td> <td>36.82</td> <td>000</td> <td>1.00</td> <td>0.00</td> <td>000</td>	10 Not 10	L8 1.81 2.82 2.83 2.84 2.84 2.84 2.84 2.84 2.84 2.84 2.84	4051066-10	290231.42	36.82	000	1.00	0.00	000
R2:00 L1:0 990.96 900.1 R2:10 L1:0 990.96 900.1 R2:11 L2:0 990.34 900.1 R2:12 L2:0 990.34 900.1 R3:11 L2:0 700.1 900.1 R3:11 L3:0 700.1 900.1 R3:11 L3:0 700.1 900.1 R4:11 L3:0 700.1 900.1 R4:12 L3:0 700.1 900.1 R4:12 L3:0 700.1 900.1 R4:13 L3:0 700.1 900.1 R4:14 R4:15 700.1 900.1 R4:14 R4:16 R4:17 700.1 R4:14 R4:16 R4:16 900.1	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	81 81 81 81 81 81 81 81 81 81 81 81 81 8	1031475.08	10111111	43.03	1010	828	0.80	100	
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930 320 120 411.1 940 230 110.0 411.1 941 240 110.0 411.1 942 240 110.0 411.1 943 441 110.0 411.1 946 440 110.0 411.1 948 440 110.0 411.1 949 441.1 110.0 411.1 948 11.1 199.6 411.1	60 111.00 11 123.60 123.60	888 9 1	10/08/91512	100001	10.46	10.45	10.05	243	+1+	
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6416 449 77613 4413 1446 149 77613 4413 1444 449 726 454 1444 443 7264 450 7264 1013 7269 550	21 131.65 22 133.65	591	00/00/15/2	NATES IN	93.59	10.00	18-41	07.8	100	
64.05 7.15 7.24.12 4.26. 1.1.24 4.55 7.24.12 4.26. 1.4.44 4.55 7.02.55 4.20.25 1.7.24 10.12 7.24.24 4.24.	123.50	Ę	80.51CISOF	それで見たの見	15:09	08.80	12/03	82.6	85	
11.11 11.11			WHEELSON	10,100,000	NT LL	10,00	11-11	12.1	111	
94.44 1.55 200.55 550.5 27.54 10.15 250.96 550.0	119.25	4.00	11.401204	3045322.36	SE-81	10.00	10,45	3.55	3.01	
1965- 96764 ETOT #9744	55 148.89	7.50	SASSICIST.	TRANSPORT OF	20102	10.00	1.1	1.11	2.00	
the set of	164.251 94	97.6	4012120-	1002021	0516	10.00	N H	10.0	58	
THES DEVEN WITH WITH	16/01 10/81	10.93	11/29/15/2	04.5525.70	12.8	08.86	19-01	28.8	P.C.	
MAD 11.06 736.14 538.1	14 127.63	06/21	4012722.00	11110101	m-son	10.10	100	14.0	2.1	
47-36 12.86 736.00 -636.0	90 181/36	15.05	40/2811209	A1.792980	Br210	08.84	12.23	0.65	271	
NALE 15.08 737.08 -539.1	189.67	10.11	00'195-015-0	14140500	11010	00.00	1912	144	9.4	
1887 67.474 DV11 1840	20 187.96	13,43	M.180120F	306599.72	119.69	100.005	31.53	125	00.00	
85.82 T0106 227.63 -529.0	109 302 109	20.44	4751861-23	INVESTIGATION OF	HE'LET	100 21	107.28	10.04	10.00	
1999- UVIAL 4712 0412	1897 B	10172	4751810.52	2060206.52	135.24	10.00	21.12	22.0-	10.00	
10124 25.01 730.40 -540.0	40 222.06	10/92	4771815199	368038.73	143.94	00'61	21,125	12.20	10.10	
1046- 001902 90192 00129 0	NU12 10	秀井	1021820.20	100015.45	122.14	10.00	10.18	450	10.01	
1945 1000 0000 1000 0	25 24255	37.68	05/950120	306013.68	361.02	101.01	90.95	87.8-	13.61	
1146 12/01 12/01 12/02 12/01	MIR2 00	92159	4151545/30-	29-313-92	Wither	00"31	10.12	87.9	10.05	
178-5 9078-6 JANE 18-28	6C.B22 20.70	10.04	4051052.94	95,50300	179.52	15.00	80.65	8CT-	10.01	
0153 42.31 740.46 -542.1	48 206.37	10.02	4751680.41	22 603905	185.00	12.00	14 15	870-	10.01	
1296- 1613s: M958 1816	NL 27.16	10.12	475156P.40	Villages LY	100.041	10/01	10.37	50.6	10.01	
147.00 40.00 141.00 -540.	00 20 20	20.10	4751,674,13	201033935	205.555	10.00	50.22	1014-	10.00	
67.50 52.71 741.76 -845.	78 204.64	11.40	ATTENDO. IM	PONANT SS	1211.45	10.00	80.00	10.04	10.04	
141 101 101 101 101	15 202 22	85.91	47516865.05	20,6063,72	238.45	10.01	65 68	2010	10.01	
0152 50.09 742.05 (544.0	05.02 20	16'96	4731001.33	22.878A04	10.812	10.01	12.52	and.	107.01	
159-35 40.121 74,000 -646.0	101 201 50	100.02	4751096.80	101-009-000	20100	10.00	10.64	070	10.01	
2 80.58 85.66 343.51 -545.	HE 000 115	112.00	4731/900.32	30192900	258.35	10.08	25.50	81.0	1D CE	

Enbridge Gas Distribution Inc.

Interpolated Pt	inte: (Relative	to Sist centre)(TVD relative t	o Brill Rear)										
	23				10 Decidion	N.CENse	1.071est	(init	formal state		CUIDest		110000	CU DONL
	101000	57.62	69.00	743.92	-545.50	211.00	121.22	10/10/15/01	266705.34	12,885	30.60	87.68	9.12	30.61
	1820.00	82,457	72.53	764.34	PE.846-	314.36	130.64	4051907-16	CRIMINS,	277.96	30.00	22,498	8778	30.01
	101000	87.73	19.40	266.34	-546.34	21.120	340.05	10121808-76	106734.45	107.54	10.60	10.08	9.17	30.01
	1840.00	87.60	19.00	CE SW	61.948-	319.31	150.00	42119115.01	50 YEL980	200.000	30.80	30.05	0.20	20.01
	1850.00	18-58	10.34	248.632	18.048-	300.93	1997-04T	40'51813'15	UNITAR LEG	11/006	33.60	18.85	3.22	30.80
	1860.00	82.95	c9:50	CITIZAL	18-045-	201.97	100.79	051514.13	00751980	115.14	30.80	80.00	9.24	30.80
MALE NO DRI	10/070	88,03	100.000	CT WAL	22.858-	107202	179.43	D/WHILE	DESTRICTION OF	123,71	30.00	10,527	92.0	30.80
	1670.00	00.08	95'90	246.32	-548.12	322.44	170.77	4051514.40	10791590	123.03	000	80.0	0.00	0.00
	100,000	88,03	147.00	20.007	78.8581-	10,000	189.77	42751914-04	100121001	81.211	0010	8010	0.80	000
	100.000	0.03	55'90	746.5t	-548.51	322.80	100.76	4751514.46	286794.05	10.04	0000	80.0	0.00	0.00
	00100011	89,03	140'002	ST OM	10.035	102.90	200-10	0/1818/01	JBKT94LON	2011004	8010	80'0	0.80	0010
	1110.00	88.03	95'90	240.040	-549.60	303.56	219.74	40.51814.48	28 606 A. OT	326.05	000	80.8	0.80	0.00
	31,20,000	89/03	99,955	747.34	-349.54	203.35	229.74	1019161519	NO YOM BO	E01064E	000	00'0	0.00	000
	1110.000	88.02	96'80	11.14	90.522-	03.53	E7.001	4051814-50	1010080	115.17	8010	80.8	0.00	90.0
	11-40.000	89/03	95.95	CW Brd.	-550.63	12,838	249.72	4051914.54	201034103	363.72	000	00.0	0.00	000
	00'08'11	10.03	10.04	76.87	48-205-	00100	21/0/2	40.0181419.09	101000000	107736	8010	010	0.00	0.00
	1100.000	80.03	95.80	17 18 21	10,102-	334.07	20001	4751914.58	386054.02	400.00	0.00	0.00	0.00	0.00
	11/10/00	80/03	84.84	148.844	-012.86	107120	01/612	00701615/29	10/19/00/02	409-339	8010	0.00	0/00	90'0
	1100.00	80.03	95.00	007 RSL	-552.80	324.44	100.000	10.4181214	1010/00000	40'.CTF	90.0	00.0	0.00	9010
	00'06711	86/03	96.95	10.000	10,000	234.62	200.68	4751914.63	200/1463662	05924	000	0.00	0.00	0.06
	1206.00	M0.02	24.95	752.68	-552.40	00.400	2011-64	40151814.64	COLVERNED	418-04	80.0	00.0	00/0	80/0
	3210.00	86.03	08.55	01102	CU1020-	334,96	275/62	4751314.08	38/09/13/90	10104	0.00	0.00	0.00	90.0
	00'0121	80.03	10.05	78.37	-983.37	91%26	99/625	4751914-08	20013126	41.554	0.00	0.00	0.00	0.00
	1230.00	80.03	96.80	10.125	10,022-71	325.15	20.015	4751914-08	380503.96	20.034	80'0	0.00	000	8010
	00'0921	80103	88.86	752.86	1024,005	325.53	59/ GHC	4751914.71	10/12/00/02	87.824	0.08	0.80	0.00	0.00
	1256.06	80.03	94.86	04.051	CALAD-	105.71	10.44	10.01010100	100413-07	68.778	8010	0.80	00/00	80/0
	00'0021	89/03	84.95	10.25	10,1400-	325.00	E9/89C	101103020	380553.96	8C-90+	0.08	0.80	0.00	0.00
	1275.00	80.08	84.86	67 E K	-583, 05	326,077	29/612	80'9161929	2012/09/06	10,000	0.08	0.00	0.00	0.00
	00'0921	80.03	68.95	CV/05/	-525.43	32,261	10/ 900	80.4185524	386873.95	85.002	0.08	0.80	0.00	80.0
	1276.08	80108	00.05	75.687	-10.85, 77	120.44	11/ 442	4751914-79	10/21/24	512.06	0.08	0.80	0000	0.08
	1208.06	46.03	56.55	10.00	-226.422	15.42	409.62	101410104	10002.04	200.00	80.0	0.00	0,00	80'0
	00'01111	80/03	86.85	19.50	1001.45	326,60	419.58	4751914.83	367003.93	11,822	0.08	0.80	0.00	80.0
	1216.00	mi.03	10.34	Vise and	-586.80	126.08	419-118	4752914.44	3877013-963	21,008	B0/0	0.80	0/00	00.0
	1336,00	80/03	66.95	735.45	-037.155	327.46	426.58	4751914.05	367023.92	1795	80'0	0.50	0.00	80'0
	1948.00	mi.03	10.34	755.49	-087.488	327.10	12.816	0251916-193	181001BC	087950	B010	0.80	00/0	0.00
	1098-00	80108	84.85	735.83	691480-	25/126	409.034	4751914.00	10/040/04	563.39	0.08	0.80	0.00	8010
	1268.00	00.00	84.95	756.15	-530.110	17.726	22.40+	APRILIA AL	JBTTOKILWD	86'7.00	80'0	0.80	00/0	B0/0
	1012-00	20135	84.95	796.52	-986,52	80/121	479-55	4751914-50	367063.90	508.53	0.00	0.80	0.00	80.0
	1368.06	M0.03	54.94	756.86	-580.165	126.07	#57-60P	4752914.04	3811073.009	92° 605	B0'0	01.80	0000	0.00
	1,799.00	89,03	66.95	12,527	-589.21	22,021	400.53	85 ¥765524	367043.06	19 005	0.00	0.80	0.00	80.0
	2-408-20	10110	88.95	282.65	-199, 565	10/1021	28.608	4755514.36	3871095.08	15-808	0.01	0.80	0000	0.08
Mean bardward and	Internationality	Ireduct								0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A Not La	Contraction	0.01 0.01	A-114 2000-6
TT NUMBER OF TAXABLE PARTY.	The second se	Contraction of the local division of the loc								10 011100 00	1	7 DigMenner	CULT, LOUD	DUDI DUDI

SD Plan Report

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Enbridge Gas Distribution Inc.



Enbridge Gas Distribution Inc.

SECTION 4.0 - DRILLING PROCEDURES

Section 4.1 - Pre Spud

1. Fresh Water Well Samples

Obtain samples from all fresh water wells located within a minimum 750 metre radius of the proposed well. Have routine water analysis done on all water samples by an independent laboratory in Sarnia. Ensure that copies of these reports are placed in the well files in Enbridge's office

2. Site Preparation

Prepare drilling location as follows:

- a. Locate all drainage tiles crossing lease area
- b. Strip and properly stock pile all soil from the lease
- c. Cut, block and divert drainage tiles as required
- d. Construct adequate berms around lease and access road as required
- 3. Government Notification of Spud

48 hours prior to spud, notify the Ministry of Natural Resources and Forestry – Petroleum Operations Section by fax @ (519) 873 – 4645 of the date of commencement of drilling operations

4. Signs

Install rig signs on access road to lease.

5. Safety Meeting

Conduct a pre-spud safety meeting for all crews. Rig Manager and all crewmembers must be present. A similar meeting shall be conducted with the remaining crew(s) as they come on duty. Additional safety meetings shall be conducted at the Wellsite Supervisor's discretion.

Section 4.2 - Surface Hole & Surface Casing

1. Drilling Method

Drill a 508mm hole using water based bentonite gel/mud, 15 metres into the Kettle Point formation, to an approximate depth of 55m. Ensure that drill cutting samples are taken when bedrock is encountered and then every 3 metres to casing depth and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. The sample bags must be labeled with the well name,

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Township, Lot, Concession and Enbridge's name. Record on daily drilling reports any influx of fluids and/or hydrocarbons, static levels, pressures and any unusual hole conditions.

2. Casing Installation

Depending upon hole conditions encountered, the 406mm casing will be run in the following manner:

- Texas Shoe on bottom of first joint
- Centralizers on the top and bottom of the first joint and at the bedrock contact point
- 406mm casing to surface
- 3. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures. Establish circulation using pump truck. The casing and the hole will be circulated with fresh water for a minimum of 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14 MPa. Ensure that preflush and mix water are from a clean source and that the water truck are also clean. Pump preflush of 2.0m³ of fresh water, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples are taken and represent the cement at the beginning, middle and end of the cement job. Mix and pump sufficient Class 'G' 0-1-0% cement plus 2 to 3% CaCl₂ with a density of 1901 kg/m³ to cement the casing to surface with 100% excess. Displace cement with fresh water – under displace cement such that the bottom joint of 406mm casing is full of cement. Shut-in cementing value at surface and set casing on bottom. Wait on cement a minimum of 24 hours before installing the BOPs.

4. Arrange to have surface hole cuttings solidified and then disposed in an approved manner.

Section 4.3 - Intermediate Hole & Intermediate Casing

1. BOP Installation and Pressure Testing

Install 406mm x 425.5mm slip on weld on casing bowl. Install Class A (Rotary) BOPs as per MNRF requirements. After BOPs are installed and the cement samples indicate that the cement is competent, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

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2. Drilling Method

Drill a 375mm hole with fresh water, $5m \pm into the F$ Shale formation, to an approximate depth of 422m. Notify Geologist 12 hours in advance of reaching intermediate casing point, so that they can be on site to determine the proper casing setting depth. When casing setting depth has been determined, circulate the hole clean and run a deviation survey. Perform a flow check prior to tripping and strap out of the hole. Fast tripping of the drill string is to be avoided in order to eliminate high annular velocities, pressure surges and swabbing (maximum rate of 27 metres per minute). Keeping hole full of fluid, trip out of hole and laydown bottom hole assembly and stand back drill collars and drill pipe,

The potential for loss circulation exists while drilling through the Detroit River formations (Lucas and Amherstburg formations). If loss circulation is encountered use the loss circulation contingency program located in Section 4.6. Note all lost circulation intervals and monitor and record fluid loss volumes. If pit fluid must be hauled to disposal, keep solid content to a minimum to reduce costs.

Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. Surveys are to be taken every 100 metres. Deviation shall not exceed 1 degree per 100 metres and shall not exceed 2 degrees at any point. Record on daily tower sheets any influx of fluids (water and/or hydrocarbons), loss circulation (rate and depth) and/or any unusual hole conditions.

3. Casing Installation

Ensure that the threads are protected while hoisting casing to the floor. Drift all casing prior to running the casing in the well and apply proper API make-up torque to each connection.

Depending upon hole conditions encountered, the 298mm casing will be run in the following manner:

- Guide shoe
- 298mm joint of casing
- 298mm Float Insert or Float Collar
- Tack weld guide shoe, float collar and bottom 2 joints and use API modified pipe dope on all connections
- Centralizers will be installed one metre above the guide shoe, over the bottom of the first 2 collars and every 5 joints to surface
- 298mm casing to surface

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4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures. Establish circulation using pump truck. The casing and the hole will be circulated with fresh water for a minimum of 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14MPa for 10 minutes. Preflush and mix water must be obtained from a clean source and the water trucks must be uncontaminated. Pump 3.0m³ citric preflush with a 1.0m³ fresh water spacer, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples is taken and represent the cement at the beginning, middle and end of the cement job. Mix and pump sufficient 0-1-8% Class 'G' plus 1 to 3% CaCl₂ (50% excess) followed by 0-1-0% Class 'G' cement plus 1 to 3% CaCl₂ (30% excess) to cement casing to surface. Depending upon the severity of the loss circulation zones, thixotropic cement with additional loss circulation materials may be used to cover the loss zone. If there are no cement returns to surface, a feed rate will be established and the annulus will be grouted to surface. Drop wiper plug and displace cement and bump plug to 3.5 Mpa over final pumping pressure - do not exceed 60% of internal yield pressure of casing. Once plug is bumped bleed off casing pressure, close casing valves and bleed off surface line pressure and wash out BOPs. Wait on cement a minimum of 24 hours before slacking off casing. Remove 406mm x 425.5mm casing bowl and install the 298mm x 346.1mm casing bowl on the 298mm casing.

Section 4.4 - Production Hole & Production Casing

1. Pressure Testing

Check cement samples for hardness – if cement samples are set to the satisfaction of the Wellsite Supervisor, proceed with installation of the BOPS. Install Class B (Rotary) BOPs as per MNRF requirements on 298mm casing bowl. Stump test BOPs prior to installation. After BOPs are installed and the cement samples indicate that the cement is competent, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

2. Drilling Method

Drill a 270mm conventional hole to the kick-off point. Brine will be used to drill this portion of the well, to prevent the dissolution of the salt layers. Ensure that drill cutting samples are taken every 3 metres and placed in the sample bags provided by the Ministry of Natural Resources and Forestry. Record on daily tower sheets any influx of fluids (water and/or hydrocarbons), loss circulation (rate and depth) and any unusual hole conditions.

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At the kick-off point, circulate the hole clean, run a deviation survey and strap out of the hole. Pick up directional equipment and run in the hole with the directional bottom hole assembly. Prior to penetrating the A-2 Carbonate, the Wellsite Geologist and Wellsite Supervisor must be on-site and a BOP drill shall be completed to familiarize all on-site personnel with the proper procedures.

Drill a 270mm directional hole a minimum of 2 metres into the A-2 Anhydrite formation, at an approximate depth of 683mTVD (704mMD) at an angle of 52^{0} . The final casing point will be determined by the Wellsite Geologist. At casing total depth, circulate the hole clean and perform a flow check prior to tripping. Fast tripping of the drill string is to be avoided in order to eliminate high annular velocities, pressure surges and swabbing (maximum rate of 27 metres per minute). Keeping hole full of brine, trip out of hole – laydown bottom hole assembly, drill pipe and drill collars.

3. Casing Installation

Ensure that the threads are protected while hoisting casing to the floor. Drift all casing prior to running the casing in the well and apply proper API make-up torque to each connection.

Depending upon hole conditions encountered, the 219mm casing will be run in the following manner:

- Guide shoe
- 219mm joint of casing
- Float Insert or Float Collar
- Bottom 150 metres of 219mm casing shall have solid stand-off centralizers run on every other joint above and below the collar
- Tack weld guide shoe, float collar and bottom 4 joints and use API modified pipe dope on all connections
- Centralizers will be installed on remaining casing on every 5th joint to surface
- 219mm casing to surface
- 4. Cementing Procedures

Move in and rig up Cementers. Ensure pressure recorder is rigged in and serviceable. Pressure charts will be attached to the job ticket. Conduct a pre-job safety meeting to confirm volumes and procedures.

Establish circulation using pump truck. The casing and the hole will be circulated with brine for 15 minutes to clean the borehole and to fill the casing and hole prior to cementing. Pressure test surface equipment to 14 MPa for 10 minutes. Preflush and mix water must be obtained from a clean source and the water trucks must be uncontaminated. Pump preflush of $3.0m^3$ of clean brine, with the addition of loss circulation material if necessary. Ensure that a minimum of 4 cement samples is taken and represent the cement at the beginning, middle and end of the cement job. Mix and pump

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sufficient Class 'G' 0-1-0% cement plus 10% NaCl, to cement the 219mm casing to surface plus 50% excess over open hole and 30% excess in cased hole. Drop wiper plug and displace cement with fresh water and bump plug to 3500 kPa over final pumping pressure – do not exceed 60% of internal yield pressure of casing. Once plug is bumped bleed off casing pressure, close casing valves and bleed off surface line pressure. Wash out BOPs and split BOP stack at 346mm flange, install 219mm slips and set slips in casing bowl. Wait on cement a minimum of 48 hours and cut casing and remove BOPs.

Section 4.5 - Main Hole

1. Installation of the BOPs and Cement Bond Log

Check cement samples for hardness – if cement samples are set to the satisfaction of the Wellsite Supervisor, proceed with installation of the BOPS. Install Class B (Rotary) BOPs as per MNRF requirements on 228.6mm flange. After BOPs are installed and the cement samples indicate that the cement is competent, move in and rig up the Wireline Company and run a cement bond log (both pressure (7000kPa) and non-pressure pass) over the 219mm casing. After the cement bond log is completed and the cement job is deemed successful, the rig will proceed to pressure test the BOPs, casing and shoe. Pressure test casing and each component of the BOPs as per Section 6.2. After successfully pressure testing the BOPs and casing, drill out cement and 0.5m of new formation and conduct a PIT, with the hole full of fresh water, using a bottom hole pressure equivalent to 18 kPa/m.

2. Logging

Move in and rig up Wireline Company. With hole full of fresh water, run a casing inspection log over the 219mm casing. Rig out Wireline Company and release.

3. Drilling Method

Drill a 200mm hole with fresh water system – ensure that the temporary storage tanks are full of fresh water and water trucks have been put on alert. After drilling each length of drill pipe, work the newly drilled hole to ensure that there will not be any issues running in and out of the open hole. A high viscosity sweep with floc will be added at each connection to assist with hole cleaning. Drill from 704mMD (683mTVD) at 52° to 88° at 842mMD (737mTVD) and continue drilling to a depth of 1413mMD (758mTVD) for a horizontal distance of approximately 180m.

Ensure that Wellsite Geologist is on site to monitor cuttings and liaise with Directional Drillers concerning the path of the horizontal well. Drill to TD indicated by Wellsite Geologist. At TD pump a final sweep and if possible, circulate hole until clean returns are observed at surface.

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The potential for loss circulation exists while drilling through the Guelph formation. If loss circulation is encountered, use the loss circulation contingency program located in Section 4.6. Note all lost circulation intervals and monitor and record fluid loss volumes.

Pull out of hole with drilling assembly and laydown drill pipe, drill collars and bottom hole assembly. Move in and rig up Wireline Company complete with full lubricators. Run in hole with gauge ring to ensure clear hole to bridge plug setting depth. Run in hole with wireline set, retrievable 219mm bridge plug and place as deep as possible in the 219mm casing and pull out of hole with the setting tool. Fill hole with fresh water and pressure test plug to 7000 kPa for 10 minutes. If the plug does not hold pressure, be prepared to set another 219mm retrievable bridge plug. Release Wireline Company and release Directional Drilling Company.

Nipple down BOPs. Cut and bevel 219mm casing and install primary and secondary seals. Install 346mm x 228.6mm spool piece and install 315mm x 900 ANSI full port ball (master) valve and test wellhead seals to 14 mPa for 10 minutes. Close master valve and install 315mm blind flange. Install pressure recorder, ensure that the well is full of fresh water and pressure test casing, wellhead and master valve to a surface pressure of 11,000 kPa for a minimum of 4 hours. Call Enbridge Office with the results.

- 4. Rig down rotary rig and move off of location.
- 5. Restore wellsite to Enbridge's specifications.

Section 4.6 - Loss Circulation Procedure

- 1. Before drilling out the casing shoe:
 - a. Identify sources and location of fresh water and/or brine, loss circulation materials and weight materials
 - b. Ensure BOPs and manifold are properly installed
 - c. Ensure auxiliary tanks are connected to the pumping system and a standby mud pump is hooked up for annular injection in case of severe loss circulation (so that fluid can be pumped down both the drill pipe and annulus simultaneously)
 - d. Pressure test BOPs prior to drill out
- 2. After drilling out shoe:
 - a. Alert water suppliers and haulers
 - b. Ensure adequate amounts of fresh water and/or brine are readily available prior to penetrating the Detroit River and Guelph formations
 - c. Mechanically test BOPs and perform BOP drill prior to penetrating the Detroit River and Guelph formations.

Drilling Program

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- 3. Drilling Blind Detroit River formations:
 - a. In an attempt to maintain or re-establish circulation, pump fluid down both the annulus and the drill pipe simultaneously
 - b. Should severe loss circulation occur while drilling, the thief zone may be plugged with cement and/or loss circulation material at Enbridge's discretion.
- 4. Drilling Blind Guelph
 - a. In an attempt to maintain or re-establish circulation, pump fluid down both the annulus and the drill pipe simultaneously
 - b. Make wiper trips or reciprocate the drill pipe to maintain a clean hole every joint or two as directed by the Wellsite Supervisor
 - c. Sweep the hole every 1 to 3 joints
 - d. Use a. and b. in combination
 - e. At TD conduct a final sweep and then trip out BHA

SECTION 5.0 - REPORTING PROCEDURES

Section 5.1 - Tower Sheets

Shall be completed daily and shall include:

- 1. Bit size, fluid type and weight, weight on bit, deviation surveys, depth at the beginning of the shift and end of each shift.
- 2. Casing size, grade, weight, and number of joints, centralizers, other casing attachments, total length and setting depth.
- 3. Cementing information Service Company, cement type, amount, slurry density, additives, annular fluid returns, volume of displacement fluid and plug down time.
- 4. Water, gas or oil type, depth encountered depth of sample collected and the static level and/or rate of flow.
- 5. Pressure tests individually, surface pressures, fluid density used in the tests, bleed-off rate and duration of test.
- 6. Logging Details type and interval.
- 7. Abandonment details intervals, amount and type of cement, top of plug and time felt.
- 8. Rig release date and time.

Section 5.2 – Worker Injury

Immediately provide first aid to the injured party and ensure that all personnel are removed from harm's way. Secure the area and ensure that the site is preserved in case an investigation is required.

Every work related accident or injury shall be reported immediately to the Wellsite Supervisor. The Supervisor shall immediately contact the Enbridge Gas Distribution Inc. Office, specifically the Manager, Reservoir Development followed by the Reservoir Field Supervisor. The verbal report shall be followed with a written report, including but not limited to, the Contractor's Accident/Incident Investigation form. The affected Contractor is responsible to contact the proper authorities concerning the accident.

SECTION 6.0 - SAFETY AND PROCEDURES

Section 6.1 - General Safety

- 1. All works at the Wellsite shall be in compliance with the Occupational Health and Safety Act and the Oil, Gas & Salt Resources Act and all associated legislation. In addition, all work at the Wellsite shall be done in compliance with good oil field practices. All verbal notifications given to and approvals received from government agencies shall be recorded on the tower sheets.
- 2. Safety meetings are to be held with each crew, at the start of the well and periodically while drilling meetings shall also be held prior to cementing and upon arrival of the logging company, prior to commencement of directional drilling operations and prior to penetrating the Detroit River formations and the A-2 Carbonate formation.
- 3. The Wellsite Supervisor shall ensure that the operations are in compliance with all applicable government regulations and shall complete daily walk around rig inspections.

Section 6.2 – Well Control

All blowout prevention systems are to be in strict compliance with MNR regulations. The function and pressure testing guidelines required by the regulatory bodies (such as daily function testing of the pipe rams) will be strictly adhered to.

- 1. All pressure tests of blowout prevention equipment will be conducted with fresh water and will be conducted in 2 stages low and high pressure. It is essential that the low pressure test be done first, to prevent the high pressure test from healing leaks that would have been noted at low pressures.
- 2. The following pressure test will be conducted with fresh water prior to drilling out each casing string and the results recorded on the tower sheets and daily reports:
 - a. The blind rams, kill lines and choke manifold will be tested individually for 10 minutes each to:
 - i. Intermediate casing 2000 kPa low & 9000 kPa high
 - ii. Production casing 2000 kPa low and 10000 kPa high
 - b. Run in hole with BHA, drill pipe and drill collars and pressure test the casing string, pipe rams, kelly cock, stand pipe, swivel, safety valves, etc. will be tested individually for 10 minutes each to:
 - i. Surface casing 1400 kPa low and 3500 kPa high (using AP)
 - ii. Intermediate casing 2000kPa low & 9000 kPa high
 - iii. Production casing 2000 kPa low and 10000 kPa high

- c. The annular preventer will be tested for 10 minutes to
 - i. Surface casing 1400 kPa low and 3500 kPa high
 - ii. Intermediate casing 2000 kPa low & 9000 kPa high
 - iii. Production casing 2000 kPa low and 10000 kPa high
- 3. Upon drilling out the casing, drill 0.5m to 1.0m of new hole and test the formation, with the hole full of fluid, to a minimum bottom hole pressure of 18 kPa per metre.
- 4. After one day of drilling below the casing shoe, check the entire blowout prevention system and tighten all bolts.
- 5. Crews should be kept alert and familiar with the blowout prevention equipment. At least one member of the crew who has been trained in blowout prevention and well control procedures must be on the floor at all times.
- 6. Conduct blowout prevention drills prior to drilling out casing and once per week thereafter. Ensure that the drills are recorded in the tour book.
- 7. The blowout preventers are to be function tested once per tour. Ensure that the function test is recorded on the tower sheets.