

WATER PERMIT NO. 2000-1

Name of Applicant: **Troy Johnson**

Address: **11295 SD Hwy 34, St. Onge SD 57779**

Phone: **605 641-8769**

Amount of Water Claimed: **0.011 cfs**

Total Acres: **NA**

Source of Water Supply: **groundwater (1 existing well)**

Water to be used for: **commercial**

County: **Butte**

Type of Waste Disposal System:

Location: **3 miles southeast of Belle Fourche**

PRIORITY

Date Received: **9-25-20**

Application/License Fee: **\$ 300**

Corrected Application Received:

Period of Annual Use: **January 1 – December 31**

Remarks:

Diversion Point: **NW 1/4 NE 1/4 Sec 36-T8N-R2E**

Land to be Irrigated: **NA**

Depth of Well: **280 feet deep**

Well Driller: **M & R Drilling**

Remarks:

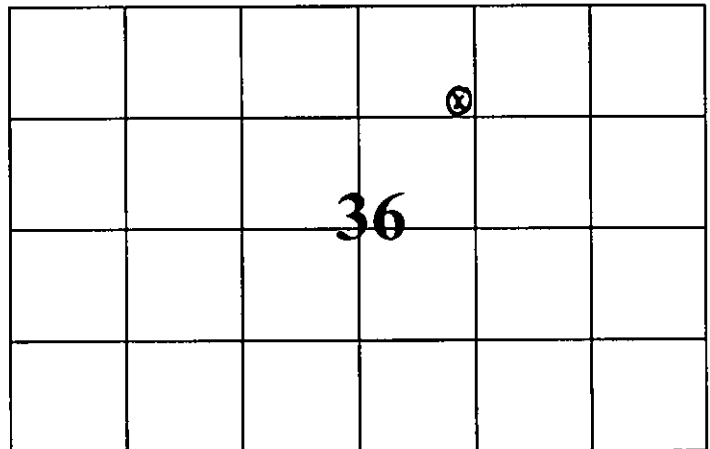
Type of Map: **aerial**

Prepared by:

Reviewed and the Number Assigned on: **9-25-20**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



**SOUTH DAKOTA
WATER PERMIT NO. 2000-1**

Date of first receipt of application September 25, 2020.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 2000-2 to Troy Johnson, 11295 SD Hwy 34, St Onge SD 57779 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. 2000-1 appropriates up to 1.0 acre-feet of water annually at a maximum pump rate of 0.011 cubic feet of water per second from one well completed into the Inyan Kara Aquifer (280 feet deep) located in the NW 1/4 NE 1/4 Section 36-T8N-R2E for commercial use in a beef/pork processing plant. This site is located approximately three miles southeast of Belle Fourche 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. 2000-1 is December 11, 2020.
5. The date from which applicant may claim right is September 25, 2020.
6. One-fifth of the construction is to be completed on or before June 11, 2023.
7. All construction is to be completed on or before December 11, 2025.
8. Water is to be put to beneficial use on or before December 11, 2029.
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 well approved under this Permit 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 his 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. 2000-1 authorizes a total annual diversion up to 1.0 acre-feet of water.

WATER MANAGEMENT BOARD

By: Eric Gronlund
Eric Gronlund, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JAN 19 2021
date



Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>2000-1</u> (office use only) Hydrologic Unit <u>10120203</u>
	Basin <u>Belle Fourche River</u>
	Newspaper <u>Black Hills Pioneer</u>

PAID
SEP 25 2020
Ck# 1525

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.)

BEEF/PORK PROCESSING PLANT

- Name to Appear on Water Permit TROY JOHNSON
Mailing Address 11295 SD HWY. 34 SAINT ONGE SD 57779
(Address) (City) (State) (Zip Code)
Phone 605-641-8769 Mobile _____ Email TROYJACK14@GMAIL.COM
- Amount of water claimed 0.011 *CFS or 5 **GPM and 200,000 ***AF or 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)
- Source of water supply WELL (Comp. Pat. 00032943)
- Location of point of diversion SE 1/4 NW 1/4 NE 1/4 S36, T8N, R2E County BUTTE
(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 ☒ No
If "Yes," where will water be used? _____
(example - NW1/4 section 12-T104N-R53W)
- County or counties where water will be used BUTTE
- Annual period during which water is to be used DAILY Jan 1 - Dec 31
- 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)

BEEF SLAUGHTER, CUT, & WRAP PROCESSING PLANT
WITH A 20 HEAD PER WEEK CAPACITY

RECEIVED
SEP 25 2020

WATER RIGHTS
PROGRAM

I, Troy Johnson, 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.

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 ____ Have test holes been drilled ☐ Yes ☐ No Drilled by ____
(if yes, please provide copies of logs)

b) If existing wells, how many 1 Provide copy of log(s), if available. Drilled by M&R DRILLING

For either Existing or Proposed Wells:

c) Well Depth (required) 280 FT Depth to Top of Water Bearing Material 99 FT Depth to Water from Surface FLOWING

d) Distance to nearest domestic well on applicant's property 1500 FT Property owned by others 2000 FT

2. Wastewater Disposal System Information

PLANT BATHROOM - SEPTIC TANK + DRAIN FIELD

a) Type of System (i.e. septic tank, drain field) REST OF PLANT - EVAPORATION POND (LESS THAN 1 ACRE)

b) System Capacity (gallons) ____ Year Constructed ____

c) Connected to the City of ____ Sanitary System

3. Dugout Information

a) Surface Dimensions EVAPORATION POND 200 FT x 200 FT Depth 3 FT

b) Depth to water (ground surface to water level) 20 FT

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



Q Search for a place or address

3D

T8N R2E S36

T8N R3E S31

WELL
X

BUILDING
SITE

34

LAGOON

54
AQI 45

8N-2E
Section: 26

8N-2E
Section: 25

8N-3E
Section: 30

8N-2E
Section: 35

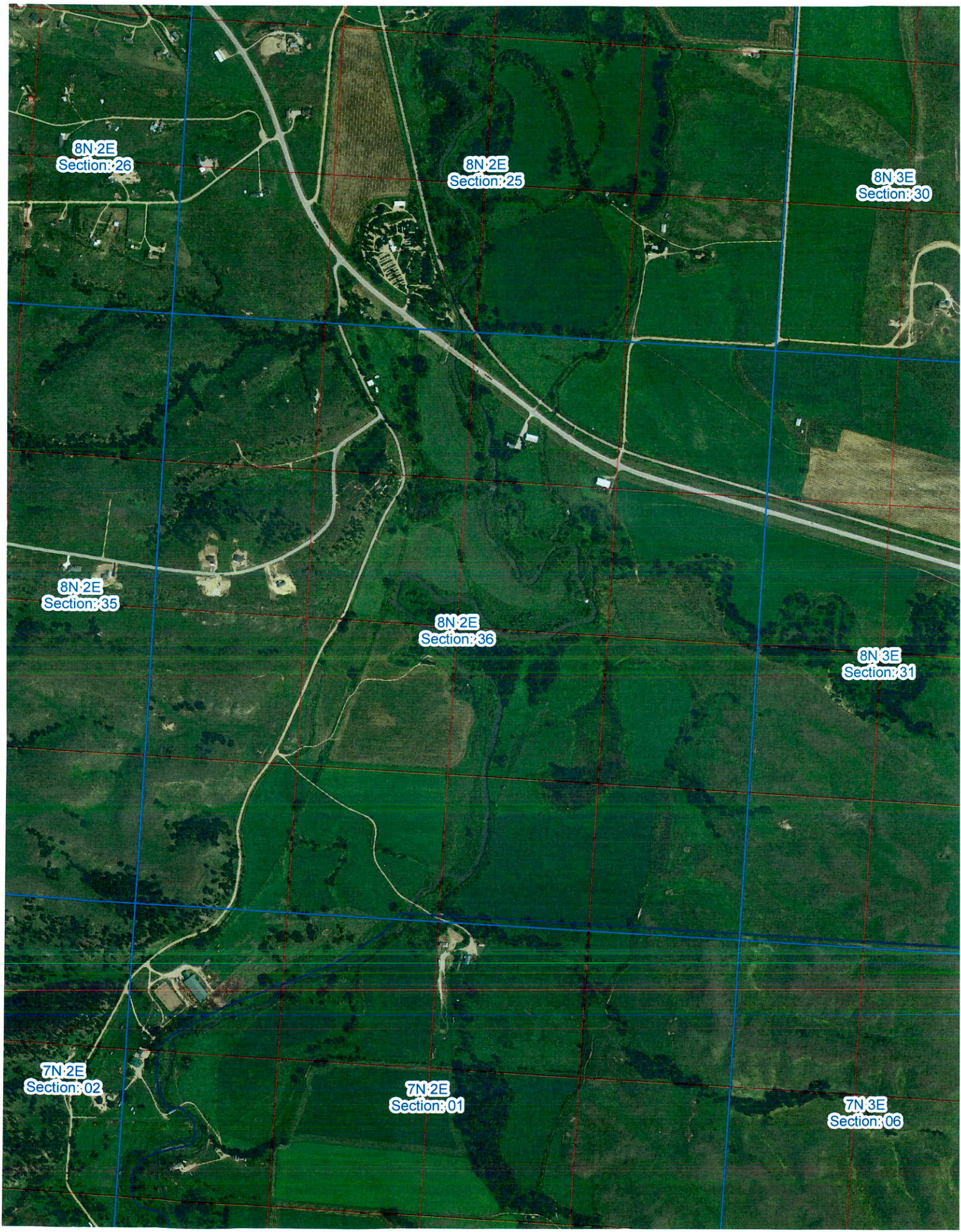
8N-2E
Section: 36

8N-3E
Section: 31

7N-2E
Section: 02

7N-2E
Section: 01

7N-3E
Section: 06

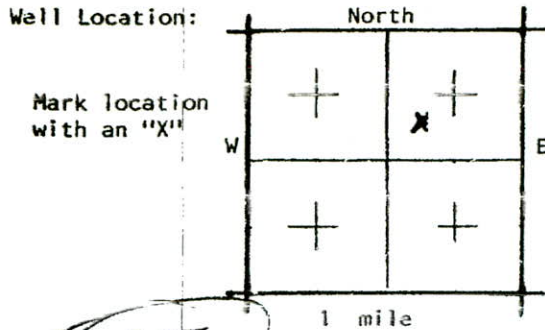


WELL DRILLERS REPORT
SOUTH DAKOTA WATER RIGHTS COMMISSION

4-78

Well Owner:
Name Doug Johnson FREDSTON
Address Belle Fourche, S.D. 57717

Water Level Information:
Static water level _____ below land surface
If flowing: closed in pressure 11 PSI
rate of flow 30 GPM
Controlled by:
☒ Valve ☐ Reducers ☐ Other
If other; specify _____



County BUTTE
NE 1/4 SW 1/4 Sec. 36 Twp. 8N Rg. 2E

Proposed Use:
☒ Domestic ☐ Municipal ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Stock

Method of Drilling:
☒ Forward Rotary ☐ Bored ☐ Jetted
☐ Reverse Rotary ☐ Cable ☐ Other

Well Construction:
Diameter of Hole 6 1/2 + 3 1/2
Depth 280
Casing ☐ Steel ☐ Concrete
☒ Plastic ☐ Other
If other, specify _____

Was casing end left open YES
Was a well screen installed NO
Describe Well Screen
Diameter _____ Material _____
Slot size _____
Was well gravel packed YES
Was well grouted _____
Was water sample taken _____

Well Test Data:
☐ Pumped _____
☐ Bailed Describe: _____
☐ Other _____
Pumping Level Below Land Surface
ft. After _____ Hrs. pumped _____ GPM
" " " " " "
" " " " " "

Well Log:

Formation	From	To
SURFACE	0	6
BUFF SHALE	6	10
LARGE CLAY	10	12
GRAY SHALE	14	16
LIGHT GRAY SHALE	16	19
LIGHT GRAY SHALE	19	21
TAN SAND	21	35
TAN SAND	35	36
GRAY SHALE	36	40
TAN SAND	40	42
WHITE SAND	42	70
BUFF SAND	70	74
LIGHT GRAY + GREENISH	74	76
GREENISH CLAY SAND	76	77

(Use Back if Necessary)

Date Completed: SEPT. 26 - 1979

Driller: M. R. Knollig 0721
Driller's or Firm's Name License NO.

Belle Fourche
Address

Mark A. Sandy 10-9-79
Signed By Date

Remarks:



- 84-86 GRAY SHALE
 86-91 TAN, BUFF, REDISH BROWN SAND ROCK
 91-93 GRAY, DARK SHALE
 93-96 TAN, BUFF SAND ROCK
 96-99 GRAY, GREEN SHALE
 99-105 WHITE SAND FLOWED TO BALCON
 105-170 GRAY, GREEN, REDISH BROWN SANDY SHALE
 170-192 TAN SAND ROCK
 192-193 GRAY SILTY SHALE
 193-196 SILTSTONE
 196-227 GRAY SILTY SHALE
 227-265 TAN & WHITE SAND
 265-280 GRAY, GREEN, WHITE SHALE.

**ROGER HUCK
ROGER HUCK
1005 STATE STREET
BELLE FOURCHE SD 57717**

Domestic Suitability
For: (56799) ROGER HUCK
W3 Water Quality

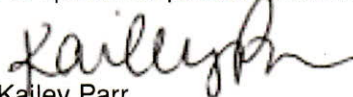
Analytical Results for TROY JOHNSON

PARAMETER	SODIUM	CALCIUM	MAGNESIUM	pH	NITRATE	SULFATE	CONDUCTIVITY	TOTAL DISSOLVED SOLIDS	HARDNESS	TOTAL COLIFORM	IRON	MANGANESE	CHLORIDE	FLUORIDE
METHOD	EPA 200.7 Na	EPA 200.7 Ca	EPA 200.7 Mg	SM 4500 H+B	EPA 300.0 NO ₃ -N	EPA 300.0 SO ₄	SM 2510 B	CALC	CALC	SM 9223B	EPA 200.7 Fe	EPA 200.7 Mn	EPA 300.0 Cl	EPA 300.0 F
UNITS	ppm	ppm	ppm		ppm	ppm	mmhos/cm	ppm	gr/gallon	MPN/100 mL	ppm	ppm	ppm	ppm
LEVEL FOUND	9.85	82.0	26.6	7.14	n.d.	109	0.636	413	18.4	n.d.	0.16	0.017	1	0.4
CAUTION LEVEL	100	80	30	6.5/9	10	400	0.75	500	20	1	0.3	0.05	200	4

PARAMETER	SODIUM	CALCIUM	MAGNESIUM	pH	NITRATE	SULFATE	CONDUCTIVITY	TOTAL DISSOLVED SOLIDS	HARDNESS	TOTAL COLIFORM	IRON	MANGANESE	CHLORIDE	FLUORIDE
METHOD	EPA 200.7 Na	EPA 200.7 Ca	EPA 200.7 Mg	SM 4500 H+B	EPA 300.0 NO ₃ -N	EPA 300.0 SO ₄	SM 2510 B	CALC	SM 2310B	SM 9223B	EPA 200.7 Fe	EPA 200.7 Mn	EPA 300.0 Cl	EPA 300.0 F
UNITS	ppm	ppm	ppm		ppm	ppm	mmhos/cm	ppm	gr/gallon	MPN/100 mL	ppm	ppm	ppm	ppm
GRAPHIC														
Level Exceeds EPA limits														
Problems Likely														
Potential Problems														
No Apparent Problems														

All results are reported on an AS RECEIVED basis., n.d. = not detected , MPN = most probable number , ppm = parts per million, ppm = mg/kg, ppm = mg/L

For questions please contact:


Kailey Parr
Account Manager
kparr@midwestlabs.com (402)829-9863

The result(s) issued on this report only reflect the analysis of the sample(s) submitted.

SUGGESTED WATER QUALITY GUIDELINES FOR HUMAN CONSUMPTION

Sodium (Na)	Less than 20 ppm: No adverse effects.	20-80 ppm: Persons on restricted sodium diets should consult a physician concerning use.	More than 80 ppm: Should be used sparingly by persons on low-sodium diets.
Calcium (Ca)	Less than 80 ppm: No adverse effects.	80-150 ppm: Hard water problems such as scale formation can be expected.	More than 150 ppm: May be associated with high levels of sulfate (see sulfate below). Extreme hardness is undesirable for household use.
Magnesium (Mg)	Less than 30 ppm: No adverse effects.	30-80 ppm: Contributes to hardness when associated with high calcium levels.	More than 80 ppm: When associated with high sulfate, is likely to have a laxative effect (magnesium sulfate is Epsom Salts).
pH	Less than 6.5: Corrosive to metal.	6.5-8.5: No adverse effects.	Higher than 8.5: Possible bitter taste, and germicidal activity of chlorine is reduced, corrosive to pipes.
Nitrate Nitrogen (NO ₃ -N)	Less than 2 ppm: No adverse effects.	2-10 ppm: No acute toxicity. Could have some negative health effects in young children.	More than 10 ppm: Increasing probability of health effect in children under 6 months of age due of reduced oxygen carrying capacity of the blood. EPA MCL standard of < 10 ppm.
Sulfate (SO ₄)	Less than 250 ppm: No adverse effects.	250-500 ppm: Likely to have a laxative effect, especially when first introduced. Diarrhea may or may not persist.	More than 500 ppm: Strongly laxative.
Conductivity	Less than 0.30: Extremely pure water can be corrosive metal.	0.30-1.50: No adverse effects.	Greater than 1.50: High levels of dissolved solids (see below).
Total Dissolved Solids (TDS)	Less than 200 ppm: No adverse health or nutritional effects. May be corrosive if extremely pure.	200-1000 ppm: No adverse effects.	More than 1000 ppm: Increasingly adverse effects, especially diarrhea. Water loses esthetic effect.
Hardness	Less than 6 gr/gal: No adverse effects (17.1 mg/L CaCO ₃ = (1 gr/gal).	6-12 gr/gal: Some scale may form in pipes and water heaters. Softening may be desirable.	More than 12 gr/gal: Scale will form rapidly and laundry will not come clean. Softening for household use is desirable.
Total Coliform*	Negative: No coliform bacteria present in 100 mL of water.		Positive: Coliforms are a bacteria that are naturally present in the environment and can be used to indicate the presence of other potentially harmful bacteria such as Fecal Coliform or <i>E.coli</i> . The presence of Fecal and <i>E. coli</i> may indicate a contamination from human or animal waste. The EPA acceptable level is less than one (<1) MPN (most probable number) per 100 mL of water.
Iron (Fe)	Less than 0.3 ppm: No adverse effects.	0.3-1.0 ppm: Some staining will occur.	More than 1.0 ppm: Iron oxide (rust) will cause extensive staining and will precipitate out, forming a red sludge. Taste will be bitter.
Manganese (Mn)	Less than 0.05 ppm: No adverse effects.	0.05-0.30 ppm: May cause black or brown staining of pipes, sinks and laundry.	More than 0.30 ppm: Besides the staining effect, will cause a metallic taste. It is harmful for infants 0-6 months at 0.30 to 1.0 mg/L. Greater than 1.0 mg/L is harmful for adults. May cause neurological issues. Refer to State Health Department.
Chloride (Cl)	Less than 200 ppm: No adverse effects.	200-500 ppm: Increasingly salty taste.	More than 500 ppm: Very salty taste.

*Holding/Transit time between sampling and analysis cannot exceed 30 hours. If this time has been exceeded, the results might be invalid.

N.D. = Not Detected

EPA Guidelines suggest less than 0.015 ppm (mg/L) for Lead (Pb) and 1.30 ppm (mg/L) for Copper (Cu).

20-239-4197

REPORT DATE
Aug 26, 2020
RECEIVED DATE
Aug 20, 2020

SEND TO
56799



ROGER HUCK
ROGER HUCK
1005 STATE STREET
BELLE FOURCHE SD 57717

REPORT OF ANALYSIS
For: (56799) ROGER HUCK
W3 Water Quality

Analysis	Level Found	Units	Reporting		Method	Analyst- Date	Verified- Date
	As Received		Limit				
Sample ID: TROY JOHNSON Lab Number: 8794959							
E. coli (generic)	< 1	MPN/100mL	1		SM 9223 B	elh8-2020/08/21	jzh4-2020/08/21

All results are reported on an AS RECEIVED basis., MPN = most probable number

For questions please contact:

Kaley Parr
Account Manager
kparr@midwestlabs.com (402)829-9863

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date September 25, 2020

RECEIVED OF Troy A. Johnson 11295 SD Hwy 34 Saint Onge SD 57779

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

Fee for Application for Permit No. <u>2000-1</u> to Appropriate Water, to construct and to put water to beneficial use	\$100.00
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>2000-1</u>	\$200.00
Fee for Filing Transfer Form _____	\$
Fee for _____	\$
Fee for Issuing New Well Driller's License No. _____	\$
Fee for Renewal of Well Driller's License No. _____	\$
Fee for Issuing Well Pump Installer's License No. _____	\$
Fee for Renewal of Well Pump Installer's License No. _____	\$
(Any Other Work Provided by Law)	
TOTAL	\$300.00

By *Eric Gronlund*
Chief Engineer

vm

Schlaak, Karen

From: Schlaak, Karen
Sent: Thursday, October 22, 2020 11:00 AM
To: Troy Johnson
Subject: RE: [EXT] FW: Water application for beef processing plant

Troy,
We received your application September 25th. We have 60 days from that date (which would be November 25, 2020) to prepare a report and recommendation. When the report and recommendation are complete, you will be notified with instructions regarding the public notice along with a copy of the report and recommendation.
Let me know if you have further questions.
Karen

From: Troy Johnson <troyjack14@gmail.com>
Sent: Thursday, October 22, 2020 9:48 AM
To: Schlaak, Karen <Karen.Schlaak@state.sd.us>
Subject: Re: [EXT] FW: Water application for beef processing plant

Karen

I was checking on the status of my water application. We are nearing 30 days since I sent in the application. I have a meeting with my partners in the processing plant on Saturday and was hoping to give them an update on the progress of the permit.

Thank you for your time
Troy Johnson

On Tue, Sep 22, 2020 at 1:20 PM Schlaak, Karen <Karen.Schlaak@state.sd.us> wrote:

Troy,

Eric forwarded your email to me. I have reviewed your application.

The application states the well is located in the NE ¼ SW ¼ NE ¼ Section 36. Based on the map you submitted and the ArcMap which I have attached, it appears your well is located in the NW ¼ NE ¼ Section 36 with the building site located in the approximate center of the NE ¼ Section 36. If you agree, please make that change on Item No. 4 of the application.

The application/license fee will be \$300.00.

Please send the check and application to: Water Rights Program, 523 E Capitol, Pierre SD 57501. Let me know if you have further questions.

Karen Schlaak

Water Rights Program

(605) 773-3352



From: Troy Johnson <troyjack14@gmail.com>
Sent: Tuesday, September 22, 2020 11:12 AM
To: Gronlund, Eric <Eric.Gronlund@state.sd.us>
Subject: [EXT] Water application for beef processing plant

Eric

I talked to most of the departments with DENR in July about starting a beef processing plant outside the city limits of Belle Fourche. Would there be anything else required for the water permit application? If I have everything required here, would the email suffice as the application or would I need to mail it in with the application fee? Thank you for taking the time to review the application.

Troy Johnson
11295 SD Hwy 34
Saint Onge, SD 57779
605-641-8769

Sent from my iPad

Schlaak, Karen

From: Schlaak, Karen
Sent: Thursday, November 19, 2020 2:18 PM
To: Troy Johnson
Subject: Water Permit Application No. 2000-1
Attachments: 0139.pdf

Attached is a copy of the report, chief engineer recommendation and information regarding the public notice for your water permit application. As stated in the letter, please contact the paper as soon as possible to authorize publication and arrange for payment. This information is being mailed to you also.

Karen Schlaak
Water Rights Program
(605) 773-3352





DENR
SOUTH DAKOTA

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2000-1, Troy Johnson**

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. 2000-1, Troy Johnson, 11295 SD Hwy 34, St. Onge SD 57779.

The Chief Engineer is recommending APPROVAL of Application No. 2000-1 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 well approved under this Permit 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 his 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. 2000-1 authorizes a total annual diversion up to 1.0 acre-feet of water.

See report on application for additional information.

Eric Gronlund, Chief Engineer
November 20, 2020

Report to the Chief Engineer
On Water Permit Application No. 2000-1

Troy Johnson

November 18, 2020

Water Permit Application No. 2000-1 proposes to appropriate up to one acre-feet of water annually at a maximum instantaneous diversion rate of 0.011 cubic feet of water per second (cfs) (5 gallons per minute (gpm)) from one well (280 feet deep) to be completed into the Inyan Kara aquifer and located in the NW ¼ NE ¼ of Section 36-T8N-R2E for commercial use in a beef/pork processing plant. The site is located in Butte County approximately three miles southeast of Belle Fourche, South Dakota.

AQUIFER: Inyan Kara (INKR)

HYDROGEOLOGY:

The Inyan Kara aquifer exists in the saturated portions of the permeable materials that make up the Inyan Kara Group. The Inyan Kara Group is comprised of the Lower Cretaceous aged, Fall River and Lakota Formations (Downey, 1986). The Inyan Kara aquifer is a regional, bedrock aquifer that underlies most of the northern great plains in Montana, North Dakota, South Dakota and Wyoming and extends up into Canada (Downey, 1986). Generally, the Lakota Formation constitutes approximately the lower two thirds of the Inyan Kara Group and the Fall River Formation constitutes approximately the upper one third (Gott et al., 1974). The contact of these two parts is a transgressive disconformity of regional extent marking the initial incursion of the (early) Cretaceous Sea (Waage, 1959), which deposited the materials that make up the Fall River Formation (Downey, 1986). The Fall River Formation consists of a “variegated brown, red and gray to purple, calcareous, well-sorted, fine grained sandstone, siltstone and shale containing mica,” and is estimated to be 100 to 200 feet thick (Martin et al., 2004). The Lakota Formation consists of a “yellow, brown, red-brown, and gray to black claystone, silty pebble conglomerate, and massive to thin-bedded, cross-bedded sandstone,” that can be locally interbedded with fresh-water limestone and bituminous coal beds (Martin et al., 2004). The estimated thickness of the Lakota Formation ranges from 35 to 500 feet (Martin et al., 2004). For the purpose of appropriations, the Water Management Board and the SD DENR-Water Rights Program consider the Inyan Kara Group as one aquifer.

The Inyan Kara Group outcrops in the Black Hills but is otherwise buried in South Dakota (See Figure 1) (Martin et al., 2004). The proposed diversion point for this application is located on the Inyan Kara outcrop in an area that is overlain by surficial deposits and the top of the Inyan Kara aquifer materials are expected to be approximately 99 feet below grade at the well site (Water Rights, 2020c and 2020d). The direction of groundwater movement in the Inyan Kara aquifer is generally to the northeast (Kyllonen & Peter, 1987).

In western South Dakota, the Inyan Kara aquifer is estimated to range between 81 to 475 feet thick and underlies approximately 23,239,040 acres with 324,169,440 acre-feet of recoverable water in storage (Allen et al., 1985; Kyllonen & Peter, 1987). In Butte County, the Inyan Kara aquifer is estimated to be 200 feet thick on average and underlies approximately 1,431,040 acres with 21,465,600 acre-feet of recoverable water in storage (Allen et al., 1985).

A water well completion report was submitted with Water Permit Application No. 2000-1 for a well (280 feet deep) located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 36-T8N-R2E. The report indicated layers of shale, gravel, sand and sandstone from 0 to 99 feet below grade. From 99 to 105 feet below grade, a water-bearing, white sand was identified and measured to flow at approximately 30 gallons per minute (gpm) on the well completion date (September 26, 1979). From 105 to 280 feet below grade, layers of shale, sand and silt were identified. Based on the submitted well completion report and lithologic logs on file for nearby observation wells, the Inyan Kara aquifer is expected to be confined at the applicant's proposed diversion point (SDGS, 2020; Water Rights, 2020b and 2020d).

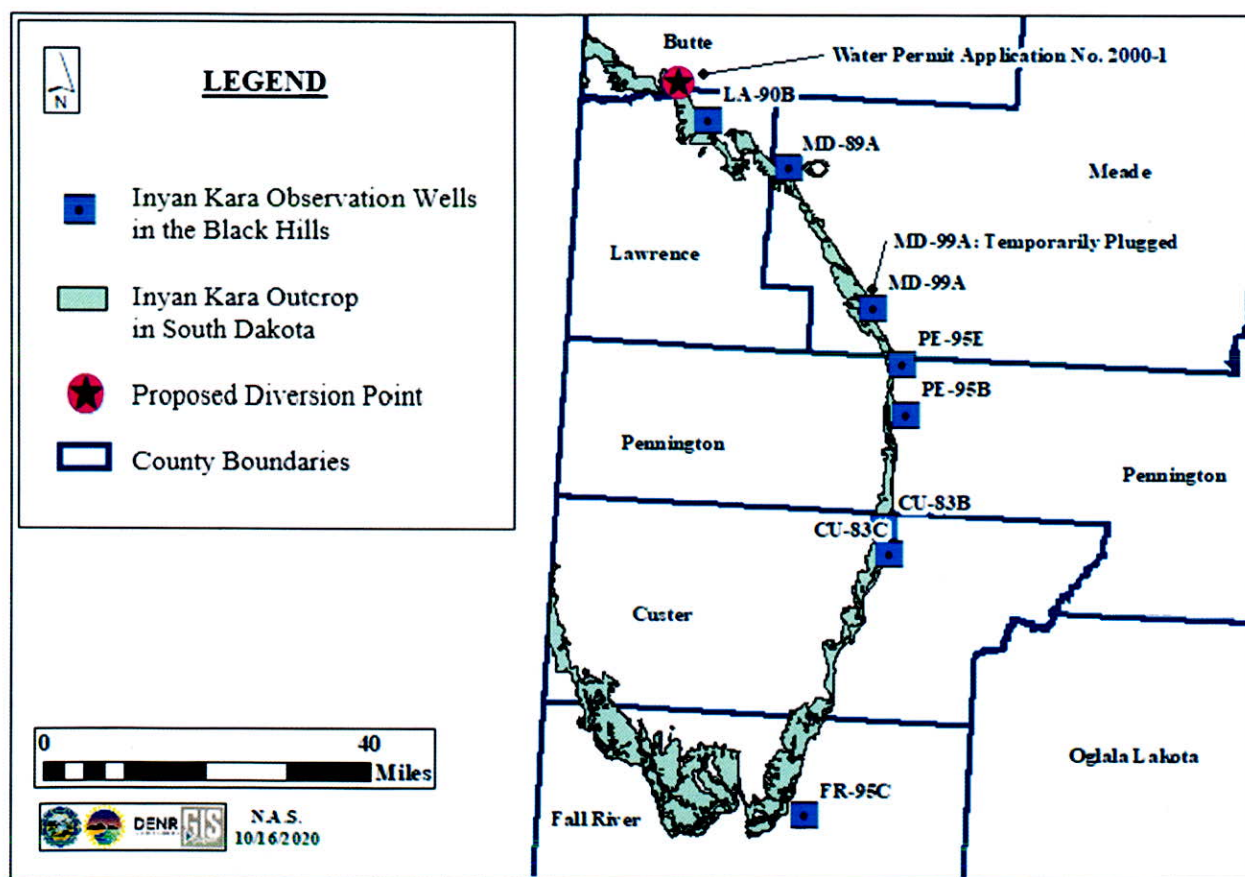


Figure 1. Inyan Kara outcrop in the Black Hills in South Dakota (Carter and Redden, 1999), Inyan Kara observation wells in the Black Hills (Water Rights, 2020b) and the proposed diversion point for Water Permit Application No. 2000-1

South Dakota Codified Law (SDCL) 46-2A-9

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 diversion point can be developed without unlawful impairment of existing rights, and that the proposed use is a beneficial use and in the public interest.” This report will address the availability of unappropriated water and the potential for unlawful impairment of existing water rights within the Inyan Kara aquifer.

WATER AVAILABILITY:

Water Permit Application No. 2000-1 proposes to appropriate water from the Inyan Kara aquifer. The probability of unappropriated water being available from the 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. An application may be approved, however, for withdrawals of groundwater from any groundwater formation older than or stratigraphically lower than the greenhorn formation in excess of the average estimated annual recharge for use by water distribution systems.” The Inyan Kara aquifer is older than and stratigraphically lower than the Greenhorn Formation; however, the applicant’s proposed use is not for use in a water distribution system. Therefore, the average annual recharge and average annual withdrawal rates to and from the Inyan Kara aquifer must be considered.

HYDROLOGIC BUDGET:

Recharge

Recharge to the Lower Cretaceous aquifer is from the infiltration of precipitation at the edges of small basins in central Montana, at the western edge of the Power River basin, and at the edge of the Black Hills uplift (Lobmeyer, 1985). Additionally, in south-central North Dakota and across South Dakota, the Lower Cretaceous aquifer appears to be receiving water from underlying bedrock units (Lobmeyer, 1985); such as, the Madison Limestone and Englewood Formation (Gott et al., 1974). The Lower Cretaceous aged geologic units include the Muddy Sandstone/Newcastle Sandstone, the Skull Creek Shale, the Fall River Formation and the Lakota Formation (listed youngest to oldest) (Driscoll and Carter, 2001).

Precipitation data for the Black Hills (in South Dakota) from 1950 to 1998 was analyzed to estimate a total recharge yield for the Inyan Kara aquifer. On average during this period, the Inyan Kara outcrop received approximately 17.84 inches of precipitation per year and lost approximately 17.05 inches of precipitation per year to evapotranspiration (Driscoll and Carter, 2001). By subtracting these values, an estimated total recharge yield of 0.79 inches of precipitation per year over the Inyan Kara outcrop in the Black Hills was calculated. A recharge factor of 0.80 was used for the Inyan Kara aquifer because the formation contains more shale layers than the Madison, Minnelusa and Minnekahta Formations, which are predicted to experience direct runoff and are assumed to have a recharge factor of 1.0 (Driscoll and Carter,

2001). By multiplying the estimated total recharge yield of 0.79 inches per year by a recharge factor of 0.8, it is expected 0.63 inches of precipitation per year contributes to recharge of the Inyan Kara aquifer on the Black Hills outcrop. The remaining 0.16 inches per year are assumed to contribute to runoff. The Inyan Kara outcrop overlies approximately 219,700 acres in the Black Hills and when multiplied by the recharge estimate of 0.63 inches per year, the average annual recharge rate to the Inyan Kara aquifer is approximately 11,600 acre-feet per year (Driscoll and Carter, 2001). This is a conservative estimate that accounts for precipitation losses to evapotranspiration and runoff. Additional recharge is likely occurring due to upward leakage from underlying aquifers, areas other than the Black Hills (in South Dakota) where the Inyan Kara aquifer outcrops and groundwater inflow from out of state.

Discharge

Discharge from the Lower Cretaceous aquifer occurs where streams cross the outcrop areas in Montana and Wyoming, by leakage through overlying sediments in eastern North Dakota and South Dakota, and through well withdrawals for irrigation, non-irrigation and domestic users (Water Rights, 2020c, 2020d and 2020f).

Uncontrolled, flowing wells are discharging water from the Inyan Kara aquifer at ground surface, and it is expected water from the aquifer is also being discharged to other aquifers if wells completed into the Inyan Kara aquifer have experienced casing failure. It is currently unknown how much water is being discharged from the Inyan Kara aquifer through uncontrolled, flowing wells. The Water Management Board has previously determined water being discharged through uncontrolled, flowing wells from the Dakota aquifer is not a beneficial use and does not constitute appropriation pursuant to SDCL 46-6-3.1 (Water Rights, 1987). Since discharge from uncontrolled flowing wells is likely to continue until water levels in the aquifer decline to being at or below ground surface, continuing to allow beneficial pumping to occur reduces the amount of water being discharged to waste. Therefore, the Water Management Board has allowed development of the Dakota and Inyan Kara aquifers to continue.

Currently, there are 198 water rights/permits authorized to withdraw water from the Inyan Kara aquifer (Water Rights, 2020c). Four additional water rights/permits (Nos. 6011-3, 6091-3, 6128-3 and 6257-3) are included in this analysis as they are authorized to withdraw from the Dakota and Inyan Kara aquifers; however, for this analysis these water rights/permits are assumed to withdraw only from the Inyan Kara aquifer (Water Rights, 2020c). Additionally, there is one future use permit (Future Use Permit No. 1780-2, held by the Town of New Underwood) reserving 142 acre-feet of water annually from the Inyan Kara aquifer and one application held in abeyance (Water Permit Application No. 2686-2 for Powertech (USA)) requesting 274.2 acre-feet of water annually from the Inyan Kara aquifer (Water Rights, 2020c). The average annual withdrawal rate from the Inyan Kara aquifer by the 202 water rights/permits was estimated by: 1) averaging the annual usage for irrigation permits/rights required to report over the period of record (1982-2019) and by assuming an application rate of 12 inches per permitted/licensed acre for newer irrigation permits and irrigation rights/permits not required to report; 2) calculating the approximate Concentrated Animal Feeding Operations (CAFO) annual usage by multiplying the number of permitted animals by the average daily use for each type of animal permitted; 3) using

the average volume for non-irrigation appropriations required to report their usage and withdraw a similar volume each year; 4) assuming the non-irrigation water rights/permits limited by an annual volume, and not required to report annual usage, will withdraw the entire appropriated volume every year; and assuming the non-irrigation water rights/permits limited only by a diversion rate, and not required to report annual usage, are estimated to pump at their maximum permitted diversion rate for 60 percent of the time.

There are domestic wells completed into the Inyan Kara aquifer that do not require a water right/permit, so the withdrawal amount is unknown (Water Rights, 2020d). Due to their relatively low diversion rates, withdrawals from domestic wells are not considered to be a significant portion of the hydrologic budget for the Inyan Kara aquifer.

Eleven municipal or suburban housing development water rights/permits are known by the DENR to be on standby for emergency use because they are obtaining their water from a rural water system or are supplied by a municipality (Table 1) (Drinking Water Program, 2020; Friedeman, 2020; Water Rights, 2020c). As such, their withdrawal rates are accounted for with the respective water system permits that supply them on Table 5 and are assumed to be zero acre-feet per year, so they are not accounted for twice.

Table 1. Inyan Kara municipal or suburban housing development water rights/permits with wells on stand-by (Drinking Water Program, 2020; Friedeman, 2020; Water Rights, 2020c)

Permit No.	Status	Name	Use Type	Pump Rate (cfs)	
1360-2	LC	Aladdin Investments Inc	SHD	0.15	Supplied by Rapid City
2224-3	LC	Sunshine Acres Water System	SHD	0.22	Mid Dakota RWS
2279-3	LC	Camelot Land	SHD	0.22	Supplied by City of Pierre
2442-2	LC	Rainbow Water Co Inc	SHD	0.09	Supplied by Rapid City
473-1	LC	Town of Fruitdale	MUN	1	Butte-Meade RWS
595-3	LC	City of Onida	MUN	1.11	Mid Dakota RWS
1198-3	LC	Town of Mound City	MUN	0.17	WEB RWS
1647-2	LC	Town of Quinn	MUN	0.2	West River/Lyman Jones RWS
1712-3	LC	City of Ipswitch	MUN	0.19	WEB RWS
2263-2	LC	Town of Belvidere	MUN	0.17	West River/Lyman Jones RWS
6735-3	LC	City of Eureka	MUN	1.48	WEB RWS
LC: Licensed Water Right, SHD: Suburban Housing Development, MUN: Municipal, RWS: Rural Water System					

There are 17 water rights/permits currently authorized to appropriate water from the Inyan Kara aquifer for irrigation use (Water Rights, 2020c). Generally, irrigation water rights/permits are required to report their annual water usage. Currently, 10 out of the 17 irrigation water rights/permits are required to report their annual water usage. The average annual withdrawal rate for irrigation appropriations for the Inyan Kara aquifer (that are required to report) over the period of record (1982-2019) is approximately 79.44 acre-feet per year (Table 2) (Water Rights, 2020a). The seven irrigation water rights/permits that are not required to report, or are still within their 5-year construction period, are conservatively assumed to apply 12 inches of water (compared to maximum allowed volume of two acre-feet per year) over the 583 acres permitted/licensed, which results in a withdrawal rate of approximately 583 acre-feet per year (Water Rights, 2020c). Overall, the estimated average annual withdrawal rate for all irrigation water rights/permits authorized to appropriate water from the Inyan Kara aquifer is approximately 662 acre-feet per year (Table 5). However, it is expected irrigation water rights/permits will withdraw less than 662 acre-feet per year as seven of these irrigation water

rights/permits have assumed withdrawal rates based on a set volume per permitted/licensed acres rather than actual reported usage.

Table 2. Reported historic irrigation use from the Inyan Kara aquifer (Water Rights, 2020a)

Year	No. of Permits	Annual Appropriation (ac-ft)	Reported Pumpage (ac-ft)
1982	5	1,844.90	2.53
1983	7	2,056	33.17
1984	8	2,084	4.5
1985	8	2,084	224.6
1986	7	1,904	4
1987	6	1,876	38
1988	6	1,876	54.10
1989	8	1,957	18.82
1990	8	1,957	33.5
1991	9	1,957	25.12
1992	9	1,957	26
1993	9	1,957	36.41
1994	9	2,046	30.56
1995	10	2,236	37.42
1996	8	894	19.81
1997	8	894	6
1998	8	1,165	20.75
1999	6	799	14.18
2000	6	799	25.27
2001	6	552	53.23
2002	7	823	87.83
2003	6	781	111.90
2004	7	781	143.48
2005	7	781	132.51
2006	8	910	136.04
2007	8	910	141.86
2008	9	1,188	130.51
2009	9	1,188	98.93
2010	9	1,188	112.57
2011	9	1,188	129.79
2012	9	1,188	188.76
2013	9	1,188	146.48
2014	9	1,188	112.25
2015	7	882	105.82
2016	7	882	177.81
2017	8	750	183.55
2018	9	777	99.92
2019	10	777	70.61
Min	5	552.3	2.53
Max	10	2,235.70	224.6
Avg	7.8	1323	79.4

The average annual withdrawal rate for the 15 Inyan Kara aquifer water rights/permits who operate a CAFO was estimated by multiplying the number of permitted animals by the average daily use for each type of animal permitted (Ag-Info Centre, 2009; Drennon, 2020; Water Rights, 2020c) (Table 3). However, if that estimated withdrawal rate was higher than the annual limit authorized by the water right/permit, the annual volume limit was assumed to be the estimated use for that user. Water Right/Permit Nos. 6011-3, 6091-3, 6128-3 and 6257-3 are authorized to withdraw from the Dakota and Inyan Kara aquifers; however, for this analysis these water rights/permits are assumed to withdraw their full amount from the Inyan Kara aquifer (Water Rights, 2020c). Overall, the average annual withdrawal rate for the Inyan Kara aquifer water rights/permits who operate a CAFO is approximately 1,447.8 acre-feet per year (Ag-Info Centre, 2009; Drennon, 2020; Water Rights, 2020c) (Tables 3 and 5).

Table 3. Estimated annual water use for the Inyan Kara aquifer water rights/permits who operate CAFO (Ag-Info Centre, 2009; Drennon, 2020; Water Rights, 2020c)

Permit No.	Status	Name	Pump Rate (cfs)	County	Annual Limit (acre-feet/year)	Estimated Livestock Needs (acre-feet/year)	Estimated Use (acre-feet/year)
2178-2	LC	Fall River Feed Yard LLC	0.62	FR	448.88	280.22	280.22
2552-2	LC	Kjerstad Livestock Partnership	0.16	PT	115.84	11.19	11.19
4965-3	LC	Dakota Feeding Company LLC	0.33	SU	238.92	168.02	168.02
5890-3	LC	Evergreen Colony	0.14	FA	101.36	189.24	101.36
6011-3	LC	Plainview Colony Htn	0.22	ED	159.28	135.00	135.00
6091-3	PE	Brentwood Colony	0.1	FA	72.4	57.86	57.86
6128-3	LC	Deerfield Htn Brethren	0.27	ED	195.48	71.92	71.92
6257-3	PE	Thunderbird Colony	0.2	FA	144.8	129.95	129.95
6376-3	LC	LDL Cattle Company	0.22	ED	159.28	112.09	112.09
6377-3	LC	LDL Cattle Company	0.27	ED	195.48	112.09	112.09
6619-3	PE	PJ Werdell & Sons	0.33	HD	238.92	112.09	112.09
6851-3	LC	Todd Cowan	0.15	HY	108.6	53.24	53.24
7034-3	LC	Vogel & Sautner Farms	0.123	PT	89.052	44.84	44.84
7098-3	LC	Mike & Jessie Fuller	0.04	SU	28.96	45.93	28.96
7209-3	LC	Paul Oberltnr	0.04	PT	28.96	61.65	28.96
					Total (acre-feet/year):		1,447.8

There are 30 non-irrigation water rights/permits required to report their annual water usage from the Inyan Kara aquifer each year. Of those 30 non-irrigation water rights/permits, 14 withdraw a consistent volume from the Inyan Kara aquifer each year. As such, the reported volume of water withdrawn by these users was averaged over the respective period of record for each water right/permit (Water Rights, 2020f) (Table 4). The remaining 16 non-irrigation water rights/permits required to report their annual usage have had less consistent withdrawals over their respective period of record or are still undergoing development of their permit (Water Rights, 2020c). As such, these non-irrigation water rights/permits limited by an annual volume are assumed to withdraw the entire appropriated volume every year and those limited by only by a diversion rate are estimated to pump at their maximum permitted diversion rate for 60 percent of the time (Water Rights, 2020c) (Table 4). Overall, the average annual withdrawal rate for the Inyan Kara non-irrigation water rights/permits that are required to report their annual volume withdrawn is approximately 3,462.3 acre-feet per year (Tables 4 and 5).

Table 4. Estimated annual water use for the Inyan Kara aquifer water rights/permits who are required to report their annual usage (Water Rights, 2020c and 2020f)

Permit No.	Status	Name	Use Type	Pump Rate (cfs)	Priority Date	Annual Volume (acre-feet/year)	Estimated Use (acre-feet/year)	Estimation Method
1645-2	LC	Hermosa Water Users Assoc.	RWS	0.6	08/17/1978		157.87	Average
1826-1	LC	Golden Valley Water Company LLC	SHD	0.267	09/01/2004		15.18	Average
1837-1	LC	Guy Mann (Prairie Haven)	SHD	0.22	02/28/2005		95.57	60% Pumping Rate
1846-1	LC	Dennis or Anna Mae Beckham	SHD	0.1	05/26/2005		3.36	Average
1874-1	LC	Viewfield Rural Water Assoc.	RWS	0.212	01/03/2007		37.54	Average
1898-1	LC	Viewfield Rural Water Assoc.	RWS	0.212	11/14/2007			
1903-1	LC	Castle Rock Group	DOM	0.11	05/19/2009		15.37	Average
1906-1	LC	City of Sturgis	MUN	0.222	08/21/2009		2.56	Average
1958-1	LC	City of Sturgis	MUN	0.088	04/11/2016	8.1		
1920-1	LC	Elk Valley Ranchettes Homeowners Assoc.	SHD	0.1	01/24/2011		7.35	Average
1968-1	PE	Venekamps LLC	SHD	0.11	04/27/2017	29	29	Volume
1983-1	PE	Continental Resources	IND	0.5	07/10/2018	360	360	Volume
1989-1	PE	Luff Exploration Company	IND	0.1	04/09/2019	58.8	58.8	Volume
2464-2	LC	West River Lyman Jones	RWS	0.76	07/26/2011	360	430.29	Average
2465-2	LC		RWS	1	07/26/2011	360		
2797-2	PE		RWS	1	04/01/2019	455		
2538-2	PE	JKRK Propoerties LLC - Timberwood Park	SHD	0.244	08/30/2004		106.0	60% Pumping Rate
2543-2	LC	Southern Black Hills Water System	SHD	0.19	09/30/2004		82.54	60% Pumping Rate
2752-2	PE	Southern Black Hills Water System	RWS	0.33	04/25/2016	170	170	Volume
2550-2	LC	Town of Hermosa	MUN	0.22	01/25/2005	162	47.31	Average
2596-2	LC	City of Wall	MUN	0.6	07/24/2006	261	142.93	Average
2601-2	LC	Grandview Land LLC	SHD	0.33	09/01/2006	206	206	Volume
2622-2	LC	Owanka Rural Water Assoc.	RWS	0.39	10/09/2007		169.42	60% Pumping Rate
2635-2	LC	Fall River Water Users District	SHD	0.1	07/17/2008		43.44	60% Pumping Rate
2778-2	PE	Western Construction Inc	COM	0.17	11/13/2017	31	31	Volume
8197-3	PE	Aberdeen Farm LLC	COM	0.16	01/29/2016	72.1	72.1	Volume
8299-3	PE	Aberdeen Energy LLC	IND	1.33	09/28/2018	968	968	Volume
8420-3	PE	Vogel Farms PTR	GEO	0.12	01/28/2020	88.7	88.7	Volume
1996-1	PE	Dylan Giegas	SHD	0.133	04/14/2020	48	48	Volume
1999-1	PE	Rafter Properties LLC	SHD	0.17	07/23/2020	74	74	Volume
Total:							3,462.3	

LC: Water Right; PE: Water Permit; RWS: Rural Water System; SHD: Suburban Housing Development; DOM: Domestic; MUN: Municipal; COM: Commercial; IND: Industrial; GEO: Geothermal

Table 5 summarizes the 198 water rights/permits (plus the 4 permits authorized to withdraw from both the Inyan Kara and Dakota aquifers, Future Use Permit No. 1780-2 and Water Permit Application No. 2686-2) authorized to withdraw water from the Inyan Kara aquifer and the estimated average annual withdrawal rate.

Table 5. Summary of the water rights/permits currently authorized to withdraw water from the Inyan Kara aquifer

Inyan Kara Aquifer Use Type	No. of Permits	Estimated Withdrawal Rate (acre-feet/year)
Irrigation (required to report) (average 1979-2019)	10	79.4
Irrigation (not required to report)	7	583
CAFO (not required to report) (diversion rate limited)	15	1,447.8
Standby/Hooked up to RWS (MUN/SHD)	11	0
Non-Irrigation (required to report)	30	3,462.3
Non-Irrigation (not required to report - volume limited)	4	191.8
Non-Irrigation (not required to report - diversion rate limited)	125	9,067
Total Number of Permits :	202	
Future Use Permit No. 1780-2		142
Water Permit Application No. 2686-2 - Abeyance		274.2
Total Withdrawal Rate (acre-feet/year):		15,247.6

Localized Hydrologic Budget

A subarea enclosing the proposed diversion point was delineated to assess a hydrologic budget for the Inyan Kara aquifer on a localized scale (Figure 2). The subarea was identified based on hypothetical flow paths that were constructed approximately orthogonal to the potentiometric surface of the Inyan Kara aquifer mapped by Strobel and others (2000) with the intent of minimizing groundwater flow to and from adjacent subareas.

The subarea outcrop was estimated to be approximately 86 acres (Carter and Redden, 1999). The average annual recharge rate from precipitation to the Inyan Kara outcrop in the Black Hills, after accounting for evapotranspiration and runoff, was estimated to be 0.63 inches per year (Carter and Driscoll, 2001). By multiplying the recharge estimate by the subarea outcrop area, an average annual precipitation recharge rate of 4.5 acre-feet per year for the subarea is estimated. This estimated recharge rate does not account for additional recharge that occurs from underlying aquifers and infiltration of precipitation at areas other than the Black Hills where the Inyan Kara aquifer outcrops. Additionally, streamflow recharge to the Inyan Kara aquifer has not been quantified due to insufficient information (Carter and Driscoll, 2001).

There are no water rights/permits located within three miles upgradient or downgradient from the proposed diversion point in the subarea. The closest water right/permit to the proposed diversion point is Water Right No. 1752-1, held by Hazen and Mary Ann Wells, which is located approximately 3.7 miles northwest of the proposed diversion point (see Figure 7) (Water Rights, 2020c).

The estimated average annual recharge rate cited in this report only accounts for precipitation on the Inyan Kara outcrop in the Black Hills (in South Dakota) and does not account for other factors contributing to recharge. Additionally, the Inyan Kara aquifer still produces flowing wells, and there are uncontrolled wells completed into the Inyan Kara aquifer flowing water to waste at ground surface. By allowing beneficial pumping to occur, it is lowering the amount of pressure in the uncontrolled, flowing wells, which is reducing the amount of water being discharged to waste. Since additional recharge is likely available through upward leakage from underlying aquifers, infiltration of precipitation at areas other than the Black Hills where the Inyan Kara aquifer outcrops, streamflow losses, well withdrawals inducing groundwater inflow from outside the subarea, and the Inyan Kara aquifer still produces flowing wells, there is a reasonable probability that unappropriated water is available for this proposed appropriation.

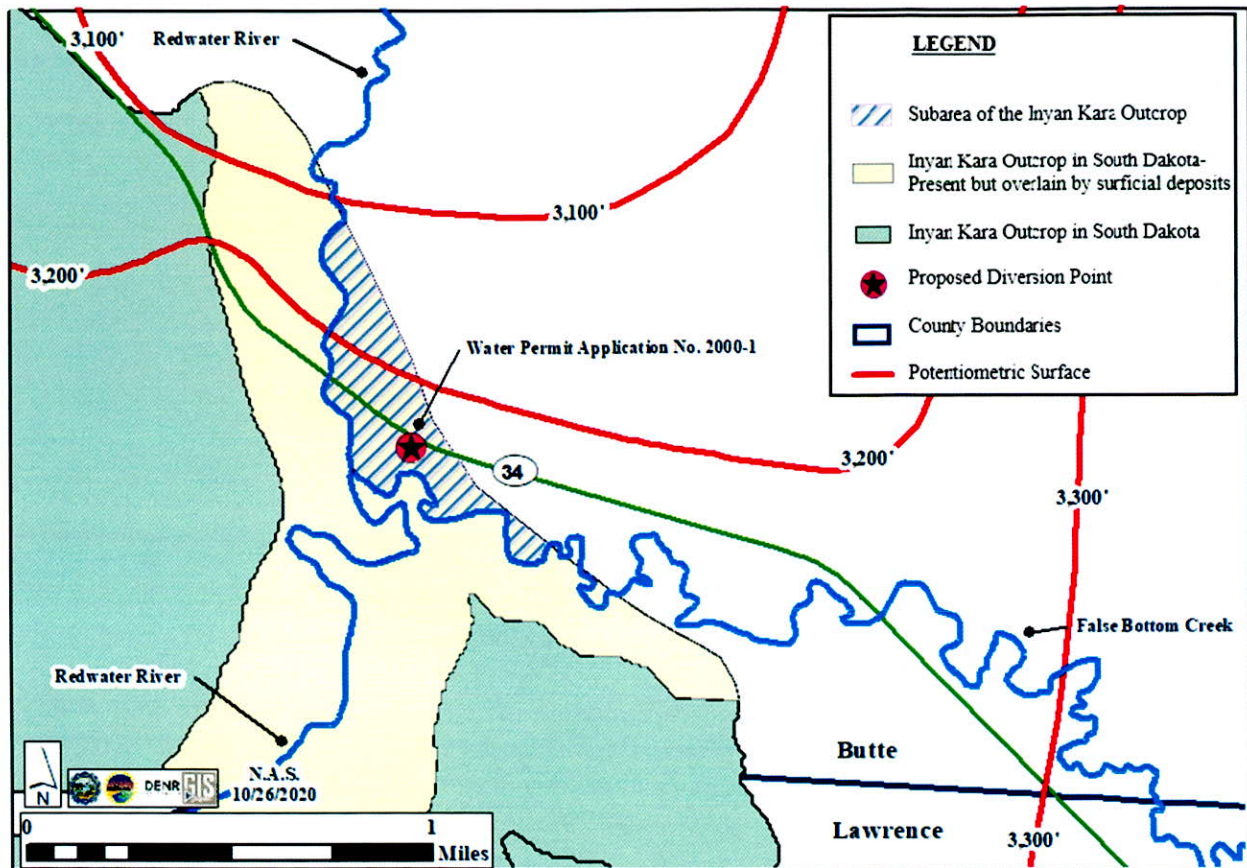


Figure 2. The subarea of the Inyan Kara outcrop used to calculate the localized hydrologic budget with the potentiometric surface contour lines for the Inyan Kara aquifer (modified from Carter and Redden, 1999; Strobel et al., 1999; Strobel et al., 2000) and the proposed diversion point

Hydrologic Budget Summary

The average annual recharge rate to the Inyan Kara aquifer from precipitation on the outcrop in the Black Hills (in South Dakota) is approximately 11,600 acre-feet per year (Driscoll and Carter, 2001). This is a conservative estimate that accounts for precipitation losses to evapotranspiration and runoff, and additional recharge is likely occurring due to upward leakage from underlying aquifers and infiltration of precipitation at areas other than the Black Hills where the Inyan Kara aquifer outcrops, streamflow losses, and increased well withdrawals could induce groundwater inflow from outside the subarea.

The average annual withdrawal rate from the Inyan Kara aquifer plus the appropriation proposed by this application (if approved) is approximately 15,248.6 acre-feet per year. This average annual withdrawal rate has assumptions on annual water usage for both irrigation and non-irrigation water rights/permits, and it is expected the average annual withdrawal rate from the Inyan Kara aquifer is less than 15,248.6 acre-feet per year.

After delineating a subarea of the Inyan Kara aquifer and only accounting for recharge from precipitation on the Inyan Kara outcrop in the Black Hills (in South Dakota), the estimated average annual recharge rate was calculated to be approximately 4.5 acre-feet per year. There are

no water rights/permits located within three miles upgradient or downgradient from the proposed diversion point in the subarea. Since additional recharge is likely available through streamflow losses, increased well withdrawals could induce groundwater inflow from outside the subarea, and the Inyan Kara aquifer still produces flowing wells, there is a reasonable probability that unappropriated water is available for this proposed appropriation.

OBSERVATION WELL DATA:

Administrative Rule of South Dakota (ARSD) Section 74:02:05:07 requires that the Water Management 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 of the aquifer.

The DENR-Water Rights Program monitors nine observation wells completed into the Inyan Kara aquifer, however observation well MD-99A has had a history of leakage and maintenance issues and has been temporarily plugged to prevent further outflow (Water Rights, 2020b). These observation wells provide data on how the aquifer reacts to regional climatic conditions and local pumping. The observation wells used for this analysis and their respective distances from the proposed diversion point are LA-90B (approximately 6 miles southeast), MD-89A (approximately 17.5 miles southeast), PE-95E (approximately 45 miles southeast) and PE-95B (approximately 50 miles southeast) (as shown in Figure 1) (Water Rights, 2020b and 2020c). The hydrographs for these observation wells are displayed in Figures 3 to 6 (Water Rights, 2020b). The data points utilized to construct the hydrographs are measurements of the static water level in the observation wells from the top of the well casing.

Observation wells MD-89A and PE-95E are both approximately 1.2 miles from the closest Inyan Kara outcrop, which is a primary recharge area for the Inyan Kara aquifer. As such, the hydrographs for MD-89A and PE-95E are more reactive to the magnitude of recharge occurring on the outcrop than areas downgradient from the outcrop, resulting in observation wells near the outcrop showing greater fluctuations to seasonal recharge and withdrawals than observation wells further away. Additionally, a decline in water levels (as seen on the hydrograph for observation well PE-95E) in a confined aquifer does not indicate a significant decrease in water stored in the aquifer, as water levels above the top of the aquifer materials are representative of the hydraulic head (water pressure) inside the aquifer. As development of Dakota aquifer increased, the decline in hydraulic head in the aquifer created a pressure variance between the Dakota and Inyan Kara aquifers, which causes water to flow from the Inyan Kara aquifer to the Dakota aquifer. If there is a difference in hydraulic head between the two aquifers, flow will continue between the two. In the future, it is possible flows between the Dakota and Inyan Kara aquifers will reach a state of equilibrium. The Water Management Board has previously determined that it is better to allow the Dakota aquifer water to be put to beneficial use than it is to allow it to flow to waste (Water Rights, 1987). That conclusion is expected to apply to the Inyan Kara aquifer as well.

The water levels on the hydrograph for the observation well MD-89A show the response to pumping from irrigation and stable water levels preceding each irrigation season over the respective period of record. The water levels on the hydrographs for the observation wells LA-90B and PE-95B display stable to increasing water levels over the respective period of record. The effects of climatic conditions are clear on the hydrographs because water levels are rising during wetter periods (early spring snowmelt and precipitation) and slowly declining to a stable water level during drier periods. The hydrographs show the aquifer consistently recovers after an irrigation season is finished and the stable to rising water levels in observation wells shows the aquifer is not being stressed by pumping. Aquifer recovery indicates that climatic conditions and therefore, recharge to and natural discharge from the aquifer governs changes in water level to the Inyan Kara aquifer rather than pumping. That means recharge to and natural discharge from the aquifer greatly exceeds withdrawals. By recognizing that both recharge to and natural discharge from an aquifer can be captured for pumping, the observation well hydrographs demonstrate there is a reasonable probability unappropriated water is available for the proposed appropriation.

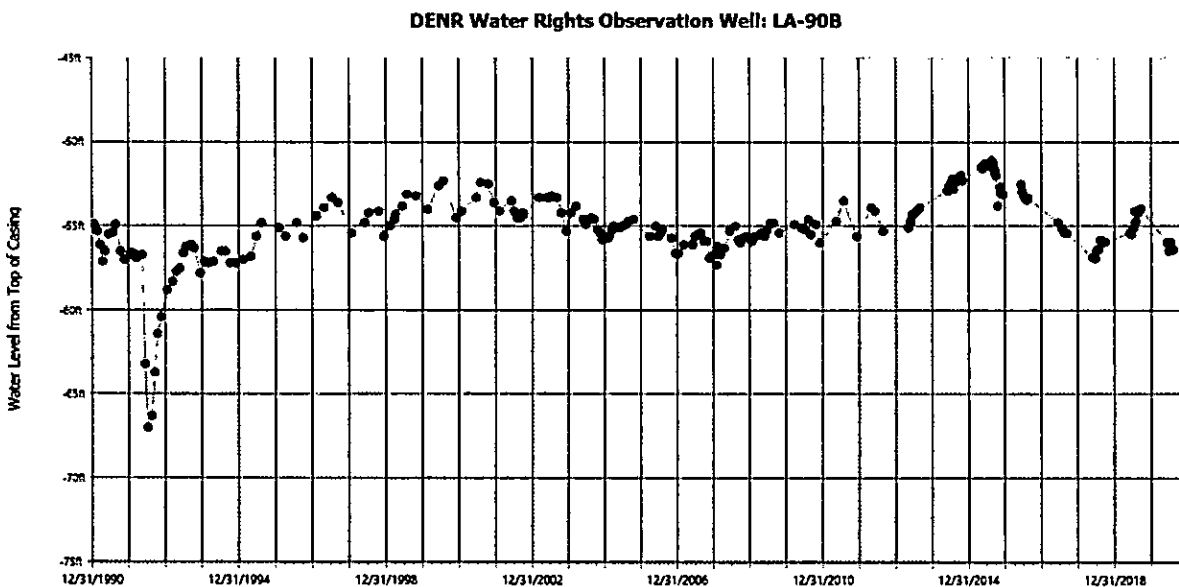


Figure 3. Hydrograph for observation well LA-90B (Water Rights, 2020b)

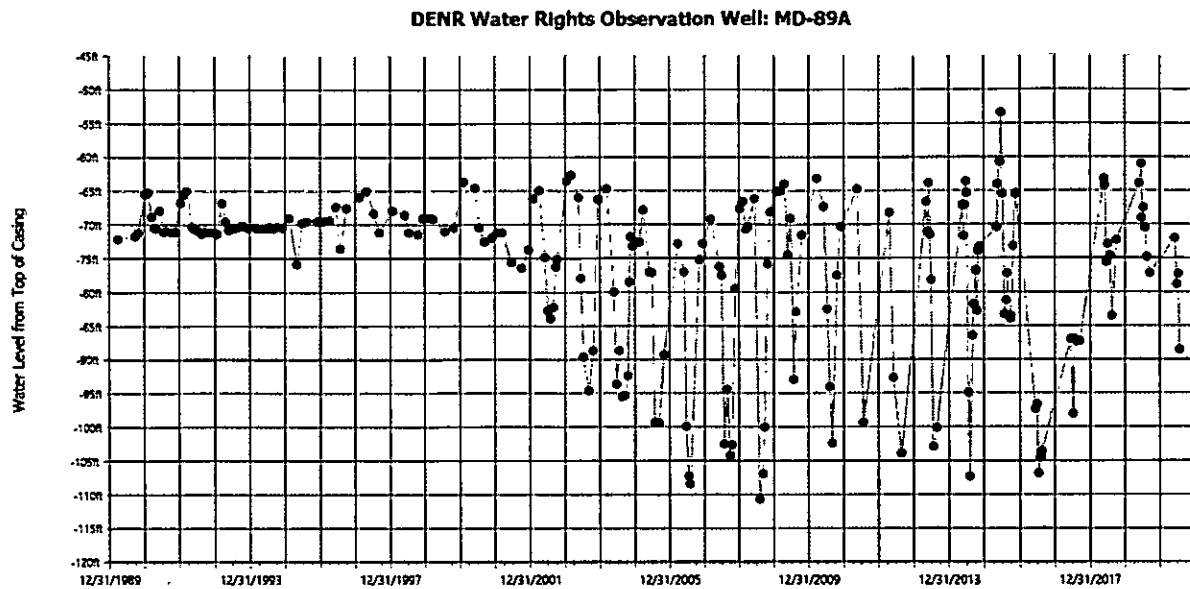


Figure 4. Hydrograph for observation well MD-89A (Water Rights, 2020b)

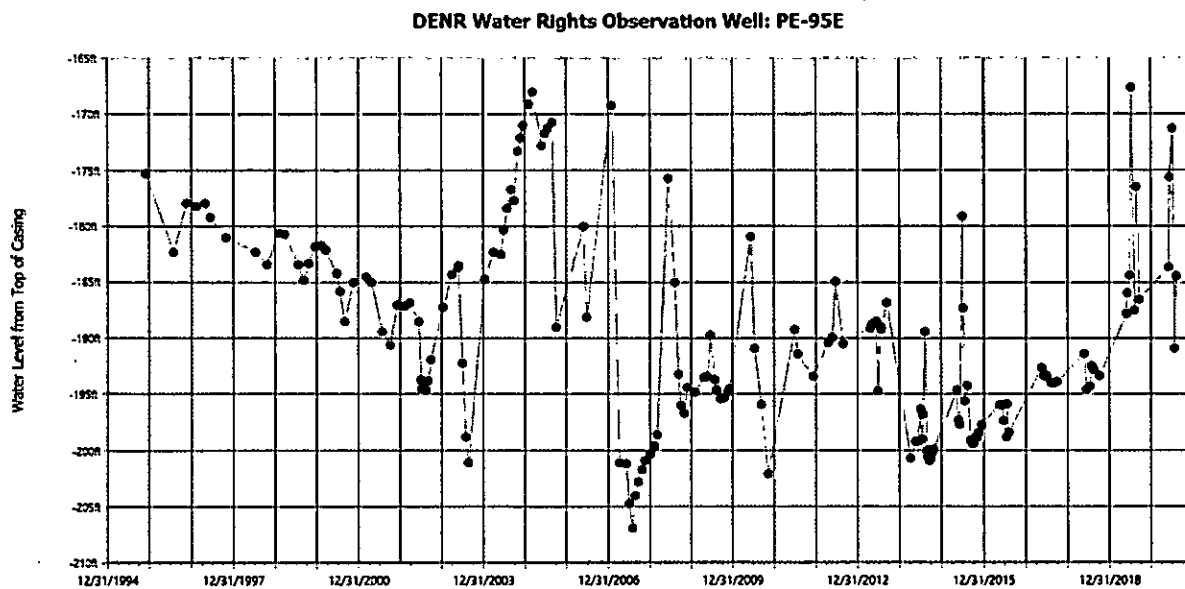


Figure 5. Hydrograph for observation well PE-95E (Water Rights, 2020b)

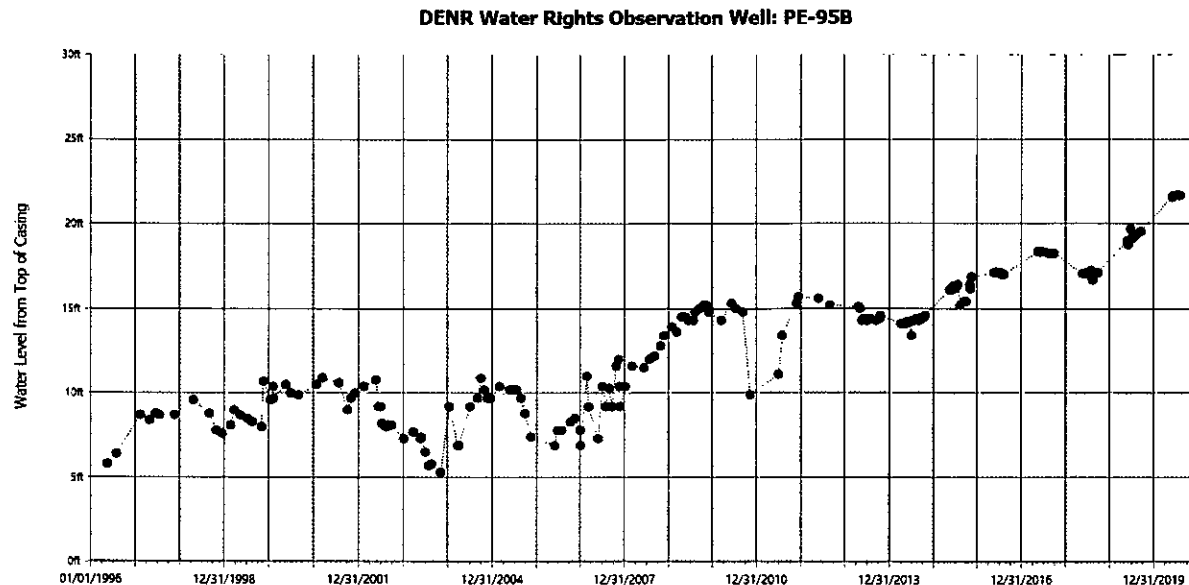


Figure 6. Hydrograph for observation well PE-95B (Water Rights, 2020b)

POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

Currently, there are 198 (plus the 4 water rights/permits authorized to appropriate from both the Inyan Kara and Dakota aquifers) water rights/permits authorized to appropriate water from the Inyan Kara aquifer (Water Rights, 2020c). The closest water right/permit to the proposed diversion point is Water Right No. 1752-1, held by Hazen and Mary Ann Wells, which is located approximately 3.7 miles northwest of the proposed diversion point (Table 7) (Figure 7) (Water Rights, 2020c).

There are domestic wells on file with the DENR-Water Rights Program that are completed into the Inyan Kara aquifer, with the closest domestic well on file (not held by the applicant) approximately 0.5 miles northeast of the proposed diversion point (Water Rights, 2020d). There are likely other domestic wells completed into the Inyan Kara aquifer near the diversion point that are not on file with the DENR-Water Rights Program.

Table 7. Water rights authorized to withdraw from the Inyan Kara aquifer as shown in Figure 7 (Water Rights, 2020c)

Permit No.	Name	Status	Use	Rate (cfs)	Volume (acre-feet/year)
466-1	Asa J/Helen E Queen	LC	IRR	1.5	434
473-1	Town of Fruitdale	LC	MUN	1	
1752-1	Hazen and Mary Ann Wells	LC	COM	0.067	
LC: Licensed Water Right, IRR: Irrigation, MUN: Municipal, COM: Commercial					

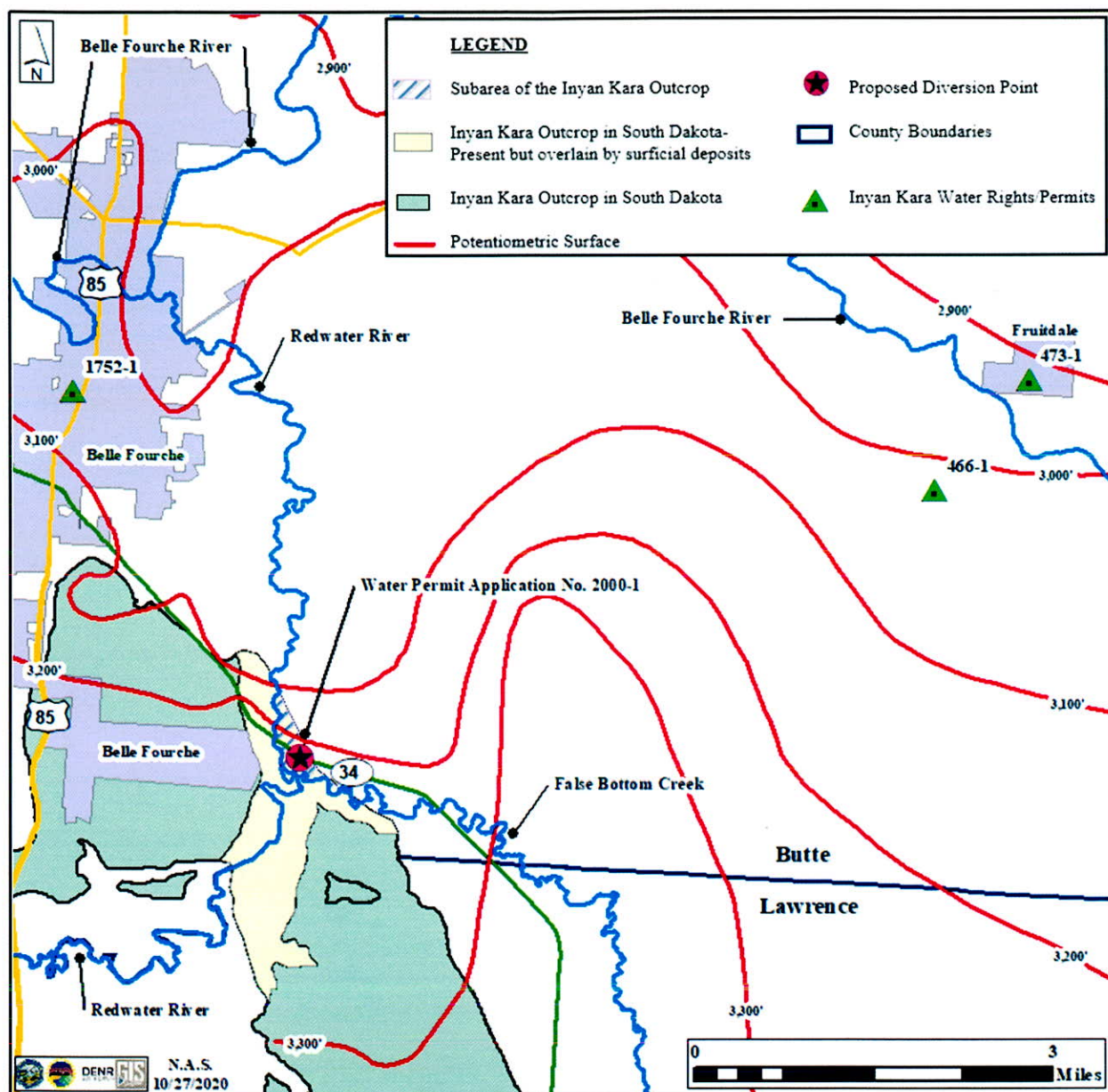


Figure 7. Location of the proposed diversion point for Water Permit Application No. 2000-1 with nearby water rights authorized to withdraw water from the Inyan Kara aquifer and the potentiometric surface contour lines for the Inyan Kara aquifer (modified from Carter and Redden, 1999; Strobel et al., 1999; Strobel et al., 2000; Water Rights, 2020c)

The Inyan Kara aquifer is under confined conditions at the applicant's proposed diversion point based on the submitted well completion report and lithologic logs on file for nearby observation wells (SDGS, 2020; Water Rights, 2020b). Since the Inyan Kara aquifer is expected to be confined at the proposed diversion point, drawdown can extend some distance but the exact drawdown behavior of a well cannot be known without an aquifer performance test. Observation well MD-89A (approximately 17.5 miles southeast of proposed diversion point) has 6 irrigation wells within approximately 1.7 miles of it (Water Rights, 2020b and 2020c). The drawdown from pumping can be seen on the hydrograph for MD-89A, along with the aquifer returning to pre-pumping conditions between irrigation seasons (Figure 4) (Water Rights, 2020b). The lithologic log on file for MD-89A noted the well was drilled 482 feet deep and was screened from 447 to 477 feet below grade with the top of aquifer materials at 287 feet below grade (SDGS, 2020). The lowest recorded static water level on the hydrograph is approximately 110 feet below grade, which indicates there was still approximately 177 feet of artesian head pressure in MD-89A even during a drier period when irrigation wells are expected to be pumping more water (Water Rights, 2020b).

In Butte County at the applicant's proposed diversion point, the Inyan Kara aquifer has an average saturated thickness of approximately 200 feet with the depth to top of aquifer materials approximately 99 feet below grade according to the well completion report submitted with Water Permit Application No. 2000-1 (Allen et al., 1985; Water Rights, 2020d). This would allow for enough thickness for a pump to be placed 20 feet below the top of the aquifer, which is required for the well to be considered adequate under ARSD 74:02:04:20 (6). Any drawdown as a result of the diversion for this application is not expected to unlawfully impair nearby adequate wells. In Butte and Lawrence Counties, there are no complaints on file with the DENR-Water Rights Program regarding well interference for wells completed into the Inyan Kara aquifer (Water Rights, 2020e).

The Water Management Board recognizes that putting water to beneficial use requires a certain amount of drawdown to occur. The Board has developed rules to allow water to be placed to maximum beneficial use without the necessity of maintaining artesian head pressure for domestic use. The Water Management Board defined an "adversely impacted domestic well" in ARSD 74:02:04:20(7) 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."

The Water Management Board considered the delivery of water by artesian head pressure versus maximum beneficial use during the issuance of Water Right No. 2313-2 for Coca-Cola Bottling Company of the Black Hills. The Board adopted the Findings of Facts and Conclusions of Law that noted the reservation of artesian head pressure for delivery of water would be inconsistent with SDCL 46-1-4 which states, "general welfare requires that the water resources of the state be put to beneficial use to the fullest extent of which they are capable..." (Water Rights, 1995).

Furthermore, the Water Management Board found if increased cost or decreased production as a result of impacts on artesian head pressure by legitimate users is to be considered as an unlawful impairment, it would also conflict with SDCL 46-1-4 (Water Rights, 1995). With that in mind, some existing well owners may need to install or lower pumps depending on the specific characteristics of the Inyan Kara aquifer at their location. However, when considering the statutes (SDCL 46-1-4 and 46-6-6.1) and ARSD 74:02:04:20 (6) and (7), the estimated thickness of the Inyan Kara aquifer at the applicant's location and the lack of well interference complaints, any drawdown created from the proposed diversion is not expected to cause an unlawful impairment on existing water rights/permits or domestic users with adequate wells. Therefore, there is a reasonable probability that any interference from the proposed appropriation will not impose unlawful impairments on existing users with adequate wells.

CONCLUSIONS:

1. Water Permit Application No. 2000-1 proposes to appropriate up to one acre-feet of water annually at a maximum instantaneous diversion rate of 0.011 cfs (5 gpm) from one well (280 feet deep) to be completed into the Inyan Kara aquifer. The proposed appropriation is for commercial use in a beef/pork processing plant to be located in Butte County approximately three miles southeast of Belle Fourche, South Dakota.
2. Based on the hydrologic budget and observation well data, there is a reasonable probability that unappropriated water is available from the Inyan Kara aquifer to supply the proposed appropriation.
3. There is a reasonable probability that the proposed diversion by Water Permit Application No. 2000-1 will not unlawfully impair adequate wells for existing water rights/permits and domestic users.

Nakaila Steen

Nakaila Steen
Natural Resources Engineer I
SD DENR - Water Rights Program

Reviewed by:

Adam Mathiowetz
Adam Mathiowetz, PE
Natural Resources Engineer III
SD DENR - Water Rights Program

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Affidavit of Publication

STATE OF SOUTH DAKOTA:

COUNTY OF LAWRENCE:

Letitia Lister of said County and State being first duly sworn, on her oath says: That the BLACK HILLS PIONEER is a legal daily newspaper of general circulation, printed and published in the City of Spearfish, in said County and State by Letitia Lister, and has been such a newspaper during the times hereinafter mentioned; and that said newspaper has a bonafide circulation of at least 200 copies weekly, and has been published within said County in the English language for at least one year prior to the first publication of the notice herein mentioned, and is printed in whole or in part in an office maintained at the place of publication; and that I, Letitia Lister, the undersigned, am the Publisher of said newspaper and have personal knowledge of all the facts stated in this affidavit; and that the advertisement headed:

Notice Of Application
No. 2000-1

a printed copy of which is hereto attached, was printed and published in said newspaper for 1 successive and consecutive weeks, the first publication being made on the 1st day of Dec., 2020, the last publication on the day of , , that the amount of fees charged for publishing same, to-wit: The sum of \$23.56, insures solely to the benefit of the publisher of the BLACK HILLS PIONEER, that no agreement or understanding for a division thereof has been made with any person and that no part thereof has been agreed to be paid to any other person whomsoever.

Letitia Lister
Subscribed and sworn to before me this 8th day of Dec., 2020

Kenny J. Seng

Notary Public, Lawrence County, South Dakota

My commission expires: 7-18-2025

NOTICE OF APPLICATION NO. 2000-1 to Appropriate Water

Notice is given that Troy Johnson, 11295 SD Hwy 34, St. Onge SD 57779 has filed an application for a water permit to appropriate up to 1.0 acre-feet of water annually at a maximum pump rate of 0.011 cubic feet of water per second from one well completed into the Inyan Kara Aquifer (280 feet deep) located in the NW 1/4 NE 1/4 Section 36-T8N-R2E for commercial use in a beef/pork processing plant. This site is located approximately three miles southeast of Belle Fourche SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2000-1 with qualifications because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, 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 Ron Duvall 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 December 11, 2020.

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.

Published once at the total approximate cost of \$24.95.

#677
Dec 1

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DEC 11 2020

WATER RIGHTS
PROGRAM

Schlaak, Karen

From: Schlaak, Karen
Sent: Thursday, November 19, 2020 2:11 PM
To: Legals (legals@bhpioneer.com)
Subject: 2000-1, Troy Johnson
Attachments: 2000-1public.short.docx; FORM8.FRM.doc

Attached is a notice to be published on December 1, 2020.

Troy Johnson, 11295 SD Hwy 34, St. Onge SD 57779 (605 641-8769) 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
Water Rights Program
(605) 773-3352





DENR
SOUTH DAKOTA

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

November 19, 2020

Troy Johnson
11295 SD Hwy 34
St. Onge SD 57779

Dear Mr. Johnson:

Water Permit Application No. 2000-1 for commercial use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Black Hills Pioneer printed at Spearfish SD (Ph # 605 642-2761). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization from you, the publisher has been instructed to publish your notice. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Karen Schlaak

Karen Schlaak
Water Rights Program
(605) 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

NOTICE OF APPLICATION NO. 2000-1 to Appropriate Water

Notice is given that Troy Johnson, 11295 SD Hwy 34, St. Onge SD 57779 has filed an application for a water permit to appropriate up to 1.0 acre-feet of water annually at a maximum pump rate of 0.011 cubic feet of water per second from one well completed into the Inyan Kara Aquifer (280 feet deep) located in the NW 1/4 NE 1/4 Section 36-T8N-R2E for commercial use in a beef/pork processing plant. This site is located approximately three miles southeast of Belle Fourche SD.

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denr.sd.gov

JAN 19 2021

Troy Johnson
11295 SD Hwy 34
St. Onge SD 57779

Dear Mr. Johnson:

Enclosed is Water Permit No. 2000-1 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,

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

enclosures