EMS Leak Detection Program
Registration RA05006
NW¼-35-042-25-W4M
Ponoka County, Alberta

ENVIROWEST ENGINEERING INC.

Professional Environmental Engineering Services

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Professional Environmental Engineering Services

EMS Leak Detection Program
Registration RA05006
NW¼-35-042-25-W4M
Ponoka County, Alberta

Prepared For: Jamison Ward
Westcoast Holsteins Ltd.

Prepared By: Envirowest Engineering
Box 4248, Ponoka, AB, T4J 1R6
(403) 783-8229

Report Date: June 12, 2020

Project Number: 2004-42875

Private and Confidential

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Appendices

1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Jamison Ward of Westcoast Holsteins Ltd. to sample and monitor groundwater as part of a leak detection program for an earthen manure storage (EMS) facility. The lagoon is associated with a 724 head dairy operation located in Ponoka County on NW-35-042-25-W4M.

The groundwater monitoring leak detection program has been undertaken in accordance with Registration RA05006 issued by the NRCB in April 2005.

2.0 Site Description

The subject site is located approximately 3.5 kilometers east of Ponoka, Alberta. The site is an established operation for a 724 head dairy. The existing two-stage liquid EMS is located north and northeast of the barns. Lagoons were estimated to be approximately 1/5 full at the time of the inspection. Monitoring wells were all in adequate condition at the time of the inspection.

The topography of the site and surrounding area is level. Surface runoff flows away from the EMS towards surrounding cropland.

The uppermost bedrock formation is the Paskapoo Formation which consists of grey to greenish grey, thick bedded calcareous, cherty sandstone; grey and green siltstone and mudstone; minor conglomerate, thin limestone, coal and tuff beds, and is non marine in nature (Prior, 2013).

The quaternary geology of the site is that of a draped moraine, which consists of till of even thickness with minor amounts of water-sorted material and local bedrock exposures. The topography is flat to undulating, reflecting the topography of the underlying bedrock (Shetsen, 1990).

3.0 Leak Monitoring Program Methodology

A site map with approximate well locations is attached. There are three groundwater monitoring wells surrounding the manure storage lagoons, as shown on Figure 2.0. Envirowest drilled three boreholes with a truck-mounted rotary auger on July 30, 2018. The boreholes were completed between depths of 5.2 and 5.8 meters below ground surface (mbgs) and each borehole was completed as a groundwater monitoring well.

When assessing groundwater quality, a sample of water is collected from each well. The samples are gathered in individual dedicated point source bailers and stored in laboratory supplied plastic bottles. Groundwater samples to be analyzed for some nitrogen species are preserved with H_2SO_4. The groundwater level in each well is determined prior to sample collection.

The samples are then subjected to laboratory analysis. The analysis included pH, electrical conductivity, dissolved potassium, dissolved phosphorus, chloride, nitrate as nitrogen (nitrate-N), nitrite as nitrogen (nitrite-N), and ammonia as nitrogen (ammonia-N). Nitrate, nitrite, and chloride concentrations are components of animal manure and are considered to be good indicators of leakage from a manure storage lagoon. These components move more easily through the soil than do other manure constituents such as phosphates. Ammonia is changed over time to nitrates and nitrites through a nitrification process. These latter components would be indicators of a past leak or contaminant source or may occur at greater distances from the lagoon.

4.0 Groundwater Analysis Results

Depth to groundwater was measured for each monitoring well, and a sample was taken from monitoring well 18MW03 on May 28, 2020. The other wells were dry or did not yield sufficient water for a sample. Previous sampling events by Envirowest Engineering indicated that the monitoring wells were dry, and therefore, no historical data is available for comparison.

The results of the laboratory analysis for 18MW03 are presented in Table 2.

Table 2:
Groundwater Analysis Results

Parameter	18MW01	18MW02	18MW03
Date	May 28, 2020		
Depth to Water (m)	Dry	Dry	6.21[1]
pH	-	-	6.9
Electrical Conductivity (uS/cm)	-	-	5930
Chloride (mg/L)	-	-	974.2
Dissolved Potassium (mg/L)	-	-	9.4
Dissolved Phosphorus (mg/L)	-	-	0.065
Nitrite-N (mg/L)	-	-	0.245
Nitrate-N (mg/L)	-	-	210.8
Total Ammonia-N (mg/L)	-	-	0.14
Unionized Ammonia-N (mg/L)	-	-	<0.01
Ammonium-N (mg/L)*	-	-	0.13

*Calculated
[1] measured from top of casing

As only one well could be monitored, groundwater flow direction could not be confirmed.

5.0 Conclusions and Recommendations

Without historical groundwater results or additional current groundwater results for spatial comparison, the following conclusions are drawn based on typical industry values. The groundwater sample collected from monitoring well 18MW03, indicates elevated levels of chloride, dissolved potassium, nitrate as nitrogen, total ammonia as nitrogen and ammonium as nitrogen. It is considered that there is a past and current leak based on the data available during this monitoring event.

It is recommended to complete confirmatory sampling and assess the lagoon walls once emptied.

Closure

Envirowest Engineering is pleased to submit the report on the leak detection program to Jamison Ward of Westcoast Holsteins Ltd. The information and conclusions contained in this report are for their sole use. No other party is to rely upon the information contained within the report without the express written authorization of Envirowest Engineering.

The review and leak detection program have been conducted in accordance with generally accepted environmental engineering practices. No other warranty is expressed nor implied.

We trust that this report meets your present needs. Please feel free to contact the undersigned with any questions or should you require additional information.

Respectfully submitted,

2020-06-12

June 12, 2020

Prepared by:
Leah Predy, P.Ag.
Envirowest Engineering

Reviewed by:
Emily Low, P.Eng.
Envirowest Engineering

2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

6.0 References

Prior, G.J., Hathway, B., Glombick, P.M., Pana, D.I., Banks, C.J., Hay, D.C., Weiss, J.A. (2013). Bedrock Geology of Alberta (Map 600). Edmonton, AB: Alberta Research Council, Natural Resources Division, Terrain Sciences Department.

Shetsen, I. (1990). Quaternary Geology, Central Alberta. Edmonton, AB: Alberta Research Council, Natural Resources Division, Terrain Sciences Department.

Appendix A

Site Location

ENVIROWEST ENGINEERING INC.
Professional Environmental Engineering Services

Title: Site Location
Site and Soil Assessment
NW¼-Sec.35-Twp.42-Rge.25-W4M
Ponoka County, Alberta

Project No: 2004-42875

Date: June 9, 2020

Prepared by: L. Predy

Figure No.: 1.0

Appendix B

Site Plan and Borehole Logs

ENVIROWEST ENGINEERING INC.

Professional Environmental Engineering Services

Title:

Monitoring Well Locations
Site and Soil Assessment
NW¼-Sec.35-Twp.042-Rge.25-W4M
Ponoka County, Alberta

Project No: 2004-42875	**Date:** June 9, 2020
Scale: 1:1600	**Prepared By:** L. Predy

Figure:

2.0

ENVIROWEST ENGINEERING INC.

LOG OF BORING 18BH01

Leak Detection Replacement Wells
NW-35-042-25 W4M
West Coast Holstiens

Ponoka County, Alberta
Project No. : 1711-42875

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : July 30, 2018
Logged By: : Emily Low, P.Eng

Depth in Meters	Gastech Reading (ppm) 0 20 40 60 80 100	OVA Reading	GRAPHIC	DESCRIPTION	Well: 18MW01 Elev.:	Water Level
0.0				TOP SOIL		
0.3				SAND, trace silt, light brown, loose, damp		
0.5					Bentonite	
0.8				trace oxidation		
1.0					Solid	
1.3				SANDY CLAY, brown, firm, damp		
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0					Sand	
3.3						
3.5						
3.8					Screen	
4.0				SAND, some clay, light brown, damp		
4.3						
4.5						
4.8						
5.0				Weathered Sandstone Auger Refusal		

10-15-2018 G:\42875 (Westcoast Holstiens)\18BH01.bor

ENVIROWEST ENGINEERING INC.

LOG OF BORING 18BH02

Leak Detection Replacement Wells
NW-35-042-25 W4M
West Coast Holstiens

Ponoka County, Alberta
Project No. : 1711-42875

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : July 30, 2018
Logged By: : Emily Low, P.Eng

Depth in Meters	Gastech Reading (ppm) 0 20 40 60 80 100	OVA Reading	GRAPHIC	DESCRIPTION	Well: 18MW02 Elev.:	Water Level
0.0				TOP SOIL		
0.3				SAND, trace silt, light brown, loose, damp		
0.5					Bentonite	
0.8				trace oxidation		
1.0					Solid	
1.3				SANDY CLAY, brown, firm, damp		
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0					Sand	
3.3						
3.5						
3.8					Screen	
4.0				SAND, some clay, light brown, damp		
4.3						
4.5						
4.8						
5.0						
5.3				Weathered Sandstone Auger Refusal		

10-15-2018 G:\42875 (Westcoast Holstiens)\18BH02.bor

ENVIROWEST ENGINEERING INC.

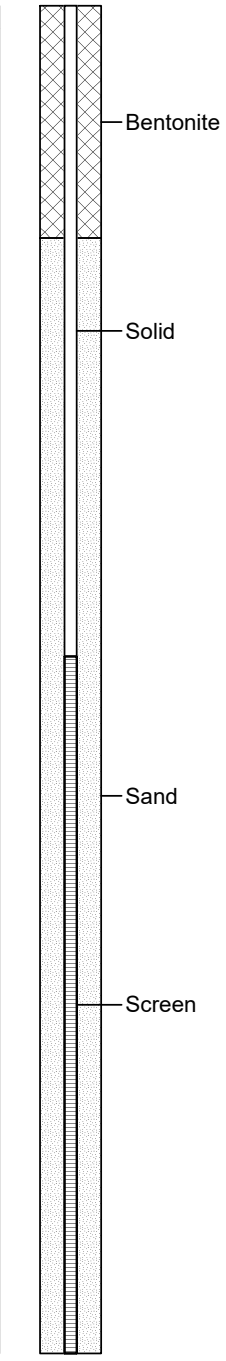
LOG OF BORING 18BH03

Leak Detection Replacement Wells
NW-35-042-25 W4M
West Coast Holstiens

Ponoka County, Alberta
Project No. : 1711-42875

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : July 30, 2018
Logged By: : Emily Low, P.Eng

Depth in Meters	Gastech Reading (ppm) 0 20 40 60 80 100	OVA Reading	GRAPHIC	DESCRIPTION
0.0				TOP SOIL
0.3				SAND, trace silt, light brown, loose, damp
0.5				
0.8				some clay
1.0				
1.3				
1.5				
1.8				bluegreen discolouration
2.0				
2.3				
2.5				SANDY CLAY, brown, firm, damp
2.8				
3.0				SAND, some clay, light brown, damp
3.3				
3.5				
3.8				
4.0				
4.3				
4.5				
4.8				
5.0				
5.3				
5.5				
5.8				Weathered Sandstone Auger Refusal



10-15-2018 G:\42875 (Westcoast Holstiens)\18BH03.bor

Appendix C

Certificate of Analysis

333 50th Ave. S.E.
Calgary, AB, T2G 2B3
Phone (403) 297-0868
Fax: (403) 297-0869

KaizenLAB

ANALYTICAL REPORT

Client: Envirowest Engineering
5118 50 St
Ponoka, AB, T4J 1R6

Attention: Emily Low

KaizenLAB JOB #:	**306736**
DATE RECEIVED:	29-May-2020
DATE REPORTED:	04-Jun-2020
PROJECT ID:	42875
LOCATION:	

KaizenLAB Sample #: 306736_001 **Sample ID:** 18MW03 pH 7.0 EC 6ms Temp 9.7°C
Date Sampled: 28-May-2020 11:00 **Matrix:** Water

Parameter Description	Units	Result	Detection Limit
Leak Detection Package NRCB			
pH @ 15°C		6.9	
Electrical Conductivity (EC)	uS/cm	5930	1
Ammonia-N in Water			
Ammonia-N	mg/L	0.14	0.05
Ammonia-N (un-ionized)	mg/L	<0.01	0.01
Ammonia-N (ionized)	mg/L	0.14	0.01
Anions in Water by IC			
Chloride	mg/L	974.2	0.50
Nitrite-N	mg/L	0.245	0.005
Nitrate-N	mg/L	210.8	0.010
Dissolved Potassium	mg/L	9.4	0.1
Dissolved Phosphorus	mg/L	0.065	0.030

Test Methodologies

Ammonia in Water: Modified from SM 4500-NH3 F
Anions in Water: Modified from SM 4110B
Cations in Water: Modified from SM 3030B and SM 3120B
Dissolved Metals in Water: Modified from SM 3030B and SM 3120B
Electrical Conductivity in Water: Modified from SM 2510B
pH of Water: Modified from SM 4500-H+ B

Final Review by:

Loida Agacid
Client Services Administrator

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Phone (403) 297-0868
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e-Mail: kaizenlab@kaizenlab.ca

KaizenLAB

QUALITY CONTROL REPORT

Client: Envirowest Engineering
Attention: Emily Low

KaizenLAB JOB #:	306736
PROJECT:	42875
LOCATION:	
DATE REPORTED:	04-Jun-2020

		Method Blank	Calibration Verification Standard %Recovery		Laboratory Control Sample %Recovery		Duplicate or Matrix Spike Duplicate Rel. % Diff.	
Test:	**pH of Water**							
QC Batch #:	**BW_PH_BOD_200529_03**							
Date:	**29-May-2020**							
pH		N/A	100	Pass	100	Pass	1	Pass
Test:	**Ammonia-N in Water**							
QC Batch #:	**BW_NH3_N_200531_03**							
Date:	**31-May-2020**							
Ammonia-N		<0.05 mg/L	109	Pass	109	Pass	2	Pass
Test:	**Electrical Conductivity of Water**							
QC Batch #:	**BW_EC_PCT_200530_01**							
Date:	**30-May-2020**							
EC		<10 uS/cm	103	Pass	103	Pass	0	Pass
Test:	**Dissolved Metals in Water by ICP-OES**							
QC Batch #:	**BW_DMET_O_200529_01**							
Date:	**29-May-2020**							
Phosphorus		<0.030 mg/L	99	Pass	99	Pass	6	Pass
Test:	**Cations in Water by ICP-OES**							
QC Batch #:	**BW_CATION_200601_01**							
Date:	**01-Jun-2020**							
Potassium		<0.1 mg/L	99	Pass	99	Pass	N/A-NC	-

N/A-NC: Not Applicable-Not Calculated: Result does not apply to this test or the difference between duplicate and its parent sample is not significant to perform a calculation (results are too close to the detection limit)

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KaizenLAB

		Method Blank	Calibration Verification Standard %Recovery		Laboratory Control Sample %Recovery		Duplicate or Matrix Spike Duplicate Rel. % Diff.	
Test:	**Anions in Water by IC**							
QC Batch #:	**BW_ANIONS_200530_02**							
Date:	**30-May-2020**							
Chloride		<0.50 mg/L	101	Pass	101	Pass	1	Pass
Nitrate		<0.50 mg/L	101	Pass	101	Pass	2	Pass
Nitrite		<0.10 mg/L	100	Pass	100	Pass	N/A-NC	-

Final Review by:

Loida Agacid
Client Services Administrator

N/A-NC: Not Applicable-Not Calculated: Result does not apply to this test or the difference between duplicate and its parent sample is not significant to perform a calculation (results are too close to the detection limit)

KaizenLAB

333 -50 Avenue SE, Calgary, Alberta T2G 2B3
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e-mail: kaizencsr@kaizenlab.ca

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

KaizenLAB Job #: 306736

SERVICE REQUESTED (3PM Cut off)

Service	Surcharge	TAT *Business days
Regular	None	4 days ☑

RUSH TAT (3PM Cut off)

Rush	50%	2 - 3 days ☐
Priority	100%	Next day ☐
Emergency	200%	Weekend/Holiday Same day ☐

Report Date: 4 Jun 20 * Please call (403) 815-5815 to coordinate rush analysis

REPORT CONTACT

Company: Environwest Engineering
Contact: Emily Law / Leah Prady
Emails: elaw@environwestengineering.ca
lprady@environwestengineering.ca
Address:
403-783-8229
Phone: [redacted]

INVOICE CONTACT

Same as Report ☑
Company:
Contact:
Email:
Address:
Phone:

PROJECT DETAILS

Project ID: 42575
Location ID:
P.O. :
Quotation #:

Guideline

☑ AB Tier 1 ☐ BC
☐ CCME ☐ MB
☐ SPIGEC
☐ Drinking Water
☐ D50
☐ Other _____

	Client	Depot	Lab
Rel. by:	ELaw		
Rec. by:			SC
Date:	May 28/20		29 May 20
Time:			9:55 am

Additional Notes:

LAB USE ONLY
Temp: 17.9 °C

ANALYSIS REQUESTED

LAB ID	SAMPLE IDENTIFICATION	DEPTH	DATE SAMPLED (DD/MM/YYYY)	TIME SAMPLED	MATRIX (SOIL / WATER)	HOLD ANALYSIS	SPECIAL INSTRUCTIONS
1	18MW03 pH 7.0 EC 6ms temp 9.7°C.		28/05/2020	11:00am	Water		

Fill out chain of custody completely to avoid processing delays. Gray fields are for lab use only.