



June 19, 2007
WL07-1291

1300382 Alberta Ltd.
c/o Joe and Helen Doef
Site 1, Box 14, RR #3
Lacombe, Alberta
T4L 2N3

Attention: Joe and Helen Doef

Dear Mr. and Mrs. Doef:

RE: PHASE 1 GROUNDWATER POTENTIAL STUDY, WITHIN SW-14-041-28-W4M, FOR A PROPOSED 100-LOT RESIDENTIAL SUBDIVISION DEVELOPMENT NEAR GULL LAKE, ALBERTA

INTRODUCTION

Waterline Resources Inc. (Waterline) is pleased to present the results of a Phase I groundwater potential study for a proposed 100-lot residential subdivision (the Site) to be located within the SW-14-041-28-W4M, approximately 7 KM north of the community of Gull Lake, Alberta along the east shore of Gull Lake. The Site location is shown on Figure 1.

Information sources reviewed as part of the study included the Alberta Environment (AENV) Provincial Water Well Database (2007), the AENV Authorization/Approvals Viewer Database (2007), The Groundwater Centre's (TGWC) Database (2007) and relevant and readily attainable published geology and hydrogeology maps and reports.

INVESTIGATION GUIDELINES

This study was completed in general accordance with the 1994 AENV publication "interim Guidelines for the Evaluation of Groundwater Supply for Unserviced Residential Subdivisions Using Privately Owned Domestic Water Wells". These guidelines are recommended for use for unserviced residential subdivisions where the water supply will be provided by privately owned domestic water wells and, where the number of residential parcels within one quarter section is six or more.

As stated in the guidelines, the principle of sustainable development should guide the utilization of groundwater resources. Specifically, the guidelines state that: "the threat of groundwater shortages and contamination grows with the density of wells and their collective demand on the local groundwater resources". The guidelines also state that as a component of a General Municipal Plan, groundwater availability could be mapped and used as criteria for locating future unserviced residential subdivisions. In any area, continued development of the groundwater

resource can ultimately exceed recharge of the aquifers causing groundwater mining, which can result in a lowering of groundwater levels. A regional assessment would have to be completed by/for regulatory authorities in order to assess these impacts on the aquifer system. The results of this type of study should be adopted into groundwater management criteria for future use in locating and managing other developments within the County. This philosophy has been incorporated into the Act, which came into force January 1, 1999. The Water Act sets up the framework for the future development of "Water Management Plans" within defined watersheds. This approach is also consistent with AENV's move to a wellhead protection and integrated watershed management philosophy.

Section 23 (3) which states that a person residing within a subdivision on a parcel of land has the right to commence and continue the diversion of water only if *"a report certified by a professional engineer, professional geologist or professional geophysicist, as defined in the Engineering, Geological and Geophysical Professions Act, was submitted to the subdivision authority as part of the application for subdivision under the Municipal Government Act, and the report states that the diversion of 1,250 cubic metres of water per year for household purposes under section 21 for each of the households within the subdivision will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved."*

Relevant to the proposed development in the subject area, the Act specifies that the diversion of 1,250 m³/year per household (household use as defined in the Act) for the proposed new undeveloped lot should not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved. Therefore, the objective of this study is to render a professional opinion, based on a review of readily available information, whether aquifers underlying the proposed 100 undeveloped lots at the Site can sustain production of 125,000 m³/year (1,250 m³/year/lot x 100 lots), equivalent to continuous production of approximately 52.3 Imperial gallons per minute (lgpm), and whether managed diversion of that groundwater will negatively impact existing users of the groundwater resource, as defined in the Act.

Waterline's opinion presented herein is based on the assumption that existing domestic users in the area, and users proposed at the Site will utilize less than or equal to 1,250 m³/year/lot obtained at a daily rate of less than or equal to 3.43 m³/day/lot (1,250 m³/year/lot ÷ 365 days), or 753 imperial gallons per day per lot. The 1994 AENV publication "Interim Guidelines For The Evaluation Of Groundwater Supply For Unserved Residential Subdivisions Using Privately Owned Domestic Water Wells" indicates that residential water needs are estimated to be 0.23 - 0.68 m³/day/person (50 - 150 imperial gallons per day per person). Therefore, a water consumption limit of 3.43 m³/day/lot is considered conservative for an average family.

GEOLOGY

The surficial geology of the general Site area has two distinctive types of materials. On the east side of the Site, surficial materials are mapped as stagnation moraine consisting of till with an uneven thickness, local water-sorted material, undulating topography with a local relief of generally less than 3 m and unconsolidated materials up to 30 m thick (Shetsen, 1990). On the

west side of the Site surficial materials are defined as coarse sediments and comprise sand and silt with an undulating surface in places which are modified by wind (Shetsen, 1990).

Bedrock beneath the Site is mapped as the Upper and Lower Lacombe Members underlain by the Haynes Member, of the Paskapoo Formation, which consists of sandstone, shale, siltstone and minor coal (HCL, 2001 and Le Breton, 1971). The Paskapoo Formation is underlain by the Upper and Lower Scollard Formations underlain by the Upper and Middle Horseshoe Canyon Formations, respectively (HCL, 2001). A downward succession of bedrock tops for the Site is presented in Appendix A as produced by TGCW (2007) website.

Figure 2 presents a hydrogeologic cross-section orientated approximately southwest - northeast extending through the general Site area. The surface trace of the cross-section location is shown on Figure 1. The cross-section includes soil and bedrock stratigraphy data obtained from four water wells completed adjacent to the Site area (AENV Well ID No. 0281245, 0287486, 0296824 and 0152894). Copies of the completion records for the water wells used to construct the cross-section are provided for reference in Appendix A.

The geology recorded on water well completion records listed in the AENV water well database for the general area is consistent with the regional geologic mapping, and is logged mainly as clay/sand/gravel, underlain by layers of shale and sandstone.

HYDROGEOLOGY

AENV Database

The AENV (2007) and TGWC (2007) water well databases each list forty-three (43) water well records within approximately a 1.0 km radius from the centre of SW-14-041-28-W4M. Of the records listed, only a subset typically represents water wells currently in operation. Information for all records is summarized in Table A1 in Appendix A. The records indicate that present groundwater use in the area is primarily for domestic consumption, with lesser use for industrial and other purposes (TGWC, 2007).

Further to the AENV water well drilling reports, the Alberta Environment Authorization/Approval Viewer (2007) database lists one (1) active registration within approximately 1 km of the proposed Site development. The registration listing the details of the water diversion license is included in Appendix A.

Well Completion Depth and Static Water Level

Water wells in the greater study area, appear to be completed within 18 to 283 m (60 to 930 ft) below ground level (bGL), with a calculated average depth of 51 m (168 ft) bGL (AENV, 2007), primarily in the Upper and Lower Lacombe Members of the Paskapoo Formation (TGWC, 2007). Static water levels, measured in wells following construction, ranged from 4 to 46 m (13 to 151 ft) bGL, with a calculated average static water level depth of 14 m (46 ft) bGL.

Aquifer Depth and Well Yield

The main water bearing units developed for local water supplies in and surrounding the SW-14-041-28-W4M appear to be in interbedded sandstones of the Upper Lacombe Member of the Paskapoo Formation (HCL, 2001). The safe yields of wells in the vicinity of the Site are mapped as 22.7 to 114 L/min (5 to 25 lgpm) (Le Breton, 1971). The range of average expected yield is based on quantitative and qualitative information such as pumping and bail tests, flow regime and lithology (Le Breton, 1971).

Limited duration well tests, completed by the drillers following construction, on wells located within approximately a 1 km radius from the centre of SW-14-041-28-W4M, have been conducted in the range of 14 to 182 L/min (3 to 40 lgpm), with a calculated average test rate of 72.7 L/min (16 lgpm). TGWC (2007) groundwater potential report for the Site indicates that 28 L/min (5 lgpm) can be produced from the Upper Lacombe Member where nearly all wells for the search area are completed. TGWC report is presented in Appendix A. The well tests and TGWC groundwater potential report appear to indicate that the single well yields are generally within and towards the lower end of the range of safe yields mapped by Le Breton (1971).

Groundwater Quality

Based on a review of AENV (2007) groundwater chemistry reports the regional groundwater quality in the area is mapped as having a total dissolved solids (TDS) concentration ranging between 474 and 777 mg/L, with cations dominated by sodium and anions dominated by bicarbonate. Five (5) AENV (2007) water quality reports for groundwater samples collected from wells located within a 1 km radius of the Site area were reviewed (refer to Table A1 in Appendix A). The chemistry reports are included for reference in Appendix B. Where multiple chemistry reports are listed for a single water well only one was reviewed.

Table 1 presents the dominant laboratory-tested parameter concentrations analyzed from groundwater samples collected from 5 water wells located within or near the Site. In addition, Table 1 also presents the applicable Guidelines for Canadian Drinking Water Quality (GCDWQ) (Health Canada, 2007).

Table 1: Summary of Dominant Chemical Parameters for Selected Area Wells (AENV Database, 2007)

PARAMETER	Well ID# 0275024	Well ID# 0280612	Well ID# 0275006	Well ID# 0275018	Well ID# 0275023	GCDWQ (2007)
Date Sampled	7/8/1981	6/23/1974	9/20/1981	6/7/1982	4/22/1985	N/A
pH	NT	NT	NT	NT	NT	6.6-8.5 AO
Electrical Conductivity uS/cm	1,084	1,300	1,300	824	1,052	N/A
Total Dissolved Solids (TDS) mg/L	<u>719</u>	<u>694</u>	<u>777</u>	474	625	≤ 500 AO
Bicarbonate (HCO ₃)	571	583	599	444	466	N/A

PARAMETER	Well ID# 0275024	Well ID# 0280612	Well ID# 0275006	Well ID# 0275018	Well ID# 0275023	GCDWQ (2007)
mg/L						
Sulphate (SO ₄) mg/L	143	119.	170	55	130	≤ 500 AO
Chloride (Cl) mg/L	1	5	1	1	1	≤ 250 AO
Fluoride (F) mg/L	0.2	1.2	0.2	0.3	1.1	1.5 MAC
Calcium (Ca) mg/L	13.0	38.9	1.0	8.0	1.0	N/A
Magnesium (Mg) mg/L	5.0	4.0	3.0	3.0	1.0	N/A
Sodium (Na) mg/L	<u>259</u>	<u>234</u>	<u>288</u>	174	<u>245</u>	≤ 200 AO
Total Iron (Fe) mg/L	<u>0.58</u>	0.30	0.11	0.20	0.05	≤ 0.3 AO
Total Manganese (Mn) mg/L	NT	NT	NT	NT	NT	≤ 0.05 AO
Nitrate-N mg/L	NT	0.10	NT	NT	NT	10 MAC
Nitrite-N mg/L	0.05	0.10	0.05	0.05	0.05	1 MAC
Notes: Underlined and bolded values indicate exceedance of the GCDWQ (2007) with AO – aesthetic objective or MAC – maximum acceptable concentration, N/A is not applicable, NT indicates parameter was not tested.						

Estimated Groundwater Allocation

If it is assumed that each of the 43 well records within the study area service single family dwellings, and that each family utilizes their full 1,250 m³/yr water allocation, and that the active groundwater registration is allotted 6,250 m³/yr, then the water utilization within a 1 km radius from the centre of the Site area represents approximately 164.4 m³/day (25.1 lgpm). The proposed 100 lots require an additional groundwater allocation of 342.5 m³/day (52.3 lgpm). The total groundwater allocation required to service the proposed 100 lots and the existing users would be 506.9 m³/day (77.4 lgpm).

CONCLUSIONS AND RECOMENDATIONS

- Information available from published reports and from the AENV (2007) and TGWC (2007) databases indicates that the majority of wells completed in the study area are generally not deeper than 100 m (330 ft) bGS, and are completed in the Upper Lacombe Member of the Paskapoo Formation.
- Based on the available data reviewed during this study, the groundwater quality in the Site area appears to present TDS concentrations ranging between 474 and 777 mg/L, and is a sodium bicarbonate dominant water. This evaluation is based on limited available chemistry information. Site specific detailed water quality analysis would be required to confirm groundwater quality from aquifers underlying the Site.

- The sustainable yield from wells completed in bedrock within the general study area is mapped as 22.7 to 114 L/min (5 to 25 lpm). Based on well records in the AENV (2007) database, the average yield from wells located within a 1 km radius from the centre of SW-14-041-28-W4M, are calculated at 72.7 L/min (16 lpm). The well tests indicate that the bedrock single well yields fall generally within and towards the lower range of safe yields mapped by Le Breton (1971).
- Although the groundwater potential assessment appears to indicate that the required groundwater allocation of 342.5 m³/day (52.3 lpm) can be developed from multiple wells within the proposed development, the impact to existing users can not be quantified based on existing information. In order to confirm the groundwater resource development potential for the Site an aquifer testing and observation field program, as well as field verification of existing groundwater utilization is required.
- Waterline's conclusion is based on the assessment of potential impacts on local aquifers while only considering present resource utilization and utilization proposed for the subject development.

CLOSURE

The present study should be combined with the results of any future site-specific hydrogeological investigations, should they be completed, to gain a more complete understanding of the site-specific aquifer conditions underlying the study area. This will allow for the results of the present study to be updated, as necessary, and will serve to promote groundwater resource management and protection in the area for current and future users.

The findings presented in this report are based upon a review of published maps and reports, and information available from the AENV water well database. This report is intended for use in support of the application for subdivision under the Municipal Government Act, and should not be considered as a Water Management Plan or as a Phase 1 Environmental Site Assessment.

It should be noted that Waterline does not employ health care professionals, and any health related questions with regards to water quality should be discussed with the local health authority.

The enclosed study has been carried out in accordance with generally accepted hydrogeological practices. No other warranty is intended or implied.

PHASE I GROUNDWATER POTENTIAL STUDY
Proposed 100-Lot Residential Subdivision Development
SW-14-041-28-W4M, Near Gull Lake, Alberta
1300382 Alberta Ltd.

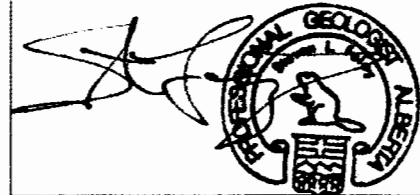
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Respectfully submitted

Waterline Resources Inc.
APEGGA Permit To Practice No. P07329



Chris Dobson, MSc., Geol.I.T.
Project Hydrogeologist



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Principal Hydrogeologist

REFERENCES

Alberta Environment, June 27, 1994. Interim Guidelines For The Evaluation Of Groundwater Supply For Unserved Residential Subdivisions Using Privately Owned Domestic Water Wells. LUB FILE: 3000-G1-W1.

Alberta Environment Authorization/Approvals Viewer Database, 2007. Government of Alberta.

Alberta Environment Provincial Water Well Database, 2007. Government of Alberta.

Guidelines for Canadian Drinking Water Quality, 2007. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment, Health Canada.

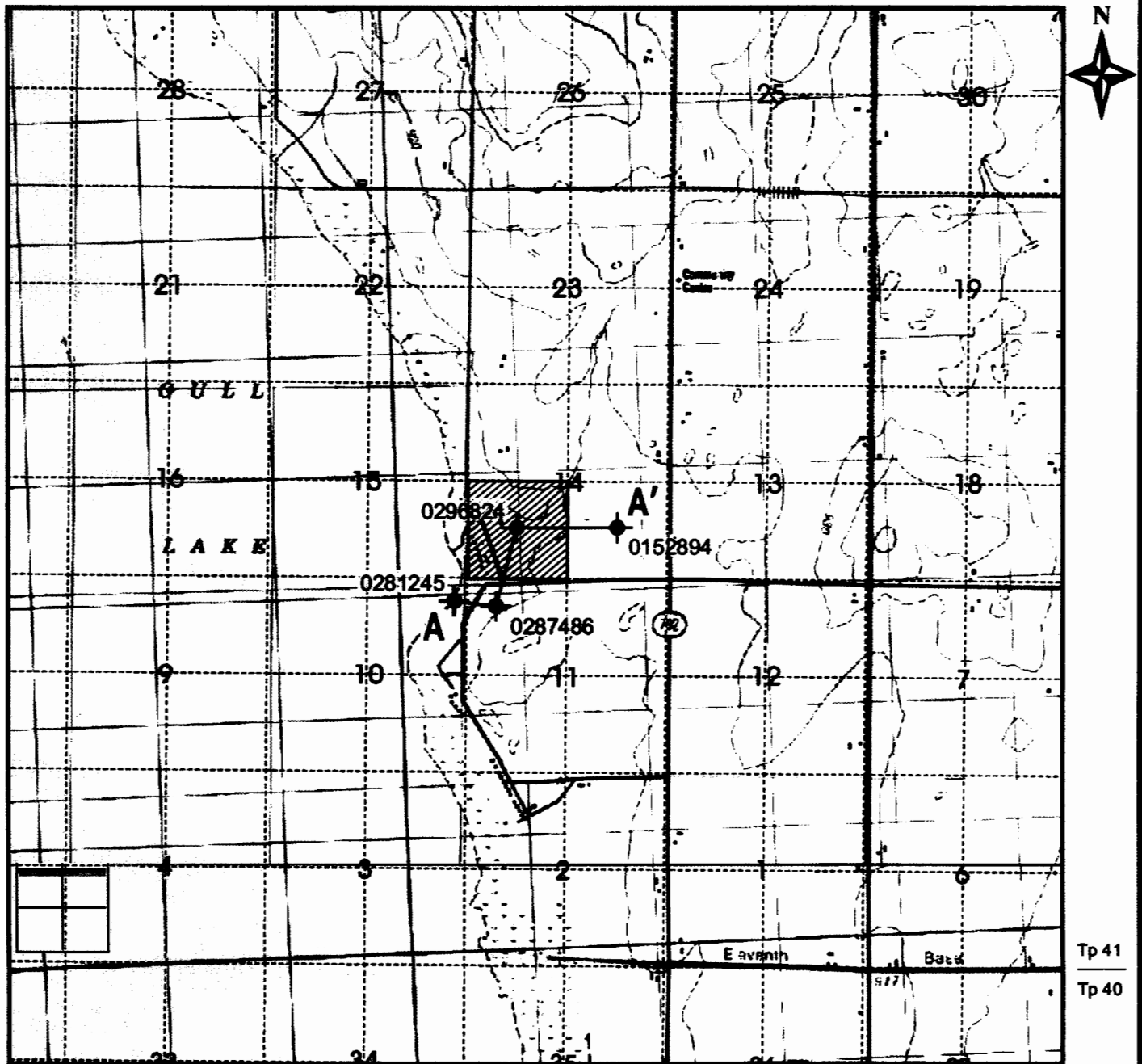
Hydrogeological Consultants Ltd., January 2001, Lacombe County, Regional Groundwater Assessment. Prepared for Lacombe County in conjunction with Agriculture and Agri-Food Canada, Prairie Farm Rehabilitation Administration.

Le Breton, G. E. 1971. Earth Sciences Report 71-1, Hydrogeology of the Red Deer Area, Alberta. Alberta Research Council.

Shetsen, I. 1990. Quaternary Geology, Central Alberta. Alberta Geological Survey. Map Scale 1:500,000.



The Groundwater Centre, 2007. <http://www.groundwatercentre.com/Default.asp?bhcp=1>. MOW-TECH LTD.

Figures

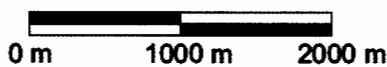


MAP REFERENCE: 1 : 50 000, 83 A/12 & 83 A/05 (ETOPO)

LEGEND:

- 0281245 AENV WELL ID #
-  APPROXIMATE WELL LOCATION
- A—A'** CROSS-SECTION TRACE
-  SITE LOCATION

SCALE = 1 : 50 000



Waterline Resources Inc. 
Groundwater Resource and Environmental Consultants 

1300382 Alberta Ltd.
Phase I Groundwater Potential Study
Proposed 100-Lot Residential Subdivision Development
SW-14-041-28-W4M, Gull Lake, AB

SITE LOCATION

FIGURE
1

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APPENDIX A

Water Well Summary Table, AENV Water Well Drilling Reports, AENV Water Diversion License(s), and TGWC Water Well Search and Site Groundwater Potential Report

Table A1: AENV (2007) Reconnaissance Report for Site and Lands Within up to Approximately a 1.0 km Radius of SW-14-041-28-W4M

WELL ID	W.M	TWP	RGE	SEC	LSB	DRILLING COMPANY	DATE COMPLETED (M/D/YR)	DEPTH (R BGL)	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (R B TOC)	TEST RATE (MPPM)	CASING PERFS FROM (R BGL)	TO (R BGL)
152546	4	41	28	14	SW	FORRESTER WATER WELL DRILLING (1981) LTD.	8/9/1980	145	Domestic	0	15	0	VANDERMEULEN, TED	33	4	102	145
159962	4	41	28	14	SE	GAS WATER WELL SERVICING	5/10/1980	165	Domestic	0	10	0	PRINS, RAY	60	4	130	165
156330	4	41	28	14	SW	UNKNOWN DRILLER		120	Domestic	1	0	0	SCHETT, HELGE				
159600	4	41	28	14	SW	FEHR DRILLING	7/16/1980	138	Domestic	0	15	0	MCDONALD, DALE	60	3	126	138
167142	4	41	28	15	SE	J.C. DRILLING	8/12/1981	145	Domestic	0	10	0	LACOMBE FISH & GAME	32	10	60	145
256449	4	41	28	14	SW	FORRESTER WATER WELL DRILLING (1981) LTD.	6/9/1982	155	Domestic	0	18	0	WANDLEN, RAY	43	5	95	155
272449	4	41	28	11	13	ALKEN BASIN DRILLING LTD.	7/2/1984	300	Industrial	0	14	13	A.P. OIL & GAS (CACTUS 20E)	120	35	240	200
274810	4	41	28	11	13	ALKEN BASIN DRILLING LTD.	12/19/1985	300	Industrial	0	22	15	A.P.L. (BREILCO 11) #RIG	146	40	140	200
274911	4	41	28	11	NW	FLINN DRILLING LTD.	8/15/1979	88	Domestic	0	5	0	HIGGINS, R.S.	40	40	66	88
274996	4	41	28	14	13	UNKNOWN DRILLER	11/14/1982	930	Industrial	0	0	0	CALIF STD COME440				
275000	4	41	28	14	7	UNKNOWN DRILLER	10/6/1983	920	Industrial	0	0	0	CALIF STD COME390				
275002	4	41	28	14	SW	SCHMIDT DRILLING LTD.	10/4/1973	100	Domestic	0	3	0	BRUINS PLUMBING	38	15		
275003	4	41	28	14	SW	SCHMIDT DRILLING LTD.	7/1/1971	105	Municipal	0	3	0	LACOMBE COUNTY OF	31	12		
275004	4	41	28	14	SW	AL'S WATER WELLS LTD	8/28/1972	72	Domestic	0	2	0	BRUINS, R.C.	24	10		
275006	4	41	28	14	SW	UNKNOWN DRILLER	9/16/1972	66	Industrial	0	3	0	BC PLUMBING	22	10		
275007	4	41	28	14	SW	UNKNOWN DRILLER		107	Domestic	2	0	0	FREEMAN, JEAN				
275008	4	41	28	14	SW	RICHMOND WVDRLG	8/20/1978	90	Domestic	1	3	0	SCARLETT, RALPH	25	3.5		
275010	4	41	28	14	SW	SCHMIDT DRILLING LTD.	3/18/1980	140	Domestic	0	4	0	HODGSON, RON	30	6	80	100
275011	4	41	28	14	SW	UNKNOWN DRILLER		90	Unknown	0	0	0	WILSON, A.				
275014	4	41	28	14	SW	SCHMIDT DRILLING LTD.	9/15/1980	80	Domestic	0	3	0	BRUINS PLUMBING	18	7	70	80
275015	4	41	28	14	SW	SCHMIDT DRILLING LTD.	10/2/1980	80	Domestic	0	4	0	OTTO, W.	14	10	70	80
275016	4	41	28	14	SW	SCHMIDT DRILLING LTD.	9/13/1980	85	Domestic	0	3	0	MERRICK, D.	16	10	70	85
275018	4	41	28	14	SW	SCHMIDT DRILLING LTD.	7/12/1982	105	Domestic	0	3	0	SKANBERG, ERIC	31	20		
275019	4	41	28	14	SW	UNKNOWN DRILLER		60	Municipal	1	0	0	LACOMBE FISH & GAME ASSOC				
275020	4	41	28	14	SW	UNKNOWN DRILLER		135	Domestic	0	5	0	BIRK, ROBERT				
275023	4	41	28	14	SW	JRST DRILLING LTD.	8/16/1984	100	Unknown	1	0	0	CURZON, JACK	40	13	95	135
275024	4	41	28	14	SW	UNKNOWN DRILLER		100	Unknown	1	0	0	MILSON, DAN				
275026	4	41	28	14	SW	UNKNOWN DRILLER		100	Domestic	1	0	0	SAFEWAY CREDIT UNION				
275028	4	41	28	14	SW	UNKNOWN DRILLER		180	Domestic	1	0	0	NEVIADONY, LES				
275029	4	41	28	14	NW	BROWN JM	8/28/1987	130	Domestic	0	5	0	KAMLAH, W.H.	20	12		
275043	4	41	28	14	NW	UNKNOWN DRILLER		85	Unknown	0	0	0	MILSON, A.				
275044	4	41	28	14	0	UNKNOWN DRILLER		107	Domestic	1	0	0	ETHER, R.				
275045	4	41	28	15	SE	FLINN DRILLING LTD.	5/9/1985	145	Domestic	0	5	0	HIGHBERG, DAVE				
280812	4	41	28	14	SW	UNKNOWN DRILLER	8/1/1972	110	Domestic	1	0	0	LACOMBE FISH & GAME ASSOC	33	15	95	145
280813	4	41	28	14	SW	FRASER, JACK	8/18/1983	90	Domestic	0	5	0	SMITH, RAYMOND	38			
280814	4	41	28	14	SW	FRASER, JACK	8/11/1983	95	Domestic	0	5	0	MAGLEOD, ALLAN	25	10		
	4	41	28	10	16	J.C. DRILLING	1/4/1986	105	Domestic	0	6	25	BLENGOWE, EVAN	30	15		
	4	41	28	11	13	ALKEN BASIN DRILLING LTD.	7/14/1987	240	Industrial	0	18	21	BECKLEY, FREDKAREN	31.1	10	85	105
280897	4	41	28	11	NW	ALBERTA EAGLE DRILLING LTD.	5/27/1987	100	Domestic	0	3	7	A.P.L. CANTEX 4#RIG WELL	46	35	60	100
280872	4	41	28	14	SE	AERO DRILLING & CONSULTING LTD.	11/7/2000	340	Domestic	0	21	8	OWENS, FRED	39	20	76	100
280873	4	41	28	14	SW	J.C. DRILLING	10/17/2000	130	Domestic	0	6	21	GILL, RANDY	36.4	10	90	130
1200088	4	41	28	14	SW	ALKEN BASIN DRILLING LTD.	5/27/2001	220	Domestic	0	18	13	SCARLETT, RALPH	46	10	180	220
	4	41	28	14	SW	CLIFF'S DRILLING	5/14/2003	100	Domestic				SCHLEIBER, JAKE	36	30	80	100

AENV (2007) Drilling Reports used for Cross-Section Generation (Figure 2)
AENV (2007) Groundwater Chemistry Reports (Appendix B)

Minimum	Maximum	Average
60	930	168
14	481	46
3	40	16
60	280	109
80	340	148



Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.: 0281245
 Map Verified: Not Verified
 Date Report: 1998/04/25
 Received:
 Measurements: Metric

1. Contractor & Well Owner Information

Company Name: J.C. DRILLING
 Mailing Address: BOX 5291
 Well Owner's Name: BECKLEY, FRED/KAREN
 P.O. Box Number: 7
 City:
 City or Town: LACOMBE AB CA
 Well Location Identifier:
 Mailing Address: RR3 SITE 1, LACOMBE
 Province:
 Drilling Company Approval No.: 118599
 Postal Code: T4L 1W9
 Postal Code: T0C 1S0
 Country:

2. Well Location

1/4 or Sec Twp Rge West of LSD
 16 10 041 28 4 M
 Location in Quarter
 15.24 M from N Boundary
 121.92 M from E Boundary
 Lot Block Plan
 4A 5 9422258
 Well Elev: M
 How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
 Reclaimed Well
 Date Reclaimed:
 Method of Drilling: Cable Tool
 Flowing Well: No
 Gas Present: No
 Proposed well use: Domestic Anticipated Water Requirements/day 2273 Liters
 Materials Used:
 Rate: Liters
 Oil Present: No

3. Well Yield

Test Date (yyyy/mm/dd): 1998/01/04
 Start Time: 9:30 AM
 Test Method: Bailor
 Non pumping static level: 9.48 M
 Rate of water removal: Liters/Min
 Depth of pump intake: 18.29 M
 Water level at end of pumping: 12.19 M
 Distance from top of casing to ground level:

4. Formation Log

Depth from ground level (meters)	Lithology Description
0.81	Topsoil
8.1	Clay
17.07	Gray Till
17.37	Sand & Gravel
28.96	Gray Shale & Coal
32	Gray Hard Shale & Sandstone

5. Well Completion

Date Started (yyyy/mm/dd): 1998/01/02
 Date Completed (yyyy/mm/dd): 1998/01/04
 Well Depth: 32 M
 Casing Type: Steel
 Size OD: 16.81 CM
 Wall Thickness: 0.48 CM
 Bottom at: 21.03 M
 Borehole Diameter: 0 CM
 Liner Type: Plastic
 Size OD: 11.43 CM
 Wall Thickness: 0.6 CM
 Top: 19.81 M Bottom: 32 M
 Perforations from: 25.91 M to: 32 M
 Perforations Size: 0.32 CM x 20.32 CM
 from: 0 M to: 0 M
 0 CM x 0 CM
 from: 0 M to: 0 M
 0 CM x 0 CM
 Perforated by: Saw
 Seal: Driven
 from: 0 M to: 21.03 M
 Seal:
 from: 0 M to: 0 M
 Seal:
 from: 0 M to: 0 M
 Screen Type:
 from: 0 M to: 0 M
 Screen ID: 0 CM
 Slot Size: 0 CM
 Screen Type:
 from: 0 M to: 0 M
 Screen ID: 0 CM
 Slot Size: 0 CM
 Screen Installation Method:
 Fittings
 Top: Bottom:
 Pack:
 Grain Size: Amount:
 Geophysical Log Taken:
 Retained on Files:
 Additional Test and/or Pump Data
 Chemistries taken By Driller: No
 Held: 0 Documents Held: 1
 Pitless Adapter Type:
 Drop Pipe Type:
 Length: M Diameter: CM
 Comments:
 DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 2'

Depth To water level (meters)	Elapsed Time
0:00	12.24
1:00	11.51
2:00	11.18
3:00	10.97
4:00	10.8
5:00	10.69
6:00	10.67
7:00	10.67
8:00	10.57
9:00	10.52
10:00	10.46
12:00	10.39
14:00	10.29
16:00	10.24
20:00	10.16
25:00	10.13
30:00	10.13
35:00	10.11
40:00	10.08
50:00	9.98
60:00	9.96
75:00	10.11
90:00	9.96
105:00	9.96
120:00	9.93

Total Drawdown: 2.74 M
 If water removal was less than 2 hr duration, reason why:

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
 Certification No.: 3887AD
 This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
 Signature _____ Yr Mo Day

Recommended pumping rate: 22.73 Liters/Min
 Recommended pump intake: 18.29 M
 Type Pump Installed
 Pump Type:
 Pump Model:
 H.P.:
 Any further pump test information?



Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.: 0287488
 Map Verified: Not Verified
 Date Report: 1997/08/05
 Received:
 Measurements: Metric

1. Contractor & Well Owner Information

Company Name: ALKEN BASIN DRILLING LTD. Drilling Company Approval No.: 38394
 Mailing Address: BOX 47 City or Town: BENTLEY AB CANADA Postal Code: T0C 0J0
 Well Owner's Name: A.P.L./CANTEX 4#RIG WELL Well Location Identifier:
 P.O. Box Number: Mailing Address: 300 2924 11 ST NE, CALGARY Postal Code: T2E 7L7
 City: Province: Country:

2. Well Location

1/4 or Sec Twp Rge Westor
 LSD M
 13 11 041 28 4
 Location in Quarter
 0 M from Boundary
 0 M from Boundary
 Lot Block Plan
 Well Elev: M How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well Reclaimed Well
 Date Reclaimed: Materials Used:
 Method of Drilling: Rotary
 Flowing Well: No Rate: Liters Gas Present: No Oil Present: No
 Proposed well use: Industrial Anticipated Water Requirements/day: 27276 Liters

6. Well Yield

Test Date (yyyy/mm/dd): 1997/07/14 Start Time: 11:00 AM
 Test Method: Air
 Non pumping static level: 14.02 M
 Rate of water removal: 159.11 Liters/Min
 Depth of pump intake: 73.15 M
 Water level at end of pumping: 73.15 M
 Distance from top of CM casing to ground level:

4. Formation Log

Depth from ground level (meters)	Lithology Description
7.01	Brown Sand
18.59	Gray Sandy Clay & Rocks
25.91	Gray Sandstone
27.43	Gray Shale
29.57	Gray Sandstone
31.39	Gray Shale
37.19	Gray Sandstone
39.32	Gray Shale
50.6	Gray Sandstone
51.82	Gray Shale
54.86	Gray Sandstone
58.22	Gray Shale
62.48	Gray Sandstone
64.92	Gray Shale
67.67	Gray Sandstone
68.88	Gray Shale
71.32	Gray Sandstone
73.15	Gray Shale

5. Well Completion

Date Started (yyyy/mm/dd): 1997/07/14 Date Completed (yyyy/mm/dd): 1997/07/14
 Well Depth: 73.15 M Borehole Diameter: 0 CM
 Casing Type: Steel Liner Type: Steel
 Size OD: 13.97 CM Size OD: 11.43 CM
 Wall Thickness: 0.62 CM Wall Thickness: 0.4 CM
 Bottom at: 21.95 M Top: 0.61 M Bottom: 73.15 M
 Perforations from: 18.29 M to: 30.48 M Perforations Size: 0.95 CM x 0.95 CM
 from: 54.86 M to: 73.15 M 0 CM x 0 CM
 from: 0 M to: 0 M 0 CM x 0 CM
 Perforated by: Torch
 Seal: Drive Shoe from: 0 M to: 21.95 M
 Seal: from: 0 M to: 0 M
 Seal: from: 0 M to: 0 M
 Seal: from: 0 M to: 0 M
 Screen Type: Screen ID: 0 CM
 from: 0 M to: 0 M Slot Size: 0 CM
 Screen Type: Screen ID: 0 CM
 from: 0 M to: 0 M Slot Size: 0 CM
 Screen Installation Method:
 Fittings Top: Bottom:
 Pack: Grain Size: Amount:
 Geophysical Log Taken:
 Retained on Files:
 Additional Test and/or Pump Data
 Chemistries taken By Driller: No
 Held: 0 Documents Held: 1
 Pitless Adapter Type:
 Drop Pipe Type: Length: M Diameter: CM
 Comments:
 DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 2'

Depth To water level (meters)	Elapsed Time	Drawdown Minutes:Sec	Recovery
		4:00	73.15
		5:00	67.97
		6:00	62.79
		7:00	57.91
		8:00	53.04
		9:00	48.77
		10:00	44.5
		12:00	40.54
		14:00	36.58
		16:00	32.92
		20:00	29.57
		25:00	26.82
		30:00	24.99
		35:00	22.86
		40:00	21.34
		50:00	20.12
		60:00	18.9
		75:00	17.68
		90:00	16.46
		105:00	15.24
		120:00	14.02

Total Drawdown: 59.13 M
 If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 136.38 Liters/Min
 Recommended pump intake: 59.44 M
 Type Pump Installed
 Pump Type: SUB
 Pump Model: GOULDS
 H.P.: 3
 Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
 Certification No.: 5881AD
 This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
 Signature Yr Mo Day



Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.: 0296824
 Map Verified: Not Verified
 Date Report: 2001/06/12
 Received:
 Measurements: Metric

1. Contractor & Well Owner Information

Company Name: ALKEN BASIN DRILLING LTD. Drilling Company Approval No.: 38394
 Mailing Address: BOX 47 City or Town: BENTLEY AB CANADA Postal Code: T0C 0J0
 Well Owner's Name: SCARLET, RALPH Well Location Identifier:
 P.O. Box Number: 147 Mailing Address: BENTLEY Postal Code: T0C 0J0
 City: Province: Country:

2. Well Location

1/4 or Sec Twp Rge West
 LSD M
 SW 14 041 28 4
 Location in Quarter
 0 M from Boundary
 0 M from Boundary
 Lot Block Plan
 Well Elev: M How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
 Reclaimed Well
 Date Reclaimed: Materials Used:
 Method of Drilling: Rotary
 Flowing Well: No Rate: Liters
 Gas Present: No Oil Present: No
 Proposed well use: Domestic
 Anticipated Water Requirements/day: 2954.9 Liters

6. Well Yield

Test Date (yyyy/mm/dd): 2001/05/27 Start Time: 11:00 AM
 Test Method: Air
 Non pumping static level: 14.02 M
 Rate of water removal: 45.46 Liters/Min

4. Formation Log

Depth from ground level (meters)	Lithology Description
1.83	Brown Clay
8.23	Sandy Clay
11.28	Gray Shale
12.8	Gray Sandstone
14.02	Gray Shale
17.37	Gray Sandstone
19.81	Gray Shale
24.99	Gray Sandstone
29.57	Gray Shale
34.75	Gray Sandstone
35.05	Gray Shale
38.1	Gray Sandstone
42.06	Gray Shale
46.33	Gray Sandstone
56.39	Gray Shale
59.74	Gray Sandstone
65.53	Gray Shale
67.06	Gray Sandstone

5. Well Completion

Date Started (yyyy/mm/dd): 2001/05/27 Date Completed (yyyy/mm/dd): 2001/05/27
 Well Depth: 67.06 M Borehole Diameter: 0 CM
 Casing Type: Steel Liner Type: Plastic
 Size OD: 13.97 CM Size OD: 11.43 CM
 Wall Thickness: 0.62 CM Wall Thickness: 0.6 CM
 Bottom at: 28.65 M Top: 24.38 M Bottom: 67.06 M
 Perforations from: 54.86 M to: 67.06 M Perforations Size: 0.95 CM x 0.95 CM
 from: 0 M to: 0 M 0 CM x 0 CM
 from: 0 M to: 0 M 0 CM x 0 CM
 Perforated by: Hand Drill
 Seal: Drive Shoe from: 0 M to: 28.65 M
 Seal: from: 0 M to: 0 M
 Seal: from: 0 M to: 0 M
 Screen Type: from: 0 M to: 0 M Screen ID: 0 CM Slot Size: 0 CM
 Screen Type: from: 0 M to: 0 M Screen ID: 0 CM Slot Size: 0 CM
 Screen Installation Method:
 Fittings Top: Bottom:
 Pack: Grain Size: Amount:
 Geophysical Log Taken:
 Retained on Files:
 Additional Test and/or Pump Data
 Chemistries taken By Driller: No
 Held: 0 Documents Held: 1
 Pitless Adapter Type:
 Drop Pipe Type: Length: M Diameter: CM
 Comments:
 DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 2'. TEST WITH DRILL PIPE IN HOLE. DRILLING WATER TAKEN FROM SHOP WELL.

Depth of pump intake:	67.06 M
Water level at end of pumping:	67.06 M
Distance from top of CM casing to ground level:	
Depth To water level (meters)	Elapsed Time
Drawdown Minutes:Sec	Recovery
1:00	67.06
2:00	60.96
3:00	54.86
4:00	48.77
5:00	42.67
6:00	36.58
7:00	30.48
8:00	24.38
9:00	21.34
10:00	18.29
12:00	15.24
14:00	14.02
120:00	14.02

Total Drawdown: 0 M
 If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 45.46 Liters/Min
 Recommended pump intake: 51.82 M

Type Pump Installed
 Pump Type:
 Pump Model:
 H.P.:
 Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
 Certification No.: VA4790
 This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
 Signature Yr Mo Day



Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.: 0152894
 Map Verified: Not Verified
 Date Report: 1990/09/06
 Received:
 Measurements: Metric

1. Contractor & Well Owner Information

Company Name: G&S WATER WELL SERVICING
 Mailing Address: City or Town: Postal Code:
 Well Owner's Name: PRINS, RAY
 P.O. Box Number: Mailing Address: RR 3, LACOMBE
 City: Province: Country:

Drilling Company Approval No.:

2. Well Location

1/4 or Sec Twp Rge West of
 LSD M
 SE 14 041 28 4
 Location in Quarter
 0 M from Boundary
 0 M from Boundary
 Lot Block Plan
 Well Elev: M How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
 Reclaimed Well
 Date Reclaimed: Materials Used:
 Method of Drilling: Rotary
 Flowing Well: No
 Gas Present: Rate: Liters Oil Present:

Proposed well use: Domestic
 Anticipated Water Requirements/day: 0 Liters

6. Well Yield

Test Date (yyyy/mm/dd): 1990/05/10 Start Time: 11:00 AM
 Test Method: Bailer
 Non pumping static level: 24.38 M
 Rate of water removal: 18.18 Liters/Min
 Depth of pump intake: 42.67 M
 Water level at end of pumping: 38.1 M
 Distance from top of CM casing to ground level:

4. Formation Log

Depth from ground level (meters)	Lithology Description
22.86	Clayey Sand & Gravel
24.38	Clay
25.91	Shale
27.43	Sandstone
30.48	Shale
39.01	Shale
40.23	Sandstone
46.33	Shale
47.85	Sandstone
50.29	Shale

5. Well Completion

Date Started (yyyy/mm/dd): 1990/05/08 Date Completed (yyyy/mm/dd): 1990/05/10
 Well Depth: 50.29 M Borehole Diameter: 0 CM
 Casing Type: Steel Liner Type: Plastic
 Size OD: 14.12 CM Size OD: 10.16 CM
 Wall Thickness: 0.62 CM Wall Thickness: 0.62 CM
 Bottom at: 28.96 M Top: 28.65 M Bottom: 50.29 M
 Perforations from: 39.62 M to: 50.29 M Perforations Size: 0.95 CM x 0 CM
 from: 0 M to: 0 M 0 CM x 0 CM
 from: 0 M to: 0 M 0 CM x 0 CM
 Perforated by: Machine
 Seal: Driven from: 28.96 M to: 0 M
 Seal: from: 0 M to: 0 M
 Seal: from: 0 M to: 0 M
 Screen Type: Screen ID: 0 CM
 from: 0 M to: 0 M Slot Size: 0 CM
 Screen Type: Screen ID: 0 CM
 from: 0 M to: 0 M Slot Size: 0 CM
 Screen Installation Method:
 Fittings Top: Bottom:
 Pack: Grain Size: Amount: 0
 Geophysical Log Taken:
 Retained on Files:
 Additional Test and/or Pump Data
 Chemistries taken By Driller: No
 Held: 0 Documents Held: 1
 Pitless Adapter Type:
 Drop Pipe Type: Length: M Diameter: CM
 Comments:

Depth To water level (meters)
 Elapsed Time
 Drawdown Minutes: Sec Recovery
 Total Drawdown: 13.72 M
 If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 18.18 Liters/Min
 Recommended pump intake: 0 M

Type Pump Installed
 Pump Type:
 Pump Model:
 H.P.:
 Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
 Certification No.: 3892
 This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
 Signature Yr Mo Day

TGWC On-line Search Report
 Search Results for a 1,000.00 m radius around SW 14-041-28 W4M.

(click id for more details) TGWC ID	Legal Location	Owner Name	Ground Elevation AMSL (metre)	Well Depth (metre)	Date Drilling Completed	Date Well Abandoned	Top of Bedrock (metre)	Completion Interval (metre)	Most Recent Water Level (metre)	Most Recent (Aquifer Test)	Most Recent (Chemistry)	* Distance From Location (metre)
Well Proposed Use: [unknown]												
M35377.069179	SW 14-041-28-4	Wilson, A.	908	27.4		-						28 C
M35377.069192	SW 14-041-28-4	Wilson, Dan	908	30.5		-					May 16, 1985	28 C
M35377.069188	SW 14-041-28-4	Birk, Robert	908			-						28 C
M35377.069197	NW 14-041-28-4	Wilson, A.	915	25.9		-						793 C
Well Proposed Use: Domestic												
M35377.069193	SW 14-041-28-4	Safeway Credit Union	908	30.5		-					Jul 24, 1981	28 C
M35377.069194	SW 14-041-28-4	Nieviadony, Les	908	54.9		-						28 C
M35377.076656	SW 14-041-28-4	Smith, Raymond	908	33.5	Aug 01, 1972	-			11.6	Jun 23, 1974	Jul 05, 1974	28 C
M35377.088282	SW 14-041-28-4	Scheit, Helge	908	36.6		-						28 C
M35377.069169	SW 14-041-28-4	Bruins Plumbing	908	30.5	Oct 04, 1973	-	20.4	23.8 - 30.5	11.6	Oct 04, 1973		28 C
M35377.069172	SW 14-041-28-4	Bruins, R.C.	908	21.9	Aug 28, 1972	-	12.8	12.8 - 21.9	7.3	Aug 28, 1972		28 C
M35377.069174	SW 14-041-28-4	Freeman, Jean	908	32.6		-					Oct 09, 1981	28 C
M35377.069184	SW 14-041-28-4	Merrick, D.	908	25.9	Sep 13, 1980	-	11.6	21.3 - 25.9	4.9	Sep 13, 1980		28 C
M35377.069181	SW 14-041-28-4	Bruins Plumbing	908	24.4	Sep 15, 1980	-	11.3	21.3 - 24.4	5.5	Sep 15, 1980		28 C
M35377.069185	SW 14-041-28-4	Skavberg, Eric	908	32.0	Jul 12, 1982	-	20.4	24.4 - 32.0	9.5	Jul 12, 1982		28 C
M35377.076658	SW 14-041-28-4	Blencowe, Evan	908	29.0	Aug 11, 1983	-	27.4	28.0 - 29.0	9.1	Aug 11, 1983		28 C
M35377.076657	SW 14-041-28-4	Macleod, Allan	908	27.4	Aug 18, 1983	-	25.0	25.6 - 27.4	7.6	Aug 18, 1983		28 C
M37066.935141	SW 14-041-28-4	Gill, Randy	908	39.6	Oct 17, 2000	-	15.2	27.4 - 39.6	11.1	Oct 17, 2000		28 C
M37490.030727	SW 14-041-28-4	Scarlet, Ralph	908	67.1	May 27, 2001	-	8.2	54.9 - 67.1	4.3	May 27, 2001		28 C
M35377.069178	SW 14-041-28-4	Hodgson, Ron	908	42.7	Mar 18, 1980	-	12.5	24.4 - 30.5	9.1	Mar 18, 1980		281 B
M35377.069176	SW 14-041-28-4	Scarlett, Ralph	906	27.4	Jun 20, 1978	-	12.2	22.3 - 27.4	7.6	Jun 20, 1978		341 B
M35377.084912	SW 14-041-28-4	Vandermeulen, Ted	911	44.2	Aug 08, 1990	-	8.8	32.3 - 44.2	10.1	Aug 08, 1990		341 B
M35377.069182	SW 14-041-28-4	Otto, W.	905	24.4	Oct 02, 1980	-	11.9	21.3 - 24.4	4.3	Oct 02, 1980		346 B
M35377.115256	SW 14-041-28-4	Wandlen, Ray	908	47.2	Jun 08, 1992	-	17.7	31.4 - 47.2	13.1	Jun 08, 1992		385 B
M35377.088649	SW 14-041-28-4	McDonald, Dale	904	42.1	Jul 16, 1990	-	16.1	38.4 - 42.1	24.4	Jul 16, 1990		386 B
M35377.069190	SW 14-041-28-4	Curzon, Jack	908	41.2	Aug 16, 1984	-	21.3	29.0 - 41.2	12.2	Aug 16, 1984		399 B
M35377.068981	NW 11-041-28-4	Higgins, R.S.	908	26.8	Aug 15, 1979	-	19.5	21.6 - 26.8	12.2	Aug 15, 1979		552 B
M36234.923478	NW 11-041-28-4	Owens, Fred	908	30.5	May 27, 1997	-	17.1	23.2 - 30.5	11.9	May 27, 1997		552 B
M35377.069214	SE 15-041-28-4	Lacombe Fish & Game Association	902	44.2	May 09, 1985	-		29.0 - 44.2	10.1	May 09, 1985		572 B
M35377.091199	SE 15-041-28-4	Lacombe Fish & Game	902	44.2	Jun 12, 1991	-	8.8	18.3 - 44.2	9.8	Jun 12, 1991		572 B
M35377.069211	· 14-041-28-4	Ethier, R.	910	32.6		-						577 C
M35377.069212	· 14-041-28-4	Highburg, Dave	910	33.5		-						577 C
M35377.085250	SE 14-041-28-4	Prins, Ray	913	50.3	May 10, 1990	-	24.4	39.6 - 50.3	24.4	May 10, 1990		671 B
M35377.069195	NW 14-041-28-4	Kamlah, W.H.	912	39.6	Jun 28, 1967	-	12.2	14.3 - 39.6	6.1	Jun 28, 1967		705 B
M37066.935130	SE 14-041-28-4	Gull Lake Farms	913	103.6	Nov 07, 2000	-	20.4	85.3 - 103.6	46.0	Nov 07, 2000		836 C
M35377.077289	16-10-041-28-4	Beckley, Fred/Karen	899	32.0	Jan 04, 1996	-	17.4	25.9 - 32.0	9.5	Jan 04, 1996		848 C

TGWC On-line Search Report
 Search Results for a 1,000.00 m radius around SW 14-041-28 W4M.

(click id for more details) TGWC ID	Legal Location	Owner Name	Ground Elevation AMSL (metre)	Well Depth (metre)	Date Drilling Completed	Date Well Abandoned	Top of Bedrock (metre)	Completion Interval (metre)	Most Recent Water Level (metre)	Most Recent (Aquifer Test)	Most Recent (Chemistry)	* Distance From Location (metre)
Well Proposed Use: Industrial												
M35377.069173	SW 14-041-28-4	BC Plumbing	908	20.1	May 16, 1972	-	15.2	15.2 - 20.1	6.7	May 16, 1972		28 C
M35377.068982	13-11-041-28-4	California Standard Oil Company	907	283.5	Nov 14, 1952	-						503 C
M35377.069164	07-14-041-28-4	California Standard Oil Company	911	280.4	Oct 06, 1953	-						687 C
M35377.220899	13-11-041-28-4	APL Oil & Gas Ltd.	911	91.4	Jul 02, 1994	-	18.3	73.2 - 88.4	36.6	Jul 02, 1994		804 B
M35377.064940	13-11-041-28-4	APL Oil & Gas Ltd.	911	91.4	Dec 15, 1995	-	22.9	42.7 - 91.4	44.5	Dec 15, 1995		804 B
M36234.922267	13-11-041-28-4	APL Oil & Gas Ltd.	911	73.2	Jul 14, 1997	-	18.6	21.9 - 73.2	14.0	Jul 14, 1997		804 B
Well Proposed Use: Municipal												
M35377.069187	SW 14-041-28-4	Lacombe Fish & Game Asso	908	18.3		-					Jul 13, 1982	28 C
M35377.069171	SW 14-041-28-4	Town of Lacombe	908	32.0	Jul 01, 1971	-	21.6	27.4 - 32.0	9.5	Jul 01, 1971		361 B

*** Spatial Description of Groundwater Well**

- A - GPS or Surveyed Location
- B - Geo-Referenced Location
- C - Centre of Location
- D - Less Than Centre of Location

Lacombe County

SW 14-041-28 W4M

MOW-TECH LTD. gwQuery Results

[View Regional Groundwater Assessment Report \(PDF\)](#)

[gwQuery Results - Metric \(PDF\)](#) :: [gwQuery Results - Imperial \(PDF\)](#)

General Results Depth(s)	Top metre	Yield* m ³ /day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	33	33 ²	12	614	60	--	--
gwQuery Determined Maximum	65	33 ²	12	614	60	--	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m ³ /day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	72 ²	4	768	194	9	--
Bedrock Surface	17						
Upper Lacombe Member	17	33 ²	12	614	60	--	--
Lower Lacombe Member	117	--	53	495	--	26	--
Haynes Member	162	95 ²	75	456	--	6	--
Upper Scollard Formation	212	--	75	585	--	33	--
Lower Scollard Formation	266	75 ²	121	823	225	8	Water
Upper Horseshoe Canyon Formation	324	--	122	1319	186	66	--
Middle Horseshoe Canyon Formation	414	--	--	--	--	--	Oil

Parameter	metre
Base of Groundwater Protection (Depth)	264
Ground Elevation (AMSL)	907

Legend/Notes

'--' Indicates information not available.

Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).

* Yield based on the 'Fluid Encountered' being water.

² Results are based on a regional groundwater study by [hydrogeological consultants ltd. \(HCL\)](#)

³ Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

The information calculated with the MOW-TECH LTD. gwQuery is meant only as a guide. Actual drilling conditions may vary. MOW-TECH LTD. is not liable for drilling or groundwater problems as a result of using this data.

LC01144 {00-174}



PHASE I GROUNDWATER POTENTIAL STUDY
Proposed 100-Lot Residential Subdivision Development
SW-14-041-28-W4M, Near Gull Lake, Alberta
1300382 Alberta Ltd.

WL07-1279
June, 2007

APPENDIX B

AENV Groundwater Chemistry Reports



ALBERTA ENVIRONMENT CHEMICAL ANALYSIS REPORT

WELL NAME: SAFEWAY CREDIT UNION
 LOCATION: LSD SW SEC 14 TWP 041 RG 28 M 4
 WELL DEPTH: 100
 AQUIFER:
 SAMPLING DATE: 7/8/1981 TIME: 0

WELL ID No:0275024
 SAMPLE No: 6153
 WATER LEVEL: -9
 LABORATORY: AE
 PRINT DATE: 5/24/2007

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9

LABORATORY: Analysis Date: 7/24/1981

COD	-9	CONDUCTIVITY	1084
DIC	-9	FLUORIDE	0.18
ION BALANCE	0.96	PH	8.7
SAR	-9	SIO2	8.7
TOTAL ALKALINITY	495	TC	-9
TDS	719	TN	-9
DOC	-9		

AMMONIUM-N	-9	BICARBONATE	570.8136
CALCIUM	12.974	CARBONATE	15.999
CHLORIDE	1.0011	MAGNESIUM	5.00384
NITRATE-N	-9	NITRITE-N	0.0504*
PHOSPHATE	-9	POTASSIUM	1.61555
SODIUM	259.0007	SULPHATE	142.9104
NO ₂ + NO ₃	0.0144*	TOTAL HARDNESS	52

ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.58	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9

HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks: CATIONS=12.34; ANIONS=12.90.

-9 indicates that no analysis was done for this parameter

*Indicates concentrations less than.

Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential

DIC - Dissolved Inorganic Carbon

DOC - Dissolved Organic Carbon

TDS - Total Dissolved Solids

SAR - Sodium Adsorption Ratio

COD - Chemical Oxygen Demand

TN - Total Particulate Nitrogen

TC - Total Particulate Carbon

NOTE: This data may not be fully checked.

The Province disclaims all responsibility for its accuracy



ALBERTA ENVIRONMENT CHEMICAL ANALYSIS REPORT

WELL NAME: SMITH, RAYMOND
 LOCATION: LSD SW SEC 14 TWP 041 RG 28 M 4
 WELL DEPTH: 110
 AQUIFER:
 SAMPLING DATE: 6/23/1974 TIME: 0

WELL ID No:0280612
 SAMPLE No: 5314
 WATER LEVEL: 38
 LABORATORY: AE
 PRINT DATE: 5/24/2007

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9

LABORATORY: Analysis Date: 7/5/1974

COD	-9	CONDUCTIVITY	1300
DIC	-9	FLUORIDE	1.18
ION BALANCE	1.01	PH	7.7
SAR	-9	SIO2	-9
TOTAL ALKALINITY	478	TC	-9
TDS	694	TN	-9
DOC	-9		

AMMONIUM-N	-9	BICARBONATE	582.8062
CALCIUM	38.922	CARBONATE	-9
CHLORIDE	5.0055	MAGNESIUM	4.003072
NITRATE-N	0.0994*	NITRITE-N	0.0994*
PHOSPHATE	-9	POTASSIUM	1.3114
SODIUM	232.9992	SULPHATE	118.9248
NO ₂ + NO ₃	-9	TOTAL HARDNESS	116

ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.3	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9

HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks:

-9 indicates that no analysis was done for this parameter

*Indicates concentrations less than.

Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
 DIC - Dissolved Inorganic Carbon
 DOC - Dissolved Organic Carbon
 TDS - Total Dissolved Solids

SAR - Sodium Adsorption Ratio
 COD - Chemical Oxygen Demand
 TN - Total Particulate Nitrogen
 TC - Total Particulate Carbon

**NOTE: This data may not be fully checked.
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ALBERTA ENVIRONMENT CHEMICAL ANALYSIS REPORT

WELL NAME: FREEMAN, JEAN
 LOCATION: LSD SW SEC 14 TWP 041 RG 28 M 4
 WELL DEPTH: 107
 AQUIFER:
 SAMPLING DATE: 9/20/1981 TIME: 0

WELL ID No:0275006
 SAMPLE No: 8602
 WATER LEVEL: 34
 LABORATORY: AE
 PRINT DATE: 5/24/2007

FIELD:	MG/L
BICARBONATE	-9
CHLORIDE	-9
DISSOLVED OXYGEN	-9
IRON	-9
PH	-9
S2	-9
TOTAL ALKALINITY	-9

FIELD:	MG/L
CARBONATE	-9
CONDUCTIVITY	-9
EH	-9
MANGANESE	-9
SULPHATE	-9
TEMPERATURE°C	-9
TOTAL HARDNESS	-9

LABORATORY: Analysis Date: 10/9/1981

COD	-9
DIC	-9
ION BALANCE	0.92
SAR	-9
TOTAL ALKALINITY	523
TDS	777
DOC	-9

CONDUCTIVITY	1300
FLUORIDE	0.21
PH	8.7
SIO2	8.4
TC	-9
TN	-9

AMMONIUM-N	-9
CALCIUM	0.998*
CHLORIDE	1.0011*
NITRATE-N	-9
PHOSPHATE	-9
SODIUM	287.9991
NO ₂ + NO ₃	0.0144*

BICARBONATE	598.8065
CARBONATE	18.999
MAGNESIUM	3.002304
NITRITE-N	0.0504*
POTASSIUM	1.4141
SULPHATE	169.896
TOTAL HARDNESS	10

ALUMINUM	-9
BARIUM	-9
CADMIUM	-9
COBALT	-9
IRON	0.11
MANGANESE	-9
MOLYBDENUM	-9
SELENIUM	-9
VANADIUM	-9

ARSENIC	-9
BERYLIUM	-9
CHROMIUM	-9
COPPER	-9
LEAD	-9
MERCURY	-9
NICKEL	-9
STRONTIUM	-9
ZINC	-9

HYDROCARBONS	-9
PHENOLICS	-9

PESTICIDES	-9
OTHER 3	0

Remarks: CATIONS=12.85; ANIONS=14.02.

-9 indicates that no analysis was done for this parameter

*Indicates concentrations less than.

Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
 DIC - Dissolved Inorganic Carbon
 DOC - Dissolved Organic Carbon
 TDS - Total Dissolved Solids

SAR - Sodium Adsorption Ratio
 COD - Chemical Oxygen Demand
 TN - Total Particulate Nitrogen
 TC - Total Particulate Carbon

NOTE: This data may not be fully checked.

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ALBERTA ENVIRONMENT CHEMICAL ANALYSIS REPORT

WELL NAME: LACOMBE FISH & GANME
 LOCATION: LSD SW SEC 14 TWP 041 RG 28 M 4
 WELL DEPTH: 60
 AQUIFER:
 SAMPLING DATE: 8/7/1982 TIME: 0

WELL ID No:0275018
 SAMPLE No: 6094
 WATER LEVEL: -9
 LABORATORY: AE
 PRINT DATE: 5/24/2007

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9

LABORATORY: Analysis Date: 7/13/1982

COD	-9	CONDUCTIVITY	824
DIC	-9	FLUORIDE	0.3
ION BALANCE	0.93	PH	8.6
SAR	-9	SiO2	8.8
TOTAL ALKALINITY	385	TC	-9
TDS	474	TN	-9
DOC	-9		

AMMONIUM-N	-9	BICARBONATE	443.8543
CALCIUM	7.984	CARBONATE	12
CHLORIDE	1.0011*	MAGNESIUM	3.002304
NITRATE-N	-9	NITRITE-N	0.0504*
PHOSPHATE	-9	POTASSIUM	1.817
SODIUM	173.9996	SULPHATE	54.9648
NO ₂ + NO ₃	0.0144*	TOTAL HARDNESS	32

ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.2	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9

HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks: CATIONS=8.26; ANIONS=8.89.

-9 indicates that no analysis was done for this parameter

*Indicates concentrations less than.

Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential

DIC - Dissolved Inorganic Carbon

DOC - Dissolved Organic Carbon

TDS - Total Dissolved Solids

SAR - Sodium Adsorption Ratio

COD - Chemical Oxygen Demand

TN - Total Particulate Nitrogen

TC - Total Particulate Carbon

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ALBERTA ENVIRONMENT CHEMICAL ANALYSIS REPORT

WELL NAME: WILSON, DAN
 LOCATION: LSD SW SEC 14 TWP 041 RG 28 M 4
 WELL DEPTH: 100
 AQUIFER:
 SAMPLING DATE: 4/22/1985 TIME: 0

WELL ID No:0275023
 SAMPLE No: 4321
 WATER LEVEL: -9
 LABORATORY: AE
 PRINT DATE: 5/24/2007

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9

LABORATORY: Analysis Date: 5/16/1985

COD	-9	CONDUCTIVITY	1052
DIC	-9	FLUORIDE	1.09
ION BALANCE	0.98	PH	8.8
SAR	-9	SIO2	6.8
TOTAL ALKALINITY	410	TC	-9
TDS	625	TN	-9
DOC	-9		

AMMONIUM-N	-9	BICARBONATE	465.8448
CALCIUM	0.998*	CARBONATE	17.001
CHLORIDE	1.0011*	MAGNESIUM	1.000768*
NITRATE-N	-9	NITRITE-N	0.0504*
PHOSPHATE	-9	POTASSIUM	0.60435
SODIUM	245.0006	SULPHATE	129.9168
NO ₂ + NO ₃	0.0144*	TOTAL HARDNESS	5*

ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.05	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9

HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks: CATIONS=10.8; ANIONS=10.99.

-9 indicates that no analysis was done for this parameter

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EH - Oxidation-Reduction Potential

DIC - Dissolved Inorganic Carbon

DOC - Dissolved Organic Carbon

TDS - Total Dissolved Solids

SAR - Sodium Adsorption Ratio

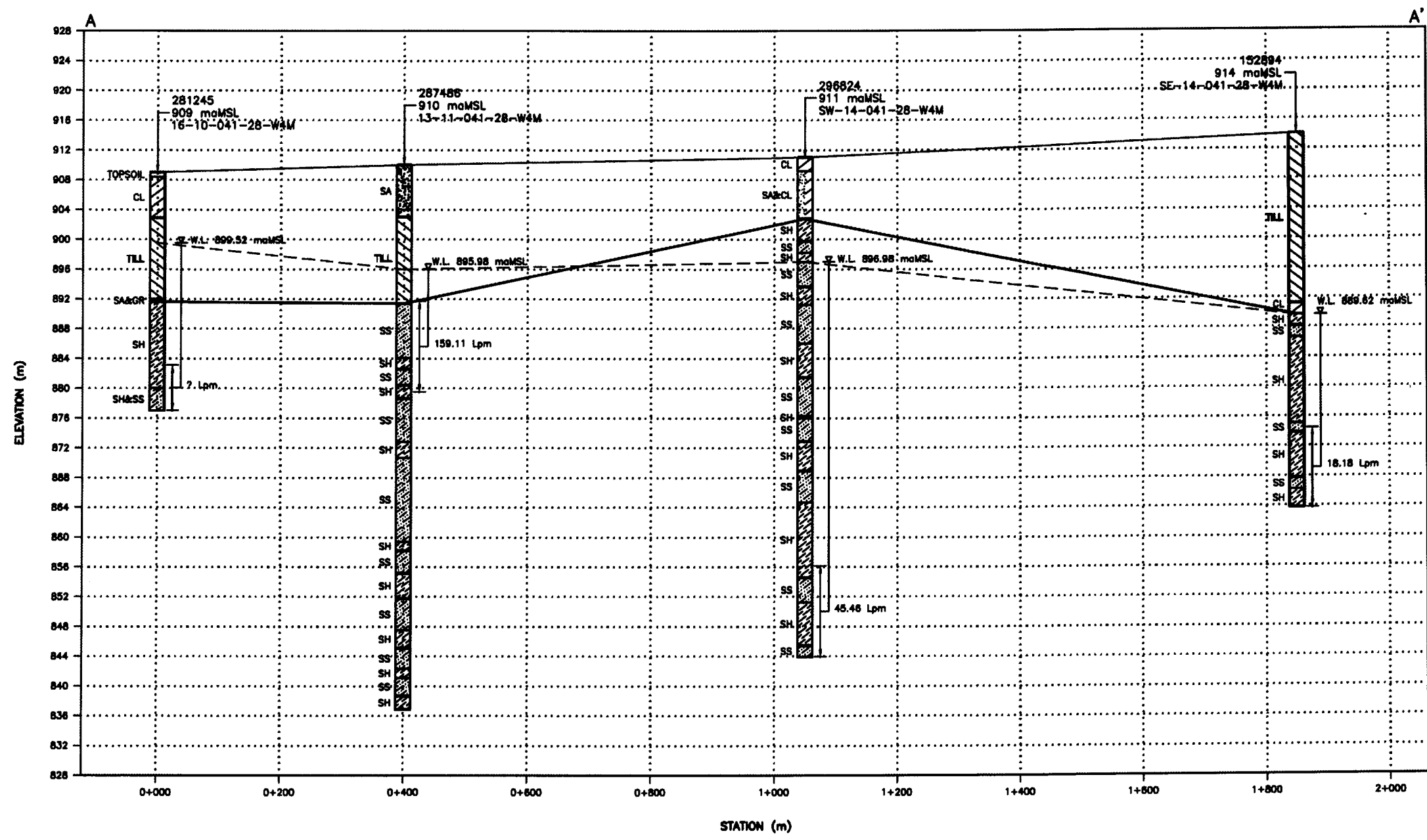
COD - Chemical Oxygen Demand

TN - Total Particulate Nitrogen

TC - Total Particulate Carbon

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- LEGEND:**
- INTERPRETED GROUND SURFACE
 - INTERPRETED BEDROCK SURFACE
 - - - INTERPRETED WATER TABLE/PIEZOMETRIC SURFACE CONFIGURATION
 - TOPSOIL
 - ▨ CLAY
 - ▧ TILL
 - ▩ GRAVEL
 - SAND
 - SHALE
 - ▬ SANDSTONE

- 18.18 Lpm WATER REMOVAL DURING DRILL'S PRODUCTION TESTING (LITERS PER MINUTE).
- STATIC WATER LEVEL AT THE TIME OF COMPLETION.
- SCREENED INTERVAL.
- moMSL METERS ABOVE MEAN SEA LEVEL

- NOTES:**
1. WELLS LABELED BY WELL I.D. ON DRILL LOGS AND SECTION LOCATION.
 2. WELL LOCATIONS APPROXIMATED WITHIN THE QUARTER SECTION. SURFACE ELEVATIONS ESTIMATED FROM 1:50,000 CONTOUR MAP.
 3. VERTICAL SCALE HAS 12 EXAGGERATION.
 4. DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT THE BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN BOREHOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND SO MAY VARY FROM THAT SHOWN.



	1300382 Alberta Ltd. Groundwater Potential Study Proposed 100-lot Residential Development SW-14-041-28-W4M, Gull Lake, AB	
	HYDROGEOLOGICAL CROSS-SECTION A-A'	FIGURE 2
		JUN 2007 WL07-1291