

WATER PERMIT NO. 8280-3

Name of Applicant: **Dylbrook Farms RE LLC**

Address: **PO Box 188, Pipestone MN 56164**

Phone: **507 825-4211**

Amount of Water Claimed: **161.37 AF**

Total Acres: **NA**

Source of Water Supply: **2 wells**

Water to be used for: **commercial**

County: **McCook**

Type of Waste Disposal System:

Location: **5 miles southeast of Salem**

PRIORITY Date Received: **4-20-17**

Application/License Fee: **\$ 950**

Corrected Application Received:

Period of Annual Use: **Jan 1 – Dec 31**

Remarks: **Swine farrowing operation**

Diversion Point: **SE 1/4 SW 1/4 Sec 9-T102N-R54W**

Land to be Irrigated: **NA**

Depth of Well: **300 feet deep**

Well Driller: **Dave Putzke Well Drilling**

Remarks:

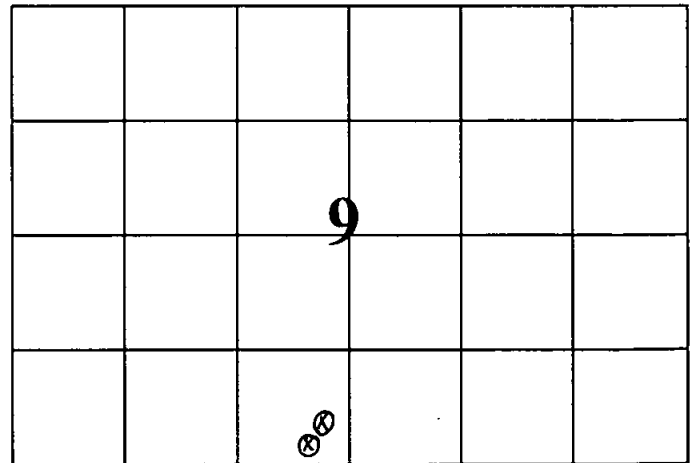
Type of Map: **aerial**

Prepared by:

Reviewed and the Number Assigned on: **4-20-17**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



RECEIVED

APR 19 2017

WATER RIGHTS
PROGRAM

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>8280-3</u> (office use only) Hydrologic Unit <u>10170102</u>
	Basin <u>Vermillion River</u>
	Newspaper <u>Salem Special</u> <u>Argus Leader</u>

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

☐ Municipal	☐ Water Distribution System	☐ Recreational	☐ Institutional
☐ Rural Water System	☒ Commercial	☐ Fish & Wildlife	☐ Geothermal
☐ Domestic (over 18 gpm)	☐ Industrial	☐ Other	

Type of Application:
(check one)

☒ New	☐ Vested Right (Use predates Mar 2, 1955)	☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____		
☐ Amendment/Correction to Permit No. _____		

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

1. Name to Appear on Water Permit Dylbrook Farms RE, LLCMailing Address 1300 S Hwy 75, PO Box 188 Pipestone MN 56164
(Address) (City) (State) (Zip Code)Phone (507) 825-4211 Mobile _____ Email barry.kerkaert@pipestone.com2. Amount of water claimed 0.22 *CFS or 100 **GPM and 121.0 ***AF or 52.6M Gallons
Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***Acre Feet - storage capacity of dam/dugout or annual use)3. Source of water supply 3 wells4. Location of point of diversion SE 1/4, SW 1/4 Section 9, T102N, R54W County McCook
(example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☐ Yes ☒ NoIf "Yes," where will water be used? _____
(example - NW1/4 section 12-T104N-R53W)5. County or counties where water will be used McCook6. Annual period during which water is to be used January 1 thru December 31

7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Dylbrook Farms RE, LLC is a new swine farrowing operation which is permitted for a maximum of 10,960 animals over 55 lbs and 1,000 animals under 55 lbs. The CAFO Permit has been approved by SD DENR and construction is underway.

I, Barry Kerkaert Managing Partner, the applicant, certify under
Name of Person Title (if applicable)

penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

SOUTH DAKOTA
WATER PERMIT NO. 8280-3

Date of first receipt of application April 20, 2017.

Date application placed on hold June 22, 2017.

Date of receipt of corrected application November 6, 2017.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 8280-3 to Dylbrook Farms RE, LLC, c/o Barry Kerkaert, PO Box 188, Pipestone MN 56164 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 8280-3 appropriates 121 acre-feet of water annually with a maximum diversion rate of 0.22 cubic feet of water per second from three wells to be completed into a Cretaceous aged undifferentiated sandstone Aquifer (300 feet deep) located in the SE 1/4 SW 1/4 Section 9 for commercial use in a swine farrowing facility located in the SE 1/4 SW 1/4 Section 9; all in T102N-R54W. This site is located approximately 6 miles southeast of Salem SD.
2. The water appropriated shall be used for the purpose of commercial use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 8280-3 is April 23, 2018.
5. The date from which applicant may claim right is April 20, 2017.
6. One-fifth of the construction is to be completed on or before October 23, 2020.
7. All construction is to be completed on or before April 23, 2023.
8. Water is to be put to beneficial use on or before April 23, 2027.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

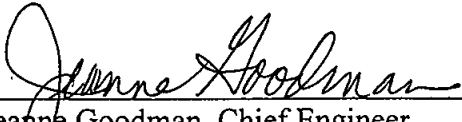
QUALIFICATIONS

1. The wells approved under Water Permit No. 8280-3 will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner, under these Permits shall control withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. Water Permit No. 8280-3 is subject to compliance with requirements of the Department's Water Pollution Control Permit issued pursuant to SDCL 34A-2-36 or 34A-2-112 for concentrated animal feeding operations.

(continued)

3. Water Permit No. 8280-3 is subject to compliance with all existing and applicable Water Management Board Rules including but not limited to:
 - a) Chapter 74:54:01 Ground Water Quality Standards,
 - b) Chapter 74:54:02 Ground Water Discharge Permit,
 - c) Chapter 74:51:01 Surface Water Quality Standards,
 - d) Chapter 74:51:02 Uses Assigned to Lakes,
 - e) Chapter 74:51:03 Uses Assigned to Streams, and
 - f) Chapter 74:52:01 through 74:52:11 Surface Water Discharge Provisions
4. The Permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Cretaceous aged undifferentiated sandstone.
5. Water Permit No. 8280-3 authorizes a total annual diversion of 121 acre feet of water.
6. The permit holder for Water Permit No. 8280-3 shall contract with a licensed well driller to construct an observation well that will become part of the South Dakota Department of Environment and Natural Resources Observation Well Network. The observation well must be completed into the same aquifer as the production wells and shall be located in the public right of water or a perpetual easement granted to the State for the purpose of maintaining an observation well on property owned by the permit holder. The observation well construction shall be coordinated with the DENR-Water Rights Program staff.

WATER MANAGEMENT BOARD

By: 
Jeanne Goodman, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

APR 30 2018

date



Supplemental Information

(type or print)

1. Well Information

(check one or both as applicable) ☒ Drilling new well(s) ☐ Using existing well(s)

a) If new wells, how many 2 Have test holes been drilled ☒ Yes ☐ No Drilled by Dave Putzke Well Drilling
(if yes, please provide copies of logs)

b) If existing wells, how many Provide copy of log(s), if available. Drilled by

For either Existing or Proposed Wells:

c) Well Depth (required) 300' Depth to Top of Water Bearing Material Depth to Water from Surface 136'

d) Distance to nearest domestic well on applicant's property none Property owned by others ~1,300'

2. Wastewater Disposal System Information

a) Type of System (i.e. septic tank, drain field)

b) System Capacity (gallons) Year Constructed

c) Connected to the City of Sanitary System

3. Dugout Information

a) Surface Dimensions Depth

b) Depth to water (ground surface to water level)

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:

b) Freeboard

c) Crest Width

Crest Length

d) Height

e) Primary Outlet Capacity

If pipe, diameter

f) Secondary Spillway Capacity

Spillway Width

g) X & Y Slope (e.g. 3 to 1 is a typical slope)

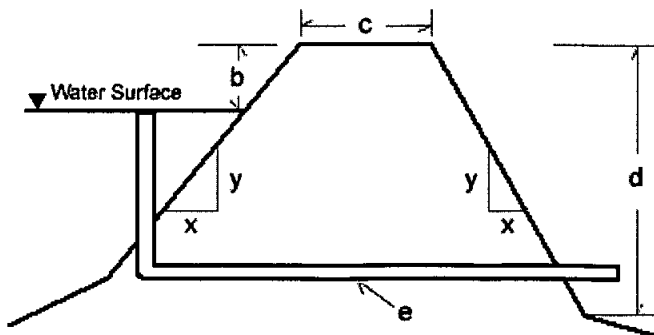
Upstream

Downstream

h) Surface Area of Impoundment

i) Storage Acre Feet

j) Drainage Area Above Dam Acres



SOUTH DAKOTA WATER WELL COMPLETION REPORT

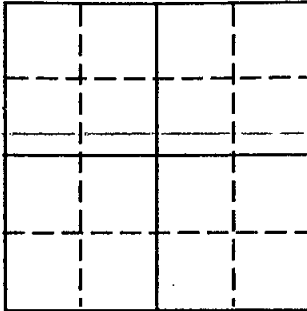
3rd well
11-02

Location 1/4 SW 1/4 Sec 9 Twp 102 N Rg 54

County McCook

North

Please mark well location with an "X"



Well completion Date
7-21-17

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)
? None ft. from None (identify source)

PROPOSED USE:

- ☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring

METHOD OF DRILLING:

Rotary

CASING DATA: ☐ Steel ☒ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
<u>250 LB/FT</u>	<u>5 IN</u>	<u>0 FT</u>	<u>300 FT</u>	<u>8 3/4 IN</u>
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
<u>Grout DF</u>	<u>26</u>	<u>Lb/gal</u>	<u>0 Ft</u>	<u>260 Ft</u>
		Lb/gal	Ft	Ft

Describe grouting procedure 1" trimix line Pump
w/ Grout machine

SCREEN:

- ☐ Perforated pipe ☒ Manufactured

Diameter 5 Inches Length 27 Feet

Material Plastic

Slot Size 25 Set From 273 Feet to 300 Feet

Other information gravel Pack

WAS A PACKER OR SEAL USED?

- ☐ Yes ☒ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

- ☐ Yes, How?

- ☐ No, Why Not?

Lab sample sent to for water quality analysis

Please return WHITE COPY to: DENR Water Rights

Well Owner:

Business Name: Dixbrook Farms

Address: W4448 - 258th street

City, State, Zip: Camistota S.D 57012

WELL LOG:

DEPTH

FORMATION	FROM	TO
<u>Top Soil</u>	<u>0</u>	<u>2</u>
<u>yellow clay</u>	<u>2</u>	<u>70</u>
<u>Blue clay</u>	<u>70</u>	<u>273</u>
<u>Coarse Sand-Chalk Sandstone</u>	<u>273</u>	<u>300</u>
<u>Granite</u>	<u>300</u>	

STATIC WATER LEVEL

136

FEET

If flowing: closed in pressure

PSI

GPM flow

through

Inch pipe

Controlled by

☐ Valve

☐ Reducers

☐ Other

Reduced flow rate

GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped

Describe:

AIR

☐ Bailed

☐ Other

Pumping Level Below Land Surface

Ft. After

Hrs. pumped

GPM

Ft. After

Hrs. pumped

GPM

If pump installed, pump rate:

GPM

REMARKS

220

50 gpm

? W/R

This well was drilled under license #

439

And this report is true and accurate.

Drilling firm:

Dave Putke well Drilling & repair, Inc.

Signature of License Representative:

Dave Putke

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Signature of Well Owner or Equitable Property Holder:

AUG 02 2017

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Date:

523 E Capitol Ave.

Pierre SD 57501

Lot 1 of

Dylbrook Addition

SOUTH DAKOTA WATER WELL COMPLETION REPORT

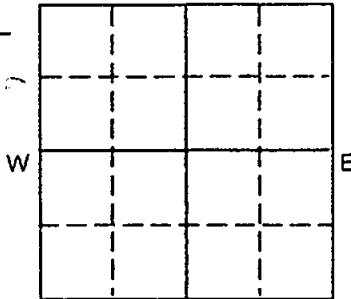
11-02

Location 1/4 SW 1/4 Sec 9 Twp 102N Rg 54W

County McCook

North

Please mark well location with an "X"



Well completion Date

3-10-17

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)

? ft. from NONE (identify source)

PROPOSED USE:

☒ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring

METHOD OF DRILLING:

Rotary

CASING DATA:

☐ Steel ☒ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
250 LB/FT	5 IN	0 FT	284 FT	8 3/4 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Grout DF	25	Lb/gal	0 Ft	250 Ft
		Lb/gal	Ft	Ft

Describe grouting procedure 1" trimix line pumped w/ grout machine

SCREEN:

☐ Perforated pipe ☒ Manufactured
Diameter 5 Inches Length 20 Feet
Material Plastic
Slot Size 25 Set From 264 Feet to 284 Feet
Other information gravel pack

WAS A PACKER OR SEAL USED?

☐ Yes ☐ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☒ Yes, How? 5 gallons of chlorine
☐ No, Why Not? Pumped
Lab sample sent to for water quality analysis

Well Owner:

Business Name:

Address:

City, State, Zip:

Dylbrook Farms RE-LLC
44248-258th Street
Cognistate, SD 57012

WELL LOG:

FORMATION	DEPTH	
	FROM	TO
Top Soil	0	2
Yellow clay	2	166
Blue clay	166	260
Coarse Sand	260	284

STATIC WATER LEVEL

136 FEET

If flowing: closed in pressure

PSI

GPM flow through inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced flow rate GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped Describe: AIR
☐ Bailed
☐ Other

Pumping Level Below Land Surface

Fl. After Hrs. pumped GPM

Fl. After Hrs. pumped GPM

If pump installed, pump rate: GPM

REMARKS

220' 50 gpm

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WATER RIGHTS PROGRAM

This well was drilled under license # 439

And this report is true and accurate.

Drilling firm: Dave Putzke well Drilling & repair Inc

Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date:

Please return WHITE COPY to: DENR Water Rights

523 E Capitol Ave. Pierre SD 57501

Lot 1 of
Dylbrook Addition

SOUTH DAKOTA WATER WELL COMPLETION REPORT

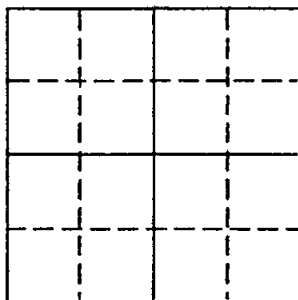
11-02

Location 1/4 SW 1/4 Sec 9 Twp 102N Rg 54

County McCook

North

Please mark well location with an "X"



Well completion Date
3-24-17

1 Mile

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)

? ft. from None (identify source)

PROPOSED USE:

☒ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring

METHOD OF DRILLING:

Rotary

CASING DATA: ☐ Steel ☒ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
250 LB/FT	5 IN	0 FT	300 FT	8 3/4 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Neat DF	26	Lb/gal	0 Ft	260 Ft
		Lb/gal	Ft	Ft

Describe grouting procedure 1" Trimec line pumped w/ Grout machine.

SCREEN: ☐ Perforated pipe ☒ Manufactured
Diameter 5 Inches Length 20 Feet
Material Plastic
Slot Size 25 Set From 280 Feet to 300 Feet
Other information gravel pack

WAS A PACKER OR SEAL USED? ☐ Yes ☐ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☒ Yes, How? 5 gallons of chlorine Pumped
☐ No, Why Not?

Lab sample sent to for water quality analysis

Well Owner:

Business Name: Dylbrook Farms RE-LLC
Address: 44448 - 258th Street
City, State, Zip: Canistota S.D 57012

WELL LOG:

FORMATION	DEPTH	
	FROM	TO
Top Soil	0	2
Yellow clay	2	70
Blue clay	70	271
Coarse Sand	271	300
Granite	300	

STATIC WATER LEVEL 136 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced flow rate _____ GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped Describe: AIR
☐ Bailed
☐ Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

REMARKS

220' 50 gpm

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This well was drilled under license # 439

And this report is true and accurate.

Drilling firm: Dave Puteke Well Drilling & Repair, Inc

Signature of License Representative:

Dave Puteke

Signature of Well Owner or Equitable Property Holder:

Date: _____

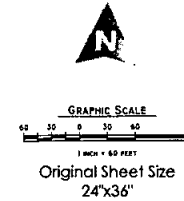
Please return WHITE COPY to: DENR Water Rights

523 E Capitol Ave. Pierre SD 57501

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Control Table			
Description	Northing	Easting	Elevation
CP #1	58,703.57	85,595.19	1,529.40
CP #2	58,848.01	83,994.41	1,521.25
CP #3	58,744.44	87,543.34	1,534.53

Control Point #3 is 1,954 feet East of Control Point #1, on the north side of the County Road and East of a Fence Corner.

LEGEND	
---	Existing Contour
- - - -	Proposed Contour
-#-	Proposed Storm Sewer Pipe
-D#-	Proposed Concrete Drop Inlet
[Pattern]	Proposed Heavy Duty Gravel Surfacing (Geo-Separation Fabric & 12" of 3/4" SD D01 Surfacing Gravel)
[Pattern]	Proposed Medium Duty Gravel Surfacing (8" of 3/4" SD D01 Surfacing Gravel)
[Pattern]	Proposed Concrete Surfacing

Dylbrook Farms RE, LLC
SW 1/4, Sec. 9, T102N, R54W
McCook County, South Dakota

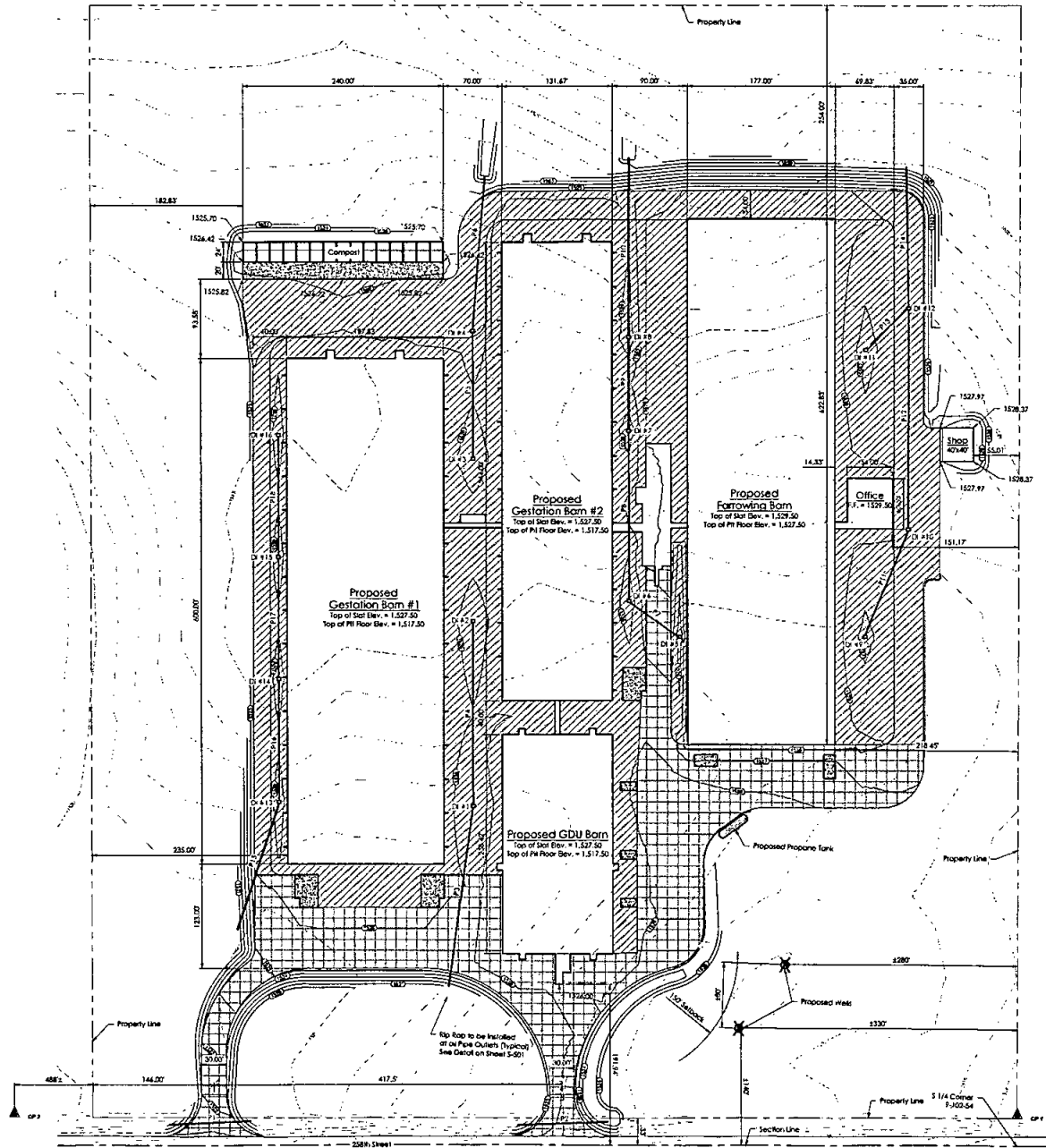
REVISION SCHEDULE
DATE

SEI PROJECT #: 15112

Water
Rights

WR-101

15112 - Water Rights.dwg





Sec 5
T102N
R54W

Sec 4
T102N
R54W

Sec 3
T102N
R54W

Sec 8
T102N
R54W

Sec 9
T102N
R54W

Sec 10
T102N
R54W

Sec 17
T102N
R54W

Sec 16
T102N
R54W

Sec 15
T102N
R54W

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 4/20, 20 17

RECEIVED OF Dylbrook Farms RE LLC PO Box 370 Pipestone MN 56164

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>8280-3</u> to Appropriate Water, to construct and to put water to beneficial use	750	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>8280-3</u>	200	00
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	950 00

No. 08232

By Jean Goodman 981
Chief Engineer



DL131333

B0025-6751 03/08/2017 9:17AM Rec'd by SD SOS

ARTICLES OF ORGANIZATION**DOMESTIC LIMITED LIABILITY COMPANY**
SDCL 47-34A-203, 212South Dakota State Capitol
500 E. Capitol Ave
Pierre, SD 57501
(605) 773-3537**Filing Fee: \$150**Please Type or Print Clearly in Ink
Please submit one Original and one Photocopy
Make payable to the SECRETARY OF STATE**Article I**The name of the Company: **Dylbrook Farms, LLC****Article II**

The address of the initial designated office in or out of the State of South Dakota where the company conducts its business:

Street Address

STE 205
324 S SPLITROCK BLVD
BRANDON, SD 57005-1652

Mailing Address

STE 205
324 S SPLITROCK BLVD
BRANDON, SD 57005-1652**Article III**

SDCL 59-11-6

The South Dakota Registered Agent's Name:

South Dakota law permits the registered agent to be either a (a) noncommercial registered agent, (b) a commercial registered agent, or (c) an office holder.

(a) The South Dakota Noncommercial Registered Agent's name

LUKE W MINION
STE 205
324 S SPLITROCK BLVD
BRANDON, SD 57005-1652
Minnehaha**Article IV**

The name and address of each organizer

Name

Address

Sean Simpson**1300 S Hwy 75 Pipestone, MN 56164****Article V**The duration of the company if other than perpetual is: **Perpetual**The effective date of the business shall be: **March 9, 2017**



B0025-6752 03/08/2017 9:17AM Rec'd by SD SOS

Article VI

☐ Member Managed ☒ Manager Managed

Name

Address

Dr. Barry Kerkaert

324 Spiltrock Blvd, Suite 205

Article VII

Whether one or more of the members of the company are to be liable for its debts and obligations as set forth under SDCL 47-34A-303(c).

☒ Yes

☐ No

Article VIII

Beneficial Owners: A beneficial owner is a person who has or in some manner controls an equity security. Please consult an attorney for legal advice if you have any questions concerning this entry. Any question under this heading is considered a request for legal advice and the secretary of state's office is, by statute, not permitted, to provide legal advice.

Signature/Authorization

The Articles of Organization must be executed by the organizers.

No person may execute this report knowing it is false in any material respect. Any violation may be subject to a criminal penalty (SDCL 22-39-36).

Kassie Bokker

Kassie Bokker

Business Assistant

03/08/2017

PRINTED NAME

SIGNATURE

TITLE

DATED

January 25, 2017

Dr. Barry Kerkaert
Dylbrook Farms RE, LLC
P.O. Box 188
Pipestone, MN 56164-0188

Re: Dylbrook Farms RE, LLC - Manure Management System
General Permit Application Review

Dear Dr. Kerkaert:

The Department of Environment and Natural Resources has received four copies of your application for coverage under the *General Water Pollution Control Permit for Concentrated Animal Feeding Operations* (general permit), **permit application number SDG-0100530**. The manure management system is located in the Southwest $\frac{1}{4}$ of Section 9, Township 102 North, Range 54 West in McCook County, South Dakota.

Your proposed manure management system is for a housed lot feeding a maximum of 11,960-head of production swine consisting of 7,480 gestating sows, 1,560 lactating sows, 640 gilts, 1,280 finisher swine and 1,000 nursery swine (1,000 swine weighing less than 55 pounds and 10,960 swine weighing 55 pounds or more). The proposed system consists of a farrowing barn with shallow pull-plug pits, two gestation barns with deep pits, a gilt developer (GDU) barn with a deep pit, piping, a loadout, a mortality compost building, and no acres of drainage area. Liquid manure and process wastewater from the farrowing barn will gravity flow into the deep pit beneath the east gestation barn. Each deep pit is designed with at least 365 days of liquid storage capacity.

We have reviewed and hereby conditionally approve the plans and specifications for your project. This approval expires on January 25, 2019, unless construction of the manure management system has been started by that date. Requirements you must implement are listed on the attached pages. Failure to implement the requirements on the following pages prior to operation of the manure management system will invalidate this approval.

Two copies of the approved plans and specifications are being retained for our files. If any deviations are required from the approved plans, those changes and all change orders must be approved by the department prior to construction. A complete set of as-built plans will be required if any major deviations result.

Dr. Barry Kerkaert
Dylbrook Farms RE, LLC
January 25, 2017
Page 2 of 8

Upon completion of construction, the enclosed Notice of Completion must be returned to the department. **The proposed barns cannot be populated or used to store manure until the department issues final permit coverage and a Certificate of Compliance.** Continued compliance is dependent upon you performing proper operation and maintenance activities. You will be liable for any noncompliance with applicable South Dakota environmental laws or regulations.

Our review is primarily to assure the system meets the requirements of the general permit and does not cover items such as, quality of material, structural soundness, electrical, and mechanical design features. Approval of the plans and specifications does not in any way release the producer from the responsibility of ensuring that the project will be an operable facility when construction is completed.

If you have any questions regarding the content of this letter, please feel free to contact Peter Adair, Feedlot Permit Program at (605) 773-3351. Thank you for your cooperation.

Sincerely,

Kent R. Woodmansey, PE, Engineering Manager
Feedlot Permit Program

Enclosures: Construction Schedule Postcard

cc: Brad Woerner, PE, Stockwell Engineering
McCook County Commissioners

REQUIREMENTS

The following requirements must be implemented before we will issue a Certificate of Compliance and coverage under the general permit. Failure to implement these requirements will invalidate this approval.

Plans and Specifications

The plans and specifications review is to determine whether seepage, storage, and other design requirements will be met.

1. Pull-plug Drains from Farrowing Barn to Gestation Barn

The submitted plans indicate the shallow pull-plug pits in the farrowing barn will drain to the deep pit of the east gestation barn, but did not include invert elevations or include a detail indicating the height above the floor that the piping will enter the deep pit. If surcharging occurs, the producer should be aware of the potential for additional maintenance due to solids deposition in the piping. **Please have your engineer indicate the invert elevations of the piping between the farrowing barn and east gestation barn on as-built plans.**

2. Freeze Protection

The submitted plans indicate there will be a minimum cover over the gravity manure pipes between the farrowing barn and the east gestation barn. These pipes must not freeze, since frozen pipes can result in operational difficulties and unauthorized discharges of manure. **You must revise your operation and maintenance (O&M) guideline to include procedures for operating the pull-plugs within the farrowing barn to ensure the waste line between the farrowing barn and the gestation barn does not freeze.**

3. GDU Barn

The design for the GDU barn indicates there will be three separate pits beneath the barn and that two of the pits will not have equalization ports. The volume calculations for each pit are based on the specific animal numbers to be housed above the respective pit. **Your operation and maintenance O&M guideline must be revised to reflect the operation of the GDU barn so the maximum number of animals for each specific pit is not exceeded.**

4. Drain Tile

The submitted plans indicate drain tile will be installed around the perimeter of each deep pit, with a sump and standpipe to be used for collection and removal of liquids. The operation and maintenance (O&M) guideline indicates the liquid level in the standpipes will be checked weekly and after major rainfall events. The O&M guideline also indicates the producer will contact the department in the event that liquid levels rise in the standpipe, and during an emergency liquid in the standpipe will be pumped into the deep pits. **Any water removed from the tile sumps is considered process wastewater and must be placed in**

REQUIREMENTS CONTINUED

the deep pits to prevent a discharge. If this occurs on a frequent basis, your engineer will be required to submit revised capacity calculation for the pits including the excess water.

5. Technical Specifications

The technical specifications submitted were not sealed, signed, and dated. The South Dakota State Board of Technical Professions' requires plans and specifications to be sealed in accordance with South Dakota Codified Law (SDCL) 36-18A-45. A sealed, signed, and dated copy of the technical specifications must be submitted to the department and approved before construction begins.

6. Composting Building

According to your permit application, a composting building for the composting of mortalities is to be constructed at the site. Your composting protocols must be approved by the Animal Industry Board. **If the Animal Industry Board grants approval for composting of mortalities, please provide the department with a copy of the approved compost protocols to include in our files.**

If manure will not be used to compost your mortalities, DENR approval of the compost building is not required to maintain general permit coverage for your operation but you may not have a discharge from the composting building. If manure or process wastewater will be used in the composting process, DENR approval of the plans and specifications and general permit coverage for the compost building is required. **If you plan on using manure or process wastewater in the composting process, please have your engineer submit plans and specifications for the compost building and information on how runoff will be prevented.**

7. Office Septic System

Your submittal indicates an office area will be constructed adjacent to the proposed farrowing barn and a septic system will be installed by a certified installer in accordance with state plumbing codes. Plans and specifications for any new on-site system for an office, must be submitted to the department for review and approval prior to construction. The Plans and Specifications must comply with the Administrative Rules of South Dakota, Chapter, 75:53:01. For more information contact Scott Hipple at (605) 773-3351. **Please have your engineer submit as-built drawings showing the general location of the septic system.**

General Permit

You will be required to operate your feeding operation and manure management system in accordance with the requirements in the general permit.

1. Ground Water Monitoring

Based on the system design, soil boring logs, and other published reports and information, this system does not appear to overlie a shallow aquifer and should not impact ground water. Therefore, a Ground Water Discharge Permit and groundwater monitoring will not be

REQUIREMENTS CONTINUED

required. Should the design or operation of the facility change appreciably, new hydrogeological information become available, or any contamination problems be reported, the department reserves the right to reassess the need for possible remediation, monitoring of ground water, or a Ground Water Discharge Permit. For additional information concerning ground water monitoring, please contact Troy Roth, at (605) 773-3351.

2. Notification

Construction Schedule - You or your engineer must notify the department of the proposed construction schedule for your project to allow our personnel the opportunity for construction inspections. Please fill out the enclosed postcard and return it to us prior to beginning construction of the manure management system. If any of the dates change from the ones submitted on the postcard, please notify us at (605) 773-3351 and ask for Peter Adair.

Other Government - You are responsible for contacting your local planning and zoning office to determine if there are any local ordinances or requirements with which you need to comply. If a stream, lake, or wetland will be dredged or filled during the construction of the feeding operation, then you need to contact the United States Corps of Engineers at (605) 224-8531 prior to construction of the manure management system.

Notice of Completion - The Notice of Completion form must be completed by your engineer and returned to the department when construction of the manure management system is complete. The department cannot issue you a Certificate of Compliance and coverage under the general permit until we receive a Notice of Completion. **The proposed barns cannot be populated or used to store manure until the department issues final permit coverage and a Certificate of Compliance.**

3. Operation and Maintenance Guideline

We received a signed O&M guideline with your permit submittal. **However, a revised O&M guideline must be submitted that includes procedures for the following:**

- Operating the pull plugs within the farrowing barn to ensure the waste lines between the farrowing barn and the gestation barn do not freeze;
- Reflects the operation of the GDU barn so that the maximum number of swine above each of the deep pits is not exceeded; and
- Includes guidelines on the storage and handling of the generated mortality compost. **Please submit a signed copy after you have reviewed the O&M guideline with your engineer.**

4. Phosphorus-Based Nutrient Management Plan (NMP)

A. Annual Soil Testing

The following tables list the legal descriptions and sampling requirements for all the fields in your nutrient management plan. Annual soil samples from 0 to 2 feet are required on all manure land application fields prior to manure application. Fields identified as being located over a shallow aquifer require soil sampling from 0 to 2 feet

REQUIREMENTS CONTINUED

and 2 to 4 feet prior to manure application. The shaded fields in the following tables require the 0 to 2-foot and 2 to 4-foot soil sampling.

For fields that require additional soil testing from 2 to 4 feet, you have the option to either conduct the initial 0 to 2-foot and the 2 to 4-foot soil test prior to land application or the alternative option to conduct the initial 0 to 2-foot soil test prior to land application and a second 0 to 2-foot soil test within four weeks of harvesting the crop. Please refer to section 1.4.4.4., beginning on page 29 of the general permit, for the annual nutrient management requirements. **You must notify the department in writing if you plan to use the alternative post-harvest soil sampling option instead of the 2 to 4-foot soil sampling requirement.**

B. Nitrogen-Based Manure Application

As indicated in your phosphorus-based NMP, manure application on the following fields may be based on nitrogen need as determined from the table on page 29 of the general permit. Please refer to this table prior to land application of manure to determine the proper procedure for calculating the appropriate application rate for each specific field. A current soil test and the table on page 29 must be used to determine the required application method before manure is applied to these fields.

Table One: Dylbrook Farms RE, LLC Nitrogen-Based Manure Application Fields

Field ID	Tract & Field #	County	Legal Description	Available Acres	Soil Sampling Requirements	
					0-2 feet	Additional
1	1	McCook	SE ¼, Sec. 21, T102N, R54W	144.0	Yes	No
2	2	McCook	E 1/2, Sec. 28, T102N, R54W	270.6	Yes	No
3	3	McCook	NE ¼, Sec. 16, T102N, R54W	71.9	Yes	No
4	4	McCook	SW ¼, Sec. 14, T102N, R54W	55.0	Yes	No
5	5	McCook	NE ¼, Sec. 17, T102N, R54W	115.7	Yes	No
6	6	McCook	SE ¼, Sec. 13, T102N, R55W	45.5	Yes	No
7	7	McCook	SW ¼, Sec. 18, T102N, R54W	156.0	Yes	No
8	8	McCook	SW ¼, Sec. 21, T102N, R54W	131.9	Yes	No
9	9	McCook	SE ¼, Sec. 12, T102N, R55W	52.5	Yes	No
10	10	McCook	SE ¼, Sec. 16, T102N, R54W	69.4	Yes	No
11	11	McCook	NW ¼, Sec. 7, T102N, R54W	155.5	Yes	No
12	12	McCook	NE ¼, Sec. 12, T102N, R55W	122.2	Yes	No
13	13	McCook	NE ¼, Sec. 6, T102N, R54W	112.1	Yes	No
14	14	McCook	NW ¼, Sec. 5, T102N, R54W	100.9	Yes	No
15	15	McCook	SW ¼, Sec. 6, T102N, R54W	51.4	Yes	No
16	16	McCook	NE ¼, Sec. 9, T102N, R54W	49.7	Yes	No
17	17	McCook	NE ¼, Sec. 16, T102N, R54W	67.6	Yes	No
18	18	McCook	NW ¼, Sec. 9, T102N, R54W	134.2	Yes	No
19	19	McCook	SE ¼, Sec. 17, T102N, R54W	119.4	Yes	No
20	20	McCook	SW ¼, Sec. 7, T102N, R54W	85.6	Yes	No
21	21	McCook	SW ¼, Sec. 16, T102N, R54W	140.3	Yes	No
22	22	McCook	SW ¼, Sec. 9, T102N, R54W	95.2	Yes	No
23	23	McCook	SE ¼, Sec. 2, T102N, R54W	110.7	Yes	No

REQUIREMENTS CONTINUED

Field ID	Tract & Field #	County	Legal Description	Available Acres	Soil Sampling Requirements	
					0-2 feet	Additional
24	24	McCook	NE ¼, Sec. 16, T102N, R54W	75.4	Yes	No
25	25	McCook	NE ¼, Sec. 21, T102N, R54W	68.3	Yes	No
26	26	McCook	SW ¼, Sec. 20, T102N, R54W	83.9	Yes	No
27	27	McCook	SW ¼, Sec. 15, T102N, R54W	348.9	Yes	No
28	28	McCook	SW ¼, Sec. 3, T102N, R54W	104.9	Yes	No
29	29	McCook	SE ¼, Sec. 9, T102N, R54W	104.0	Yes	No
30	30	McCook	NW ¼, Sec. 16, T102N, R54W	62.3	Yes	No
31	31	McCook	SW ¼, Sec. 5, T102N, R54W	118.2	Yes	No
32	32	McCook	SE ¼, Sec. 11, T102N, R54W	145.6	Yes	No
33	33	McCook	SW ¼, Sec. 17, T102N, R54W	70.6	Yes	No
34	34	McCook	NW ¼, Sec. 16, T102N, R54W	74.2	Yes	No
35	35	McCook	SE ¼, Sec. 7, T102N, R54W	65.7	Yes	No
36	36	McCook	SE ¼, Sec. 7, T102N, R54W	66.1	Yes	No
Total Available Nitrogen Acres				3,845.4		

Please note in your phosphorus-based NMP the estimated time it will take to build your listed fields up to 50 ppm (Olsen test) or 75 ppm (Bray-1 test) of phosphorus. You may need additional land in order to apply to your fields based on phosphorus removal at that time.

C. Phosphorus-Based Manure Application

As indicated in your phosphorus-based NMP, none of the listed fields currently require manure application based on crop removal of phosphorus. If future soil tests identify fields with elevated phosphorus levels, the manure application rate must be based on phosphorus removal in the harvested portion of the crop. However, manure application to these fields can be based on multi-year phosphorus crop removal but cannot exceed the one year nitrogen crop need, and no more manure may be applied to that field again until the applied phosphorus has been removed from the field via harvest and crop removal. Please refer to the table on page 29 of the general permit for the proper manure application determination.

5. Field Addition Requirements

To add fields to your approved NMP, you must submit the required information for each additional field to the department for our review and approval. Required documentation includes the calculation of a RUSLE value for each field to be added. Information on adding fields to your approved NMP may be obtained from your local Natural Resources Conservation Service (NRCS) office. You may also contact us for assistance at (605) 773-3351, or visit our website at <http://denr.sd.gov/des/fp/FieldAdditions.aspx> for instructions on adding fields to your NMP. **You cannot apply manure to any fields not included in your approved NMP.**

REQUIREMENTS CONTINUED

6. Other Permits That May or Will Be Required

Storm Water Permit - Since the construction of your project disturbs more than one acre in total land area, a general storm water construction permit is required. This permit must be obtained 15 days prior to starting construction. As part of the requirement for obtaining coverage under this permit you must develop and implement a pollution prevention plan. Information concerning this permit and the pollution prevention plan can be obtained by calling Laura Newman at 1-800-737-8676. **A copy of this plan must be kept on site during construction for review by DENR inspectors.**

Emission Reporting - Depending on the estimated quantity of emissions of hazardous substance from your facility, you may be required to submit a continuous release report to the State Emergency Response Commission and Local Emergency Planning Commission. Information regarding emission reporting and how to determine if you need to submit a report can be found on the department's website at http://denr.sd.gov/des/gw/SARATitleIII/Emissions_from_Animal_Waste.aspx or by contacting Trish Kindt with the department at 1-800-433-2288.

Emergency Power Generator - The department has observed that emergency power generators have been installed at similar sized operations. If an emergency power generator will be installed at your operation it may require that you obtain an air quality permit. Please contact Earl Berg with the department's Air Quality Program at (605) 773-4051, to determine whether an air quality permit is required. If an air quality permit is required, you must have that permit prior to using the generator.

Permit to Occupy Right of Way - If manure application will involve placing hoses or other equipment in a state highway right of way (for example, in a road ditch or through a culvert), you must first obtain a Permit to Occupy Right of Way. Application for this permit may be made through the local South Dakota Department of Transportation area office. Contact your local SD DOT area office for more information on this permit. In addition, please contact your county highway superintendent to determine if your county has similar requirements.

7. General Permit Reissuance

The general permit is currently in the process of being reissued. Please note that after the general permit is reissued, certain modifications to the plans approved by DENR will require the operation to submit a permit application for coverage under the reissued permit. Information on the reissuance of the general permit can be found at <http://denr.sd.gov/ccdocs.aspx?CCID=CCID25> and <http://denr.sd.gov/des/fp/fphome.aspx>.

April 6, 2017

Dr. Barry Kerkaert
Dylbrook Farms RE, LLC
P.O. Box 188
Pipestone, MN 56164-0188

Re: Dylbrook Farms RE, LLC - Manure Management System
Revised Plans and Specifications Review

Dear Dr. Kerkaert:

The Department of Environment and Natural Resources has received four copies of revised plans and specifications for your proposed manure management system and one copy of the Animal Industry Board (AIB)'s approval of your composting protocol on February 14, 2017. The approved manure management system will be located in the Southwest ¼ of Section 9, Township 102 North, Range 54 West in McCook County, South Dakota.

Your approved manure management system is for a housed lot feeding a maximum of 11,960-head of production swine consisting of 7,480 gestating sows, 1,560 lactating sows, 640 gilts, 1,280 finisher swine and 1,000 nursery swine (1,000 swine weighing less than 55 pounds and 10,960 swine weighing 55 pounds or more). The approved system consists of a farrowing barn with shallow pull-plug pits, two gestation barns with deep pits, a gilt developer (GDU) barn with a deep pit, piping, a loadout, a mortality compost building, and no acres of drainage area. Liquid manure and process wastewater from the farrowing barn will gravity flow into the deep pit beneath the east gestation barn. Each deep pit is designed with at least 365 days of liquid storage capacity.

The department previously approved plans and specifications for your project on January 25, 2017. The revisions to the approved plans consist of changes to the dimensions and layout of the barns:

- The GDU barn has been changed from 204.25 feet long to 258.4 feet long;
- The West Gestation Barn #1 has been changed from 581.83 feet by 176 feet to 600 feet by 187.83 feet; and
- Various changes to the layout of the building above the slats were included.

Dr. Barry Kerkaert
Dylbrook Farms RE, LLC
April 6, 2017
Page 2 of 6

With the proposed revisions, there was no change to the animal population and the barns will still have at least 365 days of liquid storage capacity. The department is also including a copy of the AIB approval of your composting protocols in your file.

We have reviewed and hereby conditionally approve the plans and specifications for the revisions to your project. This approval expires on April 6, 2019, unless construction of the manure management system has been started by that date. Requirements you must implement are listed on the attached pages. Failure to implement the requirements on the following pages prior to operation of the manure management system will invalidate this approval.

Two copies of the approved plans and specifications for the revisions are being retained for our files. If any deviations are required from the approved plans, those changes and all change orders must be approved by the department prior to construction. A complete set of as-built plans will be required if any major deviations result.

Upon completion of construction, the enclosed Notice of Completion must be returned to the department. **The proposed barns cannot be populated or used to store manure until the department issues permit coverage and a Certificate of Compliance.** Continued compliance is dependent upon you performing proper operation and maintenance activities. You will be liable for any noncompliance with applicable South Dakota environmental laws or regulations.

Our review is primarily to assure the system meets the requirements of the general permit and does not cover items such as, quality of material, structural soundness, electrical, and mechanical design features. Approval of the plans and specifications does not in any way release the producer from the responsibility of ensuring that the project will be an operable facility when construction is completed.

If you have any questions regarding the content of this letter, please feel free to contact Peter Adair, Feedlot Permit Program at (605) 773-3351. Thank you for your cooperation.

Sincerely,

Kent R. Woodmansey, PE, Engineering Manager
Feedlot Permit Program

Enclosures: Construction Schedule Postcard

cc: Brad Woerner, PE, Stockwell Engineering
McCook County Commissioners

REQUIREMENTS

The following requirements must be implemented before we will issue a Certificate of Compliance and coverage under the general permit. Failure to implement these requirements will invalidate this approval.

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The plans and specifications review is to determine whether seepage, storage, and other design requirements will be met.

1. Pull-plug Drains from Farrowing Barn to Gestation Barn

The submitted plans indicate the shallow pull-plug pits in the farrowing barn will drain to the deep pit of the east gestation barn, but did not include invert elevations or include a detail indicating the height above the floor that the piping will enter the deep pit. If surcharging occurs, the producer should be aware of the potential for additional maintenance due to solids deposition in the piping. **Please have your engineer indicate the invert elevations of the piping between the farrowing barn and east gestation barn on as-built plans.**

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REQUIREMENTS CONTINUED

the deep pits to prevent a discharge. If this occurs on a frequent basis, your engineer will be required to submit revised capacity calculation for the pits including the excess water.

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Your submittal indicates an office area will be constructed adjacent to the proposed farrowing barn and a septic system will be installed by a certified installer in accordance with state plumbing codes. Plans and specifications for any new on-site system for an office, must be submitted to the department for review and approval prior to construction. The Plans and Specifications must comply with the Administrative Rules of South Dakota, Chapter, 75:53:01. For more information contact Scott Hipple at (605) 773-3351. **Please have your engineer submit as-built drawings showing the general location of the septic system.**

General Permit

You will be required to operate your feeding operation and manure management system in accordance with the requirements in the general permit.

1. Notification

Construction Schedule - You or your engineer must notify the department of the proposed construction schedule for your project to allow our personnel the opportunity for construction inspections. Please fill out the enclosed postcard and return it to us prior to beginning construction of the manure management system. If any of the dates change from the ones submitted on the postcard, please notify us at (605) 773-3351 and ask for Peter Adair.

Water Right Permit – Your engineer indicates the initially your operation will be supplied by rural water but eventually you will obtain a water right for two proposed wells. To apply for a water right you must submit information regarding the source(s) of all water to be used in the operation of your manure management system. You must include the average and maximum daily volumes of water to be used from each source. The water volumes must include all water usage such as water for consumption, washing, misters, milk cooling, overflow watering systems, cooling, dust control, etc. Information concerning this permit can be obtained by calling Eric Gronlund at (605) 773-3352. **Please contact Eric so he can assist you in applying for a water rights permit.**

Other Government - You are responsible for contacting your local planning and zoning office to determine if there are any local ordinances or requirements with which you need to comply. If a stream, lake, or wetland will be dredged or filled during the construction of the feeding operation, then you need to contact the United States Corps of Engineers at (605) 224-8531 prior to construction of the manure management system.

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REQUIREMENTS CONTINUED

populated or used to store manure until the department issues permit coverage and a Certificate of Compliance.

2. Operation and Maintenance Guideline

We received a signed O&M guideline with your original permit submittal. **However, a revised O&M guideline must be submitted that includes procedures for the following:**

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Dr. Barry Kerkaert
Dylbrook Farms RE, LLC
April 6, 2017
Page 6 of 6

REQUIREMENTS CONTINUED

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The general permit is currently in the process of being reissued. Please note that after the general permit is reissued, if changes during construction require certain modifications to the plans approved by DENR, the operation will be required to submit a permit application for coverage under the reissued permit. Information on the reissuance of the general permit can be found at <http://denr.sd.gov/ccdocs.aspx?CCID=CCID25> and <http://denr.sd.gov/des/fp/fphome.aspx>.

Gronlund, Eric

From: Brad Woerner <bwoerner@stockwellengineers.com>
Sent: Friday, April 21, 2017 3:49 PM
To: Gronlund, Eric
Subject: [EXT] Dylbrook Water Rights

Eric,
Spoke with Marty. He suggested we go with 121 ac-ft/year. That equates to about 75% of the peak flow. Their concern is not acquiring rights for enough water and having to go back through the process. Each time can have its own issue(s).
Please let me know either way if this works/doesn't.

Thanks,
Bradley S. Woerner, PE
PROJECT MANAGER



bwoerner@stockwellengineers.com
Phone: 605.665.8092
Cell: 605.660.1362
Fax: 605.665.0523
215 Walnut Street
Yankton, SD 57078
stockwellengineers.com

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Kilts, Whitney (DENR)

From: Holmes, Stevie L <Stevie.Holmes@usd.edu>
Sent: Friday, June 09, 2017 3:18 PM
To: Kilts, Whitney (DENR)
Cc: Goodman, Jeanne; Iles, Derric
Subject: RE: [EXT] Well completion reports

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Whitney,

I reviewed the data surrounding the wells in the SW¼ sec. 9, T. 102 N., R. 54 W. near Canistota in an attempt to identify the sand units described in the well completion reports. Based on the information provided by the Water Rights Program for permit 8280-3 and previous work by the Geological Survey Program in this area, it appears that the sand encountered is not glacial in nature. From data surrounding the area, and from other drilling logs in the region, sand units of this type are known to exist: 1) as part of the Sioux Quartzite as a weathering surface, 2) as a part of the Sioux Quartzite that is in place but naturally less cemented than most other Sioux Quartzite, and 3) as part of the "Cretaceous undifferentiated" shales, sands, marls, and chinks. The nature of these types of deposits makes the sand unlikely to be laterally continuous, and if it is, at present, we do not know the lateral extent. Additionally, although water was pumped from the test wells at 50 gallons per minute, it is unknown whether a consistent water supply would be available due to the unknowns regarding the extent, thickness, continuity and recharge related to the sand. Sand units of this type are also known to sometimes have very poor water quality, most notably elevated levels of radionuclides. A potential source of recharge could not be identified.

Let me know if there's anything else I can do. Have a good weekend!
Stevie

Stevie L. Holmes
Geologist
South Dakota DENR
Geological Survey Program
Akeley-Lawrence Bldg. 307
414 East Clark Street
Vermillion, SD 57069
(605) 677-6147

From: Kilts, Whitney
Sent: Friday, June 09, 2017 11:27
To: Holmes, Stevie L <Stevie.Holmes@usd.edu>
Subject: Well completion reports

Whitney Kilts

Gronlund, Eric

From: Goodman, Jeanne
Sent: Thursday, June 22, 2017 3:40 PM
To: Gronlund, Eric
Subject: FW: [EXT] Dylbrook temp water permit

See Mr. Rost's request for a temporary hold on the water right application.

From: Marty Rost [<mailto:Marty.Rost@pipestone.com>]
Sent: Thursday, June 22, 2017 3:39 PM
To: Goodman, Jeanne
Subject: RE: [EXT] Dylbrook temp water permit

Thanks. Can you temporarily put the application for water rights on hold for public notice? I'm leaving for vacation until July 5. I've explained and asked for input from our group and will respond to you when I get back.

Marty Rost

1300 South Highway 75
Pipestone, MN 56164
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From: Goodman, Jeanne [<mailto:Jeanne.Goodman@state.sd.us>]
Sent: Thursday, June 22, 2017 3:18 PM
To: Marty Rost <Marty.Rost@pipestone.com>
Subject: RE: Dylbrook temp water permit

Thanks, Marty. You will be receiving a temporary permit within a day or two.

From: Marty Rost [<mailto:Marty.Rost@pipestone.com>]
Sent: Thursday, June 22, 2017 3:04 PM
To: Goodman, Jeanne
Subject: [EXT] Dylbrook temp water permit

Jeanne,

Attached is the application for tem water use. I hit the email button after I filled it out, but didn't really do anything. Here's a copy. I think the total water used is very strong. On a huge day, they'll use 12,000 per day but only really 6 of those days left. After that, it'll be much smaller.

Marty Rost

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marty.rost@pipestone.com
www.pipevet.com



Gronlund, Eric

From: Goodman, Jeanne
Sent: Monday, June 26, 2017 4:19 PM
To: Gronlund, Eric; Kilts, Whitney (DENR)
Subject: FW: [EXT] Letter as we discussed

Barry sent this on Saturday.

From: Dr. Barry Kerkaert [<mailto:Barry.Kerkaert@pipestone.com>]
Sent: Saturday, June 24, 2017 4:19 PM
To: Goodman, Jeanne
Cc: Marty Rost; Woodmansey, Kent; Iles, Derric; Sean Simpson
Subject: RE: [EXT] Letter as we discussed

Hi Jeanne

Thanks for the letter summarizing the situation and the options. As you stated will ask that the application be placed on hold as per Marty's request. We will begin the process for the geological study and work with you to determine the status of the water supply.

Best regards

Barry

Barry R. Kerkaert, DVM
Vice President
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Phone: 507.825.4211
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From: Goodman, Jeanne [<mailto:Jeanne.Goodman@state.sd.us>]
Sent: Friday, June 23, 2017 1:45 PM
To: Dr. Barry Kerkaert <Barry.Kerkaert@pipestone.com>
Cc: Marty Rost <Marty.Rost@pipestone.com>; Woodmansey, Kent <Kent.Woodmansey@state.sd.us>; Iles, Derric <Derric.Iles@usd.edu>
Subject: Letter as we discussed

Dr. Kerkaert:

Attached is a letter providing the information we discussed by phone on June 21. Please call if you have questions.

**WELL #1 AQUIFER PUMPING TEST
PROPOSED CAFO FACILITY
PIPESTONE**

CANISTOTA, SOUTH DAKOTA

Prepared For:
Pipestone
1300 South Highway 75
Pipestone, MN 56164

November 6, 2017

LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Groundwater and Environmental Engineering Services
140 East Hinks Lane, Suite 126
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**WELL #1 AQUIFER PUMPING TEST
PROPOSED CAFO FACILITY
PIPESTONE**

CANISTOTA, SOUTH DAKOTA

1.0 INTRODUCTION

The purpose of this report is to provide the results of aquifer testing and analysis recently completed at the project site (Site). The aquifer testing was conducted utilizing three newly installed wells, Wells #1, #2, and #3. The three wells are located in close proximity to each other, and are located in the southeast quarter (SE $\frac{1}{4}$) of the southwest quarter (SW $\frac{1}{4}$) of Section 9, Township 102 North, Range 54 West, McCook County, South Dakota (Figure 1). The Leggette, Brashears & Graham, Inc. (LBG) proposal for this project, dated August 15, 2017, was authorized by Mr. Barry Kerkaert, Manager, on August 17, 2017.

1.1 Purpose of Project and Major Tasks

Pipestone is currently constructing a swine confined animal feeding operation (CAFO) facility (Facility) at the Site. The planned industrial water source is groundwater.

The purpose of the aquifer pumping test (aquifer test or test) was to: 1) determine the aquifer properties of transmissivity (T) and storativity (S); 2) obtain information regarding the yield potential of the wells; 3) provide information regarding the degree of interference that will occur between the wells; 4) obtain information regarding the rate of groundwater recovery in the wells; and, 5) provide groundwater quality results.

During the aquifer test, Well #1 was utilized as the pumping well, and the other two wells were utilized as observation wells. Groundwater level changes in the three wells were monitored utilizing data-logging pressure transducers (provided by LBG), in addition to periodic manual groundwater level measurements. The aquifer test consisted of a 6-hour step-rate pumping test, immediately followed by a 70-hour constant-rate pumping test. At the conclusion of the total 76 hours of pumping, the recovery of the groundwater levels in the three wells was monitored for approximately 94 hours.

The project included the following four major tasks:

1. Background data review, aquifer test design, and permitting;
2. Aquifer test oversight;
3. Water quality sampling and analysis; and,
4. Aquifer test data analysis and reporting.

1.2 Datum and Projections

All map coordinates used to produce the report figures are UTM Zone 14. Horizontal coordinates are referenced to the North American Datum of 1983 (NAD 83).

1.3 Background Information

Pipestone has submitted a water permit application to the South Dakota Department of Environment & Natural Resources (DENR) to appropriate 0.22 cubic feet per second (cfs) of groundwater for use as an industrial water supply for a swine CAFO. The requested amount of 0.22 cfs is equivalent to an annual continuous pumping rate of approximately 100 gallons per minute (gpm).

As indicated previously, there are three newly constructed wells at the Site. Wells #1 and #2 were constructed by Putzke Well Drilling & Pump Company of Sioux Falls, SD (Putzke) in March 2017, and are constructed of 5-inch diameter PVC casing and screen. The wells are screened in a unit labeled on the well logs as “coarse sand.” Well #1 is screened from 264 to 284 feet below ground surface (ft. bgs) and Well #2 is screened from 280 to 300 ft. bgs. This coarse sand is the target aquifer. The static (non-pumping) groundwater level in the two wells is listed on the well logs as 136 ft bgs.

Well #3 was completed by Putzke in July 2017. Well #3 is screened from 273 to 300 ft. bgs and is constructed of 5-inch diameter PVC casing and screen. Representatives of the South Dakota Geological Survey (SDGS) were present when Well #3 was drilled, and LBG received a copy of the lithologic log. The SDGS also conducted downhole geophysical logging (gamma, resistivity, and conductivity) in the borehole of Well #3, and provided LBG the results of the downhole geophysical logging. The three wells are numbered from north to south, Well #1, #2, and #3, respectively. Wells #2 and #3 are located 89 feet and 151 feet, respectively, south of Well

#1. Information regarding the three wells, including depths, construction details, and static water levels, is summarized in Table 1. The locations of the three wells are shown on Figure 2, and copies of the well construction logs are provided in Appendix A.

Wells #1 and #2 are equipped with submersible pumps. According to information from Putzke, each well is capable of being pumped at a rate of approximately 60 gpm. Putzke indicated that Well #1 was likely the best producing well.

To assess the ability of an aquifer to provide a permit requested amount, LBG generally recommends conducting the aquifer pumping test at a rate equal to or exceeding the requested permit amount. Knowing that the maximum pumping rate was likely on the order of 60 gpm, it was decided to pump Well #1 at the maximum rate achievable with the existing submersible pump.

2.0 SITE HYDROGEOLOGY

There is little published information available regarding the target aquifer at the Site. The SDGS lithologic log from Well #3 identifies the target aquifer as an undifferentiated sandstone of Cretaceous age (undifferentiated meaning the lateral and vertical extent of the unit, unit identification, as well as other details, has not been defined).

The project area is located in the James Basin of the Central Lowland physiographic division of South Dakota (Christensen, 1989). Surface sediments generally consist of till (clay-rich, un-sorted sediments deposited by the continental glaciers during the Pleistocene Epoch). The till deposits consist of clay with silt to boulder-size clasts of glacial origin up to 300 ft thick. Cretaceous-age, undifferentiated sediments underlie the till. Further discussion of the Cretaceous-aged sediments is in the following paragraph. The Precambrian-age Sioux Quartzite underlies the Cretaceous-age sediments to an unknown depth.

Review of the geology for McCook, Lake, Moody, Hanson, and Turner Counties indicates the likely presence of Cretaceous-age sand or sandstone water producing deposits. The Codell Sandstone Member (Codell Member) of the Carlile Shale has been previously identified within 5 miles of the Site, based on local well completion reports. The Codell Member consists of white to yellow-brown sandstone interbedded with siltstone and mudstone (Lindgren, 1993). Water produced from the Codell Member generally has high concentrations of sodium, sulfate, and dissolved solids (Hansen, 1986). Hardness is variable in the Codell Member (Hanson, 1986).

The underlying Sioux Quartzite is able to produce limited quantities of water when fractured. The uncemented sediments overlying the quartzite, known locally as the Quartzite Wash, are composed of fine to coarse, angular to sub-rounded, pink, quartzose sand, and is known to be interbedded with the Codell Member in southern Lake County (Hansen, 1986). Southern Lake County is immediately northeast of McCook County and the Quartzite Wash likely extends into McCook County. The extent of the Quartzite Wash has not been mapped specifically in McCook County. The Quartzite Wash is known to produce water with high concentrations of calcium, sulfate, bicarbonate, dissolved solids, and hardness (Hansen, 1986).

There are some stratigraphic differences in the three Site wells. For example, the sand in Well #1 is underlain by “blue clay,” and the lower sand in Wells 2 and 3 is underlain by Quartzite (logged as granite). There is not enough information to specifically name the sandy units described in the three well logs; therefore, LBG agrees with the SDGS designation of the target aquifer as undifferentiated Cretaceous sandstone.

Well completion reports and lithologic logs within 5 miles of the Site were reviewed for the presence of sand and sandstone layers with likely correlation to those identified in Well #3 (and likely Wells #1 and #2). Of the 42 wells reviewed, 21 contained sandy units that appeared at similar depths and with similar characteristics as the sandy units identified in the Site wells. The correlation indicates that the sandy units are regionally extensive.

Recharge to the sandy units likely consists of lateral movement from adjacent counties. Recharge likely also occurs as water moves vertically between the interbedded water bearing formations. Review of the lithologic log of Well #3 (ID 102N54W09CDDD) indicates the presence of greater than 200 feet of clay till overlying the Site aquifers and precludes direct recharge by surface water bodies or precipitation in the immediate vicinity of the Site. However, this clay may provide pumping induced recharge as Wells #1 through #3 are used.

3.0 WELL #1 AQUIFER TESTING

Step-rate and constant-rate aquifer tests were completed by pumping Well #1 from September 19, 2017 to September 21, 2017. Each test, along with other ancillary information pertaining to the test setup, monitoring, and analysis are discussed in this section. The wells were off for the entirety of the background and recovery monitoring periods, and only Well #1 was pumped during the pumping portion of the test.

3.1 Observation Well Network and Monitoring Equipment

A total of three wells were monitored during the aquifer testing, consisting of Well #1 (pumping well), and Wells #2 and #3 (observation wells). The radial distance between Well #1 and Wells #2 and #3 is 89 feet and 151 feet, respectively. A summary of the well information is provided in Table 1 and the locations are shown on Figure 2. Geologic logs for the three wells are provided in Appendix A.

3.2 Monitoring and Test Pumping Equipment

Each well was equipped with a data-logging pressure transducer (transducer) provided by LBG. Transducers were installed by LBG on September 8, 2017. The LBG transducers recorded water-levels continuously until transducer removal at the completion of the aquifer testing on September 25, 2017. The sample rate (rate at which the water-level is recorded) during the background period was 5 minutes, but was increased for the pumping and recovery period in Well #1 to 30 seconds and in Wells #2 and #3 to 1 minute.

Manual water-level measurements were collected multiple times per day in all wells to record water level fluctuations and to validate the transducer measurements. The manual measurements agreed with the transducer data, indicating that all transducers functioned properly.

Transducers provided by LBG were gauged, In-Situ brand, LevelTroll 700's with a pressure rating of 100 psig in Well #1 and 30 psig in Wells #2 and #3. Psig (pounds per square inch gauged) indicates that the transducers are vented and automatically compensate for changes in barometric pressure. Data from the transducers were downloaded manually periodically throughout the testing.

A submersible pump and motor (5-horsepower) was already installed in Well #1. Assistance with pump setting, wellhead connections, discharge piping, and electrical generator utilized to power the pump were provided by Putzke. The pump intake was installed at approximately 236 ft bgs. LBG provided the wellhead discharge assembly, flow control valves, an in-line totalizing flow meter (GPI, Series G2S15), and a sample port. Putzke also maintained the generator during the pumping portion of the aquifer testing. A pump was also in Well #2 during the aquifer test but was not used. There was no pump in Well #3.

3.3 Temporary Discharge and Temporary Use Permit

A temporary discharge permit was not required since the discharged water was pumped to one of the CAFO containment areas. Water was not discharged to the ground surface.

An application for the South Dakota Temporary Permit to Use Public Waters was submitted by LBG, on behalf of Pipestone, to the DENR. The temporary use permit was issued by the DENR on August 28, 2017.

3.4 Barometric Pressure, Temperature, and Precipitation

Barometric pressure and ambient air temperature were recorded throughout the aquifer testing period using an In-Situ BaroTroll data logger. Barometric pressure and temperature data are presented in Appendix B and were used when reviewing the qualitative data plots to determine if fluctuations in water levels were pumping-induced or were instead variations due to changes in barometric pressure or precipitation. Subtle variations are observed in the water level data and are a result of fluctuations in barometric pressure. A precipitation event occurred on September 19, 2017 and resulted in 0.4 inches of rain. However, given the confined nature of the tested aquifer, this precipitation event did not affect the test.

3.5 Aquifer Testing Discharge

Water pumped from Well #1 was diverted from the wellhead via a 2-inch flexible hose to a concrete containment area beneath one of the CAFO barns, located approximately 385 feet north-northwest of Well #1. Therefore, the discharged water was not anticipated to recharge the pumped aquifer.

3.6 Discharge Assembly and Flow Rate Measurements

LBG provided the wellhead discharge assembly, flow control valves, an in-line totalizing flow meter, and a sample port. The discharge flow rate from Well #1 during the aquifer test was measured and recorded using an inline totalizing flow meter (a 1.5-inch GPI Series G2S15) provided by LBG. The discharge assembly and appurtenances are shown in the photographs provided in Appendix C.

3.7 Step-Rate Testing

A step-rate test (step test) was conducted in the initial six hours of the aquifer test. The purpose of the step test was to evaluate the well capacity and to determine the rate at which the constant-rate test could be performed. The step test was performed by pumping Well #1 at three rates with a planned duration of two hours for each step. The step test was conducted on September 18, 2017, between 11:00 am and 5:00 pm, at rates of approximately 28 gpm, 45 gpm, and 63 gpm. After reviewing the initial 6-hours of test data in the field, it was determined that the constant-rate test could continue at the 63 gpm rate; therefore, the pumping portion of the aquifer test transitioned un-interrupted from the step test to the constant-rate test. Manual water-level measurements, pumping rate data, and drawdown versus time graphs are provided in Appendix D.

3.8 Constant-Rate Testing

The constant-rate test immediately followed the 6-hour step test and continued at 63 gpm for the remaining 70 hours until pumping shutdown at 3:00 pm on September 21, 2017. The total pumping duration of the aquifer test was 76 hours. There were no issues with the generator or pump and continuous and steady pumping rates were observed throughout the duration of the pumping portion of the aquifer test. Flow rate data from the totalizing flow meter are illustrated in Appendix D.

3.9 Qualitative Analysis

Drawdown in Well #1 at the end of each step was approximately 16.9 feet, 27.8 feet, and 39.7 feet, respectively. With flow rates of 28 gpm, 45 gpm, and 63 gpm, the calculated specific capacity for Steps 1, 2, and 3 was 1.65 gallons per minute per foot of drawdown (gpm/ft), 1.62 gpm/ft, and 1.58 gpm/ft, respectively. Decreasing specific capacity with time and increased pumping rate is expected. The maximum drawdown in Well #1 at the end of the constant-rate portion of the test was approximately 42.4 feet which, at 63 gpm, corresponds to a specific capacity of 1.48 gpm/ft. The maximum drawdown at the end of the constant-rate test in Wells #2 and #3 were approximately 9.6 ft and 6.8 ft, respectively.

A qualitative analysis of the aquifer test data was completed for all wells by evaluating the drawdown response in each of the three wells due to pumping in Well #1, to determine if drawdown occurred and to identify data for which a quantitative evaluation could be completed for the purpose of determining aquifer parameters. The plots were also reviewed to identify abnormal data resulting from natural background conditions, malfunctioning transducers, or aquifer boundary conditions. Aquifer response to pumping, barometric pressure response, distances from the pumping wells, and observation well construction were considered in the qualitative analysis. All three wells experienced water-level drawdown due to pumping from Well #1. Drawdown and recovery data versus time graphs are provided in Appendix D.

Water-level recovery data were collected both manually and with the transducers after the pumping portion of the aquifer test was completed. After approximately 1 hour of recovery, water-levels in Wells #1, #2, and #3 had reached approximately 90%, 60%, and 51%, respectively, of the pre-pumping static water levels. On September 25, 2017, when the transducers were removed from the wells, the water-levels in Wells #1, #2, and #3 had recovered to approximately 99%, 97%, and 96%, respectively, of static.

3.10 Constant-Rate Test – Quantitative Analysis

Aquifer parameters of T and S were determined by analyzing the drawdown versus time data using Aqtesolv for Windows Pro (Aqtesolv) (ver. 4.51). Based on the qualitative analyses, and assuming the required assumptions for the specific solutions were met, the Theis (1935) and Cooper-Jacob (1946) solutions for a confined aquifer were applied to the test data. The Theis Recovery (1935) solution and Agarwal recovery method was also applied to recovery data.

Given the short distance from Well #1 to Wells #2 and #3, partial penetration effects were considered and representative well construction details were included in the quantitative solutions. The results of the quantitative analysis are summarized in Table 2 and the quantitative plots are provided in Appendix E. Early and late time solutions were evaluated generally before and after 200 minutes into the test.

Values of T for the target aquifer in the vicinity of the Facility, as determined from the drawdown versus elapsed time analyses, range from approximately 530 to 1,800 ft²/day, with a

geometric mean of approximately 1,000 ft²/day. However, there is some variation in early versus late time results, with geometric means of approximately 710 and 1,380 ft²/day, respectively.

The S values determined from the Well #1 aquifer tests range from 2.4×10^{-7} to 1.8×10^{-4} , with a geometric mean of 2.4×10^{-5} . The ratio of S (calculated during pumping) to S' (calculated during recovery), for Wells #2 and #3, is provided in Table 2. Values of S/S' that are less than 1.0 indicate the presence of a negative boundary condition and values greater than 1.0 indicate the presence of a positive boundary condition. Although the early time results show S/S' values of approximately 4 to 4.6, their associated late time S/S' values are close to 1. This indicates that positive or negative boundaries were not encountered during the test and that the aquifer appears to be laterally extensive. However, once the CAFO is in production, long-term pumping may encounter aquifer boundaries (positive or negative) beyond the reach of the 76-hour test.

3.11 Future Drawdown Projections

Data from the Well #1 aquifer test was used to estimate long-term drawdown projections for Well #1 at the tested rate (63 gpm), lower rates of 33 gpm and 50 gpm, and a maximum demand rate of 100 gpm (Figure 3). Figure 3 illustrates that Well #1 could be pumped long-term at 33 gpm, 50 gpm, or the tested rate of 63 gpm for long durations; likely without concern of drawdown resulting in water-levels declining to the pump intake. Figure 3 also illustrates that Well #1 may be able to be pumped at the maximum demand of 100 gpm for shorter durations; such as, when Wells #2 and/or #3 have to be taken offline for service. However, Well #1 (or Wells #2 and #3) should not be used alone for long-term withdrawals as future drawdown may approach the recommended submergence level for the pump.

Drawdown was estimated assuming two wells or three wells pumping simultaneously to produce 100 gpm (two wells pumping 50 gpm or three wells pumping 33.3 gpm). Drawdown from Wells #2 and #3 was calculated using geometric mean values of 1,000 ft²/day for T and 2.4×10^{-5} for S. Several pumping scenarios were evaluated (Well #1 with Well #2, Well #1 with Well #3, Well #2 with Well #3, and all three wells). The results between the 2-well scenarios (Figure 4) and 3-well scenarios (Figure 5) are quite similar, with only subtle variations due to different distances between wells and distribution of pumping rates. However, all 3-well pumping scenarios result in the least amount of drawdown in each of the three wells. Although the

projections do not include positive or negative boundary conditions, the projections indicate that the aquifer source for the Site will likely sustain long-term withdrawals of 100 gpm.

4.0 WATER QUALITY SAMPLE ANALYTICAL RESULTS

A select list of water quality parameters was developed by Pipestone and LBG. Groundwater samples were collected from Well #1 on September 21, 2017; before the end of the test and analyzed for the select list of water quality parameters. The water quality analytical results are provided in Table 3. Water quality parameters collected in the field are provided in Table 4. A copy of the laboratory analytical report is provided in Appendix F.

The results from groundwater samples collected from Well #1 indicate that none of the analytes exceeded their respective Primary Maximum Contaminant Level (MCL). However, total dissolved solids (TDS), sulfate, iron, and manganese exceed their respective or Secondary MCL. All other sample results for Well #1 were either non-detect at the laboratory practical quantitation limit or below the respective Primary MCL or Secondary MCL. Additionally, coliform bacteria were absent.

5.0 SUMMARY, DISCUSSION AND CONCLUSIONS

The information discussed and the conclusions presented draw from LBG's interpretations of the hydrogeologic data obtained during this project.

- The results from the aquifer test indicate that Well #1 could be pumped at 63 gpm for the duration of the test, and could have likely pumped at a higher rate; potentially up to 100 gpm. However, for the test, the pump reached its maximum capacity and could not be increased.
- Influence from pumping was observed in all three Site wells indicating they are hydraulically connected and, therefore, will interfere with each other when pumped concurrently.
- Water levels recovered to near pre-pumping static conditions (greater than 90% recovery) within a similar duration as the pumping duration of the aquifer test.

- Review of the Site and regional hydrogeology indicates that the Site wells are likely completed in and receive water from laterally extensive interbedded sand and sandstone units referred to by the SDGS as undifferentiated Cretaceous sandstones.
- The groundwater sample collected from Well #1 indicates that TDS, sulfate, iron, and manganese exceed their respective Secondary MCL. All other sample results for Well #1 were either non-detect at the laboratory detection limit or below the respective Primary MCL or Secondary MCL. Additionally, coliform bacteria were absent.
- Boundary conditions (negative or positive) were not identified during the Well #1 aquifer test.
- Projected drawdown data indicates that long-term withdrawals of 100 gpm are likely sustainable when divided between two or three wells (50 gpm each or 33 gpm each, respectively). Short-term individual well yields of 100 gpm appear possible if other wells need to be taken offline for maintenance.
- The long-term projections assume that negative or positive boundary conditions are not encountered, and also assume the slope of the projected drawdown versus time curve remains consistent with the slope determined from the late-time aquifer test data (does not steepen in the future).
- The data from this project indicate that groundwater pumped from Well #1 (and, if needed, from Wells #2 and #3), could serve as an industrial water supply for the Facility.

6.0 RECOMMENDATIONS

These recommendations include actions designed to reduce the stress on the aquifer, increase the long-term sustainability of the industrial groundwater supply for Pipestone, as well as specific recommendations regarding short-term well maintenance.

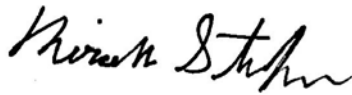
- Minimize the operation of only one well. Although each well is likely capable of providing 100 gpm for short durations, it is recommended that two or all three wells be pumped simultaneously to provide the water for the Facility. Operating the wells simultaneously will reduce the stress on the aquifer at each of the well locations and

reduce prolonged “resting periods” of unused wells which can lead to well-screen fouling that reduces well yield.

- Although long-term projections indicate an apparently sustainable groundwater source at the permit-requested volume, routine and long-term monitoring of the water-levels in the wells is recommended to monitor the response of the aquifer to long-term pumping.
- Maintain records of water levels, pumping rates, pumping schedules, well or pump maintenance, and well rehabilitation.
- Conduct a 1-hour specific capacity test in Wells #2 and #3 to be used as a baseline test to which all subsequent specific capacity tests will be compared. Allow for 24 hours of recovery between the tests to allow for aquifer recovery to static water-level conditions. The data for Well #1 presented in this report can be used as the baseline for Well #1.
- Perform a specific capacity test on each pumping well annually to monitor well performance, and to identify when well maintenance or rehabilitation would be beneficial. Generally, if a well’s specific capacity decreases by 25% or more, well maintenance or rehabilitation should be conducted.

This report was prepared by:

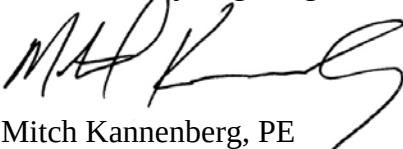
LEGGETTE, BRASHEARS & GRAHAM, INC.



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Mitch Kannenberg, PE
Associated Vice President

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TABLES

TABLE 1
PIPESTONE
PUMPING AND OBSERVATION WELL SUMMARY

Well ID	UTM Zone 14 NAD83 X (meters)	UTM Zone 14 NAD83 Y (meters)	Distance from Pumping Well #1 (meters)	Distance from Pumping Well #1 (feet)	Approximate Land Surface Elevation (feet)	Stickup (feet)	Approximate M.P. Elevation (feet)	Static Water Level (ft bgs)	Total Boring Depth (feet)	Well Diameter (inch)	Screen Slot Size (inch)	Screen Material	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	Date Drilled	Top of Aquifer (ft bgs)	Bottom of Aquifer (feet)	Date Transducer Installed	Date Transducer Removed	Transducer Sample Rate
Well #1	635602.9	4833854.4	0	0	1528	1.7	1529.7	135.0	284	5	0.025 mill slot	PVC	264	284	1,264.0	1,244.0	3/10/2017	260	284	9/8/2017	9/25/2017	0.5 minutes
Well #2	635603.1	4833827.2	27.2	89	1528	2.2	1530.2	137.1	300	5	0.025 mill slot	PVC	280	300	1,248.0	1,228.0	3/24/2017	271	300	9/8/2017	9/25/2017	1 minute
Well #3	635604.2	4833808.5	45.9	151	1528	1.3	1529.3	136.8	300	5	0.025 mill slot	PVC	273	300	1,255.0	1,228.0	7/21/2017	273	300	9/8/2017	9/25/2017	1 minute

Notes:
ft bgs: feet below ground surface
Locations surveyed September 2017
NAD83: North American Datum of 1983 (horizontal datum)

TABLE 2
PIPESTONE
SUMMARY OF AQUIFER PUMPING TEST RESULTS

Well	Distance to Pumped Well (ft)	Screen Interval (ft)	Aquifer Thickness (ft)	Transmissivity (ft ² /day)	Transmissivity (gpd/ft)	Storativity	S/S'	Method of Analysis
Well #1 Step Rate Test into Constant Rate Test: Pumping rates = 28 and 45 gpm each for 2 hours followed by 63 gpm for remainder of test out to 76 hours.								
Well #1	0	264-284	24	641	4,792	NV	NA	Confined Theis (early time)
				1,035	7,743	NV	NA	Confined Theis (late time)
				533	3,990	NV	NA	Confined Cooper-Jacob (early time)
				997	7,460	NV	NA	Confined Cooper-Jacob (late time)
				572	4,279	NV	NA	Confined Theis Recovery (early time)
				1,319	9,866	NV	NA	Confined Theis Recovery (late time)
				608	4,544	NV	NA	Confined Cooper-Jacob Agarwal Recovery (early time)
				1,210	9,049	NV	NA	Confined Cooper-Jacob Agarwal Recovery (late time)
Well #2	89	280-300	29	822	6,146	4.785E-05	NA	Confined Theis (early time)
				1,050	7,853	1.450E-05	NA	Confined Theis (late time)
				658	4,925	1.040E-04	NA	Confined Cooper-Jacob (early time)
				1,536	11,492	2.436E-07	NA	Confined Cooper-Jacob (late time)
				704	5,262	NA	4.6	Confined Theis Recovery (early time)
				1,577	11,798	NA	1.121	Confined Theis Recovery (late time)
				728	5,442	1.078E-04	NA	Confined Cooper-Jacob Agarwal Recovery (early time)
				1,515	11,330	3.101E-07	NA	Confined Cooper-Jacob Agarwal Recovery (late time)
Well #3	151	273-300	27	779	5,827	1.782E-04	NA	Confined Theis (early time)
				1,461	10,929	1.390E-05	NA	Confined Theis (late time)
				864	6,463	1.499E-04	NA	Confined Cooper-Jacob (early time)
				1,606	12,016	5.580E-06	NA	Confined Cooper-Jacob (late time)
				869	6,501	NA	3.969	Confined Theis Recovery (early time)
				1,801	13,468	NA	1.085	Confined Theis Recovery (late time)
				882	6,597	1.494E-04	NA	Confined Cooper-Jacob Agarwal Recovery (early time)
				1,755	13,125	2.195E-06	NA	Confined Cooper-Jacob Agarwal Recovery (late time)
			min =	533	3,990	2.436E-07	1.085	
			max =	1,801	13,468	1.782E-04	4.600	
			geometric mean =	991	7,410	2.416E-05	2.171	
			geometric mean (early time) =	712	5,326	1.135E-04	4.273	
			geometric mean (late time) =	1,378	10,311	2.390E-06	1.103	

NOTES:

ft: feet
ft²/day: feet squared per day
gpd: gallons per day
gpm: gallons per minute
S/S': the ratio of storativity during pumping to storativity during recovery. Values < 1 indicate a negative boundary. Values > 1 indicate a positive boundary.
Values in italics are questionable.

NA: Not applicable
NV: not valid

TABLE 3
PIPESTONE
WATER QUALITY ANALYTICAL RESULTS

Analyte	Units	MCL	Secondary MCL	Well #1
				9/21/2017
Conductivity	umhos/cm			2,040
Total Dissolved Solids	mg/L		500	1,500
pH	s.u.			
Total Suspended Solids (TSS)	mg/L			<10.0
Alkalinity, Total as CaCO ₃	mg/L			339
Bicarbonate	mg/L			414
Carbonate	mg/L			0
Chloride	mg/L		250	11.4
Sulfate	mg/L		250	846
Fluoride	mg/L	4.0	2.0	0.434
Hardness	grains/gal			47.9
Organic Carbon, Total (TOC)	mg/L			1.58
Nitrogen, Ammonia (NH ₃)	mg/L			0.748
Nitrogen, Nitrate (NO ₃)	mg/L	10.0		<0.05
Nitrogen, Nitrite (NO ₂)	mg/L	1.0		<0.05
Calcium (Dissolved)	mg/L			232
Magnesium (Dissolved)	mg/L			58.5
Potassium (Dissolved)	mg/L			15.1
Sodium (Dissolved)	mg/L			144
Arsenic (Total)	mg/L	0.01		0.008
Barium (Total)	mg/L	2		0.009
Chromium (Total)	mg/L	0.1		<0.001
Iron (Total)	mg/L		0.3	1.74
Manganese (Total)	mg/L		0.05	2.16
Selenium (Total)	mg/L	0.05		<0.005
Uranium	mg/L	0.03		0.002
Gross Alpha	pCi/L	15		3.50
Gross Beta	pCi/L	50		15.6
Radium-226	pCi/L	5.0		1.14
Radium-228	pCi/L	5.0		1.31
Combined Radium-226 & Radium-228	pCi/L	5.0		2.45
E Coli	Presence or Absence	5%		Absent
Total Coliform Bacteria	Presence or Absence	5%		Absent

NOTES:

umhos/cm: micro Mhos per centimeter

s.u.: standard units

MCL: Maximum Contaminant Level

mg/L: milligrams per liter

grains/gal: grains per gallon

pCi/L: picoCuries per liter

Red highlighted cells indicate exceedances over the Primary or Secondary MCL

The 50 pCi/L for Gross Beta is a screening level that, if exceeded, warrants further evaluation of potential exposure to beta particles, and is not an MCL.

TABLE 4
PIPESTONE
WELL #1 FIELD WATER QUALITY RESULTS

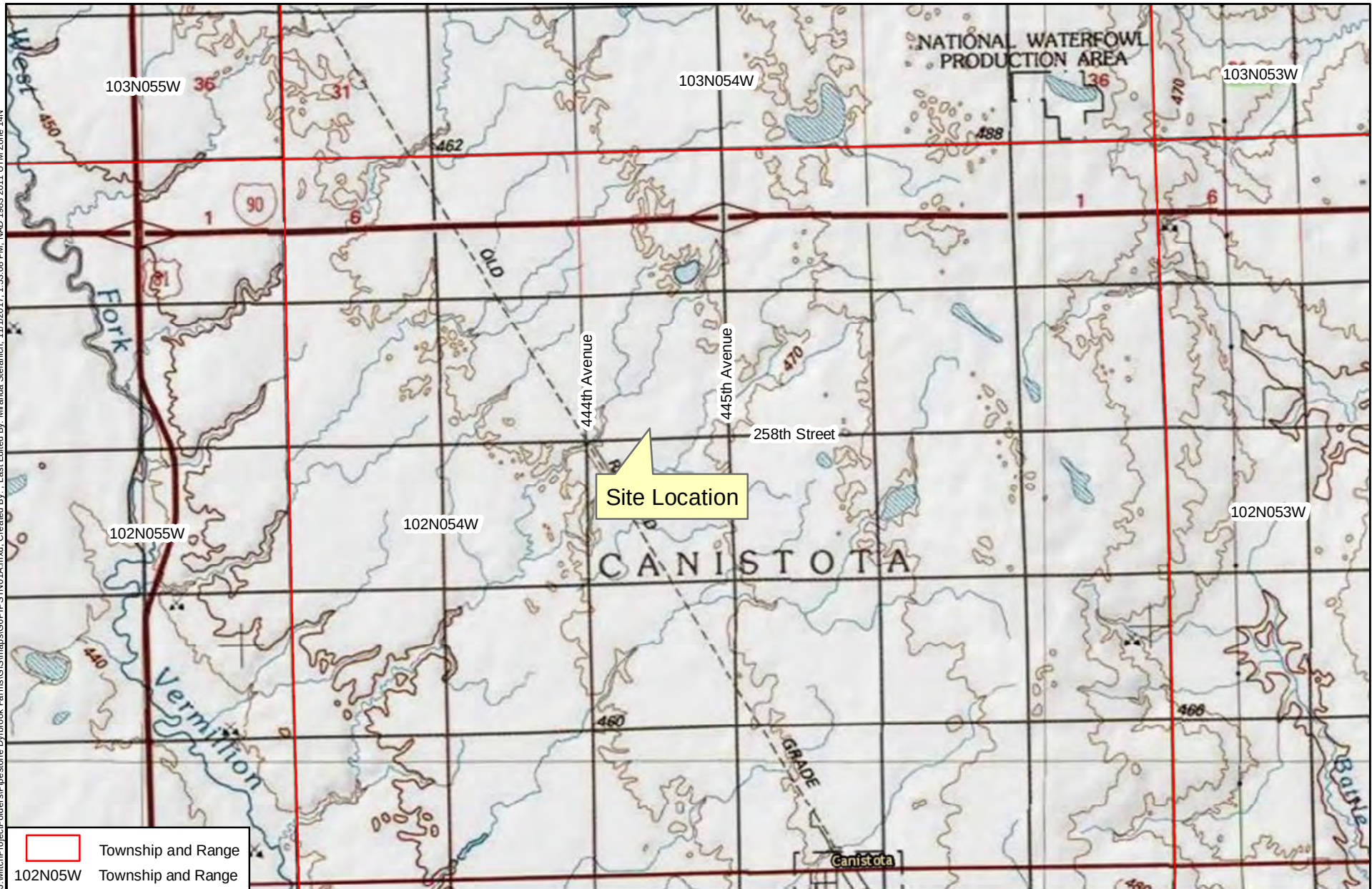
Date	Time	Temperature (°C)	Conductivity (µmhos/cm)	Dissolved Oxygen (mg/L)	pH (SU)	ORP (mV)	Back Pressure (psi)
9/18/2017	14:29	10.79	1977	1.25	7.22	-33.6	
9/18/2017	15:34	9.88	1985	0.83	7.46	-59.9	18.5
9/18/2017	16:46	9.84	1983	1.02	7.57	-63.7	
9/18/2017	17:07						18.5
9/18/2017	18:00	9.81	1982	0.88	7.48	-56.3	18.5
9/18/2017	19:09	9.74	1979	0.85	7.59	-54.4	18.5
9/18/2017	20:14	9.69	1976	0.73	7.65	-53.7	18.5
9/18/2017	21:28	9.89	1976	0.96	7.81	-53.0	18.5
9/18/2017	22:13	9.86	1972	1.18	7.96	-50.9	18.5
9/18/2017	23:18	9.85	1972	1.29	8.05	-53.1	18.5
9/19/2017	0:29	9.91	1970	0.88	8.03	-50.6	18.5
9/19/2017	1:20	9.94	1968	0.65	8.05	-46.3	18.5
9/19/2017	2:26	10.01	1966	0.93	8.11	-47.1	18.0
9/19/2017	3:30	10.00	1966	0.82	8.17	-48.8	18.0
9/19/2017	4:25	10.03	1965	0.89	8.28	-49.3	18.0
9/19/2017	5:38	10.02	1964	0.70	8.39	-49.9	18.0
9/19/2017	6:22	10.04	1968	0.93	8.46	-52.8	18.0
9/19/2017	8:01	10.21	1962	0.96	8.58	-53.8	17.0
9/19/2017	9:04	9.92	1968	0.54	8.50	-55.2	17.0
9/19/2017	10:19	10.29	1965	0.58	8.46	-54.0	17.0
9/19/2017	11:21	10.16	1965	0.53	8.40	-55.0	16.5
9/19/2017	12:28	10.32	1968	0.43	8.21	-53.1	16.5
9/19/2017	13:37	10.97	1968	0.46	8.07	-55.0	16.5
9/19/2017	14:35	10.10	1968	0.45	8.01	-55.3	16.5
9/19/2017	15:40	10.65	1971	0.47	8.00	-56.2	16.5
9/19/2017	16:36	10.25	1972	0.42	7.93	-57.0	16.5
9/19/2017	17:35	10.32	1967	0.49	8.01	-57.5	16.5
9/19/2017	18:31	10.43	1971	0.52	8.07	-57.6	16.5
9/19/2017	20:08	10.06	1969	0.97	8.11	-55.2	16.0
9/19/2017	20:49	10.18	1965	1.01	8.41	-30.5	
9/20/2017	0:22	9.95	1943	1.06	8.65	-47.5	16.0
9/20/2017	1:03	10.12	1951	0.89	8.53	-46.2	16.0
9/20/2017	2:06	10.03	1948	0.98	8.48	-48.9	16.0
9/20/2017	3:03	9.86	1942	1.11	8.53	-49.0	16.0
9/20/2017	4:02	9.75	1935	1.03	8.59	-49.5	16.0
9/20/2017	5:00	9.81	1933	1.07	8.42	-45.6	16.0
9/20/2017	6:20	9.69	1932	0.41	8.46	-42.5	16.0
9/20/2017	9:26	9.74	1930	0.50	8.68	-45.8	16.0
9/20/2017	13:27	10.00	1923	0.45	8.55	-43.5	16.0
9/20/2017	17:31	10.00	1937	0.43	7.85	-47.0	16.0
9/20/2017	20:18	9.74	1934	0.80	8.69	-51.0	16.0
9/20/2017	21:12	9.68	1934	0.93	8.57	-50.8	16.0
9/20/2017	22:01	9.72	1936	1.08	8.62	-49.7	16.0
9/20/2017	23:06	9.70	1935	0.90	8.65	-51.3	16.0
9/21/2017	0:20	9.67	1938	1.01	8.59	-52.8	16.0
9/21/2017	1:02	9.65	1941	0.89	8.60	-51.6	16.0
9/21/2017	2:03	9.62	1936	0.96	8.61	-50.9	16.0
9/21/2017	3:05	9.68	1937	0.97	8.59	-50.2	16.0
9/21/2017	4:03	9.62	1940	1.05	8.58	-50.7	16.0
9/21/2017	5:50	9.67	1940	1.18	8.60	-49.3	16.0
9/21/2017	7:15						
9/21/2017	9:17	9.86	1934	0.54	8.70	-45.3	16.5
9/21/2017	10:28	10.01	1931	0.69	8.57	-46.3	16.5
9/21/2017	11:12	10.03	1933	0.51	8.52	-50.6	16.0
9/21/2017	12:20	10.18	1934	0.66	8.42	-49.9	16.5
9/21/2017	13:13	10.09	1936	0.50	8.33	-49.0	16.0
9/21/2017	14:16	10.23	1934	0.50	8.17	-46.2	16.0

NOTES:

µmhos/cm: micro mhos per centimeter
 oC: degrees Celsius
 mg/L: milligrams per liter
 SU: standard units
 mV: milli volts
 psi: pounds per square inch

FIGURES

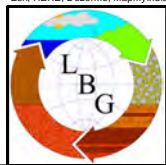
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 Township and Range
102N05W Township and Range



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(605) 334-6000

PIPESTONE - DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA

SITE LOCATION

J:\Mitch\Project\Folders\Pipestone Dylbrook Farms\GIS\maps\G6PIPSTN01B.mxd, Created By: , Last Edited By: Miranda Stefanich, 11/1/2017, 1:54:39 PM, NAD 1983 2011 UTM Zone 14N

- Observation Well
- Pumping Well
- Discharge Point
- Section Lines

102N054W9 Township, Range, and Section

102N054W8

102N054W9

Discharge Point

Well 1

Well 2

Well 3

258th Street

444th Avenue

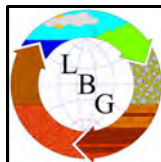
102N054W17

102N054W16

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



0 500 Feet



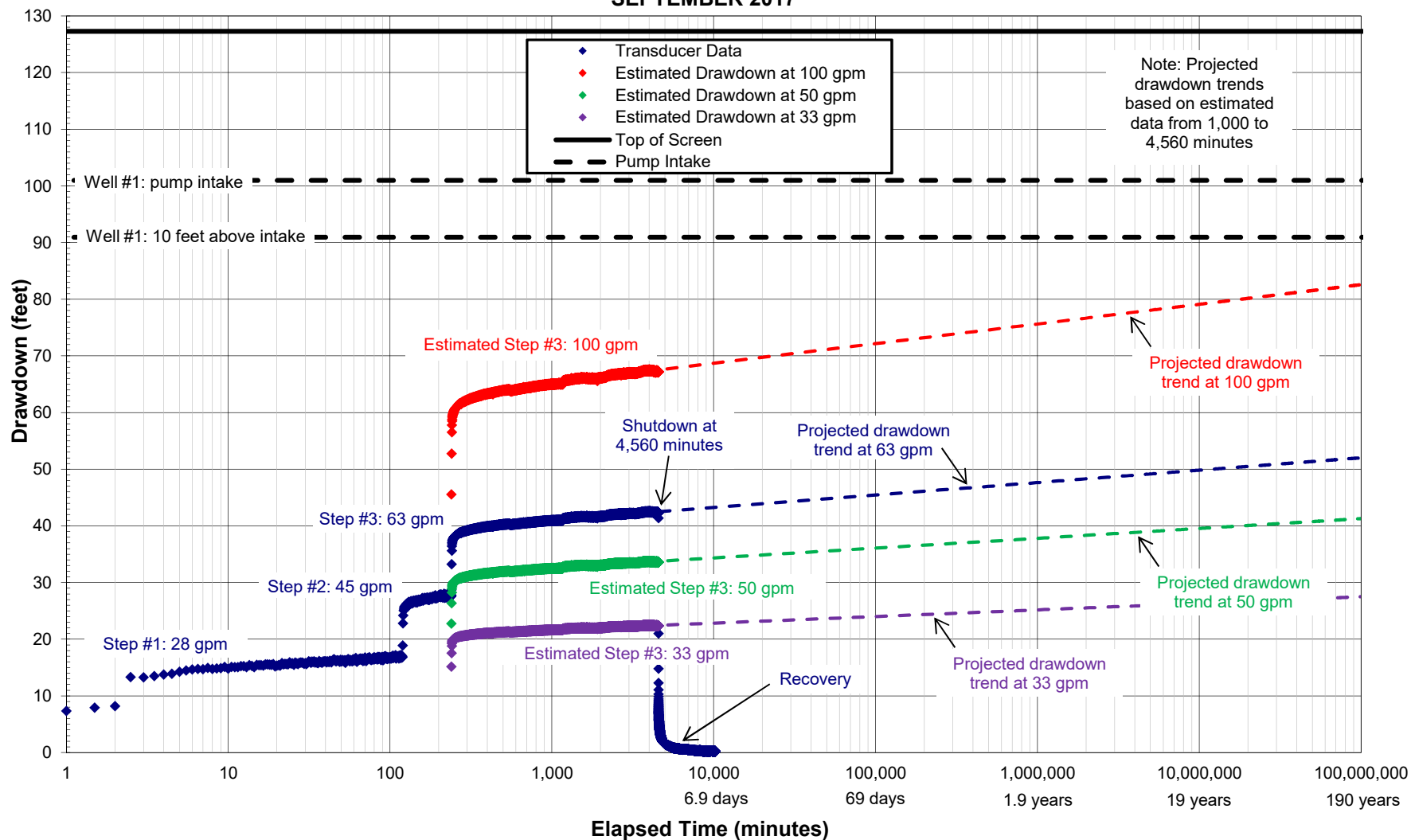
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PIPESTONE - DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA

WELL LOCATIONS

Path: J:\Mitch\Project\Folders\Pipestone Dylbrook Farms\GIS\maps\G6PIPSTN01B.mxd Date: 11/1/2017 FIGURE: 2

**WELL #1 - (SEMI-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**



**Figure 3
Long-Term Projection - Well #1**

**WELLS #1, #2, #3 (SEMI-LOG)
PIPESTONE - DYLBROOK FARMS
PROJECTED DRAWDOWNS
TWO-WELL SCENARIOS**

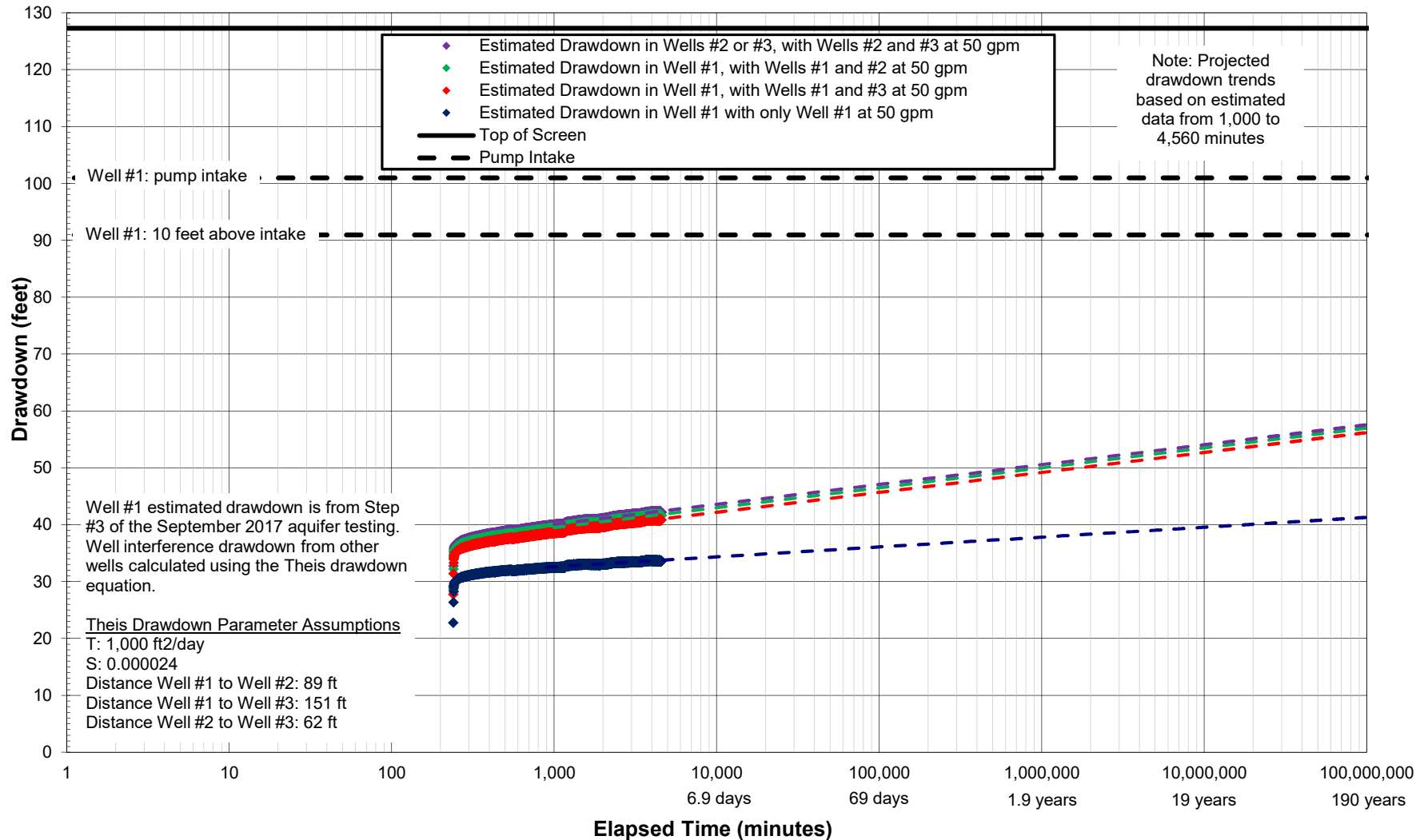


Figure 4
Well Interference & Combined Drawdown Projections (Two-Well Scenarios)

**WELLS #1, #2, #3 (SEMI-LOG)
PIPESTONE - DYLBROOK FARMS
PROJECTED DRAWDOWNS
THREE-WELL SCENARIOS**

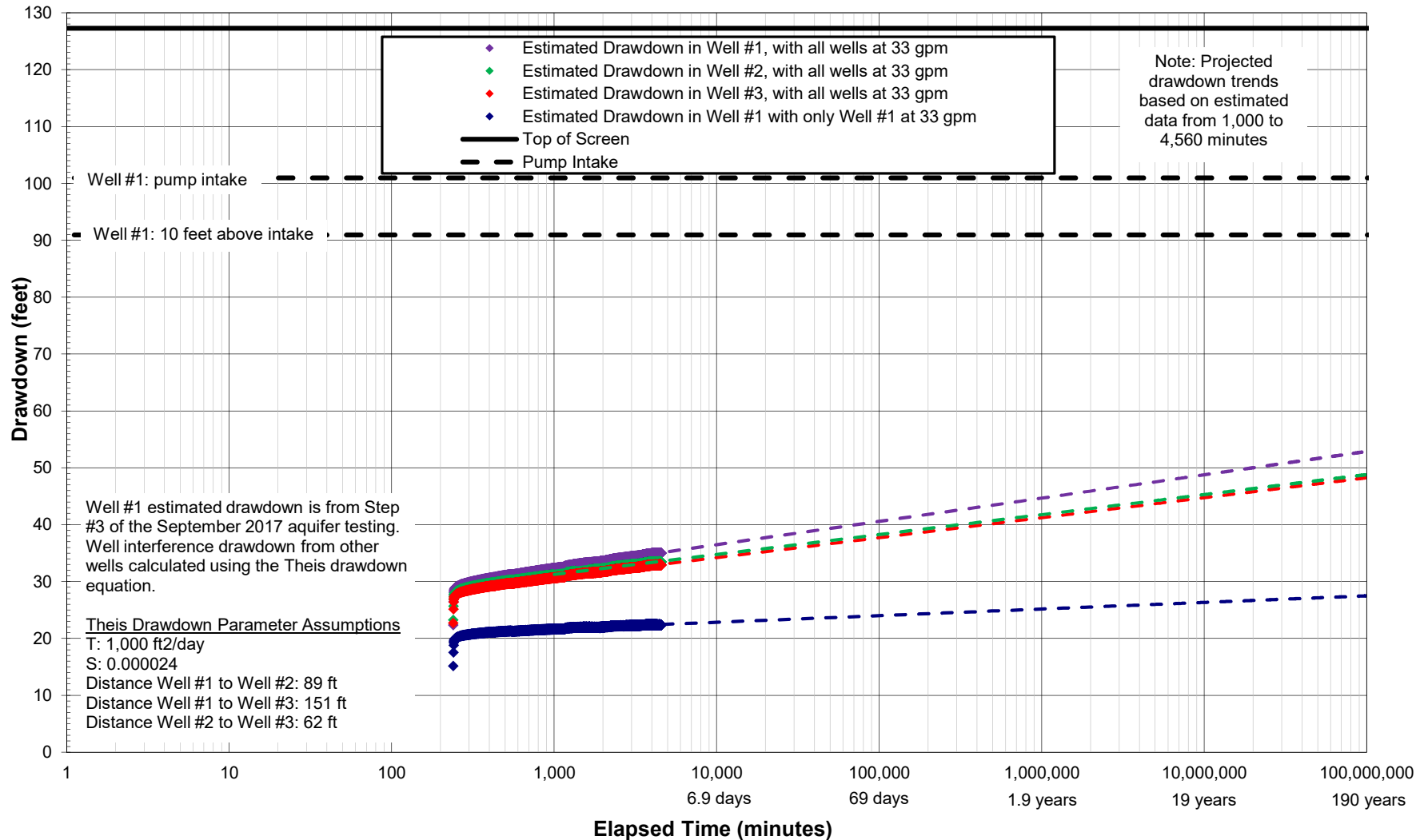


Figure 5
Well Interference & Combined Drawdown Projections (Three-Well Scenarios)

APPENDIX A

Wells #1, #2, and #3 Geologic Logs

Lot 7 of

8280-3 (1)

Dylbrook Addition

SOUTH DAKOTA WATER WELL COMPLETION REPORT

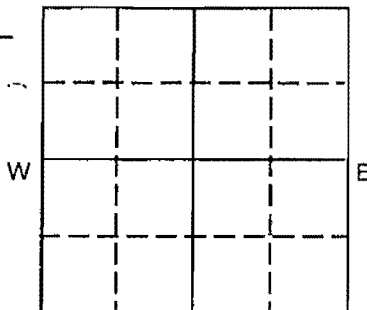
11-02

Location 1/4 SW 1/4 Sec 9 Twp 102N Rg 54W Well Owner:

County McCook

North

Please mark well location with an "X"



Well completion Date

3-10-17

1 Mile

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)

? ft. from NONE (identify source)

PROPOSED USE:

☒ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring well

METHOD OF DRILLING:

Rotary

CASING DATA:

☐ Steel ☒ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
<u>250 LB/FT</u>	<u>5 IN</u>	<u>0 FT</u>	<u>284 FT</u>	<u>8 3/4 IN</u>
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
<u>Grout DF</u>	<u>25</u>	<u>Lb/gal</u>	<u>0 Ft</u>	<u>250 Ft</u>
		<u>Lb/gal</u>	<u>Ft</u>	<u>Ft</u>

Describe grouting procedure 1" trimix line pumped w/ grout machine

SCREEN:

☐ Perforated pipe ☒ Manufactured

Diameter 5 Inches Length 20 Feet

Material Plastic

Slot Size 25 Set From 264 Feet to 284 Feet

Other information gravel pack

WAS A PACKER OR SEAL USED?

☐ Yes ☐ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☒ Yes, How?

5 gallons of chlorine pumped

Lab sample sent to for water quality analysis ☐ No, Why Not?

Business Name:

Address:

City, State, Zip:

Dylbrook Farms RE LLC
44448-258th Street
Canistota, SD 57012

WELL LOG:

DEPTH

FORMATION

FROM

TO

<u>Top Soil</u>	<u>0</u>	<u>2</u>
<u>Yellow clay</u>	<u>2</u>	<u>166</u>
<u>Blue clay</u>	<u>166</u>	<u>260</u>
<u>Coarse Sand</u>	<u>260</u>	<u>284</u>
<u>Blue clay</u>	<u>284</u>	

STATIC WATER LEVEL

136

FEET

If flowing: closed in pressure

PSI

GPM flow

through

Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced flow rate

GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped Describe:

AIR

☐ Bailed

☐ Other

Pumping Level Below Land Surface

Ft. After

Hrs. pumped

GPM

Ft. After

Hrs. pumped

GPM

If pump installed, pump rate:

GPM

REMARKS

220' 50 gpm

RECEIVED

APR - 3 2017

Plastic on series: Unknown?

WATER RIGHTS PROGRAM

This well was drilled under license #

439

And this report is true and accurate.

Drilling firm:

Dave Putzke well Drilling & repair Inc

Signature of License Representative:

Dave Putzke

Signature of Well Owner or Equitable Property Holder:

Date:

523 E Capitol Ave.

Pierre SD 57501

Please return WHITE COPY to: DENR Water Rights

Lot I of
Dylbrook Addition

SOUTH DAKOTA WATER WELL COMPLETION REPORT

8280-3

(2)

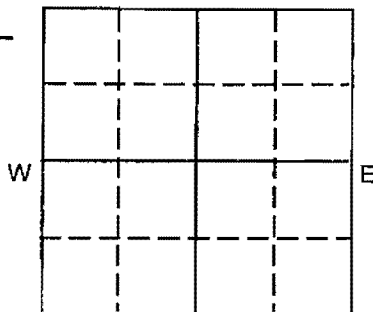
11-02

Location 1/4 SW 1/4 Sec 9 Twp 102N Rg 54

County McCook

North

Please mark well location with an "X"



Well completion Date

3-24-17

1 Mile

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)

? ft. from None (identify source)

PROPOSED USE:

☒ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring

well

METHOD OF DRILLING:

Rotary

CASING DATA:

☐ Steel ☒ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
250 LB/FT	5 IN	0 FT	300 FT	8 3/4 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
Grout DE	26	Lb/gal	0 Ft	260 Ft
		Lb/gal	Ft	Ft

Describe grouting procedure 1" Trimec liner pumped w/ Grout machine

SCREEN:

☐ Perforated pipe ☒ Manufactured

Diameter 5 Inches Length 20 Feet

Material Plastic

Slot Size 25 Set From 280 Feet to 300 Feet

Other information gravel pack

WAS A PACKER OR SEAL USED?

☐ Yes ☐ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☒ Yes, How?

5 gallons of chlorine pumped

☐ No, Why Not?

Lab sample sent to for water quality analysis

Well Owner:

Business Name: Dylbrook Farms RE LLC

Address: 44448 - 258th Street

City, State, Zip: Canistota S.D 57012

WELL LOG:

DEPTH

FORMATION

FROM

TO

Top Soil

0

2

Yellow clay

2

70

Blue clay

70

271

Coarse sand

271

300

Granite

300

STATIC WATER LEVEL

136

FEET

If flowing: closed in pressure

PSI

GPM flow

through

Inch pipe

Controlled by

☐ Valve

☐ Reducers

☐ Other

Reduced flow rate

GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped

Describe:

AIR

☐ Bailed

☐ Other

Pumping Level Below Land Surface

Ft. After

Hrs. pumped

GPM

Ft. After

Hrs. pumped

GPM

If pump installed, pump rate:

GPM

REMARKS

220' 50 gpm

RECEIVED

APR - 3 2017

WATER RIGHTS PROGRAM

This well was drilled under license #

439

And this report is true and accurate.

Drilling firm: Dave Putzke Well Drilling & Repair, Inc

Signature of License Representative:

Dave Putzke

Signature of Well Owner or Equitable Property Holder:

Date:

523 E Capitol Ave.

Pierre SD 57501

Please return WHITE COPY to:

DENR Water Rights

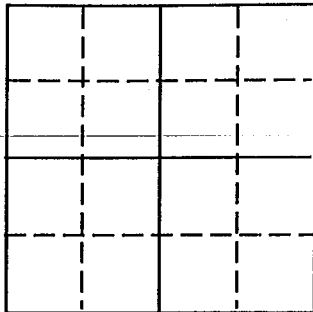
SOUTH DAKOTA WATER WELL COMPLETION REPORT

3rd well
11-02

Location 1/4 SW 1/4 Sec 9 Twp 102 N Rg 54

County McCook

North



Please mark well location with an "X"

Well completion Date 7-21-17

1 Mile

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)

? None ft. from None (identify source)

PROPOSED USE:

- ☐ Domestic/Stock
☐ Irrigation
☐ Municipal
☐ Industrial
☐ Business
☐ Institutional
☐ Test Holes
☐ Monitoring well

METHOD OF DRILLING:

Rotary

CASING DATA:

- ☐ Steel
☒ Plastic
☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
<u>250 LB/FT</u>	<u>5 IN</u>	<u>0 FT</u>	<u>300 FT</u>	<u>8 3/4 IN</u>
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
<u>Grout DF</u>	<u>26</u>	<u>Lb/gal</u>	<u>0 Ft</u>	<u>260 Ft</u>
		Lb/gal	Ft	Ft

Describe grouting procedure 1" trimix line Pumped w/ Grout machine

SCREEN:

- ☐ Perforated pipe
☒ Manufactured

Diameter 5 Inches Length 27 Feet

Material Plastic

Slot Size 25 Set From 273 Feet to 300 Feet

Other information gravel pack

WAS A PACKER OR SEAL USED?

- ☐ Yes
☒ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

- ☐ Yes, How?
☐ No, Why Not?

Lab sample sent to for water quality analysis

5 gallons of Chlorine Pumped

Well Owner:

Business Name: Dy1brook Farms

Address: W 4448 - 258th Street

City, State, Zip: Cambria S.D 57012

WELL LOG:

DEPTH

FORMATION	FROM	TO
<u>TOP Soil</u>	<u>0</u>	<u>2</u>
<u>yellow clay</u>	<u>2</u>	<u>70</u>
<u>Blue clay</u>	<u>70</u>	<u>273</u>
<u>Coarse Sand - Chalk Sandstone</u>	<u>273</u>	<u>300</u>
<u>Granite</u>	<u>300</u>	

STATIC WATER LEVEL

136

FEET

If flowing: closed in pressure

PSI

GPM flow through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced flow rate _____ GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped Describe: AIR

☐ Bailed

☐ Other

Pumping Level Below Land Surface

_____ Ft. After _____ Hrs. pumped _____ GPM

_____ Ft. After _____ Hrs. pumped _____ GPM

If pump installed, pump rate: _____ GPM

REMARKS

220

50 gpm

? W/R

This well was drilled under license # L/39

And this report is true and accurate.

Drilling firm: Dave Putke well Drilling & repair, Inc

Signature of License Representative:

Dave Putke

RECEIVED

Signature of Well Owner or Equitable Property Holder:

AUG 02 2017

WATER RIGHTS PROGRAM

Date:

Please return WHITE COPY to: DENR Water Rights

523 E Capitol Ave. Pierre SD 57501

Location Information

Legal Location: SE SE SE SW SEC. 09, T. 102 N., R. 54 W.

County: MCCOOK

Hydrologic Unit Code:

Land Owner:

Location: 102N54W09CDDD

Latitude: 43.644920

Longitude: -97.318381

Ground Surface Elevation: 1527 T

Project Information

Project: Dylbrook Farms

Drill Date: 7/19/2017

Company: PUTZKE WELL DRILLING

Drilling Method: ROTARY

Test Hole Number: #3

Geologist: L. SCHULZ

Geologist's Log: ☒

Driller:

Driller's Log: ☐

Total Drill Hole Depth (ft): 300.0

Well Information

SDGS Well Name:

Water Rights Well:

Other Well Name:

Casing Type:

Screen Type:

Total Casing and Screen (ft):

Aquifer:

Management Unit:

Casing Top Elevation:

Casing Diameter (in):

Screen Length (ft):

Casing Stick-up (ft):

Geophysical Information

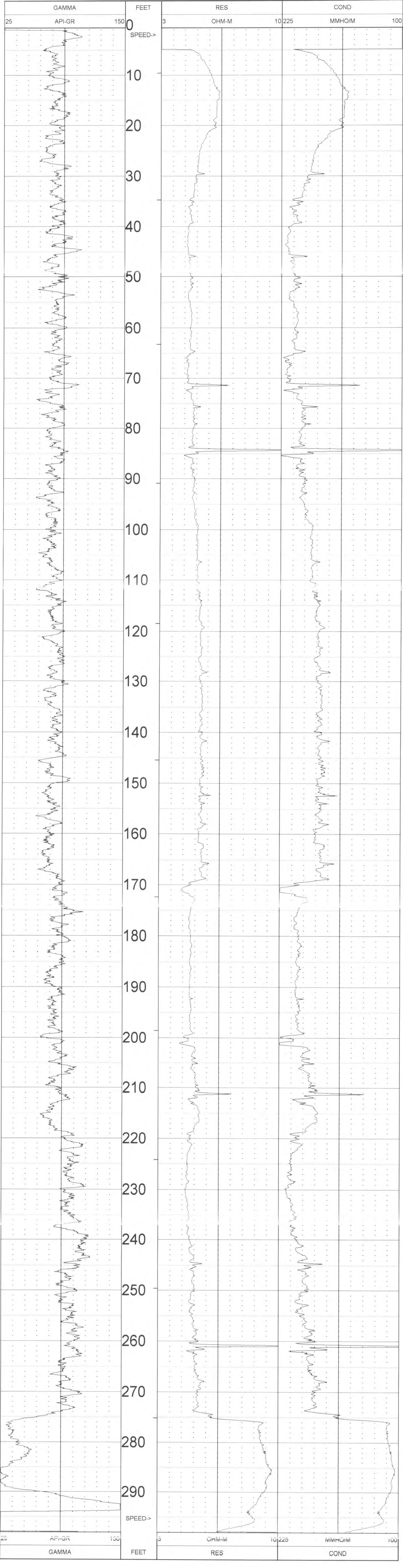
☒ E-Log Available

TEST HOLE WAS DRILLED TO DETERMINE THE FORMATIONS ENCOUNTERED IN PREVIOUSLY DRILLED WELLS ON THE PROPERTY.

<u>Elevation (ft)</u>	<u>Depth (ft)</u>	<u>Description</u>
1527 - 1502	0 - 25	CLAY, LIGHT-OLIVE-BROWN, SILTY, SANDY, PEBBLY; OXIDIZED (TILL)
1502 - 1360	25 - 167	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED, NO BREAK IN LITHOLOGY WAS NOTED IN CUTTINGS, INTERVAL DETERMINED FROM E-LOG (TILL)
1360 - 1264	167 - 263	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED; SOME SAND AND GRAVEL LENSES, POSSIBLE SECOND TILL SHEET? (TILL)
1264 - 1253	263 - 274	SILTSTONE, BLACK, HARD, MUCH DRILL CHATTER; SOME WHITE CHALK IN CUTTINGS (CRETACEOUS UNDIFFERENTIATED SEDIMENTS)

1253 - 1246	274 - 281	SANDSTONE, BROWN TO WHITE, FINE TO VERY FINE GRAINED; SOME FINE PINK SAND IN DRILLING MUD (CRETACEOUS UNDIFFERENTIATED SANDSTONE-EMBAYMENT DEPOSIT)
1246 - 1243	281 - 284	CLAY, BLACK, ORGANIC, MUCH VERY FINE LIGHT-PINK SAND IN MATRIX (CRETACEOUS UNDIFFERENTIATED)
1243 - 1227	284 - 300	SANDSTONE, CLEAR TO LIGHT PINK, FINE TO VERY FINE GRAINED, SOMEWHAT FRIABLE; DRILLED FAIRLY EASY (CRETACEOUS UNDIFFERENTIATED-SANDSTONE)
1228 - 1227	299 - 300	QUARTZITE, VERY HARD LAYER, DID NOT PENETRATE, PSUEDO END DEPTH (SIOUX QUARTZITE)

South Dakota Geological Survey		DYL BROOK FARMS	
COMPANY	: SDGS	OTHER SERVICES: NONE NONE NONE	
WELL	: DYL BROOK FARMS		
FIELD	:		
COUNTY	: MCCOOK		
STATE	: SD		
LOCATION	: 102N54W09CDDD		
SECTION	: 09		
TOWNSHIP	: 102N		
RANGE	: 54W		
API NO.	:		
UNIQUE WELL ID	:		
PERMANENT DATUM	: GRND	ELEVATION KB	: NONE
LOG MEASURED FROM:	GRND	ELEVATION DF	: NONE
DRL MEASURED FROM:	GRND	ELEVATION GL	: 1527
DATE	: 07/9/17	RIG NUMBER	:
DEPTH DRILLER	: 300	LOGGER TD	:
BIT SIZE	: 4.75	ARRIVAL TIME	:
LOG TOP	: 0.57	DEPARTURE TIME:	
LOG BOTTOM	: 298.06	CIRC STOPPED : NONE	
CASING OD	: 0		
CASING BOTTOM	: NONE		
CASING TYPE	: NONE		
BOREHOLE FLUID	: MUD		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	: 0		
WITNESSED BY	: D. PUTZKE		
RECORDED BY	: L. SCHULZ		
REMARKS 1	: NONE		
REMARKS 2	: NONE		
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS			



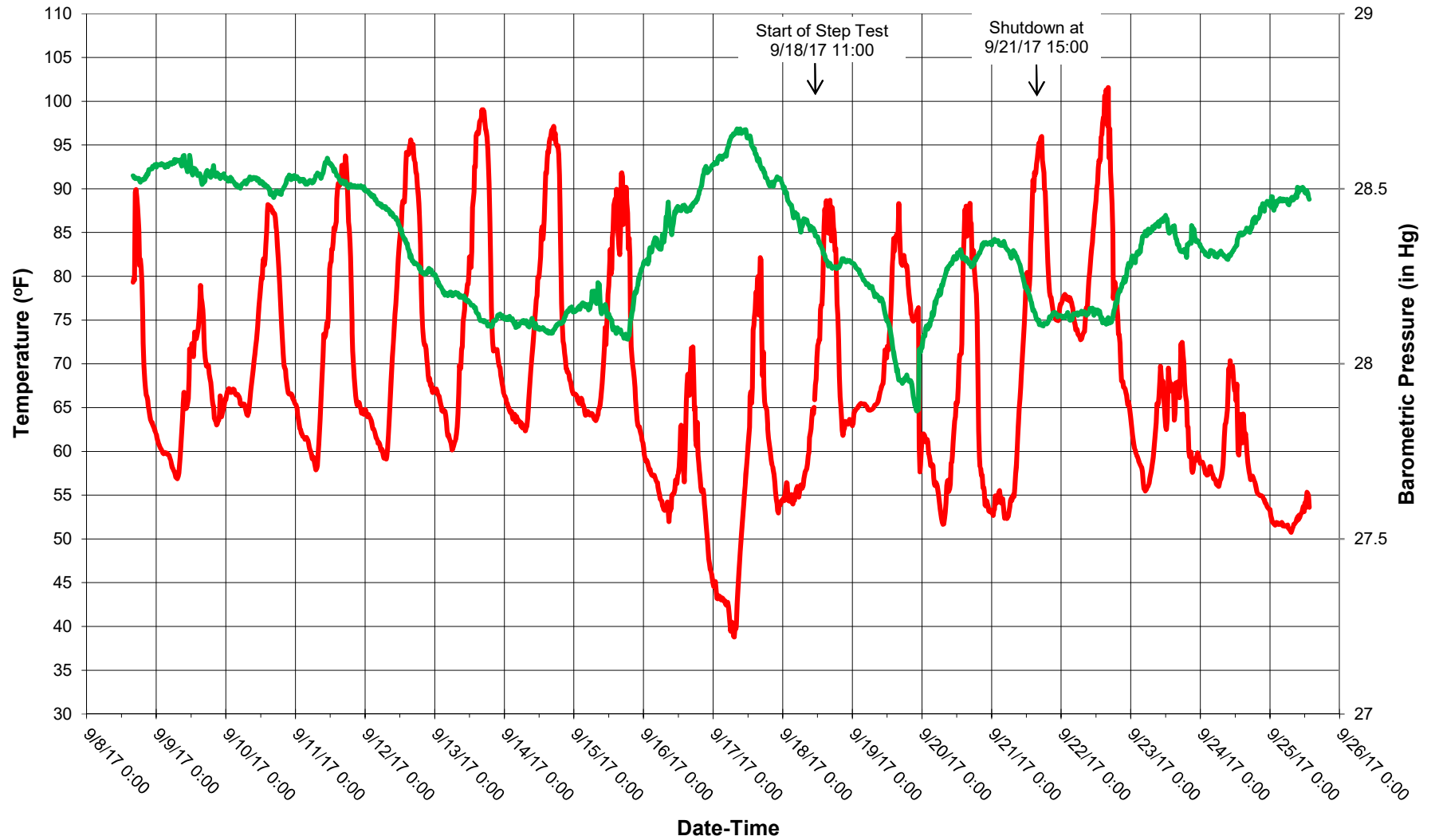
APPENDIX B

Temperature and Barometric Pressure

**BAROMETRIC PRESSURE VS. TEMPERATURE
PIPESTONE - DYLBROOK FARMS**

SEPTEMBER 2017

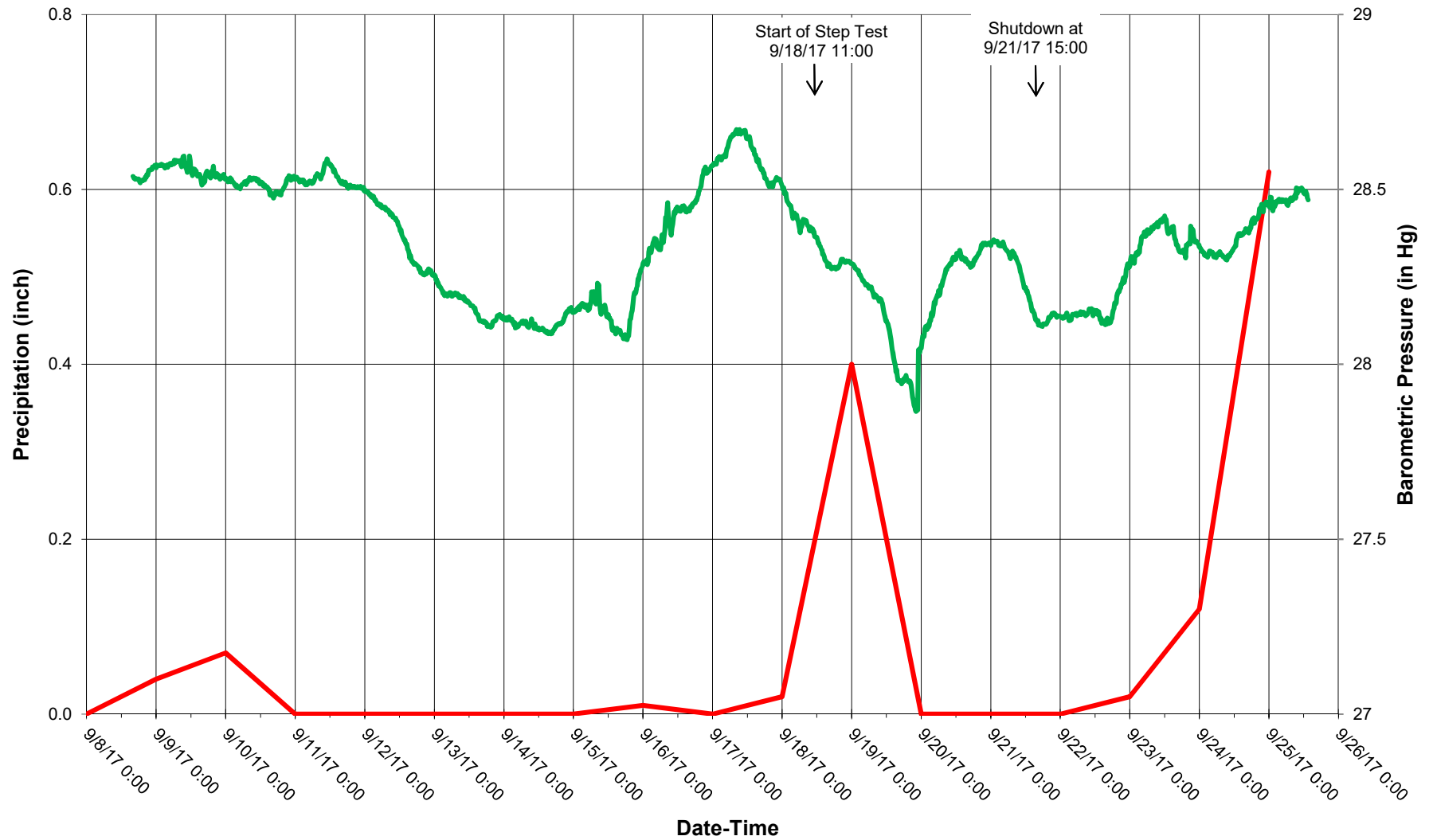
— Temperature
— Barometric Pressure



**BAROMETRIC PRESSURE VS. PRECIPITATION
PIPESTONE - DYLBROOK FARMS**

SEPTEMBER 2017

Precipitation
Barometric Pressure



APPENDIX C

Photographs

PIPESTONE – DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA

PHOTOGRAPHS

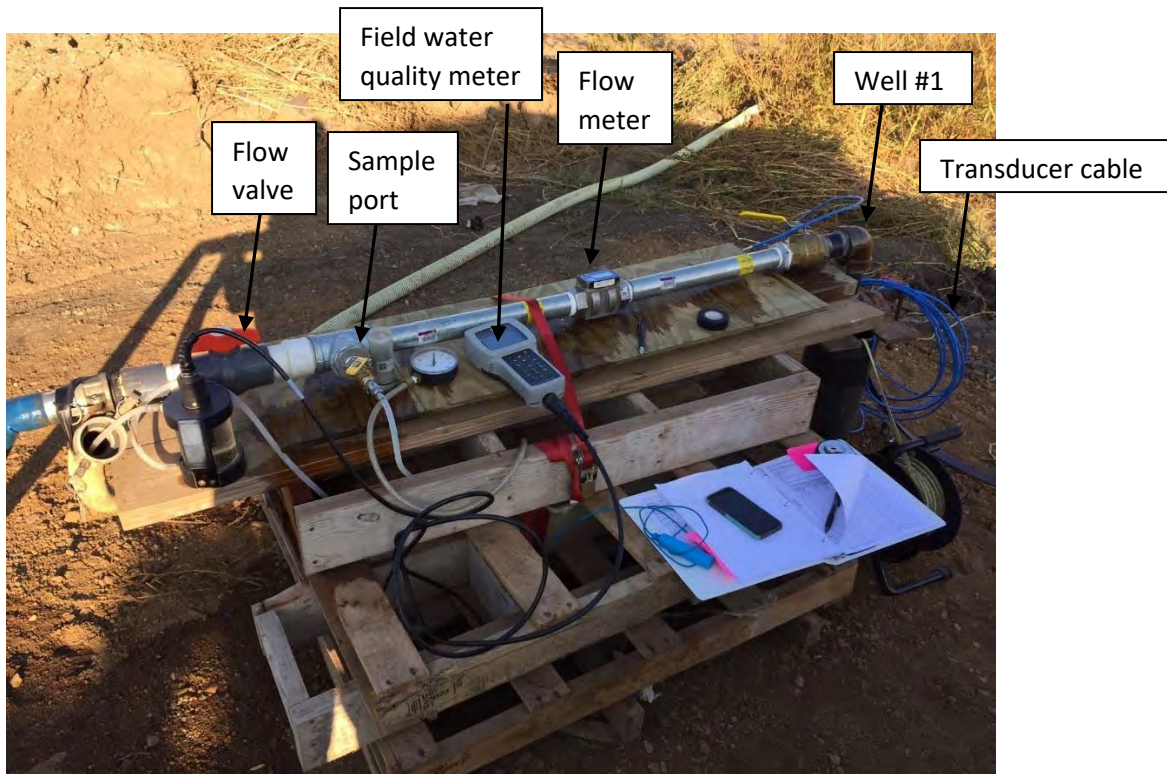


Photo 1: Well #1 wellhead discharge configuration, looking east.



Photo 2: Well #1 aquifer test generator.

**PIPESTONE – DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA**

PHOTOGRAPHS



Photo 3: Well #2 looking east.



Photo 4: Well #3 looking north.

**PIPESTONE – DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA**

PHOTOGRAPHS



Photo 5: Well #1 discharge hose looking northwest.



Photo 6: Well #1 discharge hose looking northwest.

**PIPESTONE – DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA**

PHOTOGRAPHS



Photo 7: Well #1 discharge hose looking north.



Photo 8: Well #1 discharge hose enters barn containment area (looking west).

**PIPESTONE – DYLBROOK FARMS
CANISTOTA, SOUTH DAKOTA**

PHOTOGRAPHS

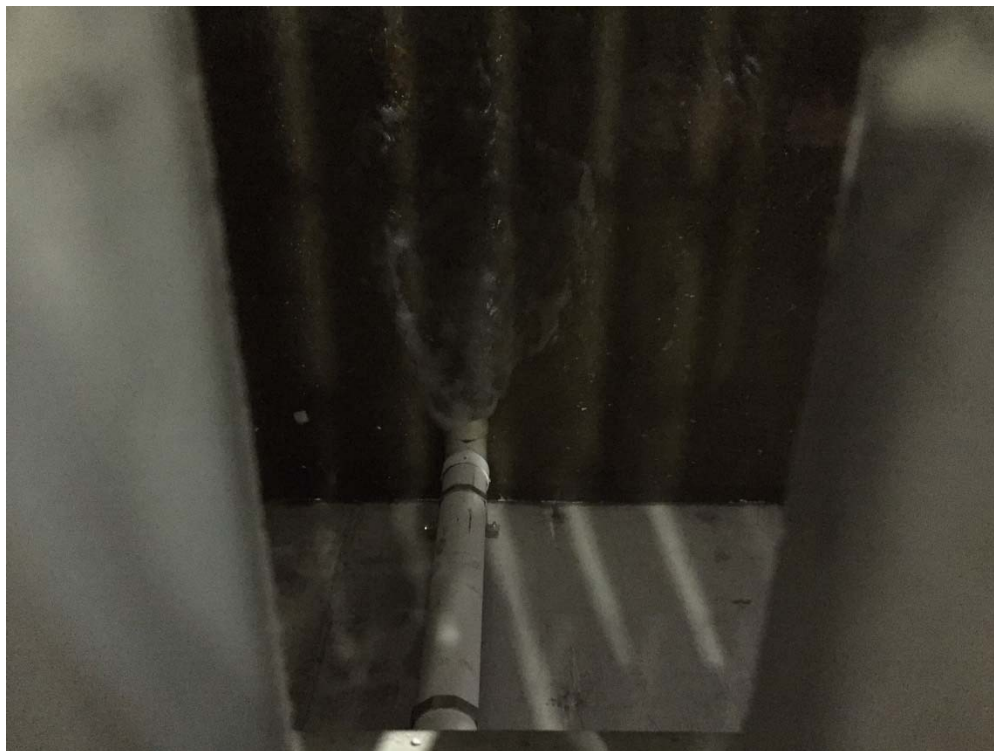


Photo 9: Well #1 discharge into containment area under barn.

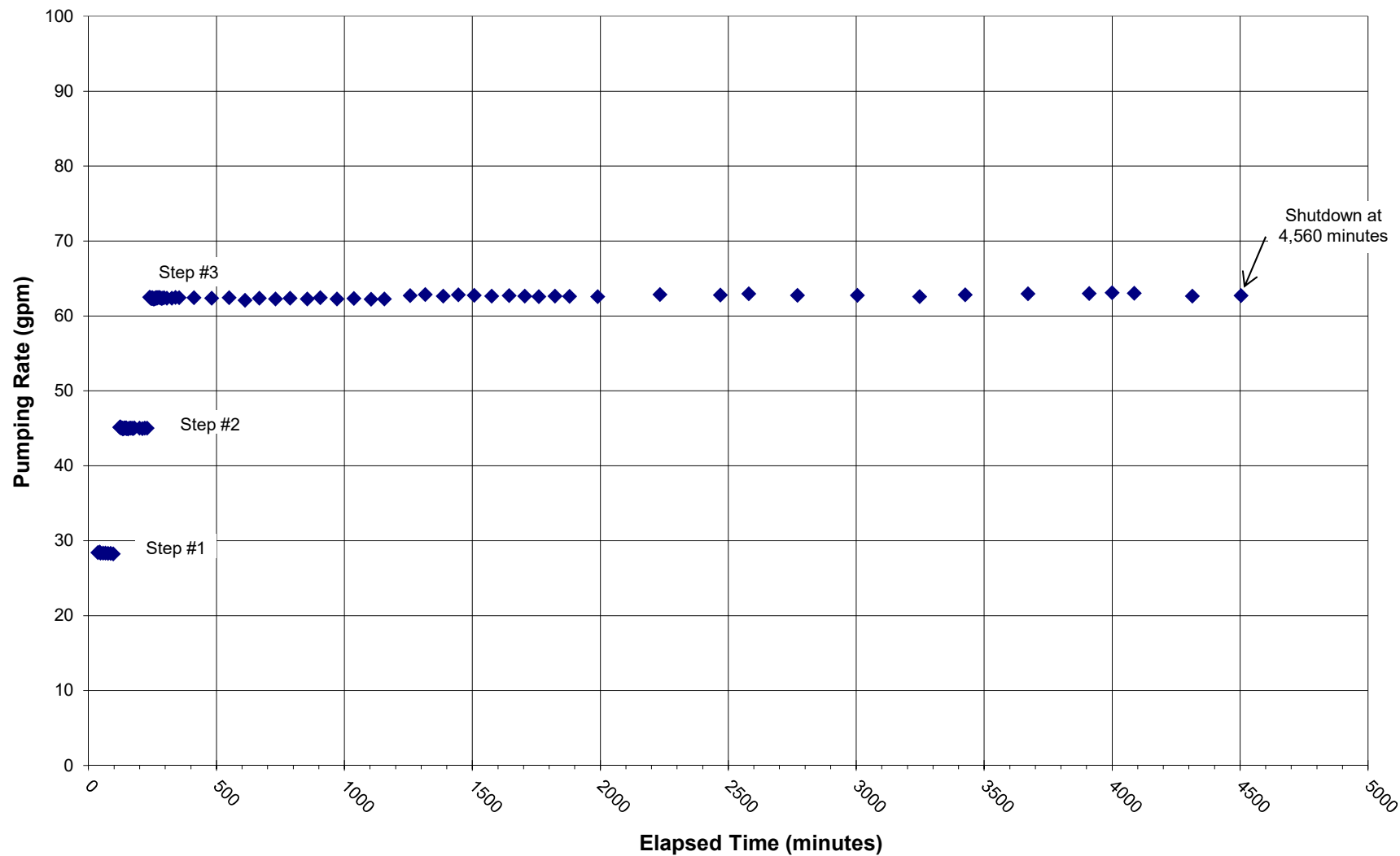


Photo 10: Barotroll attached to nearby power pole.

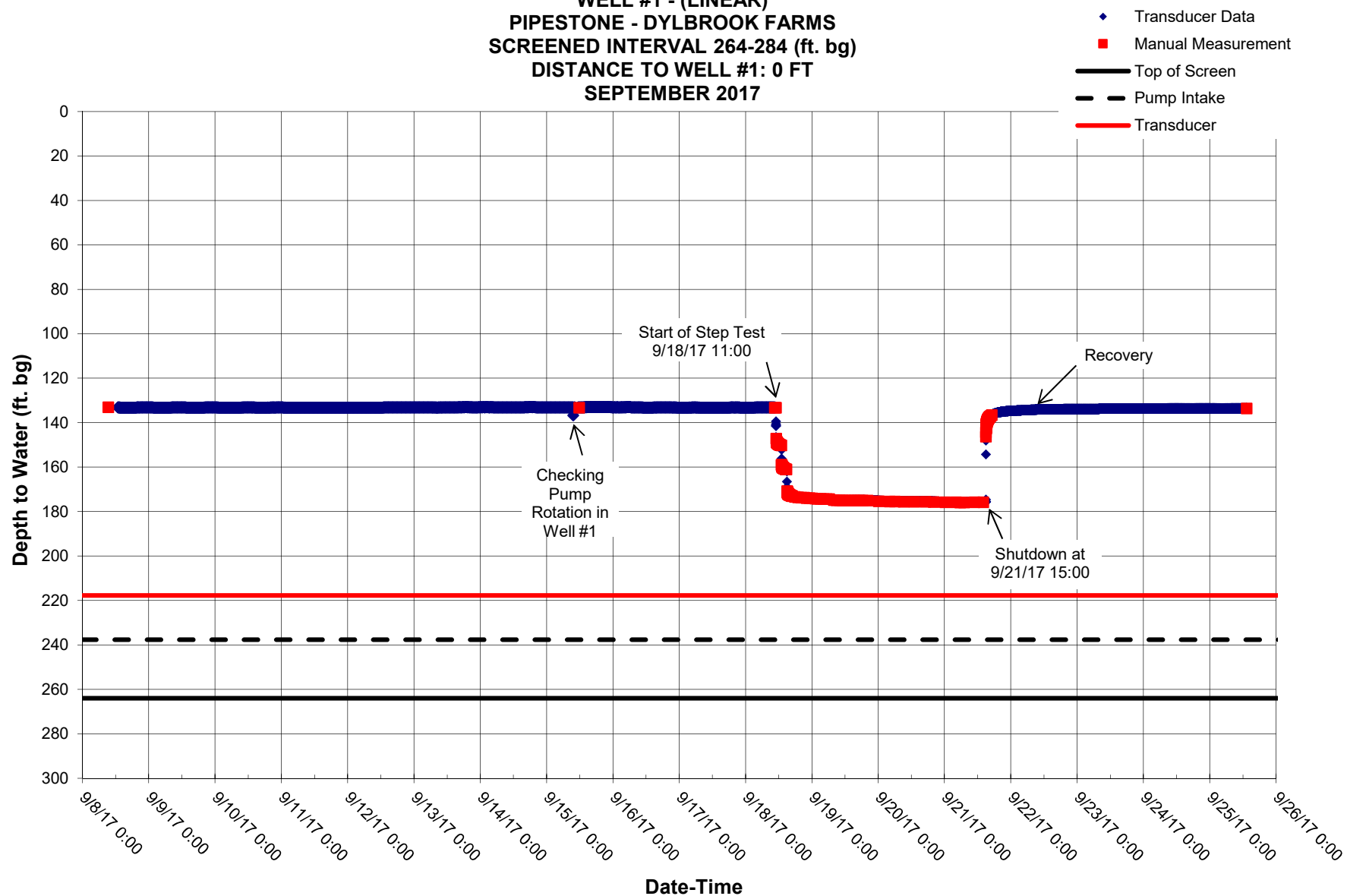
APPENDIX D

Qualitative Analysis Plots

**WELL #1
PIPESTONE - DYLBROOK FARMS
FLOW RATE COMPARISON - AQUIFER TEST
SEPTEMBER 2017**

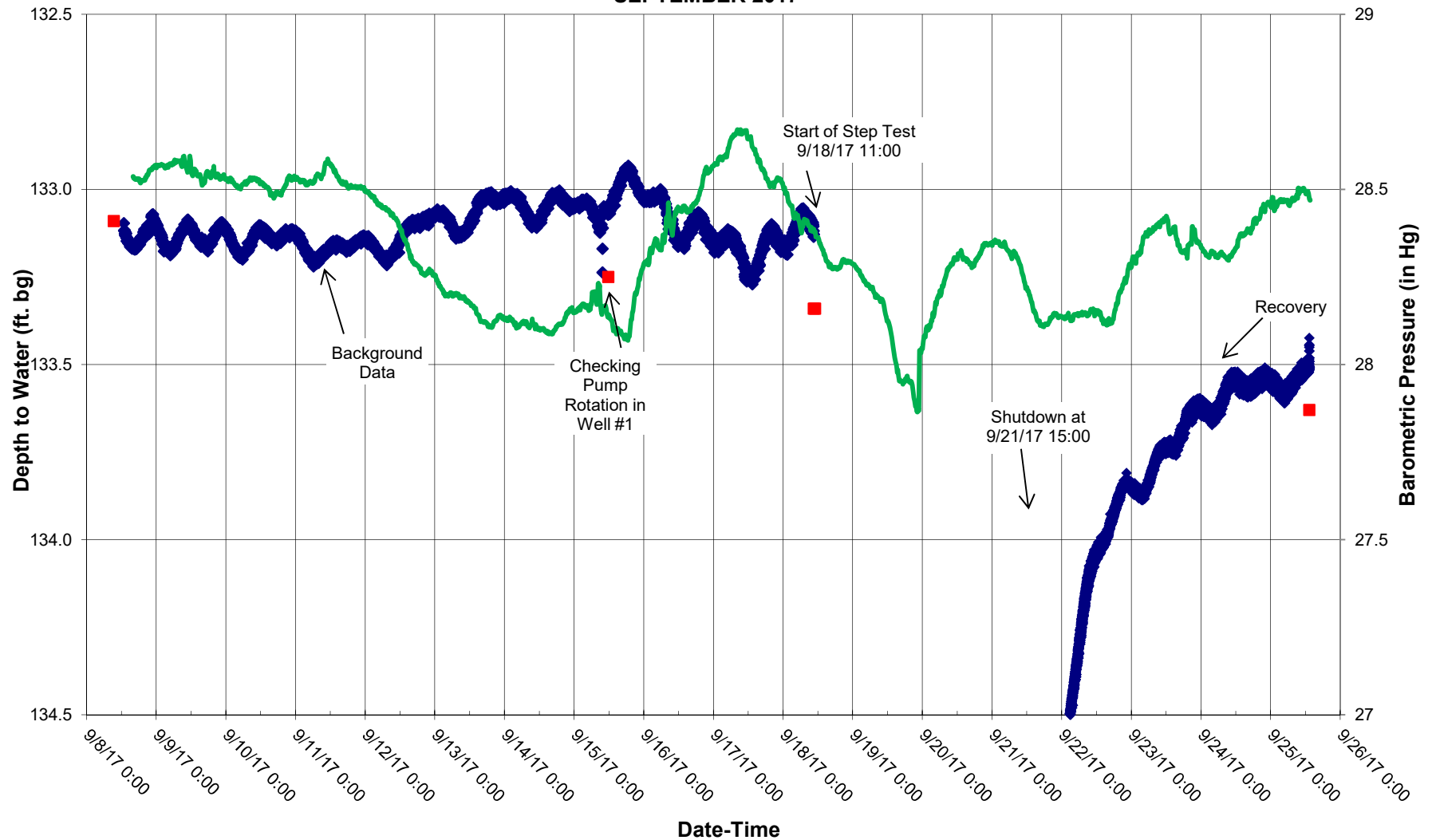


**WELL #1 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**



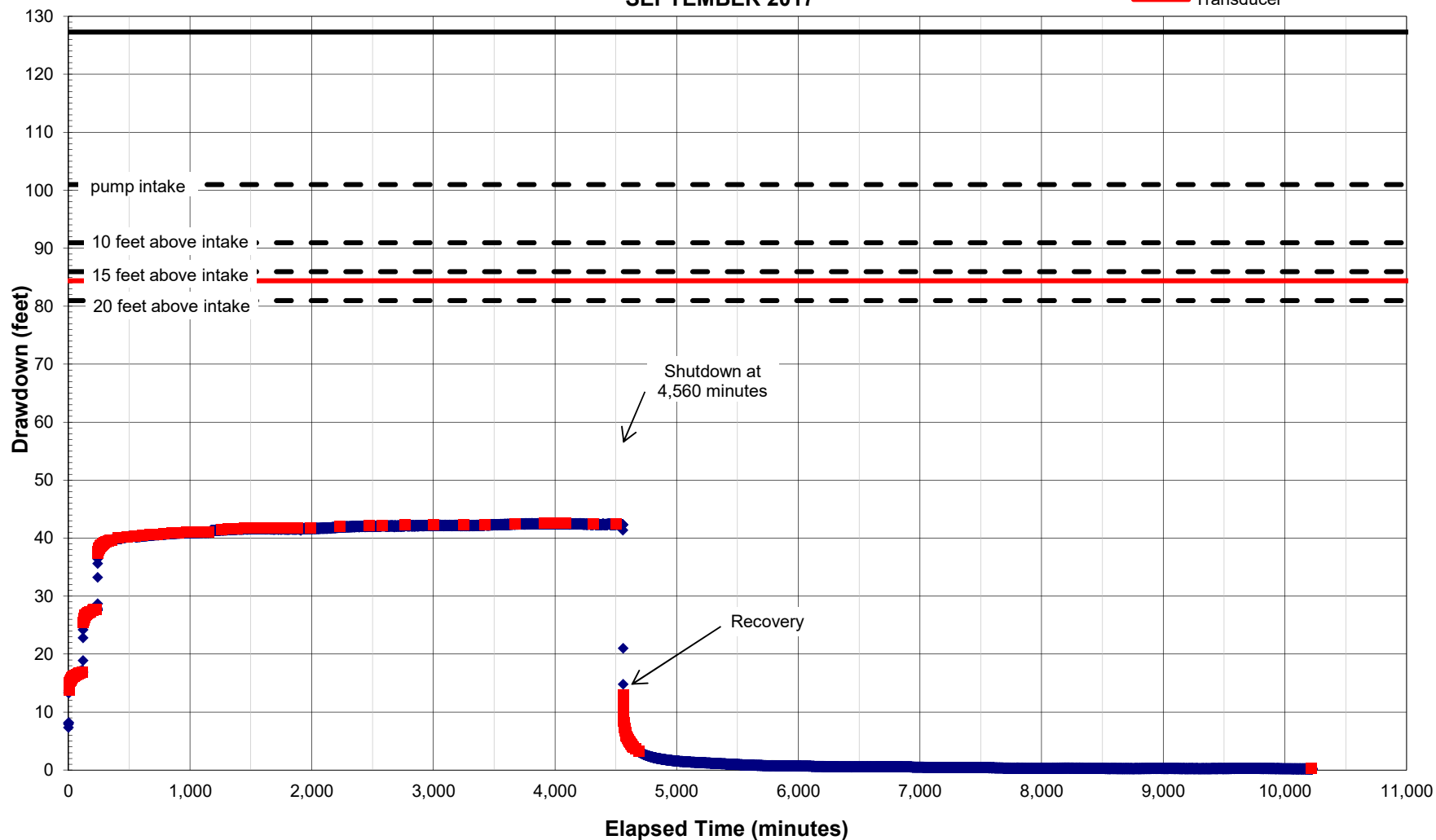
**WELL #1 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**

- ◆ Transducer Data
- Manual Measurement
- Barometric Pressure

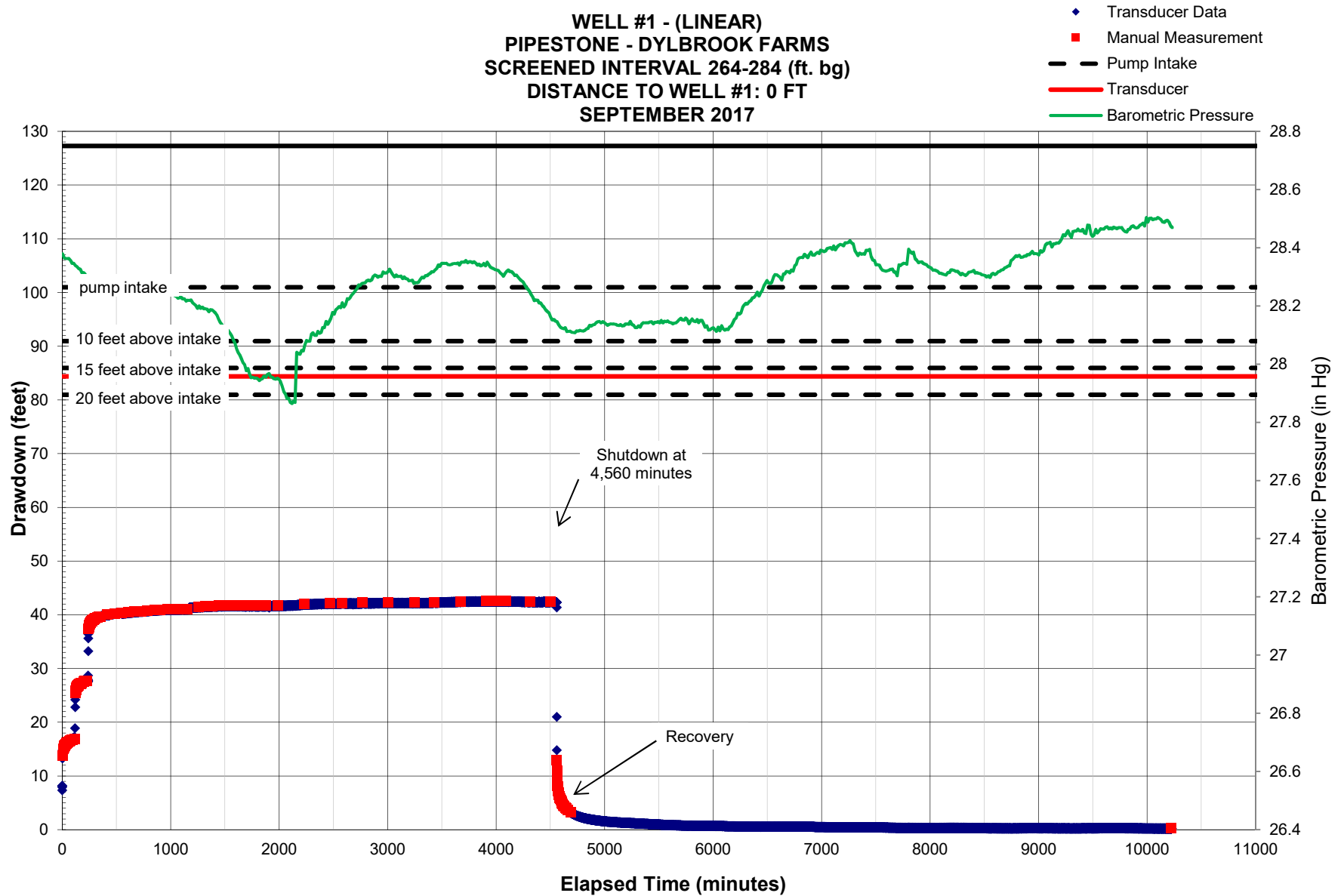


**WELL #1 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**

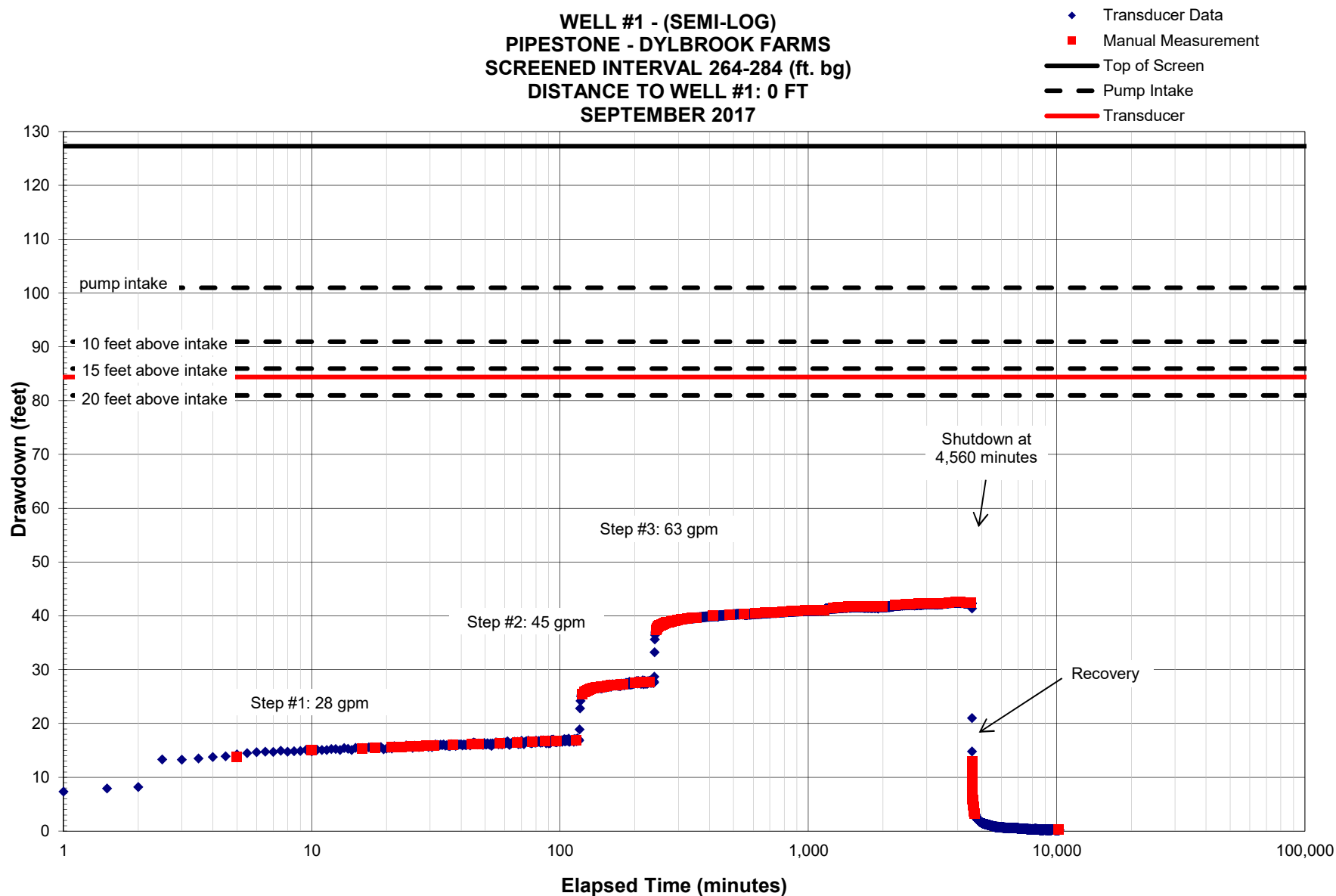
- ◆ Transducer Data
- Manual Measurement
- Top of Screen
- - Pump Intake
- Transducer



**WELL #1 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**

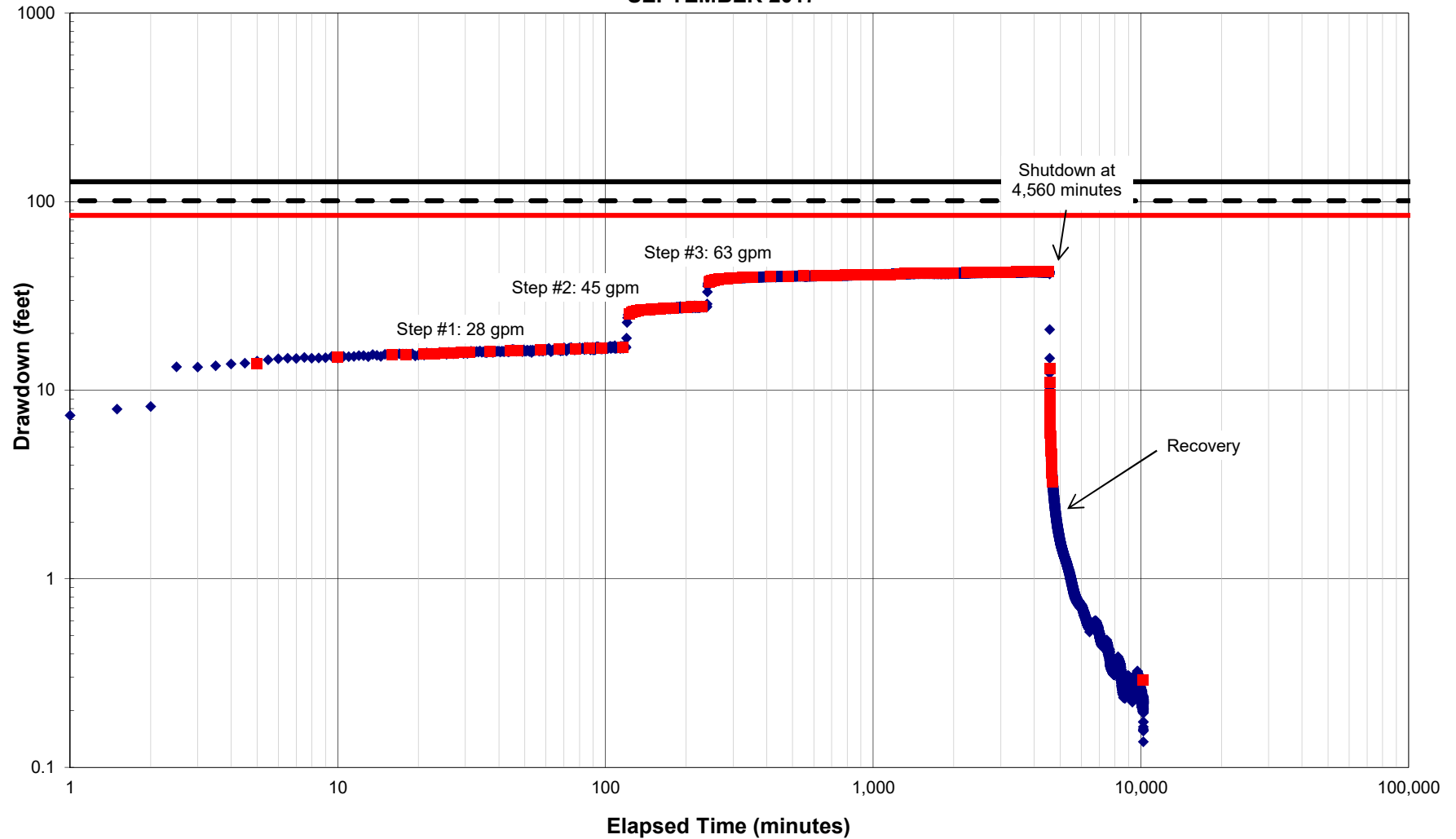


**WELL #1 - (SEMI-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**

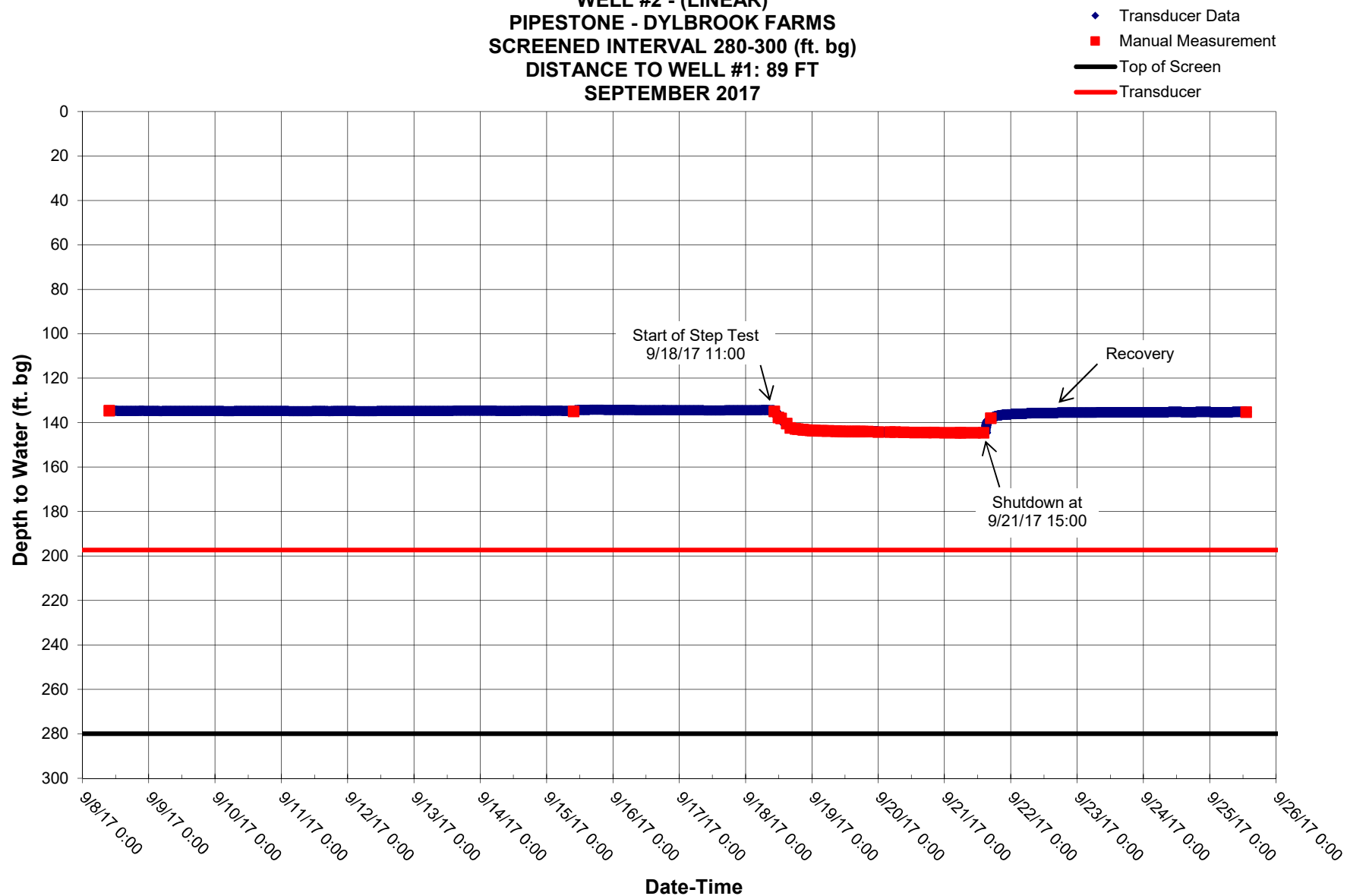


**WELL #1 - (LOG-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 264-284 (ft. bg)
DISTANCE TO WELL #1: 0 FT
SEPTEMBER 2017**

- ◆ Transducer Data
- Manual Measurement
- Top of Screen
- - - Pump Intake
- Transducer

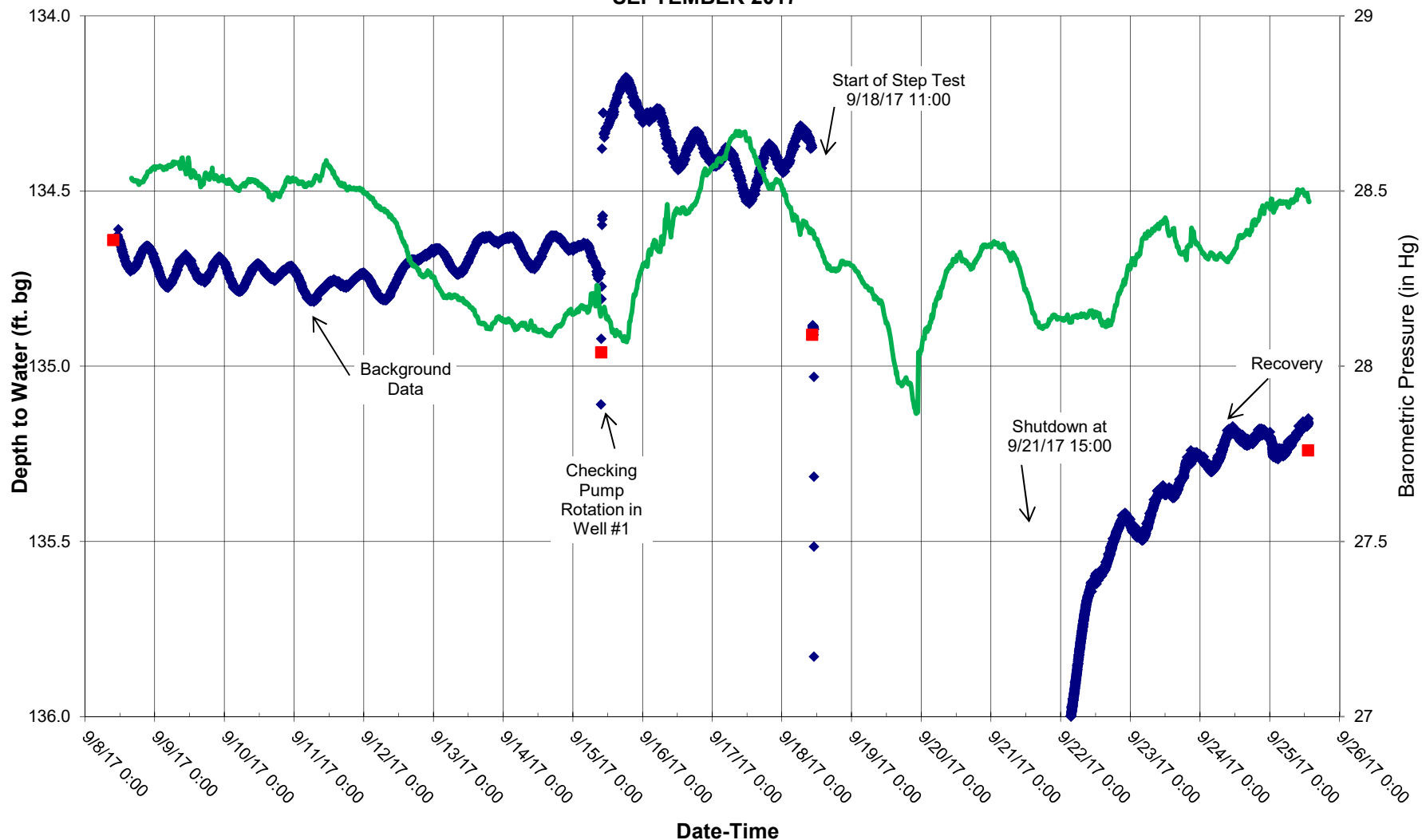


**WELL #2 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**

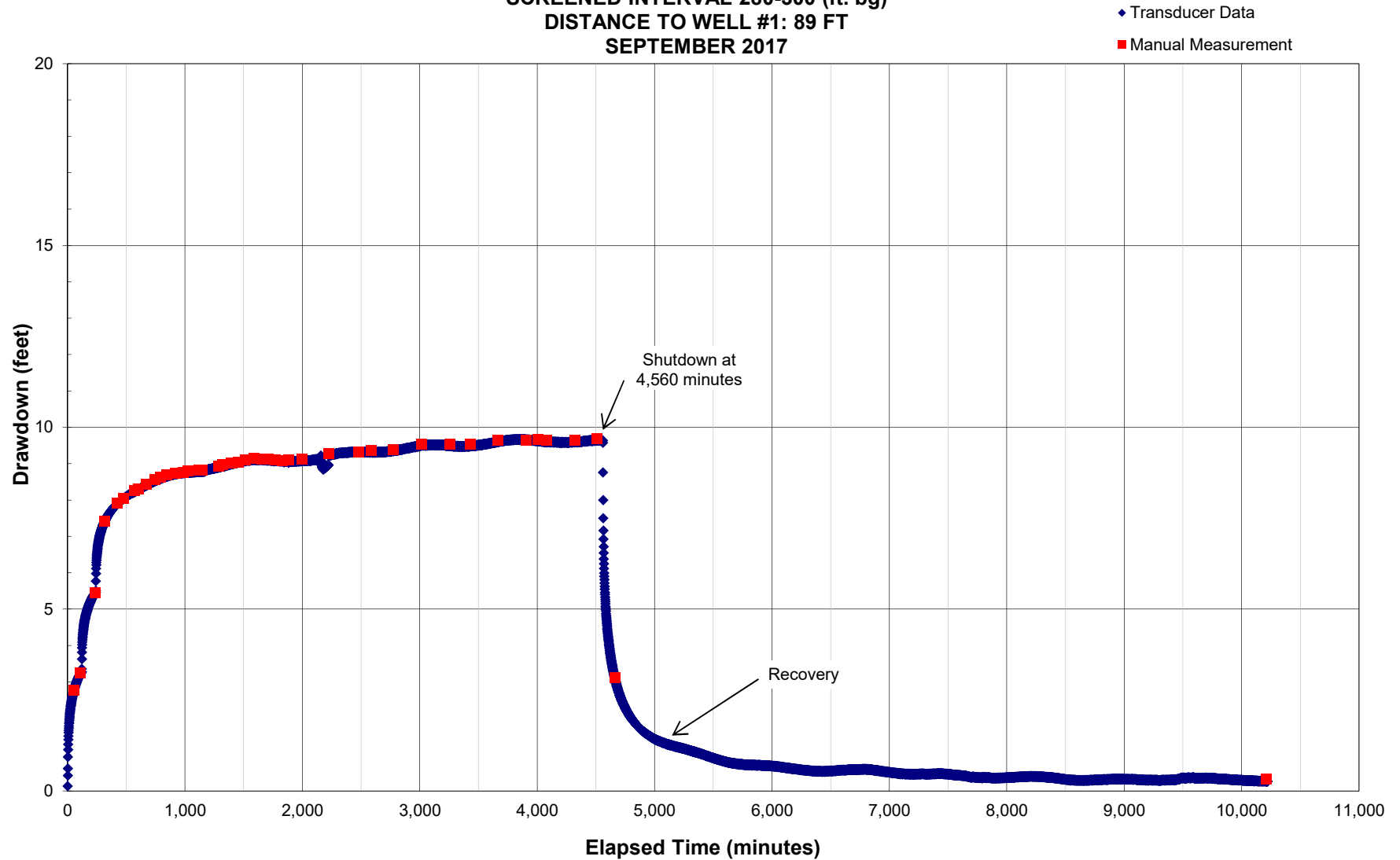


**WELL #2 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**

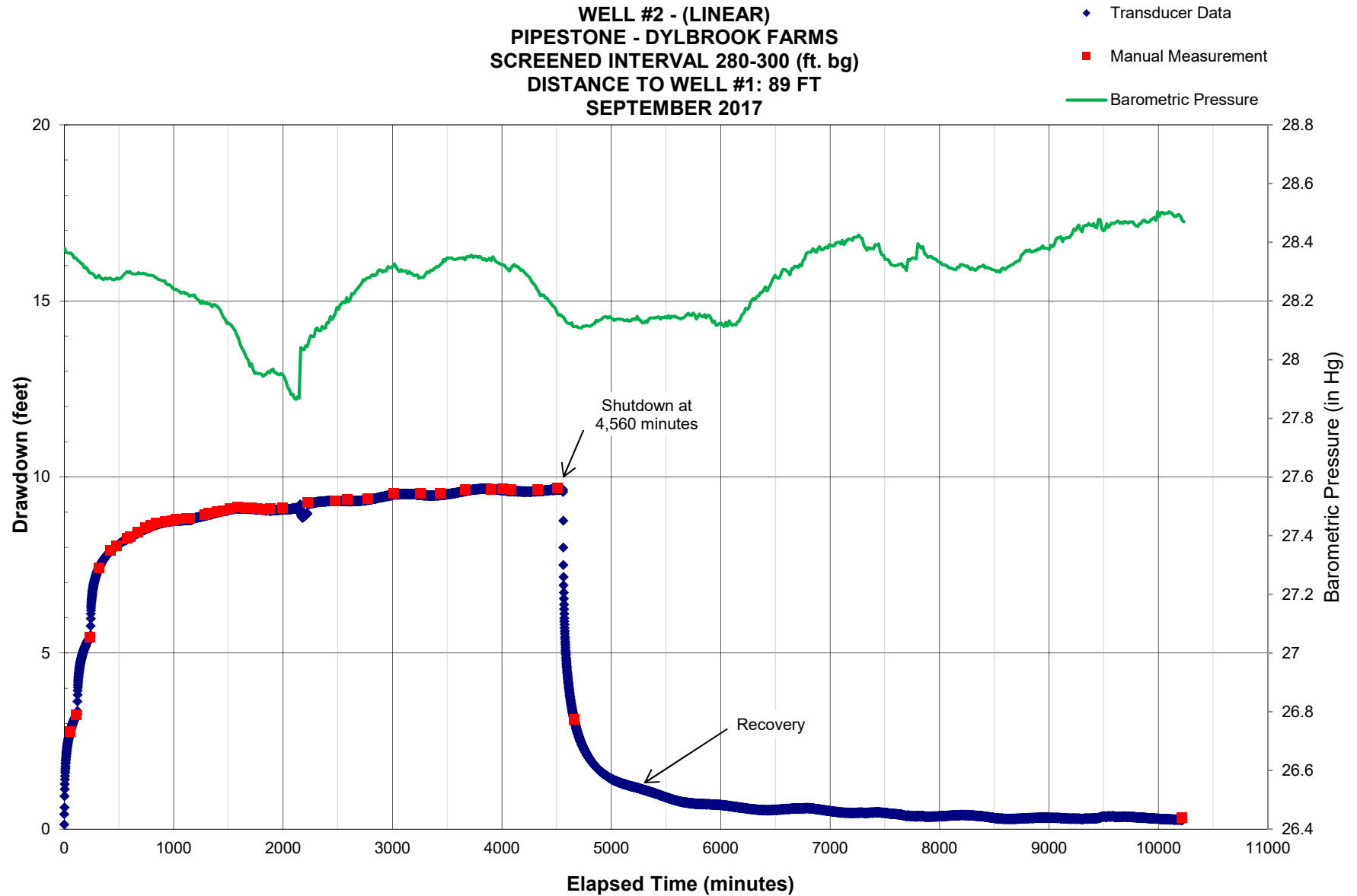
◆ Transducer Data
■ Manual Measurement
— Barometric Pressure



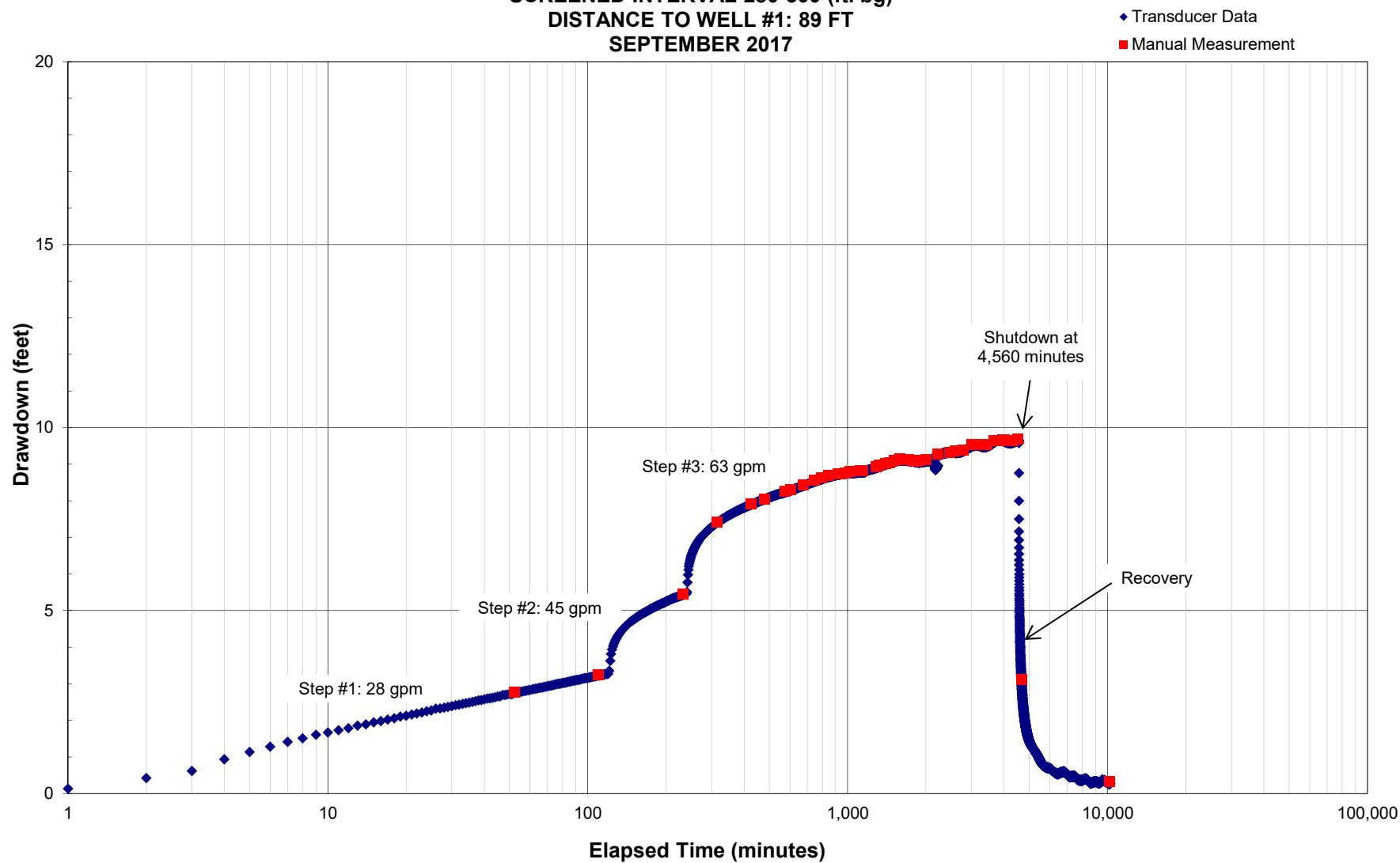
**WELL #2 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**



**WELL #2 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**

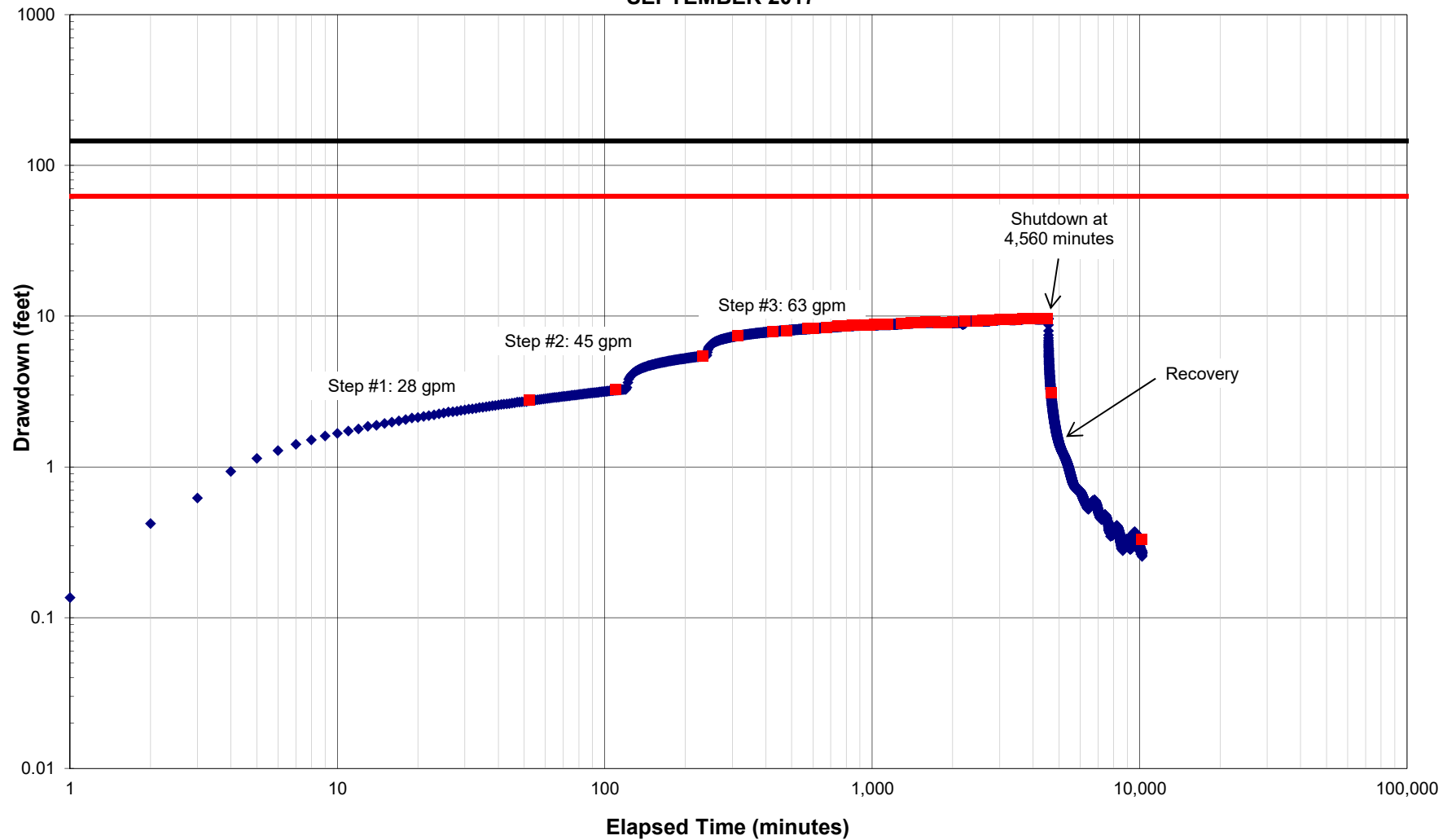


**WELL #2 - (SEMI-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**

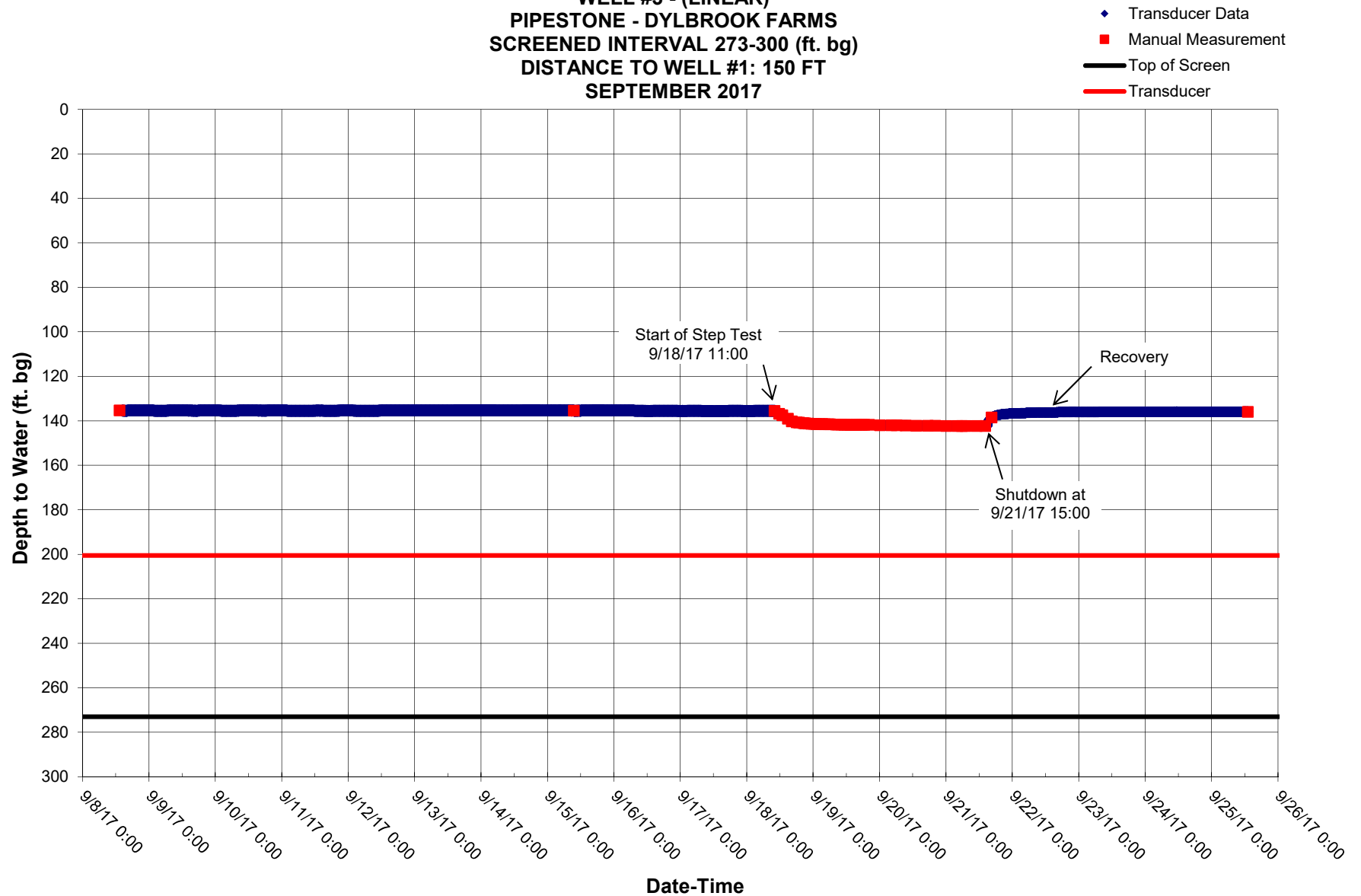


**WELL #2 - (LOG-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**

- ◆ Transducer Data
- Manual Measurement
- Top of Screen
- Transducer

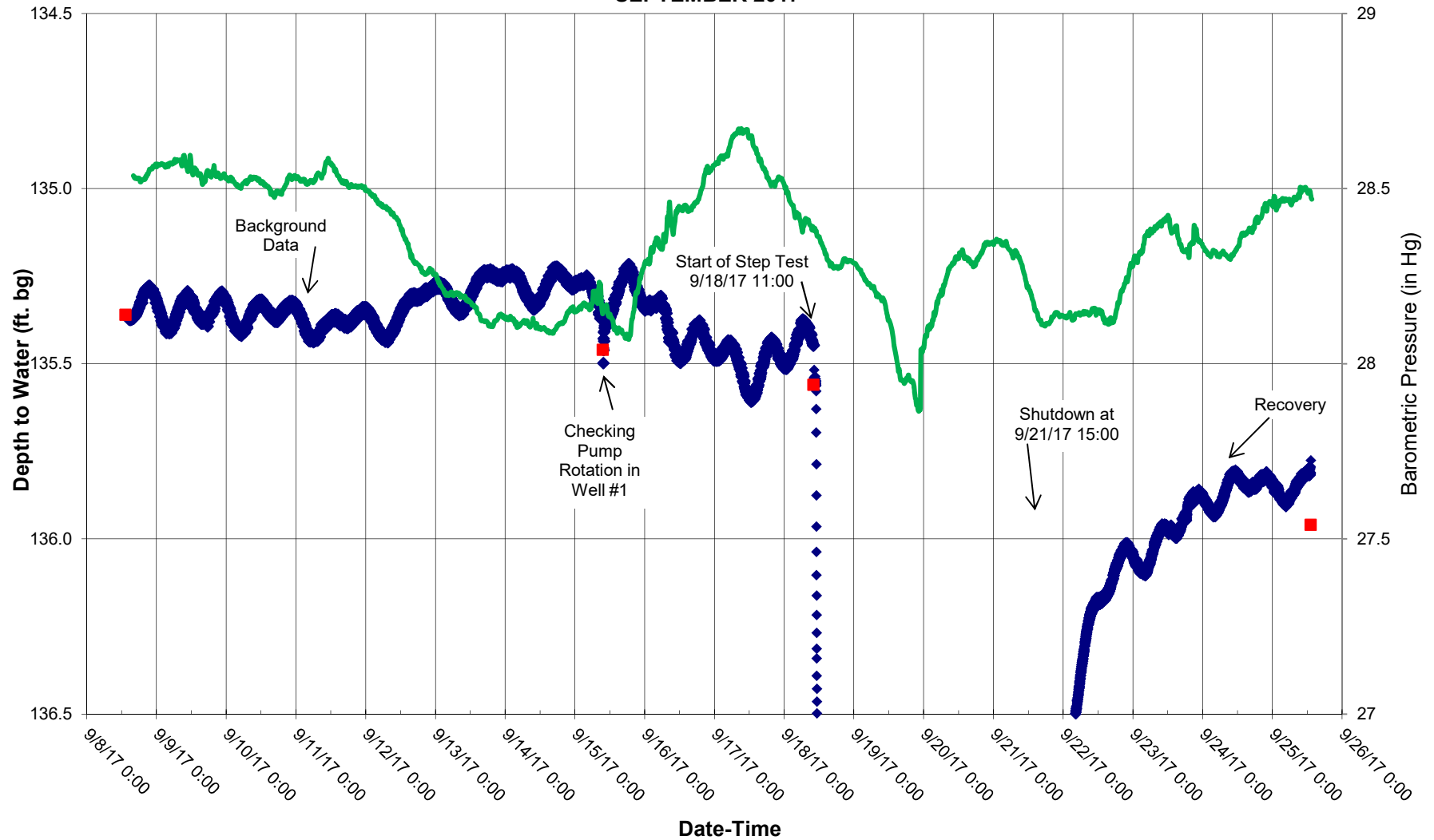


**WELL #3 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 273-300 (ft. bg)
DISTANCE TO WELL #1: 150 FT
SEPTEMBER 2017**

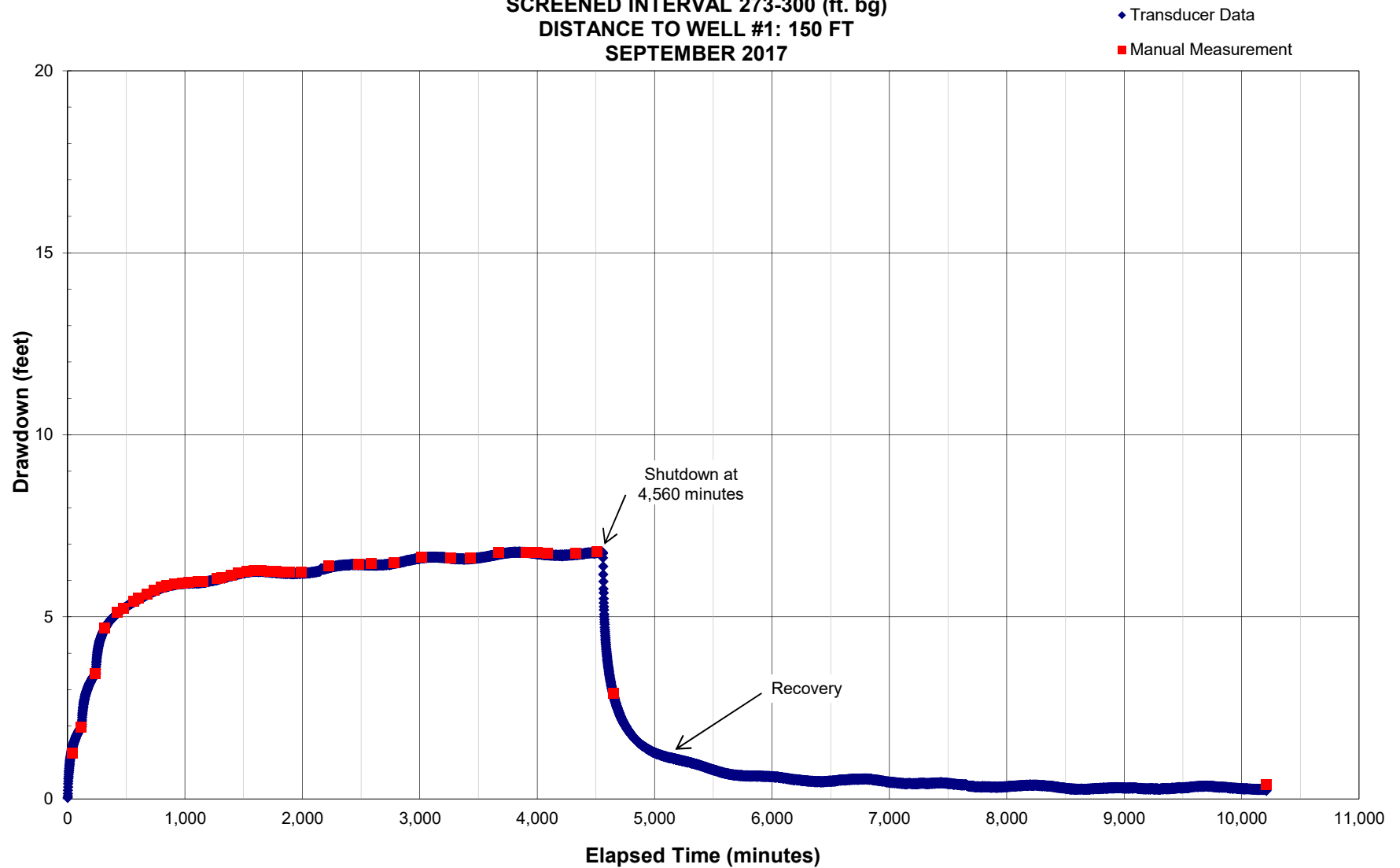


**WELL #3 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 273-300 (ft. bg)
DISTANCE TO WELL #1: 150 FT
SEPTEMBER 2017**

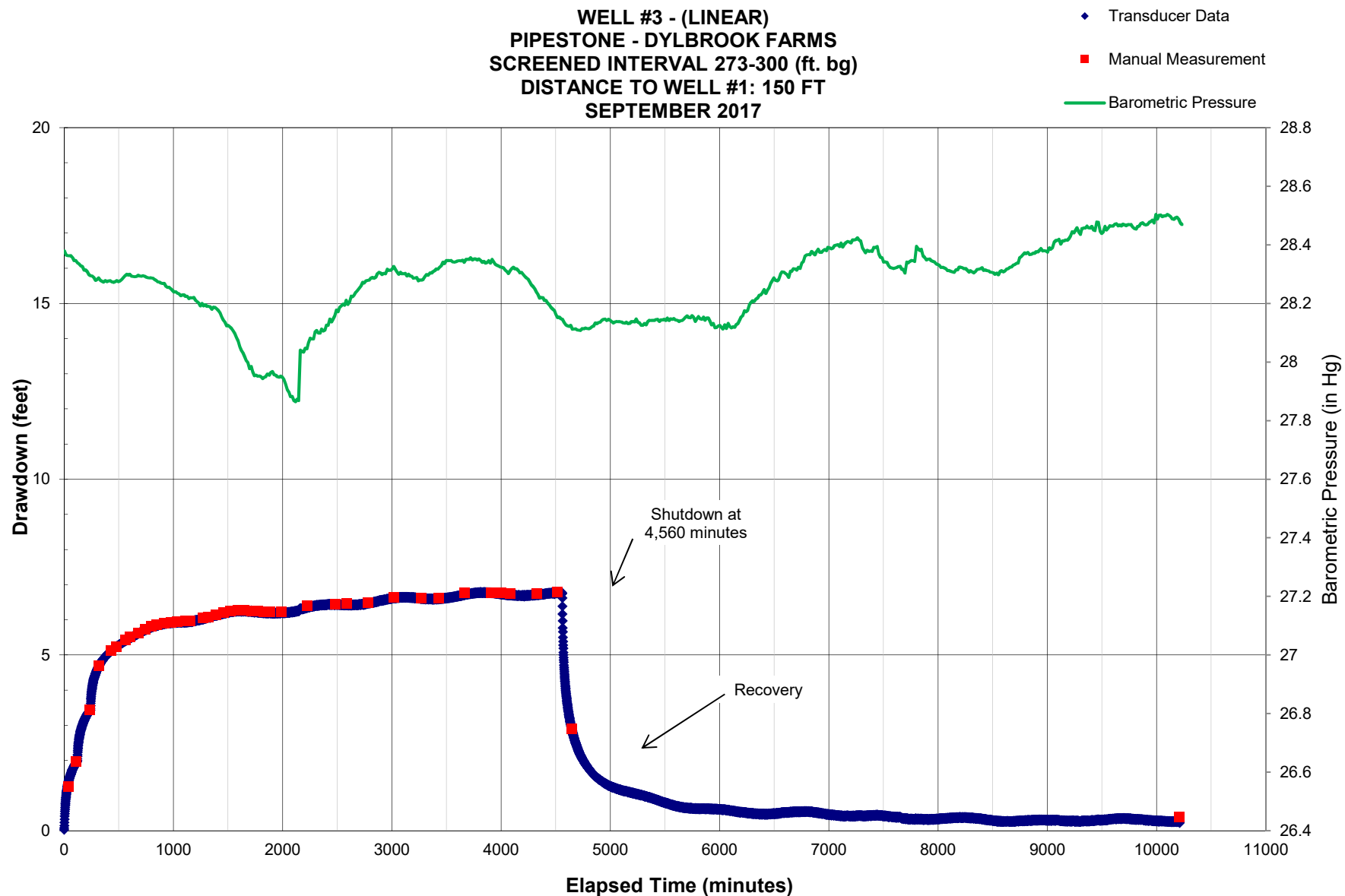
- ◆ Transducer Data
- Manual Measurement
- Barometric Pressure



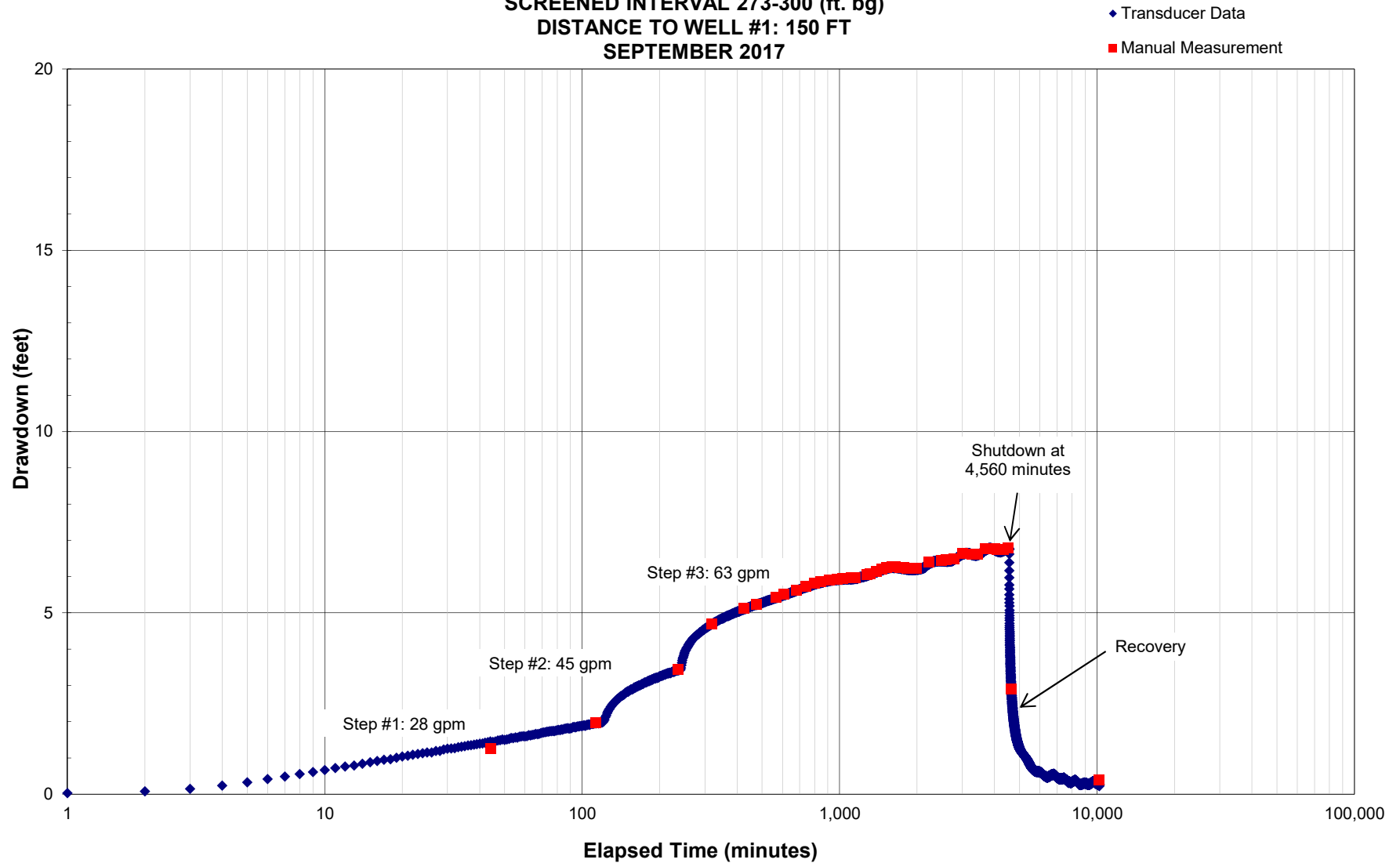
**WELL #3 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 273-300 (ft. bg)
DISTANCE TO WELL #1: 150 FT
SEPTEMBER 2017**



**WELL #3 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 273-300 (ft. bg)
DISTANCE TO WELL #1: 150 FT
SEPTEMBER 2017**

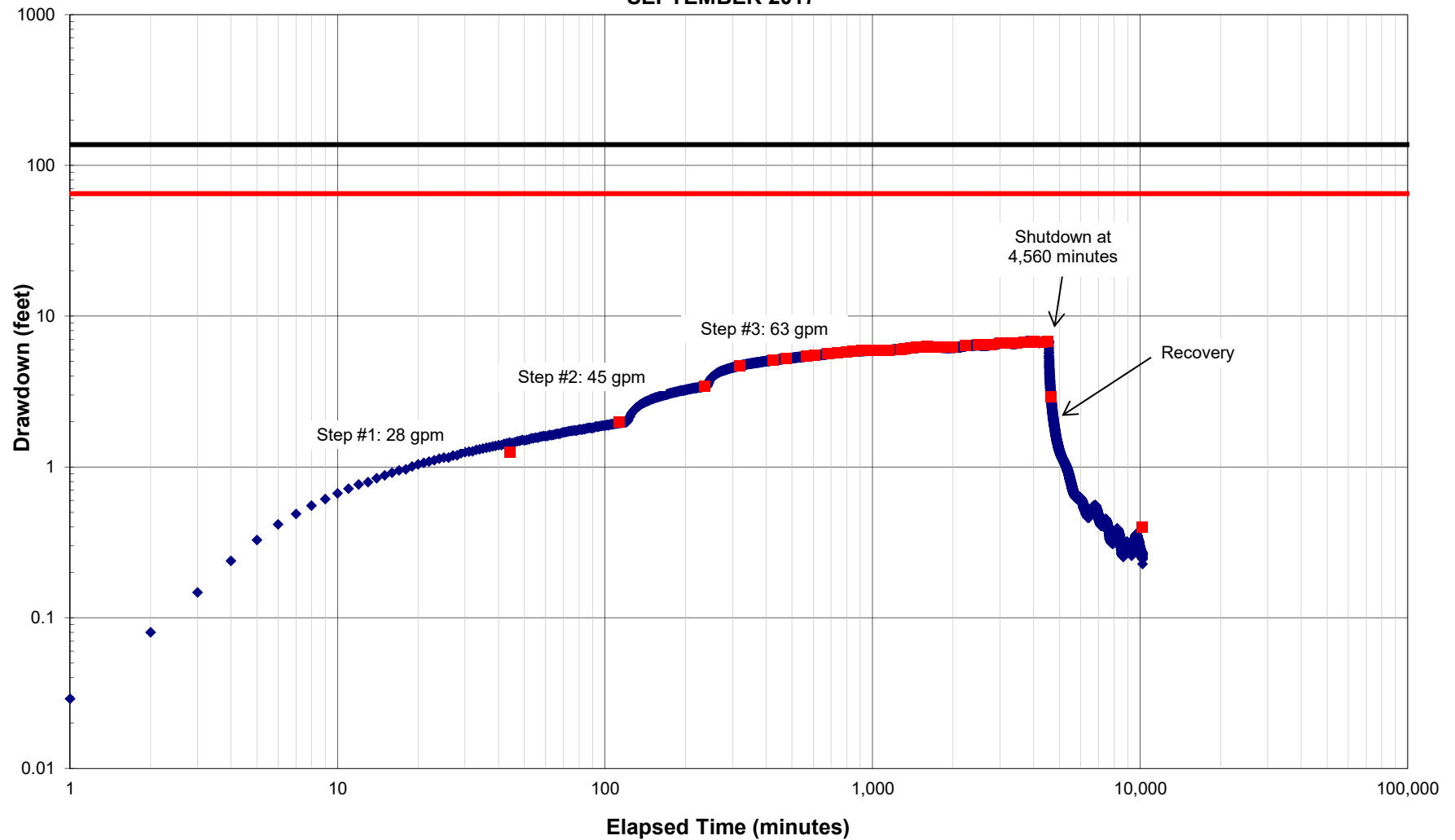


**WELL #3 - (SEMI-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 273-300 (ft. bg)
DISTANCE TO WELL #1: 150 FT
SEPTEMBER 2017**



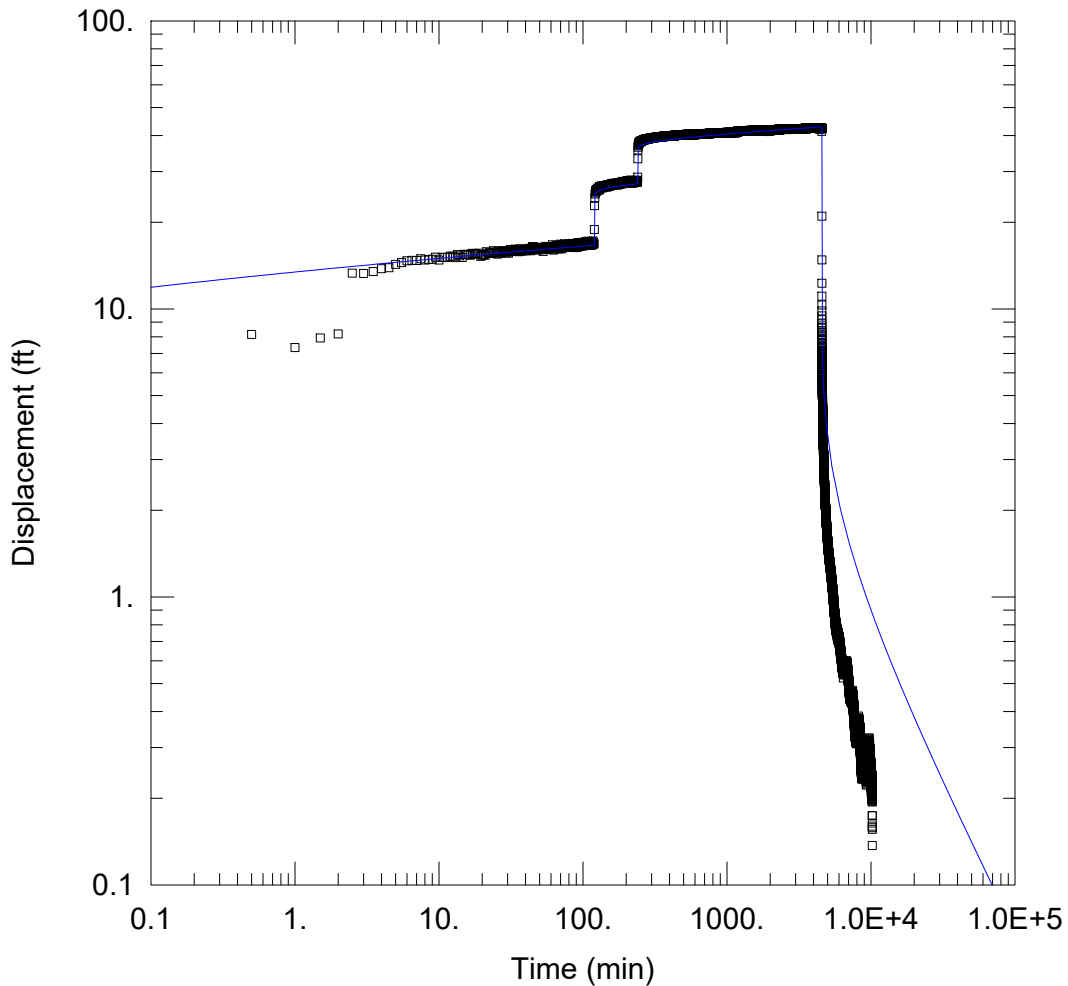
**WELL #3 - (LOG-LOG)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 273-300 (ft. bg)
DISTANCE TO WELL #1: 150 FT
SEPTEMBER 2017**

- ◆ Transducer Data
- Manual Measurement
- Top of Screen
- Transducer



APPENDIX E

Quantitative Analysis Plots



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf theis early.aqt
 Date: 10/12/17 Time: 13:14:25

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #1	0	0

SOLUTION

Aquifer Model: Confined

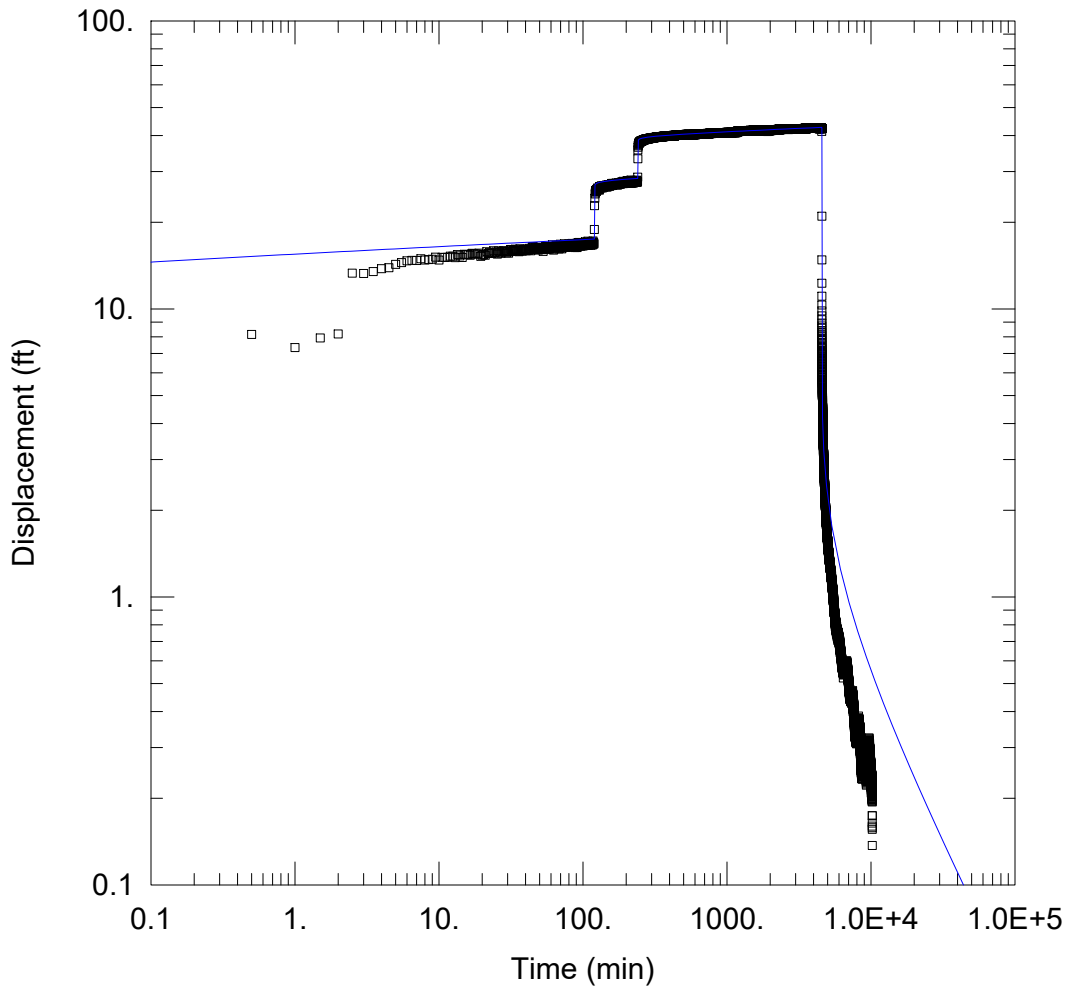
Solution Method: Theis

T = 640.7 ft²/day

S = 3.785E-8

Kz/Kr = 1.

b = 24. ft



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf theis late.aqt
 Date: 10/12/17 Time: 13:13:52

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #1	0	0

SOLUTION

Aquifer Model: Confined

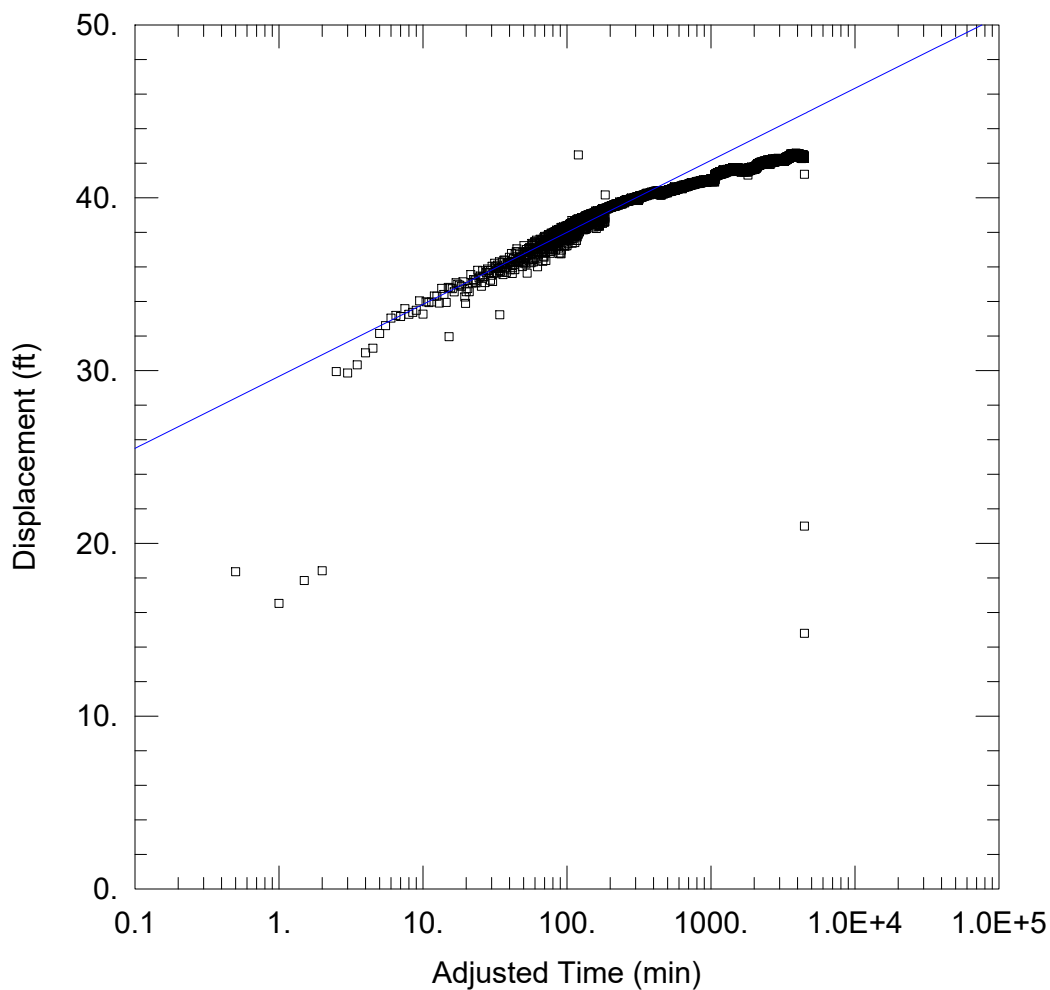
Solution Method: Theis

T = 1035.1 ft²/day

S = 1.814E-15

Kz/Kr = 1.

b = 24. ft



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf CJ early.aqt

Date: 10/12/17

Time: 13:15:12

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #1	0	0

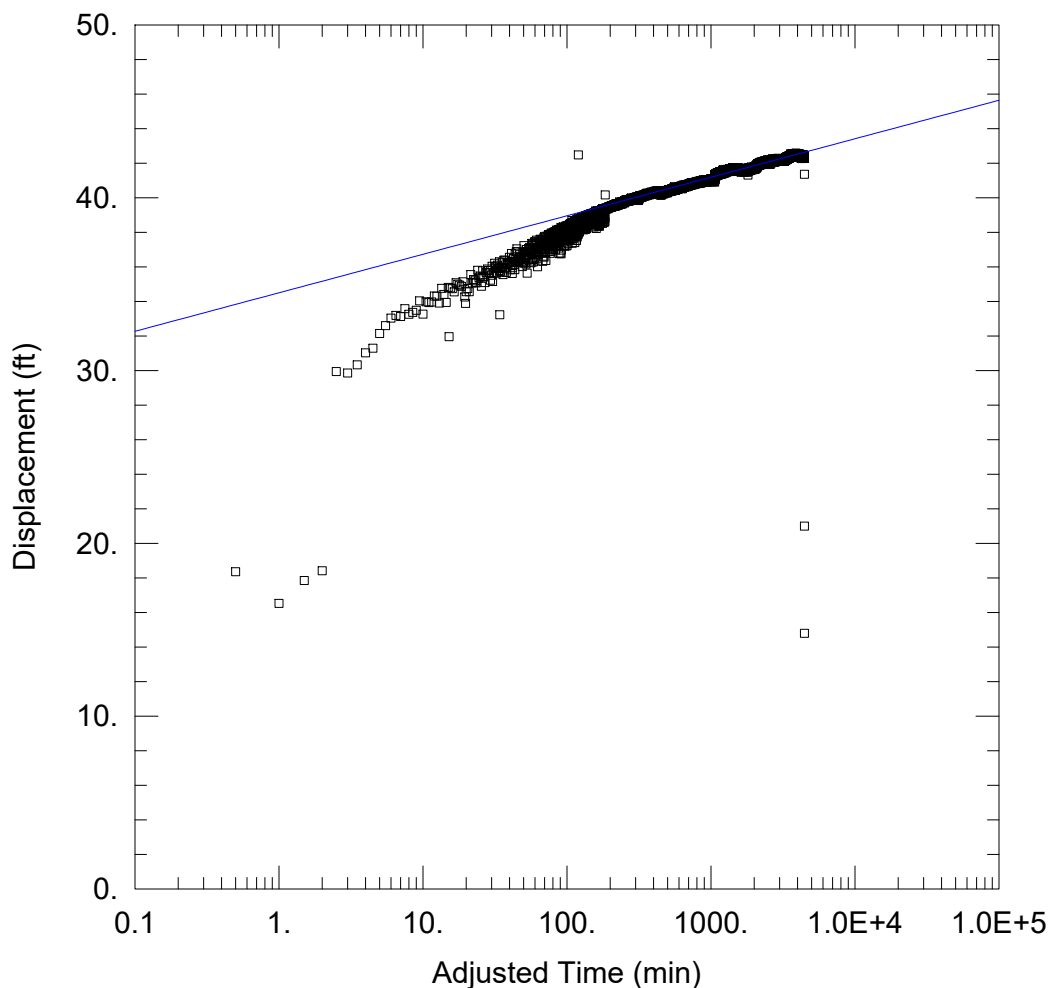
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 533.4 ft²/day

S = 4.733E-7



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf CJ late.aqt

Date: 10/12/17

Time: 13:14:53

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #1	0	0

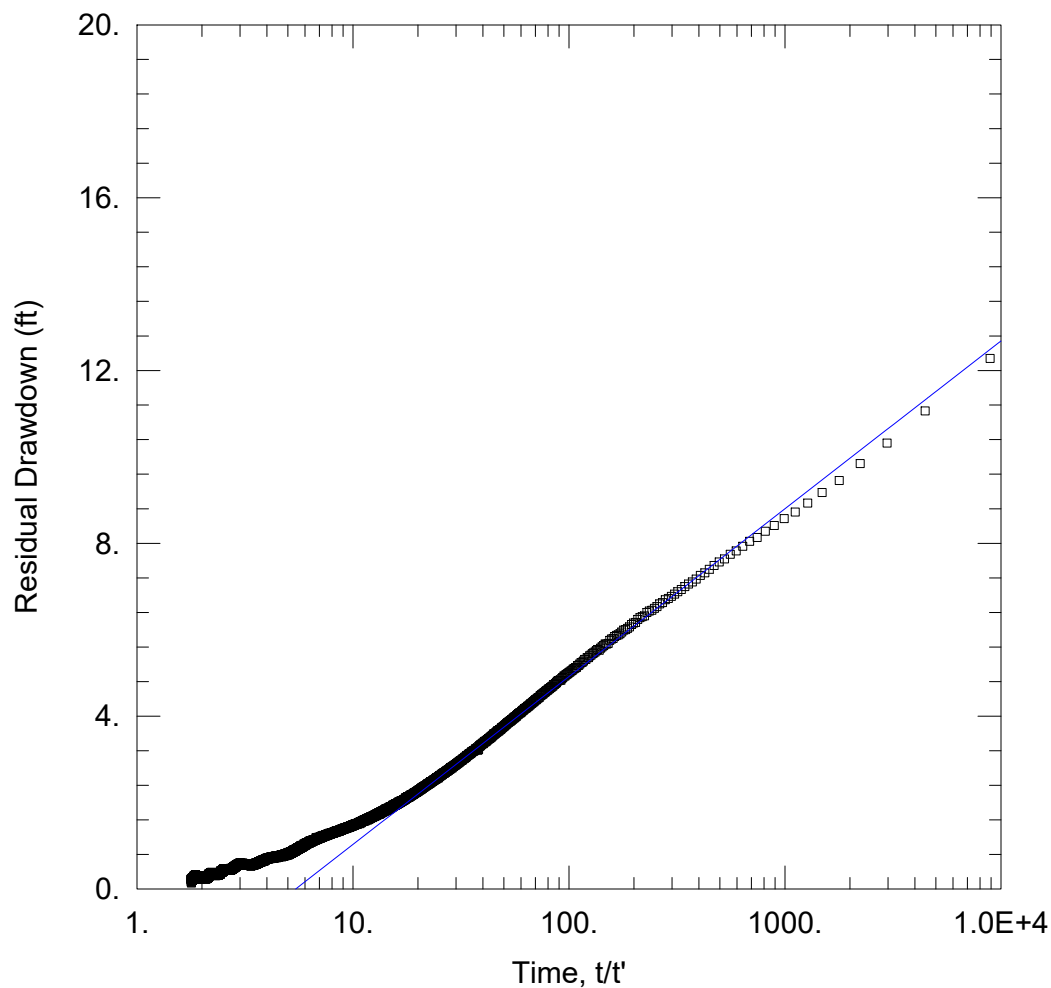
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 997.3 ft²/day

S = 3.853E-15



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf theis recovery early.aqt

Date: 10/12/17

Time: 13:13:14

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #1	0	0

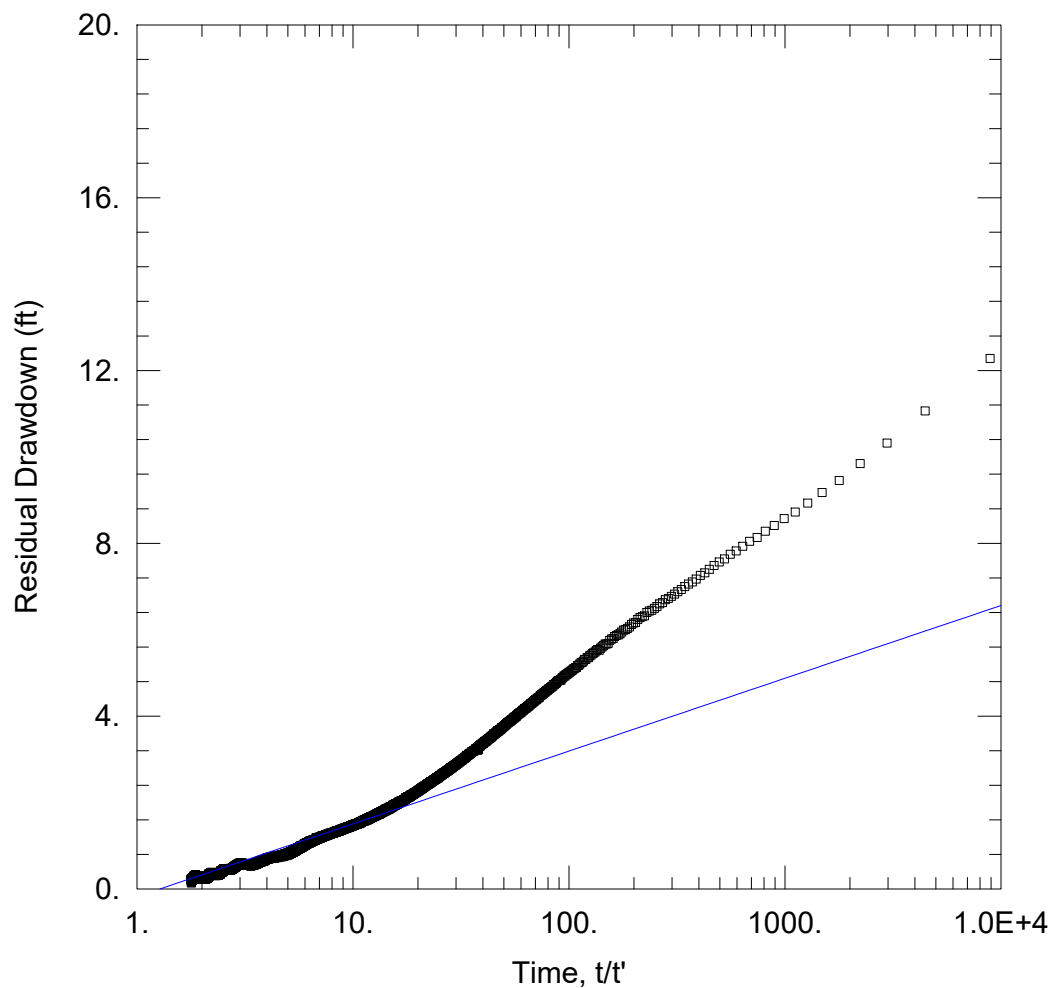
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

$T = 572.$ ft²/day

$S/S' = 5.438$



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf theis recovery late.aqt

Date: 10/12/17

Time: 13:12:43

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 24. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #1	0	0

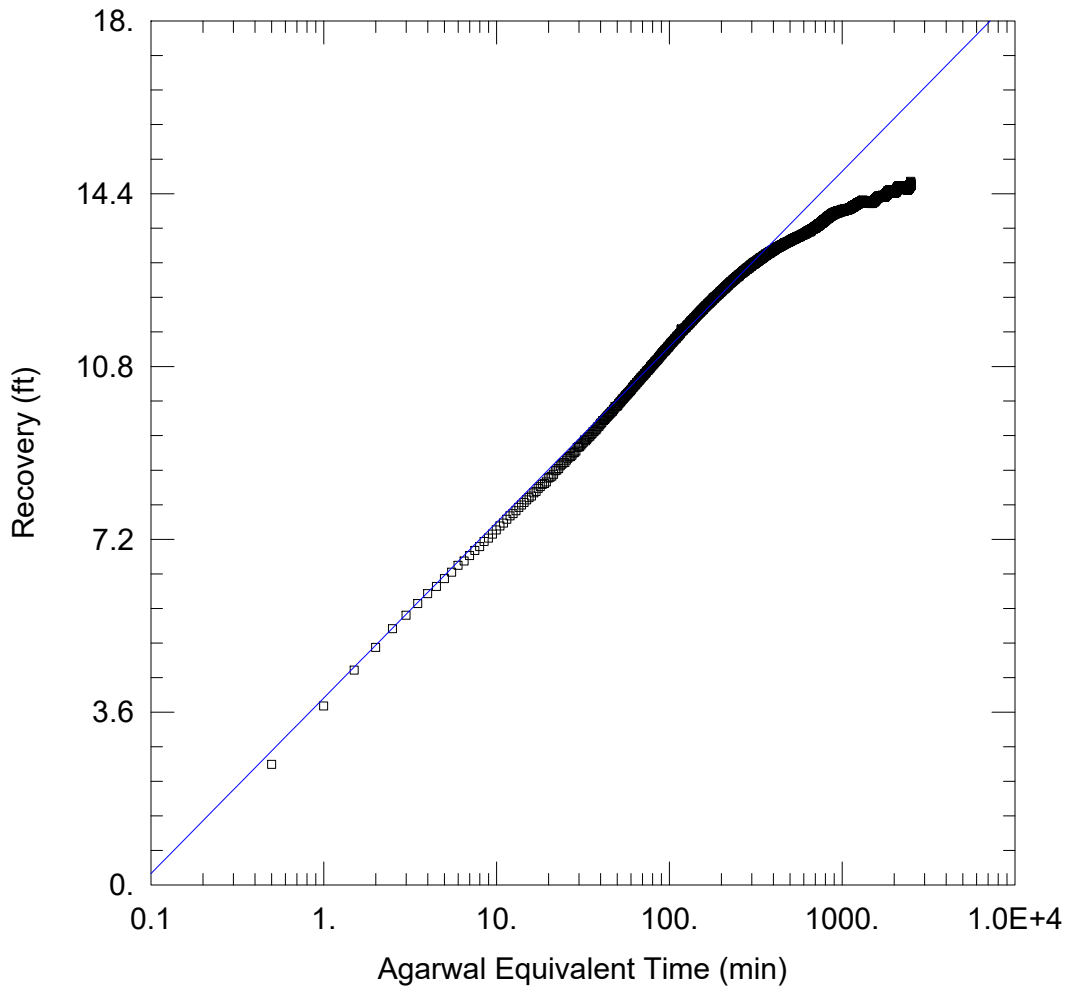
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 1319. ft²/day

S/S' = 1.279



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf CJ agarwal recovery early.aqt
 Date: 10/12/17 Time: 13:19:58

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

AQUIFER DATA

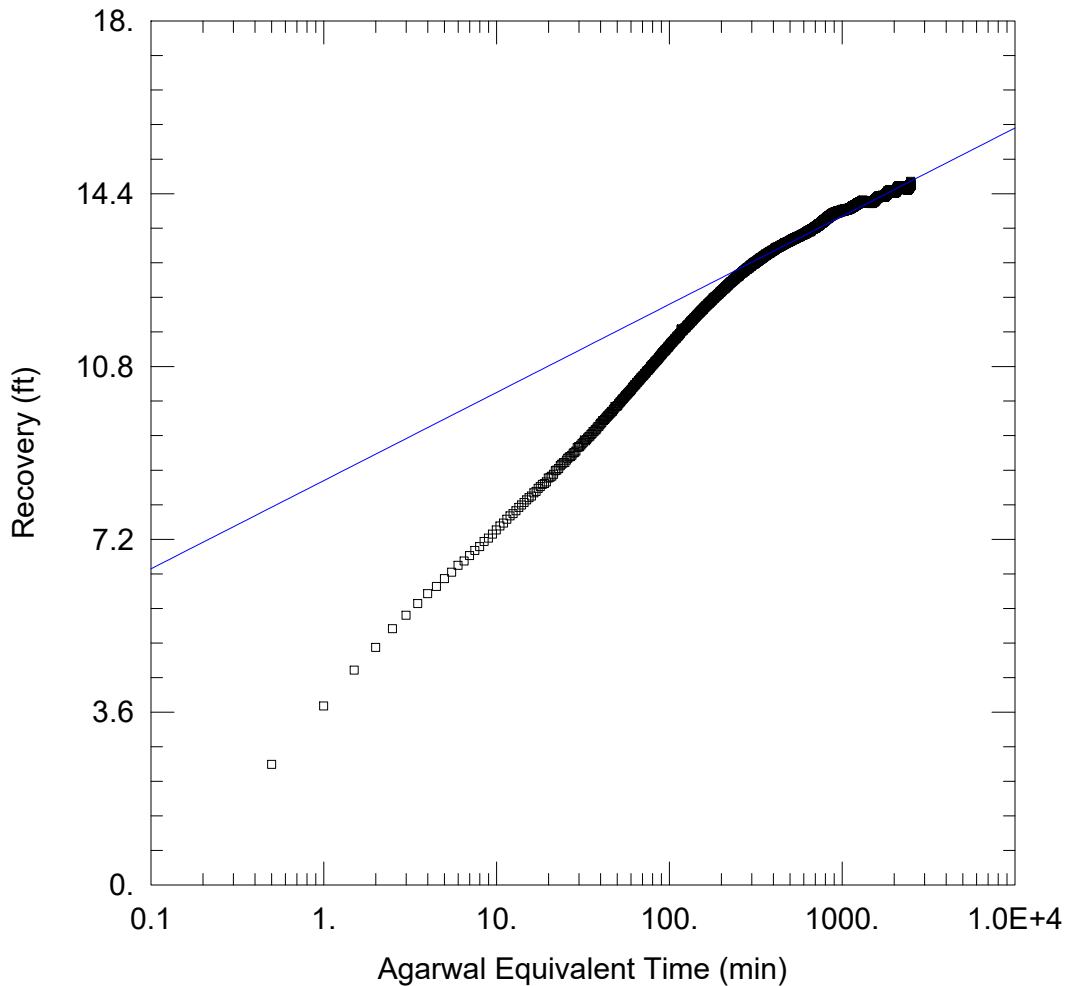
Saturated Thickness: 24. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #1	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
 T = 607.5 ft²/day S = 0.6133



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #1 obs - Sept2017 - conf CJ agarwal recovery late.aqt
 Date: 10/12/17 Time: 13:15:43

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

AQUIFER DATA

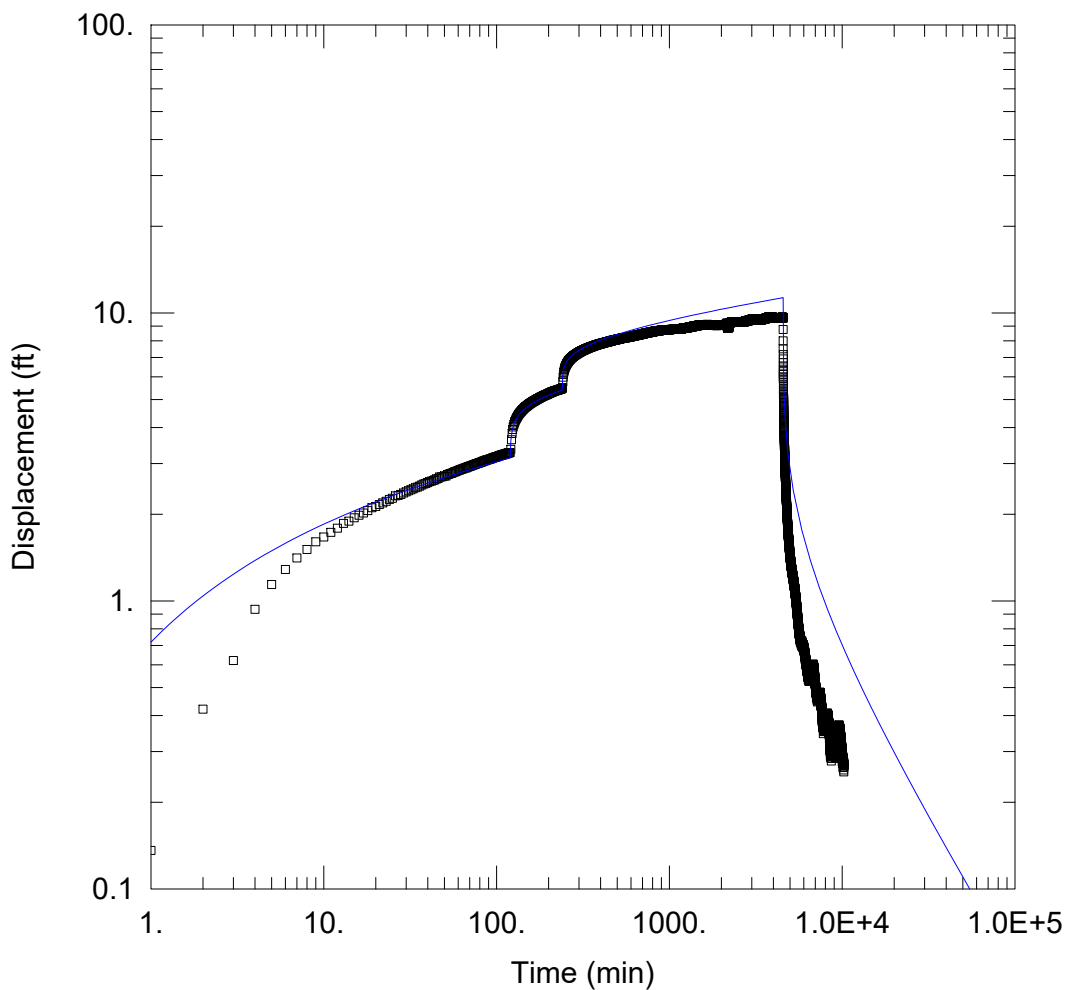
Saturated Thickness: 24. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #1	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
 T = 1209.7 ft²/day S = 0.0003684



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf theis early.aqt

Date: 10/12/17

Time: 13:24:20

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #2	89	0

SOLUTION

Aquifer Model: Confined

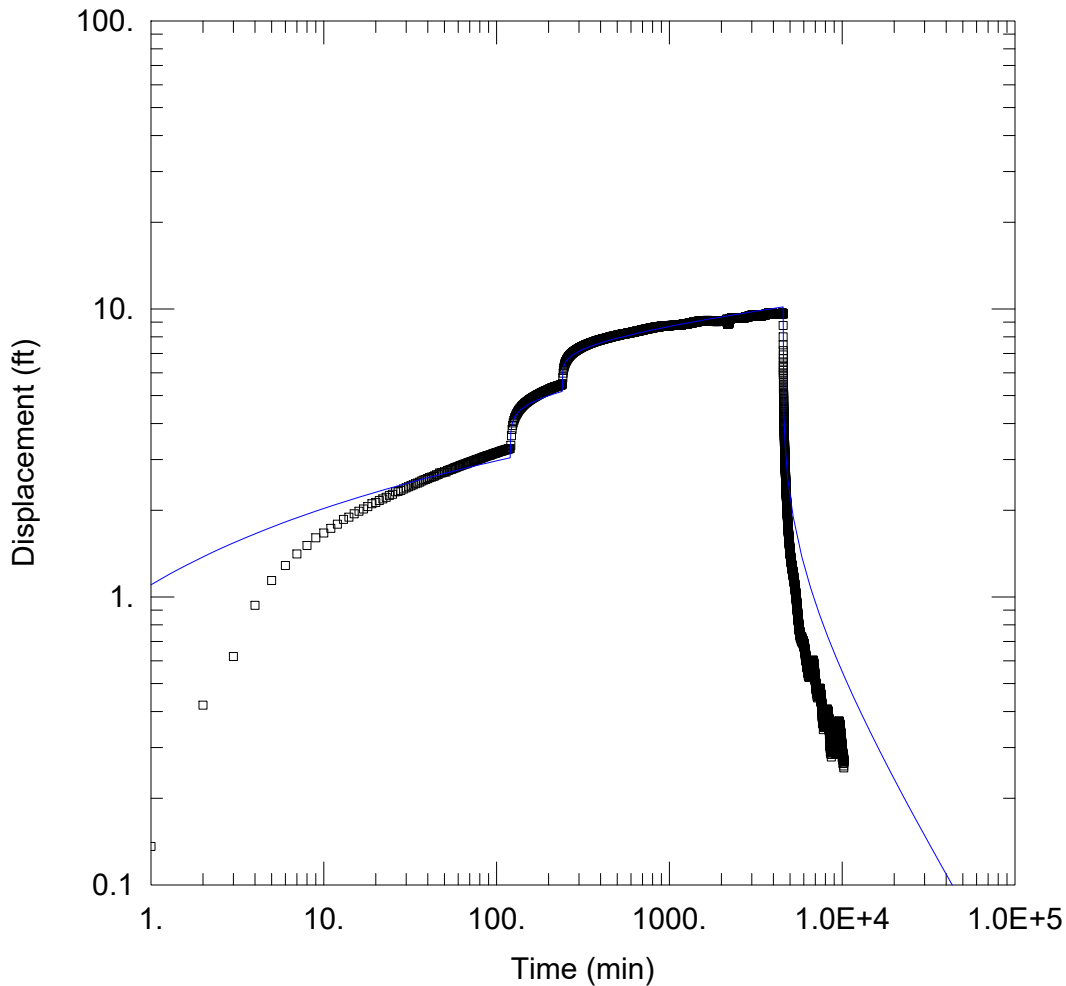
Solution Method: Theis

T = 821.6 ft²/day

S = 4.785E-5

Kz/Kr = 1.

b = 29. ft



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf theis late.aqt
 Date: 10/12/17 Time: 13:25:31

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #2	89	0

SOLUTION

Aquifer Model: Confined

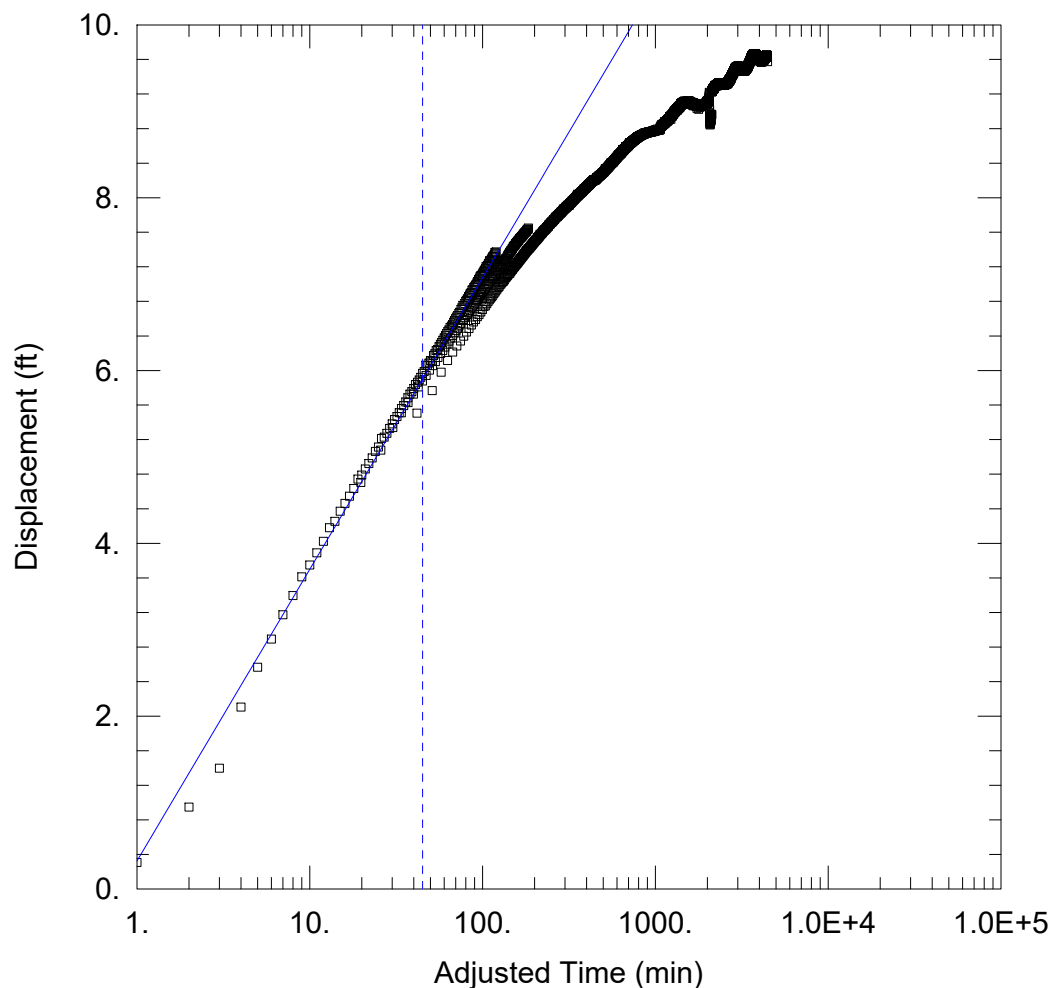
Solution Method: Theis

$T = 1049.9 \text{ ft}^2/\text{day}$

$S = 1.45\text{E-}5$

$Kz/Kr = 1.$

$b = 29. \text{ ft}$



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf CJ early.aqt

Date: 10/12/17

Time: 13:23:27

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 29. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #2	89	0

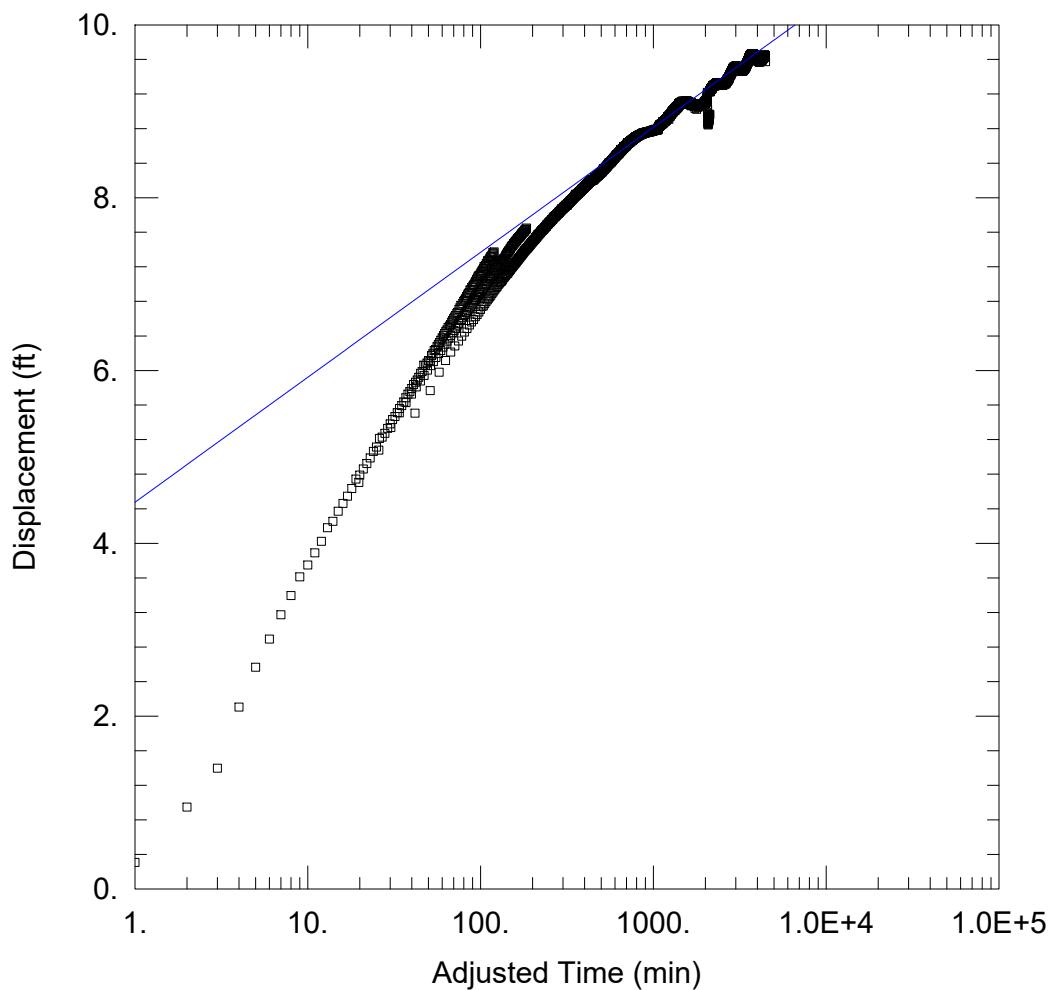
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 658.4 ft²/day

S = 0.000104



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf CJ late.aqt

Date: 10/12/17

Time: 13:23:54

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 29. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #2	89	0

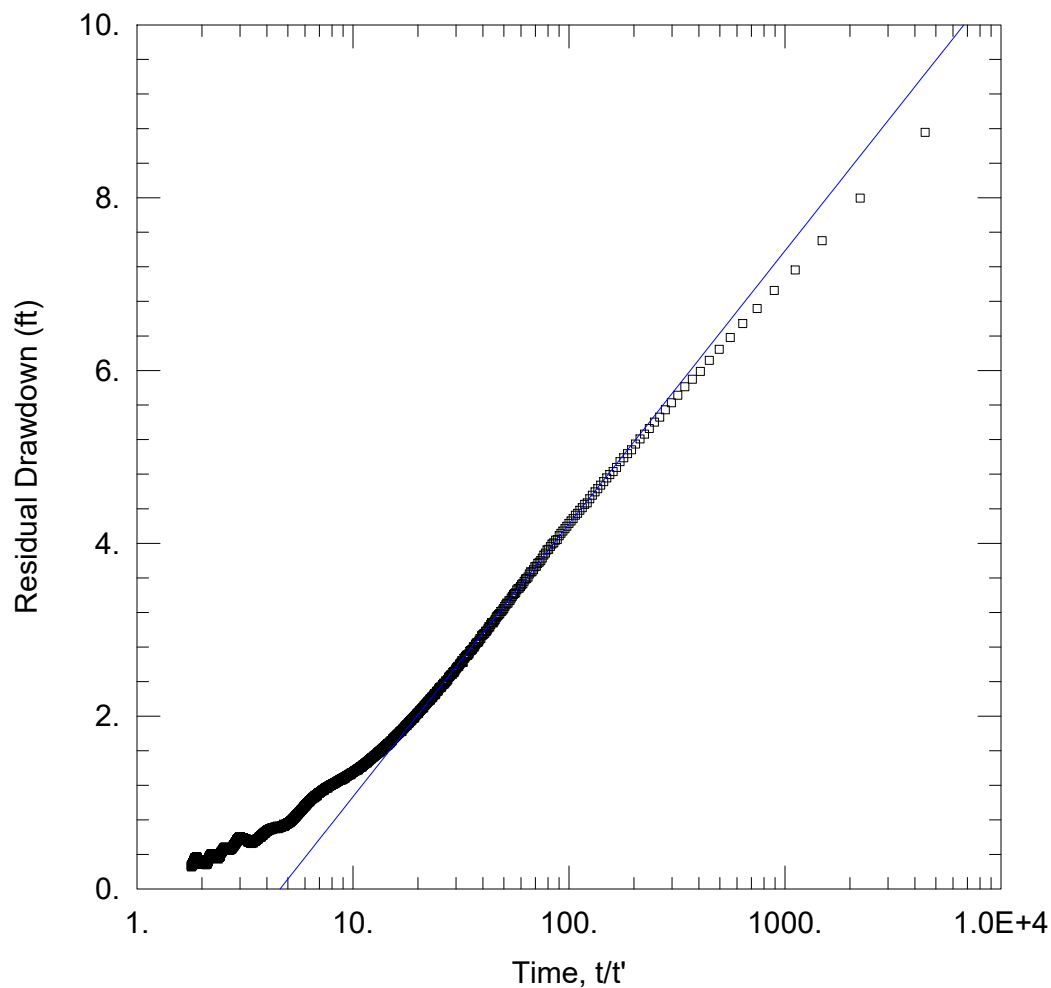
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 1536.4 ft²/day

S = 2.436E-7



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf theis recovery early.aqt

Date: 10/12/17

Time: 13:26:05

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 29. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #2	89	0

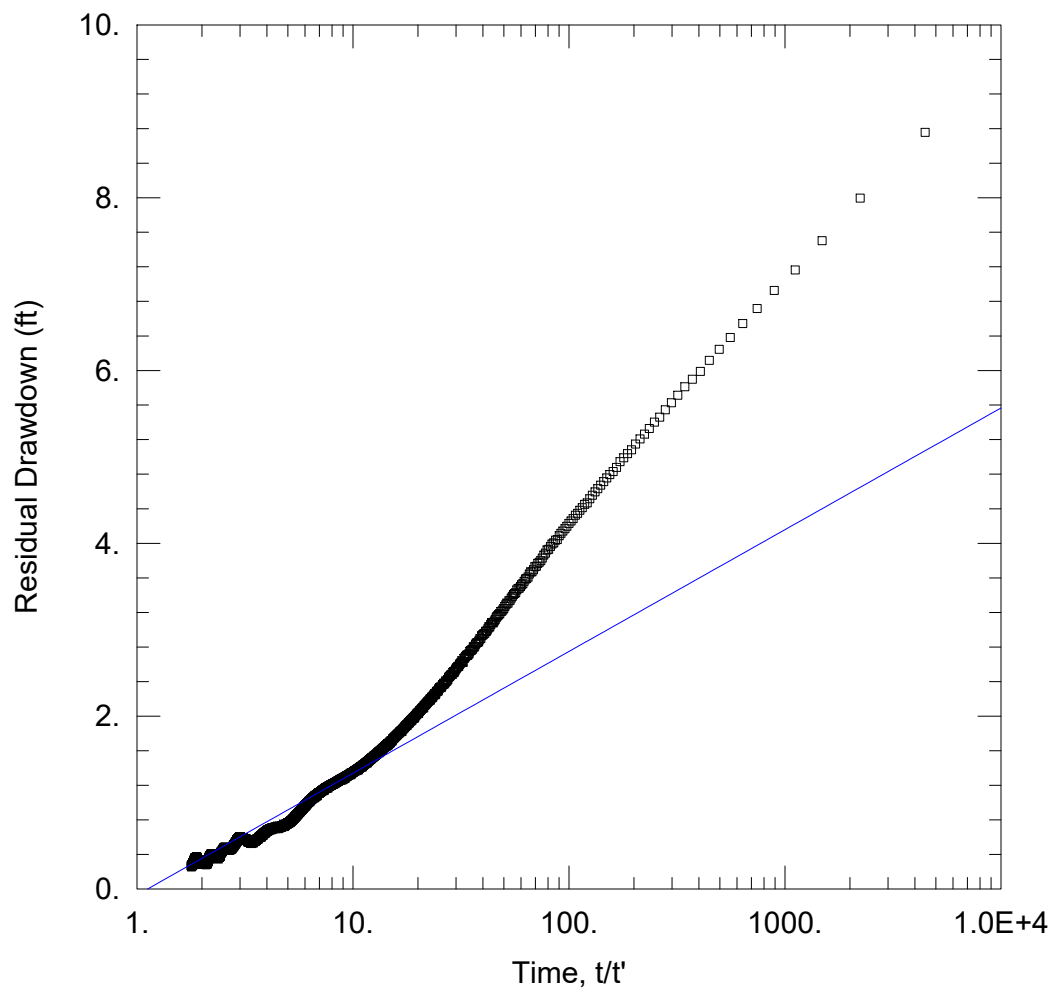
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

$T = 703.5 \text{ ft}^2/\text{day}$

$S/S' = 4.6$



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf theis recovery late.aqt

Date: 10/12/17

Time: 13:26:34

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 29. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #2	89	0

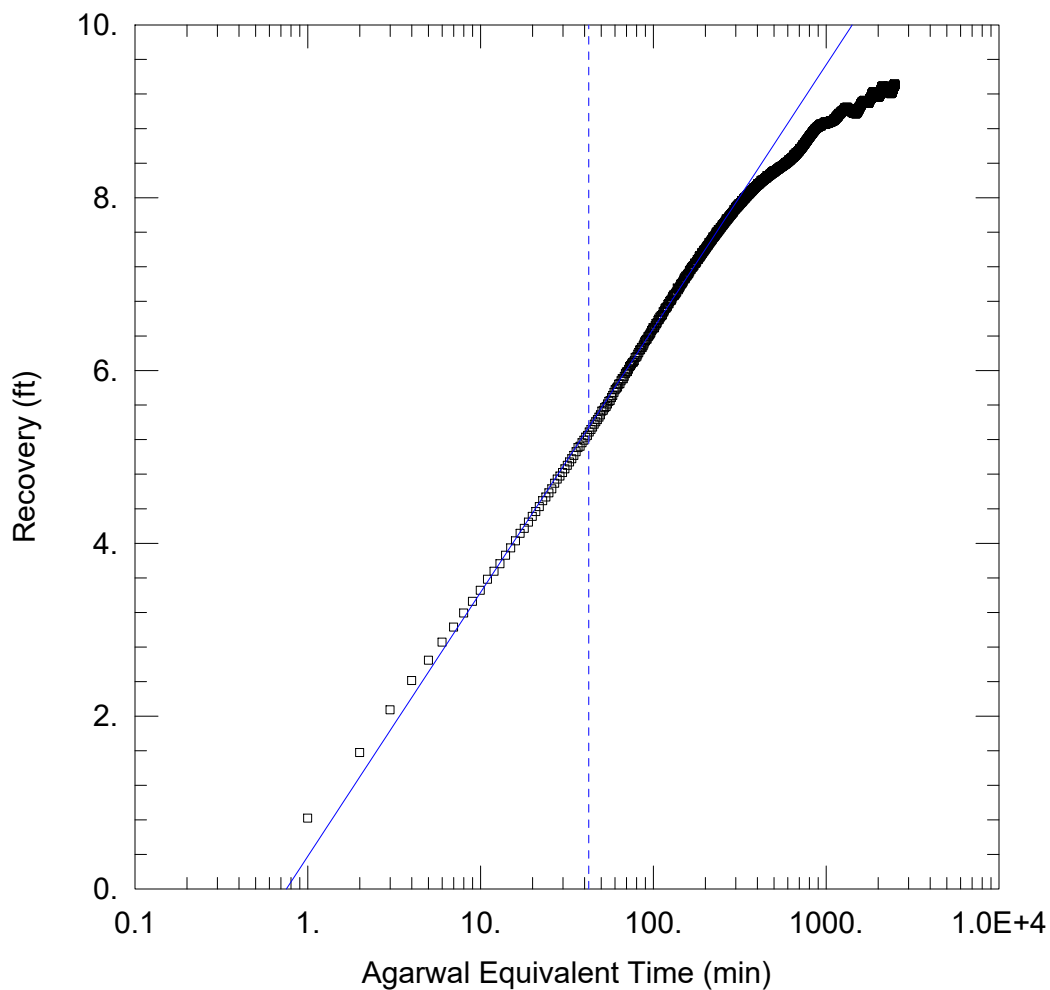
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 1577.3 ft²/day

S/S' = 1.121



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf CJ agarwal recovery early.aqt
 Date: 10/12/17 Time: 13:22:33

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

AQUIFER DATA

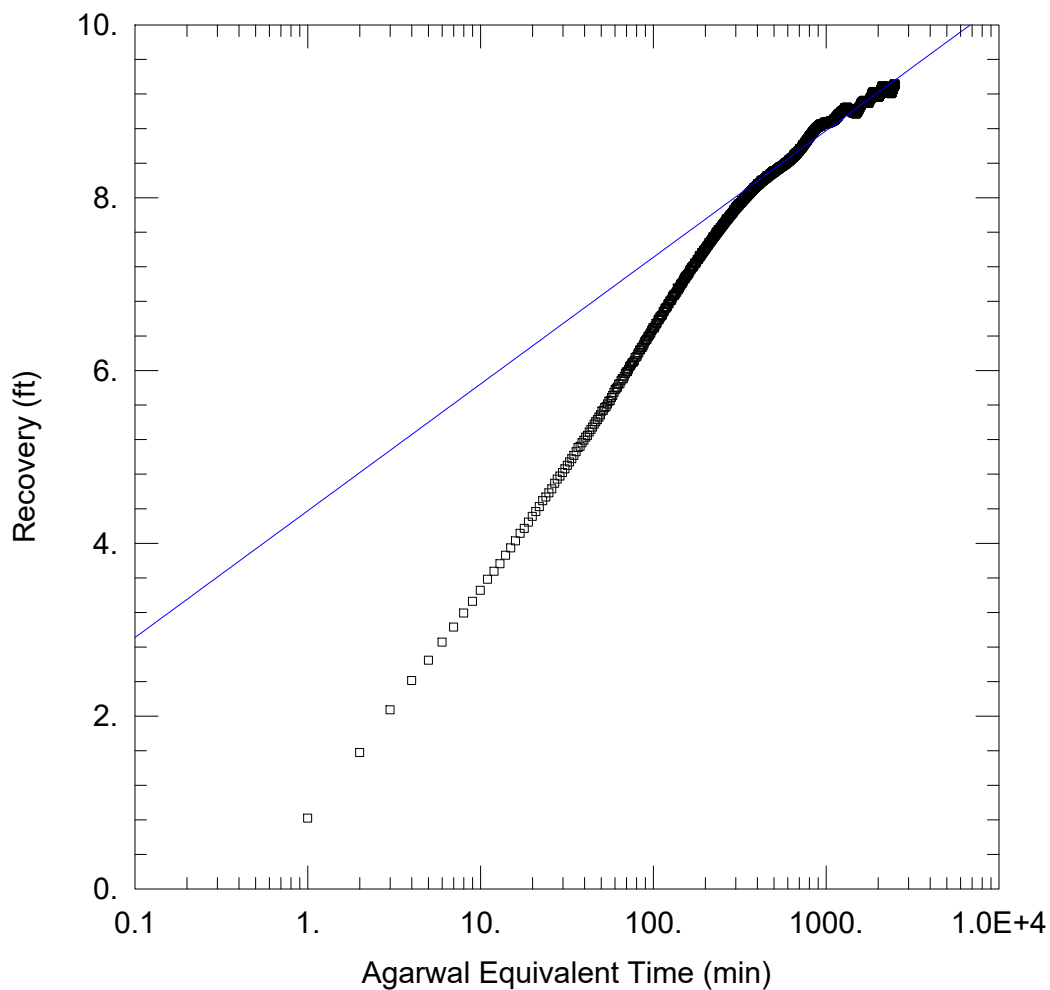
Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #2	89	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
 $T = 727.6 \text{ ft}^2/\text{day}$ $S = 0.0001078$



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #2 obs - Sept2017 - conf CJ agarwal recovery late.aqt
 Date: 10/12/17 Time: 13:23:00

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

AQUIFER DATA

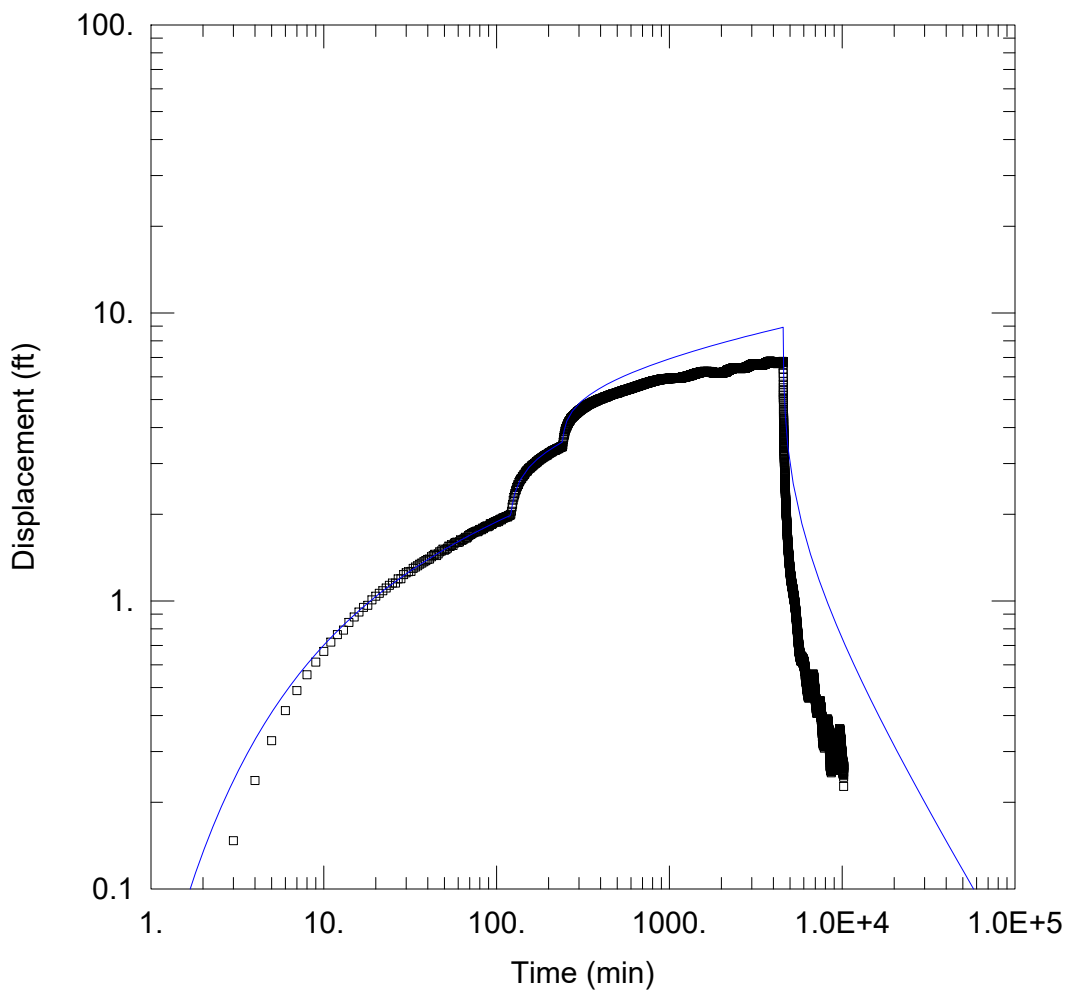
Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #2	89	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
 T = 1514.7 ft²/day S = 3.101E-7



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf theis early.aqt

Date: 10/12/17

Time: 13:30:32

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #3	151	0

SOLUTION

Aquifer Model: Confined

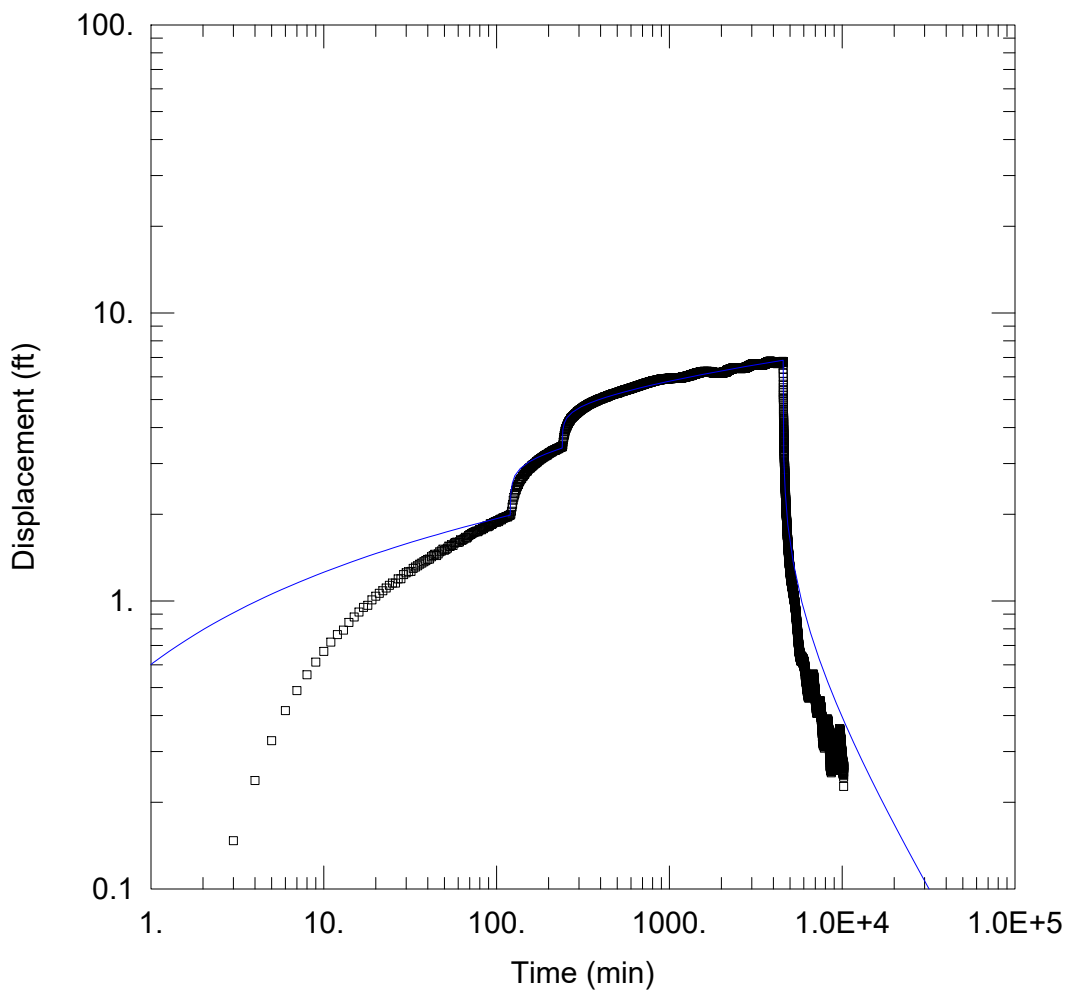
Solution Method: Theis

T = 779. ft²/day

S = 0.0001782

Kz/Kr = 1.

b = 27. ft



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf theis late.aqt

Date: 10/12/17

Time: 13:30:10

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #3	151	0

SOLUTION

Aquifer Model: Confined

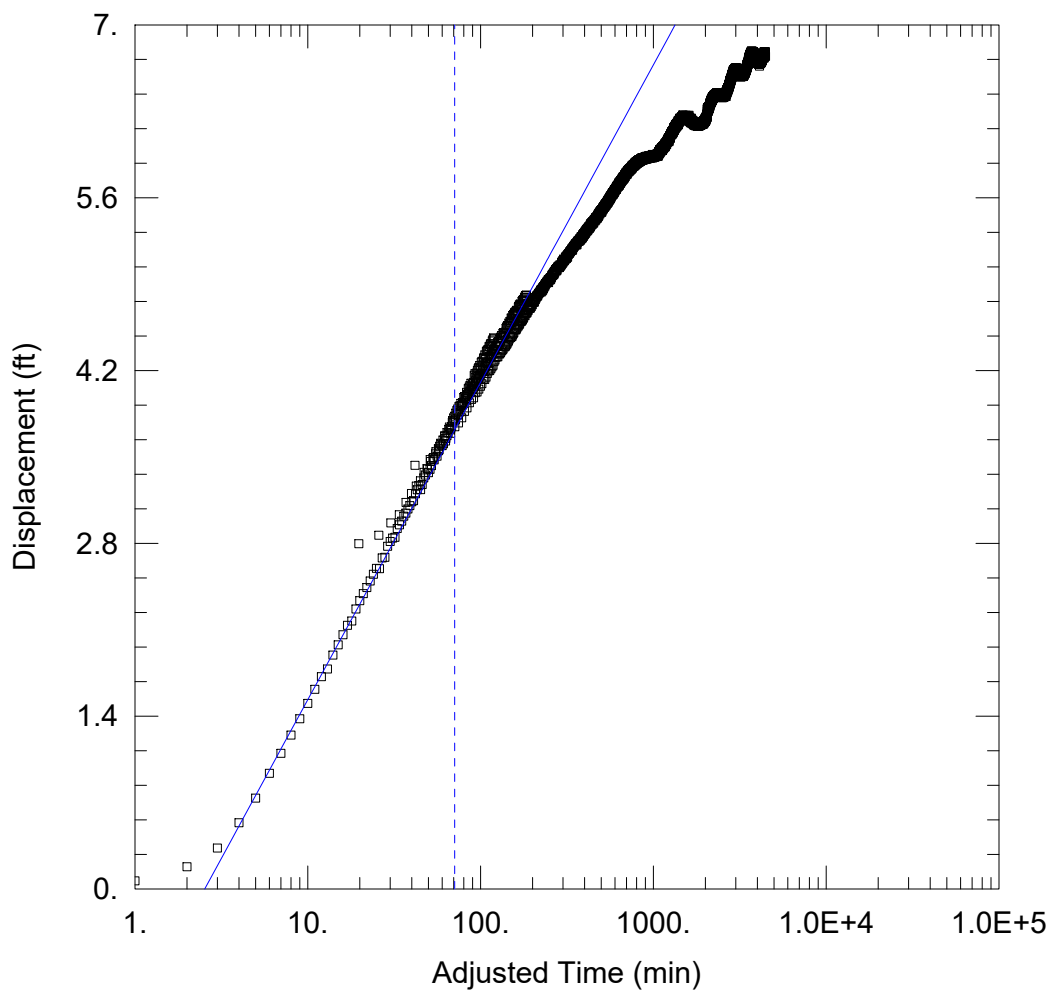
Solution Method: Theis

T = 1461.1 ft²/day

S = 1.39E-5

Kz/Kr = 1.

b = 27. ft



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf CJ early.aqt

Date: 10/12/17

Time: 13:31:19

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 27. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #3	151	0

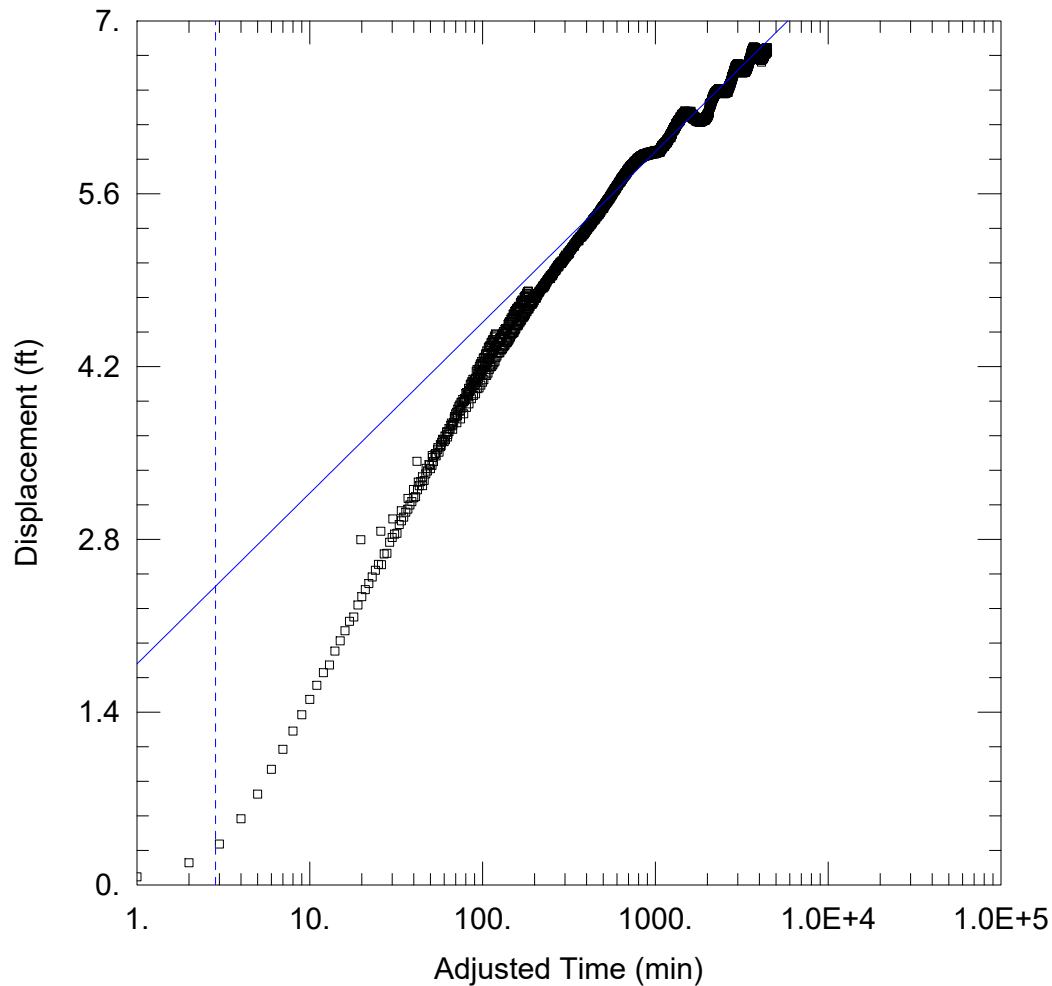
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 864. ft²/day

S = 0.0001499



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf CJ late.aqt

Date: 10/12/17

Time: 13:30:57

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 27. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #3	151	0

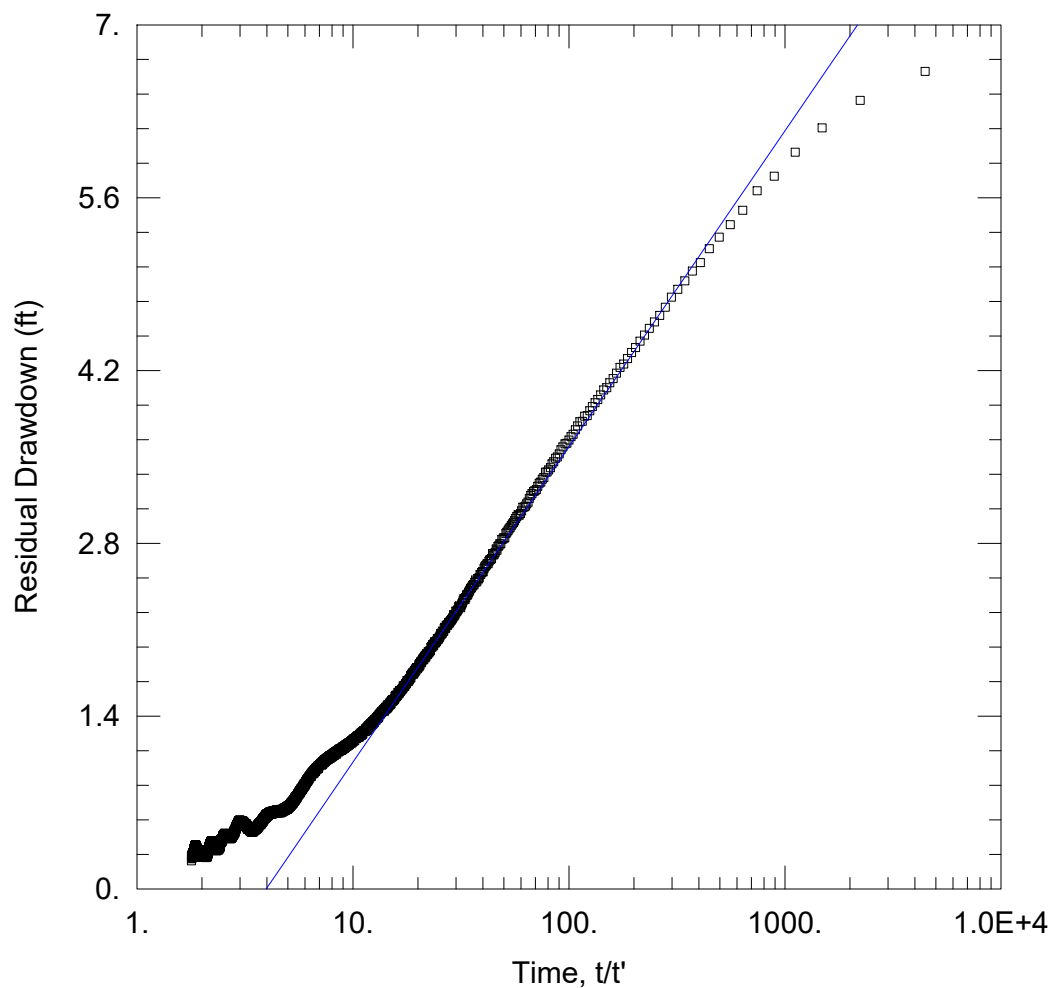
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 1606.4 ft²/day

S = 5.58E-6



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf theis recovery early.aqt

Date: 10/12/17

Time: 13:29:33

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 27. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #3	151	0

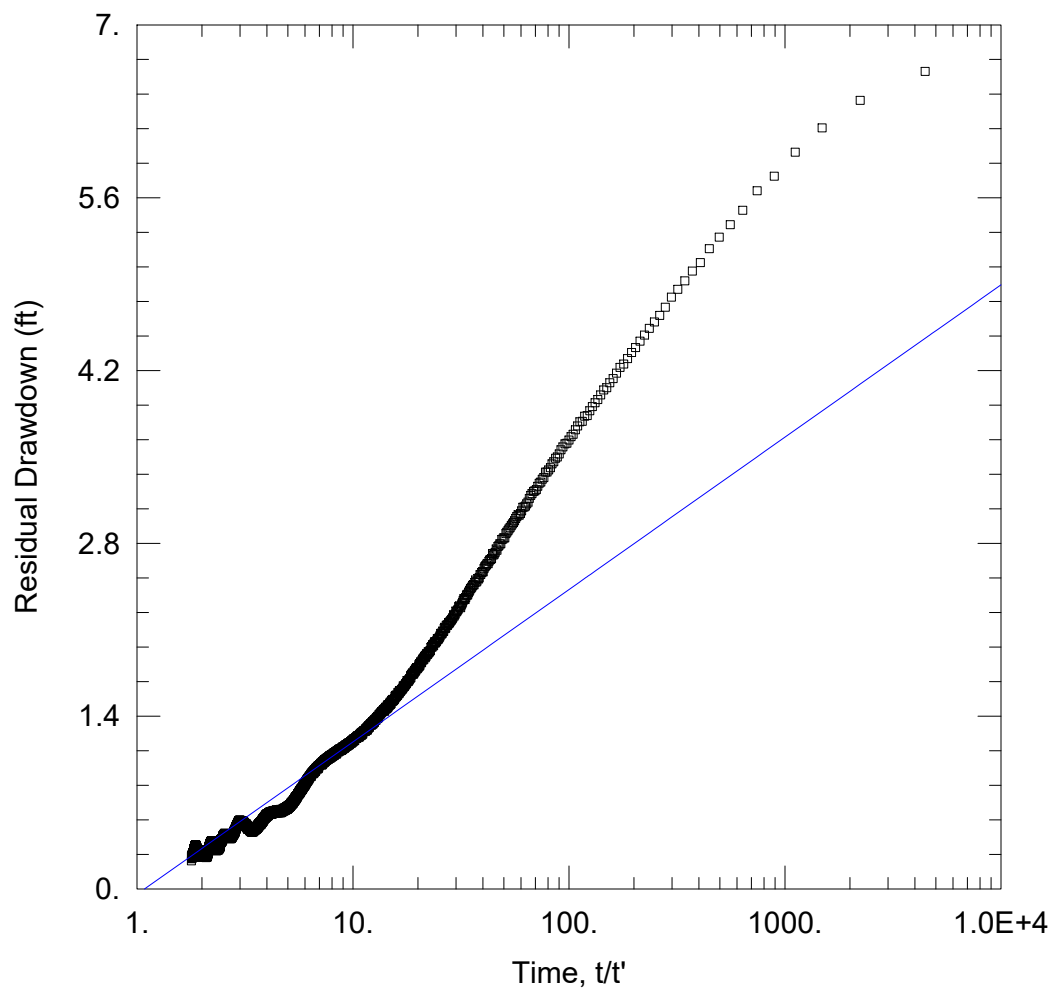
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 869.1 ft²/day

S/S' = 3.969



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf theis recovery late.aqt

Date: 10/12/17

Time: 13:29:10

PROJECT INFORMATION

Company: LBG

Client: Pipestone

Project: PIPSTN.AT

Location: Canistota, SD

Test Well: Well #1

Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 27. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well #1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ Well #3	151	0

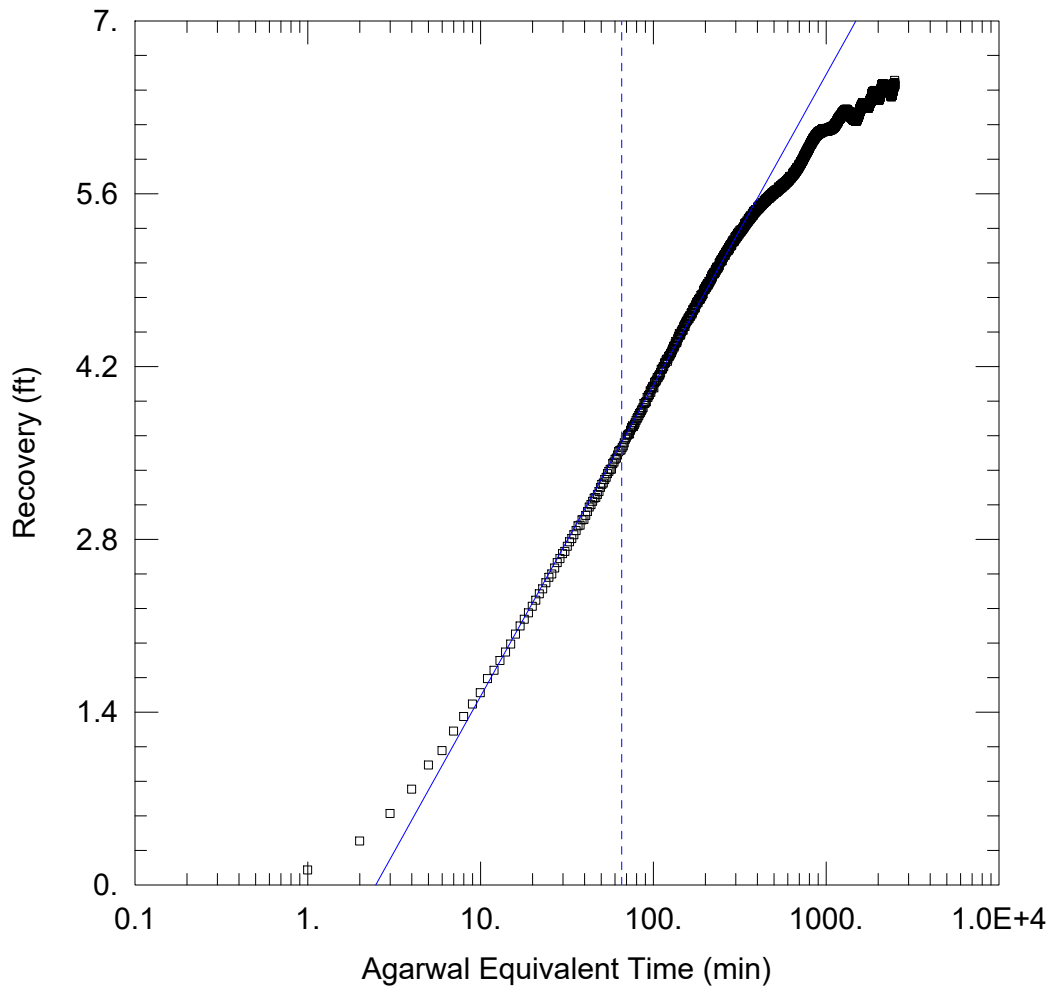
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 1800.6 ft²/day

S/S' = 1.085



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf CJ agarwal recovery early.aqt
 Date: 10/12/17 Time: 13:32:12

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

AQUIFER DATA

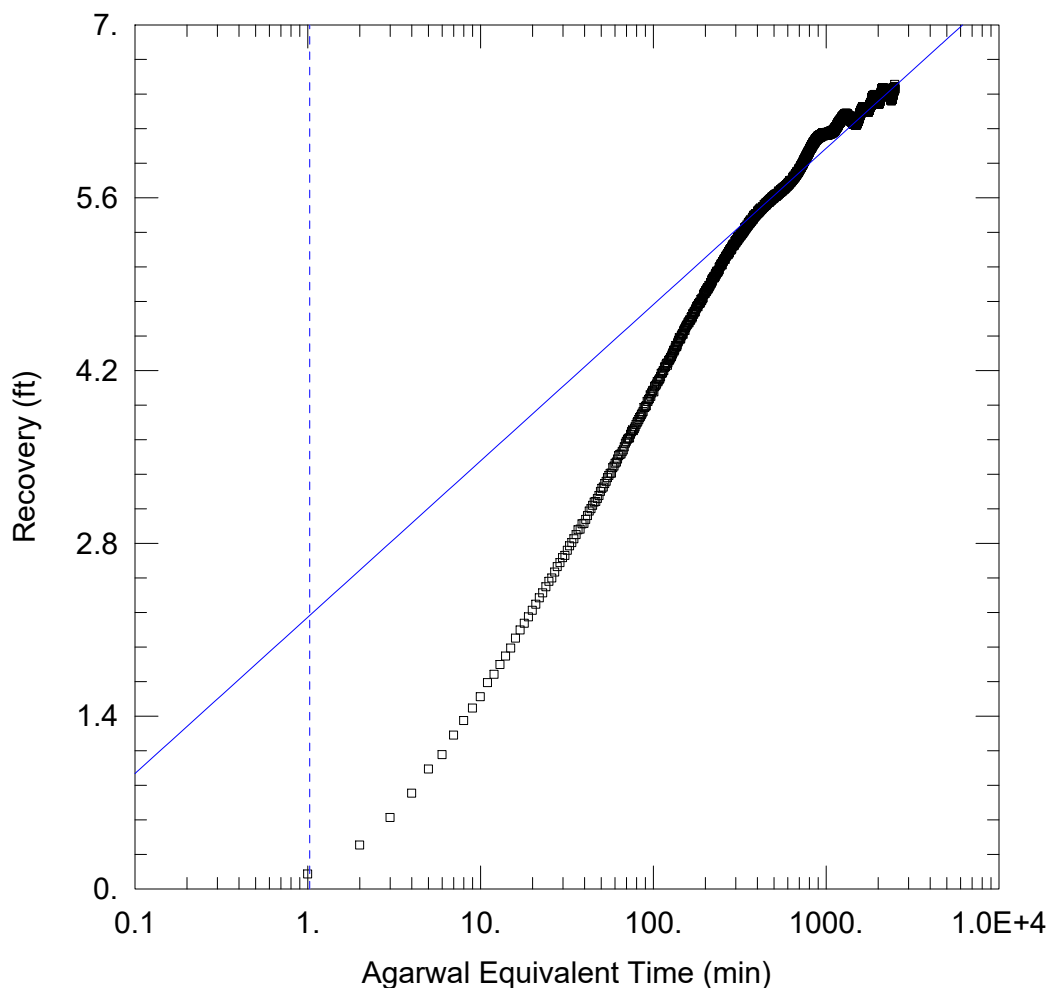
Saturated Thickness: 27. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #3	151	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
 T = 882. ft²/day S = 0.0001494



WELL TEST ANALYSIS

Data Set: S:\...\Well #1 pumping - Well #3 obs - Sept2017 - conf CJ agarwal recovery late.aqt
 Date: 10/12/17 Time: 13:31:46

PROJECT INFORMATION

Company: LBG
 Client: Pipestone
 Project: PIPSTN.AT
 Location: Canistota, SD
 Test Well: Well #1
 Test Date: 9/18/17

AQUIFER DATA

Saturated Thickness: 27. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
Well #1	0	0	□ Well #3	151	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
 T = 1754.7 ft²/day S = 2.195E-6

APPENDIX F

Water Quality Analytical Report



2381 South Plaza Drive P.O. Box 3388 Rapid City, SD 57709
(605) 348-0111 -- www.thechemistrylab.com

LEGGETTE, BRASHEARS & GRAHAM, INC.
140 E. HINKS LANE, SUITE 126
SIOUX FALLS, SD 57104

Sample Site: Well 1
Project Name: Pipestone Dylbrook Farms
Project Number: 0616.PIPSTN.
Sampled: 09/21/17 at 07:15 AM
by R.L.
Sample Matrix: Water

Lab ID#: 20170922501
Received: 09/22/17 at 11:50 AM
by Bob Miller
Account: W1400 - Leggette, Brashears & Graham, Inc.

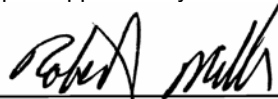
Parameter	Result	Units	DF	MDL	PQL	Method	Analyst/Date	
Physical Properties								
Electrical Conductivity	2040	µmhos/cm	1	0.470	5.00	SM 2510B	JAM	09/27/17
Hardness	47.9	grains/gal	1			SM 2340 B	RAM	09/28/17
Total Dissolved Solids	1500	mg/L	100ml	18.1	50.0	SM 2540 C	TMN	09/24/17
Total Suspended Solids	< 10.0	mg/L	100ml	3.36	10.0	SM 2540 D	TMN	09/22/17
Non-Metallics								
Alkalinity (CaCO3)	339	mg/L	1	0.506	10.0	SM 2320 B	JAM	09/27/17
Bicarbonate	414	mg/L	1	0.618	10.0	SM 2320 B	JAM	09/27/17
Carbonate	0.00	mg/L	1	0.253	5.00	SM 2320 B	JAM	09/27/17
Chloride (Cl-)	11.4	mg/L	1	0.214	0.500	SM 4500-Cl E	EJF	09/23/17
Fluoride	0.434	mg/L	1	0.003	0.050	SM 4500 F-C	KDS	09/26/17
Nitrogen, Ammonia (NH3)	0.748	mg/L	4	0.010	0.200	SM 4500-NH3 D	JAM	09/25/17
Nitrogen, Nitrate (NO3)	< 0.050	mg/L	1	0.008	0.050	SM 4500-NO3 F	EJF	09/23/17
Nitrogen, Nitrite (NO2)	< 0.050	mg/L	1	0.008	0.050	SM 4500-NO2 B	EJF	09/23/17
Sulfate (SO4)	846	mg/L	20	10.6	20.0	SM 4500-SO4 E	EJF	09/23/17
Total Organic Carbon	1.58	mg/L	1			SM 5310 C	JEP	09/26/17
Metals - Dissolved								
Calcium (Ca)	232	mg/L	6	0.187	6.00	SM 3111 B	TMS	09/25/17
Magnesium (Mg)	58.5	mg/L	2	0.082	1.00	SM 3111 B	TMS	09/25/17
Potassium (K)	15.1	mg/L	3	0.060	1.50	SM 3111 B	TMS	09/25/17
Sodium (Na)	144	mg/L	9	0.475	4.50	SM 3111 B	TMS	09/25/17
Metals - Total								
Arsenic (As)	0.008	mg/L	10	0.00047	0.005	EPA 200.8	TNA	09/25/17
Barium (Ba)	0.009	mg/L	10	0.00029	0.005	EPA 200.8	TNA	09/25/17
Chromium (Cr)	< 0.001	mg/L	10	0.000025	0.001	EPA 200.8 DRC	TNA	09/25/17
Iron (Fe)	1.74	mg/L	10			EPA 200.8	TNA	09/25/17
Manganese (Mn)	2.16	mg/L	10	0.000058	0.010	EPA 200.8	TNA	09/25/17
Selenium (Se)	< 0.005	mg/L	10	0.001	0.005	EPA 200.8	TNA	09/25/17
Uranium (U)	0.002	mg/L	10	0.000022	0.001	EPA 200.8	TNA	09/25/17

Parameter	Result	Units	DF	MDL	PQL	Method	Analyst/Date
<u>Bacteria</u>							
E. coli	Absent		1			SM 9223 B (P/A)	JMH 09/22/17
Total Coliform	Absent		1			SM 9223 B (P/A)	JMH 09/22/17
<u>Radiological</u>							
Gross Alpha	3.50	pCi/L	1			EPA 900.0	EJF 10/24/17
Gross Beta	15.6	pCi/L	1			EPA 900.0	EJF 10/24/17
Radium-226	1.14	pCi/L	1			MC Radium-226	EJF 10/25/17
Radium-228	1.31	pCi/L	1			MC Radium-228	EJF 10/25/17
<u>Precision Data</u>							
Gross Alpha precision	± 1.13	pCi/L	1			MC - Gross Alpha precision	EJF 10/24/17
Gross Beta precision	± 1.36	pCi/L	1			MC - Gross Beta precision	EJF 10/24/17
Radium-226 precision	± 0.214	pCi/L	1			MC-Radium 226 precision	EJF 10/25/17
Radium-228 precision	± 0.277	pCi/L	1			MC-Radium 228 precision	EJF 10/25/17
<u>MDA Data</u>							
Gross Alpha MDA	3.50	pCi/L	1			MC - Gross Alpha MDA	EJF 10/24/17
Gross Beta MDA	3.76	pCi/L	1			MC - Gross Beta MDA	EJF 10/24/17
Radium-226 MDA	0.441	pCi/L	1			MC - Radium 226 MDA	EJF 10/25/17
Radium-228 MDA	0.589	pCi/L	1			MC - Radium 228 MDA	EJF 10/25/17

Quality Control Data

Parameter	Result	Limits	DF	Method	Analyst/Date
<u>Total Metals - Internal Std</u>					
Germanium (Ge72)	98.0 %	(60.0 - 125.0) %	10	EPA 200.8	TNA 09/25/17
Germanium (Ge74)	100.3 %	(60.0 - 125.0) %	10	EPA 200.8 DRC	TNA 09/25/17
Bismuth (Bi)	95.3 %	(60.0 - 125.0) %	10	EPA 200.8	TNA 09/25/17
Germanium (Ge72)	99.0 %	(60.0 - 125.0) %	10	EPA 200.8	TNA 09/25/17
Germanium (Ge74)	93.2 %	(60.0 - 125.0) %	10	EPA 200.8 DRC	TNA 09/25/17
Indium (In)	99.2 %	(60.0 - 125.0) %	10	EPA 200.8	TNA 09/25/17
Lithium (Li)	116.3 %	(60.0 - 125.0) %	10	EPA 200.8	TNA 09/25/17
Scandium (Sc)	103.6 %	(60.0 - 125.0) %	10	EPA 200.8	TNA 09/25/17

Report Approved By:



Report Approved On: 10/31/2017 1:21:41 PM



2381 South Plaza Drive P.O. Box 3388 Rapid City, SD 57709
(605) 348-0111 -- www.thechemistrylab.com

Lab Numbers: 20170922501

QC Sample Report

Parameter	Lab#	QC Value	Smp Value	Spike	DF	Result	Limits	Method
Spike								
Chloride	0922202	9.72	4.31	5.00	1	108.2 %	(90.56) - (113.5)	SM 4500-Cl E
DOC	0915208	4.40	2.55	2.00	1	92.4 %	(83.82) - (110.9)	SM 5310 C
Fluoride	0922829	1.02	0.634	0.400	1	96.5 %	(87.00) - (113.5)	SM 4500 F-C
N, Ammonia	0921932	0.535	0.167	0.400	1	92.0 %	(80.54) - (115.7)	SM 4500-NH3 D
N, Ammonia	0922209	0.406	< 0.050	0.400	1	101.4 %	(80.54) - (115.7)	SM 4500-NH3 D
N, Ammonia	0919927	0.402	< 0.050	0.400	1	100.5 %	(80.54) - (115.7)	SM 4500-NH3 D
N, Ammonia	0914905	0.406	0.045	0.400	1	90.2 %	(80.54) - (115.7)	SM 4500-NH3 D
N, Nitrate	0922203	1.08	0.713	0.400	1	91.0 %	(89.76) - (109.4)	SM 4500-NO3 F
N, Nitrate	0925103	0.428	0.004	0.400	1	106.0 %	(89.76) - (109.4)	SM 4500-NO3 F
N, Nitrate	0922501	0.398	< 0.050	0.400	1	99.5 %	(89.76) - (109.4)	SM 4500-NO3 F
N, Nitrite	0925103	0.425	0.004	0.400	1	105.3 %	(89.72) - (106.6)	SM 4500-NO2 B
- within 10%								
N, Nitrite	0922501	0.433	< 0.050	0.400	1	108.3 %	(89.72) - (106.6)	SM 4500-NO2 B X
- Result is within QC guidelines of 90 - 110%								
Sulfate	0922501	1160	846	19.2	20	90.7 %	(89.25) - (112.4)	SM 4500-SO4 E
- within 10%								
TOC	0922501	3.59	1.58	2.00	1	100.6 %	(84.11) - (107.5)	SM 5310 C
Calcium - D	0922501	334	232	10.0	10	102.8 %	(86.40) - (117.7)	SM 3111 B
Magnesium - D	0922501	165	58.5	10.0	10	106.4 %	(86.54) - (119.0)	SM 3111 B
Potassium - D	0922501	46.2	15.1	3.00	10	103.5 %	(83.89) - (117.4)	SM 3111 B
Sodium - D	0922501	192	144	5.00	10	96.4 %	(83.64) - (117.8)	SM 3111 B
Arsenic - T	0920976	0.253	< 0.005	0.025	10	101.3 %	(81.95) - (117.5)	EPA 200.8
Barium - T	0920976	0.287	0.042	0.025	10	98.1 %	(84.08) - (109.9)	EPA 200.8
Chromium - T	0920976	0.227	< 0.001	0.025	10	90.9 %	(87.14) - (112.2)	EPA 200.8 DRC
Iron - T	0920976	1.15	< 0.050	0.125	10	92.0 %	(85.07) - (114.2)	EPA 200.8
Manganese - T	0920976	0.244	< 0.010	0.025	10	97.8 %	(82.77) - (116.4)	EPA 200.8
Selenium - T	0920976	1.24	< 0.005	0.125	10	99.4 %	(78.90) - (111.3)	EPA 200.8
Uranium - T	0920976	0.248	< 0.001	0.025	10	99.0 %	(91.05) - (119.6)	EPA 200.8
Gross Alpha	0912904	17.8	3.50	10.0	1	143.1 %	(31.45) - (174.3)	EPA 900.0
Gross Beta	0912904	20.6	13.4	10.0	1	72.4 %	(50.18) - (123.4)	EPA 900.0
Radium-226	0922501	5.17	1.14	4.00	1	100.7 %	(64.92) - (126.6)	MC Radium-226
Radium-228	0922501	6.35	1.31	4.00	1	126.1 %	(58.98) - (145.2)	MC Radium-228
Matrix Spike Duplicate								
Chloride	0922202	9.82	9.72		1	1.02%	(-6.118) - (9.806)	SM 4500-Cl E
DOC		4.39	4.40		1	-0.159%	(-10.27) - (8.122)	SM 5310 C
Fluoride	0922829	1.07	1.02	0.400	1	4.78%	(-4.826) - (4.674)	SM 4500 F-C X
- Recovery was within 10% of expected value								

Parameter	Lab#	QC Value	Smp Value	Spike	DF	Result	Limits	Method
Matrix Spike Duplicate								
N, Ammonia	0919927	0.403	0.402		1	0.298%	(-7.164) - (8.461)	SM 4500-NH3 D
N, Ammonia	0921932	0.525	0.535		1	-1.91%	(-7.164) - (8.461)	SM 4500-NH3 D
N, Nitrate	0925103	0.427	0.428		1	-0.234%	(-7.958) - (6.084)	SM 4500-NO3 F
N, Nitrate	0922203	1.16	1.08		1	7.16%	(-7.958) - (6.084)	SM 4500-NO3 F X
N, Nitrate	0922501	0.413	0.398		1	3.70%	(-7.958) - (6.084)	SM 4500-NO3 F
N, Nitrite	0925103	0.424	0.425		1	-0.236%	(-5.435) - (5.109)	SM 4500-NO2 B
N, Nitrite	0922501	0.430	0.433		1	-0.695%	(-5.435) - (5.109)	SM 4500-NO2 B
Sulfate	0922501	1150	1160		20	-0.858%	(-2.887) - (5.268)	SM 4500-SO4 E
TOC		3.68	3.59		1	2.48%	(-6.547) - (4.226)	SM 5310 C
Calcium - D	0922501	327	334		10	-2.22%	(-6.296) - (5.779)	SM 3111 B
Magnesium - D	0922501	163	165		10	-1.05%	(-4.663) - (4.107)	SM 3111 B
Potassium - D	0922501	46.0	46.2		10	-0.391%	(-3.429) - (3.181)	SM 3111 B
Sodium - D	0922501	194	192		10	0.772%	(-4.915) - (5.300)	SM 3111 B
Arsenic - T	0920976	0.261	0.253		10	2.95%	(-7.940) - (10.98)	EPA 200.8
Barium - T	0920976	0.285	0.287		10	-0.752%	(-8.691) - (10.68)	EPA 200.8
Chromium - T	0920976	0.218	0.227		10	-4.13%	(-7.133) - (8.208)	EPA 200.8 DRC
Iron - T	0920976	1.11	1.15		10	-3.41%	(-8.409) - (9.362)	EPA 200.8
Manganese - T	0920976	0.246	0.244		10	0.563%	(-9.491) - (9.562)	EPA 200.8
Selenium - T	0920976	1.27	1.24		10	2.43%	(-8.613) - (11.71)	EPA 200.8
Uranium - T	0920976	0.244	0.248		10	-1.63%	(-7.254) - (6.233)	EPA 200.8
Gross Alpha		10.5	10.1		1	3.99%	(-18.44) - (14.26)	EPA 900.0
Gross Beta		7.38	8.52		1	-14.3 %		EPA 900.0
Radium-226	0922501	5.00	5.17		1	-3.29%	(-14.72) - (27.24)	MC Radium-226
Radium-228	0922501	6.24	6.35		1	-1.78%	(-30.32) - (34.25)	MC Radium-228
Duplicate								
Conductivity	0922501	2010	2040		1	-1.48%	(-2.181) - (1.926)	SM 2510B
Conductivity	0926898	488	487		1	0.205%	(-2.181) - (1.926)	SM 2510B
Conductivity	0926102	2750	2760		1	-0.363%	(-2.181) - (1.926)	SM 2510B
TDS	0922501	1490	1500		100ml	-1.27%	(-10.78) - (11.56)	SM 2540 C
TSS	0922912	38.0	37.0		200ml	2.67%	(-19.00) - (26.86)	SM 2540 D
TSS	0922501	< 10.0	< 10.0		100ml	0.00%	(-19.00) - (26.86)	SM 2540 D
Alkalinity	0922501	335	339		1	-1.19%	(-3.477) - (2.793)	SM 2320 B
Bicarbonate	0922501	409	414		1	-1.22%	(-5.222) - (4.964)	SM 2320 B
Carbonate	0922501	0.00	0.00		1	0.00%	(-11.59) - (12.50)	SM 2320 B
Initial Calibration Verification								
Conductivity		452	497		1	-9.05%	(-15.41) - (6.915)	SM 2510B
Chloride		25.4	25.0		1	1.52%	(-12.05) - (15.09)	SM 4500-Cl E
Fluoride		0.397	0.400		1	-0.750%	(-10.80) - (6.223)	SM 4500 F-C
N, Ammonia		0.412	0.400		1	3.10%	(-9.739) - (8.839)	SM 4500-NH3 D
N, Nitrate		1.01	1.00		1	0.700%	(-4.728) - (7.738)	SM 4500-NO3 F
N, Nitrite		0.992	1.00		1	-0.800%	(-2.597) - (2.387)	SM 4500-NO2 B
Sulfate		52.3	50.0		1	4.54%	(0.9420) - (8.369)	SM 4500-SO4 E
TOC		9.70	10.0		1	-3.03%	(-11.59) - (6.236)	SM 5310 C
Arsenic - D		0.050	0.050		1	-0.220%	(-6.932) - (9.604)	EPA 200.8

Parameter	Lab#	QC Value	Smp Value	Spike	DF	Result	Limits	Method	
Initial Calibration Verification									
Barium - D		0.051	0.050		1	1.76%	(-6.654) - (9.696)	EPA 200.8	
Chromium - D		0.048	0.050		1	-5.08%	(-7.449) - (12.55)	EPA 200.8 DRC	
Iron - D		0.240	0.250		1	-4.12%	(-7.679) - (10.83)	EPA 200.8	
Manganese - D		0.050	0.050		1	-0.640%	(-5.438) - (8.942)	EPA 200.8	
Selenium - D		0.247	0.250		1	-1.39%	(-6.095) - (7.027)	EPA 200.8	
Uranium - D		0.050	0.050		1	-0.760%	(-9.350) - (13.25)	EPA 200.8	
Continuing Calibration Verification									
Conductivity		1430	1410		1	0.991%	(-9.457) - (5.134)	SM 2510B	
TDS		904	1000	100ml		-9.60%	(-10.83) - (4.238)	SM 2540 C	
TSS		49.0	50.0	100ml		-2.00%	(-15.53) - (6.929)	SM 2540 D	
Alkalinity		101	106		1	-4.64%	(-8.513) - (1.966)	SM 2320 B	
Alkalinity		101	106		1	-4.45%	(-8.513) - (1.966)	SM 2320 B	
Chloride		25.3	25.0		1	1.04%	(-7.166) - (5.078)	SM 4500-Cl E	
Fluoride		0.504	0.500		1	0.800%	(-8.411) - (16.30)	SM 4500 F-C	
Fluoride		1.02	1.00		1	2.00%	(-8.411) - (16.30)	SM 4500 F-C	
N, Ammonia		0.469	0.500		1	-6.18%	(-14.78) - (7.762)	SM 4500-NH3 D	
N, Ammonia		0.092	0.100		1	-8.10%	(-14.78) - (7.762)	SM 4500-NH3 D	
N, Ammonia		0.100	0.100		1	-0.300%	(-14.78) - (7.762)	SM 4500-NH3 D	
N, Ammonia		0.378	0.400		1	-5.43%	(-14.78) - (7.762)	SM 4500-NH3 D	
N, Ammonia		1.01	1.00		1	1.10%	(-14.78) - (7.762)	SM 4500-NH3 D	
N, Nitrate		1.05	1.00		1	4.90%	(-4.280) - (5.140)	SM 4500-NO3 F	
N, Nitrate		0.982	1.00		1	-1.80%	(-4.280) - (5.140)	SM 4500-NO3 F	
N, Nitrate		1.01	1.00		1	0.600%	(-4.280) - (5.140)	SM 4500-NO3 F	
N, Nitrite		0.908	1.00		1	-9.20%	(-3.225) - (5.155)	SM 4500-NO2 B	X
- Recovery was within 10% of expected value									
N, Nitrite		0.920	1.00		1	-8.00%	(-3.225) - (5.155)	SM 4500-NO2 B	X
- Recovery was within 10% of expected value									
Sulfate		53.1	50.0		1	6.22%	(1.200) - (7.794)	SM 4500-SO4 E	
TOC		9.85	10.0		1	-1.55%	(-12.68) - (9.668)	SM 5310 C	
TOC		9.91	10.0		1	-0.910%	(-12.68) - (9.668)	SM 5310 C	
Arsenic - D		0.005	0.005		1	-0.800%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.019	0.020		1	-5.55%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.010	0.010		1	-2.10%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.050	0.050		1	0.700%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.098	0.100		1	-1.89%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.002	0.002		1	-2.00%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.050	0.050		1	-0.960%	(-12.10) - (13.04)	EPA 200.8	
Arsenic - D		0.050	0.050		1	-0.720%	(-12.10) - (13.04)	EPA 200.8	
Barium - D		0.005	0.005		1	0.00%	(-5.167) - (4.686)	EPA 200.8	
Barium - D		0.051	0.050		1	2.02%	(-5.167) - (4.686)	EPA 200.8	
Barium - D		0.002	0.002		1	-2.50%	(-5.167) - (4.686)	EPA 200.8	
Barium - D		0.010	0.010		1	1.50%	(-5.167) - (4.686)	EPA 200.8	
Barium - D		0.020	0.020		1	-0.800%	(-5.167) - (4.686)	EPA 200.8	
Barium - D		0.101	0.100		1	0.520%	(-5.167) - (4.686)	EPA 200.8	
Calcium - D		25.1	25.0		1	0.280%	(-3.455) - (5.463)	SM 3111 B	

Parameter	Lab#	QC Value	Smp Value	Spike	DF	Result	Limits	Method
Continuing Calibration Verification								
Calcium - D		25.2	25.0		1	0.760%	(-3.455) - (5.463)	SM 3111 B
Chromium - D		0.098	0.100		1	-2.12%	(-11.24) - (11.92)	EPA 200.8 DRC
Chromium - D		0.020	0.020		1	-0.350%	(-11.24) - (11.92)	EPA 200.8 DRC
Chromium - D		0.005	0.005		1	-3.40%	(-11.24) - (11.92)	EPA 200.8 DRC
Chromium - D		0.002	0.002		1	-4.00%	(-11.24) - (11.92)	EPA 200.8 DRC
Chromium - D		0.010	0.010		1	-0.100%	(-11.24) - (11.92)	EPA 200.8 DRC
Chromium - D		0.046	0.050		1	-7.30%	(-11.24) - (11.92)	EPA 200.8 DRC
Iron - D		0.024	0.025		1	-3.12%	(-12.47) - (13.78)	EPA 200.8
Iron - D		0.050	0.050		1	-0.560%	(-12.47) - (13.78)	EPA 200.8
Iron - D		0.492	0.500		1	-1.69%	(-12.47) - (13.78)	EPA 200.8
Iron - D		0.230	0.250		1	-7.88%	(-12.47) - (13.78)	EPA 200.8
Iron - D		0.099	0.100		1	-1.30%	(-12.47) - (13.78)	EPA 200.8
Iron - D		0.010	0.010		1	-2.80%	(-12.47) - (13.78)	EPA 200.8
Magnesium - D		24.9	25.0		1	-0.280%	(-1.271) - (5.011)	SM 3111 B
Magnesium - D		25.5	25.0		1	1.88%	(-1.271) - (5.011)	SM 3111 B
Manganese - D		0.005	0.005		1	1.00%	(-9.479) - (10.25)	EPA 200.8
Manganese - D		0.049	0.050		1	-1.42%	(-9.479) - (10.25)	EPA 200.8
Manganese - D		0.002	0.002		1	1.50%	(-9.479) - (10.25)	EPA 200.8
Manganese - D		0.096	0.100		1	-4.47%	(-9.479) - (10.25)	EPA 200.8
Manganese - D		0.010	0.010		1	2.50%	(-9.479) - (10.25)	EPA 200.8
Manganese - D		0.020	0.020		1	1.90%	(-9.479) - (10.25)	EPA 200.8
Potassium - D		4.94	5.00		1	-1.20%	(-11.02) - (5.904)	SM 3111 B
Potassium - D		4.99	5.00		1	-0.200%	(-11.02) - (5.904)	SM 3111 B
Selenium - D		0.024	0.025		1	-3.12%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.009	0.010		1	-7.30%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.250	0.250		1	-0.064%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.049	0.050		1	-1.78%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.251	0.250		1	0.260%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.248	0.250		1	-0.656%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.096	0.100		1	-4.40%	(-12.61) - (12.63)	EPA 200.8
Selenium - D		0.490	0.500		1	-1.94%	(-12.61) - (12.63)	EPA 200.8
Sodium - D		14.2	15.0		1	-5.07%	(-5.388) - (5.034)	SM 3111 B
Sodium - D		14.5	15.0		1	-3.40%	(-5.388) - (5.034)	SM 3111 B
Uranium - D		0.002	0.002		1	-4.00%	(-12.59) - (6.806)	EPA 200.8
Uranium - D		0.010	0.010		1	1.70%	(-12.59) - (6.806)	EPA 200.8
Uranium - D		0.020	0.020		1	-1.35%	(-12.59) - (6.806)	EPA 200.8
Uranium - D		0.005	0.005		1	-0.800%	(-12.59) - (6.806)	EPA 200.8
Uranium - D		0.051	0.050		1	1.16%	(-12.59) - (6.806)	EPA 200.8
Radium-226		10100	10200		1	-0.930%	(-2.343) - (1.692)	MC Radium-226
Radium-226		10200	10200		1	0.176%	(-2.313) - (1.494)	MC Radium-226
Radium-226		10300	10200		1	0.577%	(-2.308) - (1.485)	MC Radium-226
Radium-228		10100	10300		1	-2.18%	(-10.58) - (7.748)	MC Radium-228
Radium-228		9830	10300		1	-4.54%	(-10.03) - (7.509)	MC Radium-228
Radium-228		10000	10300		1	-2.95%	(-10.33) - (7.641)	MC Radium-228

Parameter	Lab#	QC Value	Smp Value	Spike	DF	Result	Limits	Method
Lab Fortified Blank								
Arsenic - T		0.049	0.00	0.005	10	97.1 %	(87.18) - (112.6)	EPA 200.8
Barium - T		0.051	0.00	0.005	10	101.2 %	(92.88) - (108.6)	EPA 200.8
Chromium - T		0.047	0.00	0.005	10	94.7 %	(92.78) - (109.6)	EPA 200.8 DRC
Iron - T		0.238	0.00	0.025	10	95.1 %	(93.03) - (111.5)	EPA 200.8
Manganese - T		0.050	0.00	0.005	10	98.9 %	(93.74) - (115.5)	EPA 200.8
Selenium - T		0.249	0.00	0.025	10	99.78%	(84.09) - (113.8)	EPA 200.8
Uranium - T		0.050	0.00	0.005	10	99.54%	(92.71) - (116.8)	EPA 200.8
Gross Alpha		10.1	0.00	10.0	1	101.3 %	(83.65) - (121.5)	EPA 900.0
Gross Beta		8.52	0.00	10.0	1	85.2 %		EPA 900.0
Radium-226		4.57	0.00	4.00	1	114.2 %	(89.22) - (138.7)	MC Radium-226
Radium-228		5.01	0.00	4.00	1	125.4 %	(79.57) - (152.8)	MC Radium-228
Initial Calibration Blank								
Conductivity		0.500	0.00		1	0.5	(-0.1473) - (1.097)	SM 2510B
Alkalinity		1.94	0.00		1	1.94	(-2.120) - (6.850)	SM 2320 B
Chloride		0.280	0.00		1	0.28	(-0.4035) - (0.7828)	SM 4500-Cl E
Fluoride		0.007	0.00		1	0.007	(0.0011) - (0.0102)	SM 4500 F-C
N, Ammonia		0.019	0.00		1	0.0192	(0.0148) - (0.0225)	SM 4500-NH3 D
N, Nitrate		0.014	0.00		1	0.014	(-0.0270) - (0.0275)	SM 4500-NO3 F
N, Nitrite		0.00	0.00		1	0	(-0.0035) - (0.0068)	SM 4500-NO2 B
Sulfate		0.850	0.00		1	0.85	(0.4760) - (1.428)	SM 4500-SO4 E
TOC		0.033	0.00		1	0.033	(-0.1496) - (0.1795)	SM 5310 C
Continuing Calibration Blank								
Conductivity		0.500	0.00		1	0.5	(-0.1293) - (0.9593)	SM 2510B
TDS		-4.00	0.00		100ml	-4	(-17.91) - (16.41)	SM 2540 C
TSS		-2.00	0.00		100ml	-2	(-7.732) - (3.932)	SM 2540 D
Alkalinity		2.20	0.00		1	2.2	(-0.7790) - (5.311)	SM 2320 B
Chloride		-0.960	0.00		1	-0.96	(-0.1329) - (0.2939)	SM 4500-Cl E X
- Blank value is less than half of the reporting limit								
Fluoride		0.007	0.00		1	0.007	(0.0015) - (0.0109)	SM 4500 F-C
N, Ammonia		0.013	0.00		1	0.0126	(0.0076) - (0.0247)	SM 4500-NH3 D
N, Ammonia		0.003	0.00		1	0.0025	(0.0076) - (0.0247)	SM 4500-NH3 D X
- Blank value is less than half of the reporting limit								
N, Ammonia		0.018	0.00		1	0.0179	(0.0076) - (0.0247)	SM 4500-NH3 D
N, Ammonia		0.014	0.00		1	0.0137	(0.0076) - (0.0247)	SM 4500-NH3 D
N, Nitrate		0.044	0.00		1	0.044	(-0.0047) - (0.0059)	SM 4500-NO3 F X
- Blank is less than reporting limit.								
N, Nitrate		0.045	0.00		1	0.045	(-0.0047) - (0.0059)	SM 4500-NO3 F X
- Blank is less than reporting limit.								
N, Nitrate		0.049	0.00		1	0.049	(-0.0047) - (0.0059)	SM 4500-NO3 F X
- Blank is less than reporting limit.								
N, Nitrite		0.006	0.00		1	0.006	(-0.0046) - (0.0090)	SM 4500-NO2 B
N, Nitrite		0.008	0.00		1	0.008	(-0.0046) - (0.0090)	SM 4500-NO2 B
- blank value is less than half of the reporting limit								
Sulfate		0.780	0.00		1	0.78	(-0.1024) - (2.548)	SM 4500-SO4 E

Parameter	Lab#	QC Value	Smp Value Spike	DF	Result	Limits	Method
Continuing Calibration Blank							
TOC		0.100	0.00	1	0.1	(-0.1143) - (0.2051)	SM 5310 C
TOC		0.014	0.00	1	0.014	(-0.1143) - (0.2051)	SM 5310 C
Arsenic - D		0.000	0.00	1	0.00007	(-0.0004) - (0.0004)	EPA 200.8
Barium - D		0.000	0.00	1	0.00008	(0.0000) - (0.0001)	EPA 200.8
Calcium - D		0.030	0.00	1	0.03	(-0.0502) - (0.1162)	SM 3111 B
Calcium - D		0.090	0.00	1	0.09	(-0.0502) - (0.1162)	SM 3111 B
Chromium - D		0.000	0.00	1	0.00003	(0.0000) - (0.0001)	EPA 200.8 DRC
Iron - D		0.000	0.00	1	0.00029	(-0.0002) - (0.0005)	EPA 200.8
Magnesium - D		0.040	0.00	1	0.04	(-0.0432) - (0.0962)	SM 3111 B
Magnesium - D		0.050	0.00	1	0.05	(-0.0432) - (0.0962)	SM 3111 B
Manganese - D		0.000	0.00	1	0.00009	(0.0000) - (0.0001)	EPA 200.8
Potassium - D		-0.090	0.00	1	-0.09	(-0.2400) - (0.1220)	SM 3111 B
Potassium - D		-0.090	0.00	1	-0.09	(-0.2400) - (0.1220)	SM 3111 B
Selenium - D		0.000	0.00	1	-0.00009	(-0.0003) - (0.0005)	EPA 200.8
Sodium - D		-0.020	0.00	1	-0.02	(-0.0379) - (0.0679)	SM 3111 B
Sodium - D		-0.020	0.00	1	-0.02	(-0.0379) - (0.0679)	SM 3111 B
Uranium - D		0.000	0.00	1	0.00009	(-0.0001) - (0.0001)	EPA 200.8
Lab Reagent Blank							
Arsenic - D		< 0.005		10	0	(0.000) - (0.000)	EPA 200.8
Barium - D		< 0.005		10	0	(0.000) - (0.000)	EPA 200.8
Chromium - D		< 0.001		10	0	(0.000) - (0.000)	EPA 200.8 DRC
Iron - D		< 0.050		10	0	(0.000) - (0.000)	EPA 200.8
Manganese - D		< 0.010		10	0	(0.000) - (0.000)	EPA 200.8
Selenium - D		< 0.005		10	0	(0.000) - (0.000)	EPA 200.8
Uranium - D		< 0.001		10	0	(0.000) - (0.000)	EPA 200.8
Gross Alpha		-0.152	0.00	1	-0.152	(-1.108) - (0.8550)	EPA 900.0
Gross Beta		-0.631	0.00	1	-0.631		EPA 900.0
Radium-226		0.00	0.00	1	0	(-0.6090) - (1.087)	MC Radium-226
Radium-228		0.396	0.00	1	0.396	(-0.8229) - (1.260)	MC Radium-228

Approved By: _____



Approved On: 09/28/2017 12:15 PM

[illegible]

WHITE - Project File YELLOW - Laboratory PINK - Shipping Record

**Water Quality Parameters for Pipestone Dylbrook Farms Pump Test
(one sample)**

Analyte	Units	MCL	Secondary MCL
PHYSICAL PROPERTIES			
Electrical Conductivity	umhos/cm		
Hardness	grains/gallon		
Total Dissolved Solids	mg/L		500
Total Suspended Solids	mg/L		
RADIONUCLIDES			
Gross Alpha	pCi/L	15	
Gross Beta	pCi/L	See Notes	
Radium 226	pCi/L		
Radium 228	pCi/L		
Combined Radium (226 + 228)	pCi/L	5	
Uranium, Total	mg/L	0.030	
BACTERIA			
Total Coliform	MPN/100 ml		
E. coli	MPN/100 ml		
NON-METALLICS			
Total Alkalinity (as CaCO ₃)	mg/L		
Bicarbonate	mg/L		
Carbonate	mg/L		
Chloride	mg/L		250
Fluoride	mg/L	4	2
Ammonia-Nitrogen as N	mg/L		
Nitrate as N	mg/L	10	
Nitrite as N	mg/L	1	
Sulfate	mg/L		250
Total Organic Carbon	mg/L		
METALS, TOTAL			
Arsenic - Total	mg/L	0.010	
Barium - Total	mg/L	2	
Chromium - Total	mg/L	0.1	
Iron - Total	mg/L		0.3
Manganese - Total	mg/L		0.05
Selenium - Total	mg/L	0.05	
METALS, DISSOLVED			
Calcium - Dissolved	mg/L		
Magnesium - Dissolved	mg/L		
Potassium - Dissolved	mg/L		
Sodium - Dissolved	mg/L		

NOTES:

MCL = EPA maximum contaminant level

mg/L = milligrams per liter

MPN/100 ml = Most Probable Number per 100 milliliters

pCi/L = picocuries per liter

umhos/cm = micro Mhos per centimeter

The MCL for gross beta emitters is 4 millirems per year. In South Dakota, 50 pCi/L is used as a screening level. If the screening level is exceeded, additional information is required to determine if the beta particles and photon emitters concentration exceeds the



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
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PIERRE SOUTH DAKOTA 57501-3182
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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 8280-3, Dylbrook Farms RE, LLC**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 8280-3, Dylbrook Farms RE, LLC, PO Box 188, Pipestone MN 56164.

The Chief Engineer is recommending APPROVAL of Application No. 8303-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and, 4) it is in the public interest with the following qualifications:

1. The wells approved under Water Permit No. 8280-3 will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner, under these Permits shall control withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. Water Permit No. 8280-3 is subject to compliance with requirements of the Department's Water Pollution Control Permit issued pursuant to SDCL 34A-2-36 or 34A-2-112 for concentrated animal feeding operations.
3. Water Permit No. 8280-3 is subject to compliance with all existing and applicable Water Management Board Rules including but not limited to:
 - a) Chapter 74:54:01 Ground Water Quality Standards,
 - b) Chapter 74:54:02 Ground Water Discharge Permit,
 - c) Chapter 74:51:01 Surface Water Quality Standards,
 - d) Chapter 74:51:02 Uses Assigned to Lakes,
 - e) Chapter 74:51:03 Uses Assigned to Streams, and
 - f) Chapter 74:52:01 through 74:52:11 Surface Water Discharge Provisions

(continued)

4. The Permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Cretaceous aged undifferentiated sandstone.
5. Water Permit No. 8280-3 authorizes a total annual diversion of 121 acre feet of water.
6. The permit holder for Water Permit No. 8280-3 shall contract with a licensed well driller to construct an observation well that will become part of the South Dakota Department of Environment and Natural Resources Observation Well Network. The observation well must be completed into the same aquifer as the production wells and shall be located in the public right of water or a perpetual easement granted to the State for the purpose of maintaining an observation well on property owned by the permit holder. The observation well construction shall be coordinated with the DENR-Water Rights Program staff.

See report on application for additional information.

A handwritten signature in black ink, appearing to read "Jeanne Goodman". The signature is fluid and cursive, with the first name "Jeanne" being more prominent than the last name "Goodman".

Jeanne Goodman, Chief Engineer
April 9, 2018

NOTE: DENR is willing to discuss suitable locations for the observation well. For specific information regarding the requirement to complete an observation well, please contact Whitney Kilts at (605) 773-3352.

Amended Report to the Chief Engineer
Water Permit Application No. 8280-3
Dylbrook Farms
March 20, 2017

Water Permit Application No. 8280-3 for Dylbrook Farms c/o Barry Kerkaert proposes to appropriate water at a maximum instantaneous diversion rate of 0.22 cubic feet per second (cfs) and a maximum annual appropriation of 121 acre-feet per year. The diversion points for this application are three wells completed into an undifferentiated sandstone of Cretaceous age located in the SE ¼ SW ¼ Section 9 in T102N-R54W in McCook County. The water is for commercial use in a swine farrowing facility located in SE ¼ SW ¼ Section 9 in T102N-R54W.

Water Source: a Cretaceous aged undifferentiated sandstone

Background

Water Permit Application No. 8280-3 was submitted April 20, 2017. The two well completion reports for this application report “coarse sand” occurring from 271 to 300 feet below grade and 260 to 284 feet below grade. One of the well completion reports for this application reported “granite” at 300 feet below grade; this “granite” is interpreted as Sioux Quartzite. Based on the information available at the time of the application’s initial submission, three possible identifications for the “coarse sand” were identified, (1) a weathering surface on the Sioux Quartzite, (2) a portion of the Sioux Quartzite that is naturally less cemented than commonly observed in the geologic unit, or (3) as part of the shales, sands, marls, and chinks referred to as “Cretaceous undifferentiated” (Holmes, 2017). The conclusion of Water Rights Staff Engineer Kilts was that sufficient information was not available to evaluate the application pursuant to the requirements of SDCL 46-2A-9 in regard to availability of unappropriated water and unlawful impairment of existing rights. The Chief Engineer contacted the applicant and indicated the recommendation on the application would be deferral for the collection of additional information. The applicant decided to put the application on hold to allow for the collection of additional information.

In regard to the collection of additional information, Water Rights staff engineers recommended first identification of the “coarse sand” as either part of the Sioux Quartzite or as Cretaceous undifferentiated. Water Rights staff also indicated that the identification of the “coarse sand” as part of the shales, sands, marls, and chinks referred to as “Cretaceous undifferentiated” would likely result in further work being required. A third well was drilled by the applicant in July 2017 with a representative of the South Dakota Geological Survey on site to examine the “coarse sand” and to conduct a geophysical logging of the borehole (Schulz, 2017). This work indicated that the “coarse sand” was best identified as a Cretaceous aged undifferentiated sandstone. Water Rights and South Dakota Geological Survey staff then both recommended that the applicant retain the services of a qualified and experienced hydrogeology firm to further evaluate the water source. The applicant hired Leggette, Brashears & Graham

(LBG) to conduct and analyze an aquifer pumping test on their behalf, which is presented in LBG (2017).

Hydrogeology and Aquifer Characteristics

During the Cretaceous age the midcontinental United States and Canada were variably inundated by the Western Interior Seaway. The approximate maximum area in which the seaway was located is shown in Figure 1, however the sea had five major transgressions during the Cretaceous age. In southeast South Dakota, southwest Minnesota, and northwest Iowa, there is a topographic high in the Sioux Quartzite. This Sioux Quartzite highland acted as an island in the interior sea (Kairo, 1987).

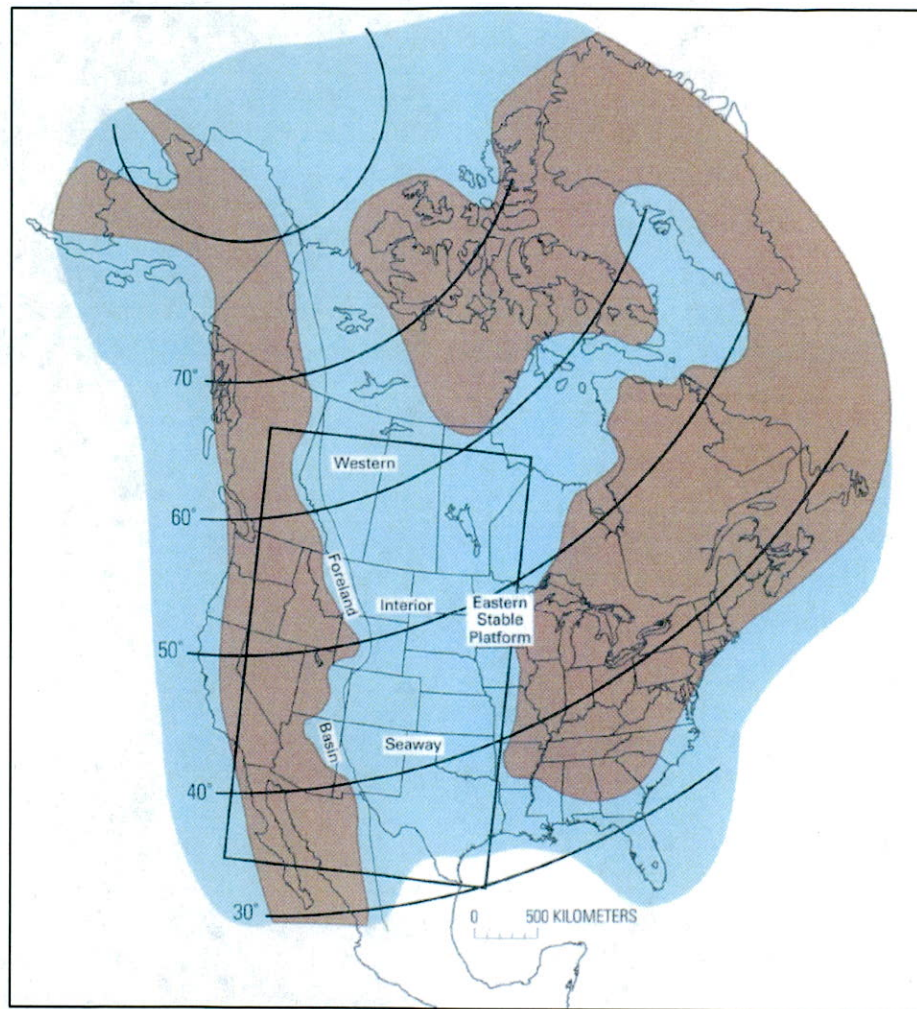


Figure 1: Approximate maximum extent of the Cretaceous age Western Interior Seaway (Roberts and Kirschbaum, 1995)

As Southeastern South Dakota was inundated, the marine waters flooded valleys in the quartzite highland forming marine embayments, parts of the highland became shoreline, and shallower marine areas surrounded the highland (Holzheimer, 1987; Kairo, 1987). This resulted in localized impacts on sedimentation so the Cretaceous aged deposits on and around the Sioux

Quartzite highland vary lithologically from the adjacent open marine deposits (Kairo, 1987). The Cretaceous aged deposits of differing lithology are collectively referred to as Cretaceous undifferentiated. The Cretaceous section of the Sioux Ridge portion of the South Dakota Stratigraphic Correlation Chart is shown in Figure 2.

SIOUX RIDGE			
GROUP	FORMATION	MEMBER	INFORMAL UNIT NAME
Montana	Pierre Shale	Elk Butte	
		Mobridge	
		Virgin Creek	
		Verendrye	
		DeGrey	
		Crow Creek	
		Gregory	
Colorado	Niobrara	Sharon Springs	
		Smoky Hill Chalk	
	Carlile Shale	Fort Hays Limestone	
		Unnamed shale	
		Codell Sandstone	
		Blue Hill Shale	
		Fairport Chalk	
Graneros	Belle Fourche Shale	Graneros Shale	
	Mowry Shale		
	Newcastle Sandstone	Dakota Sandstone	
	Skull Creek Shale		
Inyan Kara	Fall River Sandstone		
	Lakota		

Figure 2: Cretaceous section of Sioux Ridge portion of the South Dakota Stratigraphic Correlation Chart (modified from Fahrenbach et al, 2010)

Within the Cretaceous undifferentiated material in South Dakota, the Water Rights Program currently identifies one named aquifer. The Split Rock Creek aquifer is located primarily in southeastern Minnehaha County and extends into adjacent states (Kairo, 1987). The Split Rock Creek Formation primarily consists of embayment deposits of a specific sequence of Cretaceous aged materials (Tomhave, 1994). Another aquifer name has also been applied to geologic material that could potentially be Cretaceous undifferentiated in nature, the Sioux Quartzite Wash aquifer. Hansen (1986) describes the Sioux Quartzite Wash aquifer as being composed of pink, uncemented, well rounded and well-sorted quartzose sand. The Sioux Quartzite Wash aquifer has been identified as being present in several counties in South Dakota

including McCook County (Water Rights, 2018a and 2018b; Hansen, 1986). However, its extent within McCook County has not been delineated. Additionally, due to its nature the Sioux Quartzite Wash aquifer is unlikely to be a single continuous aquifer, but instead be various isolated pockets of Sioux Quartzite Wash that in some locations can yield sufficient quantities of water to be considered an aquifer.

As previously noted, a third well was completed for this application with a representative of the South Dakota Geological Survey on site to examine the “coarse sand” and to conduct a geophysical logging of the borehole. The bedrock portion of the lithologic log is shown in Table 1. Based on the well completion report for well #3, the driller placed well screen from 273 to 300 feet below grade. In this interval, the sandstones are likely the primary aquifer material. Neither the Sioux Quartzite Wash aquifer nor the Split Rock Creek aquifer appeared to be an appropriate identifier for the screened material based on currently available information. Thus, the water source for this application is identified as a Cretaceous aged undifferentiated sandstone that is able to produce sufficient water to be considered an aquifer. The “coarse sand” of well #1 and well #2 are likely to be similar in nature to the lithology presented in Table 1, rather than coarse sand.

Table 1: Bedrock Portion of the Lithologic log for Dylbrook Well #3 (modified from Schulz, 2017)

Elevation (ft)	Depth (ft)	Description
1264-1253	263-274	SILTSTONE, BLACK, HARD, MUCH DRILL CHATTER; SOME WHITE CHALK IN CUTTINGS (CRETACEOUS UNDIFFERENTIATED SEDIMENTS)
1253-1246	274-281	SANDSTONE, BROWN TO WHITE, FINE TO VERY FINE GRAINED; SOME FINE PINK SAND IN DRILLING MUD (CRETACEOUS UNDIFFERENTIATED SANDSTONE EMBAYMENT DEPOSIT)
1246 - 1243	281 - 284	CLAY, BLACK, ORGANIC, MUCH VERY FINE LIGHT PINK SAND IN MATRIX (CRETACEOUS UNDIFFERENTIATED)
1243 - 1227	284 - 300	SANDSTONE, CLEAR TO LIGHT PINK, FINE TO VERY FINE GRAINED, SOMEWHAT FRIABLE; DRILLED FAIRLY EASY (CRETACEOUS UNDIFFERENTIATED SANDSTONE)
1228 - 1227	299 - 300	QUARTZITE, VERY HARD LAYER, DID NOT PENETRATE, PSUEDO END DEPTH (SIOUX QUARTZITE)

The 2004 map of the bedrock surface in Eastern South Dakota showed a relatively limited area of Cretaceous undifferentiated bedrock in McCook County (Tomhave and Schulz, 2004). Drilling done in McCook County since 2004 and the evolving interpretation of Cretaceous geology in the vicinity of the Sioux Ridge indicates the Cretaceous undifferentiated is more widespread than previously mapped (SDGS, 2018; Holmes et al, 2018). However, the shales, sands, marls, sandstones, siltstone, and chinks of the Cretaceous undifferentiated cannot be considered a single continuous aquifer, and the full extent to which any of these can function as aquifers is unknown. The extent of any hydraulic connection between the various geologic materials of Cretaceous undifferentiated is unknown. Additionally, of the various geologic materials of Cretaceous undifferentiated only sands, sandstones, and chinks typically have the

potential to have sufficient porosity to yield adequate amounts of water to be considered an aquifer.

Information is not available in sufficient detail to delineate the extent of the specific sandstone that the wells for this application are completed into. The sandstone appears to be in a slight low in the Sioux Quartzite, and it appears that the sandstone could potentially be of a fairly limited extent (SDGS, 2018). Another possibility is other SDGS testholes in the area indicate sandy units at a similar elevation or at slightly higher elevations directly overlying the Sioux Quartzite that if significantly hydraulically connected could contribute additional aerial extent to the aquifer (SDGS, 2018). One of these is SDGS testhole R2-2004-33 located 2.7 miles to the southwest, which identifies a “sand, pink; quartz-rich (Cretaceous undifferentiated)” at a portion of the elevation range of the sandstone. This variation in the nature of the Cretaceous undifferentiated further adds to the complexity of attempting to evaluate the hydrogeology of Cretaceous undifferentiated deposits. Also since this sandstone is directly overlying the Sioux Quartzite in spots there could be a hydraulic connection to the Sioux Quartzite, although the Sioux Quartzite is typically not considered an aquifer due to its generally low primary porosity. There are areas however, where the silica cement is not present due to either weathering or non-deposition (Baldwin, 1949). In areas where conditions are favorable, water can be transmitted through the Quartzite via secondary porosity and permeability features (i.e. fractures and joints) resulting in areas where the Quartzite can be considered an aquifer. Aquifer characteristics within the Sioux Quartzite are site specific and highly variable due to the unpredictable nature of the fractures and joints in the aquifer. SDGS testhole R2-2005-20 located about 1.1 miles to the southeast of the well sites for this application identifies weathered Sioux Quartzite at a similar elevation to the screened interval for well #3, but the extent to which weathered Sioux Quartzite is present in the area is unknown (SDGS, 2018). Therefore, checking for the presence of boundary conditions will be an important part of the aquifer pumping test evaluation.

South Dakota Codified Law (SDCL) 46-2A-9 Criteria for Granting a Water Permit

Pursuant to SDCL 46-2A-9, a permit to appropriate water may be issued only if there is a reasonable probability that there is unappropriated water available for the applicant’s proposed use, that the proposed diversion can be developed without unlawful impairment of existing rights, that the proposed use is a beneficial use, and in the public interest. This report will address the availability of unappropriated water and existing rights from the aquifer that are pertinent to this application.

Water Availability

Water Permit Application No. 8280-3 proposes to appropriate water for commercial use in a swine farrowing facility. The probability of unappropriated water being available from an aquifer can be evaluated by considering SDCL 46-6-3.1 which requires “No application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater

source.” If the source of the water is older or lower than the Greenhorn Formation and the application is for a water distribution system defined pursuant to SDCL 46-1-6 (17), the Board need not consider the recharge/withdrawal issue. Since the aquifer for this application is identified as Cretaceous undifferentiated, which can correspond to Cretaceous aged units above, below, older, younger and equivalent to the Greenhorn Formation, information is not available to classify the water source for this application as older or lower than the Greenhorn Formation. However, the withdrawal/recharge issue must be considered since a water distribution system is not involved.

Aquifer Pumping Test Evaluation

LBG prior to the aquifer test monitored background water levels at the well sites for approximately ten days prior to the start of the aquifer test. The aquifer test utilized well #1 as the pumping well and wells #2 and #3 as observation wells. Well #2 is located approximately 89 feet south of well #1 and well #3 is located approximately 151 feet south of well #1. A site map for the area of the wells for this application is provided in Appendix A.

LBG conducted an initial six hour step rate test. The step rate test was conducted at flow rates of 28 gpm (gallons per minute), 45 gpm, and 63 gpm for two hours at each rate. After the 63 gpm step, LBG immediately continued into the constant rate test, where well #1 was pumped for an additional 70 hours at 63 gpm. Water level recovery was monitored for approximately 94 hours after pumping ceased. Water level measurements were collected by pressure transducers, and manual measurements were also taken for verification. Ambient air temperature and barometric pressure data were also collected, since shifts in barometric pressure can affect water level readings. Water from the pumping test was discharged to the containment area under the facilities’ barn. Drawdown data for the wells during the aquifer pumping test are shown in Figures 3, 4, and 5.

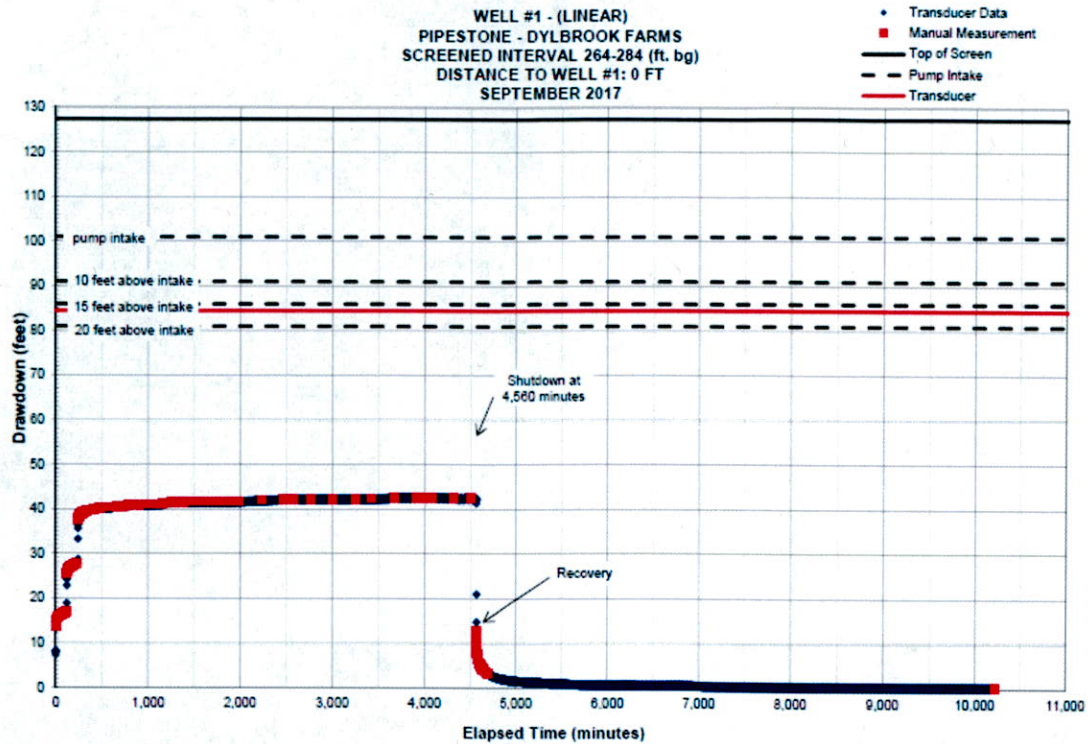


Figure 3: Drawdown in well #1 (pumped well) (LBG, 2017)

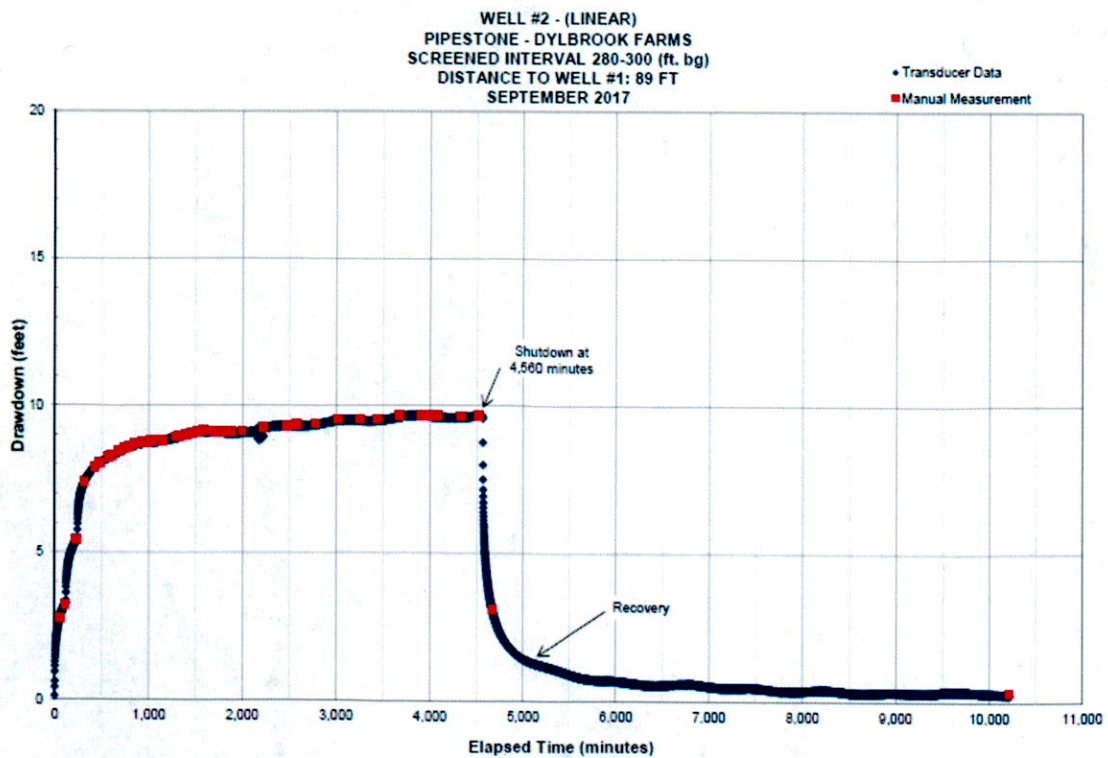


Figure 4: Drawdown in well #2 located 89 feet from well #1 (LBG, 2017)

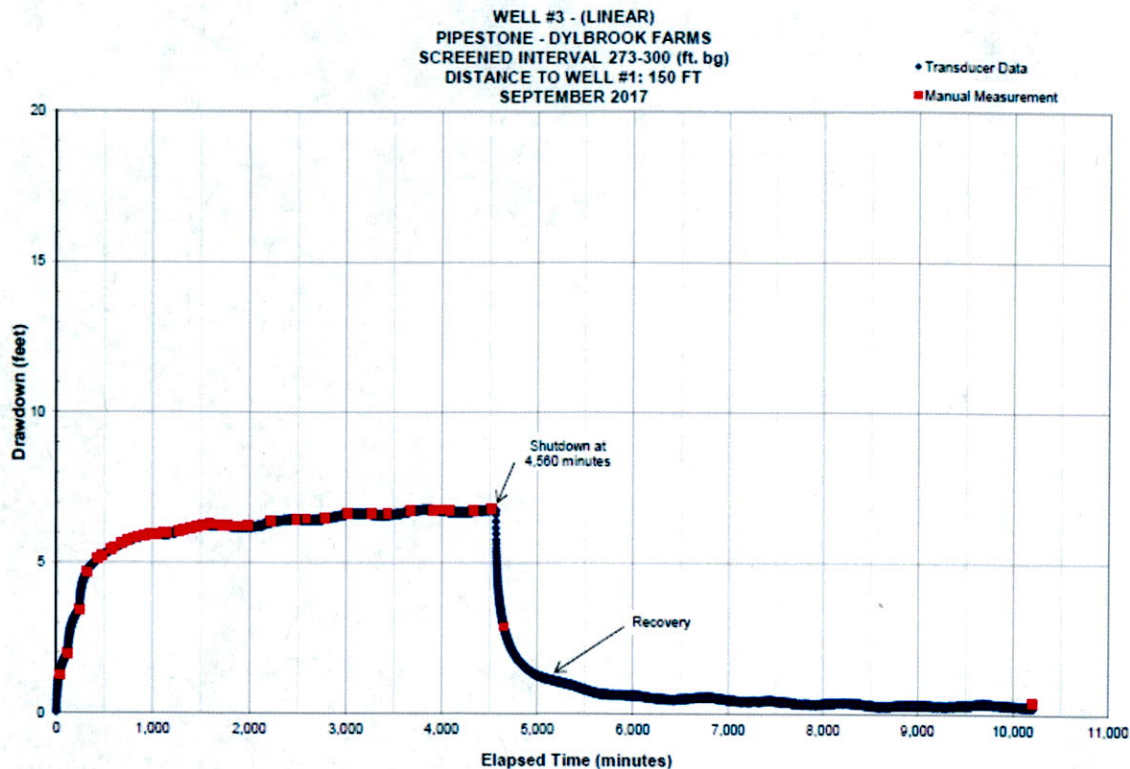


Figure 5: Drawdown in well #3 located 151 feet from well #1 (LBG, 2017)

At the end of the constant rate test, the maximum drawdown in wells #1, #2 and #3 were 42.4 feet, 9.6 ft and 6.8 feet, respectively. Following the cessation of pumping, water levels in wells #1, #2 and #3 had recovery to approximately 90%, 60%, and 51% of pre-pumping static water levels after approximately one hour. At the end of the recovery period, wells #1, #2 and #3 had recovered to approximately 99%, 97% and 96% of pre-pumping static water levels.

LBG (2017) analyzed the pumping test data using Theis and Cooper-Jacob solutions for confined aquifers and Theis Recovery solution and Agarwal recovery method for the recovery data. These methods all involve examining drawdown versus time. Values of transmissivity (T) range from 533 to 1,801 ft^2/day with a geometric mean of 991 ft^2/day . The values for the storativity (S) ranged from 2.4×10^{-7} to 1.8×10^{-4} with a geometric mean of 2.4×10^{-5} . The evaluation of the aquifer pumping test will focus primarily on the late time data, since early time data is typically considered to be less reliable than late time data due to the influence of water stored within the well bore. Early time data is generally reflective of the conditions within the well bore and the water being pumped directly from it. Late time data represents the conditions within the water bearing formation itself as at that point water is being directly removed from the aquifer to supply the pumping rate. For the pumping data, LBG (2017) examined both early and late time data with the 200 minute mark used as the division between early and late time data. Although this concern was likely to have been slightly mitigated by the pumping that occurred as part of the step test prior to the constant rate test, LBG (2017) did note variation in the geometric

mean between the early time (710 ft²/day) and late time data (1,380 ft²/day). So in the evaluation of the pumping test, emphasis is placed on the late time data.

One of the concerns with this aquifer is that it may be of fairly limited extent. Examining the radius of influence of the aquifer pumping test is an important part of the evaluation of the pumping test. Using the time-drawdown relationship from Driscoll (1989), shown in equation 1, and the geometric mean of the calculated T and S, calculated values of the radius of influence for the pump test are presented in Table 2. The time chosen for the calculation of the radius of influence was 72 hours, the length of pumping at 63gpm. However since the total pumping time was 76 hours the radius of influence is expected to be slightly larger than calculated.

$$r_o = \sqrt{\frac{0.3 \cdot T \cdot t}{S}} \quad \text{Eq. 1}$$

r_o =radius of influence (ft)

T=Transmissivity (gpd/ft)

t=time in days (72 hours=3 days)

S=storativity (2.4×10^{-5})

Table 2: Calculated Radius of Influence

	T (ft ² /day)	T (gpd/ft)	radius (miles)	Area (acres)
geometric mean	991	7,414	3.16	20,051
geometric mean (early time)	710	5,312	2.67	14,365
geometric mean (late time)	1,380	10,324	3.73	27,921

Where further insight is gained into the evaluation of the sandstone as a water source is if boundary conditions were encountered within the radius of influence for the pumping test. LBG (2017) used the ratio of storativity calculated during pumping (S) to the storativity calculated during recovery (S'), S/S', to check for the presence of boundary conditions. Values of this ratio less than one indicate the presence of a negative boundary condition (impermeable/low permeability aquifer boundaries) and values greater than one indicate the presence of a positive boundary (area of higher permeability or recharge). LBG (2017) concluded that neither type of boundary condition was encountered during the aquifer test since late time values of S/S' were close to one. Another indicator of boundary conditions are inflections in the drawdown curve. In looking at Figures 3, 4, and 5, there appears to be something around the 2,000 minute mark. However when considering the drawdown curve in relation to barometric data, Figure 6, it appears to be the product of a change in barometric pressure rather than an indicator of a boundary condition.

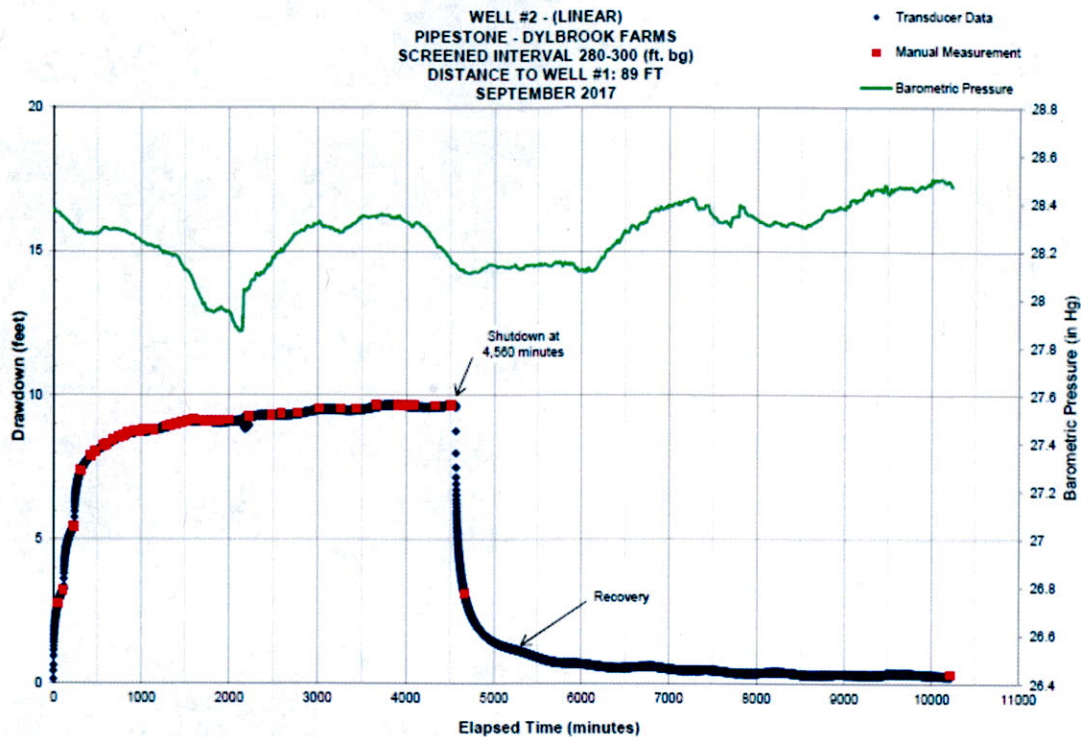


Figure 6: Drawdown data for well #2 and barometric pressure data (LBG, 2017)

Relating the information from the aquifer pumping test back to the concerns in relation to the area's geology, it appears the aquifer is more laterally extensive than indicated by the testholes in the area. The exact nature of the hydrogeology in the area is still unknown but the aquifer pumping test would suggest several possibilities: the sandstone is more extensive than the available information indicates, the sandstone and other sandy units in the area's Cretaceous undifferentiated deposits functionally act together as an aquifer, the properties of the Sioux Quartzite in the area are such that the Sioux Quartzite could contribute water to the aquifer, or a complex combination of the previous possibilities. Ultimately, the aquifer pumping test did not raise any red flags in relation to water availability and impacts to existing users discussed later in this report.

Existing Users

Water rights/permits currently authorized to appropriate water from groundwater sources within about ten miles of the well sites for this application are shown in Figure 7 and summarized in Table 3. During the time period that the South Dakota County studies were being done, a county study was not completed for McCook County. This meant limited information was available for the evaluation of older water rights. Therefore, all of the area water right/permits currently authorized to appropriate water from groundwater sources were examined for interference potential as a result of pumping under this permit, if approved. In the case of several of these water rights/permits, it is emphasized the evaluation is based on best information reasonably available for two reasons: (1) due to the age of some of these wells the only

information available is location and depth and (2) as was demonstrated with this application the basic description of geologic materials provided by a private well driller may not be sufficient to accurately determine the water source due to the complex nature of the area's geology. Reason number two is also emphasized in relation to the consideration of domestic wells in the area. The nearest well completion report on file with the Water Rights Program that is potentially completed into the aquifer that this application proposes to utilize is located about 1.6 miles to the northwest (Water Rights, 2018c). However, an examination of the 2016 National Agriculture Imagery Program aerial imagery indicates farm sites that are closer to the well sites for this application that could potentially have wells completed into this aquifer (Farm Service Agency, 2016).

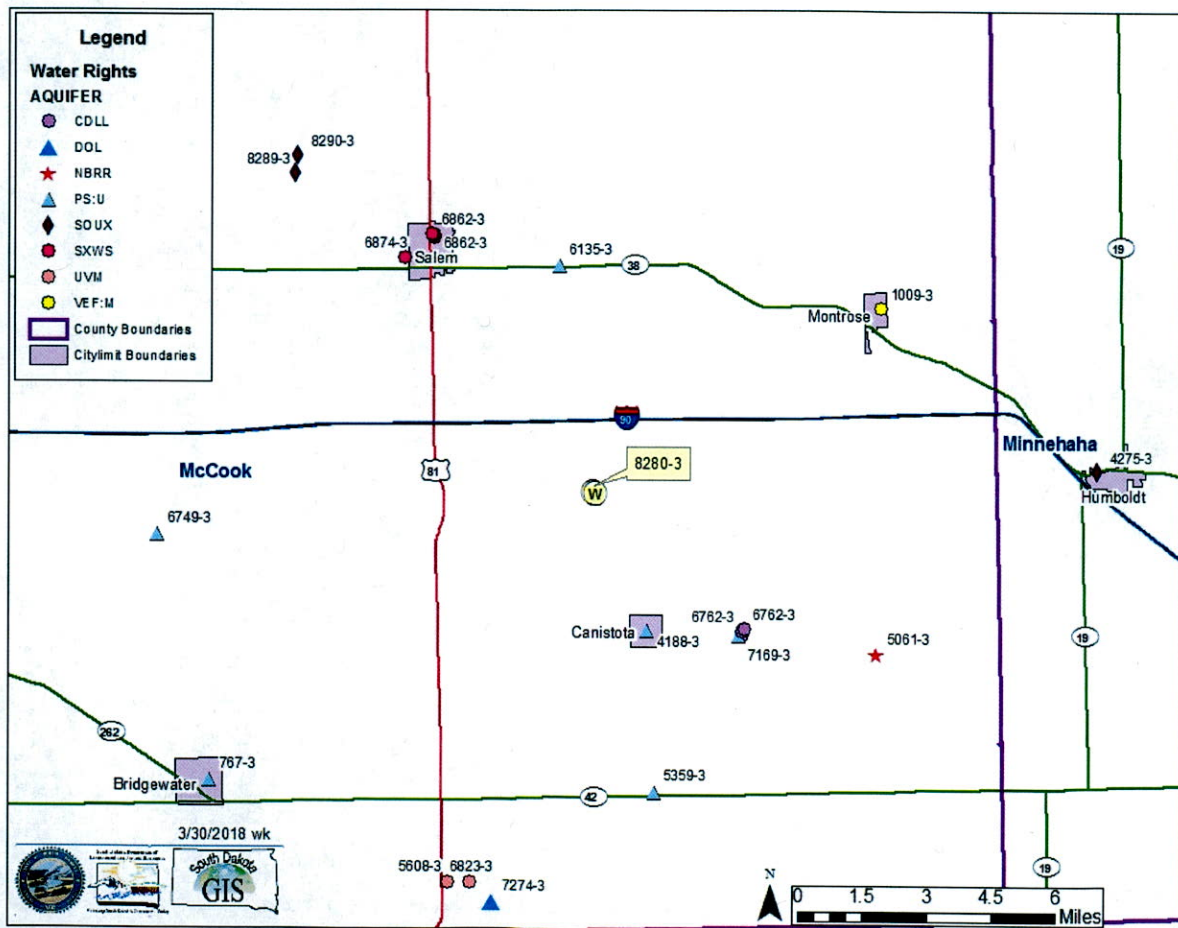


Figure 7: Groundwater water rights/permits currently authorized to appropriate water in the vicinity of the well sites for this application (Water Rights, 2018b) (aquifer abbreviations: CDLL= Codell, DOL=Dolton, NBRR= Niobrara, PS:U =Pleistocene Series: Unknown, SOUX= Sioux Quartzite, SXWS= Sioux Quartzite Wash, UVM=Upper Vermillion Missouri, VEF:M= Vermillion East Fork: Montrose

Table 3: Summary of Water Rights/Permits Shown in Figure 7 (Water Rights, 2018b)

Permit No.	Name	Aquifer	Use	Status	Rate	Acres
767-3	CITY OF BRIDGEWATER	PS: U	MUN	LC	0.96	n/a
1009-3	CITY OF MONTROSE	VEF: M	MUN	LC	0.44	n/a
4188-3	CITY OF CANISTOTA	PS: U	MUN	LC	0.3	n/a
4275-3	TOWN OF HUMBOLT	SOUX	MUN	LC	0.22	n/a
4988-3	TM RURAL WATER DISTRICT	DOL	RWS	LC	3.34	n/a
5061-3	BATTLE CREEK CAMPGROUND	NBRR	COM	LC	0.02	n/a
5359-3	HAY LOFT CAFE	PS: U	COM & DOM	LC	0.07	n/a
5608-3	TM RURAL WATER DISTRICT	UVM	RWS	LC	1.34	n/a
6135-3	MCCOOK COUNTY WILDLIFE CLUB	PS: U	COM	LC	0.022	n/a
6749-3	JAMES D DANIELS	PS: U	IRR	PE	0.55	22
6762-3	VAN WINKLE DAIRY LP	CDLL	COM	LC	0.27	n/a
6823-3	TM RURAL WATER DISTRICT	UVM	RWS	PE	2.23	n/a
6862-3	CITY OF SALEM	SXWS	MUN	LC	1.33	n/a
6874-3	MCCOOK COUNTRY CLUB	SXWS	IRR & DOM	PE	0.11	30
7169-3	VAN WINKLE DAIRY LP	PS: U	COM	PE	0.17	n/a
7274-3	TM RURAL WATER DISTRICT	DOL	RWS	PE	0	n/a
8289-3	FARMERS PORK	SOUX	COM	PE	0.067	n/a
8290-3	FARMERS PORK	SOUX	COM	PE	0.2	n/a

LC- license, PE-permit, IRR-irrigation, MUN- municipal, COM- commercial, DOM- domestic, RWS-Rural water system

The nearest of these is Water Right No. 4188-3 for the City of Canistota located about 3.5 miles to the southeast. The information available on the wells for Canistota is quite limited due to their age, but documentation on Water Right No. 4188-3 indicates two wells with depths of approximately 220 and 600 feet deep (Water Rights, 2018b). With the limited information available for the wells, Pleistocene Series: Unknown aquifer is likely an accurate identification for the aquifer for the 220 foot well (SDGS, 2018). The 600 foot well is mostly likely completed into the Sioux Quartzite (McCormick, 2010).

Water Right No. 6762-3 is located about 4.7 miles to the southeast. The three wells for Water Right No. 6762-3 were completed in a geologic material described as “sandstone” by the driller, which was identified as the Codell aquifer with the information available at the time. However it was noted by Goodman (2006) that, “this aquifer pick is difficult” and that “the geology of this area makes the identification of the water source problematical.” SDGS Testhole R2-2005-12 located 0.65 miles to the south of the wells for Water Right No. 6762-3 identifies “sand, pink, fine; cemented (Cretaceous Undifferentiated)” at a similar elevation interval to the “sandstone” identified by the well completion reports. This suggests the “sandstone” of Water Right No. 6762-3 to be a Cretaceous aged undifferentiated sandstone. SDGS Testhole R2-83-140 is located about 2 miles northwest of the wells for Water Right No. 6762-3 and about 2.8 miles to the southeast of the wells for this application (between the wells of Water Right No. 6762-3 and the wells for this application). The lithologic log for R2-83-140 appears to indicate an area of higher elevation Sioux Quartzite between the well sites, which would indicate a potential the two sandstones might not be directly connected. Testhole R2-83-140 also did not indicate the presence of a Cretaceous aged undifferentiated sandstone at the testhole location (SDGS, 2018). However, the aquifer pumping test did not indicate boundary conditions within a radius of influence of about three miles. Therefore, given the limits of the available information the

possibility that the sandstone for the wells of Water Right No. 6762-3 could be in the same aquifer as the wells for this application cannot be completely ruled out.

Water Right Nos. 6874-3 (McCook County Club) and 6862-3 (City of Salem) are located about seven miles to the northwest of the well sites for this application. The available information for Water Right Nos. 6874-3 and 6862-3 indicates the geologic material the wells for these water rights are completed into either directly overlies the Sioux Quartzite or is only separated from the Sioux Quartzite by a relatively thin layer of “blue clay” (six feet in the case of the well for Water Right No. 6874-3) and are at relatively similar elevations. The well completion report for Water Right No. 6874-3 indicates that the well is completed into a “white sandstone.” The newest well completion report for Water Right No. 6862-3 indicates that the well is completed into “pink sand.” Despite the differences in the descriptions of geologic materials for the screened intervals for both wells, the wells were identified as being completed into the Sioux Quartzite Wash aquifer at the time of permitting. Buhler (2000) notes potential for a hydraulic connection between the Sioux Quartzite and the geologic material for the wells of the City of Salem due to water quality characteristics of the wells. Given the limits of the available information and the complex hydrogeology of the area a conservative hydrologic budget for this aquifer should include these water rights.

Water Right No. 5061-3 is located about 7.6 miles to the southeast. A well completion report is not available for the well for this water right, but the water right was previously identified as being completed into the Niobrara aquifer. Given the drilling in McCook County since this water right was issued and the ongoing study of McCook County, an aquifer identification for this water right that is more reflective of the evolving geologic understanding of the area is Cretaceous Undifferentiated with an undifferentiated chalk being the most likely geologic material (SDGS, 2018).

Water Rights Nos. 767-3, 1009-3, 4988-3, 5359-3, 5608-3, 6135-3, 6749-3, 6823-3, 7169-3 and 7274-3 all appear to be correctly identified as appropriating water from glacial aquifers based on the currently available information (SDGS, 2018; Water Rights, 2018b; Water Rights, 2018c). Portions of future use area for TM Rural Water falls within the area shown in Figure 7, however the future use permits with water remaining in reserve for TM Rural Water are all for glacial aquifers (Water Rights, 2018b). Water Permit Nos. 8289-3 and 8290-3 were recently issued and are correctly identified as appropriating water from Sioux Quartzite (Water Rights, 2018b). Based on the currently available information, Water Right No. 4275-3 is likely also correctly identified as appropriating water from the Sioux Quartzite aquifer (Water Rights, 2018b).

As part of the aquifer pump test analysis, LBG (2017) projected several drawdown scenarios from data gathered from the pumping test. Projected drawdown for scenarios for two wells pumping continuously are shown in Figure 8. The use of the Theis equation to calculate drawdown is an acceptable method for estimating drawdown in a confined aquifer. The transmissivity and storativity values closely match the geometric means from the pump test data, 991 ft² per day and 2.45×10^{-5} , respectively.

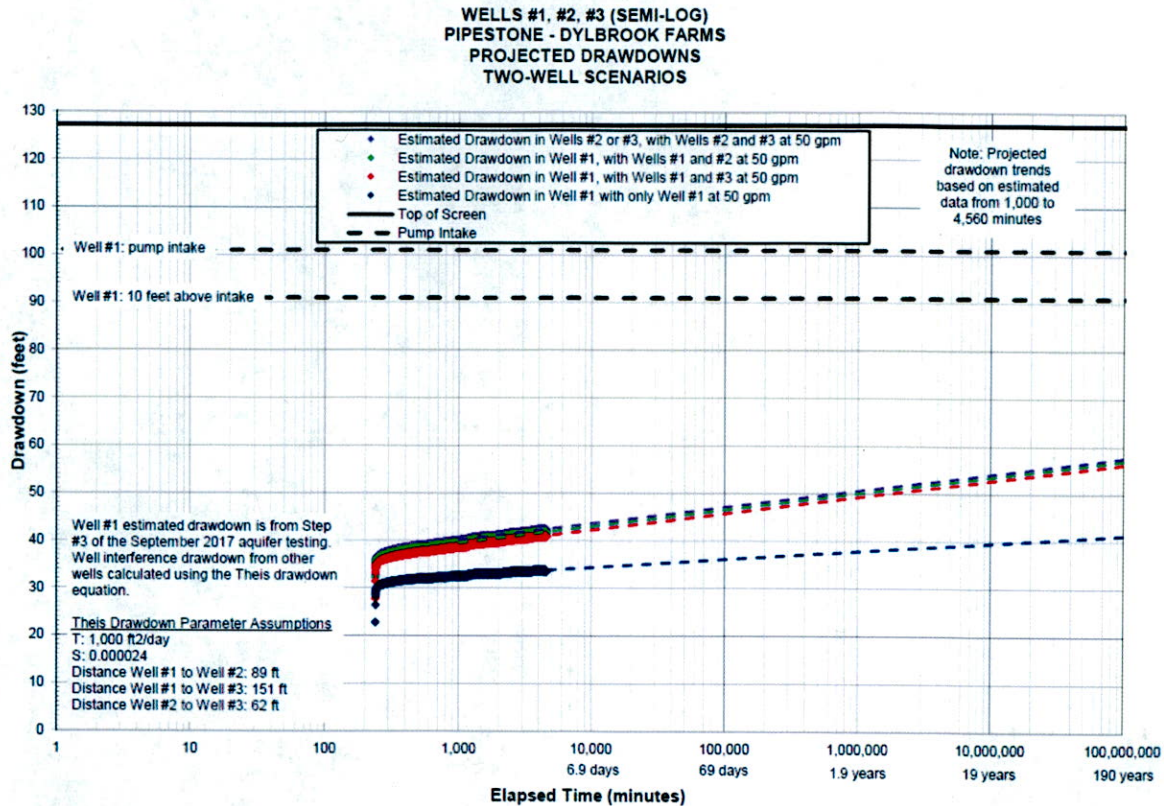


Figure 8: Projected drawdown based on a scenarios for two pumping wells (LBG, 2017)

In considering Figure 8, it should be noted that the y-axis represents drawdown, so zero feet of drawdown corresponds to static water level. For well #1, the static water level at the time of completion (March 10, 2017) was about 136 feet below grade and the top of the aquifer is at 260 feet below grade. For well #2, the static water level at the time of completion (March 24, 2017) was about 136 feet below grade and the top of the aquifer is at 271 feet below grade. For well #3, the static water level at the time of completion (July 21, 2017) was 136 feet below grade and the top of the aquifer is at 273 feet below grade. After 19 years of pumping, projected water levels are about 60 feet above the top of the aquifer in the vicinity of the pumping wells in the scenarios with two wells each pumping continuously at 50 gpm. The projections assume the aquifer properties outside the area of influence for the pump test are similar to the area of influence for the pump test. If the long term cone of drawdown encounters impermeable/low permeability aquifer boundaries, greater than projected drawdown can be expected to occur between the pumping wells and the impermeable/low permeability boundary. As the radius of influence for a pumping well expands and encounters impermeable/low permeability aquifer boundaries, drawdown in the other directions will increase. In considering the annual volume requested by this application and the maximum diversion rate, the annual volume is less than diverting 0.22 cfs continuously which would result in less drawdown than projected. Additionally, as distance from the pumping well increases, the amount of drawdown decreases.

Administrative Rule of South Dakota (ARSD) 74:02:04:20(7) defines an adversely impacted domestic well as “a well in which the pump intake was set at least 20 feet below the top of the aquifer at the time of construction or, if the aquifer is less than 20 feet thick, is as near to the bottom of the aquifer as is practical and the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner's needs.” Furthermore, since the wells for the application are in close proximity to each other (about 151 feet or less), drawdown as a result of pumping these wells will impact each other before adversely impacting other existing users with adequate wells.

The Water Management Board has promulgated rules that allow water to be placed to maximum beneficial use without the necessity of maintaining artesian head pressure for domestic use. In the case of Water Permit Application No. 2313-2 for the Coca-Cola Bottling Company of the Black Hills, the Water Management Board adopted findings that noted that if the increased costs or decreased production as a result of the impacts of legitimate users on artesian head pressure could be considered an adverse impact it would conflict with SDCL 46-1-4 (Water Rights, 1995). SDCL 46-1-4 requires the water resources of the state be put to beneficial use to the maximum extent of which they are capable (Water Rights, 1995).

When all of the above is considered, nearby water rights/permits and nearby adequate wells as defined by ARSD 74:02:04:20(6) are not expected to be adversely impacted by the drawdown as a result of the pumping proposed by this application. Additionally, well #1 was pumped under a temporary permit during construction and during the aquifer pumping test. During that time no complaints of well interference were received in relation to that pumping. However, as a precaution, this water permit, if approved, should include a qualification that the well owner shall control their withdrawals so there is not a reduction of needed water supplies for adequate domestic wells or for adequate wells having prior water rights. A qualification of this nature is relatively standard for water permits issued in the last several years (Water Rights, 2018b).

Hydrologic Budget

Withdrawals

Withdrawals from the aquifer are likely via leakage to hydraulically connected aquifers where the potentiometric gradients are favorable (a higher water level in the sandstone for this application than in a hydraulically connected aquifer would indicate potential for groundwater outflow from the sandstone) and pumping from wells. In reviewing the area well completion reports and area water rights/permits, two domestic wells and three water rights were noted as prudent to include in the hydrologic budget for this application due to the amount of unknowns in the area's hydrogeology.

The water rights noted as having some potential to be in the same aquifer as this application are Water Right No. 6762-3 for Van Winkle Dairy, Water Right No. 6874-3 for the McCook County Club, and Water Right No. 6862-3 for the City of Salem. The use of potential is stressed due to the complexity and unknowns of the area's geology and hydrogeology. Water Right Nos. 6762-3 and 6862-3 are limited by maximum diversion rate. Historically, average

water use by non-irrigation appropriations limited by instantaneous diversion rate has been less than 60% of full time pumping at the permitted diversion rate. Average annual water use for Water Right Nos. 6762-3 is estimated at 117 acre-feet per year. The City of Salem has been required to report its water use to the Water Rights Program since 2007, reported use is shown in Table 4. Reported average use for the City of Salem from 2010 through 2017 is 130 acre-feet per year, 60% of full time pumping at the permitted diversion rate for the City of Salem is about 290 acre-feet per year (Water Rights, 2008-2018). Water Right No. 6874-3 is for both irrigation and domestic use, in reviewing the file for this water right the irrigation portion of the use is likely to be the majority of the annual volume. Reported irrigation use for Water Right No. 6874-3 is shown in Table 5, average reported use is about seven acre-feet per year. The usage appears to be variable due to the water right being used to supplement a surface water source for irrigation. Total estimated average annual water use from these water rights is about 254 acre-feet per year. However, as previously noted, the evidence for these water rights definitively being in the same aquifer as the wells for this application is limited.

Table 4: Reported water use for City of Salem from
2007-2017 (Water Rights, 2008-2018)

Year	Reported Use (acre-feet)
2007	160
2008	0*
2009	1134*
2010	136
2011	119
2012	169
2013	136
2014	116
2015	115
2016	116
2017	131
Average 2010-2017	130

*Value is suspect

Table 5: Reported Irrigation Water Use by Water
Permit No. 6874-3 (Water Rights 2009-2017)

Year	Reported Pumpage acre-feet)
2008	9.94
2009	0.00
2010	3.23
2011	15.51
2012	26.98
2013	0.06
2014	0.28
2015	0.09
2016	3.15
Average	6.58

Carter and Neitzert (2008) used 2005 South Dakota water use data to estimate average self-supplied domestic use per person at 70 gallons per day. Assuming a family of four, the domestic use associated with the two domestic wells with some potential to be completed into this aquifer is estimated at about one acre-foot per year, but depending upon the amount of livestock watering done with these wells, actual use could be slightly higher. There could be additional wells completed into the aquifer that are not on file with the Water Rights Program, but it should be noted due to their relatively low diversion rates domestic wells are typically not included as part of aquifer hydraulic budgets. Additionally, with the development of rural water in the area, it is possible that some of the domestic wells in the area may no longer be in use.

Recharge

Due to the amount of glacial till overlaying the aquifer, groundwater inflow likely is the primary recharge mechanism to this sandstone. The hydrogeology in the area is complex so the potential sources of groundwater inflow can be noted but not identified with certainty. Potential sources of groundwater inflow are the other geologic materials in the area that fall under the umbrella of Cretaceous undifferentiated and the Sioux Quartzite. Data is not available to estimate average annual recharge to this aquifer. Static water levels at the time of well completion for wells #1 (March 10, 2017) and #2 (March 24, 2017) were 136 feet below the measuring point. Prior to the aquifer pumping test the wells were utilized under a temporary permit for construction. After the aquifer pumping test, water levels in well #1 recovered to about 133 feet below grade and water levels in well #2 recovered to about 135 feet below grade (LBG, 2017). The similarity in preconstruction pumping and pretest pumping water levels to post-construction and posttest pumping water levels appears to indicate the potential for at least some amount of recharge to the aquifer.

The number of well completion reports in this area is relatively small, but some insight into historic water levels can be gained by reviewing the well completion reports on file with the

Water Rights Program. However, evaluating historic water levels using domestic well data is more subjective than the use of dedicated observation wells because of the additional interpretations necessary (i.e. well locations/elevations, groundwater gradients, lack of wells completed into the aquifer, accuracy of the geologic descriptions, and seasonal and climatic water level fluctuations). A review of area well completion reports on file with the Water Rights Program (Water Rights, 2018c) that have some potential to be completed in this aquifer (two wells; one completed on 10/21/1980 and the other completed on 6/3/2014) indicates water levels in this area have historically been relatively stable. If water levels in an aquifer decline over time, it maybe suggestive of withdrawals exceeding recharge. Additionally, the ten days of background water level monitoring by LBG indicated stable background water levels. The background water data collected by LBG is shown in Appendix B. Since the limited water level information available is indicating relatively stable water levels in the area, this indicates that it is likely the current withdrawals from the aquifer likely have not exceeded recharge.

Balance

The best available information suggests that the aquifer for this application is receiving some amount of recharge. The available information also suggests that at the current level of usage, average annual discharge is not exceeding average annual recharge. Information is not available to quantify the average annual amount of recharge available to the aquifer, or how much recharge could be induced from any hydraulically connected aquifers as a result of pumping. Since long term pumping data is not available for this sandstone the long term water availability for this application is unknown. However, short term pumping information suggests potential that water is available for this application

Observation Wells

Administrative Rule 74:02:05:07 requires that, “When regulating water withdrawals by large-capacity wells and in determining the availability of unappropriated water for an application for a permit to appropriate water, the board shall rely upon the record of observation well measurements in addition to other data to determine that the quantity of water withdrawn annually from the aquifer does not exceed the estimated average annual recharge to the aquifer.”

The Water Rights Program currently monitors 25 observation wells in McCook County. Of these, four observation wells are completed in Cretaceous aged material. Three are currently identified being completed into the Niobrara aquifer and one currently identified as Sioux Quartzite Wash aquifer (Water Rights, 2018a). While it is likely the understanding of aquifer designation on these wells will evolve as a result of the recent and ongoing work on the geology of McCook County, due to distance and geologic material these observation wells are completed into; it is unlikely these observation wells are completed into the same Cretaceous aged undifferentiated sandstone as the well for this application. Therefore, Water Rights observation well data cannot be utilized as a method to evaluate the availability of unappropriated water in this aquifer.

The drilling of one or more observation wells to be added to the Water Rights Observation Well Network in the vicinity of this permit, if approved, is recommended. The monitoring of the aquifer in this area would provide information on the long term impacts of pumping under this permit, if approved. Observation well information would be valuable in evaluating any future applications for the aquifer in this area, and provide monitoring to evaluate any complaints of unlawful impairment of existing rights. To assist in evaluating the observation well data collected, a qualification of the reporting of annual diversions under this permit, if approved, is recommended.

Conclusions

1. Water Permit Application No. 8280-3 for Dylbrook Farms proposes to appropriate water at a maximum instantaneous diversion rate of 0.22 cfs with a maximum annual appropriation of 121 acre-feet per year from three wells completed into an undifferentiated sandstone of the Cretaceous age located in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 9 in T102N-R54W for commercial use.
2. A valid aquifer pumping test was conducted and analyzed by Leggette, Brashears & Graham, Inc.
3. The aquifer pumping test and analysis did not identify aquifer boundary conditions within the radius of influence of the pumping test.
4. Best available information and the long term drawdown projections based on the result of the aquifer pumping test suggest there is a reasonable probability that this application, if approved, will not adversely impact existing users with adequate wells.
5. Best available information suggests that the water source for this application is receiving some amount of recharge likely from groundwater inflow. The amount of average annual recharge to the aquifer cannot be quantified.
6. The best available information suggests that current withdrawals from the aquifer do not exceed recharge from the aquifer. Since long term pumping data is not available for this sandstone the long term water availability for this application is unknown. However, short term pumping information suggests potential that water is available for this application
7. If this application is approved, the drilling of one or more observation wells to be added to the Water Rights Observation Well Network in this aquifer is recommended.



Whitney Kilts

SDDENR-Water Rights Program

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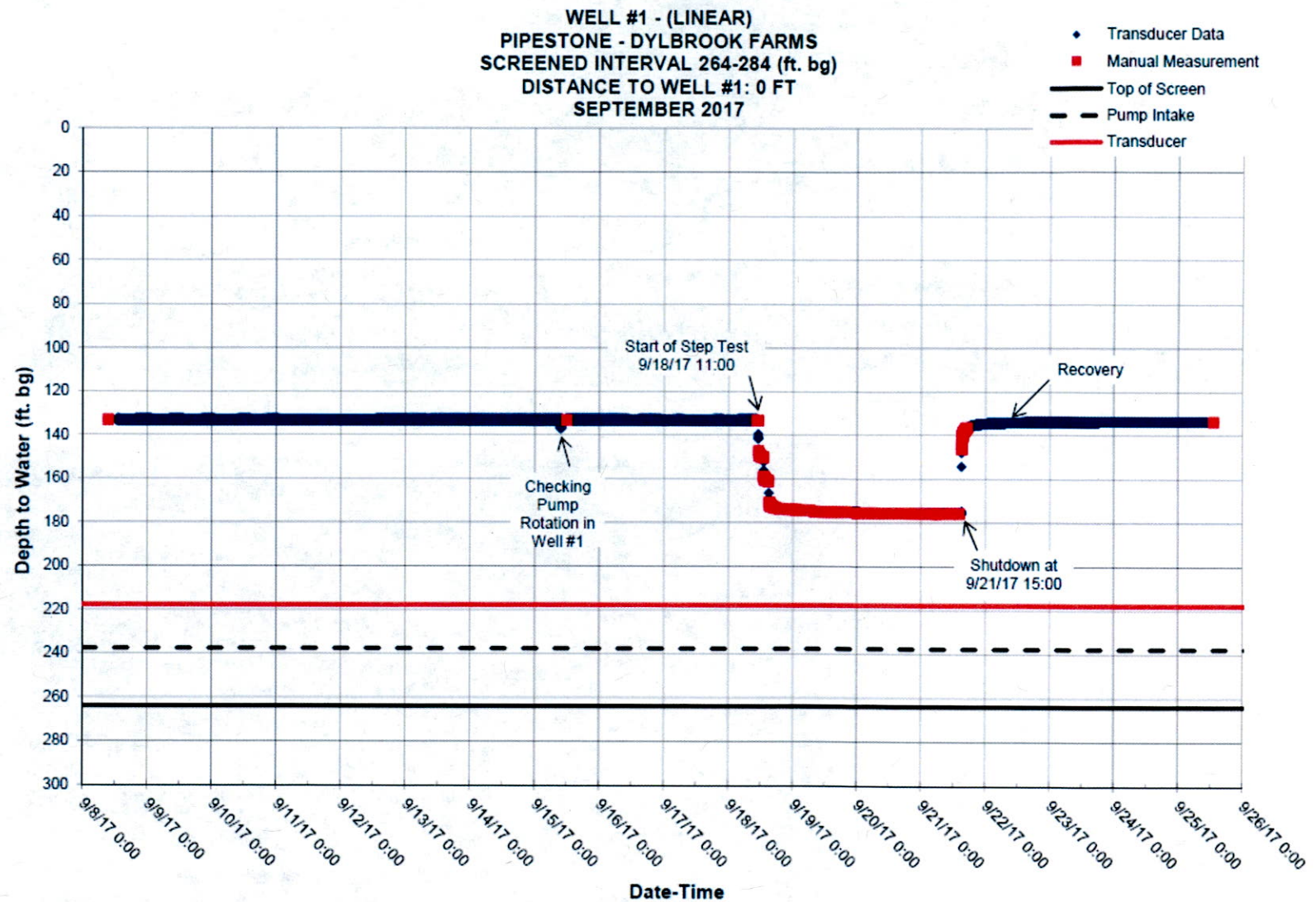
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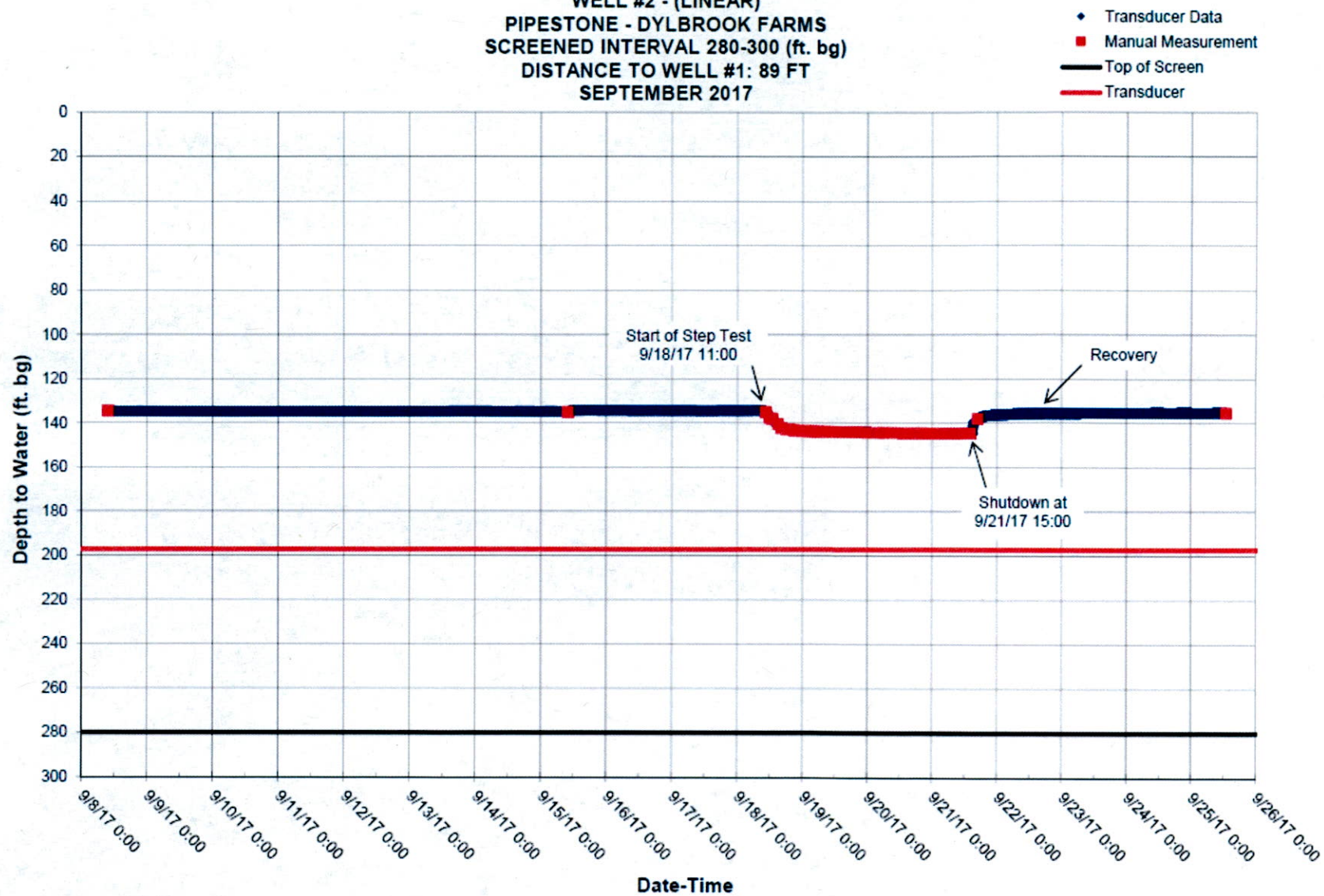
Appendix A: Site Map (modified from LBG, 2017)



Appendix B: Depth to Water including Background Data (LBG, 2017)

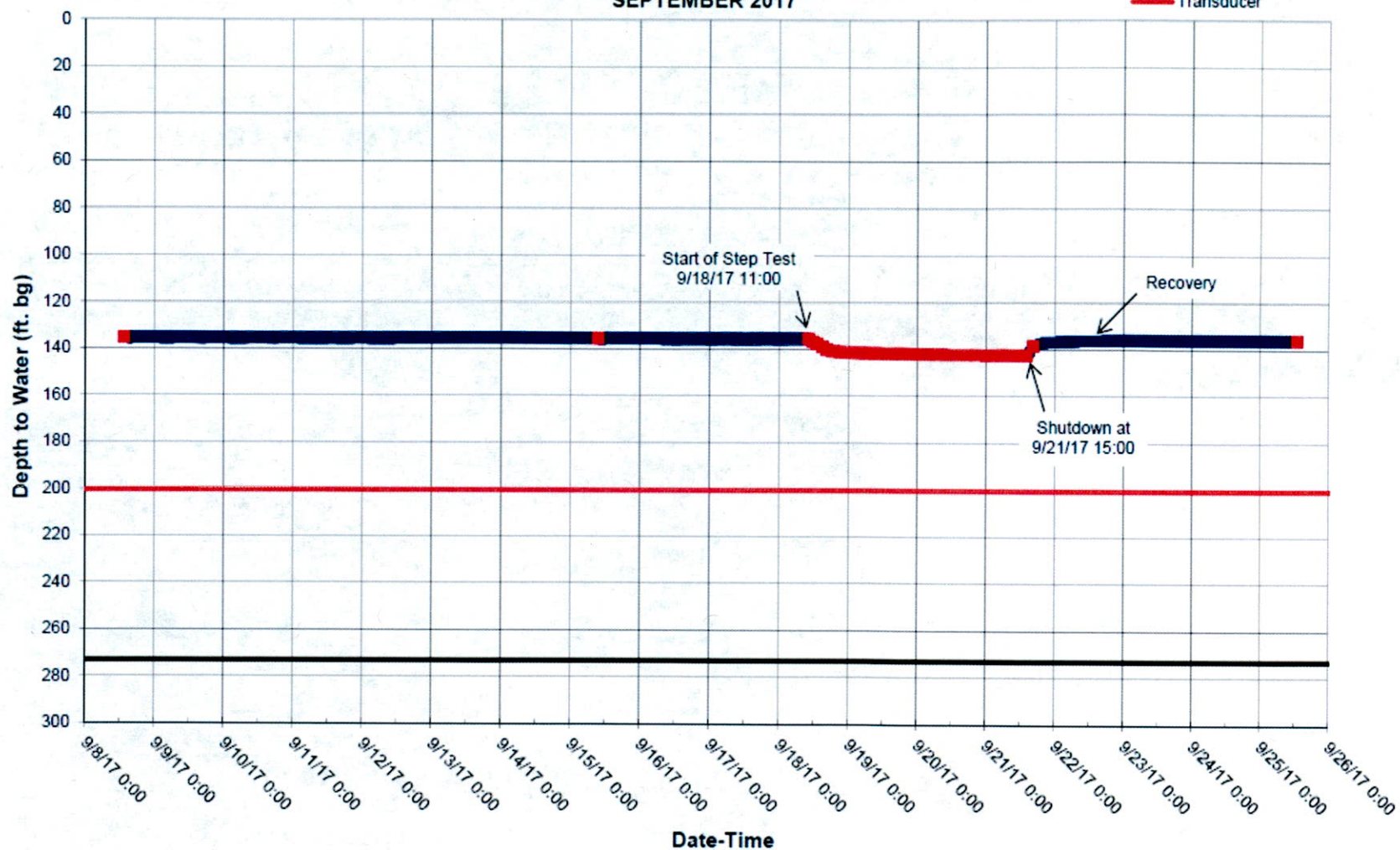


**WELL #2 - (LINEAR)
PIPESTONE - DYLBROOK FARMS
SCREENED INTERVAL 280-300 (ft. bg)
DISTANCE TO WELL #1: 89 FT
SEPTEMBER 2017**



WELL #3 - (LINEAR)
 PIPESTONE - DYLBROOK FARMS
 SCREENED INTERVAL 273-300 (ft. bg)
 DISTANCE TO WELL #1: 150 FT
 SEPTEMBER 2017

- ◆ Transducer Data
- Manual Measurement
- Top of Screen
- Transducer



Gronlund, Eric

From: Marty Rost <Marty.Rost@pipestone.com>
Sent: Friday, April 06, 2018 3:24 PM
To: Gronlund, Eric
Cc: Marty Rost
Subject: RE: [EXT] draft recommendation

We're prepared to construct a 2" observation well in the ROW by Dylbrook. Please public notice ASAP.

Marty Rost
1300 South Highway 75
Pipestone, MN 56164
Office: 507.825.7029
Cell: 507.215.0482
marty.rost@pipestone.com

PIPESTONE

From: Gronlund, Eric [<mailto:Eric.Gronlund@state.sd.us>]
Sent: Wednesday, April 4, 2018 2:42 PM
To: Marty Rost <Marty.Rost@pipestone.com>
Subject: draft recommendation

•

Gronlund, Eric

From: Marty Rost <Marty.Rost@pipestone.com>
Sent: Friday, April 06, 2018 3:39 PM
To: Gronlund, Eric
Cc: Schlaak, Karen; Kilts, Whitney (DENR)
Subject: RE: [EXT] draft recommendation

Yes, list 3 wells.

I'll contact whatever papers are listed in the letter you send out to authorize publication. Thanks.

Marty Rost
1300 South Highway 75
Pipestone, MN 56164
Office: 507.825.7029
Cell: 507.215.0482
marty.rost@pipestone.com

PIPESTONE

From: Gronlund, Eric [<mailto:Eric.Gronlund@state.sd.us>]
Sent: Friday, April 6, 2018 3:34 PM
To: Marty Rost <Marty.Rost@pipestone.com>
Cc: Schlaak, Karen <Karen.Schlaak@state.sd.us>; Kilts, Whitney (DENR) <Whitney.Kilts@state.sd.us>
Subject: RE: draft recommendation

Okay – we'll send out next week. It will need to be in the Salem newspaper and Argus Leader. Salem publishes on Thursday. Not sure we'll be able to get it in the April 12th edition but it may be possible with sending everything electronically to you and the newspaper. We'll walk you through this next week but ultimately Dylbrook (Pipestone Vet) will need to contact the newspapers to authorize publication.

Am I correct that Dylbrook wants the application to reflect three wells and that you'll use them in a rotation to appropriate the requested 100 gallons per minute?

When it comes time to construct the observation well you'll want to coordinate that with Whitney in DENR.

Have a good weekend.

Eric

From: Marty Rost [<mailto:Marty.Rost@pipestone.com>]
Sent: Friday, April 06, 2018 3:24 PM
To: Gronlund, Eric

Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, April 09, 2018 2:17 PM
To: Marty Rost (mrost@pipevet.com)
Cc: Gronlund, Eric
Subject: 8280-3, Dylbrook Farms RE LLC
Attachments: 8280-3public.short.docx; 8280-3APPL.docx

Marty Rost,

Attached is the Notice of Application No. 8280-3 to Appropriate Water. As stated in the cover letter, you need to contact the two papers to authorize publication and arrange for payment.

Please note the deadline to have the notice published in the Salem Special on April 12th is 5 today. So please call them ASAP.

The report and recommendation will be emailed to you tomorrow. Paper copies will also be mailed then.

Karen Schlaak

SD DENR, Water Rights Program
(605) 773-3352



Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, April 09, 2018 2:09 PM
To: allegals@argusleader.com
Subject: 8280-3, Dylbrook Farms RE LLC
Attachments: 8280-3public.short.docx; FORM8.FRM.doc

Attached is a notice to be published on April 12, 2018.

Dylbrook Farms RE LLC, c/o Marty Rost, 1300 S Hwy 75, Box 118, Pipestone MN 56164 (507 825-7029 or 507 215-0482) has been notified to contact you to authorize publication and arrange for payment.

Please send the affidavit or return the attached Proof of Publication form ASAP to the Water Rights Program, 523 E Capitol, Pierre SD 57501.

Let me know if you have questions. Please acknowledge receipt of this email.

Karen Schlaak

SD DENR, Water Rights Program
(605) 773-3352



Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, April 09, 2018 2:08 PM
To: Salem Special / Troy Schwans (tschwans@triotel.net)
Subject: 8280-3, Dylbrook Farms RE LLC
Attachments: 8280-3public.short.docx; FORM8.FRM.doc

Attached is a notice to be published on April 12, 2018.

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Karen Schlaak

SD DENR, Water Rights Program
(605) 773-3352



NOTICE OF APPLICATION NO. 8280-3 to Appropriate Water

Notice is given that Dylbrook Farms RE, LLC, c/o Barry Kerkaert, 1300 S Hwy 75, Box 188, Pipestone MN 56164 has filed an application for a water permit to appropriate 121 acre-feet of water annually with a maximum diversion rate of 0.22 cubic feet of water per second from three wells to be completed into a Cretaceous aged undifferentiated sandstone Aquifer (300 feet deep) located in the SE 1/4 SW 1/4 Section 9 for commercial use in a swine farrowing facility located in the SE 1/4 SW 1/4 Section 9; all in T102N-R54W. This site is located approximately 6 miles southeast of Salem SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8280-3 with qualifications 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and, 4) it is in the public interest. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <http://denr.sd.gov/public> or contact Eric Gronlund for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by April 23, 2018.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Steven M. Pirner, Secretary, Department of Environment and Natural Resources. Published once at the total approximate cost of_____.

CUSTOMER NUMBER:	5078257029DYL	Argus Leader P.O. Box 677349, Dallas, TX 75267-7349
INVOICE NUMBER:	2851708	
RUN DATES:	4/12, 2018	
		AMOUNT DUE: \$72.87 pd.

RECEIVED
APR 17 2018
WATER RIGHTS
PROGRAM

DYLBROOK FARMS RE LLC
1300 S HWY 75, BOX 188
C/O MARTY ROST
PIPESTONE, MN 56164

AFFIDAVIT OF PUBLICATION-

Customer Number: 5078257029DYL
Invoice Number: 2851708

Argus Leader
AFFIDAVIT OF PUBLICATION

STATE OF SOUTH DAKOTA

COUNTY OF MINNEHAHA } ss

Sara Kruse being duly sworn, says: That The Argus Leader is, and during all the times hereinafter mentioned was, a daily legal newspaper as defined by SDCL 17-2-2.1, as amended published at Sioux Falls, Minnehaha County, South Dakota; that affiant is and during all of said times, was an employee of the publisher of such newspaper and has personal knowledge of the facts stated in this affidavit; that the notice, order or advertisement, a printed copy of which is hereto attached, was published in said newspaper upon

Thursday, the 12 day of April 2018,
_____, the _____ day of _____ 2018,
_____, the _____ day of _____ 2018,
_____, the _____ day of _____ 2018,
_____, the _____ day of _____ 2018,
_____, the _____ day of _____ 2018,

and that \$72.87 pd. was charged for publishing the same

Sara Kruse
Subscribed and sworn to before me 4/12/18

Notary Public, South Dakota

My Commission expires March 11, 2022

NOTICE OF
APPLICATION NO. 8280-3
to Appropriate Water

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2851708 April 12, 2018

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's



RECEIVED

APR 17 2018

WATER RIGHTS
PROGRAM

Form 8

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
County of McCook) SS

I, Troy Schwans

certify that the attached printed Notice was
taken

from the Salem Special

printed and published in Salem

County of McCook and

state of South Dakota. The notice was
published

in the newspaper on the following date:

April 12, 2018

Cost of Printing \$32.16

Troy Schwans
(Signature)

Publisher
(Title)

4/12/18
(Date Signed)

this application. Notice of the hearing will
be given to the applicant and any person
filing a petition.

Steven M. Pirner,
Secretary,
Department of Environment
and Natural Resources.

Published once at the total approximate
cost of \$32.68.

Public Notice

**NOTICE OF APPLICATION
NO. 8280-3 to Appropriate Water**

Notice is given that Dylbrook Farms RE, LLC, c/o Barry Kerkaert, 1300 S Hwy 75, Box 188, Pipestone MN 56164 has filed an application for a water permit to appropriate 121 acre-feet of water annually with a maximum diversion rate of 0.22 cubic feet of water per second from three wells to be completed into a Cretaceous aged undifferentiated sandstone Aquifer (300 feet deep) located in the SE 1/4 SW 1/4 Section 9 for commercial use in a swine farrowing facility located in the SE 1/4 SW 1/4 Section 9; all in T102N-R54W. This site is located approximately 6 miles southeast of Salem SD.

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Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, April 23, 2018 9:40 AM
To: Marty Rost (mrost@pipevet.com)
Subject: Water Permit Application No. 8280-3
Attachments: 8280-3.pdf

Marty,

Attached is a copy of the Chief Engineer recommendation and report on Water Permit Application No. 8280-3, Dylbrook Farms RE LLC.

Karen Schlaak

SD DENR, Water Rights Program
(605) 773-3352





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3182
<http://denr.sd.gov>

APR 3 0 2018

Dylbrook Farms RE LLC
c/o Barry Kerkaert
PO Box 188
Pipestone MN 56164

Dear Mr. Kerkaert:

Enclosed is Water Permit No. 8280-3 authorizing construction of the water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An informational sheet *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Jeanne Goodman, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

Dylbrook Farms RE, LLC Well Tracking Form

Well 1		
Date	Reading	Use in Gallons
02/01/2018		
02/02/2018		0
02/03/2018		0
02/04/2018		0
02/05/2018		0
02/06/2018		0
02/07/2018		0
02/08/2018		0
02/09/2018		0
02/10/2018		0
02/11/2018		0
02/12/2018		0
02/13/2018		0
02/14/2018	7,700	7,700
02/15/2018	10,200	2,500
02/16/2018	12,800	2,600
02/17/2018	15,700	2,900
02/18/2018	18,400	2,700
02/19/2018	21,000	2,600
02/20/2018	23,800	2,800
02/21/2018	26,600	2,800
02/22/2018	29,500	2,900
02/23/2018	32,500	3,000
02/24/2018	35,200	2,700
02/25/2018	38,300	3,100
02/26/2018	41,300	3,000
02/27/2018	47,000	5,700
02/28/2018	52,800	5,800
		0
		0

52,800

Well 2		
Date	Reading	Use
02/01/2018		
02/02/2018		0
02/03/2018		0
02/04/2018		0
02/05/2018		0
02/06/2018		0
02/07/2018		0
02/08/2018		0
02/09/2018		0
02/10/2018		0
02/11/2018		0
02/12/2018		0
02/13/2018		0
02/14/2018	13,000	13,000
02/15/2018	16,200	3,200
02/16/2018	19,400	3,200
02/17/2018	22,900	3,500
02/18/2018	26,100	3,200
02/19/2018	29,200	3,100
02/20/2018	32,700	3,500
02/21/2018	35,900	3,200
02/22/2018	38,900	3,000
02/23/2018	42,000	3,100
02/24/2018	44,900	2,900
02/25/2018	48,100	3,200
02/26/2018	51,200	3,100
02/27/2018	54,200	3,000
02/28/2018	57,700	3,500
		0
		0

57,700

Well 3		
Date	Reading	Use
02/01/2018		
02/02/2018		0
02/03/2018		0
02/04/2018		0
02/05/2018		0
02/06/2018		0
02/07/2018		0
02/08/2018		0
02/09/2018		0
02/10/2018		0
02/11/2018		0
02/12/2018		0
02/13/2018		0
02/14/2018		0
02/15/2018		0
02/16/2018		0
02/17/2018		0
02/18/2018		0
02/19/2018		0
02/20/2018		0
02/21/2018		0
02/22/2018		0
02/23/2018		0
02/24/2018		0
02/25/2018		0
02/26/2018		0
02/27/2018		0
02/28/2018		0
		0
		0
		0

0

Date	Use in Gallons
02/01/2018	
02/02/2018	0
02/03/2018	0
02/04/2018	0
02/05/2018	0
02/06/2018	0
02/07/2018	0
02/08/2018	0
02/09/2018	0
02/10/2018	0
02/11/2018	0
02/12/2018	0
02/13/2018	0
02/14/2018	20,700
02/15/2018	5,700
02/16/2018	5,800
02/17/2018	6,400
02/18/2018	5,900
02/19/2018	5,700
02/20/2018	6,300
02/21/2018	6,000
02/22/2018	5,900
02/23/2018	6,100
02/24/2018	5,600
02/25/2018	6,300
02/26/2018	6,100
02/27/2018	8,700
02/28/2018	9,300
	0
	0
	0
	110,500

Use in Gallons

12,200
12,400
12,400
12,400
12,200
12,700
12,600
12,700
12,800
13,200
13,200
13,300
13,100
13,300
13,300
12,900
13,600
13,200
13,300
13,300
13,500
13,000
12,900
10,700
12,200
11,900
12,500
11,800
13,300
12,300
382,200

Dylbrook Farms RE, LLC Well Tracking Form

Well 1		
Date	Reading	Use in Gallons
03/01/2018	52,800	
03/02/2018	58,700	5,900
03/03/2018	64,700	6,000
03/04/2018	70,700	6,000
03/05/2018	76,600	5,900
03/06/2018	82,600	6,000
03/07/2018	88,800	6,200
03/08/2018	95,100	6,300
03/09/2018	101,200	6,100
03/10/2018	107,500	6,300
03/11/2018	114,000	6,500
03/12/2018	120,300	6,300
03/13/2018	126,800	6,500
03/14/2018	133,200	6,400
03/15/2018	139,500	6,300
03/16/2018	146,100	6,600
03/17/2018	152,100	6,000
03/18/2018	158,700	6,600
03/19/2018	165,000	6,300
03/20/2018	171,500	6,500
03/21/2018	177,900	6,400
03/22/2018	184,400	6,500
03/23/2018	190,700	6,300
03/24/2018	197,000	6,300
03/25/2018	202,000	5,000
03/26/2018	208,000	6,000
03/27/2018	213,700	5,700
03/28/2018	219,800	6,100
03/29/2018	225,600	5,800
03/30/2018	231,900	6,300
03/31/2018	237,800	5,900
		185,000

Well 2		
Date	Reading	Use
03/01/2018	57,700	
03/02/2018	64,000	6,300
03/03/2018	70,400	6,400
03/04/2018	76,800	6,400
03/05/2018	83,300	6,500
03/06/2018	89,500	6,200
03/07/2018	96,000	6,500
03/08/2018	102,300	6,300
03/09/2018	108,900	6,600
03/10/2018	115,400	6,500
03/11/2018	122,100	6,700
03/12/2018	129,000	6,900
03/13/2018	135,800	6,800
03/14/2018	142,500	6,700
03/15/2018	149,500	7,000
03/16/2018	156,200	6,700
03/17/2018	163,100	6,900
03/18/2018	170,100	7,000
03/19/2018	177,000	6,900
03/20/2018	183,800	6,800
03/21/2018	190,700	6,900
03/22/2018	197,700	7,000
03/23/2018	204,400	6,700
03/24/2018	211,000	6,600
03/25/2018	216,700	5,700
03/26/2018	222,900	6,200
03/27/2018	229,100	6,200
03/28/2018	235,500	6,400
03/29/2018	241,500	6,000
03/30/2018	248,500	7,000
03/31/2018	254,900	6,400
		197,200

Well 3			Date
Date	Reading	Use	
03/01/2018			03/01/2018
03/02/2018		0	03/02/2018
03/03/2018		0	03/03/2018
03/04/2018		0	03/04/2018
03/05/2018		0	03/05/2018
03/06/2018		0	03/06/2018
03/07/2018		0	03/07/2018
03/08/2018		0	03/08/2018
03/09/2018		0	03/09/2018
03/10/2018		0	03/10/2018
03/11/2018		0	03/11/2018
03/12/2018		0	03/12/2018
03/13/2018		0	03/13/2018
03/14/2018		0	03/14/2018
03/15/2018		0	03/15/2018
03/16/2018		0	03/16/2018
03/17/2018		0	03/17/2018
03/18/2018		0	03/18/2018
03/19/2018		0	03/19/2018
03/20/2018		0	03/20/2018
03/21/2018		0	03/21/2018
03/22/2018		0	03/22/2018
03/23/2018		0	03/23/2018
03/24/2018		0	03/24/2018
03/25/2018		0	03/25/2018
03/26/2018		0	03/26/2018
03/27/2018		0	03/27/2018
03/28/2018		0	03/28/2018
03/29/2018		0	03/29/2018
03/30/2018		0	03/30/2018
03/31/2018		0	03/31/2018
		0	

**Water Rights Program
Dam File Documentation**

NAME OF PERSON OR FILE: 8280-3 Dylbrook Farms RE LLC

DATE: 9/7/2018

RE: observation well requirement

COMMENTS:

The qualifications on Water Permit No. 8280-3 require the permit holder to provide an observation well for addition to the SD DENR Observation Well Network. On August 22, 2018 the Water Rights Program received the following well completion report for an observation well drilled by a South Dakota licensed well driller. Water Rights contacted a representative of the permit holder (Mr. Marty Rost) and verify this observation well was for the permit qualification. Mr. Rost also indicated the well is located in the right of way and declined an easement for access for the well. On September 5, 2018 a Water Rights' Observation Well technician visited the well and completed the field work to add the well to the SD DENR Observation Well Network. This observation well is identified as MC-2018A in the SD DENR Observation Well Network. With the addition of this observation well to the network the permit holder has met the permit qualification for an observation well.


Whitney Kilts
Natural Resources Engineer

SOUTH DAKOTA WATER WELL COMPLETION REPORT

11-02

Location 1/4 SW 1/4 Sec 9 Twp 102N Rg 54W

Well Owner: Pipestone System

Business Name: Dylbrook Farms

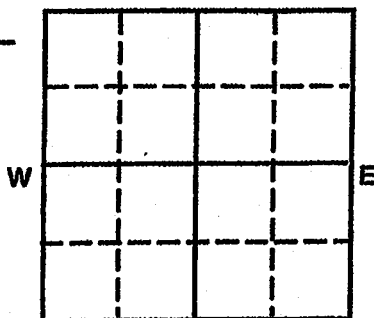
Address: 4444.8 - 258th St

City, State, Zip: Canistota, SD 57012

County: McCook

North

Please mark well location with an "X"



Well completion Date

8-16-18

Distance to nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.)

? ft. from None (Identify source)

PROPOSED USE:

☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring

well Observation well

METHOD OF DRILLING:

Rotary

CASING DATA:

☒ Steel ☐ Plastic ☐ Other

If other describe

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
<u>SC40 LB/FT</u>	<u>2 IN</u>	<u>0 FT</u>	<u>290 FT</u>	<u>6 IN</u>
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type Grout DP No. of Sacks 8 Grout Weight 255 Lb/gal From 0 Ft To 290 Ft

Describe grouting procedure 1" Trionic liner - Pumped w/ Grout machine

SCREEN:

☐ Perforated pipe ☒ Manufactured

Diameter 2 1/2 Inches Length 25 Feet

Material Plastic

Slot Size 25 Set From 265 Feet to 290 Feet

Other information Gravel Packed

WAS A PACKER OR SEAL USED?

☐ Yes ☐ No

If so, what material?

Describe packer(s) and location

DISINFECTION: Was well disinfected upon completion?

☒ Yes, How? Chlorine Pills

Lab sample sent to for water quality analysis ☐ No, Why Not?

WELL LOG:

DEPTH

FORMATION	FROM	TO
<u>Top Soil</u>	<u>0</u>	<u>2</u>
<u>Yellow clay</u>	<u>2</u>	<u>70</u>
<u>Blue Clay</u>	<u>70</u>	<u>265</u>
<u>Coarse Sandy</u>	<u>265</u>	<u>272</u>
<u>Sandstone</u>	<u>272</u>	<u>289</u>
<u>Clay</u>	<u>289</u>	<u>290</u>

STATIC WATER LEVEL

136

FEET

If flowing: closed in pressure

PSI

GPM flow

through

Inch pipe

Controlled by

☐ Valve

☐ Reducers

☐ Other

Reduced flow rate

GPM

Can well be completely shut in?

WELL TEST DATA:

☐ Pumped

Describe:

AIR

☐ Bailed

☐ Other

Pumping Level Below Land Surface

Ft. After

Hrs. pumped

GPM

Ft. After

Hrs. pumped

GPM

If pump installed, pump rate:

GPM

REMARKS

This well was drilled under license # 439

And this report is true and accurate.

Drilling firm:

Dave Putzke well Drilling & repair Inc

Signature of License Representative:

Dave Putzke

RECEIVED

Signature of Well Owner or Equitable Property Holder:

AUG 22 2018

WATER RIGHTS PROGRAM

Date:

523 E Capitol Ave.

Pierre SD 57501

Please return WHITE COPY to: DENR Water Rights

MAR 09 2020

WATER RIGHTS
PROGRAMNOTICE OF COMPLETION OF WORKS AND
APPLICATION OF WATER TO BENEFICIAL USE

8280-3

Date 3/5/2020TO: Water Rights Program, DENR
523 E. Capitol
Pierre, SD 57501-3181FROM: Dylbrook Farms RE LLC Barry Kerkert
(name)
P.O. Box 188
(address)
Pipestone MN 56164 507 825 4211
(city, state, zip) (phone)

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

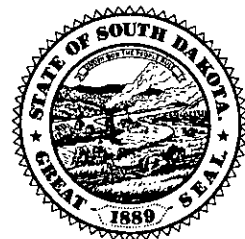
Water Permit No. 8280-3 states that the water use system is to be constructed by 4/22/23, and water is to be put to beneficial use by 4/22/27.
(date) (date)

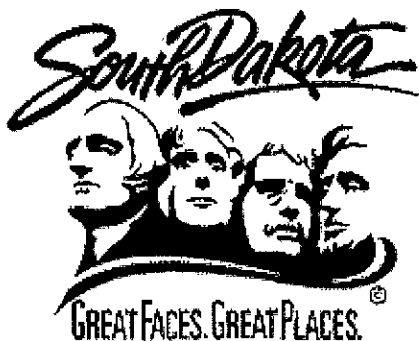
The water use system was completed on 7/1/19.
(date)

Applying the water to beneficial use was completed on 7/1/19.
(date)

You may schedule an investigation so that the water license may be issued.

[Signature]
(signature)





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3182
<http://denr.sd.gov>

March 10, 2020

Barry Kerkaert
PO Box 188
Pipestone MN 56164 0188

Dear Mr. Kerkaert:

I am writing to acknowledge receipt of the "Notice of Completion of Works" forms that you sent in for the following systems:

- Dylbrook Farms RE LLC
- Elm Valley Farms LLC
- Husky Farms LLC

The systems are now ready for inspection. Inspections are done on a county-by-county basis as staff time permits. You have done everything you need to do and the intervening time between completion of the projects and the staff inspections has no bearing on the water permits.

Someone from our office will contact you prior to the inspection to set up a time that is convenient for you. If you have any questions, please contact me.

Sincerely,

Genny McMath
Water Rights Program
(605) 773-3352
email: genny.mcmath@state.sd.us

c: Gary Glanzer, Husky Farms LLC, 533 Fordham Dr, Carpenter SD 57322

Water Rights Program File Documentation

NAME OF PERSON OR FILE:

Water Permit No. 8004-3 Mitchell Livestock Marketing

Water Permit No. 8280-3 Dylbrook Farms RE LLC

DATE: April 29, 2024

RE: Water Rights Info Database Aquifer Abbreviation Reassignment

COMMENTS:

As part of initial water permit application review and report writing, it was determined both applications would be withdrawing water from some portion of the Cretaceous aged undifferentiated sandstone aquifer. For Water Permit No. 8004-3, the aquifer listed in the permit was called "Undifferentiated Cretaceous Aquifer" with a suggested abbreviation on the report of "UC". The original abbreviation used in the Water Rights Info Database was "C:U". For Water Permit No. 8280-3, the aquifer listed in the permit was called "a Cretaceous aged undifferentiated sandstone Aquifer" with no abbreviation suggested in the report and no abbreviation used in the Water Rights Info Database.

It was determined a consistent name and abbreviation were needed from any water rights/permits that withdraw water from any portion of the discontinuous deposits of this aquifer. A review of how aquifers have been named in the past by the SD Geological Survey, U.S. Geological Survey and the Water Rights Program, consultation with the SD Geological Survey, and review of the Corps of Engineers Reports (Hedges et al, 1982) determined it would be most appropriate to designate the aquifer as the "Cretaceous Undifferentiated" and use the abbreviation "KU".



Adam Mathiowetz

Natural Resources Engineer

DANR-Water Rights Program

REFERENCES

Hedges, L.S., Burch, S. L., Iles, D. L., Barari, R. A., and Schoon, R. A. 1982. Evaluation of Ground-Water Resources Eastern South Dakota and Upper Big Sioux River, South Dakota, and Iowa. Task 1: Bedrock Topography and Distribution, Task 2: Extent of Aquifers, Task 3: Ground-Water Storage, Task 4: Computerized Data Base, Final Report. U.S. Army Corps of Engineers Contract DACW 45-80-C-0185.

**Report of Examination of Works and/or Application of Water to Beneficial Use
For Permit No. 8280-3**

I have this day, July 8, 2024, made a thorough examination of the water use system constructed by Dylbrook Farms RE LLC, PO Box 188, Pipestone, MN 56164 of Permit No. 8280-3, bearing the priority of April 20, 2017 authorizing the diversion of 0.22 cu. ft. per second of the waters of the Cretaceous aged undifferentiated sandstone Aquifer for commercial use purposes, in McCook County.

A. Works used to divert the water:

Well Information:

- 1) Well Drilling Firm: Putzke Well Drilling
- 2) No. of Wells 3
- 3) Depth(s) 284, 300, 300 feet
- 4) Well log is available Y

Casing:

- 1) Diameter 5 inches
- 2) Length 264, 280, 273 feet
- 3) Type Plastic

Screen:

- 1) Type Plastic
- 2) Length 20, 20, 27 feet
- 3) Static water level 136 feet

Pump:

- 1) Make Submersibles
- 2) Model Unknown
- 3) Size Unknown
- 4) Capacity 50 each GPM

Motor:

- 1) Make Unknown
- 2) Model No. Unknown
- 3) Horsepower rating 3 - each hp

B. Works used to transport water to place of use:

- 1) Type Buried PVC 2) Size unknown inches 3) Length 400 feet

Comments: **xx**

C. D. Compliance with Permit Requirements:

- 1) Permit qualifications being abided by N

If no, describe: **Wells capable of producing more than permitted.**

- 2) Exceptions to compliance are: None

E. Condition and Location:

1. The system is in good condition with the point(s) of diversion located as follows: **WELL LOCATIONS**
From the SW corner Sec 9 T102N R54W WELL #1: 260 ft N & 2375 ft E, Lat 43.64534 Long -97.31866
WELL #2: 180 ft N & 2375 ft E, Lat 43.64513 Long -97.31866 WELL #3: 110 ft N & 2375 ft E
Lat 43.64495 Long -97.31866 (SE ¼ SW ¼).

2. The works are capable of diverting and conveying to the place of use 0.33 cu. ft. per second of water of water which is to be used for commercial use.

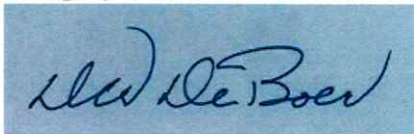
The license should be issued for 0.22 cfs.

3. All structures, wells and lands on map Y

F. Comments or other permit(s) associated with the project:

Mr. Marty Rost (507/215-0482) is the contact person for the permit.

FSA imagery and the ArcGIS software were used to make the facility map.



Darrell DeBoer
Water Rights Inspector
DENR, Water Rights Program

Date report completed: August 8, 2024

08/30/2024 Amanda Dewell called Mr. Rost to ask about the wells diversion rate. He confirmed that the wells are operated on a rotation and that all 3 wells are never being used at the same time. The license will be issued for 0.22 cfs.



0

420

840

1,680

2,520

3,360

Feet



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

SEP 04 2024

8280-3

Dylbrook Farms RE, LLC
c/o Berry Kerkaert
PO Box 188
Pipestone MN 56564

Dear Mr. Kerkaert:

Enclosed is Water License No. 8280-3. This is the final water right document completing your process of obtaining a Water Right. Included with your license is a map prepared by the staff engineer who conducted the field investigation.

For your information SDCL 46-6-27 requires that if in the future, the owner of an existing well, constructs a replacement well and does not plan to use the old well, the old well is considered abandoned and must be plugged. Also, any well that is being used or is not considered abandoned must be valved and controlled, if flowing, or sealed and capped so that no leaking occurs either underground or at the surface.

So long as you use the water beneficially, as stated in the Water License, State Water Laws provide that you have a continuing right to use the water. If you have any questions, please contact our office.

Sincerely,

Eric Gronlund, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

STATE OF SOUTH DAKOTA
WATER LICENSE NO. 8280-3

(1) Dylbrook Farms RE, LLC, PO Box 188, Pipestone MN 56164, made Application No. 8280-3, April 20, 2017, for a water permit to appropriate 121 acre-feet of water annually, with a maximum diversion rate of 0.22 cubic feet of water per second from groundwater, three wells (Cretaceous Aged Undifferentiated Sandstone Aquifer), McCook County, South Dakota for commercial use in a swine farrowing facility. Permit No. 8280-3, with a priority date of April 20, 2017, was approved April 23, 2018, and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before April 23, 2023, and for the application to beneficial use of water on or before April 23, 2027.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 0.22 cubic feet of water per second for beneficial use. The locations of the diversion points are:

- Well #1: 260 ft N & 2,375 ft E of the SW corner Section 9, T102N, R54W (SE ¼ SW ¼)
(Latitude 43.64534 & Longitude -97.31866)
- Well #2: 180 ft N & 2,375 ft E of the SW corner Section 9, T102N, R54W (SE ¼ SW ¼)
(Latitude 43.64513 & Longitude -97.31866)
- Well #3: 110 ft N & 2,375 ft E of the SW corner Section 9, T102N, R54W (SE ¼ SW ¼)
(Latitude 43.64495 & Longitude -97.31866)

(3) The water is to be used during the following described annual period: January 1 – December 31.

(4) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use.

(5) Pursuant to South Dakota Water Law 46-5-30.1 Dylbrook Farms RE LLC, the holder and/or owner of Water Right No. 8280-3 is issued a license to appropriate water, the right to use 0.22 cubic feet of water per second from groundwater, three wells (Cretaceous Aged Undifferentiated Sandstone Aquifer), with a priority date of April 20, 2017, from the location specified in (2) of this license for commercial use in a swine farrowing facility.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 8280-3 and subject to the following qualifications:

1. The wells approved under Water Permit No. 8280-3 will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner, under this Permit shall control withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. Water Permit No. 8280-3 is subject to compliance with requirements of the Department's Water Pollution Control Permit issued pursuant to SDCL 34A-2-36 or 34A-2-112 for concentrated animal feeding operations.
3. Water Permit No. 8280-3 is subject to compliance with all existing and applicable Water Management Board Rules including but not limited to:

continued

- a) Chapter 74:54:01 Ground Water Quality Standards
 - b) Chapter 74:54:02 Ground Water Discharge Permit
 - c) Chapter 74:51:01 Surface Water Quality Standards
 - d) Chapter 74:51:02 Uses Assigned to Lakes
 - e) Chapter 74:51:03 Uses Assigned to Streams
 - f) Chapter 74:52:01 through 74:52:11 Surface Water Discharge Provisions
4. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Cretaceous Aged Undifferentiated Sandstone Aquifer.
5. Water Permit No. 8280-3 authorizes a total annual diversion of 121 acre-feet of water.
6. The permit holder for Water Permit No. 8280-3 shall contract with a licensed well driller to construct an observation well that will become part of the South Dakota Department of Agriculture and Natural Resources Observation Well Network. The observation well must be completed into the same aquifer as the production wells and shall be located in the public right of way or a perpetual easement granted to the State for purpose of maintaining an observation well on the property owed by the permit holder. The observation well construction shall be coordinated with the DANR-Water Rights Program staff.


Eric Gronlund, Chief Engineer
Water Rights Program
Department of Agriculture and Natural Resources

SEP 04 2024
date

