



uniongas

A Spectra Energy Company

May 12, 2009

BY COURIER & RESS

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

Dear Ms. Walli:

**Re: Union Gas Limited
Application for Order Varying Conditions of Approval
Board File # EB-2009-0144**

Enclosed please find two (2) copies of Union's Application for the above-noted project.

In the event you have any questions on the above or would like to discuss in more detail, please do not hesitate to contact me at 519-436-5457.

Sincerely,


for

Bill Wachsmuth
Senior Administrator, Regulatory Projects
:mjp
Encl.

cc: Neil McKay, Manager Facilities Applications
Giovanna Dragic, Senior Case Administrator

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 RP-1999-0047 Oil City Pool and Bluewater Pool and EBO 206 Bentpath East Pool relating to the allowable pressure gradient in these three natural gas storage pools in the City of Sarnia and Townships of Enniskillen and Dawn-Euphemia, in the County of Lambton;

UNION GAS LIMITED

1. Union Gas Limited ("Union") wishes to operate the following natural gas storage pools: Bentpath East Pool, Bluewater Pool and Oil City Pool, above 0.7 psi per foot as permitted under the CSA Standard Z341.1-06.
2. Union therefore applies for leave to operate the natural gas storage pools above the 0.7 psi per foot operating condition as set out in the Conditions of Approval issued in the following proceedings: EBO 206 (Bentpath East Pool) RP-1999-0047 (Oil City Pool and Bluewater Pool).

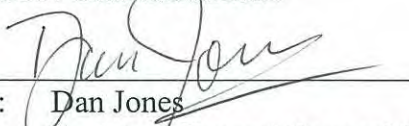
3. Union requests that the following condition be used to replace the existing condition:

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 geological study in support of any leave application

4. Attached as Schedule A is a map showing the general location of the three storage pools.
5. In order to meet the proposed in-service date, Union respectfully requests a Board Decision, no later than August 1, 2009.

Dated at the Municipality of Chatham-Kent, Ontario this 12th day of May, 2009.

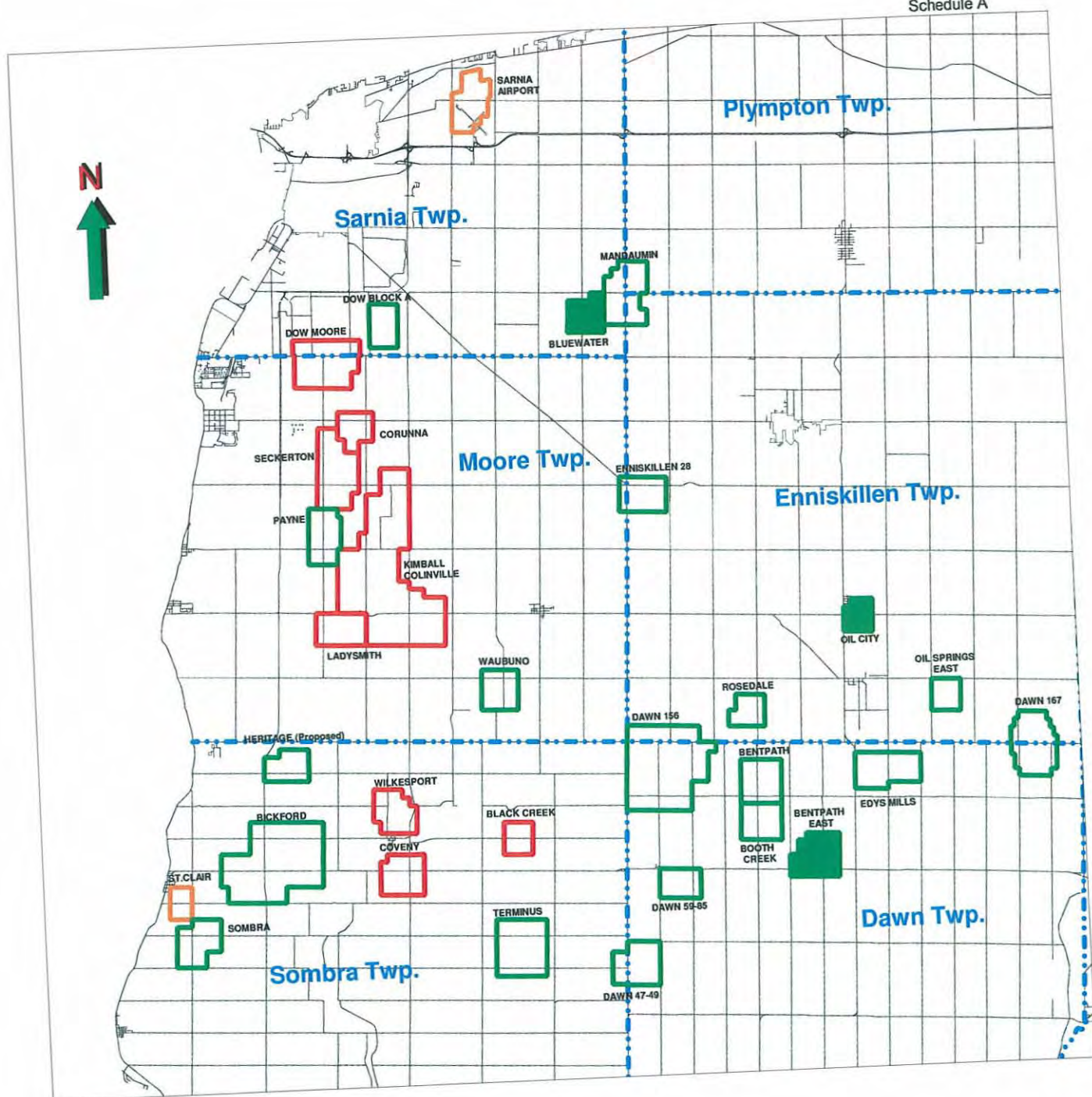
UNION GAS LIMITED

Per: 
Dan Jones
Assistant General Counsel Union Gas Limited

Comments respecting this Application should be directed to:

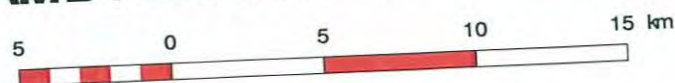
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- Union Gas Storage
- Enbridge Storage
- MHP Storage

LAMBTON COUNTY STORAGE



Vary Application

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BACKGROUND

1. In Ontario Energy Board (“Board”) proceedings RP-1999-0047 and EBO 206 [Oil City, Bluewater and Bentpath East “Pools”] a condition of approval that limited the operating pressure of the Pools to 15.8 kPa/m (0.7 psi per foot) of depth was attached to the Inject, Store, Remove Order. Attached as Schedule 1 is a table identifying the Pools, the document where this condition was imposed, and the exact wording of the condition in each case (“Conditions of Approval”).
2. At the time the pools were approved, the imposition of these limits on operating pressures reflected concerns of Board Staff about operating storage pools at higher pressure gradients.
3. Union applied to the Board in EB-2008-0038 for leave to vary similar conditions of approval for Enniskillen 28 (EBRM 95), Oil Springs East (EBRM 167), Payne (EBRM 98) and Dow A (EBRM 172) Pools. A Technical Conference was held on June 3, 2008 and a Decision from the Board was received on July 10, 2008. The conditions were removed and replaced with the following:

“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. Union is applying to the Board for leave to vary the Conditions of Approval, limiting the operating pressure it previously placed on Oil City, Bluewater and Bentpath East Pools and replacing them with the condition ordered by the Board in EB-2008-0038.
5. It is Union’s understanding that Board approvals require applicant’s to conform to CSA Z341.1-06 to the satisfaction of the Ministry of Natural Resources (“MNR”).
6. Technical information to satisfy the CSA requirements will be provided to the Petroleum Resources Section of the MNR.

7. Union proposes to increase the operating pressure of the Pools to increase their working capacity by $14,700 \text{ } 10^3 \text{ m}^3$. The capacity created will be used to meet the requirements of Union's customers such as power generators and marketers and specifically the needs of customers seeking storage services dealt with in Board decision EB-2005-0551 Natural Gas Electricity Interface Review ("NGEIR"). An economic study on the value of the proposed changes is not necessary.
8. 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 Z341.1-06. The Pools will continue to be operated in compliance with all required codes and regulations.
9. If this application is approved, Union will begin operating the Pools at higher pressure gradients during the 2009 injection season.
10. 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.
11. Union has notified landowners in the Pools. No concerns regarding these changes have been identified at the current time.
12. There are no environmental impacts as a result of the proposed changes in operating pressure.
13. Union is proposing to increase the pressures in these Pools by November 1, 2009. In order to meet this timetable, a Board Decision on Union's Application is respectfully requested by August 1, 2009.
14. Union will review and update operating procedures and Emergency Response Plans prior to operating the Pools at the increased pressure levels.
15. Emergency shut-down valves 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 Z341.1-06 Clause 9.3.
16. 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

17. Schedule 2 is a table summarizing the: minimum depth-to-crest, in-situ pressure limits and maximum formation operating pressure for each Pool.

Bentpath East Pool

18. The Bentpath East Pool was discovered in 1977 with the drilling of the Husky McClure Union, Dawn 1-27-VI well and was converted to natural gas storage in 1999. A location map showing the Bentpath East Pool in relation to the surrounding area is shown in Schedule 3. Currently, the Pool is operated and monitored using four injection/withdrawal wells and two observation wells. The Bentpath East Pool has a total capacity of $169,200 \times 10^3 \text{ m}^3$ and a working capacity of $125,100 \times 10^3 \text{ m}^3$. The Pool operates between a cushion pressure of 2,100 kPaa and a maximum pressure of 7,240 kPaa.
19. A map showing the Bentpath East Pool Designated Storage Area (“DSA”), Guelph structure and depth-to-crest is included at 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 90 m above the regional Guelph surface. The minimum depth-to-crest is established at 476.1 m.
20. A cross section illustrating the reef structure of the Bentpath East 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 25.0 to 27.4 m. The A2 Anhydrite overlying the crest of the reef ranges in thickness from 0.6 to 3.4 m.
21. In order to determine the maximum safe delta pressure limit for the Bentpath East Pool, tests were completed on the reservoir and caprock formations to determine threshold pressure, geomechanical strengths, and in-situ stresses. In addition, micro fracture testing was completed on reservoir and caprock formations in well UD.282 in the Dawn 156 Pool to

determine the local in-situ fracture pressure gradient for Silurian reefs in Lambton County. Results from these tests are summarized in Schedule 2.

22. Clause 7.6.2 (b) of CSA Z341.1-06 requires that “*The maximum operating pressure shall not exceed 80% of the fracture pressure of the caprock formation*”. Therefore the theoretical MOP of the storage zone according to code is a wellhead (“WH”) pressure of 8,901 kPaa (Schedule 2, Column G).
23. 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 Bentpath East Pool will receive new master valves and one well will be receiving a new wellhead. This work is scheduled to be completed prior to delta pressuring. No other upgrades to the wells or pipelines are required. The MOP of the physical facilities in the Pool is 8,719 kPaa WH.
24. Union is proposing to operate the Bentpath East Pool at 7,560 kPaa WH. This equates to a pressure gradient of 16.51 kPa/m. This will increase the working capacity from 169,200 10^3m^3 to 177,700 10^3m^3 which is an incremental capacity gain of 8,500 10^3m^3 .

Bluewater Pool

25. The Bluewater Pool was discovered in 1980 with the drilling of the Bluewater True et al Sarnia 5-3-II well and was converted to natural gas storage in 2000. A location map showing the Bluewater Pool in relation to the surrounding area is shown in Schedule 6. Currently, the Pool is operated and monitored using two injection/withdrawal wells and one observation well. The Bluewater Pool has a total capacity of 66,100 10^3m^3 and a working capacity of 53,300 10^3m^3 . The Pool operates between a cushion pressure of 2,100 kPaa and a maximum pressure of 9,390 kPaa.
26. A map showing the Bluewater 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 110 m above the regional Guelph surface. The minimum depth-to-crest is established at 625.3 m.

27. A cross section illustrating the reef structure of the Bluewater 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 29.0 to 51.0 m. The A2 Anhydrite overlying the crest of the reef ranges in thickness from 7.0 to 16.0 m.
28. In order to determine the maximum safe delta pressure limit for the Bluewater Pool, tests were completed on the reservoir and caprock formations to determine threshold pressure, geomechanical strengths, and in-situ stresses. In addition, micro fracture testing was completed on reservoir and caprock formations in well UD.282 in the Dawn 156 Pool to determine the local in-situ fracture pressure gradient for Silurian reefs in Lambton County. Results from these tests are summarized in Schedule 2.
29. Clause 7.6.2 (b) of CSA Z341.1-06 requires that “*The maximum operating pressure shall not exceed 80% of the fracture pressure of the caprock formation*”. Therefore the theoretical MOP of the storage zone according to code is a WH pressure of 11,519 kPaa (Schedule 2, Column G).
30. In addition, a review of well casings, wellheads, gathering pipelines, storage pipelines and related surface facilities was completed. As a result of this review, all wells in the Bluewater Pool will receive new master valves and one well will be receiving a new wellhead. This work is scheduled to be completed prior to delta pressuring. No other upgrades are required. The MOP of the facility is 10,028 kPaa WH.
31. Union is proposing to operate the Bluewater Pool at 9,780 kPaa WH. This equates to a pressure gradient of 16.51 kPa/m. This will increase the working capacity from 66,100 10^3m^3 to 69,300 10^3m^3 which is an incremental capacity gain of 3,200 10^3m^3 .

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 two observation wells. The Oil City Pool has a total capacity of $59,800 \times 10^3 \text{ m}^3$ and a working capacity of $45,800 \times 10^3 \text{ m}^3$. The Pool operates between a cushion pressure of 2,100 kPaa and a maximum pressure of 7,940 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 1.9 to 4.0 m.
35. In order to determine the maximum safe delta pressure limit for the Oil City Pool, tests were completed on the reservoir and caprock formations to determine threshold pressure, geomechanical strengths, and in-situ stresses. In addition, micro fracture testing was completed on reservoir and caprock formations in well UD.282 in the Dawn 156 Pool to determine the local in-situ fracture pressure gradient for Silurian reefs in Lambton County. Results from these tests are summarized in Schedule 2.
36. Clause 7.6.2 (b) of CSA Z341.1-06 requires that “*The maximum operating pressure shall not exceed 80% of the fracture pressure of the caprock formation*”. Therefore the theoretical MOP of the storage zone according to code is a WH pressure of 9,745 kPaa (Schedule 2, Column G).
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, all wells in the Oil City Pool will receive new master valves, two wells will be receiving new wellheads and one will be relined with a smaller diameter casing. This work is scheduled to be completed prior

to delta pressuring. No other upgrades are required. The MOP of the physical facilities constructed in the Pool is 8,718 kPaa WH.

38. Union is proposing to operate the Oil City Pool at 8,280 kPaa WH. This equates to a pressure gradient of 16.51 kPa/m. This will increase the working capacity from 59,800 10^3m^3 to 62,800 10^3m^3 which is an incremental capacity gain of 3,000 10^3m^3 .

LANDS ISSUES

39. Union implemented a landowner consultation and notification program to inform the landowners and the LCSA about the proposed changes in operating pressure in the Pools.
40. Union has attempted to contact all individuals in these Pools to explain the proposed changes to them.
41. Union also contacted members of the executive of the LCSA to explain the proposed changes to them.
42. During this consultation process, no significant issues in regard to the change in operating pressures were identified.
43. Union will continue to meet with landowners in these Pools and the LCSA to address the concerns that have been identified and any new issues that may be brought forward.

**2009 Storage Enhancement Project
Pressure Gradient Conditions**

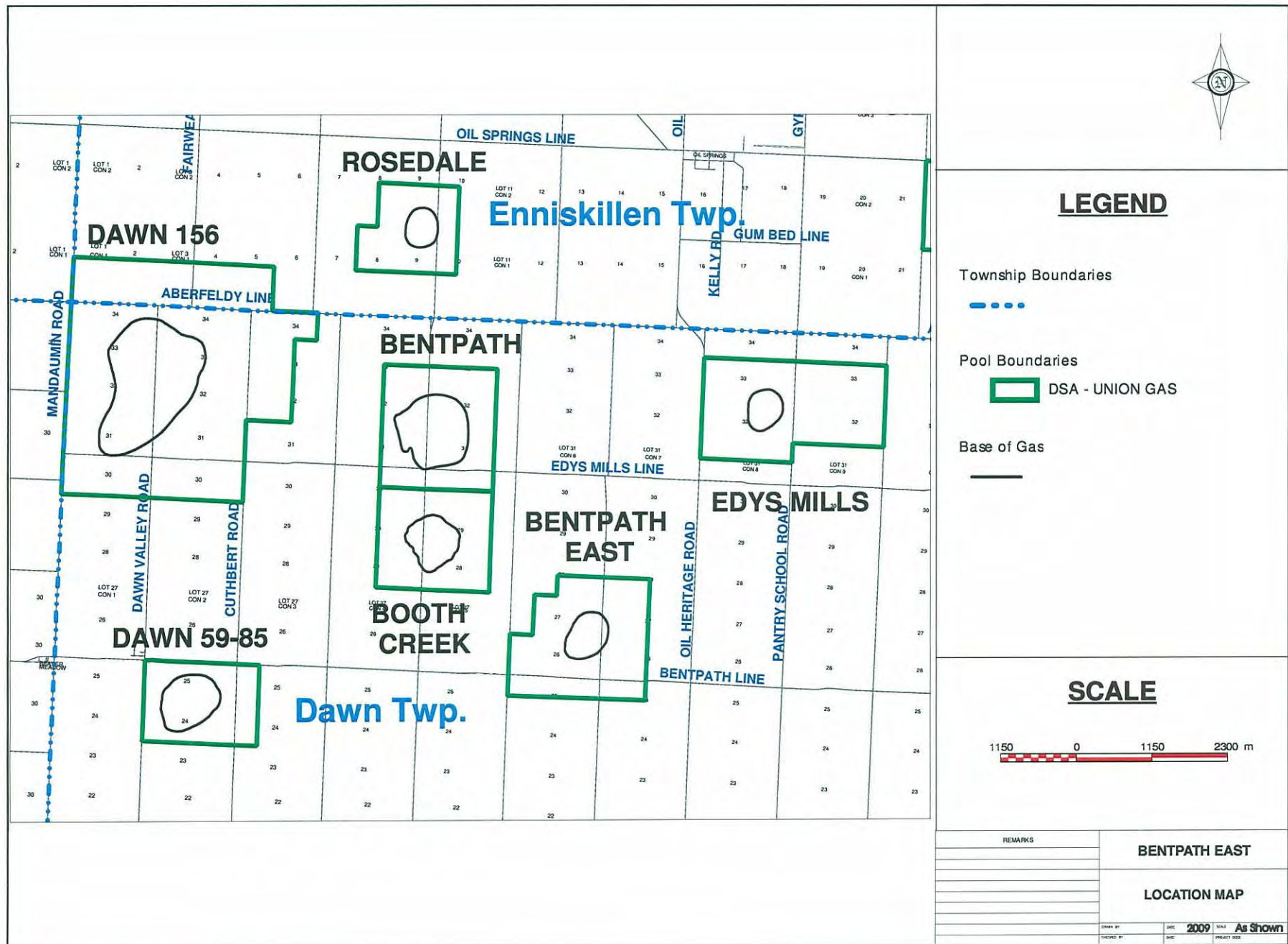
Pool	Order	Condition
Bentpath East	EBO 206 (1998) Century Pools Phase I Condition 2 of the Inject Store Remove Order	Union shall not operate the Bentpath East Pool above a pressure representing a pressure gradient of .7 psi per ft. depth (15.9 kPa/m) without leave of the board. Union shall support any leave application with an engineering, geological and economic study showing that the greater pressures are safe and in the public interest.
Bluewater	RP-1999-0047 (2000) Century Phase II Condition 2 Inject Store Remove Order	Union shall not operate the Bluewater Pool above a pressure representing a pressure gradient of .7 psi per ft. depth (15.9 kPa/m) without leave of the board. Union shall support any leave application with an engineering, geological and economic study showing that the greater pressures are safe and in the public interest.
Oil City	RP-1999-0047 (2000) Century Phase II Condition 2 Inject Store Remove Order	Union shall not operate the Oil City Pool above a pressure representing a pressure gradient of .7 psi per ft. depth (15.9 kPa/m) without leave of the board. Union shall support any leave application with an engineering, geological and economic study showing that the greater pressures are safe and in the public interest.

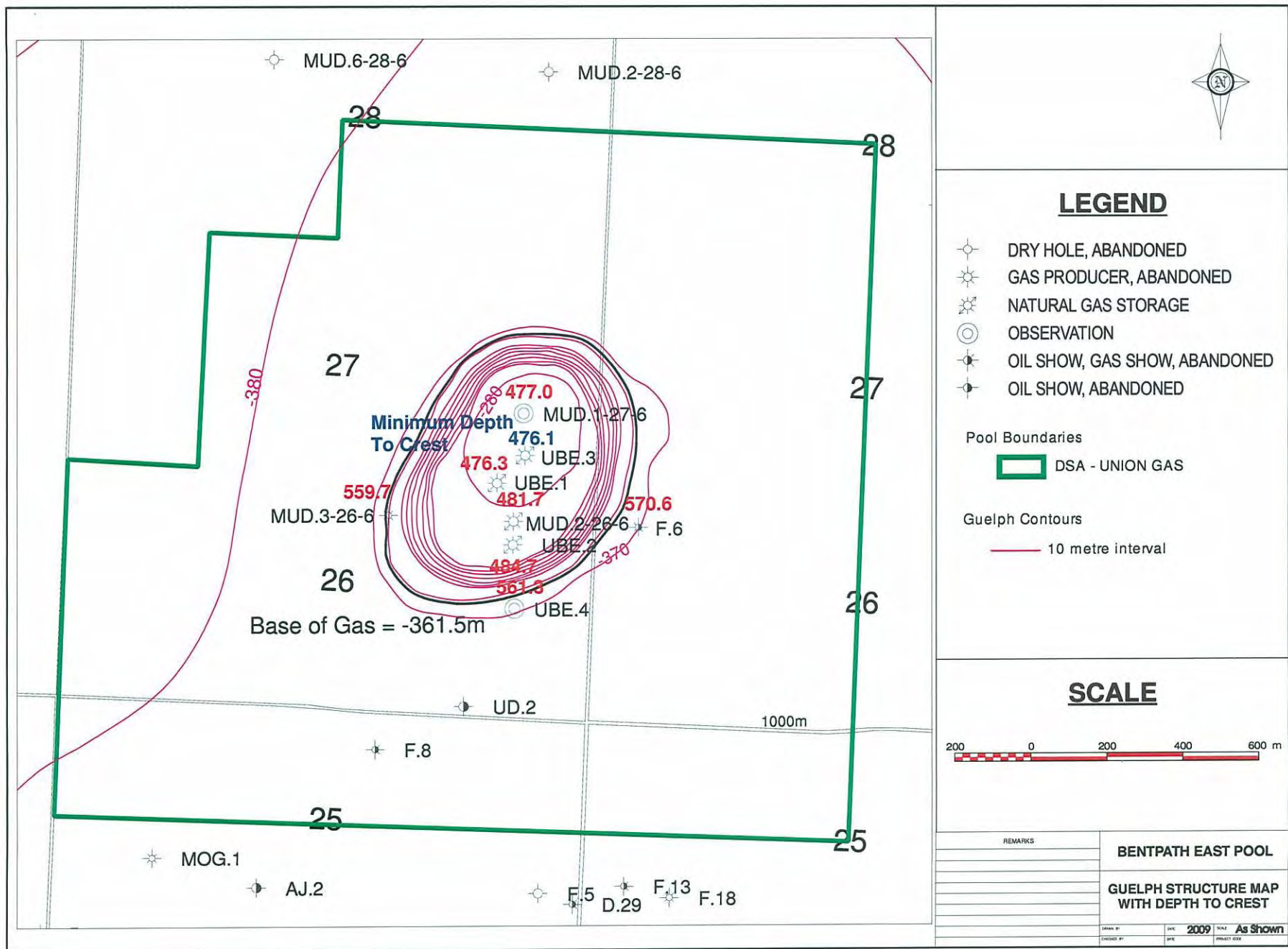
2009 Storage Enhancement Project Pressure and Strength Summary

(A)	(B)	(C)	(D)	(E)	(F)	(G)	
Pool	Minimum Depth-to-Crest ⁽¹⁾	In-situ Compressive Strength ⁽²⁾	In-situ Shear Strength ⁽²⁾	Threshold Pressure ⁽³⁾	Fracture Closure Pressure ⁽⁴⁾	Maximum Formation Operating Pressure ⁽⁵⁾	
	(m)	(kPa)	(kPa)	(kPa)	(kPa)	(kPaa)	(kPaa WH)
Bentpath East	476.1	213,196	36,084	14,663	11,584	9,267	8,901
Bluewater	625.3	188,367	31,689	26,925	15,214	12,171	11,519
Oil City	523.7	151,773	29,576	21,830	12,742	10,193	9,745

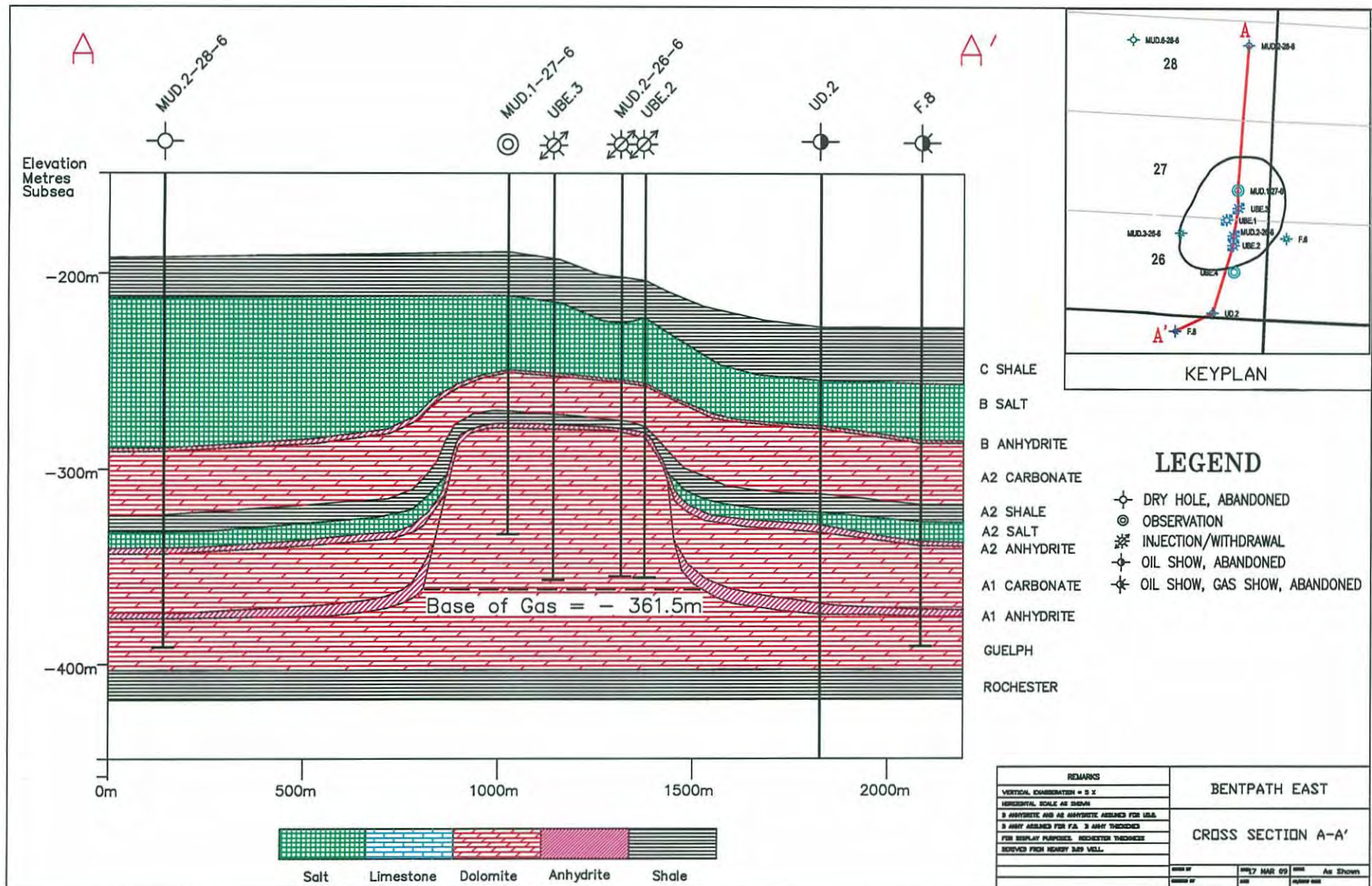
Notes:

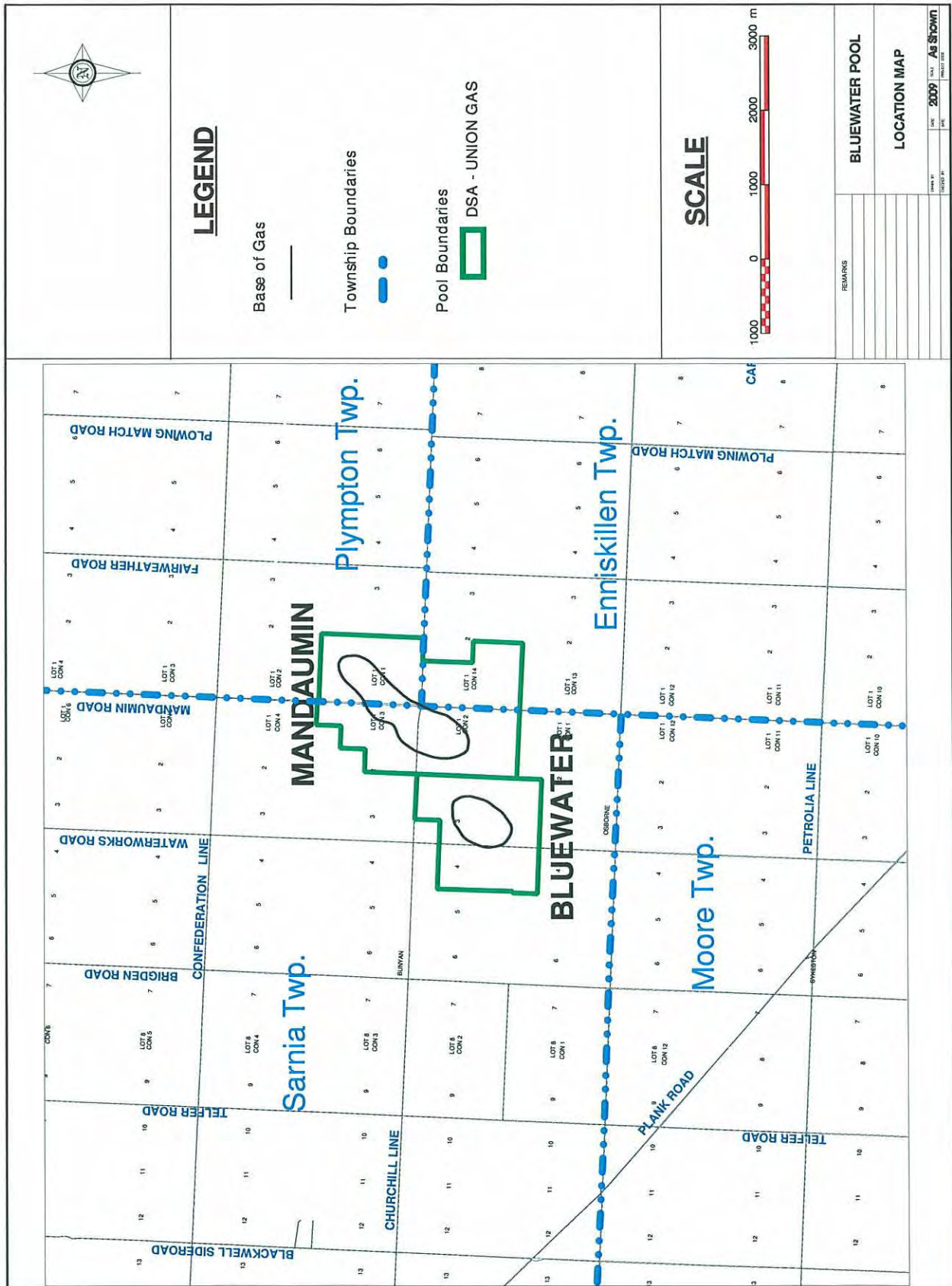
- 1) Minimum Depth to Crest (B) measured to the top of the Guelph Formation.
- 2) In-situ Compressive and Shear Strengths (C and D) are based on triaxial and unconfined compressive tests and Mohr-Coulomb failure analyses.
- 3) Threshold Pressure (E) based on core testing.
- 4) Fracture Closure Pressure (F) derived from applying the minimum gradient of 24.33 kPa/m determined from the micro fracture testing completed in Dawn 156 Pool well UD.282.
- 5) Maximum Formation Operating Pressure (G) for Bentpath East, Bluewater and Oil City are limited to 80% Fracture Closure Pressure (F) (per CSA Z341.1-06).
- 6) All pressures are bottom-hole reservoir pressures unless otherwise specified.

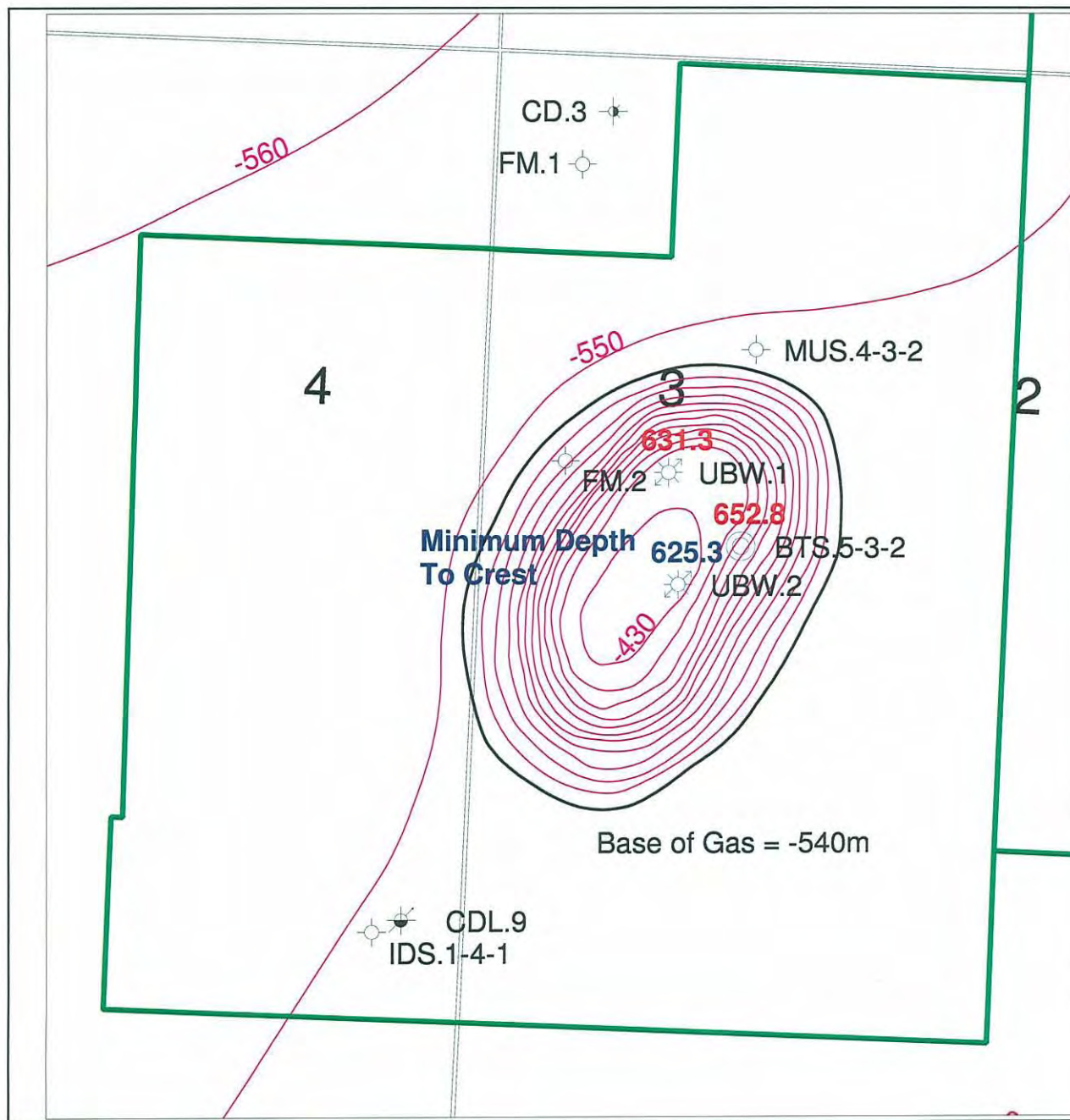




EB-2009-0144
Schedule 4







LEGEND

- DRY HOLE, ABANDONED
- NATURAL GAS STORAGE
- OBSERVATION
- OIL SHOW, GAS SHOW, ABANDONED
- BRINE WELL, ABANDONED

Pool Boundaries

DSA - UNION GAS

Guelph Contours

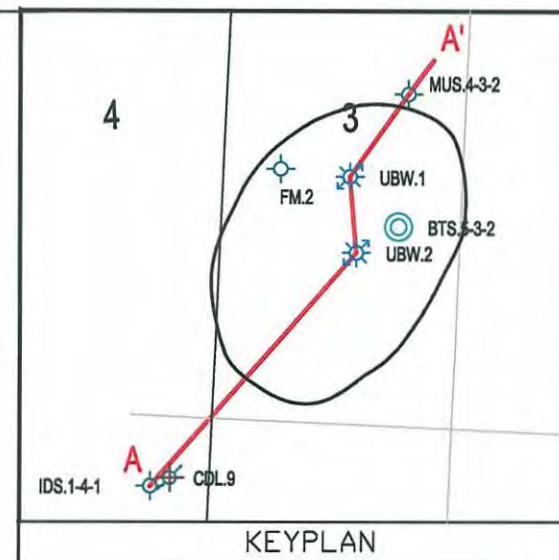
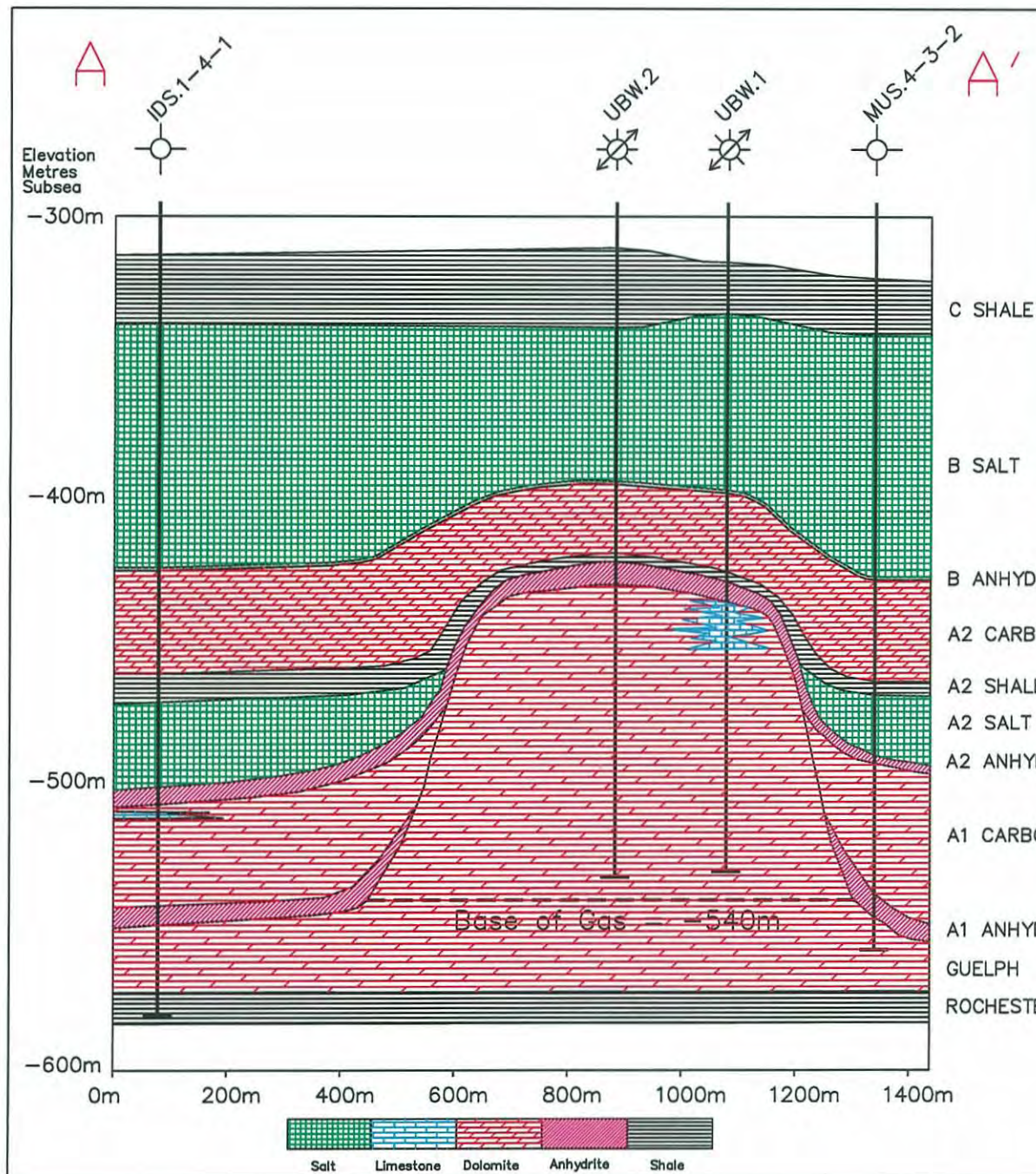
10 metre interval

SCALE



REMARKS	BLUEWATER POOL			
	GUELPH STRUCTURE MAP WITH DEPTH TO CREST			
	DRAWN BY	DATE	SCALE	As Shown
	CHECKED BY	DATE	PROJECT CODE	

EB-2009-0144
Schedule 7

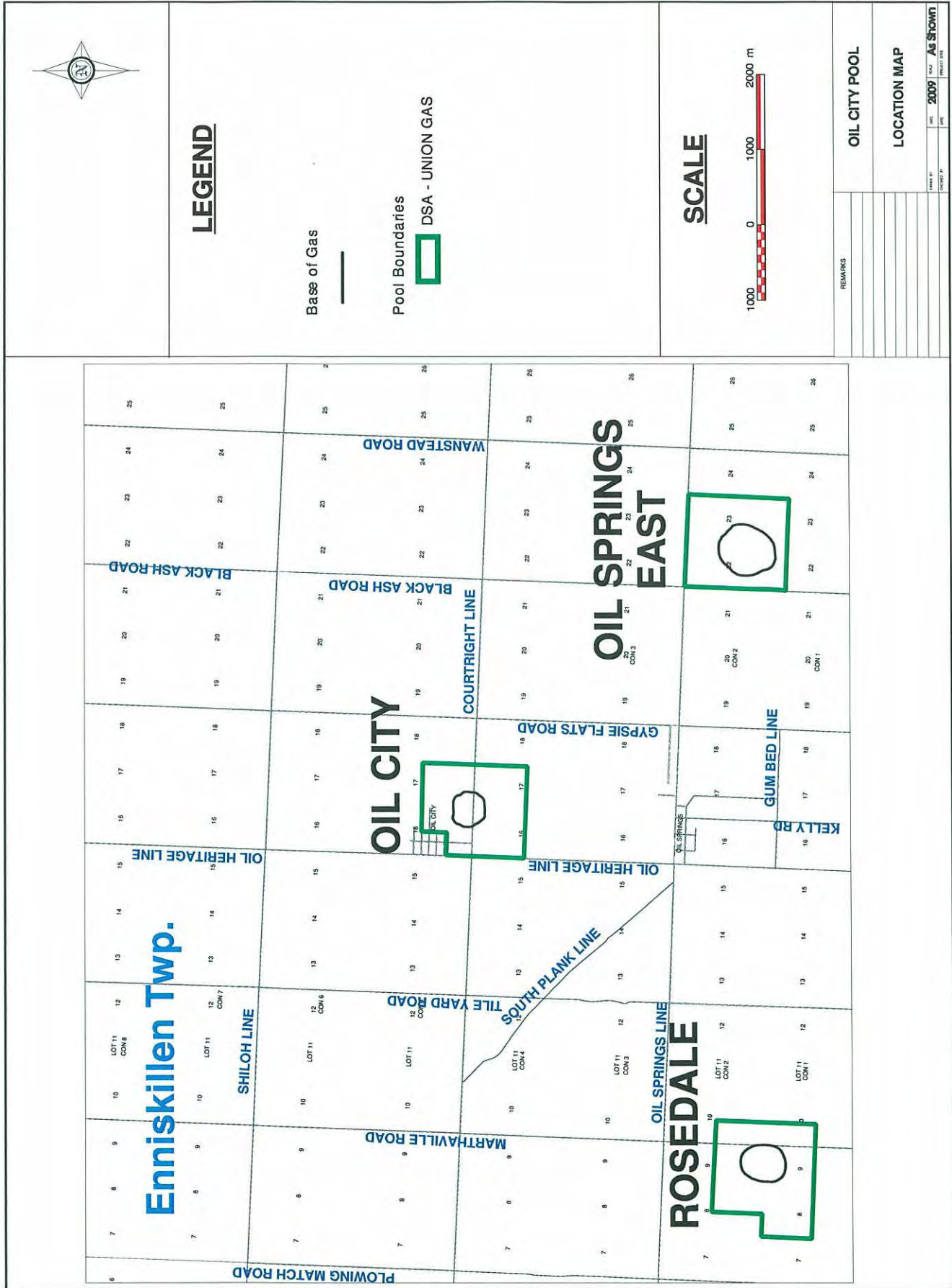


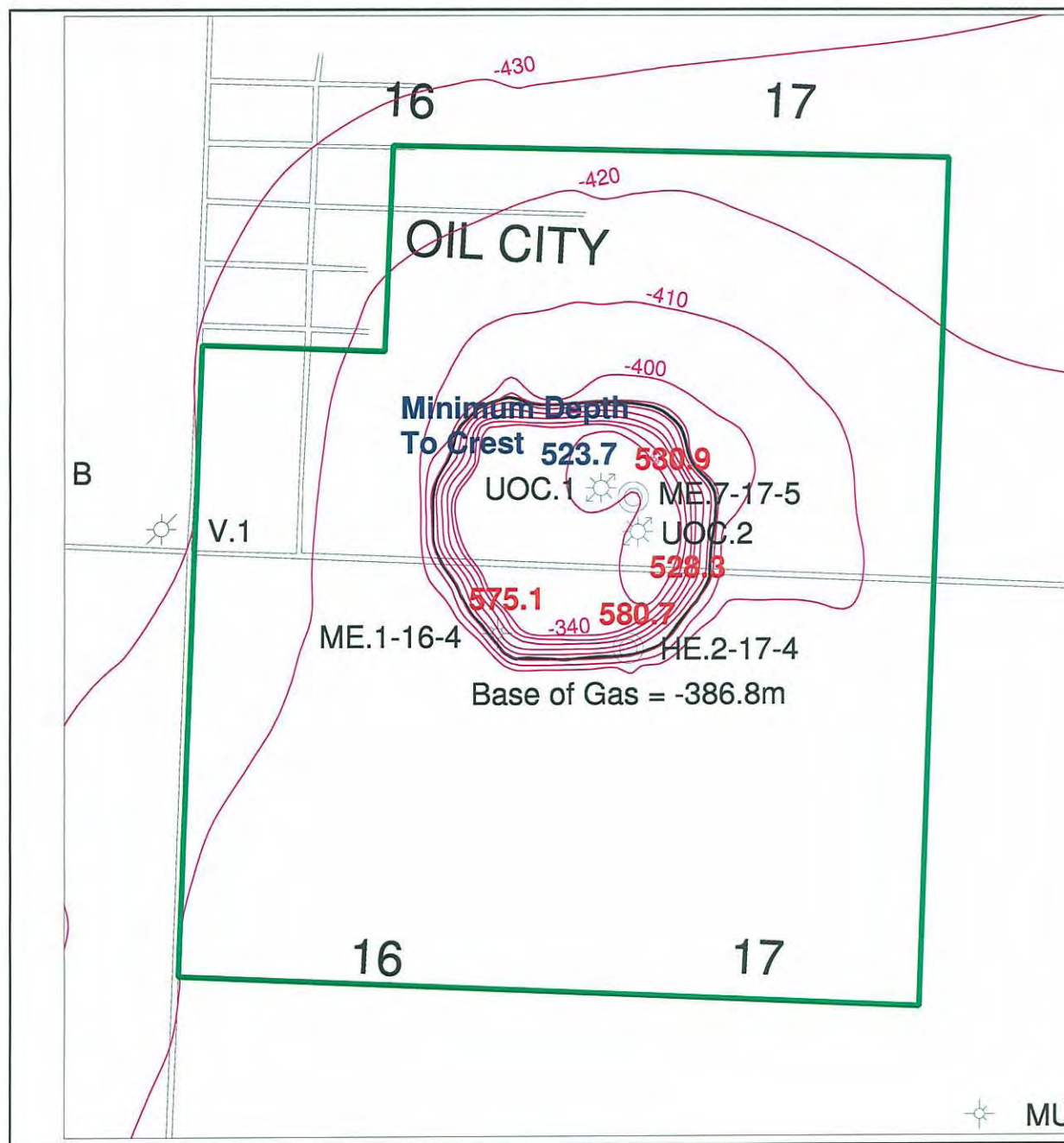
LEGEND

INJECTION/WITHDRAWAL

DRY HOLE, ABANDONED

REMARKS		BLUEWATER POOL	
VERTICAL EXAGGERATION = 5			
B ANHYDRITE ASSUMED 1m FOR ALL WELLS		CROSS SECTION A-A'	
DATE	REV	DATE	REV





LEGEND

- DRY HOLE, UNKNOWN
- GAS PRODUCER, ABANDONED
- GAS SHOW, ABANDONED
- NATURAL GAS STORAGE
- OBSERVATION

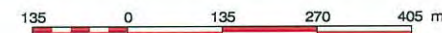
Pool Boundaries

DSA - UNION GAS

Guelph Contours

10 metre interval

SCALE



REMARKS	OIL CITY POOL			
	GUELPH STRUCTURE MAP WITH DEPTH TO CREST			
	DESIGNED BY	DATE	2009	SCALE As Shown
	CHECKED BY	DATE		PROJECT NO.

