AECOM

Public Works Government Services Canada

Monitoring Well Installation/Sampling & Capping of Waste Disposal Middens
Bar U Ranch National Historic Site, Longview, Alberta

Prepared by:

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Project Number:

106547-03

Date:

April 8, 2009

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April 8, 2009

Project Number: 106547-03

Ms. Laurie Washington
Senior Environmental Specialist
Environmental Services, Western Region
Public Works Government Services Canada
Telus Plaza North
10025 Jasper Avenue
Edmonton, Alberta T5J 1S6

Dear Ms. Washington:

Re: Monitoring Well Installation/Sampling & Capping of Waste Disposal Middens Bar U Ranch National Historic Site, Longview, Alberta

Please find attached three (3) copies and two (2) DC of the final report for the Monitoring Well Installation/Sampling and Capping of Waste Disposal Middens.

If you have comments or questions regarding the above, please contact the undersigned at (780) 453-0710.

Sincerely,
AECOM Canada Ltd.

Gordon Woollett, P.Eng.
gordon.woollett@aecom.com

GW:vad
Encl.

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	Gordon Woollett	March 9, 2009	Draft Report – Monitoring Well Installation/Sampling & Capping of Waste Disposal Middens – Bar U Ranch National Historic Site, Longview, Alberta
3	Gordon Woollett	April 8, 2009	Final Report – Monitoring Well Installation/Sampling & Capping of Waste Disposal Middens – Bar U Ranch National Historic Site, Longview, Alberta

Signature Page

Report Prepared By:	Report Reviewed By:
Mitch Bliss, E.I.T.	Gordon Woollett, P.Eng.

PROFESSIONAL ENGINEER ALBERTA
GORDON WOOLLETT
4/13/09

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature
Date Apr 14/09
PERMIT NUMBER: P10450
The Association of Professional Engineers, Geologists and Geophysicists of Alberta.

Executive Summary

AECOM was retained by Public Works and Government Services Canada to provide engineering services to assist with the remedial activities at the abandoned waste middens located at Bar U Ranch.

The remedial action included the capping of the two middens, the installation of four additional groundwater monitoring wells and the completion of a groundwater monitoring event of all onsite wells. AECOM was also responsible for contractor supervision and a quantity survey to track the amount of material being moved.

Groundwater samples were taken at the top and bottom of each waste midden as well as two downstream background samples. The sampling program included measuring groundwater levels in each of the wells and collecting groundwater samples from selected wells for dissolved metals, PAHs, pesticides and routine parameters analysis.

Blue Ridge Excavating Limited was awarded a contract to cap the two disposal middens. During the capping process, approximately of 2200 m^3 of clay fill material was hauled from a local borrow site to the two (2) midden sites. The ground contours of the final clay cap show that the disposal areas have been filled and the final grade of the coulees blends in with the natural grades of the adjacent slopes. Based on the final grades, there should be positive drainage away from the two (2) waste disposal sites and there should be no ponding of water in the areas were wastes have been deposited.

Groundwater results were compared to the *CCME Drinking Water Guidelines (2006)* and the *Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2008.)* Based on the results from this remedial program and groundwater investigation, the following conclusions can be made:

- Groundwater retrieved from wells within both waste middens showed exceedances of the CCME aesthetic objectives for sodium, iron and manganese. The wells which exceeded are MW1, MW3, MW4 and MW6.

- Groundwater concentrations for sodium, iron and manganese in the down gradient monitoring wells (ET-MW 14 and ET-MW16) were 2-3 orders of magnitude lower than the concentrations recorded in the wells in and adjacent to the two waste middens.

- Groundwater retrieved from ET-MW14 downstream of waste midden #1 showed exceedances of the applied criteria for manganese and TDS.

- Pesticide and PAH concentrations in all the analyzed groundwater samples were below the applicable remediation criteria and/or laboratory detection limits.

Based on the results from this investigation, the following recommendations can be made:

- Due to the elevated concentrations of metals in the groundwater samples collected around the two midden sites and the use of groundwater for drinking water purposes, it is recommended that an annual groundwater sampling event be completed to confirm that metal, PAH and pesticide concentrations remain stable and/or decrease. If concentrations are stable or decrease after three (3) consecutive sampling events, it is recommended that the monitoring program be halted and that the monitoring wells be decommissioned.

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1. Introduction

AECOM was retained by Public Works and Government Services Canada to provide engineering services to assist with groundwater monitoring and remedial activities at the abandoned waste middens located at Bar U Ranch. (Hereinafter referred to as the "Site"). A location plan and site plan are shown in **Appendix A**.

The remedial action included the capping of the two middens, the installation of four additional groundwater monitoring wells and the completion of a groundwater monitoring event. AECOM was also responsible for contractor supervision and a quantity survey to track the amount of material being moved to cap the two (2) abandoned waste disposal Sites.

This report presents a summary of the field data and observations gathered by AECOM.

2. Background

Bar U Ranch was in operation as an active ranch from 1881 to 1991 and has since become a National Historic Site under the management of Parks Canada. The Site is located between sloping foothills and the Rocky Mountains, approximately 14 kilometers south of Longview, Alberta. Bar U Ranch consists of thirty-five (35) structures and a visitor orientation centre illustrating various stages of ranching development. Onsite buildings include barns, sheds, pens and various other support structures.

The areas of interest are the two (2) waste middens located in coulees on the north portion of the ranch. The middens are approximately 100 meters apart and slope towards the southeast. Midden # 1 is the dumpsite furthest to the west and measures approximately 35 m x 8 m; Midden # 2 is east of the first midden and measures approximately 60 m x 10 m. The land surrounding the middens is primarily undulating agricultural land used for grazing. Pekisko Creek is located approximately 300 m southeast of the waste middens.

Based on the results of previous environmental site assessments and the development of a Risk Management Plan, a decision was made to complete a number of remedial activities at the two (2) midden sites. The activities included the capping of both dump sites as well as completion of a groundwater monitoring event.

3. Scope of Work

3.1 AECOM Scope of Work

AECOM was retained to provide engineering services to assist with the remedial activities at the abandoned waste middens located at Bar U Ranch. The engineering services are described generally below:

- **Task 1 - Project Setup**
  - Completion of a Health and Safety Plan;
  - Development of field program methodologies.
- **Task 2 - Drilling and Monitoring Well Installation / Extension**
  - Location of underground utilities;
  - Installation of four monitoring wells at the base of the two midden areas;
  - Extension of wells, where required, to bring them up to the surface grade of the midden caps.

- **Task 3 - Groundwater Sampling**
  - Sampling of the specified wells on Site for the analysis of the specified analytical parameters.
- **Task 4 - Quantity Survey**
  - Completion of a topographic survey of the borrow pit and waste midden areas before and after backfill activities to provide an estimated volume of material moved.
- **Task 5 - Contractor Supervision**
  - Provide contractor supervision services during backfill activities;
  - Confirm excavation and backfill activities are being preformed as per project specifications.
- **Task 6 - Final Report**
  - Preparation of a summary report with a volume estimate for the amount of earth moved in addition to an analysis of laboratory results and all relevant figures.

3.2 Contractor Scope of Work

Following a MERX tending process, Blue Ridge Excavating Limited was retained by Parks Canada to complete all the earthworks necessary to stockpile topsoil and complete the capping of the waste middens. The contractors' services are described generally below:

- **Task 1 – Mobilization / Demobilization**
  - Mobilization and demobilization of all personnel, equipment, support facilities and materials required for earthworks.
- **Task 2 – Upgrade of Hauling Route / Borrow Source Arrangements**
  - Placement of gravel fill in required areas of the haul route.
  - Contractor responsible for contacting the property owner of the borrow source and making all necessary arrangements to utilize the borrow source.
- **Task 3 – Topsoil Stockpiling**
  - Excavation of topsoil from the borrow area and transporting it near the Midden areas to be stockpiled for later use by Parks Canada.
  - The borrow source was located on privately owned land located northwest of the Bar U Ranch.
- **Task 4 – Capping of the Waste Middens**
  - Excavation and transport of approximately 2200 m^3 of soil from the borrow source area to the waste midden areas to be used for the capping of the middens;
  - Waste debris in the vicinity of the waste middens to be placed within the middens for capping. This includes rolls of mesh wire material currently on-site;
  - Backfilling operations at the waste middens to include backfilling around the risers of the groundwater monitoring wells currently on-site.

Field work and reporting for this project was completed by Gordon Woollett, P.Eng., Mitch Bliss, E.I.T. and Jon Nhieu, P.Eng. with Gordon Woollett, P.Eng. providing senior technical review.

4. Physical Site Description

An assessment of the subsurface conditions and characteristics was previously completed by Jacques Whitford Limited. The findings are presented in the *Waste Dump Sites Assessment*, which was prepared and submitted to Parks Canada in 2004. The information in Section 4.2 has been extracted from the 2004 Jacques Whitford report. **Photos 1-6** in **Appendix B** show the two (2) waste disposal middens and the surface debris.

4.1 Property Description

The two waste disposal middens are located in the northern portion of Bar U Ranch approximately 300 m northwest of Pekisko Creek. Midden # 1 is the dumpsite furthest to the west and measures approximately 35 m x 8 m; Midden # 2 is east of the first midden and measures approximately 60 m x 10 m. The waste middens are roughly 100 m apart and slope towards the southeast. Waste generated by historic ranching activities at Bar U Ranch during its 100+ years of operation has been placed in these naturally occurring coulees. The waste middens are suspected to contain unknown quantities of waste oil and fuel containers, pesticide and herbicide containers, glycol, batteries, creosote and CCA treated lumber, scrap metal, vehicles and paint containers. The land surrounding the middens is primarily undulating agricultural land used for grazing.

4.2 Soil, Topography and Drainage

Based on available surficial geology maps, the native surficial soils at the Site likely consist of till of even thickness with minor amounts of water-sorted material. Fine sediments consisting of sand, silt and clay with minor gravel beds are present adjacent to Pekisko Creek. Soils observed by Jacques Whitford were similarly classified. Regional surface drainage appears to be southeast towards Pekisko Creek, located approximately 300 meters southeast of the dump sites.

4.3 Groundwater Usage

A search of the Alberta Environment database for records of water wells located within a 1 km radius of the site was conducted. The provincial records indicated there were twenty-two (22) data records (water well reports) within 1 km of the site. It should be noted that the database states *"The list is not intended to be a true reflection of the exact number and location of the water wells for the area. The report may also appear as if certain records are duplicated. The same record will appear multiple times on the summary sheet each time a different well test is conducted".* This indicates the well locations are not necessarily accurate but are close to the location of interest. **Table 1** outlines the details of each of the wells.

Table 1 Water Well Search Results

Well ID	Drill Date	Approximate Distance from Site	Depth of Well	Anticipated Use
0350122	1990/03/16	0 m	9.8 m	Domestic
0360180	1991/08/23	429 m	48.8 m	Domestic
0360181	1991/08/23	429 m	54.9 m	Domestic & Stock
0361384	1991/08/19	580 m	Unknown	Domestic
0369429	1993/09/28	580 m	64.0 m	Domestic
0370152	1993/09/28	580 m	61.0 m	Domestic
0370153	1993/09/28	429 m	64.0 m	Domestic
0378438	1994/05/30	0 m	73.2 m	Municipal

Well ID	Drill Date	Approximate Distance from Site	Depth of Well	Anticipated Use
0378440	1994/05/30	0 m	61.0 m	Municipal
0378441	1994/05/30	0 m	36.6 m	Municipal
0385172	1989/09/29	580 m	82.3 m	Unknown
0385186	1975/10/14	429 m	27.4 m	Domestic
0385187	1976/02/06	429 m	152.4 m	Investigation
0385209	1986/02/18	411 m	61.0 m	Stock
0385226	1987/11/19	411 m	59.4 m	Stock
0385232	1975/05/07	0 m	Unknown	Unknown
0385233	1975/05/07	0 m	18.3 m	Unknown
0385953	1994/08/16	424 m	67.1 m	Domestic & Stock
0385959	1994/08/16	350 m	97.5 m	Domestic & Stock
0385961	1994/08/16	344 m	70.1 m	Domestic & Stock
0385965	1994/08/16	386 m	67.1 m	Domestic & Stock
0467773	1997/09/17	392 m	54.9 m	Domestic

Previous environmental assessments confirmed that privately owned groundwater wells are located within 500 m and Parks Canada drinking water wells are approximately 700 m from the middens. Therefore, the groundwater ingestion pathway remediation criteria will be applied to the subject property. The copies of the water well reports are presented in **Appendix E**.

5. Summary of Remedial Activities

Blue Ridge Excavating Limited made arrangements with a local landowner to obtain the fill material required for the project. A dugout was excavated northwest of the waste middens on the adjacent section of land to supply the necessary fill material to cap the waste middens. The final dimensions of the borrow pit were approximately 30 m x 30 m with a depth ranging from 2 m to 3 m. These dimensions are consistent with the contractors' estimate of 2200 m^3 of fill material moved during the backfill operations. It should be noted that the borrow pit filled with water and froze before the surveyors could perform the final topographic survey of the bottom of the borrow pit; therefore, the quantity of fill material was not confirmed with a quantity survey. Photos of the borrow site are presented in **Appendix B**.

The initial and final topographic surveys of the borrow pit are presented in **Figures 2** and **3** in **Appendix C**. **Figures 2** and **3** also show the ground contours at both midden sites before and after the placement of the clay cap. As indicated in **Figure 3**, the final contours show that the disposal areas have been filled and the final grade of the coulees blends in with the natural grades of the adjacent slopes. Based on the final grades, there should be positive drainage away from the two (2) waste disposal sites and there should be no ponding of water in the areas were wastes have been deposited.

Clay material excavated from the dugout was hauled by truck to the Site and dumped into the coulees to fully cover all the specified waste materials. A track dozer was used to compact the fill material and to provide a final grade which transitioned smoothly to the surrounding landscape. Affected wells were raised and re-capped to ensure accessibility in the future. Photos taken during the capping of the middens are included in **Appendix B**. Initial and final topographic surveys were preformed at the waste middens and can be seen in **Appendix C**.

In addition to the excavation of the borrow pit and capping of the waste middens minor upgrades were made to the haul route between the two (2) locations. The gravel road connecting the waste middens to the borrow pit site had several ruts and uneven areas and were filled in with gravel by Blue Ridge Excavating. A damaged culvert was in place in a low area along the route and was replaced with a new larger one to ensure that any heavy equipment attempting to cross in the future could do so safely and without further damaging the road.

6. Methodology

6.1 Monitoring Well Installation and Groundwater Sampling

Four (4) additional monitoring wells were installed by BECK Drilling and Environmental Services Limited to better assess the background groundwater conditions on Site. Two (2) of the wells (ET-MW14 and ET-MW15) were installed down gradient of Waste Midden # 1 and the other two wells (ET-MW16 and ET-MW17) were installed down gradient of Waste Midden # 2. Where necessary, groundwater wells were extended using PVC couplers and 50-mm diameter PVC pipe. The extended wells were then re-set in place with Redi-Mix concrete to ensure they were stabilized and flush with the new grades of the Middens. MW11 was removed from the Site as it was found to be damaged.

Groundwater monitoring wells were installed according to CCME document EPC-NCSRP-48E March 1994; entitled Subsurface Assessment Handbook for Contaminated Sites. Each groundwater monitoring well was equipped with a permanent standpipe. The standpipe consisted of a 50-mm diameter machine slotted (0.020 slot) PVC well screen. The annulus around and just above the screened portion was backfilled with silica # 9 sand. The remainder of the borehole was backfilled with bentonite and cement to prevent infiltration of surface water. A flush mounted bolt-down steel casing protector was also used to protect the monitoring wells. The detailed completion of each monitoring well is recorded in the borehole logs in **Appendix D**.

The water levels were measured using an electronic water level tape on November 27 and 28, 2008 and are further discussed in Section 7.1. The groundwater monitoring wells were purged by bailing three (3) well volumes using a one-litre capacity dedicated PVC bailer prior to sampling. Groundwater samples for laboratory analysis were stored in laboratory provided glass and/or plastic containers and then delivered to ALS Laboratory Group for analysis.

6.2 Laboratory Analysis

Selected groundwater samples were submitted to ALS Laboratory Group for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), F1 to F4 hydrocarbon fractions, PAHs (Polycyclic Aromatic Hydrocarbons), pesticides and routine parameters. ALS Laboratory Group is a member of the Canadian Association of Environmental Analytical Laboratories (CAEAL) and is accredited by the Standards Council of Canada (SCC). Copies of the ALS analytical reports are reproduced in **Appendix F**.

6.3 Regulatory Criteria

Selection of appropriate assessment/remediation criteria is based on the most sensitive allowable land use. Groundwater wells in the vicinity of the Site are suspected to be in use by the local residents and therefore residential land-use criteria will be applied.

In an effort to be consistent with previous environmental assessments of this Site *CCME Drinking Water Guidelines (2006)* are used. The results of laboratory analyses were also compared to *Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2008)*. The Alberta Tier I guidelines provide additional remediation objectives for PAHs and pesticides and allow for a better assessment of groundwater conditions.

7. Groundwater Sampling Results

Groundwater samples were taken at the top and bottom of each waste midden as well as two (2) downstream background samples. The sampling program included measuring groundwater levels in each of the wells and collecting groundwater samples from selected wells for dissolved metals, PAHs, pesticides and routine parameter analysis. **Table 2** presents a summary of the groundwater elevation data and it was determined that groundwater generally flows southeast towards Pekisko Creek.

Table 2 Groundwater Elevation Data

Well ID	Depth to Water (m)	Depth to Bottom (m)
MW1	1.883	14.186
MW2	2.928	5.888
MW3	2.463	2.906
MW4	5.728	11.634
MW5	-	2.873
MW6	1.704	2.738
MW7	3.294	6.083
MW8	1.947	6.052
MW9	2.002	2.993
MW10	3.333	6.039
MW11	-	2.360
MW12	1.928	3.093
MW13	2.837	4.558
ET-MW14	1.933	4.048
ET-MW15	1.787	3.698
ET-MW16	2.015	4.387
ET-MW17	2.182	4.411

Table 3 on the following page presents a summary of the metals analysis for the groundwater samples collected from the monitoring wells. This table indicates that sodium exceedances above criteria were identified in wells MW1 and MW4, iron exceedances in wells MW4 and MW6, manganese exceedances in wells MW1, MW3, MW4, MW6 and ET-MW14, and an aluminum exceedance in MW4. It should be noted that all of these exceedances were above CCME aesthetic criteria. It was also noted that in the newly installed down gradient wells, the only metal exceedance above criteria was manganese in ET-MW14, there were no exceedances in ET-MW16.

Table 4 shows a summary of the polycyclic aromatic hydrocarbon (PAH) analysis of groundwater collected from the monitoring wells. No exceedances above criteria were identified in the analyzed samples and many of the PAH compounds were below laboratory detection limits.

Table 5 shows a summary of the pesticide analysis, as indicated in this table, the pesticide concentrations were all below the laboratory detection limits.

Table 6 shows a summary of the routine parameter analysis of groundwater collected from selected groundwater monitoring wells. It shows a TDS exceedance above drinking water criteria in ET-MW14.

A copy of all laboratory results for groundwater analysis can be found in **Appendix F**.

Table 3 Summary of Metals Analysis

Parameter	CCME Guidelines[1]	AB Tier I Guidelines[2]	Range of Values From Previous Assessments[3]	Units	Well Identification					
					MW1	MW3	MW4	MW6	ET - MW14	ET - MW16
Calcium	-	-	161 - 620	mg/L	529	167	367	195	107	65.9
Potassium	-	-	5.9 - 22.2	mg/L	9.9	4.1	14.4	6.6	6.9	3.3
Magnesium	-	-	95.1 - 1480	mg/L	404	102	402	161	37.4	15.2
Sodium	200*	200	< 0.005 - 766	mg/L	537	60.2	1040	166	32.7	7.1
Iron	0.3*	0.3	< 0.005 - 0.089	mg/L	0.117	0.006	2.88	1.17	0.006	<0.005
Manganese	0.05*	0.05	< 0.005 - 1.46	mg/L	2.74	0.152	2.63	0.282	0.113	0.008
Silver	-	0.0001	< 0.0001 - 0.0002	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aluminum	0.1*	0.1	< 0.0005	mg/L	0.05	<0.01	0.1	0.01	<0.01	<0.01
Boron	5	5	0.046 - 0.19	mg/L	0.12	0.06	0.17	0.08	0.05	<0.05
Barium	1	1	0.047 - 0.256	mg/L	0.026	0.043	0.035	0.053	0.093	0.11
Beryllium	-	-	< 0.0005	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	0.005	0.005	< 0.0001 - 0.0002	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	-	-	< 0.0001 - 0.0048	mg/L	0.005	<0.002	0.012	<0.002	<0.002	<0.002
Chromium	0.05	0.05	< 0.005 - 0.007	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	1*	1	< 0.005 - 0.012	mg/L	0.007	0.002	0.008	0.002	0.002	<0.001
Molybdenum	-	-	< 0.05 - 0.012	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel	-	0.15	< 0.001 - 0.021	mg/L	0.028	0.005	0.057	0.005	0.003	0.003
Lead	0.01	0.01	< 0.0005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin	-	-	< 0.001 - 0.001	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Strontium	-	-	1.31 - 5.89	mg/L	7.54	1.52	9.18	2.09	0.624	0.353
Titanium	-	-	0.003	mg/L	0.004	<0.001	0.005	<0.001	<0.001	<0.001
Thallium	-	-	< 0.0001	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	-	-	< 0.0005 - 0.0024	mg/L	<0.001	<0.001	0.001	0.001	<0.001	<0.001
Zinc	5*	0.03	< 0.005 - 0.052	mg/L	0.004	0.003	0.007	0.002	<0.002	<0.002

Notes:

[1] CCME Drinking Water Guidelines (2006), based on Health Canada's Guidelines for Canadian Drinking Water Quality.

[2] Alberta Tier I Guidelines (2007), Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses.

[3] Values taken from "*Waste Dump Sites Assessment*" - Jacques Whitford (2004) and "*Human and Ecological Risk Assessment Former Waste Disposal Middens*" – Meridian Environmental Inc. (2007).

* Criteria based on aesthetic objectives.

Shaded values indicate an exceedance to CCME criteria.

Table 4 Summary of Polycyclic Aromatic Hydrocarbon Analysis

Parameter	CCME Guidelines[1]	AB Tier I Guidelines[2]	Range of Values From Previous Assessments[3]	Units	Well Identification					
					MW1	MW3	MW4	MW6	ET - MW14	ET - MW16
Naphthalene	-	0.0011	< 0.00001 - 0.000178	mg/L	<0.00001	<0.00001	<0.00001	0.00003	0.00003	0.00002
Quinoline	-	-	-	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	-	0.0011	< 0.00001	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001
Fluorene	-	0.0011	< 0.00001 - 0.000099	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00004	0.00002
Phenanthrene	-	0.0011	< 0.00001 - 0.000346	mg/L	0.00003	<0.00001	<0.00001	0.00003	0.00012	0.00003
Anthracene	-	0.0012	< 0.00001 - 0.00002	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acridine	-	-	-	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Fluoranthene	-	0.0014	< 0.00001 - 0.000053	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.00001
Pyrene	-	0.0016	< 0.00001 - 0.000116	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00007	0.00003
Benzo(a)anthracene	-	-	< 0.00001 - 0.00002	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chrysene	-	-	< 0.00001 - 0.000078	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001
Benzo(b&j)fluoranthene	-	-	-	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001
Benzo(k)fluoranthene	-	-	< 0.00001 - 0.000013	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(a)pyrene	-	0.000015	< 0.00001 - 0.000024	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001
Indeno(1,2,3-cd)pyrene	-	-	< 0.00001 - 0.000015	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dibenzo(a,h)anthracene	-	-	< 0.00001 - 0.000012	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

Notes:

[1] CCME Drinking Water Guidelines (2006), based on Health Canada's Guidelines for Canadian Drinking Water Quality.

[2] Alberta Tier I Guidelines (2007), Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses.

[3] Values taken from "*Waste Dump Sites Assessment*" - Jacques Whitford (2004) and "*Human and Ecological Risk Assessment Former Waste Disposal Middens*" – Meridian Environmental Inc. (2007).

Table 5 Summary of Pesticide Analysis

Parameter	CCME Guidelines[1]	AB Tier I Guidelines[2]	Range of Values From Previous Assessments[3]	Units	Well Identification		
					MW1	MW3	ET - MW14
p,p' - DDD	-	-	< 0.004	mg/L	<0.0001	<0.0001	<0.0001
p,p' - DDE	-	-	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
p,p' - DDT	-	0.000001	< 0.004	mg/L	<0.0001	<0.0001	<0.0001
Aldrin	0.0007	0.0007	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
alpha - BHC	-	-	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
beta - BHC	-	-	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
gamma - BHC (Lindane)	-	0.00001	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
Quintozine (PCNB)	-	-	-	mg/L	<0.0001	<0.0001	<0.0001
cis - Chlordane	-	-	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
trans - Chlordane	-	-	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
Dieldrin	-	0.000056	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
Endosulfan I	-	0.00002	< 0.004	mg/L	<0.0001	<0.0001	<0.0001
Endosulfan II	-	0.00002	< 0.004	mg/L	<0.0001	<0.0001	<0.0001
Endrin	-	0.000036	< 0.004	mg/L	<0.0001	<0.0001	<0.0001
Heptachlor	-	0.0000038	< 0.002	mg/L	<0.0001	<0.0001	<0.0001
Methoxychlor	-	0.00003	< 0.04	mg/L	<0.0002	<0.0002	<0.0002
Mirex	-	-	< 0.004	mg/L	<0.0001	<0.0001	<0.0001
Nonachlor	-	-	-	mg/L	<0.0001	<0.0001	<0.0001
Oxychlordane	-	-	-	mg/L	<0.0001	<0.0001	<0.0001

Notes:

[1] CCME Drinking Water Guidelines (2006), based on Health Canada's Guidelines for Canadian Drinking Water Quality

[2] Alberta Tier I Guidelines (2007), Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

[3] Values taken from "*Waste Dump Sites Assessment*" - Jacques Whitford (2004) and "*Human and Ecological Risk Assessment Former Waste Disposal Middens*" – Meridian Environmental Inc. (2007)

Table 6 Summary of Routine Parameter Analysis

Parameter	CCME Guidelines[1]	AB Tier I Guidelines[2]	Range of Values From Previous Assessments[3]	Units	Well Identification	
					ET - MW14	ET - MW16
Chloride	250*	230	1.7 - 50.6	mg/L	6.8	1.2
Total Dissolved Solids (TDS)	500*	500	1260 - 12000	mg/L	606	294
Hardness (as $CaCO_3$)	-	-	806 - 7640	mg/L	451	256
Nitrate and Nitrite (as N)	-	-	< 0.07 - 1.00	mg/L	6.36	0.21
Nitrate - N	45	45	< 0.05 - 1.00	mg/L	6.36	0.21
Nitrite - N	-	-	< 0.05	mg/L	<0.05	<0.05
Sulphate	500*	500	647 - 8390	mg/L	184	47.4
pH	6.5 - 8.5*	6.5 - 8.5	6.17 - 9.29	pH	8.0	8.09
Conductivity	-	-	1.42 - 10000	µS/cm	918	494
Bicarbonate	-	-	514 - 1100	mg/L	393	287
Carbonate	-	-	< 5	mg/L	<5	<5
Hydroxide	-	-	< 5	mg/L	<5	<5
Total Alkalinity (as $CaCO_3$)	-	-	421 - 899	mg/L	322	236

Notes:

[1] CCME Drinking Water Guidelines (2006), based on Health Canada's Guidelines for Canadian Drinking Water Quality.

[2] Alberta Tier I Guidelines (2007), Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses.

[3] Values taken from "*Waste Dump Sites Assessment*" - Jacques Whitford (2004) and "*Human and Ecological Risk Assessment Former Waste Disposal Middens*" – Meridian Environmental Inc. (2007).

* *Criteria* based on aesthetic objectives.

Shaded values indicate an exceedance of CCME criteria.

8. Conclusions and Recommendations

Groundwater results were compared to the *CCME Drinking Water Guidelines (2006)* and the *Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2008).* Based on the results from this remedial program and groundwater investigation, the following conclusions can be made:

- Both midden sites were successfully capped and re-graded with clay material hauled to the site from a local borrow site.
- Groundwater retrieved from wells within both waste middens showed exceedances of the CCME aesthetic objectives for sodium, iron and manganese. The wells which exceeded are MW1, MW3, MW4 and MW6.
- Groundwater concentrations for sodium, iron and manganese in the down gradient monitoring wells (ET-MW 14 and ET-MW16) were 2-3 orders of magnitude lower than the concentrations recorded in the wells in and adjacent to the two waste middens.
- Groundwater retrieved from ET-MW14 downstream of waste midden #1 showed exceedances of the applied criteria for manganese and TDS.
- Pesticide and PAH concentrations in all the analyzed groundwater samples were below the applicable remediation criteria and/or laboratory detection limits.

Based on the results from this program, the following recommendations can be made:

- Due to the elevated concentrations of metals in the groundwater samples collected around the two (2) midden sites and the use of groundwater for drinking water purposes, it is recommended that an annual groundwater sampling event be completed to confirm that metal concentrations remain stable and/or decrease. If concentrations are stable or decrease after three (3) consecutive sample events sampling events, it is recommended that the monitoring program be halted and that the monitoring wells be decommissioned.

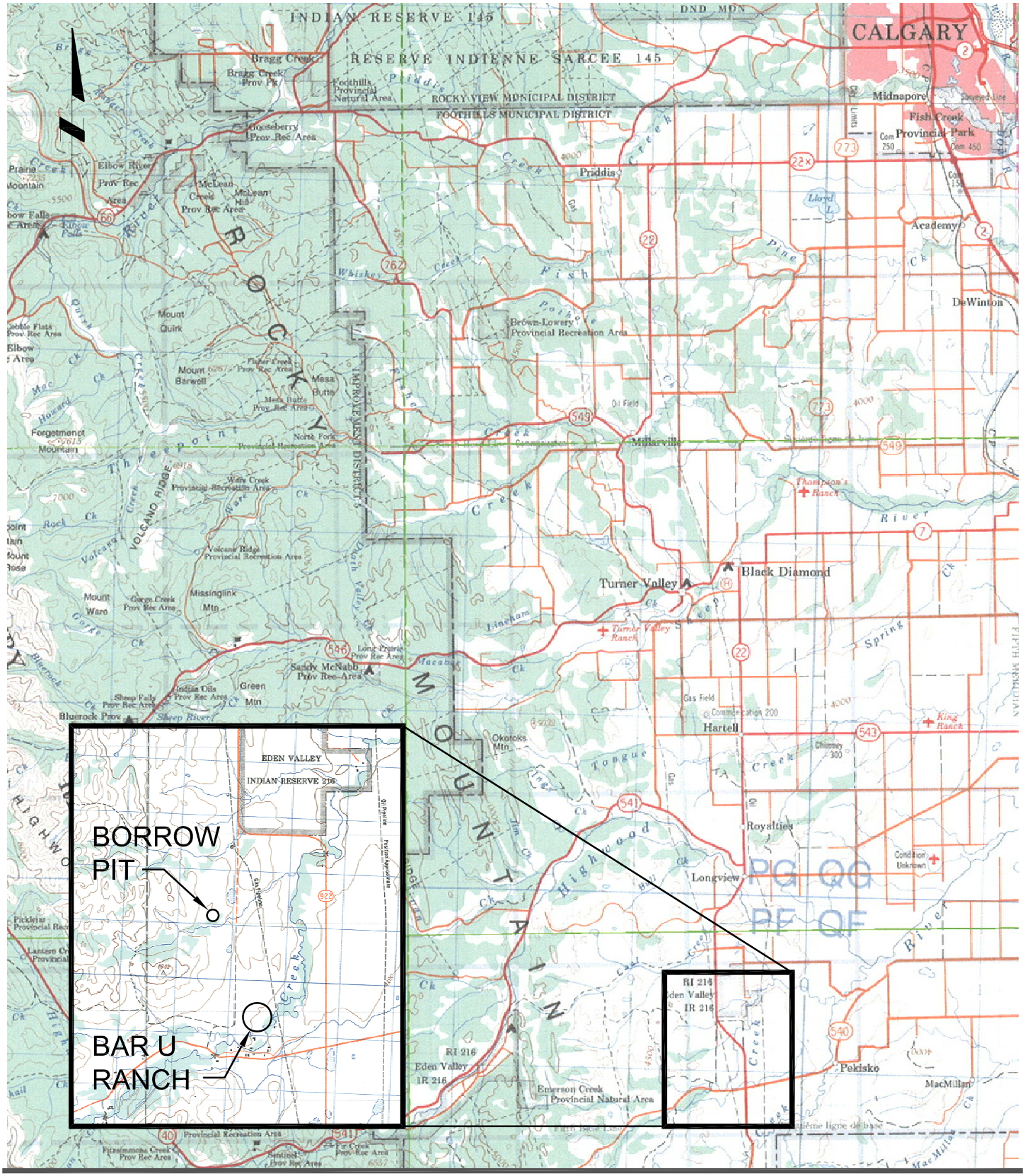
9. Closure

The use of this report is governed by the standard AECOM document Special Provisions - Environmental Site Services which is included in **Appendix G**.

Appendices

Appendix A

Figures



SCALE: NTS

Bar U Ranch National Historical Site, AB
Waste Disposal Site Closure

AECOM

SITE LOCATION

March, 2009

Figure 1

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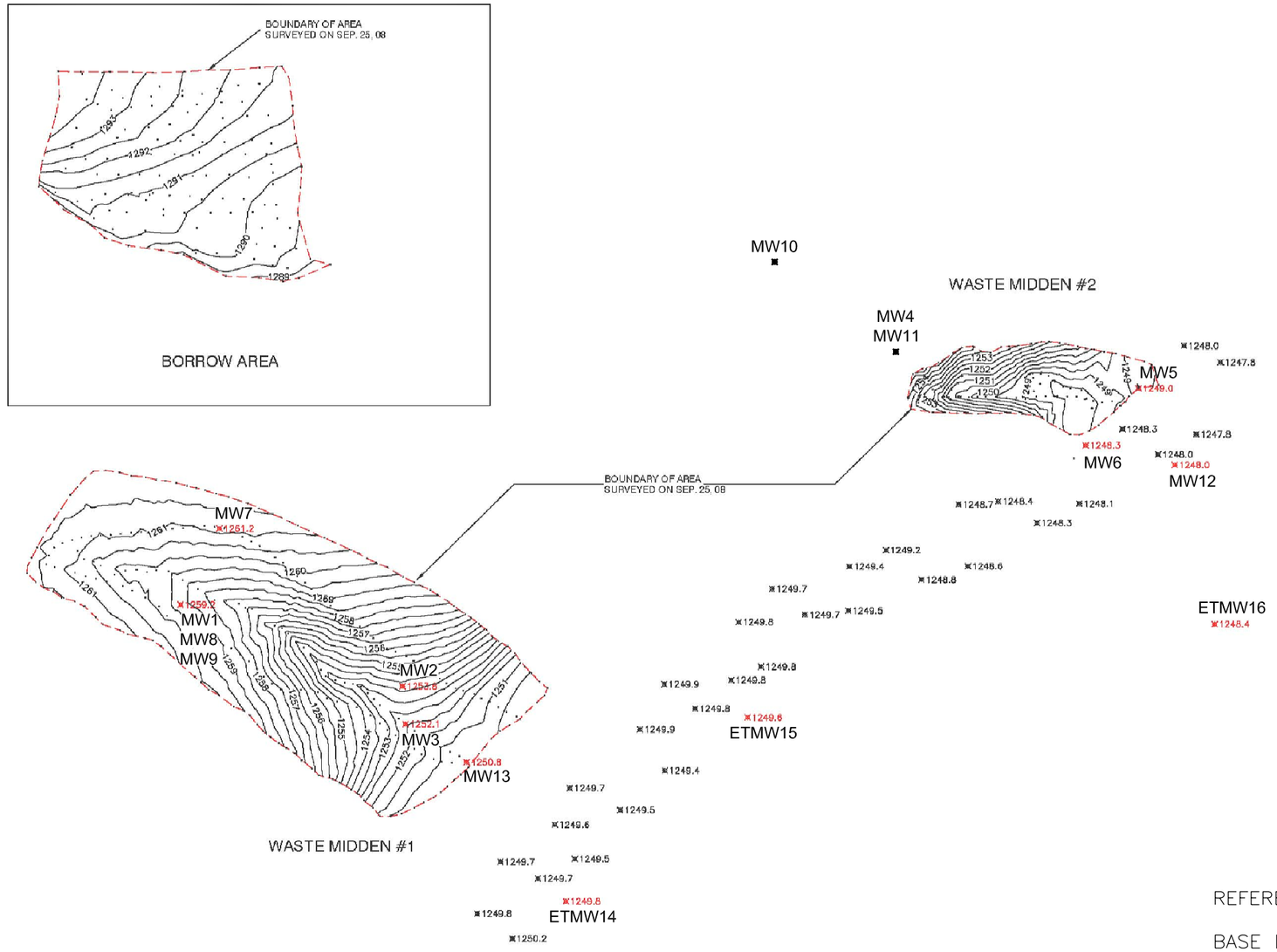


REFERENCE:

BASE DRAWING IS REFERENCED FROM FOCUS SURVEYS LTD'S "TOPOGRAPHIC INFORMATION BAR U RANCH NATIONAL HISTORIC SITE" DRAWING 1 OF 2 DATED DEC. 8, 2008 (FILE: 020300 149-Dec5-08.dwg). ORIGINAL GROUND SURVEYED ON SEPT. 25, 2008.

SCALE: NTS

Bar U Ranch National Historical Site, AB
Waste Disposal Site Closure

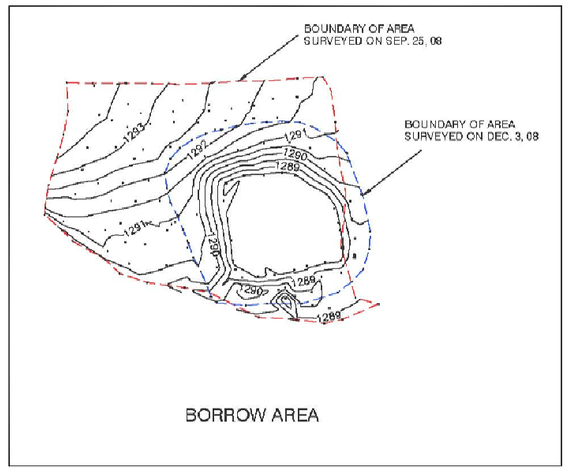
AECOM

ORIGINAL DISPOSAL SITE PLAN

File Saved Date: 3/5/2009 4:02 PM
Filename: L:\work\106000\106547\02a-CAD\ENV\Figures\106547 - Figure 2.dwg

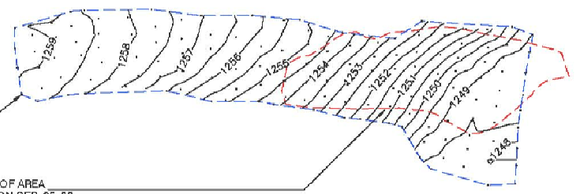
March, 2009

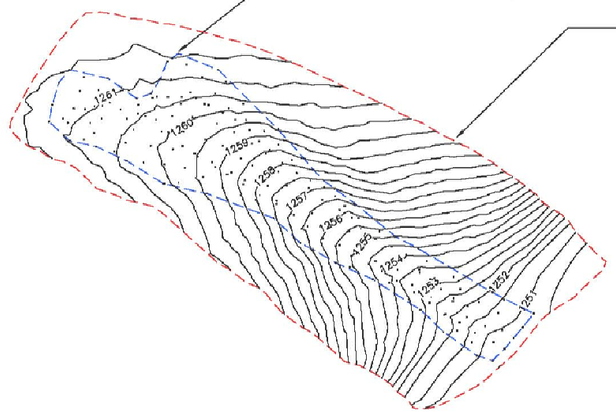
Figure 2



BORROW AREA

WASTE MIDDEN #2





WASTE MIDDEN #1

TABLE OF VOLUMES		
BORROW AREA	±1487 Cu.m	Cut
WASTE MIDDEN #1	± 756 Cu.m	Fill
WASTE MIDDEN #2	± 607 Cu.m	Fill

REFERENCE:

BASE DRAWING IS REFERENCED FROM FOCUS SURVEYS LTD'S "TOPOGRAPHIC INFORMATION BAR U RANCH NATIONAL HISTORIC SITE" DRAWING 2 OF 2 DATED DEC. 8, 2008 (FILE: 020300 149-Dec5-08.dwg). ORIGINAL SURVEYED ON DEC. 3, 2008.

SCALE: NTS

Bar U Ranch National Historical Site, AB
Waste Disposal Site Closure

AECOM

CAPPED DISPOSAL SITE PLAN
Figure 3

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March, 2009

Appendix B

Photographs

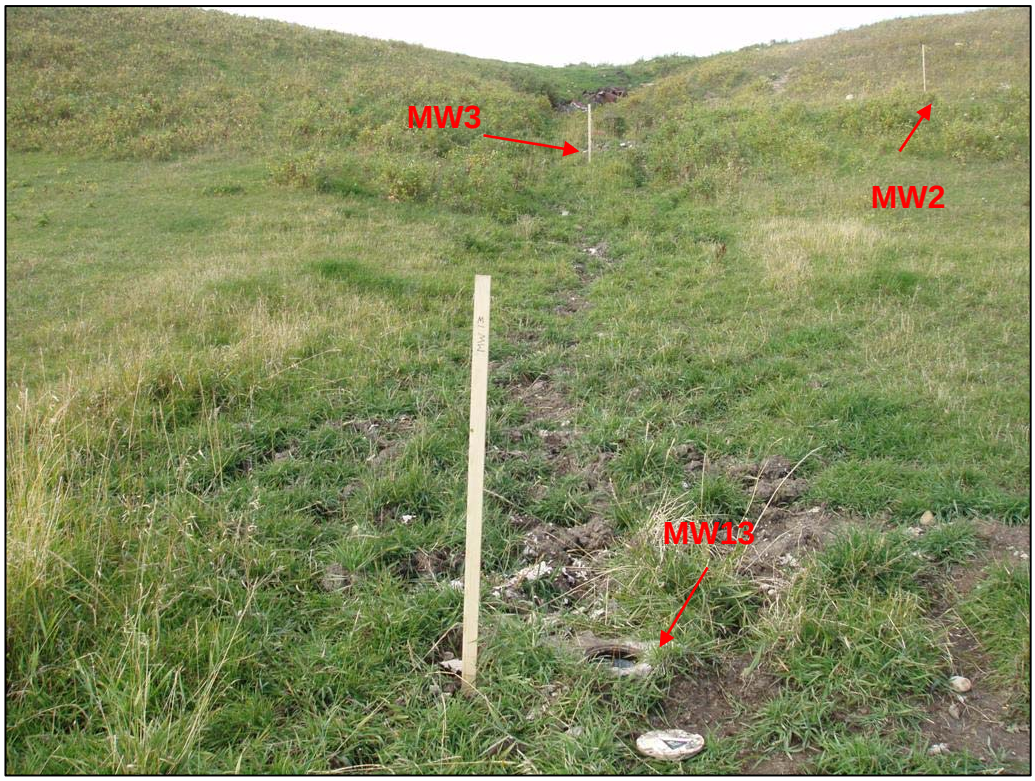


Photo 1: Looking northwest up waste midden #1

Photo 2: Visible contents of waste midden #1

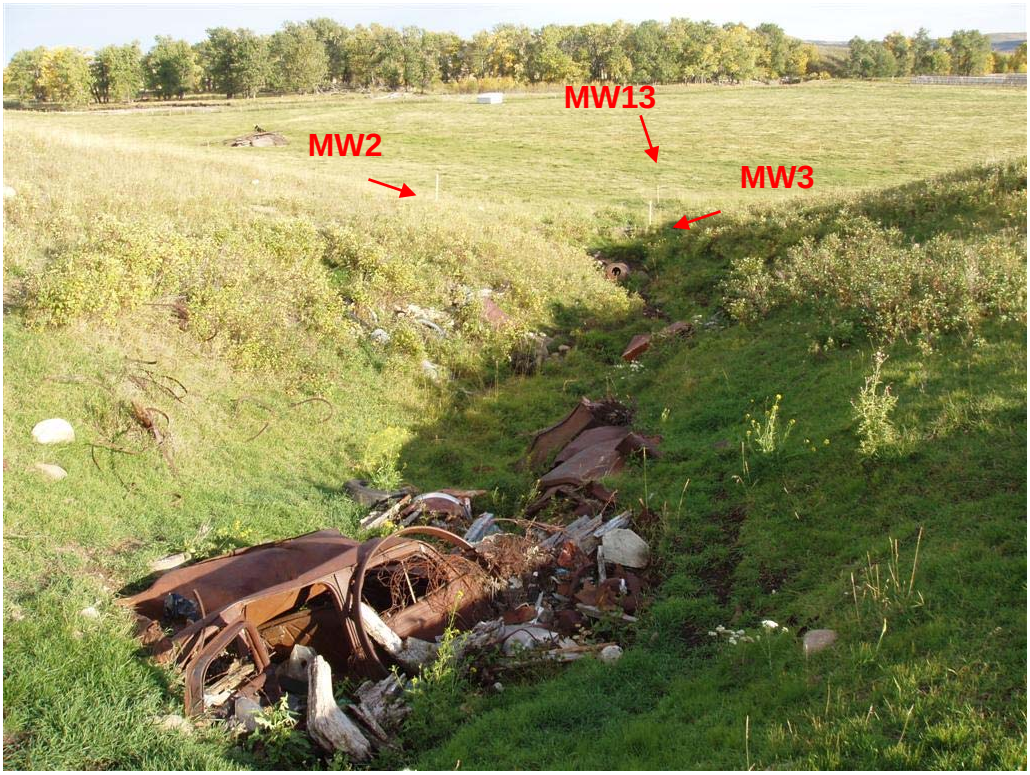


Photo 3: Looking southeast down waste midden #1

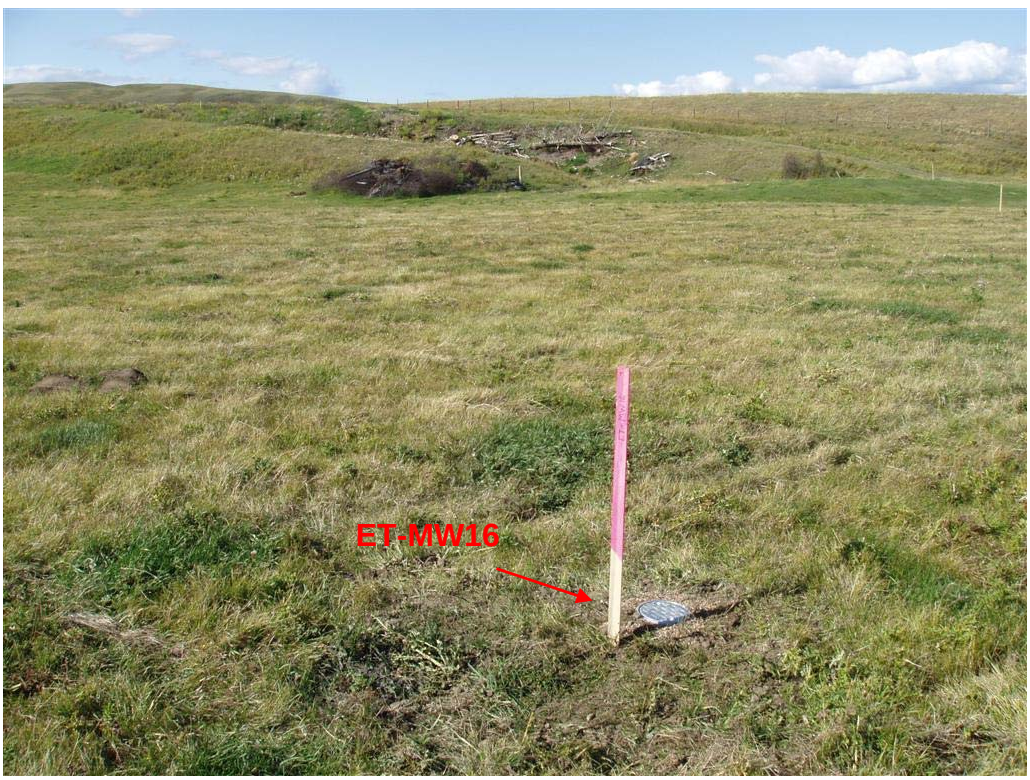


Photo 4: Looking north towards waste midden #2

Photo 5: Looking southeast down waste midden #2

Photo 6: Rolls of scrap wire at the base of waste midden #2

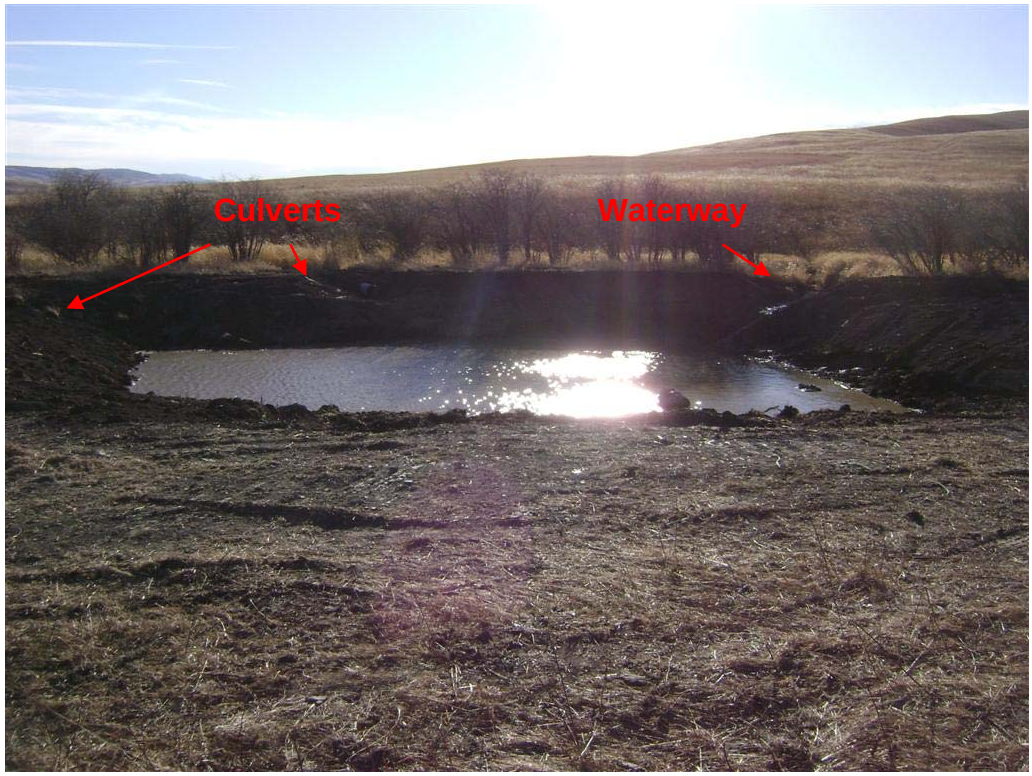


Photo 7: Finished borrow pit

Photo 8: Borrow pit when final topographic survey performed

Photo 9: Topsoil stockpile looking east from waste midden #2

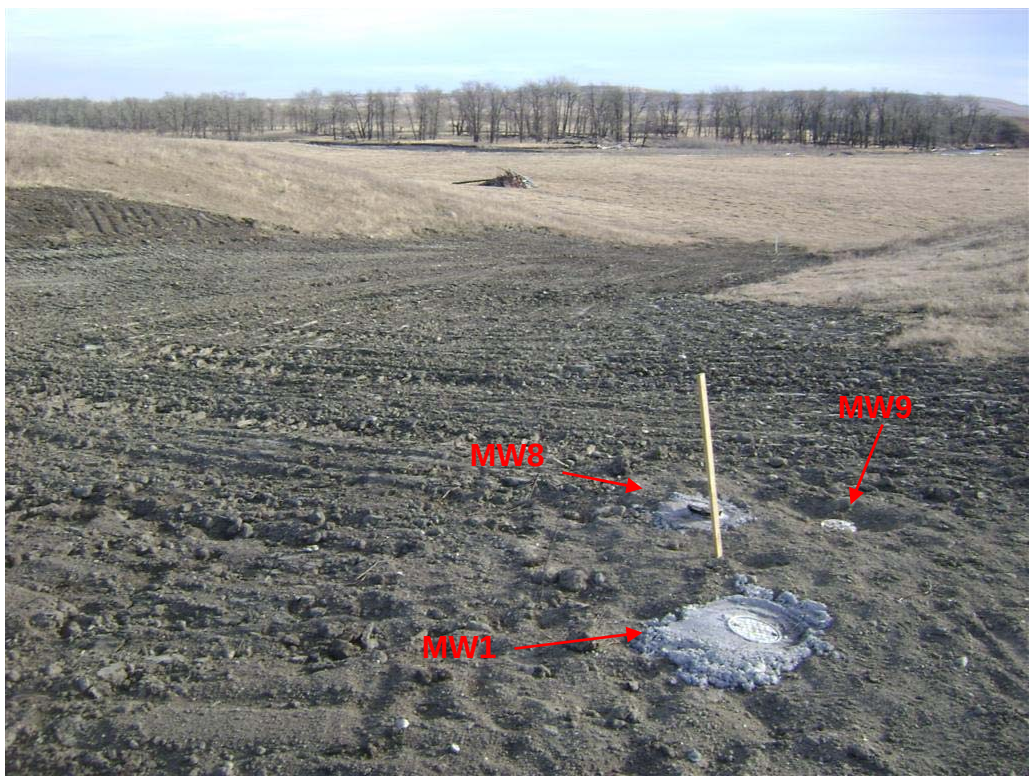


Photo 10: Looking southeast down capped waste midden #1

Photo 11: Looking northwest up capped waste midden #1

Photo 12: Looking northeast towards capped waste midden #2

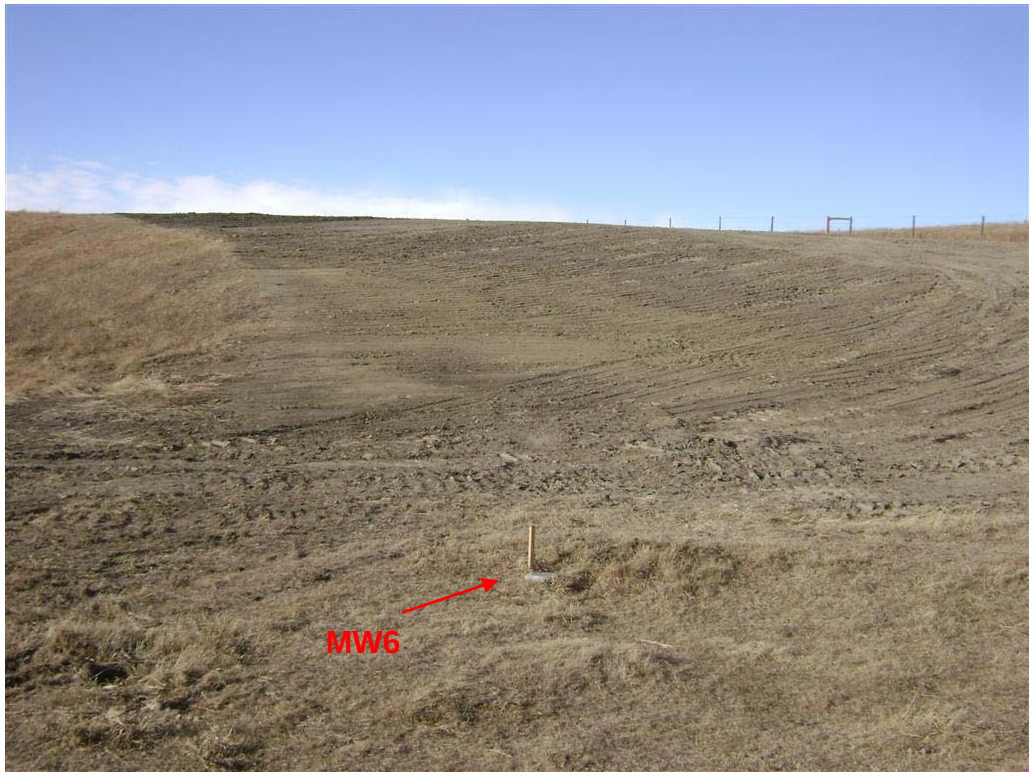


Photo 13: Looking northeast up capped waste midden #2

Photo 14: Looking northeast further up waste midden #2

Photo 15: Gravel fill placed in rough section of haul road

Photo 16: Gravel fill placed along low area over culvert, looking east

Photo 17: Looking west at gravel fill over new culvert

Photo 18: New culvert installed on haul road to borrow pit

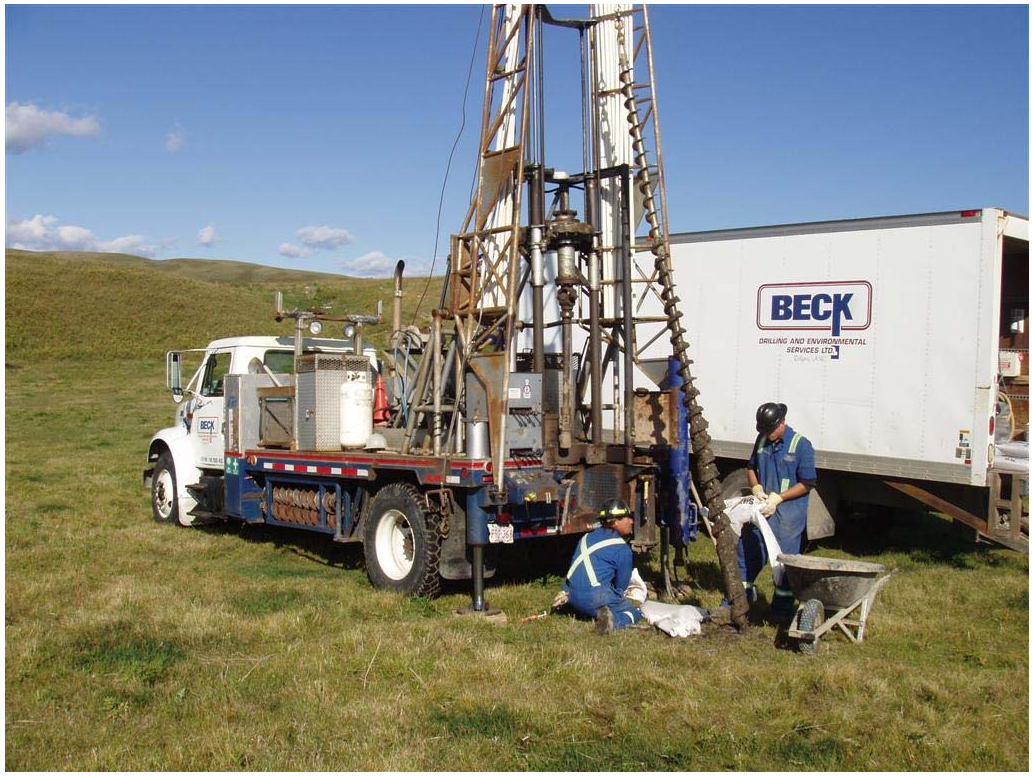


Photo 19: Drilling and groundwater monitoring well installation

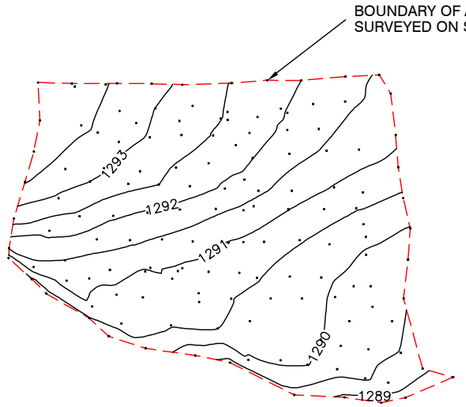
Appendix C

Topographic Surveys

TOPOGRAPHIC INFORMATION
BAR U RANCH NATIONAL HISTORIC SITE

ORIGINAL GROUND AS SURVEYED ON SEPTEMBER 25, 2008

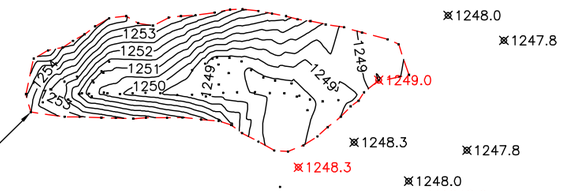
N



BORROW AREA

WASTE MIDDEN #1

WASTE MIDDEN #2



LEGEND AND NOTES

MONITORING WELL LOCATIONS WITH CORRESPONDING ELEVATIONS SHOWN THUS: ⊠1248.4
SPOT ELEVATIONS SHOWN THUS: ⊠1248.4
TOPOGRAPHIC POINTS SHOWN THUS: .
ELEVATIONS ARE GEODETIC AND DERIVED FROM ALBERTA SURVEY CONTROL MARKER NUMBER 156570
CONTOUR INTERVALS ARE 0.5 METRES.

METRES 0 10 25 50 100

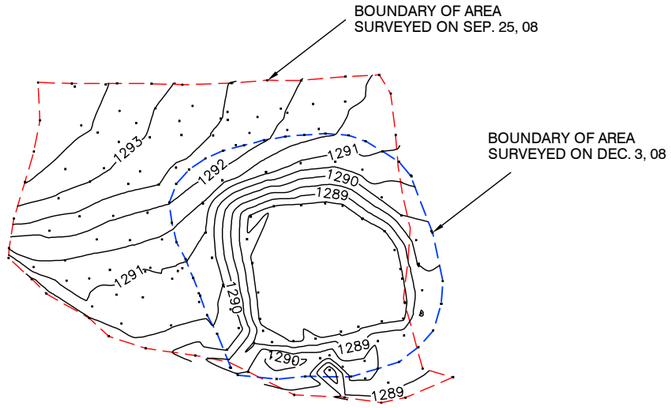
SCALE: 1:1000 | DATE: DECEMBER 8, 2008

FOCUS SURVEYS LIMITED PARTNERSHIP
#100, 6131-6th STREET SE
CALGARY, ALBERTA T2H 1L9
FILE : 020300149-Dec5-08.dwg

TOPOGRAPHIC INFORMATION
BAR U RANCH NATIONAL HISTORIC SITE

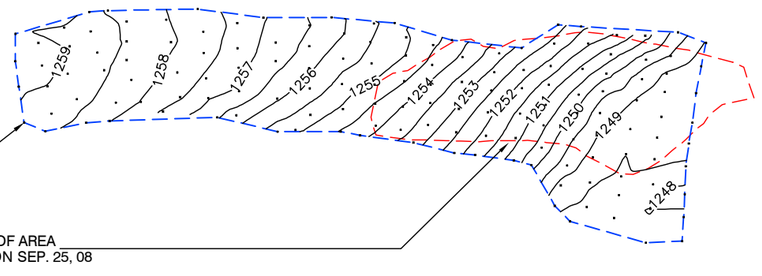
AS CONSTRUCTED, SURVEYED ON DECEMBER 3, 2008

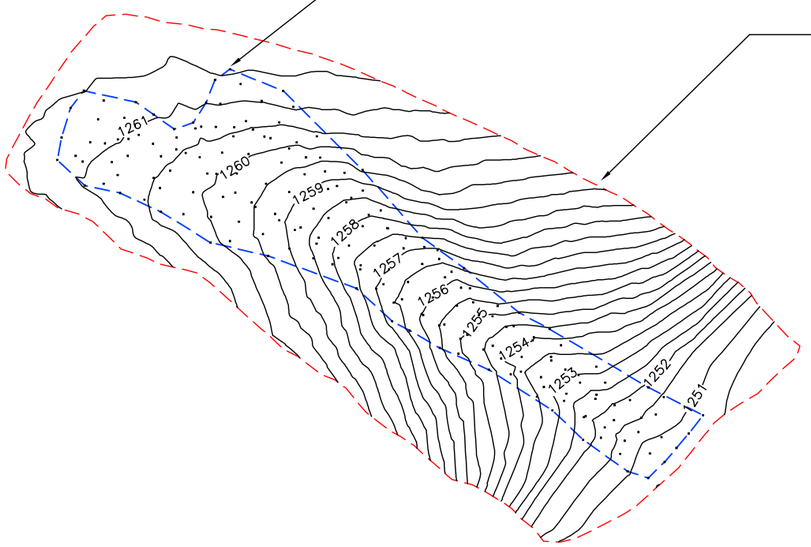
N



BORROW AREA

WASTE MIDDEN #2





WASTE MIDDEN #1

LEGEND AND NOTES

TOPOGRAPHIC POINTS SHOWN THUS: .
ELEVATIONS ARE GEODETIC AND DERIVED FROM ALBERTA SURVEY CONTROL MARKER NUMBER 156570
CONTOUR INTERVALS ARE 0.5 METRES.

TABLE OF VOLUMES		
BORROW AREA	±1487 Cu.m	Cut
WASTE MIDDEN #1	± 756 Cu.m	Fill
WASTE MIDDEN #2	± 607 Cu.m	Fill

METRES 0 10 25 50 100

SCALE: 1:1000 | DATE: DECEMBER 8, 2008

FOCUS SURVEYS LIMITED PARTNERSHIP
#100, 6131-6th STREET SE
CALGARY, ALBERTA T2H 1L9
FILE : 020300149-Dec5-08.dwg

Appendix D

Borehole Logs

Project Name: Bar U Ranch
Client: Public Works Government Services Canada
Location: Longview, Alberta
Project Number: 106547

Borehole ID: ET-MW14

Logged By: GW
Reviewed By: GW

Depth (m)	Soil Type	Soil Description	Elevation	Sample Number	Sample Type	Lab	Headspace Concentration (%LEL) 25 50 75	Well Details	Comments
0		**Topsoil** black, dry, loose							
		Clay silty, loose @ 0.6 m moist, dense							
1									
		Gravel grey-black, some clay, moist @ 1.5 m very wet @ 1.8 m sloughing							
2									
3									
		Siltstone grey, dense, stiff to very stiff							
4									
		EOH @ 4.6 m							
5									

AECOM

17203 - 103 Ave
Edmonton, Alberta
T5S 1J4, Canada

Tel. (780) 488-6800
Fax. (780) 488-2121

Drill Method: Solid Stem Auger
Drill Date: September 25, 2008
Driller: BECK Drilling and Environmental Services Ltd.

Project Name: Bar U Ranch
Client: Public Works Government Services Canada
Location: Longview, Alberta
Project Number: 106547

Borehole ID: ET-MW15

Logged By: GW
Reviewed By: GW

Depth (m)	Soil Type	Soil Description	Elevation	Sample Number	Sample Type	Lab	Headspace Concentration (%LEL) 25 50 75	Well Details	Comments
0		**Topsoil** brown, sandy, dry, loose							
		Clay grey-black, silty, dense							
1									
		Gravel sandy @ 1.5 m cobbles, wet @ 1.8 m sloughing							
2									
		Siltstone grey, dense, very stiff							
3									
4		EOH @ 4.6 m							
5									

AECOM

17203 - 103 Ave
Edmonton, Alberta
T5S 1J4, Canada

Tel. (780) 488-6800
Fax. (780) 488-2121

Drill Method: Solid Stem Auger
Drill Date: September 25, 2008
Driller: BECK Drilling and Environmental Services Ltd.

Sheet 1 of 1

Project Name: Bar U Ranch
Client: Public Works Government Services Canada
Location: Longview, Alberta
Project Number: 106547

Borehole ID: ET-MW16

Logged By: GW
Reviewed By: GW

Depth (m)	Soil Type	Soil Description	Elevation	Sample Number	Sample Type	Lab	Headspace Concentration (%LEL) 25 50 75	Well Details	Comments
0		**Topsoil** brown-black, dry, loose							
		Clay grey-black, dense							
1									
		Gravel sandy, dry, loose							
2		@ 2.1 m wet							
3		@ 3.0 m sloughing							
		Siltstone grey, dense, very stiff							
4									
		EOH @ 4.6 m							
5									

AECOM

17203 - 103 Ave
Edmonton, Alberta
T5S 1J4, Canada

Tel. (780) 488-6800
Fax. (780) 488-2121

Drill Method: Solid Stem Auger
Drill Date: September 25, 2008
Driller: BECK Drilling and Environmental Services Ltd.

Project Name: Bar U Ranch
Client: Public Works Government Services Canada
Location: Longview, Alberta
Project Number: 106547

Borehole ID: ET-MW17

Logged By: GW
Reviewed By: GW

Depth (m)	Soil Type	Soil Description	Elevation	Sample Number	Sample Type	Lab	Headspace Concentration (%LEL) 25 50 75	Well Details	Comments
0		**Topsoil** brown, dry, loose							
		Clay grey-black, silty, loose							
1		@ 0.8 m dense							
		Gravel sandy							
2		@ 2.1 m cobbles, wet							
3		@ 3.0 m sloughing							
		Siltstone grey, dense, very stiff							
4									
		EOH @ 4.6 m							
5									

AECOM

17203 - 103 Ave
Edmonton, Alberta
T5S 1J4, Canada

Tel. (780) 488-6800
Fax. (780) 488-2121

Drill Method: Solid Stem Auger
Drill Date: September 25, 2008
Driller: BECK Drilling and Environmental Services Ltd.

Appendix E

Water Well Records

Alberta Environment

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.:	0350122
Map Verified:	Map
Date Report Received:	1990/03/16
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: NIEMANS DRILLING (1980) LTD.		Drilling Company Approval No.: 119079
Mailing Address: BOX 5564	City or Town: HIGH RIVER AB CA	Postal Code: T0E 1M6
WellOwner's Name: NELSON, BOB	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
NW	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
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: Gallons
Gas Present: Oil Present:

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

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Clay
10	Gravel
12	Clay
32	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1990/02/27	Date Completed (yyyy/mm/dd): 1990/02/27
Well Depth: 32 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type: Plastic
Size OD: 5.56 Inches	Size OD: 4.5 Inches
Wall Thickness: 0.156 Inches	Wall Thickness: 0.214 Inches
Bottom at: 13 FT	Top: 12 FT Bottom: 32 FT

Perforations
from: 8 FT to: 23 FT — Perforations Size: 0.125 Inches x 10 Inches
from: 0 FT to: 0 FT — 0 Inches x 0 Inches
from: 0 FT to: 0 FT — 0 Inches x 0 Inches
Perforated by: Torch

Seal: Sand & Gravel from: 0 FT to: 0 FT
Seal: from: 0 FT to: 0 FT
Seal: from: 0 FT to: 0 FT

Screen Type: from: 0 FT to: 0 FT — Screen ID: 0 Inches, Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT — Screen ID: 0 Inches, Slot Size: 0 Inches
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: FT Diameter: Inches
Comments:
Litho depth 1/2 is entered as 1. Perforation also other and saw.

6. Well Yield

Test Date (yyyy/mm/dd): 1990/02/27	Start Time: 0:00 AM
Test Method: Bailer	
Non pumping static level:	8 FT
Rate of water removal:	7 Gallons/Min
Depth of pump intake:	0 FT
Water level at end of pumping:	32 FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 24 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 5 Gallons/Min
Recommended pump intake: 0 FT
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA5635
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.:	0360180
Map Verified:	Map
Date Report Received:	1991/08/23
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: VINO'S WATER WELL DRILLING		Drilling Company Approval No.:
Mailing Address:	City or Town:	Postal Code:
WellOwner's Name: BAKER, ALLEN #WELL 2	Well Location Identifier:	
P.O. Box Number:	Mailing Address: LONGVIEW	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
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: No
Rate: Gallons
Oil Present: No
Proposed well use: Domestic
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
40	Sand & Gravel
127	Black Clay & Shale
160	Dark Water Bearing Shale & Sandstone

5. Well Completion

Date Started(yyyy/mm/dd): 1991/05/16	Date Completed (yyyy/mm/dd): 1991/05/18
Well Depth: 160 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type: Plastic
Size OD: 0 Inches	Size OD: 5 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0.5 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 145 FT
Perforations from: 31 FT to: 147 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0.25 Inches x 6 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by: Saw	
Seal: Shale Trap from: 0 FT	to: 30 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: 4" Length: 110 FT	Diameter: 1 Inches
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): 1991/05/18	Start Time: 11:00 AM
Test Method: Bailer	
Non pumping static level:	25 FT
Rate of water removal:	4 Gallons/Min
Depth of pump intake:	100 FT
Water level at end of pumping:	60 FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 35 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 4 Gallons/Min
Recommended pump intake: 110 FT
Type Pump Installed
Pump Type: SUB
Pump Model:
H.P.: .75
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VC7929
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

Alberta Environment

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.:	0360181
Map Verified:	Map
Date Report Received:	1991/08/23
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: VINO'S WATER WELL DRILLING
Drilling Company Approval No.:
Mailing Address:
City or Town:
Postal Code:
WellOwner's Name: BAKER, ALLEN #WELL 1
Well Location Identifier:
P.O. Box Number:
Mailing Address: LONGVIEW
Postal Code:
City:
Province:
Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary
Lot
Block
Plan
Well Elev: FT
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: No
Rate: Gallons
Oil Present: No
Proposed well use: Domestic & Stock
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
25	Sand & Gravel
40	Dark Blue Shale
120	Black Shale
127	Blue Shale
180	Light Brown Shale & Sandstone

5. Well Completion

Date Started(yyyy/mm/dd): 1991/05/18
Date Completed (yyyy/mm/dd): 1991/05/20
Well Depth: 180 FT
Borehole Diameter: 0 Inches
Casing Type:
Liner Type: Plastic
Size OD: 0 Inches
Size OD: 5 Inches
Wall Thickness: 0 Inches
Wall Thickness: 0.5 Inches
Bottom at: 0 FT
Top: 0 FT Bottom: 147 FT
Perforations
from: 42 FT to: 147 FT
from: 0 FT to: 0 FT
from: 0 FT to: 0 FT
Perforations Size:
0.25 Inches x 6 Inches
0 Inches x 0 Inches
0 Inches x 0 Inches
Perforated by: Saw
Seal: Shale Trap
from: 0 FT to: 40 FT
Seal:
from: 0 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT
Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches
Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches
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: 100 FT
Diameter: 1 Inches
Comments:
STEEL CALVERT 8'.

6. Well Yield

Test Date (yyyy/mm/dd): 1991/05/20
Start Time: 11:00 AM
Test Method: Bailer
Non pumping static level: 25 FT
Rate of water removal: 4 Gallons/Min
Depth of pump intake: 100 FT
Water level at end of pumping: 60 FT
Distance from top of casing to ground level: Inches
Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 35 FT
If water removal was less than 2 hr duration, reason why:
Recommended pumping rate: 4 Gallons/Min
Recommended pump intake: 100 FT
Type Pump Installed
Pump Type: SUB
Pump Model:
H.P.: .75
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VC7989
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

Alberta Environment

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.:	0361384
Map Verified:	Map
Date Report Received:	1991/08/19
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: UNKNOWN DRILLER		Drilling Company Approval No.: 99999
Mailing Address: UNKNOWN	City or Town: UNKNOWN AB CA	Postal Code:
WellOwner's Name: MCPHERSON, HUGH	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code: T0L 1B0
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	07	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Chemistry Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Unknown
Flowing Well: No Rate: Gallons
Gas Present: Oil Present:
Proposed well use: Domestic
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description

5. Well Completion

Date Started(yyyy/mm/dd):	Date Completed (yyyy/mm/dd):
Well Depth: 0 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: 1	Documents Held: 1
Pitless Adapter Type: Drop Pipe Type: Length:	Diameter:
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.:
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

Report 1

Alberta Environment

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.:	0369429
Map Verified:	Map
Date Report Received:	1993/09/28
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: GOODISON WATER WELL DRILLING		Drilling Company Approval No.:
Mailing Address:	City or Town:	Postal Code:
WellOwner's Name: MCPHERSON, HUGH	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR1, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	07	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
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: Gallons
Gas Present: No Oil Present: No

Proposed well use: Domestic
Anticipated Water Requirements/day 400 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
53	Clay & Rocks
74	Shale
80	Sandstone
101	Shale
111	Sandstone
124	Shale
131	Sandstone
138	Shale
156	Sandstone
166	Shale
175	Sandstone
181	Shale
207	Sandstone
210	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1993/09/08	Date Completed (yyyy/mm/dd): 1993/09/09
Well Depth: 210 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type: Plastic
Size OD: 5.56 Inches	Size OD: 4.5 Inches
Wall Thickness: 0.188 Inches	Wall Thickness: 0.214 Inches
Bottom at: 55 FT	Top: 50 FT Bottom: 210 FT
Perforations from: 190 FT to: 210 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0.125 Inches x 6 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by: Saw	
Seal: Driven from: 0 FT	to: 55 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: FT	Diameter: Inches
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): 1993/09/09	Start Time: 11:00 AM
Test Method: Air	
Non pumping static level:	25 FT
Rate of water removal:	10 Gallons/Min
Depth of pump intake:	210 FT
Water level at end of pumping:	25 FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 185 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 8 Gallons/Min
Recommended pump intake: 200 FT
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: AD2129
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

Alberta Environment

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.:	0370152
Map Verified:	Map
Date Report Received:	1993/09/28
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: GOODISON WATER WELL DRILLING		Drilling Company Approval No.:
Mailing Address:	City or Town:	Postal Code:
WellOwner's Name: MCPHERSON, HUGH	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	07	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Dry Hole-Abandoned
Reclaimed Well
Date Reclaimed: 1993/09/08
Materials Used: Cuttings
Method of Drilling: Rotary
Flowing Well:
Gas Present: No
Rate: Gallons
Oil Present: No

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

4. Formation Log

Depth from ground level (feet)	Lithology Description
52	Clay & Rocks
59	Shale
64	Sandstone
72	Shale
76	Sandstone
118	Shale & Sandstone Ledges
143	Shale
148	Sandstone
160	Shale
164	Sandstone
200	Shale & Sandstone Ledges

5. Well Completion

Date Started(yyyy/mm/dd): 1993/09/06	Date Completed (yyyy/mm/dd): 1993/09/08
Well Depth: 200 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd):
Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: AD2129
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

Report 1

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.:	0370153
Map Verified:	Map
Date Report Received:	1993/09/28
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: GOODISON WATER WELL DRILLING		Drilling Company Approval No.:
Mailing Address:	City or Town:	Postal Code:
WellOwner's Name: BAKER, A.J.	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
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: No
Rate: Gallons
Oil Present: No

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

4. Formation Log

Depth from ground level (feet)	Lithology Description
40	Unknown
131	Shale & Sandstone Ledges
142	Sandstone
158	Shale
169	Sandstone
184	Shale
191	Sandstone
210	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1993/08/12	Date Completed (yyyy/mm/dd): 1993/09/02
Well Depth: 210 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type: Plastic
Size OD: 5.56 Inches	Size OD: 4.5 Inches
Wall Thickness: 0.188 Inches	Wall Thickness: 0.214 Inches
Bottom at: 180 FT	Top: 175 FT Bottom: 210 FT
Perforations from: 180 FT to: 210 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0.125 Inches x 6 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by: Saw	
Seal: Driven from: 0 FT	to: 180 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: FT	Diameter: Inches
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): 1993/09/02	Start Time: 11:00 AM
Test Method: Pump	
Non pumping static level:	78 FT
Rate of water removal:	4 Gallons/Min
Depth of pump intake:	160 FT
Water level at end of pumping:	140 FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 42 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 4 Gallons/Min

Recommended pump intake: 170 FT

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

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: AD2129
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

Report 1 Pump Test 1 page1

Alberta Environment

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.:	0378438
Map Verified:	Not Verified
Date Report Received:	1994/05/30
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: PARKS CAN#1	Well Location Identifier:	
P.O. Box Number:	Mailing Address: 552 220 4 AVE SE, CALGARY	Postal Code: T2P 3H8
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
11	08	017	02	5

Location in Quarter
400 FT from S Boundary
550 FT from E Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned
Reclaimed Well
Date Reclaimed: 1994/04/12
Materials Used: Cuttings
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No
Proposed well use: Municipal
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
38	Brown Dry Clay & Rocks
84	Gray Shale
86	Gray Water Bearing Sandstone
240	Dark Gray Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1994/04/11	Date Completed (yyyy/mm/dd): 1994/04/12
Well Depth: 240 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT Seal: from: 0 FT Seal: from: 0 FT	to: 0 FT to: 0 FT to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:
Comments: DRILLER REPORT 86'- .5 GPM.	

6. Well Yield

Test Date (yyyy/mm/dd):
Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1

Alberta Environment

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.:	0378440
Map Verified:	Not Verified
Date Report Received:	1994/05/30
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: PARKS CAN#2	Well Location Identifier:	
P.O. Box Number:	Mailing Address: 552 220 4 AVE SE, CALGARY	Postal Code: T2P 3H8
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
11	08	017	02	5

Location in Quarter
100 FT from S Boundary
550 FT from E Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned Reclaimed Well
Date Reclaimed: 1994/04/21
Materials Used: Cuttings
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: Yes
Proposed well use: Municipal
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
37	Brown Sandy Clay & Rocks
58	Gray Shale
59	Gray Water Bearing Sandstone
150	Gray Shale
153	Gray Interbedded Shale & Sandstone
200	Dark Gray Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1994/04/20	Date Completed (yyyy/mm/dd): 1994/04/20
Well Depth: 200 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:

Comments:
DRILLER REPORT 59'- 1.5 GPM, 150'- OILY LOOKING AT TIMES.

6. Well Yield

Test Date (yyyy/mm/dd):
Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1

Alberta Environment

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.:	0378441
Map Verified:	Not Verified
Date Report Received:	1994/05/30
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: PARKS CAN#3	Well Location Identifier:	
P.O. Box Number:	Mailing Address: 552 220 4 AVE SE, CALGARY	Postal Code: T2P 3H8
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
11	08	017	02	5

Location in Quarter
375 FT from S Boundary
950 FT from E Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned Reclaimed Well
Date Reclaimed: 1994/04/22
Materials Used: Cuttings
Method of Drilling: Rotary
Flowing Well: No
Rate: Gallons
Gas Present: No
Oil Present: No

Proposed well use: Municipal
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
9	Brown Sandy Clay & Rocks
15	Clay & Sand
19	Brown Clay & Rocks
20	Gray Shale
26	Gray Hard Sandstone
33	Gray Hard Shale
35	Gray Hard Sandstone
51	Gray Hard Shale
54	Gray Hard Sandstone
70	Gray Hard Shale
74	Gray Hard Sandstone
85	Gray Hard Shale
87	Gray Hard Sandstone
120	Gray Thin Shale & Sandstone Ledges

5. Well Completion

Date Started(yyyy/mm/dd): 1994/04/21	Date Completed (yyyy/mm/dd): 1994/04/22
Well Depth: 120 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:

Comments:
DRILLER REPORT SET & PULLED 20' OF SURFACE CASING THROUGH THE OVERBURDEN, 2 GPM, REST OF THE HOLE WAS BONE DRY.

6. Well Yield

Test Date (yyyy/mm/dd):
Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1

Alberta Environment

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.:	0385172
Map Verified:	Map
Date Report Received:	1989/09/29
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: NIEMANS DRILLING (1980) LTD.		Drilling Company Approval No.: 119079
Mailing Address: BOX 5564	City or Town: HIGH RIVER AB CA	Postal Code: T0E 1M6
WellOwner's Name: MCPHERSON, HUGH	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	07	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned Reclaimed Well
Date Reclaimed: 1989/08/22
Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No
Proposed well use: Unknown
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
36	Clay & Rocks
45	Sandstone
57	Shale
63	Shale & Sandstone
71	Shale
74	Shale & Sandstone
79	Shale
83	Sandstone
125	Shale & Sandstone Ledges
138	Shale & Sandstone
163	Sandstone
174	Shale
179	Sandstone
193	Shale
204	Sandstone
270	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1989/08/22	Date Completed (yyyy/mm/dd): 1989/08/22
Well Depth: 270 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: FT	Diameter: Inches
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): 1989/08/22	Start Time: 11:00 AM
Test Method: Air	
Non pumping static level:	0 FT
Rate of water removal:	1.5 Gallons/Min
Depth of pump intake:	270 FT
Water level at end of pumping:	FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 0 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 0 Gallons/Min
Recommended pump intake: 0 FT
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA5635
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

Alberta Environment

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.:	0385186
Map Verified:	Not Verified
Date Report Received:	1975/10/14
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: UNKNOWN DRILLER		Drilling Company Approval No.: 99999
Mailing Address: UNKNOWN	City or Town: UNKNOWN AB CA	Postal Code:
WellOwner's Name: STEVENSON, DUANE	Well Location Identifier:	
P.O. Box Number: 223	Mailing Address: LONGVIEW	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Chemistry Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Drilled
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No

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

6. Well Yield

Test Date (yyyy/mm/dd): Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

Total Drawdown: FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT

Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

4. Formation Log

Depth from ground level (feet)	Lithology Description

5. Well Completion

Date Started(yyyy/mm/dd): Date Completed (yyyy/mm/dd):

Well Depth: 90 FT
Borehole Diameter: 0 Inches

Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT

Perforations
from: 0 FT to: 0 FT
from: 0 FT to: 0 FT
from: 0 FT to: 0 FT

Perforations Size:
0 Inches x 0 Inches
0 Inches x 0 Inches
0 Inches x 0 Inches

Perforated by:

Seal:
from: 0 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT

Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches

Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches

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: 1
Documents Held: 1

Pitless Adapter Type:
Drop Pipe Type:
Length: Diameter:

Comments:

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.:
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

Report 1

Alberta Environment

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.:	0385187
Map Verified:	Field
Date Report Received:	1976/02/06
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: WARNKE BROS		Drilling Company Approval No.:
Mailing Address:	City or Town:	Postal Code:
WellOwner's Name: ARC/PEKISKO #1	Well Location Identifier:	
P.O. Box Number:	Mailing Address: 11315 87 AVE, EDMONTON	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SE	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: 4090 FT
How Obtain: Estimated

3. Drilling Information

Type of Work: Test Hole
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No

Proposed well use: Investigation
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
25	Light Brown Clay
70	Blue Shale
75	Gray Fine Grained Sandstone
90	Blue Shale
95	Light Gray Fine Grained Sandstone
115	Black Shale
210	Gray Fine Grained Sandstone
215	Black Shale
250	Light Gray Sandstone
300	Black Shale
310	Light Fine Grained Sandstone
325	Black Fine Grained Sandstone
360	Black Shale
410	Gray Fine Grained Sandstone
435	Brown Shale & Coal
495	Black Shale
500	Brown Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1975/09/18	Date Completed (yyyy/mm/dd):
Well Depth: 500 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type:
Size OD: 6.62 Inches	Size OD: 0 Inches
Wall Thickness: 0.125 Inches	Wall Thickness: 0 Inches
Bottom at: 43 FT	Top: 0 FT Bottom: 0 FT
Perforations	Perforations Size:
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
Perforated by:	
Seal: Driven from: 43 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: Yes Held: 2	Documents Held: 7
Pitless Adapter Type: Drop Pipe Type: Length: FT	Diameter: Inches

Comments:
DRILLER REPORTS HARD WATER COMPLETE LITH ON FILE

6. Well Yield

Test Date (yyyy/mm/dd): 1975/09/22	Start Time: 8:30 AM
Test Method: Pump	
Non pumping static level:	10.9 FT
Rate of water removal:	1.6 Gallons/Min
Depth of pump intake:	135 FT
Water level at end of pumping:	FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet) Drawdown	Elapsed Time Minutes:Sec	Recovery
10.86	0:00	
0.78	0:00	
0.95	0:15	
	0:15	40.31
11.32	0:30	39.85
1.03	0:30	
1.15	0:45	
	0:45	39.66
11.49	1:00	39.03
1.24	1:00	
11.68	1:30	38.8
1.47	1:30	
11.88	2:00	38.57
1.68	2:00	
1.87	2:30	40.12
12	2:30	38.52
2.06	3:00	
12.28	3:00	38.47
12.47	3:30	38.43
2.25	3:30	
12.65	4:00	38.28
2.44	4:00	39.82
2.64	4:30	
12.74	4:30	38.3
12.98	5:00	38.25

Total Drawdown: 0 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 0 Gallons/Min

Recommended pump intake: 0 FT

Type Pump Installed
Pump Type:
Pump Model:
H.P.:

Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.:
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

Report 1 Pump Test 1 page1 page2 page3 Pump Test 2 Pump Test 3

Alberta Environment

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.:	0385209
Map Verified:	Map
Date Report Received:	1986/02/18
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: NIEMANS DRILLING (1980) LTD.		Drilling Company Approval No.: 119079
Mailing Address: BOX 5564	City or Town: HIGH RIVER AB CA	Postal Code: T0E 1M6
WellOwner's Name: BAR U RANCH LTD/BAKER, ALLAN	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SW	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot | Block | Plan

Well Elev: 6500 FT | How Obtain: Estimated

3. Drilling Information

Type of Work: Deepened
Reclaimed Well
Date Reclaimed: | Materials Used:

Method of Drilling: Rotary

Flowing Well: No | Rate: Gallons
Gas Present: No | Oil Present: No

Proposed well use: Stock
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
14	Sandy Clay & Rocks
42	Clay & Rocks
68	Hard Sandstone
73	Shale
200	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1980/03/13	Date Completed (yyyy/mm/dd): 1985/12/05
Well Depth: 200 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type: Steel
Size OD: 6.62 Inches	Size OD: 4.6 Inches
Wall Thickness: 0.188 Inches	Wall Thickness: 0.125 Inches
Bottom at: 22 FT	Top: 0 FT Bottom: 73 FT

Perforations	Perforations Size:
from: 38 FT to: 68 FT	0.125 Inches x 10 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches

Perforated by: Torch

Seal: Driven
from: 21 FT | to: 0 FT
Seal:
from: 0 FT | to: 0 FT
Seal:
from: 0 FT | to: 0 FT

Screen Type:
from: 0 FT to: 0 FT | Screen ID: 0 Inches | Slot Size: 0 Inches

Screen Type:
from: 0 FT to: 0 FT | Screen ID: 0 Inches | Slot Size: 0 Inches

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: 2

Pitless Adapter Type:
Drop Pipe Type:
Length: FT | Diameter: Inches

Comments:
WELL DEEPENED FROM 73'-200', TEST HOLE

6. Well Yield

Test Date (yyyy/mm/dd): 1985/12/05	Start Time: 11:00 AM
Test Method: Pump	
Non pumping static level:	45 FT
Rate of water removal:	3 Gallons/Min
Depth of pump intake:	65 FT
Water level at end of pumping:	FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 0 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 2 Gallons/Min

Recommended pump intake: 65 FT

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

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA5635

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

Alberta Environment

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.:	0385226
Map Verified:	Map
Date Report Received:	1987/11/19
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: GOODISON WATER WELL DRILLING
Drilling Company Approval No.:
Mailing Address:
City or Town:
Postal Code:
WellOwner's Name: BAR U RANCH
Well Location Identifier:
P.O. Box Number:
Mailing Address: RR2, HIGH RIVER
Postal Code:
City:
Province:
Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SW	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary
Lot
Block
Plan
Well Elev: FT
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: No
Rate: Gallons
Oil Present: No
Proposed well use: Stock
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
65	Clay
87	Sandstone
163	Shale & Sandstone
178	Sandstone
195	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1987/10/21
Date Completed (yyyy/mm/dd): 1987/10/23
Well Depth: 195 FT
Borehole Diameter: 0 Inches
Casing Type: Steel
Liner Type: Plastic
Size OD: 5.56 Inches
Size OD: 4.6 Inches
Wall Thickness: 0.188 Inches
Wall Thickness: 0 Inches
Bottom at: 20 FT
Top: 15 FT Bottom: 195 FT
Perforations
from: 80 FT to: 100 FT
from: 170 FT to: 190 FT
from: 0 FT to: 0 FT
Perforations Size:
0.125 Inches x 6 Inches
0 Inches x 0 Inches
0 Inches x 0 Inches
Perforated by: Machine
Seal: Driven
from: 20 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT
Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches
Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches
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: FT
Diameter: Inches
Comments:

6. Well Yield

Test Date (yyyy/mm/dd): 1987/10/23
Start Time: 11:00 AM
Test Method: Air
Non pumping static level: 32 FT
Rate of water removal: 8 Gallons/Min
Depth of pump intake: 180 FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches
Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 148 FT
If water removal was less than 2 hr duration, reason why:
Recommended pumping rate: 0 Gallons/Min
Recommended pump intake: 0 FT
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3665AD
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

Alberta Environment

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.:	0385232
Map Verified:	Map
Date Report Received:	1975/05/07
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: UNKNOWN DRILLER		Drilling Company Approval No.: 99999
Mailing Address: UNKNOWN	City or Town: UNKNOWN AB CA	Postal Code:
WellOwner's Name: BAR U RANCH/BAKER, A.	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
13	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: 4050 FT
How Obtain: Estimated

3. Drilling Information

Type of Work: Spring
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Not Applicable
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No

Proposed well use: Unknown
Anticipated Water Requirements/day
0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description

5. Well Completion

Date Started(yyyy/mm/dd):
Date Completed (yyyy/mm/dd):

Well Depth: 0 FT
Borehole Diameter: 0 Inches

Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT

Perforations
from: 0 FT to: 0 FT
from: 0 FT to: 0 FT
from: 0 FT to: 0 FT
Perforations Size:
0 Inches x 0 Inches
0 Inches x 0 Inches
0 Inches x 0 Inches

Perforated by:

Seal:
from: 0 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT
Seal:
from: 0 FT to: 0 FT

Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches

Screen Type:
from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches

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: 1 Documents Held: 2

Pitless Adapter Type:
Drop Pipe Type:
Length: Diameter:

Comments:

6. Well Yield

Test Date (yyyy/mm/dd): Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.:
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

Report 1

Alberta Environment

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.:	0385233
Map Verified:	Map
Date Report Received:	1975/05/07
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: UNKNOWN DRILLER		Drilling Company Approval No.: 99999
Mailing Address: UNKNOWN	City or Town: UNKNOWN AB CA	Postal Code:
WellOwner's Name: BAR U RANCH	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
NW	08	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: 4050 FT
How Obtain: Estimated

3. Drilling Information

Type of Work: Well Inventory
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Unknown
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No
Proposed well use: Unknown
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description

5. Well Completion

Date Started(yyyy/mm/dd):
Date Completed (yyyy/mm/dd):

Well Depth: 60 FT
Borehole Diameter: 0 Inches
Casing Type: Unknown
Liner Type:
Size OD: 5 Inches
Size OD: 0 Inches
Wall Thickness: 0 Inches
Wall Thickness: 0 Inches
Bottom at: 50 FT
Top: 0 FT Bottom: 0 FT

Perforations
Perforations Size:
from: 0 FT to: 0 FT 0 Inches x 0 Inches
from: 0 FT to: 0 FT 0 Inches x 0 Inches
from: 0 FT to: 0 FT 0 Inches x 0 Inches
Perforated by:

Seal: from: 0 FT to: 0 FT
Seal: from: 0 FT to: 0 FT
Seal: from: 0 FT to: 0 FT

Screen Type: from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT
Screen ID: 0 Inches
Slot Size: 0 Inches
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: 1
Documents Held: 2

Pitless Adapter Type:
Drop Pipe Type:
Length: FT
Diameter: Inches

Comments:
WELL HAS RUN DRY

6. Well Yield

Test Date (yyyy/mm/dd): 1975/05/07
Start Time: 11:00 AM
Test Method: Pump

Non pumping static level: 12 FT

Rate of water removal: Gallons/Min

Depth of pump intake: 0 FT

Water level at end of pumping: FT

Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 0 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 0 Gallons/Min

Recommended pump intake: 40 FT

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

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.:
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

Report 1 Pump Test 1

Alberta Environment

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.:	0385953
Map Verified:	Map
Date Report Received:	1994/08/16
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: BAKER, ALLEN/BAR U RANCH	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code: T1V 1N2
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
03	08	017	02	5

Location in Quarter
1350 FT from N Boundary
500 FT from E Boundary

Lot Block Plan

Well Elev: FT
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: No
Rate: Gallons
Oil Present: No

Proposed well use: Domestic & Stock
Anticipated Water Requirements/day 1000 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
18	Brown Clay & Rocks
46	Brown Shale
49	Gray Shale
51	Gray Sandstone
61	Gray Shale
64	Sandstone
75	Gray Interbedded Shale & Sandstone
197	Gray Thin Shale & Sandstone Ledges
212	Gray Water Bearing Sandstone
220	Gray Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1994/05/24	Date Completed (yyyy/mm/dd): 1994/05/25
Well Depth: 220 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type: Plastic
Size OD: 6.62 Inches	Size OD: 4.5 Inches
Wall Thickness: 0.188 Inches	Wall Thickness: 0.237 Inches
Bottom at: 20 FT	Top: 14 FT Bottom: 215 FT
Perforations from: 200 FT to: 213 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0.125 Inches x 7 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by: Saw	
Seal: Driven & Bentonite from: 180 FT	to: 198 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: FT	Diameter: Inches

Comments:
DRILLER REPORT AIR TEST 6.5-7 GPM FOR 3 HRS. PUMP TEST FOR MAY 26 AND 27 8.5 HRS @ 5 GPM WATER LEVEL HELD @ 155'.

6. Well Yield

Test Date (yyyy/mm/dd): 1994/05/25
Start Time: 11:00 AM
Test Method: Pump
Non pumping static level: 64.8 FT
Rate of water removal: 5 Gallons/Min
Depth of pump intake: 160 FT
Water level at end of pumping: 138 FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)

Drawdown	Elapsed Time Minutes:Sec	Recovery
64.83	0:00	138
69	1:00	133.92
71.67	2:00	131
74	3:00	128.88
76.25	4:00	127
78.5	5:00	125.42
80.58	6:00	123.75
82.38	7:00	122
84.17	8:00	120.33
85.92	9:00	118.83
87.58	10:00	117.29
90.08	12:00	114.63
92.46	14:00	112
94.92	16:00	109.83
99.5	20:00	106.29
105.17	25:00	101.33
110	30:00	97.83
113.38	35:00	94.75
116	40:00	92
120.75	50:00	88.5
124.83	60:00	84.92
129.42	75:00	81.42
133	90:00	78.75
135.83	105:00	77
138	120:00	75.67

Total Drawdown: 73 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 5 Gallons/Min
Recommended pump intake: 185 FT
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1 Pump Test 1 page1

Alberta Environment

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.:	0385959
Map Verified:	Map
Date Report Received:	1994/08/16
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: BAKER, ALLAN/ BAR U RANCH #1	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code: T1V 1N2
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
06	08	017	02	5

Location in Quarter
1200 FT from N Boundary
680 FT from E Boundary
Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned
Reclaimed Well
Date Reclaimed: 1994/05/21
Materials Used: Cuttings
Method of Drilling: Rotary
Flowing Well: No
Rate: Gallons
Gas Present: No
Oil Present: No

Proposed well use: Domestic & Stock
Anticipated Water Requirements/day: 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
6	Brown Sandy Clay
17	Brown Sandy Clay & Sand
36	Brown Clay & Rocks
64	Gray Shale
65	Gray Water Bearing Sandstone
91	Gray Shale
96	Gray Sandstone
113	Gray Shale
116	Gray Sandstone
118	Dark Brown Shale
130	Gray Shale
134	Dark Shale
168	Gray Shale
175	Dark Gray Shale
177	Gray Shale
178	Gray Sandstone
320	Dark Gray Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1994/05/20	Date Completed (yyyy/mm/dd): 1994/05/20
Well Depth: 320 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations	Perforations Size:
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd):
Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1

Alberta Environment

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.:	0385961
Map Verified:	Map
Date Report Received:	1994/08/16
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: BAKER, ALLAN/ BAR U RANCH #2	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code: T1V 1N2
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
06	08	017	02	5

Location in Quarter
1200 FT from N Boundary
500 FT from E Boundary

Lot | Block | Plan

Well Elev: FT | How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned Reclaimed Well
Date Reclaimed: 1994/05/21 | Materials Used: Bentonite Product
Method of Drilling: Rotary
Flowing Well: No | Rate: Gallons
Gas Present: No | Oil Present: No

Proposed well use: Domestic & Stock
Anticipated Water Requirements/day: 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
49	Brown Clay & Rocks
51	Brown Shale
58	Gray Interbedded Shale & Sandstone
69	Gray Shale
70	Gray Water Bearing Sandstone
131	Gray Thin Shale & Sandstone Ledges
230	Gray Thin Shale & Sandstone Ledges

5. Well Completion

Date Started(yyyy/mm/dd): 1994/05/21	Date Completed (yyyy/mm/dd): 1994/05/21
Well Depth: 230 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations	Perforations Size:
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): | Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown | Minutes:Sec | Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1

Alberta Environment

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.:	0385965
Map Verified:	Map
Date Report Received:	1994/08/16
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: PETER NIEMANS WATER WELL DRILLING		Drilling Company Approval No.: 119926
Mailing Address: BOX 5024	City or Town: HIGH RIVER AB CA	Postal Code: T1V 1M3
WellOwner's Name: BAKER, ALLAN/ BAR U RANCH #3	Well Location Identifier:	
P.O. Box Number:	Mailing Address: RR2, HIGH RIVER	Postal Code: T1V 1N2
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
06	08	017	02	5

Location in Quarter
1275 FT from N Boundary
490 FT from E Boundary

Lot Block Plan

Well Elev: FT
How Obtain: Not Obtain

3. Drilling Information

Type of Work: Test Hole-Abandoned Reclaimed Well
Date Reclaimed: 1994/05/23
Materials Used: Bentonite Product
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Gallons
Oil Present: No

Proposed well use: Domestic & Stock
Anticipated Water Requirements/day 0 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
1	Topsoil
22	Brown Clay & Rocks
41	Brown Shale
48	Gray Shale
55	Gray Interbedded Shale & Sandstone
70	Gray Shale
72	Gray Water Bearing Sandstone
94	Gray Shale
97	Gray Sandstone
133	Gray Shale
138	Gray Sandstone
158	Gray Shale
166	Gray Interbedded Shale & Sandstone
168	Gray Sandstone
220	Gray Shale & Sandstone Ledges

5. Well Completion

Date Started(yyyy/mm/dd): 1994/05/23	Date Completed (yyyy/mm/dd): 1994/05/23
Well Depth: 220 FT	Borehole Diameter: 0 Inches
Casing Type:	Liner Type:
Size OD: 0 Inches	Size OD: 0 Inches
Wall Thickness: 0 Inches	Wall Thickness: 0 Inches
Bottom at: 0 FT	Top: 0 FT Bottom: 0 FT
Perforations from: 0 FT to: 0 FT from: 0 FT to: 0 FT from: 0 FT to: 0 FT	Perforations Size: 0 Inches x 0 Inches 0 Inches x 0 Inches 0 Inches x 0 Inches
Perforated by:	
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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:	Diameter:
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd):
Start Time:
Test Method:
Non pumping static level: FT
Rate of water removal: Gallons/Min
Depth of pump intake: FT
Water level at end of pumping: FT
Distance from top of casing to ground level: Inches

Depth To water level (feet)
Elapsed Time
Drawdown Minutes:Sec Recovery

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

Recommended pumping rate: Gallons/Min
Recommended pump intake: FT
Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 3631AD
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

Report 1

Alberta Environment

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.:	0467773
Map Verified:	Not Verified
Date Report Received:	1997/09/17
Measurements:	Imperial

1. Contractor & Well Owner Information

Company Name: NIEMANS DRILLING (1980) LTD.		Drilling Company Approval No.: 119079
Mailing Address: BOX 5564	City or Town: HIGH RIVER AB CA	Postal Code: T0E 1M6
WellOwner's Name: NELSON, JASON	Well Location Identifier:	
P.O. Box Number: 5967	Mailing Address: HIGH RIVER	Postal Code: T1V 1P6
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
NE	07	017	02	5

Location in Quarter
0 FT from Boundary
0 FT from Boundary

Lot Block Plan

Well Elev: FT
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: No
Rate: Gallons
Oil Present: No

Proposed well use: Domestic
Anticipated Water Requirements/day 500 Gallons

4. Formation Log

Depth from ground level (feet)	Lithology Description
2	Silty Clay
13	Silty Till & Gravel
25	Clay & Rocks
46	Shale
54	Shale & Sandstone Ledges
68	Sandstone
73	Shale & Sandstone
85	Sandstone
91	Shale & Sandstone
105	Shale
111	Sandstone
118	Sandstone & Shale Ledges
129	Sandstone
144	Shale & Sandstone
162	Sandstone & Shale Ledges
166	Shale & Sandstone
180	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 1997/07/07	Date Completed (yyyy/mm/dd): 1997/07/08
Well Depth: 180 FT	Borehole Diameter: 0 Inches
Casing Type: Steel	Liner Type: Plastic
Size OD: 6.62 Inches	Size OD: 4.5 Inches
Wall Thickness: 0.188 Inches	Wall Thickness: 0.237 Inches
Bottom at: 28 FT	Top: 20 FT Bottom: 180 FT
Perforations from: 140 FT to: 160 FT	Perforations Size: 0.125 Inches x 8 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
from: 0 FT to: 0 FT	0 Inches x 0 Inches
Perforated by: Saw	
Seal: Driven & Bentonite from: 10 FT	to: 28 FT
Seal: from: 0 FT	to: 0 FT
Seal: from: 0 FT	to: 0 FT
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
Screen Type: from: 0 FT to: 0 FT	Screen ID: 0 Inches Slot Size: 0 Inches
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: FT	Diameter: Inches

Comments:
DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 2'. SH TRAP 135'.

6. Well Yield

Test Date (yyyy/mm/dd): 1997/08/17	Start Time: 11:00 AM
Test Method: Pump	
Non pumping static level:	7.6 FT
Rate of water removal:	6.5 Gallons/Min
Depth of pump intake:	170 FT
Water level at end of pumping:	143.7 FT
Distance from top of casing to ground level:	Inches

Depth To water level (feet) Drawdown	Elapsed Time Minutes:Sec	Recovery
7.677	0:00	
10.498	1:00	139.597
13.714	2:00	132.74
16.338	3:00	129.853
19.029	4:00	126.966
21.161	5:00	124.341
22.933	6:00	121.946
24.868	7:00	119.814
26.312	8:00	117.616
28.084	9:00	115.746
29.626	10:00	113.81
33.3	12:00	110.398
36.482	14:00	107.248
40.485	16:00	104.23
52.558	20:00	99.015
65.353	25:00	93.503
72.374	30:00	88.845
79.986	35:00	84.744
85.399	40:00	80.675
93.241	50:00	75.131
101.375	60:00	70.439
112.662	75:00	67.256
123.29	90:00	59.252
132.543	105:00	52.722
143.731	120:00	46.784

Total Drawdown: 136 FT

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 4 Gallons/Min

Recommended pump intake: 170 FT

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

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA5635
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

Report 1 Pump Test 1 page1

Appendix F

Laboratory Reports

Certificate of Analysis

EARTH TECH (AECOM)

ATTN: GORDON WOOLLETT

PWGSC C/O EARTH TECH
5TH FLOOR 10025 JASPER AVE
EDMONTON AB T5J 1S6

Reported On: 18-DEC-08 04:07 PM
Revision: 1

Lab Work Order #: **L713299** **Date Received:** **28-NOV-08**

Project P.O. #: NOT SUBMITTED
Job Reference: 106524
Legal Site Desc: BAR U RANCH
CofC Numbers: 08-065080

Other Information:

Comments:

JOHN FORBES
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-1 MW1								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Major Metals								
Calcium (Ca)	529		0.5	mg/L		05-DEC-08	BOC	R766049
Potassium (K)	9.9		0.1	mg/L		05-DEC-08	BOC	R766049
Magnesium (Mg)	404		0.01	mg/L		05-DEC-08	BOC	R766049
Sodium (Na)	537		0.5	mg/L		05-DEC-08	BOC	R766049
Iron (Fe)	0.117		0.005	mg/L		05-DEC-08	BOC	R766049
Manganese (Mn)	2.74		0.001	mg/L		05-DEC-08	BOC	R766049
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Aluminum (Al)	0.05		0.01	mg/L		04-DEC-08	SYF	R765487
Boron (B)	0.12		0.05	mg/L		04-DEC-08	SYF	R765487
Barium (Ba)	0.026		0.003	mg/L		04-DEC-08	SYF	R765487
Beryllium (Be)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cadmium (Cd)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cobalt (Co)	0.005		0.002	mg/L		04-DEC-08	SYF	R765487
Chromium (Cr)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Copper (Cu)	0.007		0.001	mg/L		04-DEC-08	SYF	R765487
Molybdenum (Mo)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Nickel (Ni)	0.028		0.002	mg/L		04-DEC-08	SYF	R765487
Lead (Pb)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Tin (Sn)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Strontium (Sr)	7.54		0.005	mg/L		04-DEC-08	SYF	R765487
Titanium (Ti)	0.004		0.001	mg/L		04-DEC-08	SYF	R765487
Thallium (Tl)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Vanadium (V)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Zinc (Zn)	0.004		0.002	mg/L		04-DEC-08	SYF	R765487
CCME PAHs								
Naphthalene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Quinoline	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acenaphthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluorene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Phenanthrene	0.00003	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acridine	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluoranthene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Pyrene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Chrysene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(b&j)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(k)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Indeno(1,2,3-cd)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Dibenzo(a,h)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Surr: Nitrobenzene d5	68		24-132	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: 2-Fluorobiphenyl	68		37-123	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: p-Terphenyl d14	60		41-143	%	02-DEC-08	04-DEC-08	PCL	R764567
OC Screen GC/ECD								
p,p'-DDD	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
p,p'-DDE	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
p,p'-DDT	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Aldrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-1 MW1								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
OC Screen GC/ECD								
alpha-BHC	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
beta-BHC	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
gamma-BHC (Lindane)	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Quintozine (PCNB)	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
cis-Chlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
trans-Chlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Dieldrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endosulfan I	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endosulfan II	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Heptachlor	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Methoxychlor	<0.0002		0.0002	mg/L		04-DEC-08	BF	R766902
Mirex	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Nonachlor	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Oxychlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
L713299-2 MW3								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Major Metals								
Calcium (Ca)	167		0.5	mg/L		05-DEC-08	BOC	R766049
Potassium (K)	4.1		0.1	mg/L		05-DEC-08	BOC	R766049
Magnesium (Mg)	102		0.01	mg/L		05-DEC-08	BOC	R766049
Sodium (Na)	60.2		0.5	mg/L		05-DEC-08	BOC	R766049
Iron (Fe)	0.006		0.005	mg/L		05-DEC-08	BOC	R766049
Manganese (Mn)	0.152		0.001	mg/L		05-DEC-08	BOC	R766049
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Aluminum (Al)	<0.01		0.01	mg/L		04-DEC-08	SYF	R765487
Boron (B)	0.06		0.05	mg/L		04-DEC-08	SYF	R765487
Barium (Ba)	0.043		0.003	mg/L		04-DEC-08	SYF	R765487
Beryllium (Be)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cadmium (Cd)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cobalt (Co)	<0.002		0.002	mg/L		04-DEC-08	SYF	R765487
Chromium (Cr)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Copper (Cu)	0.002		0.001	mg/L		04-DEC-08	SYF	R765487
Molybdenum (Mo)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Nickel (Ni)	0.005		0.002	mg/L		04-DEC-08	SYF	R765487
Lead (Pb)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Tin (Sn)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Strontium (Sr)	1.52		0.005	mg/L		04-DEC-08	SYF	R765487
Titanium (Ti)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Thallium (Tl)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Vanadium (V)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Zinc (Zn)	0.003		0.002	mg/L		04-DEC-08	SYF	R765487
CCME PAHs								
Naphthalene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Quinoline	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acenaphthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-2 MW3								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
CCME PAHs								
Fluorene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Phenanthrene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acridine	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Pyrene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Chrysene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(b&j)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(k)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Indeno(1,2,3-cd)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Dibenzo(a,h)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Surr: Nitrobenzene d5	66		24-132	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: 2-Fluorobiphenyl	63		37-123	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: p-Terphenyl d14	59		41-143	%	02-DEC-08	04-DEC-08	PCL	R764567
OC Screen GC/ECD								
p,p'-DDD	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
p,p'-DDE	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
p,p'-DDT	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Aldrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
alpha-BHC	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
beta-BHC	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
gamma-BHC (Lindane)	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Quintozine (PCNB)	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
cis-Chlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
trans-Chlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Dieldrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endosulfan I	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endosulfan II	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Heptachlor	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Methoxychlor	<0.0002		0.0002	mg/L		04-DEC-08	BF	R766902
Mirex	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Nonachlor	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Oxychlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
L713299-3 MW4								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Major Metals								
Calcium (Ca)	367		0.5	mg/L		05-DEC-08	BOC	R766049
Potassium (K)	14.4		0.1	mg/L		05-DEC-08	BOC	R766049
Magnesium (Mg)	402		0.01	mg/L		05-DEC-08	BOC	R766049
Sodium (Na)	1040		0.5	mg/L		05-DEC-08	BOC	R766049
Iron (Fe)	2.88		0.005	mg/L		05-DEC-08	BOC	R766049
Manganese (Mn)	2.63		0.001	mg/L		05-DEC-08	BOC	R766049
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Aluminum (Al)	0.10		0.01	mg/L		04-DEC-08	SYF	R765487

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-3 MW4								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals								
Boron (B)	0.17		0.05	mg/L		04-DEC-08	SYF	R765487
Barium (Ba)	0.035		0.003	mg/L		04-DEC-08	SYF	R765487
Beryllium (Be)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cadmium (Cd)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cobalt (Co)	0.012		0.002	mg/L		04-DEC-08	SYF	R765487
Chromium (Cr)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Copper (Cu)	0.008		0.001	mg/L		04-DEC-08	SYF	R765487
Molybdenum (Mo)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Nickel (Ni)	0.057		0.002	mg/L		04-DEC-08	SYF	R765487
Lead (Pb)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Tin (Sn)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Strontium (Sr)	9.18		0.005	mg/L		04-DEC-08	SYF	R765487
Titanium (Ti)	0.005		0.001	mg/L		04-DEC-08	SYF	R765487
Thallium (Tl)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Vanadium (V)	0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Zinc (Zn)	0.007		0.002	mg/L		04-DEC-08	SYF	R765487
CCME PAHs								
Naphthalene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Quinoline	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acenaphthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluorene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Phenanthrene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acridine	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Chrysene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(b&j)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(k)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Indeno(1,2,3-cd)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Dibenzo(a,h)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Surr: Nitrobenzene d5	67		24-132	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: 2-Fluorobiphenyl	60		37-123	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: p-Terphenyl d14	54		41-143	%	02-DEC-08	04-DEC-08	PCL	R764567
L713299-4 MW6								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Major Metals								
Calcium (Ca)	195		0.5	mg/L		05-DEC-08	BOC	R766049
Potassium (K)	6.6		0.1	mg/L		05-DEC-08	BOC	R766049
Magnesium (Mg)	161		0.01	mg/L		05-DEC-08	BOC	R766049
Sodium (Na)	166		0.5	mg/L		05-DEC-08	BOC	R766049
Iron (Fe)	1.17		0.005	mg/L		05-DEC-08	BOC	R766049
Manganese (Mn)	0.282		0.001	mg/L		05-DEC-08	BOC	R766049
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-4 MW6								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals								
Aluminum (Al)	0.01		0.01	mg/L		04-DEC-08	SYF	R765487
Boron (B)	0.08		0.05	mg/L		04-DEC-08	SYF	R765487
Barium (Ba)	0.053		0.003	mg/L		04-DEC-08	SYF	R765487
Beryllium (Be)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cadmium (Cd)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cobalt (Co)	<0.002		0.002	mg/L		04-DEC-08	SYF	R765487
Chromium (Cr)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Copper (Cu)	0.002		0.001	mg/L		04-DEC-08	SYF	R765487
Molybdenum (Mo)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Nickel (Ni)	0.005		0.002	mg/L		04-DEC-08	SYF	R765487
Lead (Pb)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Tin (Sn)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Strontium (Sr)	2.09		0.005	mg/L		04-DEC-08	SYF	R765487
Titanium (Ti)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Thallium (Tl)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Vanadium (V)	0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Zinc (Zn)	0.002		0.002	mg/L		04-DEC-08	SYF	R765487
CCME PAHs								
Naphthalene	0.00003	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Quinoline	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acenaphthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluorene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Phenanthrene	0.00003	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acridine	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluoranthene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Pyrene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Chrysene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(b&j)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(k)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Indeno(1,2,3-cd)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Dibenzo(a,h)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Surr: Nitrobenzene d5	57		24-132	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: 2-Fluorobiphenyl	58		37-123	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: p-Terphenyl d14	60		41-143	%	02-DEC-08	04-DEC-08	PCL	R764567
L713299-5 ET-MW14								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Major Metals								
Calcium (Ca)	107		0.5	mg/L		05-DEC-08	BOC	R766049
Potassium (K)	6.9		0.1	mg/L		05-DEC-08	BOC	R766049
Magnesium (Mg)	37.4		0.01	mg/L		05-DEC-08	BOC	R766049
Sodium (Na)	32.7		0.5	mg/L		05-DEC-08	BOC	R766049
Iron (Fe)	0.006		0.005	mg/L		05-DEC-08	BOC	R766049
Manganese (Mn)	0.113		0.001	mg/L		05-DEC-08	BOC	R766049
Dissolved Trace Metals								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-5 ET-MW14								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Aluminum (Al)	<0.01		0.01	mg/L		04-DEC-08	SYF	R765487
Boron (B)	0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Barium (Ba)	0.093		0.003	mg/L		04-DEC-08	SYF	R765487
Beryllium (Be)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cadmium (Cd)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Cobalt (Co)	<0.002		0.002	mg/L		04-DEC-08	SYF	R765487
Chromium (Cr)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Copper (Cu)	0.002		0.001	mg/L		04-DEC-08	SYF	R765487
Molybdenum (Mo)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Nickel (Ni)	0.003		0.002	mg/L		04-DEC-08	SYF	R765487
Lead (Pb)	<0.005		0.005	mg/L		04-DEC-08	SYF	R765487
Tin (Sn)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Strontium (Sr)	0.624		0.005	mg/L		04-DEC-08	SYF	R765487
Titanium (Ti)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Thallium (Tl)	<0.05		0.05	mg/L		04-DEC-08	SYF	R765487
Vanadium (V)	<0.001		0.001	mg/L		04-DEC-08	SYF	R765487
Zinc (Zn)	<0.002		0.002	mg/L		04-DEC-08	SYF	R765487
CCME PAHs								
Naphthalene	0.00003	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Quinoline	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acenaphthene	0.00002		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluorene	0.00004		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Phenanthrene	0.00012	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acridine	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluoranthene	0.00003		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Pyrene	0.00007		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)anthracene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Chrysene	0.00002		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(b&j)fluoranthene	0.00002		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(k)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)pyrene	0.00002		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Indeno(1,2,3-cd)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Dibenzo(a,h)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Surr: Nitrobenzene d5	69		24-132	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: 2-Fluorobiphenyl	64		37-123	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: p-Terphenyl d14	58		41-143	%	02-DEC-08	04-DEC-08	PCL	R764567
OC Screen GC/ECD								
p,p'-DDD	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
p,p'-DDE	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
p,p'-DDT	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Aldrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
alpha-BHC	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
beta-BHC	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
gamma-BHC (Lindane)	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Quintozine (PCNB)	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
cis-Chlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
trans-Chlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Dieldrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-5 ET-MW14								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
OC Screen GC/ECD								
Endosulfan I	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endosulfan II	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Endrin	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Heptachlor	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Methoxychlor	<0.0002		0.0002	mg/L		04-DEC-08	BF	R766902
Mirex	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Nonachlor	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Oxychlordane	<0.0001		0.0001	mg/L		04-DEC-08	BF	R766902
Routine Water Analysis								
Chloride (Cl)	6.8		0.1	mg/L		01-DEC-08	SCL	R764138
Ion Balance Calculation								
Ion Balance	97.0			%		03-DEC-08		
TDS (Calculated)	606			mg/L		03-DEC-08		
Hardness (as CaCO3)	451			mg/L		03-DEC-08		
Nitrate and Nitrite as N	6.36		0.07	mg/L		02-DEC-08		
Nitrate-N	6.36		0.05	mg/L		01-DEC-08	SCL	R764138
Nitrite-N	<0.05		0.05	mg/L		01-DEC-08	SCL	R764138
Sulphate (SO4)	184		0.5	mg/L		01-DEC-08	SCL	R764138
pH, Conductivity and Total Alkalinity								
pH	8.00		0.01	pH		01-DEC-08	GK	R764159
Conductivity (EC)	918		3	uS/cm		01-DEC-08	GK	R764159
Bicarbonate (HCO3)	393		5	mg/L		01-DEC-08	GK	R764159
Carbonate (CO3)	<5		5	mg/L		01-DEC-08	GK	R764159
Hydroxide (OH)	<5		5	mg/L		01-DEC-08	GK	R764159
Alkalinity, Total (as CaCO3)	322		5	mg/L		01-DEC-08	GK	R764159
L713299-6 ET-MW16								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Major Metals								
Calcium (Ca)	65.9		0.5	mg/L		05-DEC-08	BOC	R766049
Potassium (K)	3.3		0.1	mg/L		05-DEC-08	BOC	R766049
Magnesium (Mg)	15.2		0.01	mg/L		05-DEC-08	BOC	R766049
Sodium (Na)	7.1		0.5	mg/L		05-DEC-08	BOC	R766049
Iron (Fe)	<0.005		0.005	mg/L		05-DEC-08	BOC	R766049
Manganese (Mn)	0.008		0.001	mg/L		05-DEC-08	BOC	R766049
Dissolved Trace Metals								
Silver (Ag)	<0.005		0.005	mg/L		05-DEC-08	SYF	R765487
Aluminum (Al)	<0.01		0.01	mg/L		05-DEC-08	SYF	R765487
Boron (B)	<0.05		0.05	mg/L		05-DEC-08	SYF	R765487
Barium (Ba)	0.110		0.003	mg/L		05-DEC-08	SYF	R765487
Beryllium (Be)	<0.001		0.001	mg/L		05-DEC-08	SYF	R765487
Cadmium (Cd)	<0.001		0.001	mg/L		05-DEC-08	SYF	R765487
Cobalt (Co)	<0.002		0.002	mg/L		05-DEC-08	SYF	R765487
Chromium (Cr)	<0.005		0.005	mg/L		05-DEC-08	SYF	R765487
Copper (Cu)	<0.001		0.001	mg/L		05-DEC-08	SYF	R765487
Molybdenum (Mo)	<0.005		0.005	mg/L		05-DEC-08	SYF	R765487
Nickel (Ni)	0.003		0.002	mg/L		05-DEC-08	SYF	R765487
Lead (Pb)	<0.005		0.005	mg/L		05-DEC-08	SYF	R765487
Tin (Sn)	<0.05		0.05	mg/L		05-DEC-08	SYF	R765487

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L713299-6 ET-MW16								
Sampled By: MB/JN on 28-NOV-08								
Matrix: WATER								
Dissolved Metals								
Dissolved Trace Metals								
Strontium (Sr)	0.353		0.005	mg/L		05-DEC-08	SYF	R765487
Titanium (Ti)	<0.001		0.001	mg/L		05-DEC-08	SYF	R765487
Thallium (Tl)	<0.05		0.05	mg/L		05-DEC-08	SYF	R765487
Vanadium (V)	<0.001		0.001	mg/L		05-DEC-08	SYF	R765487
Zinc (Zn)	<0.002		0.002	mg/L		05-DEC-08	SYF	R765487
CCME PAHs								
Naphthalene	0.00002	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Quinoline	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acenaphthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluorene	0.00002		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Phenanthrene	0.00003	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Acridine	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Fluoranthene	<0.00001	RAMB	0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Pyrene	0.00003		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Chrysene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(b&j)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(k)fluoranthene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Benzo(a)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Indeno(1,2,3-cd)pyrene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Dibenzo(a,h)anthracene	<0.00001		0.00001	mg/L	02-DEC-08	04-DEC-08	PCL	R764567
Surr: Nitrobenzene d5	61		24-132	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: 2-Fluorobiphenyl	53		37-123	%	02-DEC-08	04-DEC-08	PCL	R764567
Surr: p-Terphenyl d14	50		41-143	%	02-DEC-08	04-DEC-08	PCL	R764567
Routine Water Analysis								
Chloride (Cl)	1.2		0.1	mg/L		01-DEC-08	SCL	R764138
Ion Balance Calculation								
Ion Balance	96.6			%		03-DEC-08		
TDS (Calculated)	294			mg/L		03-DEC-08		
Hardness (as CaCO3)	256			mg/L		03-DEC-08		
Nitrate and Nitrite as N	0.21		0.07	mg/L		02-DEC-08		
Nitrate-N	0.21		0.05	mg/L		01-DEC-08	SCL	R764138
Nitrite-N	<0.05		0.05	mg/L		01-DEC-08	SCL	R764138
Sulphate (SO4)	47.4		0.5	mg/L		01-DEC-08	SCL	R764138
pH, Conductivity and Total Alkalinity								
pH	8.09		0.01	pH		01-DEC-08	GK	R764159
Conductivity (EC)	494		3	uS/cm		01-DEC-08	GK	R764159
Bicarbonate (HCO3)	287		5	mg/L		01-DEC-08	GK	R764159
Carbonate (CO3)	<5		5	mg/L		01-DEC-08	GK	R764159
Hydroxide (OH)	<5		5	mg/L		01-DEC-08	GK	R764159
Alkalinity, Total (as CaCO3)	236		5	mg/L		01-DEC-08	GK	R764159

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
RAMB	Result Adjusted For Method Blank

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
CL-CL	Water	Chloride (Cl)		APHA 4110 B-Ion Chromatography
IONBALANCE-CL	Water	Ion Balance Calculation		APHA 1030E
MET1-DIS-ED	Water	Dissolved Trace Metals		EPA 6020
MET2-DIS-ED	Water	Dissolved Major Metals		EPA 200.7
N2N3-CALC-CL	Water	Nitrate+Nitrite		CALCULATION
NO2-CL	Water	Nitrite-N		APHA 4110 B-Ion Chromatography
NO3-IC-CL	Water	Nitrate-N		APHA 4110 B-Ion Chromatography
OCSCREEN-ED	Water	OC Screen GC/ECD		EPA 8081-GC/ECD
PAH-CCME-ED	Water	CCME PAHs		EPA 3510/8270-GC/MS
PH/EC/ALK-CL	Water	pH, Conductivity and Total Alkalinity		APHA 4500H,2510,2320
SO4-CL	Water	Sulfate (SO4)		APHA 4110 B-Ion Chromatography

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

08-065080

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	ALS LABORATORY GROUP - CALGARY, ALBERTA, CANADA	ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency. The Laboratory control limits are determined under column heading D.L.
mg/kg (units) - unit of concentration based on mass, parts per million.
mg/L (units) - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

L713299

COC # **08-065080**

Page 1 of 1

Report to: Gordon Woollett	**Report Format / Distribution**
Company: AECOM	Standard: X Other:
Contact: same	Select: PDF X Excel X Digital X
Address: 17203 - 103 ave, Edm, AB	Email 1: gordon.woollett@aecom.com
	Email 2: mitchell.bliss@aecom.com
Phone: (780) 488-6800 Fax: (780) 488-2121	
Invoice To: Same as Report ? NO Yes / No ?	**Client / Project Information:**
Company: PWGSC	Job #: 106524
Contact: Laurie Washington	PO / AFE:
Address: 5th floor, 10025 Jasper Ave	Legal Site Description: Bar U Ranch
	Standing offer PWGSC →
Phone: (780) 497-3892 Fax: (780) 497-3842	Quote #: EO211-023196/001/EDM
Lab Work Order # (lab use only)	**ALS Contact:** Sampler: MB / JN

Service Requested: (rush - subject to availability)

- X Regular (Default)
- Priority (2-3 Business Days) - 50% Surcharge
- Emergency (1 Business Day) - 100% Surcharge
- For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request
(Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	PAHs	F/P dissolved metals	organochloride pesticides	routine								Number of Containers
1	MW1	Nov 28/08		water	X	X	X									3
2	MW3	↓		↓	X	X	X									3
3	MW4				X	X										2
4	MW6				X	X										2
5	ET-MW14				X	X	X	X								4
6	ET-MW16				X	X	[redacted]	X							3	[redacted]

Special Instructions / Regulations / Hazardous Details

dissolved metals have been field filtered and preserved; invoice to Laurie Washington of PWGSC.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
Mitch Bliss	Nov 28/08 4:55 pm					M.Ny	28-Nov-08 16:53 4°	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF 18.00 Front

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Sample Integrity Form

Date: 28-Nov-08. Client:: AECOM.

ALS Contact: COC #: 08-065080.

Phone #: Work Order #:

Please note the following observations that prevent your samples from being processed.
ALS is attempting to contact you for further instructions.
If our attempts fail, please contact us as soon as possible to ensure your analytical needs are met.

	Observation	Details
☐	Temperature < freezing point	actual temp. (breakdown by cooler):
☐	Temperature ≥ 10 Celsius	actual temp. (breakdown by cooler):
☐	Containers broken in transit	details:
☐	Sample integrity compromised	details:
☐	Regulatory non-compliance	details:
☐	No COC with shipment	details:
☒	Discrepancy between COC and label	details: Labels MW3 - COC MW3.
☐	COC incomplete or unclear	details:
☐	Container incompatible with test	details:
☐	Volume is insufficient for test	details:
☐	Preservation incompatible with test	details:
☐	No preservation	details:
☒	Other observation	details:

Additional Information (list all affected sample portions):

-6 No Metals BTH.
-5 -2x Metals. BTH.

Appendix G

The production and use of this Report is conditional upon the following agreement by the Client and Others who may use or rely upon it.

1. ***MANDATE OF AECOM CANADA LTD.***

This Report has been prepared pursuant to the instructions of the Client and is subject to the constraints imposed by those instructions. AECOM Canada Ltd. ("AECOM") and the Client are aware of these instructions and constraints. Others, who wish to rely upon this Report in any manner, should inquire of the Client for the terms of AECOM's mandate in preparing this Report.

2. ***BASIS OF REPORT***

2.1 ***Representations to AECOM by Client***

This Report has been prepared for the specific site, development, design objective, and purpose described to AECOM by the Client and is specifically based on all of the aforesaid.

Inaccuracies or alternations, of any of the matters upon which this Report is based, will affect the reliability and applicability of this Report.

2.2 ***Representations to AECOM by Other Persons***

AECOM may have relied upon the representations or opinions of persons other than the Client in the course of preparing this Report. AECOM may not have checked the accuracy of such representations or opinions except where directed to do so by the Client. The accuracy of these representations and opinions will affect the accuracy of this Report.

2.3 ***Time Sensitivity of Report***

The findings expressed in this Report by AECOM were valid, in accordance with generally accepted engineering practice and procedures, at the time that they were made. The Client and Others are advised that the conditions upon which such findings were based, and the findings themselves may be subject to change as a result of the passage of time.

3. ***USE OF REPORT BY THE CLIENT***

The Client recognizes that projects involving pollutants and hazardous waste, as defined below, create extraordinary risks. In consideration of the said extraordinary risks and in consideration of AECOM providing the services to the Client in connection with the project on which pollutants and hazardous wastes are involved, the Client agrees that AECOM's liability to the Client, including liability resulting from claims by Third Parties upon the Client, with respect to any matter in any way arising out of AECOM's involvement with pollutants and hazardous wastes associated shall be limited to or otherwise protected as provided in paragraphs (a) and (b) below.

(a) AECOM's liability to the Client in connection with pollutants and hazardous waste is absolutely limited, both in contract and in tort for any and all claims arising out of or in connection with the project to a total maximum aggregate amount not to exceed the cost of reperformance of the services at the sole cost of AECOM for that portion of the services proven to be in error.

It is further agreed that such limitation shall be exclusive of the liability of AECOM to the Client which may otherwise be provided for in this Agreement for claims unrelated to pollutants and hazardous wastes.

In further consideration of AECOM providing the services to the Client in connection with the project in which pollutants and hazardous wastes are involved, the Client agrees that in connection with incidents and claims initiated by Third Parties involving pollutants and hazardous wastes, the Client shall indemnify, defend and hold harmless AECOM of and from any and all suits, actions, legal and administrative or arbitration proceedings, claims, demands, damages, penalties, fines, losses, costs and expenses of whatsoever kind or character, arising or alleged to arise out of the services of AECOM or any claim against AECOM arising or alleged to arise from acts, omissions or work of others. Such indemnification shall apply to the fullest extent permitted by law, regardless of fault or breach of contract by AECOM and shall include the fees and charges of lawyers in defending or advising AECOM as to such claims under the Agreement.

Without limiting the generality of the foregoing, such indemnity extends to claims which arise out of the actual or threatened dispersal, discharge, escape, release or saturation (whether sudden or gradual) of any pollutant to hazardous waste in or into the atmosphere, or on, on to, in or into the surface or subsurface, soils, water or water courses, persons, objects or any other tangible matter.

(b) Nothing herein shall relieve AECOM from their obligations to provide the services required by this Agreement and generally as required by standard engineering practice current as of the date of the performance of the services.

(c) For all purposes of this statement of limitations, "pollutants and hazardous waste" shall mean any solid, liquid, gaseous or thermal irritant or contaminant, including without limitation smoke, vapour, soot, fumes, acids, alkalis, chemicals and wastes, including without limitation, pollutants, hazardous or special waste as defined in any federal, provincial or municipal laws.

4. ***SUBCONSULTANTS AND SUBCONTRACTORS***

As a result of its mandate, AECOM may hire companies or individuals with special expertise or services not available within AECOM. These services are for the Client's benefit. The Client agrees to pay for the services of subconsultants and subcontractors. The Client also agrees to indemnify AECOM for any damage in any way resulting from the error, omission or negligent act of such subconsultants or subcontractors, including, without limiting the generality of the foregoing, the laboratory testing by subconsultants.

5. ***JOB SITE SAFETY***

AECOM is only responsible for the activities of its employees on the job site and is not responsible for the supervision of any other persons whatsoever. The presence of AECOM personnel on the site shall not be construed in any way to relieve the Client or any other persons on site from their responsibilities for job site safety.

6. ***HAZARDOUS CONDITIONS AND EMERGENCY PROCEDURE***

The Client undertakes to inform AECOM of all hazardous conditions, or possible hazardous conditions which are known to it. The Client recognizes that the activities of AECOM may uncover previously unknown hazardous materials or conditions and that such a discovery may result in the necessity to undertake emergency procedures to protect AECOM employees as well as other persons and the environment. These procedures may involve additional costs outside of any budgets previously agreed to. The Client agrees to pay AECOM for any expenses incurred as a result of such discoveries and to compensate AECOM through payment of additional fees and expenses for time spent by AECOM to deal with the consequences of such discoveries.

7. ***NOTIFICATION OF AUTHORITIES***

The Client acknowledges that in certain instances the discovery of hazardous substances or conditions and materials may require that government bodies, and other persons, be informed and the Client agrees that notification to such bodies or persons as required may be done by AECOM in its reasonably exercised discretion.

8. ***USE OF REORTS BY OTHERS***

Others wishing to rely upon this Report in any manner may do so only upon condition that such use, and the consequences of such use, are entirely at their own risk and that they understand fully the terms of the Mandate and Basis of this Report.

It is further agreed by such Others that AECOM will not be liable to them in any manner including any liability in contract or in tort for any damages whatsoever arising from such use.