

Technical Document RA23021A

Application for Amendment

Application under the Agricultural Operation Practices Act to amend a permit for a confined feeding operation, manure collection area and/or manure storage facility(ies). ("Permit" means an NRCB issued or grandfathered approval, registration, or authorization, including a grandfathered municipal development permit.)



NRCB USE ONLY	NRCB Application number	Date Stamp
<input type="checkbox"/> Approval <input checked="" type="checkbox"/> Registration <input type="checkbox"/> Authorization	<u>RA23021A</u>	NRCB APPLICATION
Amendment		06 NOV 2024
		RECEIVED

CONTACT INFORMATION

Applicant Information		
Name: <u>Darrin Rasmussen</u>	Corporate Name (if applicable) <u>Darcor Holsteins</u>	
Address: (Street/P.O. Box) <u>RR2</u>		
City/Town: <u>Gwynne</u>	Province: <u>AB</u>	Postal Code: <u>TOC 1L0</u>
Agent consent (if applicable)		
I, _____, hereby give consent for _____ (name of applicant) (name of agent and company)		
to act on my behalf or as my agent for this application.		
Signed this ____ day of _____, 20____.		
Signature of Applicant		

LOCATION OF DEVELOPMENT

Which permit do you wish to amend? (List permit number and issuing agency.)	<u>RA23021</u>
Legal Land Description(s)	<u>S/2 NW 25-47-23-W4</u> (Qtr-Sec-Twp-Rg-W Mer)


APPLICATION DISCLOSURE

This information is collected under the authority of the Agricultural Operation Practices Act (AOPA), and is subject to the provisions of the Freedom of Information and Protection of Privacy Act. This information is public unless the NRCB grants a written request that certain sections remain private.

Any construction prior to obtaining an NRCB permit is an offence and is subject to enforcement action, including prosecution.

I, the applicant, or applicant's agent, have read and understand the statements herein and acknowledge that the information provided in this application is true to the best of my knowledge.

Nov 05/24
Date of signing
Darcor Holsteins Inc
Corporate name (if applicable)


Signature
Darrin Rasmussen
Print name

Application for Amendment – contd.



AMENDMENT INFORMATION REQUIREMENTS

Instructions:

For each part of your permit that you would like amended, please detail what change you would like made and why, and how your proposed change will meet the AOPA requirements. You may attach additional pages to this form to provide this information.

Please note that an approval officer may require a page (or pages) of the Part 2 application forms to be completed as part of this application for amendment, depending on what changes are proposed.

After reviewing the findings of a soil study conducted by Envirowest Engineering (see attached) I wish to change from a synthetically lined EMS to an EMS utilizing a naturally occurring protective layer. A new "Part 2" form for this is also attached.

Due to budget constraints I wish to amend the completion date for the calf barn only to June 2027

-ALSO to modify the dimensions of lagoon to 60m by 60m by 4.5m

AO Comment: Application to convert the liner and expand the dimensions of the permitted synthetic lined liquid manure storage (70 m x 42m x 5.5 m) into a 60 metres x 60 metres x 4.5 metres deep earthen liquid manure storage (EMS). Additionally, the applicant requests to amend the completion deadline to construct the permitted calf barn. The permitted number of dairy cows or manure production will not change with this application.

Part 2 — Technical Requirements



Application under the Agricultural Operations Practices Act for a confined feeding operation, manure collection area and/or manure storage facility(ies)

LIQUID MANURE STORAGE: Earthen manure storage (EMS): Naturally occurring protective layer (complete a copy of this section for EACH proposed earthen liquid manure storage facility with a naturally occurring protective layer)

Facility description / name (as indicated on site plan) 1. EMS connected to dairy barn
2. _____

Manure storage capacity (complete a separate row of this table for each cell of the EMS)

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY	
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (m ³) (excl. 0.5 m freeboard)	Filled in lower 1/4? Y/N
1.	60	60	4.5 X	4.0 X	3 to 1	3 to 1	4 to 1	8,292	Yes
2.									
TOTAL CAPACITY								8,292	

Surface water control systems

Describe the run-on and runoff control system
EMS will have an earthen berm of a minimum 0.5m around all 4 sides

ly	ng p	y
	5.25m	8.15 x 10 ⁻⁷ cm/s 1.85
		Bower/RICS

Additional information (attach copies of soil test reports)

NRCB USE ONLY

Requirements met: YES NO
Condition required: YES NO
Report attached: YES NO

Part 2 – Technical Requirements

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area and/or manure storage facility(ies)

NRCB USE ONLY

Liquid manure storage volume calculator attached: YES NO

Depth to water table: _____ 12 metres _____

Requirements met: YES NO

Depth to uppermost groundwater resource: _____ 30.5 m _____

Requirements met: YES NO

Comments:

ERST completed: see ERST page for details

Surface water control systems

Requirements met: YES NO

Details/comments:

Naturally occurring protective layer details

Layer specification comments (e.g. description of the layer texture, layer thickness/depth and the methodology used to collect this information such as sand lenses, number, and location of boreholes):

Leakage detection system required: YES NO

If yes, please explain why.



SITE AND SOIL ASSESSMENT

Darcor Holsteins Inc.
Darrin and Damien Rasmuson
NW $\frac{1}{4}$ -25-047-23 W4M

Wetaskiwin County, Alberta



Site and Soil Assessment
Darcor Holsteins Inc.
NW ¼-25-047-23 W4M
Wetaskiwin County, Alberta

Prepared For: Darrin and Damien Rasmuson

Delivered via Email: [REDACTED]

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

Report Date: October 6, 2023

Project Number: 2307-43011

Private and Confidential



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1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained to conduct a Site and Soil Assessment for a proposed earthen manure storage (EMS) lagoon. The assessment was completed to determine conditions beneath the proposed construction area and assess soil properties for the construction of proposed facilities. The proposed operation, herein referred to as “the Site,” is located on NW-25-047-23-W4M in Wetaskiwin County. The assessment and design were completed for 190 milking cows (dries and replacements).

The assessment has been completed in accordance with the standards and regulations associated with the amended Agricultural Operation Practices Act and associated regulations which govern all new and modified confined feeding operations.

Scope of Work

Five investigative boreholes were drilled using a truck-mounted rotary auger. The boreholes were completed in the area of the proposed manure storage lagoon on July 6, 2023. One borehole was completed as a groundwater monitoring well to allow for in-situ hydraulic conductivity. The hydraulic conductivity testing was completed on July 19, 2023. Boreholes were completed to depths between 6.0 and 12.0 meters below ground surface (mbgs). An uppermost groundwater resource (UGR) was conservatively determined to be below 12.0 mbgs. No further assessment was completed.



2.0 Assessment Results

The results of the soil analysis completed by a third-party accredited laboratory are presented in Table 1 below. The soil sample locations are presented on Figure 1.0, and borehole logs and well completion details are attached.

Table 1: Soil Properties Results

Parameter	23BH03
Sample Depth (m)	5.25
Particle Size (%clay)	40.4
Particle Size (%sand)	25.8
Particle Size (%silt)	32.7
Particle Size (%gravel)	1.1
Texture Class	Clay

The monitoring well was sufficiently hydrated prior to completing the hydraulic conductivity testing. The hydraulic conductivity test was completed on July 19, 2023.

The initial depth to water was measured in the well. A volume of water was then removed from the well and the change in depth measured over time to assess hydraulic conductivity of the clay strata. It is assumed (as per AGDEX 096-01) that all flow occurs under saturated conditions. The depth was measured every 30 seconds for 10 minutes and every 5 minutes for forty-five minutes. The results of the test were analyzed as a rising head slug test using AQTESOLV Bouwer-Rice method for unconfined wells. The results of the assessment were an in-situ hydraulic conductivity of 8.15×10^{-7} cm/sec in borehole 23MW01 (23BH03).

A saturated water table was not encountered to the depth of investigation, 12.0 meters below ground surface, within the proposed lagoon construction area. There was no bedrock encountered during the assessment to depth of investigation.



3.0 Natural Barrier Assessment

Earthen Manure Storage (EMS) Lagoon

Based on the information obtained it was determined that the native clay within the proposed area of construction was found to be from below topsoil to a minimum of 6.0 mbgs.

Minimum Required Liner Depth for a natural barrier EMS:

$$\frac{10 \text{ m}}{1 \times 10^{-6} \text{ cm/sec}} = \frac{X \text{ m}}{1.8 \times 10^{-7} \text{ cm/sec}}$$

$$X = 1.8 \text{ m}$$

As consolidated clay was found to the depth of investigation, a natural barrier is determined to be present, at minimum, from approximately below topsoil to 6.0 mbgs as measured from borehole 23BH03. The below grade depth of the lagoon is 4.0 mbgs, as measured at 23BH03. The minimum natural barrier present is 2.0 meters.



4.0 Conclusions

The following conclusions are based on the discussed scope of construction.

Earthen Manure Storage Lagoon

The native soils were determined to be appropriate as a natural barrier for use of a liquid manure storage facility.



5.0 Design and Construction Considerations

Earthen Manure Storage Sizing

The new lagoon is to be constructed in the area identified on Figure 1.0. The new liquid manure storage facility is designed for 190 milking cows with dries and replacements for approximately 9 months storage, which will have the following specifications:

- To provide the required capacity the new lagoon should be 54 m in length x 54 m in width. The overall depth has been designed as 4.5 m. The overall capacity of the new EMS will be 7,654 cubic metres (1.7 million imperial gallons) which accounts for the required 0.5 m of freeboard, a storage capacity of 6,276 cubic meters, approximately 9 months storage. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- The bottom of the liner must be not less than 1.0 m above the top of an aquifer and the shallow groundwater level. Shallow groundwater was not encountered during the assessment.
- The overall depth of 4.5 m will be achieved through a below-grade depth of 4.0 m. The above-grade dykes will prevent runoff from entering the facility. The outside dyke walls should be completed to a slope of 4:1. The crest of the dyke should be sloped slightly outward to direct rainfall away from the storage facility.
- The inlet pipe to the EMS should be located in the bottom 1/4 of the lagoon. The annulus around the inlet pipe should be sealed with a bentonite sealer.



Earthen Manure Storage Construction

The following general construction procedures are recommended, though some modifications may be required based on actual site conditions encountered during construction:

- The topsoil should be stripped from the area for construction. The topsoil can be reused on the freeboard area after construction completion.
- Sand and gravel seams, if encountered, should be excavated during construction and should be removed.
- Construction of the lagoon should be supervised by a professional engineer.
- Following completion of the lagoon, the operator should ensure that shrubs, trees, and deep-rooted plants are not allowed to grow on or near the walls of the facility.



6.0 Closure

Envirowest Engineering is pleased to submit the report to Darrin Rasmuson of Darcor Holsteins Inc. 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.

Envirowest Engineering is not responsible for any damages that may be suffered as the result of any unauthorized use of, or reliance on, this report. Envirowest Engineering has performed the work and made the findings and conclusions set out in the report in a manner consistent with the level of care and skill normally exercised by members of the environmental engineer profession practicing under similar conditions at the time the work was performed. Envirowest Engineering accepts no responsibility for any deficiency, misstatement or inaccuracy in this report resulting from misinformation from any individuals or parties that provided information as part of this report.

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,



October 6, 2023

Prepared by:

Emily J. Low, P.Eng.
Envirowest Engineering

Reviewed by:

Leah Predy, P.Ag.
Envirowest Engineering

<p align="center">PERMIT TO PRACTICE 2206165 ALBERTA LTD.</p> <p>RM SIGNATURE: _____</p> <p>RM APEGA ID #: <u>110373</u></p> <p>DATE: <u>October 6, 2023</u></p> <p>PERMIT NUMBER: P014810 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)</p>
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2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

Project No: 2307-43011: Site and Soil Assessment



7.0 Qualifications of Assessors

Ms. Emily Low, B.Sc., P.Eng, is an Environmental Engineer with Envirowest Engineering and has approximately 15 years of environmental assessment, monitoring, and remediation experience in the agricultural, industrial, real estate and development, and oil and gas sectors. Ms. Low has a Bachelor of Science in Chemical Engineering from the University of Alberta and is a certified Professional Engineer in Alberta (Association of Professional Engineers and Geoscientists of Alberta).

Leah Predy, B.A., B.Sc., P.Ag., is a Professional Agrologist with Envirowest Engineering and has approximately 4 years of experience in the environmental field, both in field data collection and report preparation for environmental assessments, monitoring, and remediation, as well as agricultural projects. Prior to her employment with Envirowest Engineering, Leah had five years of experience managing rangelands and navigating legislation and regulations as a Rangeland Agrologist with the Government of Alberta. She is a Professional Agrologist in Alberta (Alberta Institute of Agrologists).



8.0 References

GOA (Government of Alberta). (January 2020). Agricultural Operation Practices Act and Regulations. Edmonton, AB: Author.

GOA (Government of Alberta). (2017). Agricultural Operation Practices Act: Standards and Administration Regulation. Edmonton, AB: Author.

Appendix A

Figures





Range Rd 231

~340 m to Roadway

Proposed Barn Construction Area

23BH02

23BH03

23BH01

Proposed Lagoon



Title:

Borehole Locations
Site and Soil Assessment
NW¼-Sec.25-Twp.047-Rge.23-W4M
Wetaskiwin County, Alberta

Project No:

2307-43011

Date:

October 5, 2023

Scale:

1:2500

Prepared By:

E.Low

Image Source:

Google Earth Pro (June 18, 2020)

Figure No.:

1.0

Appendix B
Borehole Logs





LOG OF BORING 23BH01

(Page 1 of 1)

Site and Soil Assessment
 NW-25-047-23 W4M
 Wetaskiwin County, Alberta

Driller: : Ever Green Drilling
 Drilling Method: : Truck Mounted Auger
 Drill Date : July 6, 2023
 Logged By: : Emily Low P.Eng.

Project Number: 2307-43011
 Modified ASTM D2487/D2488

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level
0.0				TOPSOIL		
0.3				CLAY, damp, medium plasticity, mottled brown/light brown, soft to firm		
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5				firm		
4.8						
5.0						
5.3				coal inclusions		
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0						
7.3						
7.5						
7.8				grey		
8.0						
8.3						
8.5						
8.8						
9.0						
9.3						
9.5						
9.8						
10.0						
10.3						
10.5						
10.8						
11.0						
11.3						
11.5						
11.8						
12.0						

10-05-2023 Z:\Operations\Client Data\43011 Darcor Holsteins\NW-25-47-23 W4\23BH01.bor



LOG OF BORING 23BH02

(Page 1 of 1)

Site and Soil Assessment
 NW-25-047-23 W4M
 Wetaskiwin County, Alberta

Driller: : Ever Green Drilling
 Drilling Method: : Truck Mounted Auger
 Drill Date : July 6, 2023
 Logged By: : Emily Low P.Eng.

Project Number: 2307-43011
 Modified ASTM D2487/D2488

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level
0.0			TOPSOIL			
0.3				CLAY, damp, medium plasticity, mottled brown/light brown, soft to firm		
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5						
4.8						
5.0						
5.3				grey		
5.5						
5.8						
6.0						

10-05-2023 Z:\Operations\Client Data\43011 Darcor Holsteins\NW-25-47-23 W4\23BH02.bor



LOG OF BORING 23BH03

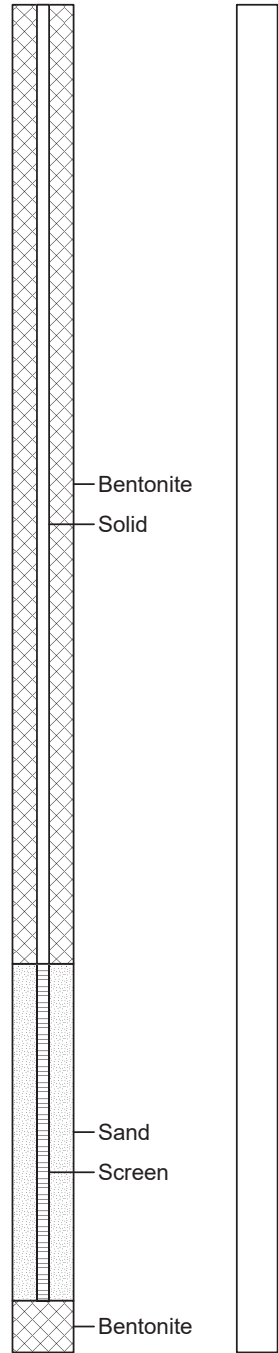
(Page 1 of 1)

Site and Soil Assessment
 NW-25-047-23 W4M
 Wetaskiwin County, Alberta

Driller: : Ever Green Drilling
 Drilling Method: : Truck Mounted Auger
 Drill Date : July 6, 2023
 Logged By: : Emily Low P.Eng.

Project Number: 2307-43011
 Modified ASTM D2487/D2488

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				TOPSOIL		
0.3				CLAY, damp, medium plasticity, mottled brown/light brown, soft to firm		
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5						
4.8						
5.0						
5.3				grey		
5.5						
5.8						
6.0						



10-05-2023 Z:\Operations\Client Data\43011 Darcor Holsteins\NW-25-47-23 W4\23BH03.bor

Appendix C
Certificates of Analysis



Laboratory Hydrometer

Sample No.: W255

Sample Information

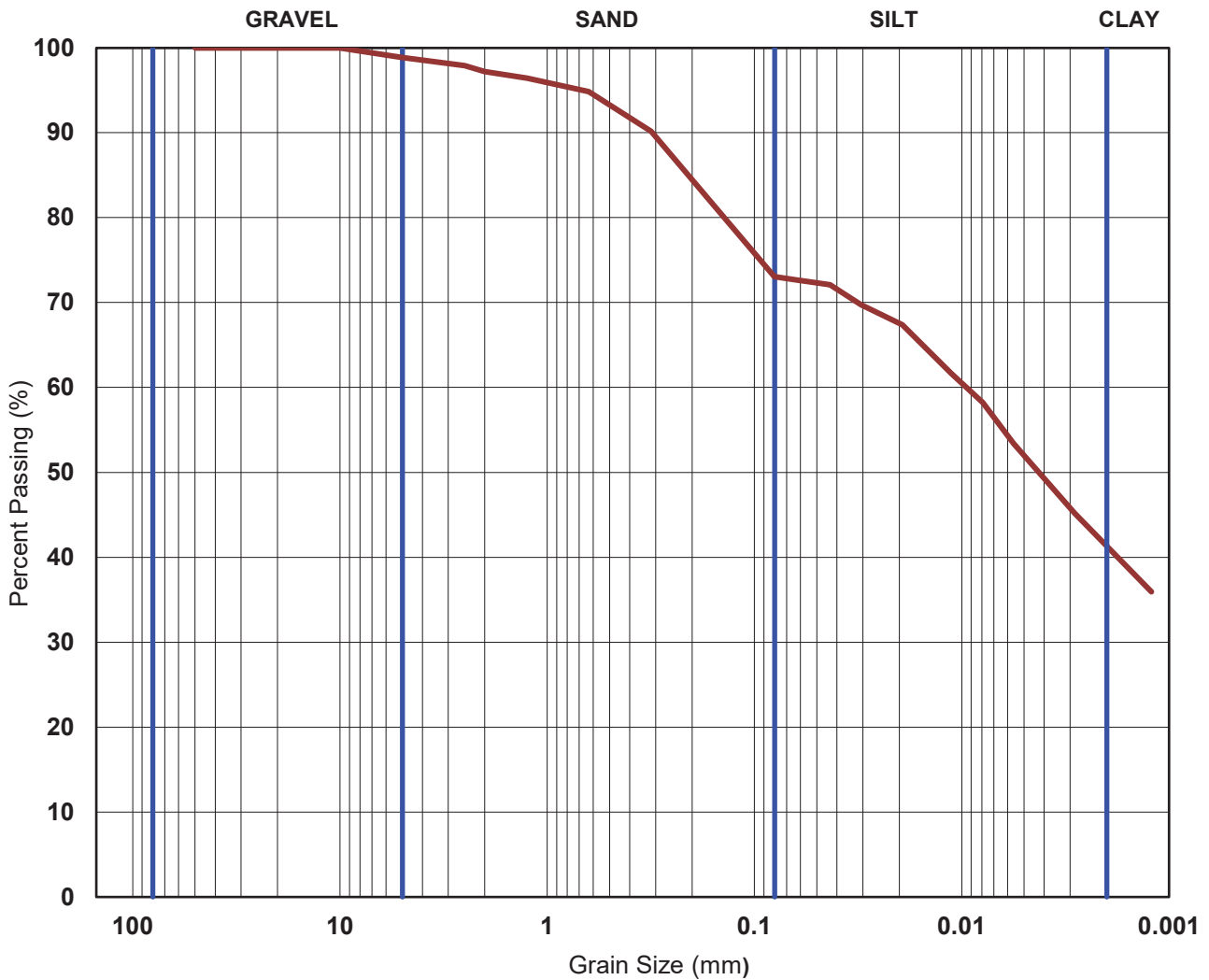
Date: - By: E.L. of: Envirowest Type: Bag
 Location: - Specification: ASTM D 422
 Description: Clay, silty, sandy, trace gravel

Specifications: Laboratory Specifications as per ASTM D 422.

Comments: Client Project Number 43011.

Sieve Results:

By Type (%): Gravel = 1.1 Sand = 25.8 Silt = 32.7 Clay = 40.4



CLIENT: Envirowest Engineering FILE No.: USG1705
 PROJECT: 2023 Geotech Inv. DATE: 26-Jul-23
 LOCATION: Red Deer, Alberta TECH: G.S.

Data Set: Z:\Operations\Client Data\43011 Darcor Holsteins\NW-25-47-23 W4\23MW01.aqt
 Date: 10/05/23
 Time: 12:30:18

PROJECT INFORMATION

Company: Envirowest Engineering
 Client: 43011
 Project: 2307-43011
 Test Date: July 19, 2023
 Test Well: 23MW01 (23BH03)

AQUIFER DATA

Saturated Thickness: 1.5 m
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

X Location: 0. m
 Y Location: 0. m

Initial Displacement: 0.46 m
 Static Water Column Height: 4.88 m
 Casing Radius: 0.0254 m
 Well Radius: 0.0762 m
 Well Skin Radius: 0.0762 m
 Screen Length: 1.5 m
 Total Well Penetration Depth: 5.77 m

No. of Observations: 27

Observation Data			
Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.	0.46	7.5	0.45
1.	0.46	8.	0.45
1.5	0.46	8.5	0.45
2.	0.46	9.	0.45
2.5	0.46	9.5	0.45
3.	0.46	10.	0.45
3.5	0.46	15.	0.45
4.	0.46	20.	0.44
4.5	0.46	25.	0.44
5.	0.46	30.	0.44
5.5	0.45	35.	0.44
6.	0.45	40.	0.44
6.5	0.45	45.	0.44
7.	0.45		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 2.958

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.815E-7	cm/sec
y0	0.4503	m

$T = K \cdot b = 2.723E-5 \text{ cm}^2/\text{sec}$