

ONTARIO ENERGY BOARD

IN THE MATTER OF the Ontario Energy Board Act, 1998, S.O. 1998, c.15, Schedule B; and in particular Sections 38(1) and 40(1) thereof;

AND IN THE MATTER OF an Application by Union Gas Limited for an Order varying the conditions of approval in the following proceedings EB-2008-0038 and EB-2009-0144 for Enniskillen 28, Oil City Pool, Oil Springs East, relating to the allowable pressure gradient in these three natural gas storage pools in the Townships of Enniskillen, and St. Clair, in the County of Lambton

AFFIDAVIT

I, Mary Jane Patrick, of Municipality of Chatham-Kent, in the Province of Ontario,

MAKE OATH AND SAY:

1. That I am an employee in the Registered Office of Union Gas Limited and, as such, have knowledge of the matters herein deposed to.
2. On November 10th, 2014, I inserted November 20, 2014 (10 calendar days from the date the notice was posted on the applicant's website) into the Notice provided by the Board.
3. On November 10th, 2014, I filed a completed version of the Notice with the Board through the RESS.
4. On Monday, November 10th and Tuesday, November 11th, 2014, I served a copy of the complete and dated Notice, the location map and a copy of the application and pre-filed evidence, attached hereto as Exhibit "A", to the following by courier and registered mail:
 - a) All landowners within the Designated Storage Areas (DSA) of the storage pools that are the subject of this application;
 - b) All owners and operators of all rail lines, telecommunications (e.g. telephone) or other utilities affected by Union's proposal;
 - c) The Clerks of the Township of St. Clair, the Township of Enniskillen and Lambton County; and
 - d) The Ministry of Natural Resources and Forestry, Petroleum Operations Section, London, Ontario.

Confirmation of courier and registered mail delivery receipts are attached hereto as Exhibit "B".

5. To the best of my knowledge and belief a copy of the application and evidence is being made for public review at the offices of Union Gas Limited;

6. On November 10th, 2014 the Notice and application and evidence was posted in a prominent place on Union Gas Limited's website.
7. I make this Affidavit in good faith and for no improper purpose.

SWORN BEFORE ME in the)
Municipality of Chatham-Kent) (original signed by)
Province of Ontario,) _____
this 13th day of November, 2014.)

(original signed by)

A Commissioner, etc.

ONTARIO ENERGY BOARD NOTICE

THIS IS EXHIBIT 1 TO THE AFFIDAVIT
OF MARY JANE PATRICK
SWORN BEFORE ME THIS _____ DAY OF _____

Union Gas Limited has applied for approval to increase the
operating pressures in certain of its natural gas storage pools.

Learn More. Have Your Say.

A COMMISSIONER, ETC.

Union Gas Limited has applied for approval to increase the operating pressures in its Oil City, Enniskillen 28, and Oil Springs East natural gas storage pools above the current operating pressures set in Board's original conditions of approval. The storage pools are located in the Townships of St. Clair and Enniskillen in Lambton County. The increase in operating pressures will increase storage capacity of the storage pools.

A map of the general location of the storage pools is provided below.

THE ONTARIO ENERGY BOARD IS HOLDING A PUBLIC HEARING

The Ontario Energy Board (OEB) will hold a public hearing to consider the application filed by Union Gas. We will question Union Gas on the case. We will also hear arguments from individuals and from groups that represent the customers of Union Gas. At the end of this hearing, the OEB will decide whether to approve the application.

The OEB is an independent and impartial public agency. We make decisions that serve the public interest. Our goal is to promote a financially viable and efficient energy sector that provides you with reliable energy services at a reasonable cost.

BE INFORMED AND HAVE YOUR SAY

You have the right to information regarding this application and to be involved in the process. You can:

- review the application filed by Union Gas on the OEB's website now.
- file a letter with your comments, which will be considered during the hearing.
- become an active participant (called an intervenor). Apply by **November 20, 2014** or the hearing will go ahead without you and you will not receive any further notice of the proceeding.
- at the end of the process, review the OEB's decision and its reasons on our website.

LEARN MORE

Our file number for this case is **EB-2014-0306**. To learn more about how to participate in this hearing, including how to file a letter with your comments or how to become an intervenor, go to: www.ontarioenergyboard.ca/participate. From that OEB web page you can also enter the file number **EB-2014-0306** to see all the documents related to this case. You can also phone our Consumer Relations Centre at 1-877-632-2727 with any questions.

ORAL VS. WRITTEN HEARINGS

There are two types of OEB hearings – oral and written. Union Gas has applied for a written hearing. The OEB is considering this request. If you think an oral hearing is needed, you can write to the OEB to explain why by **November 20, 2014**.

PRIVACY

If you write a letter of comment, your name and the content of your letter will be put on the public record and the OEB website. However, your personal telephone number, home address and email address will be removed. If you are a business, all your information will remain public. If you apply to become an intervenor, all information will be public.

This hearing will be held under sections 38(1) and 40(1) of the Ontario Energy Board Act, 1998, S.O. 1998 c. 15 (Schedule B).



October 1, 2014

BY RESS and COURIER

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
Suite 2700, 2300 Yonge Street
Toronto, Ontario
M4P 1E4

Dear Ms. Walli:

**Re: Union Gas Limited (“Union”)
2015 Storage Enhancement Project
Board File # EB-2014-0306**

Enclosed please find two copies of Union’s Vary Application and Pre-Filed Evidence for the above-noted project.

Sincerely,

(Original Signed By)

Mark A. Murray, LL.B
Manager, Regulatory Projects and Lands Acquisition
:sb
Encl.

cc: Zora Crnojacki, Project Advisor

ONTARIO ENERGY BOARD

IN THE MATTER OF the Ontario Energy Board Act, 1998, S.O. 1998, c.15, Schedule B; and in particular Sections 38(1) and 40(1) thereof;

AND IN THE MATTER OF an Application by Union Gas Limited for an Order varying the conditions of approval in the following proceedings EB-2008-0038 and EB-2009-0144 for Enniskillen 28, Oil City Pool, Oil Springs East, relating to the allowable pressure gradient in these three natural gas storage pools in the Townships of Enniskillen, and St. Clair, in the County of Lambton;

UNION GAS LIMITED

1. Union Gas Limited ("Union") wishes to operate the following natural gas storage pools: Oil City, Oil Springs East, Enniskillen 28 and Bickford Pools, at a maximum pressure gradient of 17.2 kPa/m (0.76 psi per foot) as permitted under the CSA Standard Z341.1-14.
2. Union therefore applies for leave to operate the natural gas storage pools above the 16.5 kPa/m (0.73 psi per foot) operating condition as set out in the Conditions of Approval issued in the EB-2008-0038 and EB-2009-0144 proceedings:
3. Union requests that the following condition be placed on Oil City, Oil Springs East, Enniskillen 28 and Bickford Pools:

Union Gas Limited shall not operate the storage pool above a pressure representing a pressure gradient of 17.2 kPa/m (0.76 psi/f) of depth without leave of the Board. Union Gas Limited shall file an engineering study and geological study in support of any leave application.

4. Attached as Schedule A is a map showing the general location of the four storage pools.
5. In order to meet the proposed in-service date, Union respectfully requests a Board Decision, no later than January 31, 2015.

Dated at the Municipality of Chatham-Kent, Ontario this 1st day of October, 2014.

UNION GAS LIMITED

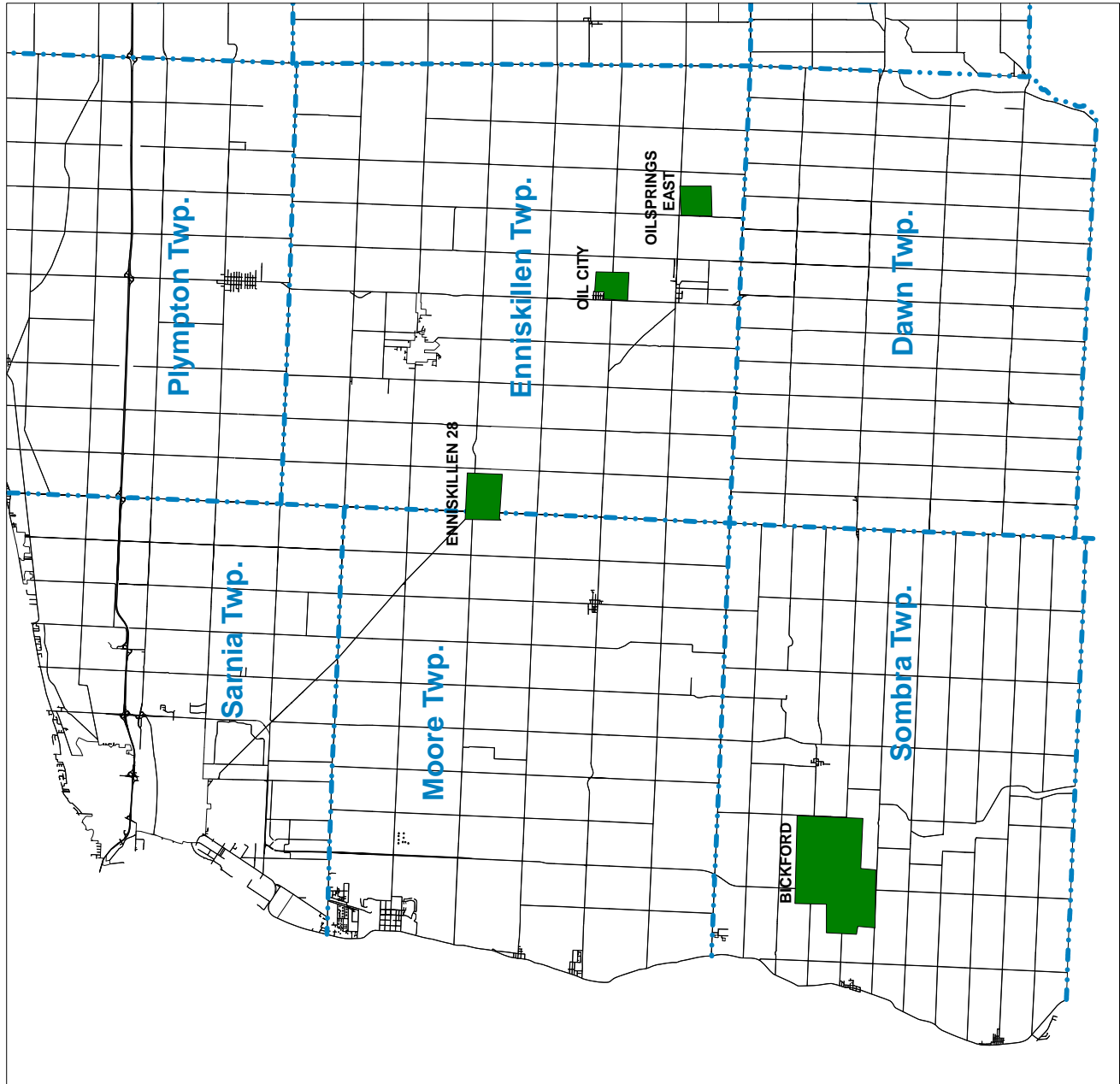
[original signed by]

Per: Mark Murray

Manager, Regulatory Projects/Land Acquisition

Comments respecting this Application should be directed to:

Mark A. Murray,
Manager, Regulatory Projects
Union Gas Limited
50 Keil Drive North
Chatham, Ontario
N7M 5M1
Telephone: (519) 436-4601
Facsimile: (519) 436-4641



Union Pools being
Delta Pressured in
2015



**Lambton County
Storage Pools
Union Gas and MHP**

Vary Application

TABLE OF CONTENTS

Background	1
Geology and Reservoir Engineering.....	3
Lands Issues.....	8

SCHEDULES

<i>Schedule 1</i>	<i>Operating Pressure Conditions</i>
<i>Schedule 2</i>	<i>Pressure Limits Summary Table</i>
<i>Schedule 3</i>	<i>Location Map of Enniskillen 28 Pool</i>
<i>Schedule 4</i>	<i>Guelph Structure Map Enniskillen 28 Pool</i>
<i>Schedule 5</i>	<i>Cross section of Enniskillen 28 Pool</i>
<i>Schedule 6</i>	<i>Location Map of Oil Springs East Pool</i>
<i>Schedule 7</i>	<i>Guelph Structure Map Oil Springs East Pool</i>
<i>Schedule 8</i>	<i>Cross section of Oil Springs East Pool</i>
<i>Schedule 9</i>	<i>Location Map of Oil City Pool</i>
<i>Schedule 10</i>	<i>Guelph Structure Map Oil City Pool</i>
<i>Schedule 11</i>	<i>Cross Section of Oil City Pool</i>
<i>Schedule 12</i>	<i>Location Map of Bickford Pool</i>
<i>Schedule 13</i>	<i>Guelph Structure Map Bickford Pool</i>
<i>Schedule 14</i>	<i>Cross Section of Bickford Pool</i>

BACKGROUND

1. Union Gas Limited (“Union”) proposes to increase the operating pressure in the Enniskillen 28, Oil Springs East, Oil City and Bickford Pools to 17.2 kPa/m (0.76 psi/ft) during the 2015 injection season.
2. In the past the Ontario Energy Board (“The Board”) has imposed conditions of approval limiting the maximum operating pressure on certain storage pools operated by Union.
3. Union applied to the Board in 2008 and 2009 to vary the conditions of approval in 7 storage pools (Enniskillen 28, Oil Springs East, Payne, Dow A, Oil City, Bentpath East and Bluewater) to increase the operating pressure from 15.8 kPa/m (0.70 psi/ft) to 16.5 kPa/m (0.73 psi/ft). The Board approved Unions request in the EB-2008-0038 and EB-2009-0144 proceedings and imposed the following condition

“Union Gas Limited shall not operate the storage pool above a pressure representing a pressure gradient of 0.73 psi per foot of depth without leave of the Board. Union Gas Limited shall file an engineering study and a geological study in support of any leave application.”

4. This Application is requesting leave to vary the conditions of approval, limiting the operating pressure it previously placed on Oil City, Oil Springs East and Enniskillen 28 Pools and replacing them with conditions allowing the Pools to be operated at a pressure gradient of 17.2 kPa/m (0.76 psi/ft).
5. Bickford does not have a condition of approval limiting its operating pressure, Union is including the Bickford Pool in this application for information purposes only. Union is requesting a condition allowing the Bickford Pool to be operated at a pressure gradient of 17.2 kPa/m (0.76 psi/ft).
6. Attached as Schedule 1 is a table identifying the Pools, subject to this application, the proceeding where the condition of approval was imposed and the exact wording of the condition.

7. It is Union's understanding that Board approvals will require the applicant to conform to CSA Standard Z341.1-14 storage of Hydrocarbons in Underground Formations to the satisfaction of the Ministry of Natural Resources ("MNR").
8. The following technical information has been provided to the Petroleum Resources Section of the MNR:
 - Engineering studies completed by Geofirma Engineering Ltd. ("Geofirma") confirming that the maximum safe operating pressure exceeds 17.2 kPa/m for each of the four pools. The approach used by Geofirma is consistent with previous studies completed for Bentpath, Rosedale, Dawn 167 and Dawn 47-49 currently operated at the elevated pressure gradient of 17.2 kPa.m (0.76 psi/ft).
 - A review of each pool as prescribed by CSA Z341.1-14 Clause 7.2 assessing: a) wells within 1 kilometre; b) operations within 5 kilometres and; c) the integrity of all wells penetrating the storage zone.
 - An analysis of hazards and operability issues ("HAZOP") for each of the storage pools.
9. Union's request will result in an average increase in pool pressure of approximately 350 kPa (50 psi). This increase is within the limits as prescribed by CSA Z341.1-14.
10. Union proposes to increase the operating pressure of the Pools to increase their working capacity by 51,300 10^3m^3 . The capacity created will be used to meet the requirements of Union's storage service customers and specifically the needs of customers seeking storage services dealt with in Board decision EB-2005-0551 Natural Gas Electricity Interface Review ("NGEIR").
11. If this application is approved, Union will begin operating the Pools at higher pressure gradients during the 2015 injection season.

12. As there are no pipelines to be constructed or wells to be drilled, a leave to construct order from the Board and a report from the Board to the MNR are not required for approval of this application.
13. No directly affected landowner has raised any concerns regarding these changes.
14. There are no environmental impacts as a result of the proposed changes in operating pressure.
15. Union is proposing to increase the pressures in these Pools by September 1, 2015. In order to meet this timetable, a Board Decision on Union's Application is respectfully requested by January 31, 2015.
16. Union will review and update operating procedures and Emergency Response Plans prior to operating the Pools at the increased pressure levels.
17. Emergency shut-down valves ("ESD") capable of isolating the storage facility from the transmission pipeline are currently in place at each pool station with remote operation from the Dawn Operations Centre in accordance with CSA Z341.1-14, Clause 9.3. In addition, Union proposes to install ESD valves on each injection/withdrawal well at each pool with the exception of UE 40, UE 58 and UE 63 in the Enniskillen 28 Pool, due to the proximity to the Bear Creek and the potential for flooding. Instead, a single ESD valve will be installed for these three wells located on the gathering pipeline system at a collection point above the flood plain.
18. All above ground piping and wells have been reviewed to ensure compliance with all codes and standards at the increased operating pressures.

GEOLOGY AND RESERVOIR ENGINEERING

19. Schedule 2 is a table summarizing the latest pressuring history of Union's storage pools.

Enniskillen 28 Pool

20. The Enniskillen 28 Pool was discovered in 1954 with the drilling of the Union Enniskillen 28 well and was converted to natural gas storage in 1977. A location map showing the

Enniskillen 28 Pool in relation to the surrounding area is shown in Schedule 3. Currently, the Pool is operated and monitored using eight injection/withdrawal wells and three observation wells. The Enniskillen 28 Pool has a total capacity of $130,900 \text{ } 10^3\text{m}^3$ and a working capacity of $99,100 \text{ } 10^3\text{m}^3$. The Pool operates between a cushion pressure of 2,413 kPaa and a maximum pressure of 8,730 kPaa.

21. A map showing the Enniskillen 28 Pool Designated Storage Area (“DSA”), Guelph structure and depth-to-crest is included in Schedule 4. The geological interpretation was completed using 3D seismic data and well information. The map is contoured in 10 m intervals and shows the reef reaching approximately 115 m above the regional Guelph surface. The minimum depth-to-crest is established at 554.1 m.
22. A cross section illustrating the reef structure of the Enniskillen 28 Pool is provided as Schedule 5. The cross section illustrates the relationship of the pinnacle reef to the surrounding formations. The A2 Salt, A1 Carbonate and A1 Anhydrite units pinch out against the flank of the reef providing lateral seals. The A2 Anhydrite, A2 Shale, and A2 Carbonate drape over the reservoir forming an effective caprock seal ranging in thickness from 29.7 to 35.5 m. The A2 Anhydrite overlying the crest of the reef ranges in thickness from 1.7 to 6.3 m.
23. Union is proposing to operate the Ennsikillen 28 Pool at 9,090 kPaa. This equates to a pressure gradient of 17.2 kPa/m. This will increase the working capacity from $130,900 \text{ } 10^3\text{m}^3$ to $137,100 \text{ } 10^3\text{m}^3$ which is an incremental capacity gain of $6,200 \text{ } 10^3\text{m}^3$.
24. In order to ensure the proposed maximum pressure gradient complies with CSA Z341.1-14 an engineering study was conducted by Geofirma for the Enniskillen 28 Pool. This engineering study incorporated data from geomechanical and in-situ tests completed on the reservoir and caprock formations.
25. In addition, a review of well casings, wellheads, gathering pipelines, storage pipelines and other related surface facilities was completed. As a result of this review, all wells in the Enniskillen 28 Pool will receive new master valves and seven wells will be receiving new wellheads. This work is scheduled to be completed prior to increasing the pressure in the

pool. No other upgrades to the wells or pipelines are required. The Maximum Operating Pressure (“MOP”) of the physical facilities in the Pool is 10,030 kPaa WH.

Oil Springs East Pool

26. The Oil Springs East Pool was discovered in 1974 with the drilling of the Husky Union Enniskillen 4-22-II well and was converted to natural gas storage in 1990. A location map showing the Oil Springs East Pool in relation to the surrounding area is shown in Schedule 6. Currently, the Pool is operated and monitored using six injection/withdrawal wells and two observation wells. The Oil Springs East Pool has a total capacity of $136,400 \text{ } 10^3\text{m}^3$ and a working capacity of $105,000 \text{ } 10^3\text{m}^3$. The Pool operates between a cushion pressure of 2,100 kPaa and a maximum pressure of 8,060 kPaa.
27. A map showing the Oil Springs East Pool DSA, Guelph structure and depth-to-crest is included at Schedule 7. The geological interpretation was completed using 3D seismic data and well information. The map is contoured in 10 m intervals and shows the reef reaching greater than 80 m above the regional Guelph surface. The minimum depth-to-crest is established at 509.6 m.
28. A cross section illustrating the reef structure of the Oil Springs East Pool is provided as Schedule 8. The cross section illustrates the relationship of the pinnacle reef to the surrounding formations. The A2 Salt, A1 Carbonate and A1 Anhydrite units pinch out against the flank of the reef providing lateral seals. The A2 Anhydrite, A2 Shale, and A2 Carbonate drape over the reservoir forming an effective caprock seal ranging in thickness from 23.0 to 26.2 m. The A2 Anhydrite overlying the crest of the reef ranges in thickness from 0.8 to 9.5 m.
29. Union is proposing to operate the Oil Springs East Pool at 8,390 kPaa WH. This equates to a pressure gradient of 17.2 kPa/m. This will increase the working capacity from $136,400 \text{ } 10^3\text{m}^3$ to $142,900 \text{ } 10^3\text{m}^3$ which is an incremental capacity gain of $6,500 \text{ } 10^3\text{m}^3$.

30. In order to ensure the proposed maximum pressure gradient complies with CSA Z341.1-14 an engineering study was conducted by Geofirma for the Oil Springs East Pool. This engineering study incorporated data from geomechanical and in-situ tests completed on the reservoir and caprock formations.
31. In addition, a review of well casings, wellheads, gathering pipelines, storage pipelines and related surface facilities was completed. As a result of this review, six wells in the Oil Springs East Pool will receive new master valves and four wells will be receiving new wellheads. This work is scheduled to be completed prior to increasing the pressure in the pool. No other upgrades are required. The MOP of the facility is 10,030 kPaa WH.

Oil City Pool

32. The Oil City Pool was discovered in 1975 with the drilling of the McClure Enniskillen 1-16-IV well and was converted to gas storage in 2000. A location map showing the Oil City Pool in relation to the surrounding area is contained in Schedule 9. Currently the Pool is operated and monitored using two injection/withdrawal wells and one observation well. The Oil City Pool has a total capacity of $62,800 \text{ } 10^3 \text{ m}^3$ and a working capacity of $48,800 \text{ } 10^3 \text{ m}^3$. The Pool operates between a cushion pressure of 2,100 kPaa and a maximum pressure of 8,280 kPaa.
33. A map showing the Oil City Pool DSA, Guelph structure and depth-to-crest is included at Schedule 10. The geological interpretation was completed using 3D seismic data and well information. The map is contoured in 10 m intervals and shows the reef reaching greater than 80 m above the regional Guelph surface. The minimum depth-to-crest is established at 523.7 m.
34. A cross section illustrating the reef structure of the Oil City Pool is provided as Schedule 11. The cross section illustrates the relationship of the pinnacle reef to the surrounding formations. The A2 Salt, A1 Carbonate and A1 Anhydrite units pinch out against the flank of the reef providing lateral seals. The A2 Anhydrite, A2 Shale, and A2 Carbonate drape over the reservoir forming an effective caprock seal ranging in thickness from 23.4 to 32.0 m. The A2 Anhydrite overlying the crest of the reef ranges in thickness from 1.8 to 3.9 m.

35. Union is proposing to operate the Oil City Pool at 8,610 kPaa WH. This equates to a pressure gradient of 17.2 kPa/m. This will increase the working capacity from 62,800 10^3m^3 to 65,700 10^3m^3 which is an incremental capacity gain of 2,900 10^3m^3 .
36. In order to ensure the proposed maximum pressure gradient complies with CSA Z341.1-14 an engineering study was conducted by Geofirma for the Oil City Pool. This engineering study incorporated data from geomechanical and in-situ tests completed on the reservoir and caprock formations.
37. In addition, a review of well casings, wellheads, gathering pipelines, storage pipelines and other related surface facilities was completed. As a result of this review, two wells in the Oil City Pool will receive new master valves and new wellheads. This work is scheduled to be completed prior to increasing the pressure of the pool. No other upgrades are required. The MOP of the physical facilities constructed in the Pool is 8,720 kPaa WH.

Bickford Pool

38. The Bickford Pool was discovered in 1954 with the drilling of the Imperial 421-Bickford 19 well and was converted to gas storage in 1972. A location map showing the Bickford Pool in relation to the surrounding area is contained in Schedule 12. Currently the Pool is operated and monitored using five injection/withdrawal wells and six observation wells. The Bickford Pool has a total capacity of 762,600 10^3m^3 and a working capacity of 592,800 10^3m^3 . The Pool operates between a cushion pressure of 2,198 kPaa and a maximum pressure of 8,650 kPaa.
39. A map showing the Bickford Pool DSA, Guelph structure and depth-to-crest is included at Schedule 13. The geological interpretation was completed using 3D seismic data and well information. The map is contoured in 10 m intervals and shows the reef reaching greater than 110 m above the regional Guelph surface. The minimum depth-to-crest is established at 548.7 m.
40. A cross section illustrating the reef structure of the Bickford Pool is provided as Schedule 14. The cross section illustrates the relationship of the pinnacle reef to the surrounding formations. The A2 Salt, A1 Carbonate and A1 Anhydrite units pinch out against the flank of

the reef providing lateral seals. The A2 Anhydrite, A2 Shale, and A2 Carbonate drape over the reservoir forming an effective caprock seal ranging in thickness from 27.4 to 44.2 m. The A2 Anhydrite overlying the crest of the reef ranges in thickness from 1.5 to 11.0 m.

41. Union is proposing to operate the Bickford Pool at 9,000 kPaa WH. This equates to a pressure gradient of 17.2 kPa/m. This will increase the working capacity from 762,600 10^3m^3 to 798,300 10^3m^3 which is an incremental capacity gain of 35,700 10^3m^3 .
42. In order to ensure the proposed maximum pressure gradient complies with CSA Z341.1-14 an engineering study was conducted by Geofirma for the Bickford Pool. This engineering study incorporated data from geomechanical and in-situ tests completed on the reservoir and caprock formations.
43. In addition, a review of well casings, wellheads, gathering pipelines, storage pipelines and other related surface facilities was completed. As a result of this review, eight wells in the Bickford Pool will receive new master valves and four wells will be receiving new wellheads. This work is scheduled to be completed prior to increasing the pressure in the pool. No other upgrades are required. The MOP of the physical facilities constructed in the Pool is 10,030 kPaa WH.

LANDS ISSUES

44. Union implemented a landowner consultation and notification program to inform the directly affected landowners about the proposed changes in operating pressure in the Pools.
45. During this consultation process, no significant issues in regard to the change in operating pressures were identified.
46. Union will continue to meet with landowners in these Pools to address the concerns that have been identified and any new issues that may be brought forward.

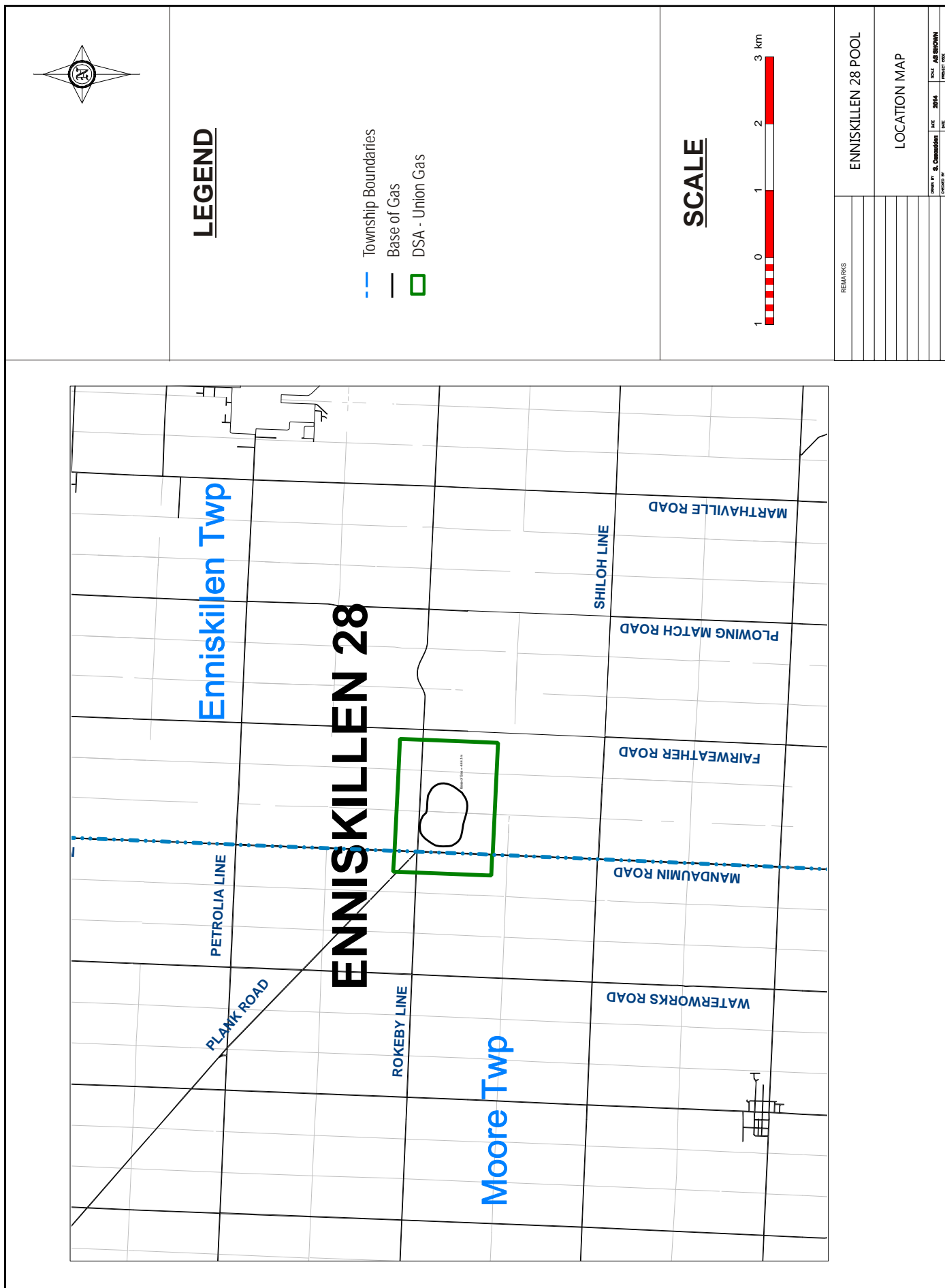
Operating Pressure Conditions

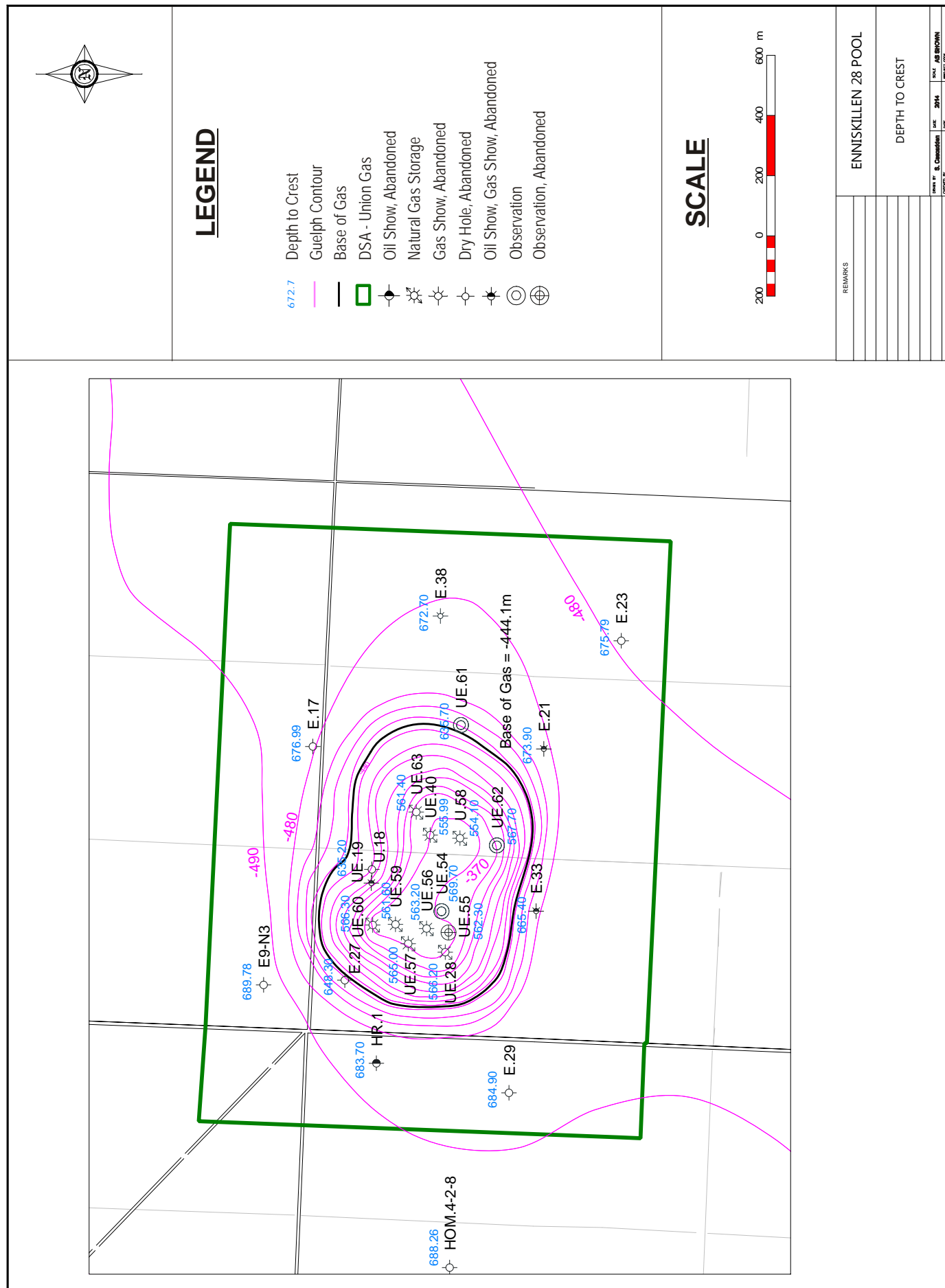
Pool	Order	Condition
Enniskillen 28	EB-2008-0038 2008 Storage Enhancement Project	Union Gas Limited shall not operate the storage pool above a pressure representing a pressure gradient of 0.73 psi per foot of depth without leave of the Board. Union Gas Limited shall file an engineering study and a geological study in support of any leave application.
Oil Springs East	EB-2008-0038 2008 Storage Enhancement Project	Union Gas Limited shall not operate the storage pool above a pressure representing a pressure gradient of 0.73 psi per foot of depth without leave of the Board. Union Gas Limited shall file an engineering study and a geological study in support of any leave application.
Oil City	EB-2009-0144 2009 Storage Enhancement Project	Union Gas Limited shall not operate the storage pool above a pressure representing a pressure gradient of 0.73 psi per foot of depth without leave of the Board. Union Gas Limited shall file an engineering study and a geological study in support of any leave application.
Bickford		No pressure limitation

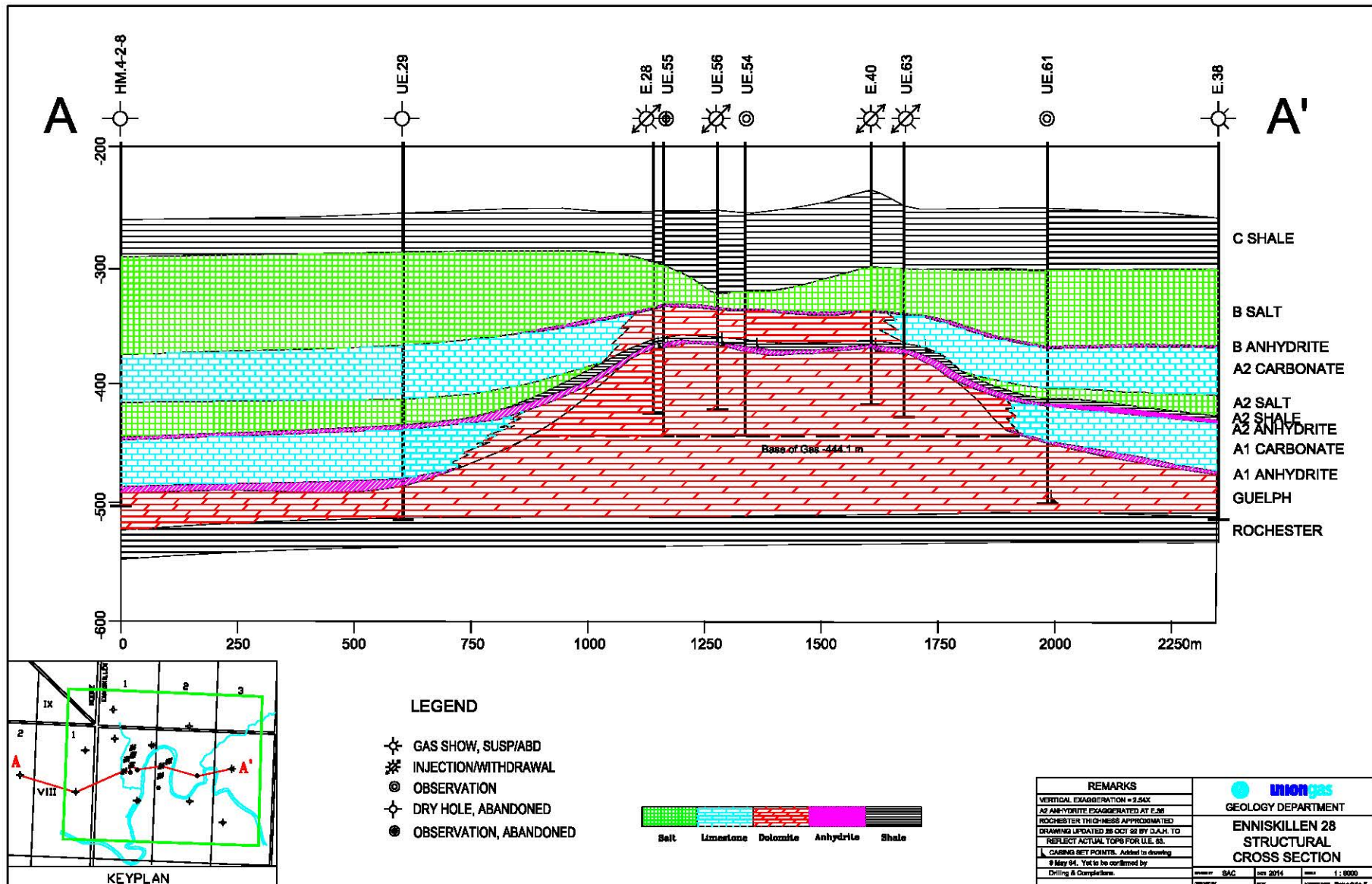
Union Gas Storage Pools

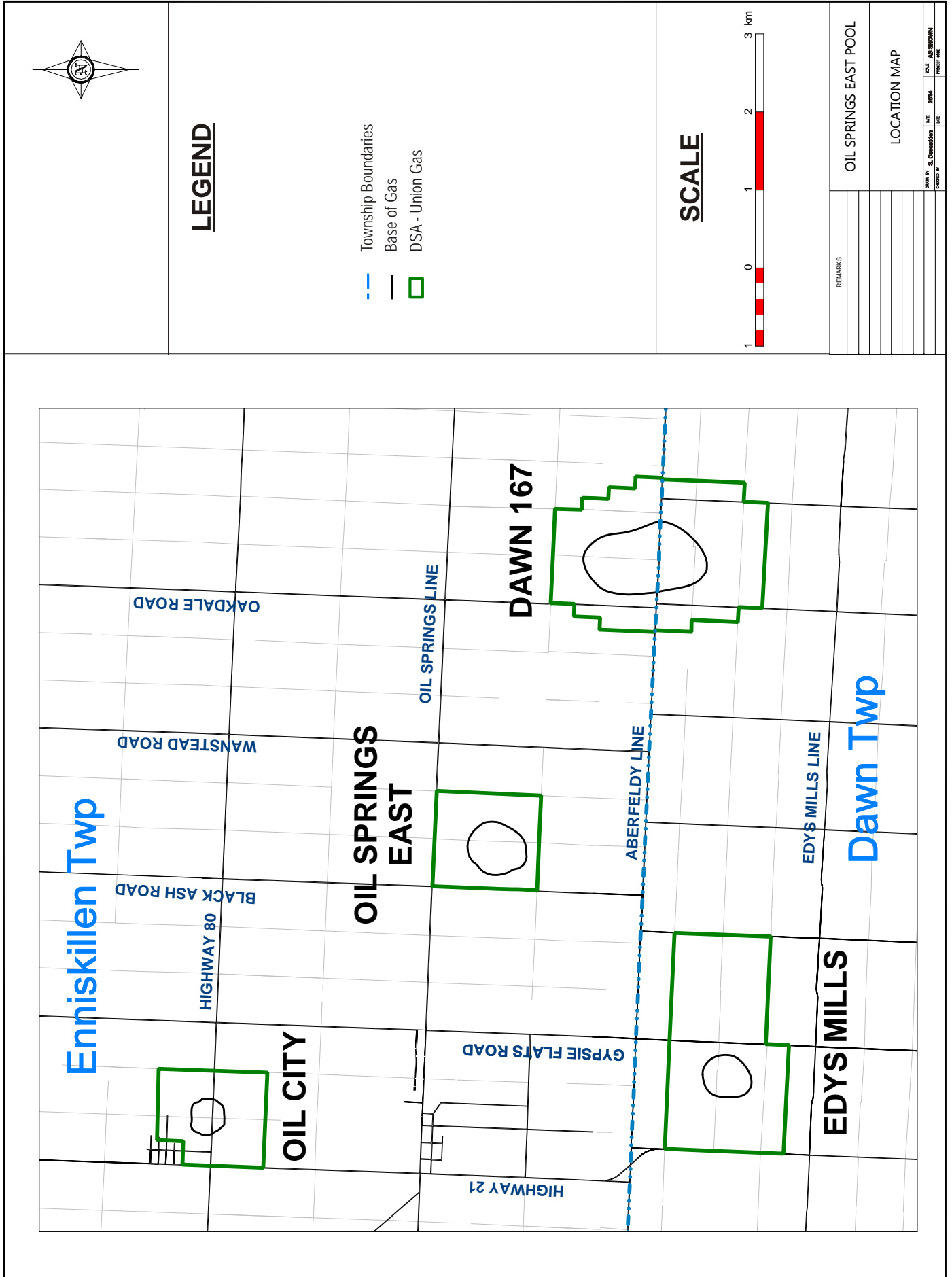
Pressure Limits Summary Table

Storage Pool	Current Pressure (kPa/m)	Year Pressure Changed	Discovery Gradient (kPa/m)	Discovery Pressure (Wellhead) (kPaa)	Maximum Operating Pressure (kPaa)
Dawn 167	17.2	2014	14.3	6,461	10,600
Bentpath	17.2	2013	12.7	6,077	8,200
Rosedale	17.2	2013	13.8	6,661	8,210
Bickford	16.5	2001	12.9	6,801	8,650
Terminus	16.5	2001	13.6	6,310	7,720
Dawn 156	16.5	2001	12.7	6,153	7,960
Waubuno	16.5	2004	12.7	6,619	8,670
Dawn 47-49	17.2	2014	13.3	6,165	8,800
Oil Springs East	16.5	2008	13.3	6,477	8,060
Enniskillen 28	16.5	2008	10.4	5,488	8,730
Payne	16.5	2008	11.1	6,247	9,250
Dow A	16.5	2008	9.0	5,819	10,690
Oil City	16.5	2009	13.3	6,718	8,280
Bentpath East	16.5	2009	13.3	6,098	7,560
Bluewater	16.5	2009	8.4	5,148	9,780
Heritage	16.5	2009	12.2	7,269	10,620
Storage Pool	Current Pressure (psi/ft)	Year Pressure Changed	Discovery Gradient (psi/m)	Discovery Pressure (Wellhead) (psia)	Maximum Operating Pressure (psia)
Dawn 167	0.76	2014	0.63	937	1,537
Bentpath	0.76	2013	0.56	881	1,189
Rosedale	0.76	2013	0.61	966	1,190
Bickford	0.73	2001	0.57	986	1,255
Terminus	0.73	2001	0.60	915	1,120
Dawn 156	0.73	2001	0.56	892	1,155
Waubuno	0.73	2004	0.56	960	1,258
Dawn 47-49	0.76	2014	0.59	894	1,276
Oil Springs East	0.73	2008	0.59	939	1,169
Enniskillen	0.73	2008	0.46	796	1,266
Payne	0.73	2008	0.49	906	1,342
Dow A	0.73	2008	0.40	844	1,551
Oil City	0.73	2009	0.59	974	1,201
Bentpath East	0.73	2009	0.59	884	1,097
Bluewater	0.73	2009	0.37	747	1,419
Heritage	0.73	2009	0.54	1,054	1,540

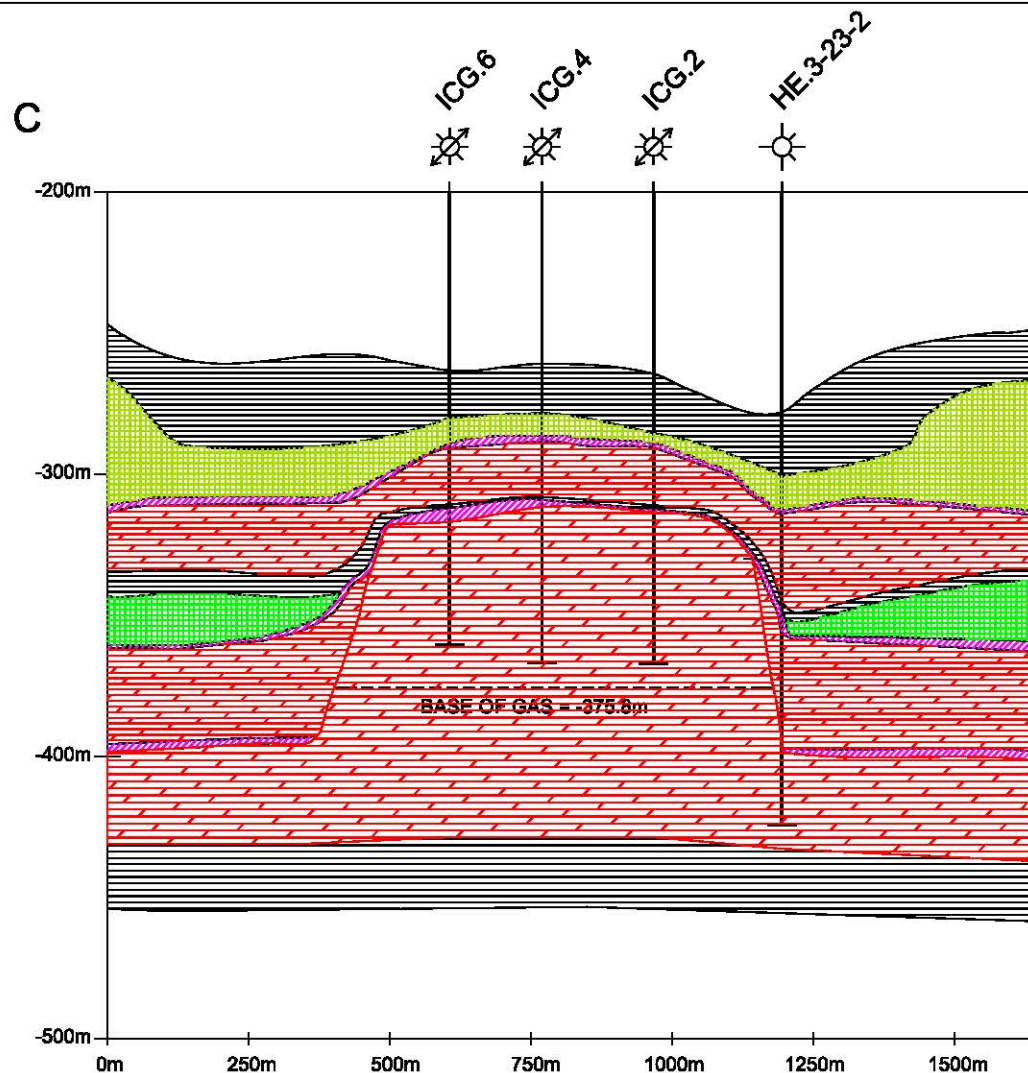












C'

Subsea Elevation

C SHALE

B EQUIVALENT

B ANHYDRITE

A2 CARBONATE

A2 SHALE

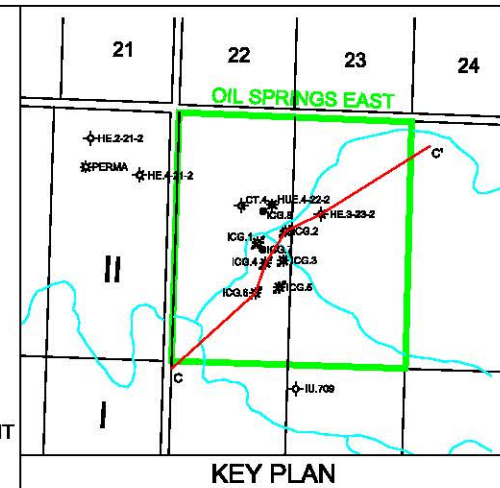
A2 SALT

A2 ANHYDRITE

A1 CARBONATE

A1 ANHYDRITE GUELPH

ROCHESTER



LEGEND



INJECTION/WITHDRAWAL



GAS SHOW, ABANDONED

REMARKS

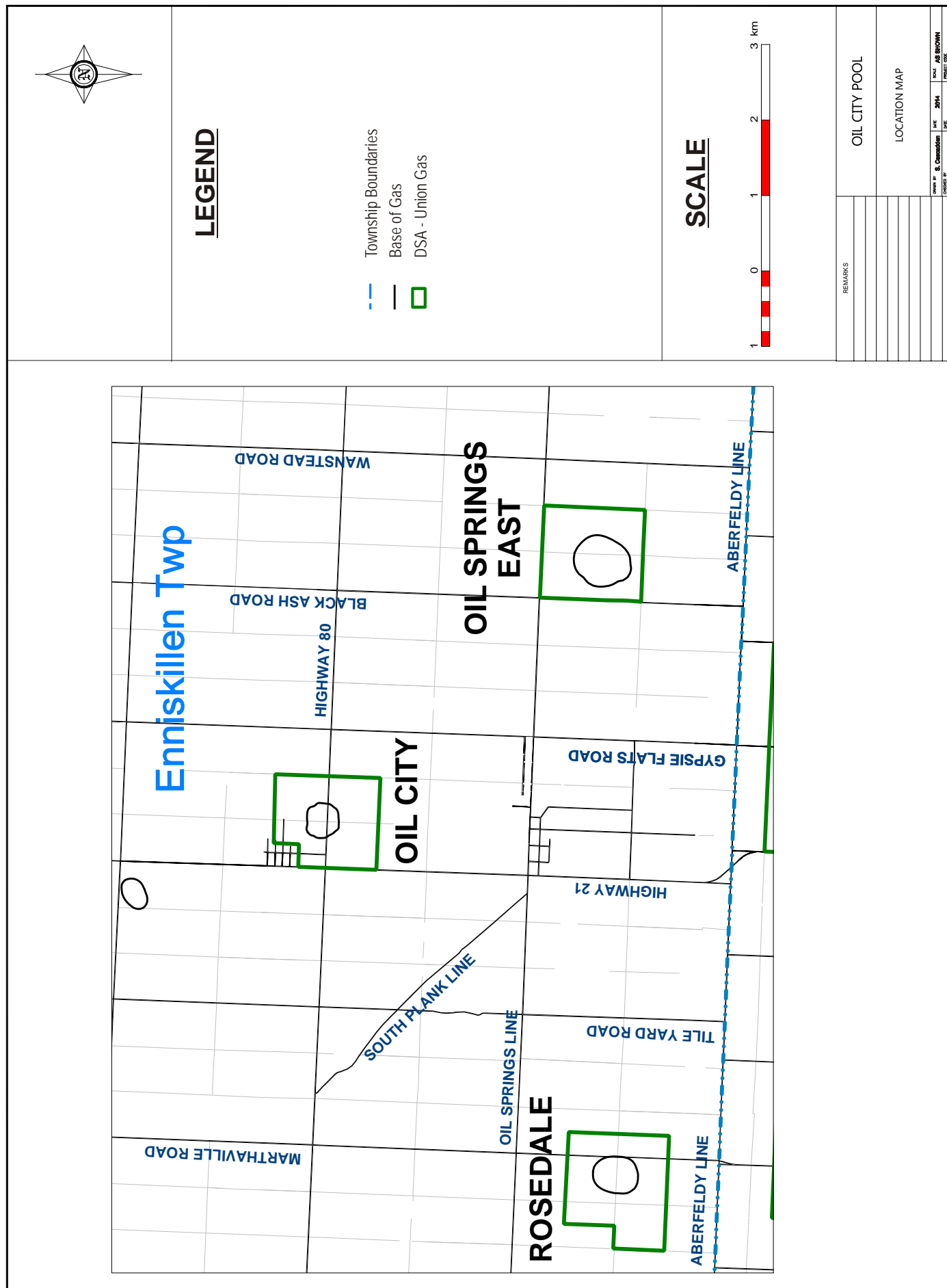
- TOP OF ROCHESTER ESTIMATED
FROM SURROUNDING WELLS



uniongas
GEOLOGY DEPARTMENT

OIL SPRINGS EAST
CROSS SECTION
C-C'

DRAWN BY J. WILD	DATE 11 JUL 14	SCALE AS SHOWN
CHECKED BY	DATE	DRAWING CODE



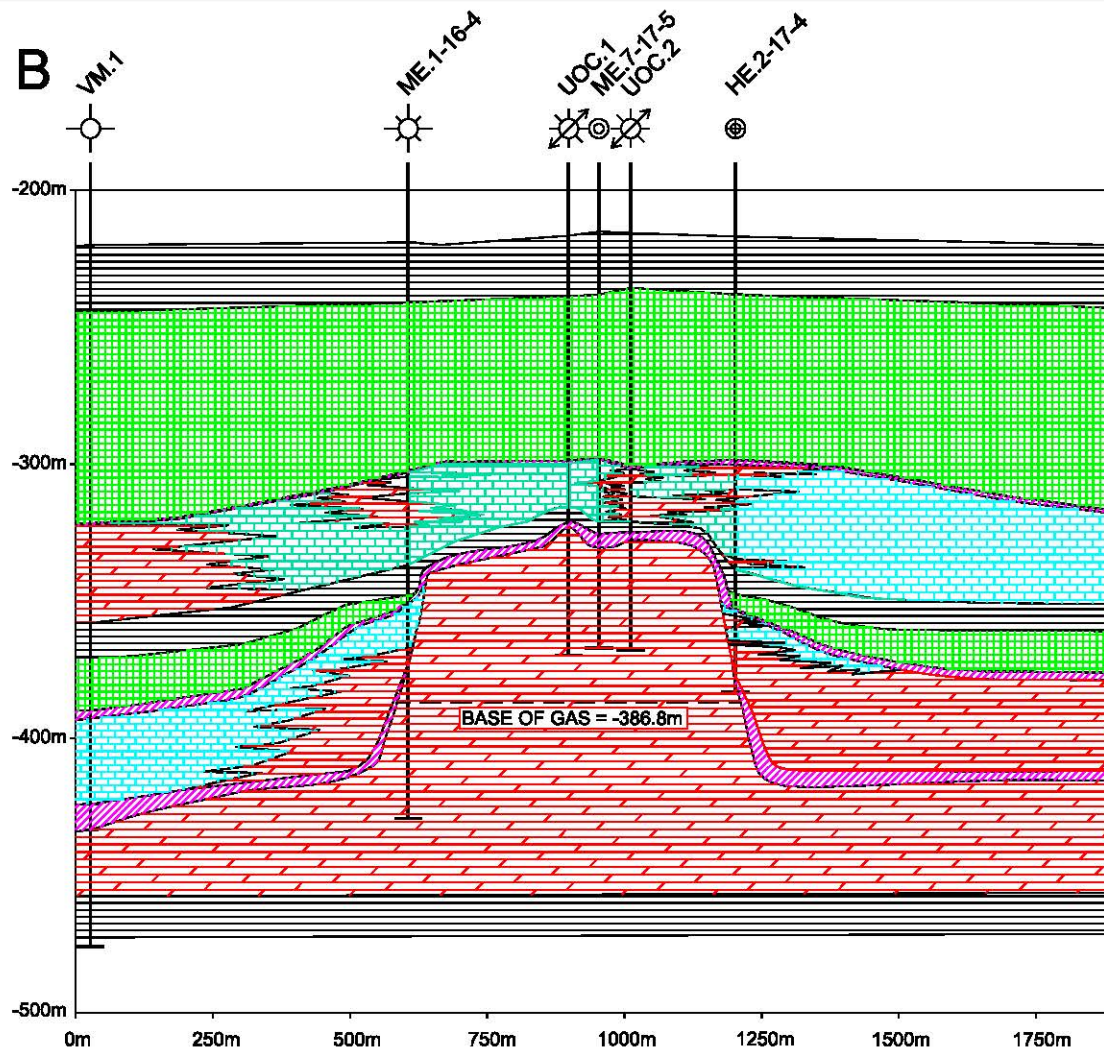


LEGEND

- | Legend | Feature |
|--------|-------------------------|
| 580 95 | Guelph Subsea Elevation |
| — | Guelph Contour |
| — | Base of Gas |
| ■ | DSA - Union Gas |
| ☼ | Natural Gas Storage |
| ⊖ | Dry Hole, Abandoned |
| ⊕ | Gas Show, Abandoned |
| ⊙ | Observation |
| ⊗ | Observation, Abandoned |

SCALE

[illegible]



B'

Subsea
Elevation

C SHALE

B SALT

B ANHYDRITE

A2 CARBONATE

A2 SHALE

A2 SALT

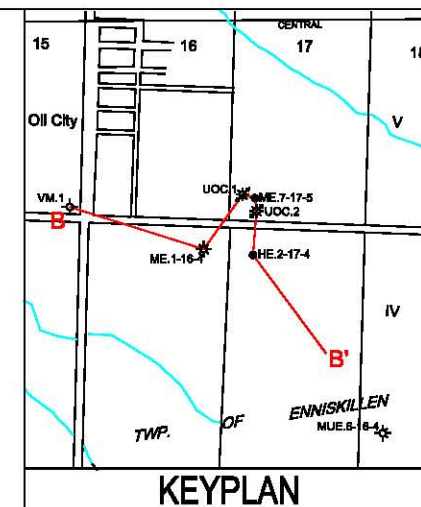
A2 ANHYDRITE

A1 CARBONATE

A1 ANHYDRITE


GUELPH

ROCHESTER



LEGEND

- * GAS PRODUCER, ABANDONED
- ✱ INJECTION/WITHDRAWAL
- ⊙ OBSERVATION
- OBSERVATION, ABANDONED
- ⊕ DRY HOLE, ABANDONED

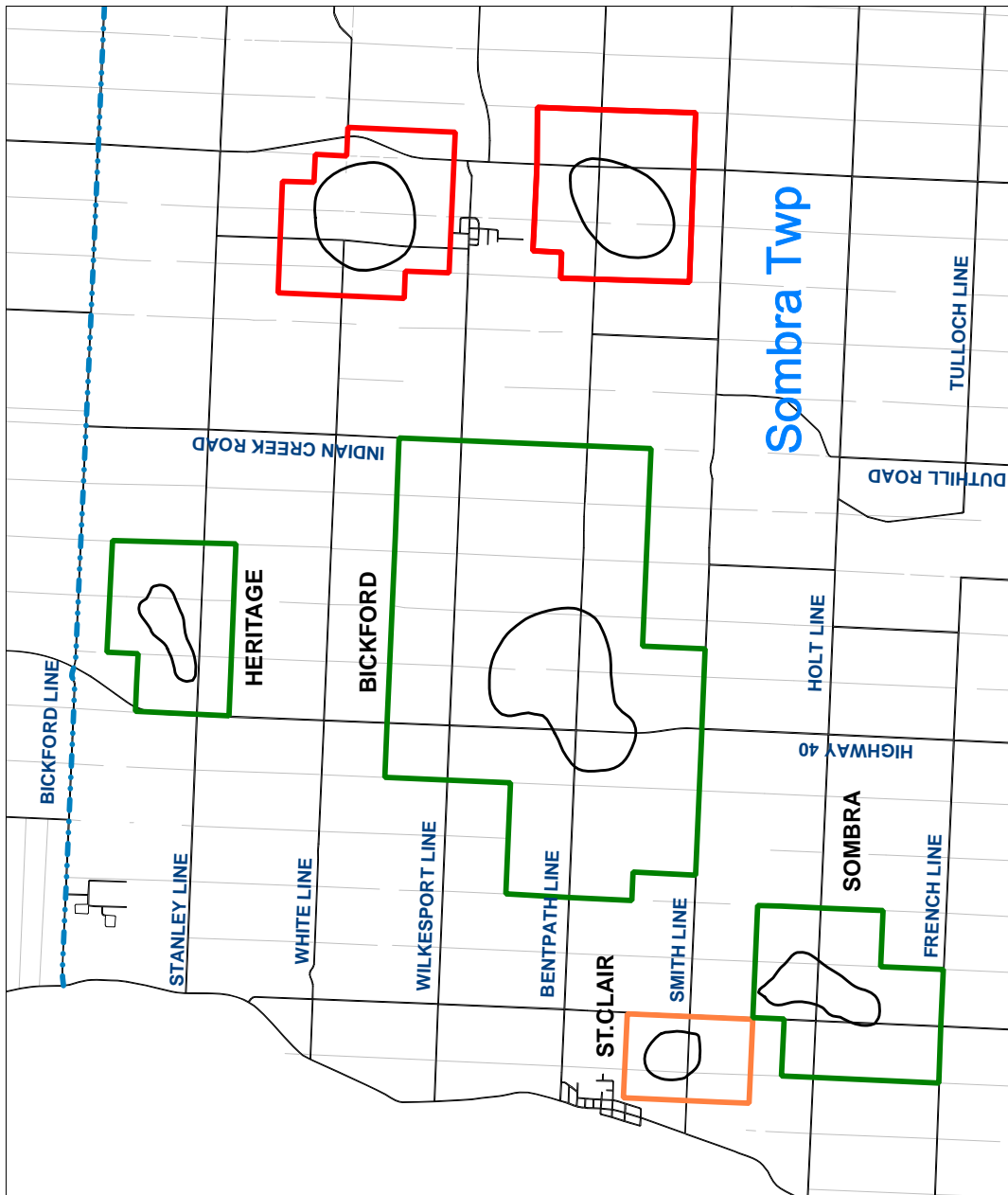
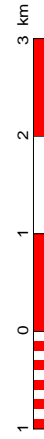
REMARKS		 uniongas GEOLOGY DEPARTMENT		
- VERTICAL EXAGGERATION = 5		OIL CITY POOL CROSS SECTION B-B'		
- B ANHYDRITE ASSUMED FOR UOC.1 & UOC.2				
- ROCHESTER THICKNESS OF 15m DERIVED FROM NEARBY REGIONAL				
WELLS.				
- REVISED - 8JUL14 - J. WILD				
		DRAWN BY	DATE	SCALE
		D.A.T.	25OCT00	AS SHOWN
		CHECKED BY	DATE	ADRAW CODE
		H.P.J.J.D.C.	27OCT00	OILX33B



LEGEND

- Township Boundaries
- Base of Gas
- DSA - Union Gas
- DSA - MHP
- DSA - Tecumseh Storage

SCALE



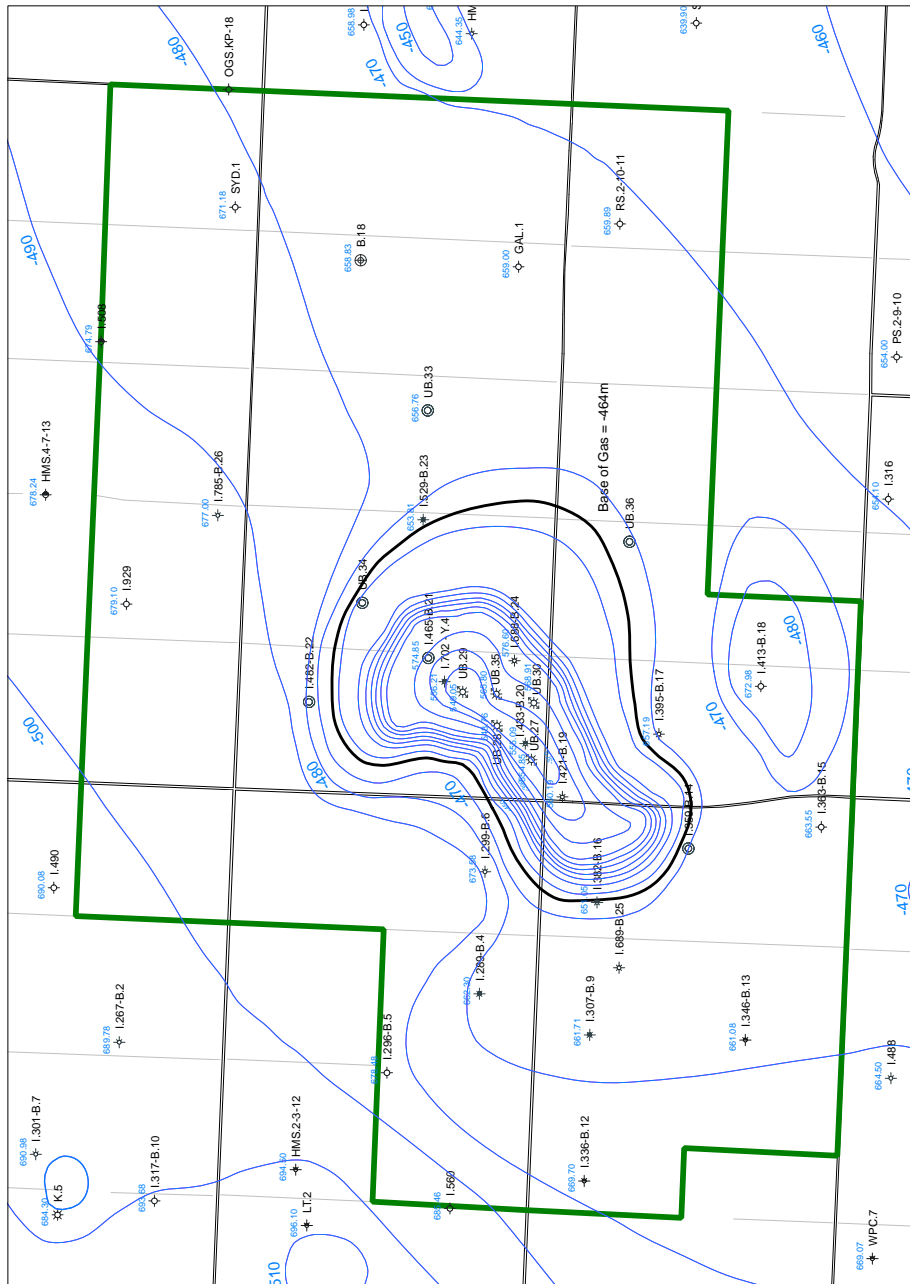
REMARKS	BICKFORD POOL		
LOCATION MAP			
DATE	2014	DATE	2014
PROJECT BY		PROJECT DATE	



LEGEND

- Guelph Contour
- 671.18 Guelph Subsea Elevation
- Base of Gas
- DSA - Union Gas
- ⊙ DRY HOLE, ABANDONED
- ⊙ GAS PRODUCER
- ⊙ GAS PRODUCER, ABANDONED
- ⊙ GAS PRODUCER, OIL SHOW, ABANDONED
- ⊙ GAS SHOW, ABANDONED
- ⊙ INJECTION WELL
- ⊙ NATURAL GAS STORAGE
- ⊙ OBSERVATION
- ⊙ OBSERVATION, ABANDONED
- ⊙ OIL SHOW, GAS SHOW, ABANDONED
- ⊙ OIL SHOW, ABANDONED

SCALE

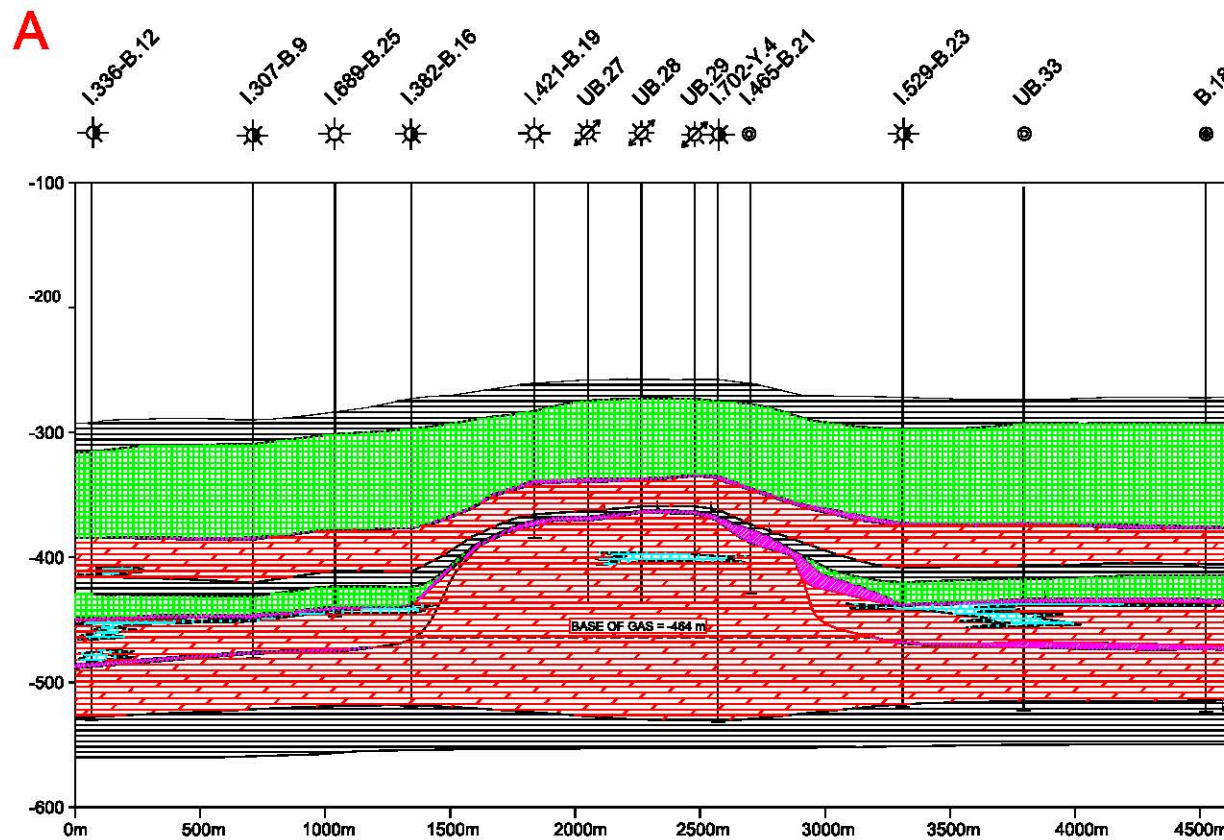


REMARKS

BICKFORD POOL

DEPTH TO CREST

DATE 2014
DRAWN BY AS SHCHVAL
CHECKED BY
PROJECT CODE



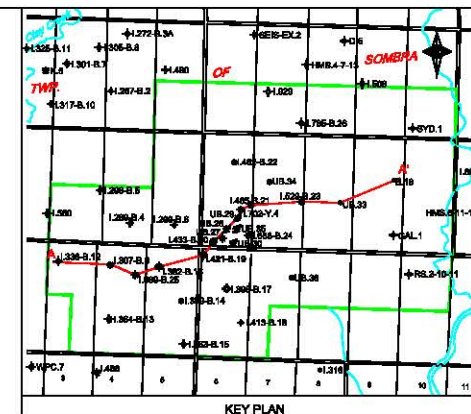
Subsea
Elevation

C UNIT SHALE

B UNIT SALT


B-ANHYDRITE
A-2 CARBONATE
A-2 SHALE
A-2 SALT
A-2 ANHYDRITE
A-1 CARBONATE
A-1 ANHYDRITE
GUELPH

ROCHESTER



LEGEND

- * GAS PRODUCER, ABANDONED
- * GAS PRODUCER, OIL SHOW, ABANDONED
- * OIL SHOW, GAS SHOW, ABANDONED
- * INJECTION/WITHDRAWAL
- OBSERVATION
- OBSERVATION, ABANDONED

REMARKS	 GEOLOGY DEPARTMENT		
- VERTICAL EXAGGERATION = 5X	BICKFORD POOL CROSS SECTION A-A'		
- MINOR AMTS LIMESTONE IN A-2 CARB (I.336-B.12, I.307-B.9, I.689-B.25), A-1 CARB (I.336-B.12, I.689-B.25, UB.33) AND GUELPH (UB. 28, UB.29)			
- CASING SET POINTS TO BE CONFIRMED BY DRILLING & COMPLETIONS			
- B. BAILEY LITHOLOGY LOGS USED FOR EST. OF LIMESTONE LOCATION			
- REVISED - 4JUL14 - J.WILD	DRAWN BY M. WILKEN	DATE 14APR82	SCALE AS SHOWN ADDRESS CODE BICKSAA