



# O'CONNOR ASSOCIATES ENVIRONMENTAL INC.

SUITE 200, 318 - 11TH AVENUE SE, CALGARY, ALBERTA T2G 0Y2 TELEPHONE: (403) 294-4200 FAX: (403) 294-4240 WATTS: (800) 661-8141

March 30, 2009

10-5846

Shell Canada Products  
400 - 4<sup>th</sup> Avenue SW  
Calgary, Alberta  
T2P 2H5

**CONFIDENTIAL**

Attention: Mr. Gary Millard, P.Geol.  
Environmental Geologist

Dear Mr. Millard:

Re: Groundwater Monitoring Well Decommissioning  
Former Barons Turbo Bulk Station  
235 Main Street, Barons, Alberta  
Location No. C42520 AENV File #82402

Under the authorization of Shell Canada Products (Shell), O'Connor Associates Environmental Inc. (OAEI) decommissioned three groundwater monitoring wells located on the boulevards adjacent the former Barons Turbo Bulk Station property at 235 Main Street in Barons, Alberta, (hereafter referred to as the "site"). The field activities were completed on 2008-03-20. The monitoring wells were decommissioned as they were no longer required for groundwater monitoring or sampling purposes.

The following report summarizes the decommissioning activities. The site location is shown on Drawing No. 1 and a site plan showing the former bulk station facilities and the borehole/monitoring well locations is presented as Drawing No. 2, for your reference.

## **BACKGROUND INFORMATION**

According to available information, prior to 1990, the site operated as a Shell bulk station. The site legal description is Plan 2605X, Block 6, Lots 21 to 27, Barons, Alberta. The Alberta Township System (ATS) locates the site within NE Section 16; Township 12; Range 23; West of the 4<sup>th</sup> Meridian (W4M). According to the available information, the former site facilities consisted of: at least seven above-ground storage tanks (enclosed in an approximate 0.5 m high concrete berm) within the east portion of the site; an on/off loading ramp within the southeast portion of the site;

**THIS REPORT IS SUBJECT TO A DISCLAIMER BY SHELL**

and, a warehouse and an office building within the southwest portion of the site. The Barons Hardware store is located immediately west of the site. There are two underground storage tanks and two fuel pump islands located on the west and south portions of the Barons Hardware property, respectively.

It is our understanding that a domestic-use water well is also located on or near the site although the status of the well is unknown. The water well drilling record as provided by Alberta Environment is included in Appendix C, for your reference.

In 1999, the above-ground tanks, concrete berm, warehouse and office buildings were removed from the site and a remedial excavation of the area was conducted by Seacor Environmental Inc.

The historical hydrochemical results for groundwater samples collected between 2001 and 2006 are summarized on Drawing No. 3, along with the 2008 Alberta Tier 1 generic criteria for commercial land use (within 30 m of residential land use) and fine-grained soil. As the data indicate, none of the analyzed petroleum hydrocarbon constituent concentrations in the groundwater samples collected from monitoring wells S-BH96-1, S-BH96-8 and S-BH96-14 would exceed the 2008 Alberta Tier 1 remediation criteria. In addition, most of the petroleum hydrocarbon constituent concentrations were less than the laboratory reportable detection limits. Based on this information, these monitoring wells are considered no longer necessary for groundwater monitoring or sampling purposes.

## **DECOMMISSIONING ACTIVITIES**

The decommissioning activities were completed in accordance with OAEI protocols described in Appendix A. During the site activities, both OAEI and Shell health and safety protocols were followed; a copy of the OAEI Daily Safe Work Permit is included in Appendix B.

The underground utilities were located and marked on 2008-03-14, by representatives of the respective utility companies and by a private locator. On 2008-03-20, offsite groundwater monitoring wells S-BH96-8 (located on the Progress Avenue boulevard immediately east of the site) and S-BH96-1 and S-BH96-14 (located on the Main Street boulevard immediately south of the site) were decommissioned using a truck-mounted auger drill rig operated by Chilako Drilling Services Ltd. of Coaldale, Alberta. The monitoring wells were decommissioned by pulling out the PVC standpipe from each well, followed by drilling out the sand pack and backfill materials and plugging the remaining borehole with hydrated bentonite to grade.

## **CLOSURE**

The reported information is believed to provide a reasonable account of the groundwater monitoring well decommissioning activities carried out for the offsite monitoring wells located near the former Barons Turbo Bulk Station at 235 Main Street in Barons, Alberta. This report is subject to the Limitations of Liability, Scope of Report, and the Third Party Reliance terms and conditions as specified in Appendix D.

Should any questions arise regarding the information presented herein, please contact the undersigned.

Yours very truly,

O'CONNOR ASSOCIATES ENVIRONMENTAL INC.

L.G. Shorter, E.I.T.

N.K. Hansen, P.Eng.

LGS/NKH/jss

Distribution: Addressee (2)

## **LIST OF APPENDICES**

**APPENDIX A - OAEI FIELD PROCEDURE FOR MONITORING  
WELL DECOMMISSIONING**

**APPENDIX B - OAEI DAILY SAFE WORK PERMIT**

**APPENDIX C - AENV WATER WELL DRILLING REPORT**

**APPENDIX D - LIMITATION OF LIABILITY, SCOPE OF  
REPORT AND THIRD PARTY**

## **APPENDIX A**

# **OAEI FIELD PROCEDURE FOR MONITORING WELL DECOMMISSIONING**

## **APPENDIX A**

### **OAEI FIELD PROCEDURES FOR WELL DECOMMISSIONING**

#### **Health and Safety**

Consistent with OAEI policy and Shell's, all completed work is carried out consistent with a site specific health and safety plan. This plan, as a minimum, complies with provincial requirements as well as OAEI and Shell's guidelines, whichever were more stringent.

#### **Approvals**

Prior to doing any site work, approval to proceed is obtained from the client. When monitoring or investigative work including monitoring decommissioning activities are required on public or third party lands, all necessary approvals are obtained from the municipality or the property owner, respectively, prior to commencing any work.

#### **Utility Locates**

Prior to any decommissioning activities, the respective utility companies are asked to mark their underground utilities within the area of drilling (well decommissioning) in addition to clearing the location of each monitoring well to be decommissioned and if possible, to provide plans indicating the locations of their underground utilities. Also, a private locator is contracted to confirm the utility company locations and/or to locate and mark the underground services on private property. Any underground utility within 2 m of a monitoring well to be decommissioned is daylighted by hydrovac.

#### **Monitoring Well Decommissioning Procedure**

Monitoring wells are generally decommissioned using a solid-stem auger drill rig. The drill rig augers must be cleaned (e.g. steam cleaned) prior to the decommissioning of each standpipe well. In addition, the auger diameter must be larger than the monitoring well diameter (including sand pack annulus) to ensure that all well materials are drilled out. The length of the monitoring well is determined by first measuring to the bottom of the well and by referring to the original borehole log, if available. The steel surface-casing is then removed by using a Hilti jack-hammer. The PVC standpipe is then either pulled out of the ground using the drill rig winch (some drilling companies provide a special attachment which bolts onto the standpipe; holes must be initially drilled into the standpipe for the bolt) or is drilled out to the full length of the standpipe. The well installation materials are then drilled out (i.e., the well annulus sand pack) to the bottom of the original borehole. The remaining borehole is then backfilled with grout ( preferably applied with a tremie pump) from the bottom of the borehole to approximately 0.5 m below ground surface (if grout is not available, hydrated bentonite chips may be used to backfill the borehole). The remainder of the borehole is backfilled consistent with the surrounding materials and the surface is finished consistent with the surrounding ground surface. All waste materials are stored in soil bags and disposed of at an authorized land fill with the appropriate approvals.

## **APPENDIX B**

### **OAEI DAILY SAFE WORK PERMIT**

## **APPENDIX C**

### **AENV WATER WELL DRILLING REPORT**

## **APPENDIX D**

### **LIMITATION OF LIABILITY, SCOPE OF REPORT AND THIRD PARTY RELIANCE**

## **APPENDIX D**

### **LIMITATION OF LIABILITY, SCOPE OF REPORT AND THIRD PARTY RELIANCE**

This report has been prepared and the work referred to in this report has been undertaken by O'Connor Associates Environmental Inc. ("O'Connor Associates") for Shell Canada Products. It is intended for the sole and exclusive use of Shell Canada Products, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, "Shell"). Any use, reliance on or decision made by any person other than Shell based on this report is the sole responsibility of such other person. Shell and O'Connor Associates make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigations undertaken by O'Connor Associates with respect to this report and any conclusions or recommendations made in this report reflect O'Connor Associates' judgement based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information examined at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed in the report. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by this investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary. Other than by Shell, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of O'Connor Associates. Nothing in this report is intended to constitute or provide a legal opinion.

These documents and the information contained in them are confidential - property of Shell Canada Products and any disclosure of same is governed by the provisions of each of the applicable provincial or territorial Freedom of Information legislation, the Privacy Act, (Canada) 1980-81-82-83, c.111, Sch.II "1", and the Access to Information Act (Canada) 1980-81-82-83, c.111, Sch. I "1", as such legislation may be amended or replaced from time to time.

and, a warehouse and an office building within the southwest portion of the site. The Barons Hardware store is located immediately west of the site. There are two underground storage tanks and two fuel pump islands located on the west and south portions of the Barons Hardware property, respectively.

It is our understanding that a domestic-use water well is also located on or near the site although the status of the well is unknown. The water well drilling record as provided by Alberta Environment is included in Appendix C, for your reference.

In 1999, the above-ground tanks, concrete berm, warehouse and office buildings were removed from the site and a remedial excavation of the area was conducted by Seacor Environmental Inc.

The historical hydrochemical results for groundwater samples collected between 2001 and 2006 are summarized on Drawing No. 3, along with the 2008 Alberta Tier 1 generic criteria for commercial land use (within 30 m of residential land use) and fine-grained soil. As the data indicate, none of the analyzed petroleum hydrocarbon constituent concentrations in the groundwater samples collected from monitoring wells S-BH96-1, S-BH96-8 and S-BH96-14 would exceed the 2008 Alberta Tier 1 remediation criteria. In addition, most of the petroleum hydrocarbon constituent concentrations were less than the laboratory reportable detection limits. Based on this information, these monitoring wells are considered no longer necessary for groundwater monitoring or sampling purposes.

## **DECOMMISSIONING ACTIVITIES**

The decommissioning activities were completed in accordance with OAEI protocols described in Appendix A. During the site activities, both OAEI and Shell health and safety protocols were followed; a copy of the OAEI Daily Safe Work Permit is included in Appendix B.

The underground utilities were located and marked on 2008-03-14, by representatives of the respective utility companies and by a private locator. On 2008-03-20, offsite groundwater monitoring wells S-BH96-8 (located on the Progress Avenue boulevard immediately east of the site) and S-BH96-1 and S-BH96-14 (located on the Main Street boulevard immediately south of the site) were decommissioned using a truck-mounted auger drill rig operated by Chilako Drilling Services Ltd. of Coaldale, Alberta. The monitoring wells were decommissioned by pulling out the PVC standpipe from each well, followed by drilling out the sand pack and backfill materials and plugging the remaining borehole with hydrated bentonite to grade.

and, a warehouse and an office building within the southwest portion of the site. The Barons Hardware store is located immediately west of the site. There are two underground storage tanks and two fuel pump islands located on the west and south portions of the Barons Hardware property, respectively.

It is our understanding that a domestic-use water well is also located on or near the site although the status of the well is unknown. The water well drilling record as provided by Alberta Environment is included in Appendix C, for your reference.

In 1999, the above-ground tanks, concrete berm, warehouse and office buildings were removed from the site and a remedial excavation of the area was conducted by Seacor Environmental Inc.

The historical hydrochemical results for groundwater samples collected between 2001 and 2006 are summarized on Drawing No. 3, along with the 2008 Alberta Tier 1 generic criteria for commercial land use (within 30 m of residential land use) and fine-grained soil. As the data indicate, none of the analyzed petroleum hydrocarbon constituent concentrations in the groundwater samples collected from monitoring wells S-BH96-1, S-BH96-8 and S-BH96-14 would exceed the 2008 Alberta Tier 1 remediation criteria. In addition, most of the petroleum hydrocarbon constituent concentrations were less than the laboratory reportable detection limits. Based on this information, these monitoring wells are considered no longer necessary for groundwater monitoring or sampling purposes.

## **DECOMMISSIONING ACTIVITIES**

The decommissioning activities were completed in accordance with OAEI protocols described in Appendix A. During the site activities, both OAEI and Shell health and safety protocols were followed; a copy of the OAEI Daily Safe Work Permit is included in Appendix B.

The underground utilities were located and marked on 2008-03-14, by representatives of the respective utility companies and by a private locator. On 2008-03-20, offsite groundwater monitoring wells S-BH96-8 (located on the Progress Avenue boulevard immediately east of the site) and S-BH96-1 and S-BH96-14 (located on the Main Street boulevard immediately south of the site) were decommissioned using a truck-mounted auger drill rig operated by Chilako Drilling Services Ltd. of Coaldale, Alberta. The monitoring wells were decommissioned by pulling out the PVC standpipe from each well, followed by drilling out the sand pack and backfill materials and plugging the remaining borehole with hydrated bentonite to grade.

## **CLOSURE**

The reported information is believed to provide a reasonable account of the groundwater monitoring well decommissioning activities carried out for the offsite monitoring wells located near the former Barons Turbo Bulk Station at 235 Main Street in Barons, Alberta. This report is subject to the Limitations of Liability, Scope of Report, and the Third Party Reliance terms and conditions as specified in Appendix D.

Should any questions arise regarding the information presented herein, please contact the undersigned.

Yours very truly,

O'CONNOR ASSOCIATES ENVIRONMENTAL INC.

L.G. Shorter, E.I.T.

N.K. Hansen, P.Eng.

LGS/NKH/jss

Distribution: Addressee (2)

## **LIST OF APPENDICES**

**APPENDIX A - OAEI FIELD PROCEDURE FOR MONITORING  
WELL DECOMMISSIONING**

**APPENDIX B - OAEI DAILY SAFE WORK PERMIT**

**APPENDIX C - AENV WATER WELL DRILLING REPORT**

**APPENDIX D - LIMITATION OF LIABILITY, SCOPE OF  
REPORT AND THIRD PARTY**

## **APPENDIX A**

# **OAEI FIELD PROCEDURE FOR MONITORING WELL DECOMMISSIONING**

## **APPENDIX A**

### **OAEI FIELD PROCEDURES FOR WELL DECOMMISSIONING**

#### **Health and Safety**

Consistent with OAEI policy and Shell's, all completed work is carried out consistent with a site specific health and safety plan. This plan, as a minimum, complies with provincial requirements as well as OAEI and Shell's guidelines, whichever were more stringent.

#### **Approvals**

Prior to doing any site work, approval to proceed is obtained from the client. When monitoring or investigative work including monitoring decommissioning activities are required on public or third party lands, all necessary approvals are obtained from the municipality or the property owner, respectively, prior to commencing any work.

#### **Utility Locates**

Prior to any decommissioning activities, the respective utility companies are asked to mark their underground utilities within the area of drilling (well decommissioning) in addition to clearing the location of each monitoring well to be decommissioned and if possible, to provide plans indicating the locations of their underground utilities. Also, a private locator is contracted to confirm the utility company locations and/or to locate and mark the underground services on private property. Any underground utility within 2 m of a monitoring well to be decommissioned is daylighted by hydrovac.

#### **Monitoring Well Decommissioning Procedure**

Monitoring wells are generally decommissioned using a solid-stem auger drill rig. The drill rig augers must be cleaned (e.g. steam cleaned) prior to the decommissioning of each standpipe well. In addition, the auger diameter must be larger than the monitoring well diameter (including sand pack annulus) to ensure that all well materials are drilled out. The length of the monitoring well is determined by first measuring to the bottom of the well and by referring to the original borehole log, if available. The steel surface-casing is then removed by using a Hilti jack-hammer. The PVC standpipe is then either pulled out of the ground using the drill rig winch (some drilling companies provide a special attachment which bolts onto the standpipe; holes must be initially drilled into the standpipe for the bolt) or is drilled out to the full length of the standpipe. The well installation materials are then drilled out (i.e., the well annulus sand pack) to the bottom of the original borehole. The remaining borehole is then backfilled with grout ( preferably applied with a tremie pump) from the bottom of the borehole to approximately 0.5 m below ground surface (if grout is not available, hydrated bentonite chips may be used to backfill the borehole). The remainder of the borehole is backfilled consistent with the surrounding materials and the surface is finished consistent with the surrounding ground surface. All waste materials are stored in soil bags and disposed of at an authorized land fill with the appropriate approvals.

## **APPENDIX B**

### **OAEI DAILY SAFE WORK PERMIT**

## **APPENDIX C**

### **AENV WATER WELL DRILLING REPORT**

## **APPENDIX D**

### **LIMITATION OF LIABILITY, SCOPE OF REPORT AND THIRD PARTY RELIANCE**

## **APPENDIX D**

### **LIMITATION OF LIABILITY, SCOPE OF REPORT AND THIRD PARTY RELIANCE**

This report has been prepared and the work referred to in this report has been undertaken by O'Connor Associates Environmental Inc. ("O'Connor Associates") for Shell Canada Products. It is intended for the sole and exclusive use of Shell Canada Products, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, "Shell"). Any use, reliance on or decision made by any person other than Shell based on this report is the sole responsibility of such other person. Shell and O'Connor Associates make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigations undertaken by O'Connor Associates with respect to this report and any conclusions or recommendations made in this report reflect O'Connor Associates' judgement based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information examined at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed in the report. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by this investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary. Other than by Shell, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of O'Connor Associates. Nothing in this report is intended to constitute or provide a legal opinion.

These documents and the information contained in them are confidential - property of Shell Canada Products and any disclosure of same is governed by the provisions of each of the applicable provincial or territorial Freedom of Information legislation, the Privacy Act, (Canada) 1980-81-82-83, c.111, Sch.II "1", and the Access to Information Act (Canada) 1980-81-82-83, c.111, Sch. I "1", as such legislation may be amended or replaced from time to time.

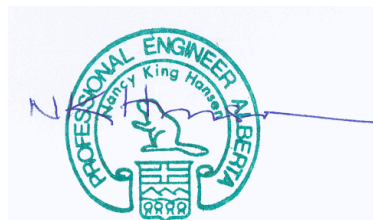
## CLOSURE

The reported information is believed to provide a reasonable account of the groundwater monitoring well decommissioning activities carried out for the offsite monitoring wells located near the former Barons Turbo Bulk Station at 235 Main Street in Barons, Alberta. This report is subject to the Limitations of Liability, Scope of Report, and the Third Party Reliance terms and conditions as specified in Appendix D.

Should any questions arise regarding the information presented herein, please contact the undersigned.

Yours very truly,

O'CONNOR ASSOCIATES ENVIRONMENTAL INC.

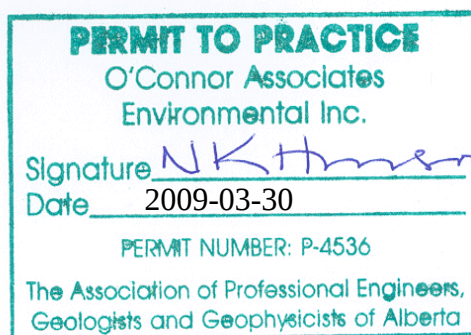


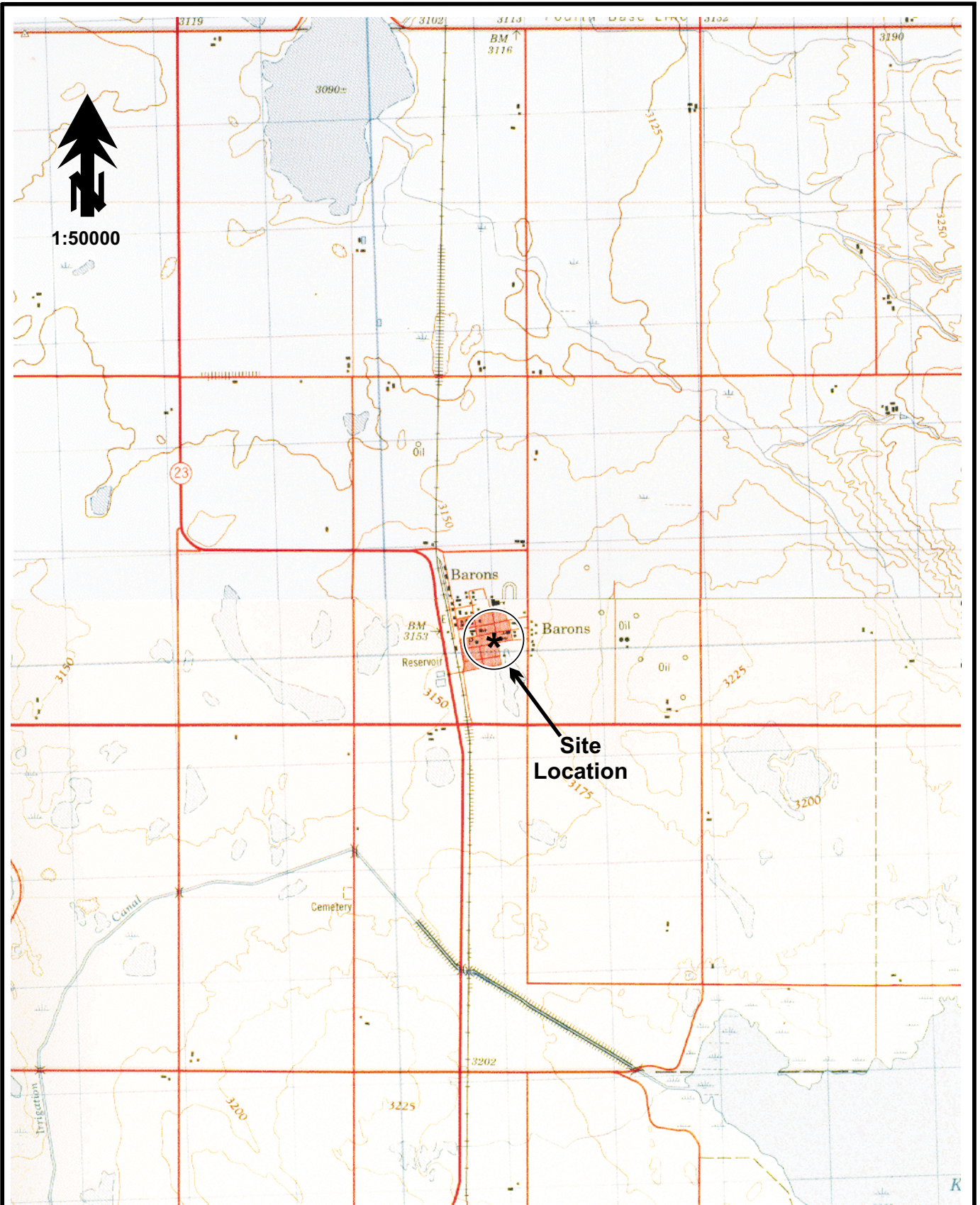
L.G. Shorter, E.I.T.

N.K. Hansen, P.Eng.

LGS/NKH/jss

Distribution: Addressee (2)





Site Location and Regional Topography

O'CONNOR ASSOCIATES

JOB NO: 10-5846

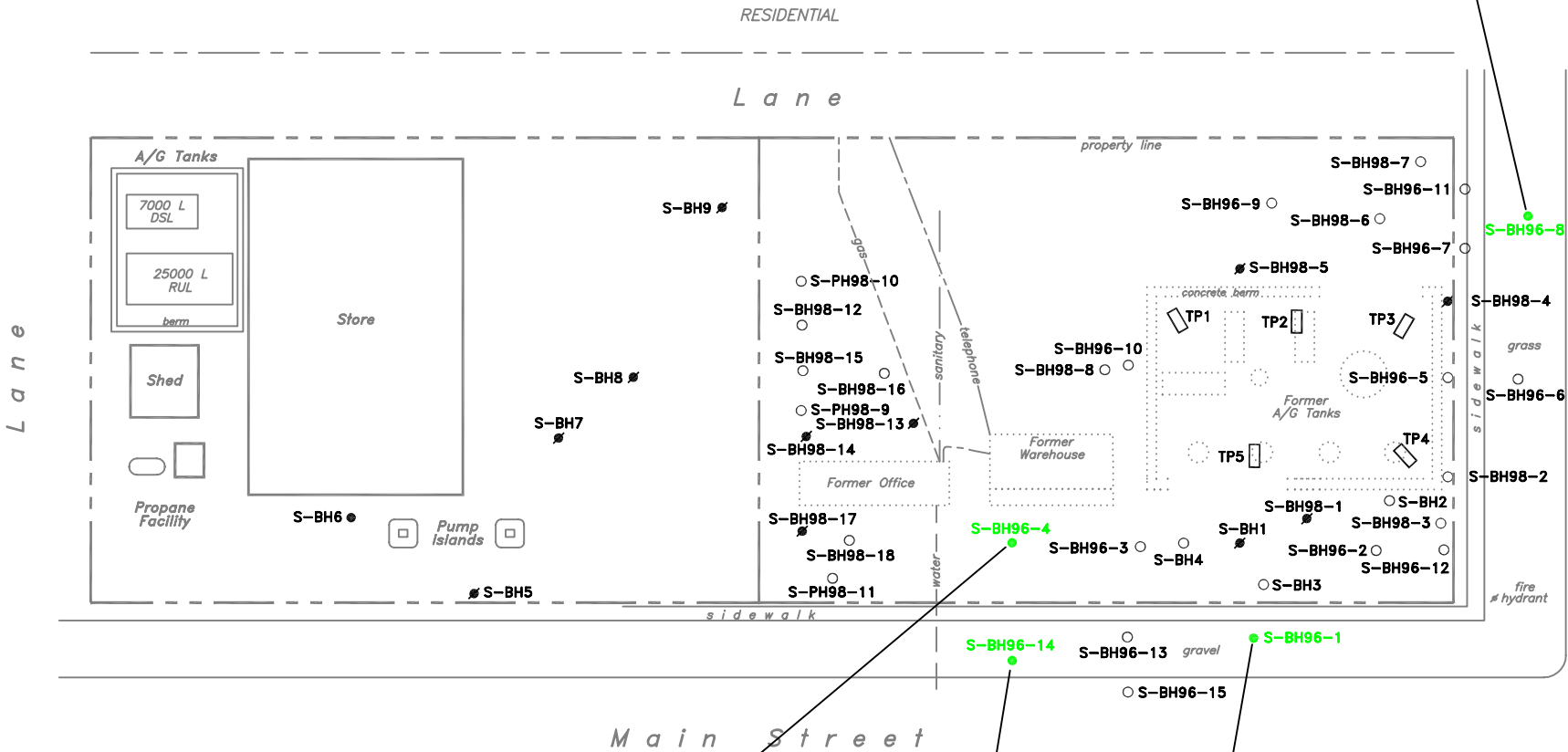
DATE: 2002/07/23

DRAWN BY: RR

DWG. NO.: 1



|                  |         |         |         |         |         |       |
|------------------|---------|---------|---------|---------|---------|-------|
| S-BH96-8         |         |         |         |         |         |       |
| Sample Date      | B       | T       | E       | X       | F1-BTEX | F2    |
| 2006-06-20       | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.13 |
| 2004-06-09       | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1  |
| 2004-06-09 (dup) | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1  |
| 2003-06-19       | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1  |
| 2003-06-19 (dup) | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1  |
| 2002-06-12       | <0.0005 | 0.0014  | <0.0005 | <0.0016 | <0.1    | <0.1  |
| 2001-12-18       | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1    | <0.1  |



- LEGEND
- Borehole (Monitoring Well)
  - Borehole (No Monitoring Well)
  - S- by SEACOR
  - ✖ Destroyed Monitoring Well
  - ⬜ Removed Facility
  - ⬜ Test Pit Location (by SEACOR)
  - Constituent concentration is less than the applicable criterion
  - Constituent concentration exceeds the applicable criterion
  - Dup Duplicate sample

|             |         |         |         |         |         |       |
|-------------|---------|---------|---------|---------|---------|-------|
| S-BH96-4    |         |         |         |         |         |       |
| Sample Date | B       | T       | E       | X       | F1-BTEX | F2    |
| 2006-06-20  | 0.0007  | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.13 |
| 2002-06-12  | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1    | <0.1  |
| 2001-12-18  | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1    | <0.1  |

|             |         |         |         |         |         |      |
|-------------|---------|---------|---------|---------|---------|------|
| S-BH96-14   |         |         |         |         |         |      |
| Sample Date | B       | T       | E       | X       | F1-BTEX | F2   |
| 2004-06-09  | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1 |
| 2003-06-19  | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1 |
| 2002-06-12  | 0.0016  | 0.0015  | <0.0005 | <0.0021 | <0.1    | <0.1 |
| 2001-12-18  | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1    | <0.1 |

|                  |         |         |         |         |         |       |
|------------------|---------|---------|---------|---------|---------|-------|
| S-BH96-1         |         |         |         |         |         |       |
| Sample Date      | B       | T       | E       | X       | F1-BTEX | F2    |
| 2006-06-20       | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.13 |
| 2006-06-20 (dup) | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.13 |
| 2004-06-09       | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1  |
| 2003-06-19       | <0.0004 | <0.0004 | <0.0004 | <0.0008 | <0.1    | <0.1  |

APPLICABLE RISK MANAGEMENT CRITERIA FOR GROUNDWATER (mg/L)

|                                                                                                                                                                                |       |       |        |     |         |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|--------|-----|---------|-----|
| 2008 Alberta Tier I generic criteria for fine-grained soil and residential land use within 30 m of residential property and commercial land use for the remainder of the site. |       |       |        |     |         |     |
|                                                                                                                                                                                | B     | T     | E      | X   | F1-BTEX | F2  |
| Groundwater ingestion pathway                                                                                                                                                  | 0.005 | 0.024 | 0.0024 | 0.3 | 2.2     | 1.1 |

Site Plan: Based on "SEACOR" dwg. no. 31-93A9 dated 1999/08/11.

Detailed Summary of Hydrochemical Results  
(mg/L)  
2001/12/18 to 2006/06/20

O'CONNOR ASSOCIATES

|           |          |           |            |
|-----------|----------|-----------|------------|
| JOB NO.:  | 10-5846  | DATE:     | 2009/03/18 |
| FILE NO.: | 5846B001 | DWG. NO.: | 3          |

## **LIST OF APPENDICES**

**APPENDIX A - OAEI FIELD PROCEDURE FOR MONITORING  
WELL DECOMMISSIONING**

**APPENDIX B - OAEI DAILY SAFE WORK PERMIT**

**APPENDIX C - AENV WATER WELL DRILLING REPORT**

**APPENDIX D - LIMITATION OF LIABILITY, SCOPE OF REPORT  
AND THIRD PARTY**

## **APPENDIX A**

### **OAEI FIELD PROCEDURE FOR MONITORING WELL DECOMMISSIONING**

## **APPENDIX A**

### **OAEI FIELD PROCEDURES FOR WELL DECOMMISSIONING**

#### **Health and Safety**

Consistent with OAEI policy and Shell's, all completed work is carried out consistent with a site specific health and safety plan. This plan, as a minimum, complies with provincial requirements as well as OAEI and Shell's guidelines, whichever were more stringent.

#### **Approvals**

Prior to doing any site work, approval to proceed is obtained from the client. When monitoring or investigative work including monitoring decommissioning activities are required on public or third party lands, all necessary approvals are obtained from the municipality or the property owner, respectively, prior to commencing any work.

#### **Utility Locates**

Prior to any decommissioning activities, the respective utility companies are asked to mark their underground utilities within the area of drilling (well decommissioning) in addition to clearing the location of each monitoring well to be decommissioned and if possible, to provide plans indicating the locations of their underground utilities. Also, a private locator is contracted to confirm the utility company locations and/or to locate and mark the underground services on private property. Any underground utility within 2 m of a monitoring well to be decommissioned is daylighted by hydrovac.

#### **Monitoring Well Decommissioning Procedure**

Monitoring wells are generally decommissioned using a solid-stem auger drill rig. The drill rig augers must be cleaned (e.g. steam cleaned) prior to the decommissioning of each standpipe well. In addition, the auger diameter must be larger than the monitoring well diameter (including sand pack annulus) to ensure that all well materials are drilled out. The length of the monitoring well is determined by first measuring to the bottom of the well and by referring to the original borehole log, if available. The steel surface-casing is then removed by using a Hilti jack-hammer. The PVC standpipe is then either pulled out of the ground using the drill rig winch (some drilling companies provide a special attachment which bolts onto the standpipe; holes must be initially drilled into the standpipe for the bolt) or is drilled out to the full length of the standpipe. The well installation materials are then drilled out (i.e., the well annulus sand pack) to the bottom of the original borehole. The remaining borehole is then backfilled with grout ( preferably applied with a tremie pump) from the bottom of the borehole to approximately 0.5 m below ground surface (if grout is not available, hydrated bentonite chips may be used to backfill the borehole). The remainder of the borehole is backfilled consistent with the surrounding materials and the surface is finished consistent with the surrounding ground surface. All waste materials are stored in soil bags and disposed of at an authorized land fill with the appropriate approvals.

**APPENDIX B**

**OAEI DAILY SAFE WORK PERMIT**

# DAILY SAFE WORK PERMIT

Can also be used as daily Safety meeting

OAEI JOB# AND WORK LOCATION: 10-5846

DESCRIPTION OF WORK: Drilling/Decommission Monitoring Wells

DATE OF ISSUE: March 20, 2008

TIME: 9:30

PRIME CONTRACTOR: OAEI

WEATHER:

Temp: 0°C

Wind Speed —

Direction: —

## Identification of hazards on site for this day

- ☐ Overhead power lines  
☐ Traffic or congestion  
☐ Hazardous material on site (e.g. PCB's, NORMs)  
Specify:  
☐ Other:

- ☐ Underground utilities  
☐ Bulk fuel/stored pressure systems (e.g. propane, NH<sub>3</sub>)  
☐ Operating equipment  
Specify:  
☐ Other:

## Hazardous work identification for this day (a JSA is required by the crew prior to commencing work to address any of these hazards)

- ☐ Demolition (includes cut and cap)  
☐ Underground tank removal/disposal  
☐ Activities in traffic areas  
☐ Borehole drilling/monitoring well installation  
☐ Monitoring well maintenance  
☐ Mobile heavy equipment activity (excavators, dump trucks, vacuum and hydrovac trucks)

- ☐ Shoring  
☐ Excavation (includes test pits)  
☐ Remedial system construction/installation  
☐ Remedial system operation/maintenance  
☐ Other:  
(Includes clearing brush/trees, reactive chemical handling, working in proximity to deep water, etc.)

## CRITICAL PROCEDURES: Where work involves any of the following hazards, applicable critical procedures must be incorporated into the JSA

- ☐ Work at heights above 1.5 m (5 ft- includes excavations)  
☐ Confined space entry (includes tank cleaning)  
☐ Electrical/Mechanical Isolation (Lock out/Tag out)  
☐ Hot work in an explosive atmosphere (e.g. cut and cap)  
☐ Heavy equipment lifting (with cranes, boom trucks, excavators)  
☐ Sub-surface clearance (pre drill/borehole/excavation protocol)  
☐ Entry into excavations > 1.2 m (4 ft) deep

- All work to be conducted in accordance with provincial OH&S regulations and Contractor's Safety Guidelines.
- All applicable conditions must be met before work commences.

|                                                                                                                                             | YES                                 | N/A                      |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|
| 1. Supervisor in attendance for duration of work outlined above.                                                                            | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All personnel involved are trained employees and have received work and site orientation.                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Work area has been inspected for potential hazards and risks have been mitigated/controlled.                                             | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. Appropriate personal protective equipment is on site and worn by workers and visitors (e.g. glove policy).                               | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 5. Work area is defined and appropriate signs/barricades are in place to ensure other traffic or people kept out of area, where applicable. | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 6. Appropriate fire extinguisher(s) available in work area.                                                                                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 7. Did any incident or near miss occur that should be reported and discussed before work starts.                                            | <input type="checkbox"/>            | <input type="checkbox"/> |
| 8. All required JSA'S (including critical procedures) signed by work crew and site supervisor                                               | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Operations/Associate acknowledges and can safety accomodate work being done on site.

☒ ☐

## SITE OPERATIONS/ASSOCIATE

SIGNATURE: \_\_\_\_\_

Date: \_\_\_\_\_

## CONTRACTOR CONFIRMATION OF ABOVE LISTED ITEMS

*Grant Woods*

CONTRACTOR SITE SUPERVISOR (print)

*[Signature]*

SIGNATURE

9:30

TIME

Copies are uncontrolled documents

**DAILY SAFE WORK PERMIT***Can also be used as daily Safety meeting***DAILY SAFETY MEETING DISCUSSION ITEMS:**

| Subject: | Comments and follow up: |
|----------|-------------------------|
|          |                         |
|          |                         |
|          |                         |

**Last Minute Risk Assessment (LMRA) Testing Results** (minimum 1/day/10 workers/supervisor)

| Worker's employer:<br>and task observed? | Test Results (Recorded pass or explain reason for failure vs 4 test areas [scope of work, hazard identification, mitigation, safety attitude]) | Learning's/Follow-up<br>Actions | Completed By Print and<br>Sign: |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|
|                                          |                                                                                                                                                |                                 |                                 |
|                                          |                                                                                                                                                |                                 |                                 |
|                                          |                                                                                                                                                |                                 |                                 |

**WORKER AND VISITOR REGISTER**

*Your signature signifies that you understand and agree to abide by all the Safety elements reviewed in this Safe Work Permit that are applicable to your activities at the work site.*

| Worker or visitor name | Company name | Arrival<br>time | Departure<br>time | Signature                                                                            |
|------------------------|--------------|-----------------|-------------------|--------------------------------------------------------------------------------------|
| Grant Hogg             | OAEI         | 9:30            | 12:15             |   |
| Kurt Macpherson        | CHILAKO      | 9:30            | 12:15             |  |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |
|                        |              |                 |                   |                                                                                      |

*Please use back of this page for additional names*

**GAS TESTING REGISTER** (Frequency: Every \_\_\_\_\_ Hours or Continuous \_\_\_\_\_)

| Time | Combustibles<br>(LEL %) | O <sub>2</sub> | Toxic (E.g. H <sub>2</sub> S) | Initial |
|------|-------------------------|----------------|-------------------------------|---------|
|      |                         |                |                               |         |
|      |                         |                |                               |         |
|      |                         |                |                               |         |
|      |                         |                |                               |         |

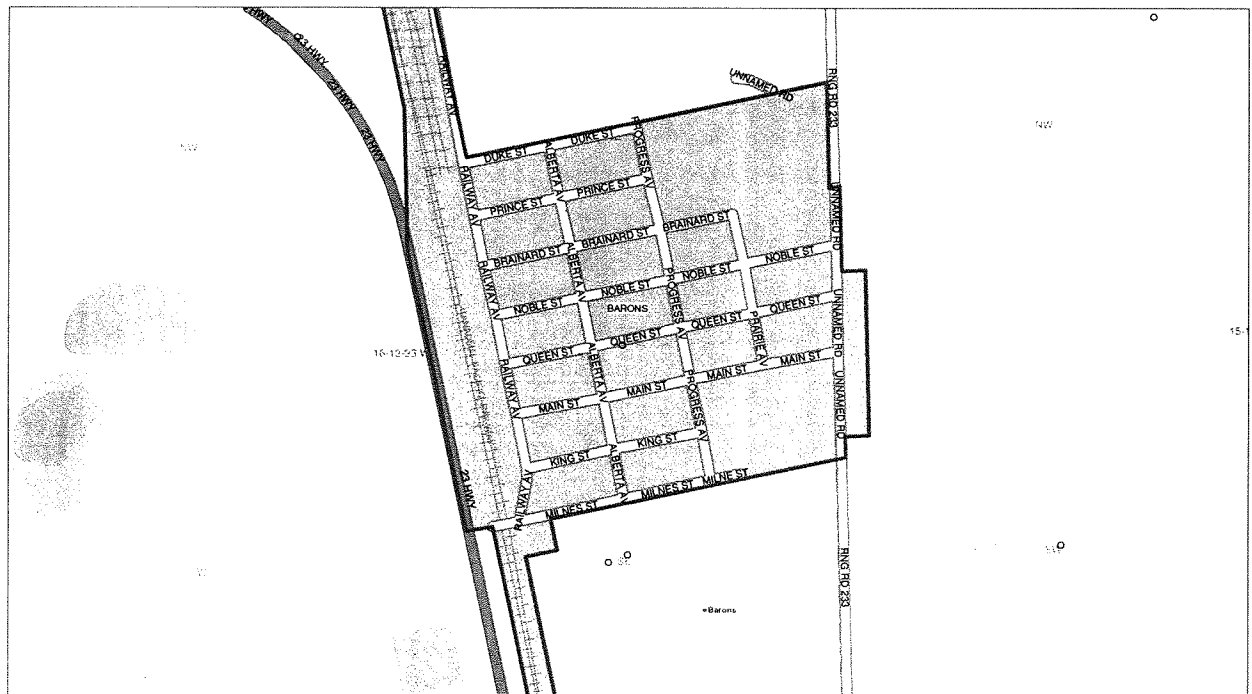
**Copies are uncontrolled documents**

## **APPENDIX C**

### **AENV WATER WELL DRILLING REPORT**

# TELUS Geomatics - Alberta Map

○ Water Wellsites



SCALE 1 : 14,396



N





# 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.:    | 0194222         |
| Map Verified: | Not Verified    |
| Date Report   |                 |
| Received:     |                 |
| Measurements: | <u>Imperial</u> |

|                                                       |  |                                |  |                                        |  |                              |                           |                                                           |                          |          |        |  |
|-------------------------------------------------------|--|--------------------------------|--|----------------------------------------|--|------------------------------|---------------------------|-----------------------------------------------------------|--------------------------|----------|--------|--|
| <b>1. Contractor &amp; Well Owner Information</b>     |  |                                |  |                                        |  |                              | <b>2. Well Location</b>   |                                                           |                          |          |        |  |
| Company Name:<br>INTERPROVINCIAL DRILLING CONTRACTORS |  |                                |  | Drilling Company Approval No.:<br>UNKN |  |                              | 1/4 or<br>LSD             | Sec                                                       | Twp                      | Rge      | Westof |  |
| Mailing Address:<br>SUB PO 36                         |  | City or Town:<br>CALGARY AB CA |  | Postal Code:                           |  |                              | EH                        | 16                                                        | 012                      | 23       | M<br>4 |  |
| WellOwner's Name:                                     |  | Well Location Identifier:      |  |                                        |  |                              |                           | Location in Quarter                                       |                          |          |        |  |
|                                                       |  |                                |  |                                        |  |                              |                           | 0 FT from                                                 |                          | Boundary |        |  |
|                                                       |  |                                |  |                                        |  |                              |                           | 0 FT from                                                 |                          | Boundary |        |  |
| P.O. Box Number:                                      |  | Mailing Address:               |  | Postal Code:                           |  |                              | Lot                       |                                                           | Block                    |          | Plan   |  |
| City:                                                 |  | Province:                      |  | Country:                               |  |                              | Well Elev:<br>3165 FT     |                                                           | How Obtain:<br>Estimated |          |        |  |
| <b>3. Drilling Information</b>                        |  |                                |  |                                        |  |                              | <b>6. Well Yield</b>      |                                                           |                          |          |        |  |
| Type of Work: Well Inventory                          |  |                                |  | Proposed well use:                     |  |                              | Test Date                 |                                                           | Start Time:              |          |        |  |
| Reclaimed Well                                        |  |                                |  | Domestic                               |  |                              | (yyyy/mm/dd):             |                                                           | 1958/02/10               |          |        |  |
| Date Reclaimed:                                       |  | Materials Used:                |  | Anticipated Water Requirements/day     |  |                              | Non pumping static level: |                                                           | 32 FT                    |          |        |  |
| Method of Drilling: Drilled                           |  |                                |  | 0 Gallons                              |  |                              |                           |                                                           |                          |          |        |  |
| Flowing Well: No                                      |  | Rate: Gallons                  |  |                                        |  |                              |                           |                                                           |                          |          |        |  |
| Gas Present: No                                       |  | Oil Present: No                |  |                                        |  |                              |                           |                                                           |                          |          |        |  |
| <b>4. Formation Log</b>                               |  |                                |  | <b>5. Well Completion</b>              |  |                              |                           |                                                           |                          |          |        |  |
| Depth from ground level (feet)                        |  | Lithology Description          |  | Date Started(yyyy/mm/dd):              |  | Date Completed (yyyy/mm/dd): |                           | Rate of water removal:                                    |                          |          |        |  |
|                                                       |  |                                |  |                                        |  | 1958/02/10                   |                           | 15 Gallons/Min                                            |                          |          |        |  |
|                                                       |  |                                |  | Well Depth: 96 FT                      |  | Borehole Diameter: 0 Inches  |                           | Depth of pump intake:                                     |                          |          |        |  |
|                                                       |  |                                |  |                                        |  |                              |                           | Water level at end of pumping:                            |                          |          |        |  |
|                                                       |  |                                |  | Casing Type: Unknown                   |  | Liner Type:                  |                           | Distance from top of casing to ground level:              |                          |          |        |  |
|                                                       |  |                                |  | Size OD: 5 Inches                      |  | Size OD: 0 Inches            |                           | Depth To water level (feet) Elapsed Time                  |                          |          |        |  |
|                                                       |  |                                |  | Wall Thickness: 0 Inches               |  | Wall Thickness: 0 Inches     |                           | Drawdown Minutes:Sec Recovery                             |                          |          |        |  |
|                                                       |  |                                |  | Bottom at: 96 FT                       |  | Top: 0 FT Bottom: 0 FT       |                           | Total Drawdown: 0 FT                                      |                          |          |        |  |
|                                                       |  |                                |  | Perforations                           |  | Perforations Size:           |                           | If water removal was less than 2 hr duration, reason why: |                          |          |        |  |
|                                                       |  |                                |  | 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:                                  |  |                              |                           | Recommended pumping rate: 0 Gallons/Min                   |                          |          |        |  |
|                                                       |  |                                |  | from: 0 FT to: 0 FT                    |  |                              |                           | Recommended pump intake: 0 FT                             |                          |          |        |  |
|                                                       |  |                                |  | Seal:                                  |  |                              |                           | Type Pump Installed                                       |                          |          |        |  |
|                                                       |  |                                |  | from: 0 FT to: 0 FT                    |  |                              |                           | Pump Type:                                                |                          |          |        |  |
|                                                       |  |                                |  | Screen Type:                           |  | Screen ID: 0 Inches          |                           | Pump Model:                                               |                          |          |        |  |
|                                                       |  |                                |  | from: 0 FT to: 0 FT                    |  | Slot Size: 0 Inches          |                           | H.P.:                                                     |                          |          |        |  |
|                                                       |  |                                |  | Screen Type:                           |  | Screen ID: 0 Inches          |                           | Any further pumptest information?                         |                          |          |        |  |
|                                                       |  |                                |  | from: 0 FT to: 0 FT                    |  | 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:                              |  |                              |                           |                                                           |                          |          |        |  |
|                                                       |  |                                |  | OWNER STATES CEALR, MEDIUM HARD WATER. |  |                              |                           |                                                           |                          |          |        |  |
| <b>7. Contractor Certification</b>                    |  |                                |  |                                        |  |                              |                           |                                                           |                          |          |        |  |
| 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

**APPENDIX D**

**LIMITATION OF LIABILITY, SCOPE OF REPORT AND THIRD  
PARTY RELIANCE**

## **APPENDIX D**

### **LIMITATION OF LIABILITY, SCOPE OF REPORT AND THIRD PARTY RELIANCE**

This report has been prepared and the work referred to in this report has been undertaken by O'Connor Associates Environmental Inc. ("O'Connor Associates") for Shell Canada Products. It is intended for the sole and exclusive use of Shell Canada Products, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, "Shell"). Any use, reliance on or decision made by any person other than Shell based on this report is the sole responsibility of such other person. Shell and O'Connor Associates make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigations undertaken by O'Connor Associates with respect to this report and any conclusions or recommendations made in this report reflect O'Connor Associates' judgement based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information examined at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed in the report. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by this investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary. Other than by Shell, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of O'Connor Associates. Nothing in this report is intended to constitute or provide a legal opinion.

These documents and the information contained in them are confidential - property of Shell Canada Products and any disclosure of same is governed by the provisions of each of the applicable provincial or territorial Freedom of Information legislation, the Privacy Act, (Canada) 1980-81-82-83, c.111, Sch.II "1", and the Access to Information Act (Canada) 1980-81-82-83, c.111, Sch. I "1", as such legislation may be amended or replaced from time to time.