

WATER PERMIT NO. 1874-1

Name of Applicant: Viewfield Rural Water Association, Inc.

Address: PO Box 157, New Underwood SD 57761 Phone: 605 754-6900

Amount of Water Claimed: 0.29 cfs Total Acres: NA

Source of Water Supply: groundwater (one well)

Water to be used for: rural water system use County: Meade

Type of Waste Disposal System:

Location: 5 miles north of New Underwood

PRIORITY Date Received: 1-3-07 Application/License Fee: \$275

Corrected Application Received: Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: SE ¼ NE ¼ Sec 31-T3N-R11E

Land to be Irrigated: NA

Depth of Well: 2700 feet deep

Well Driller:

Remarks:

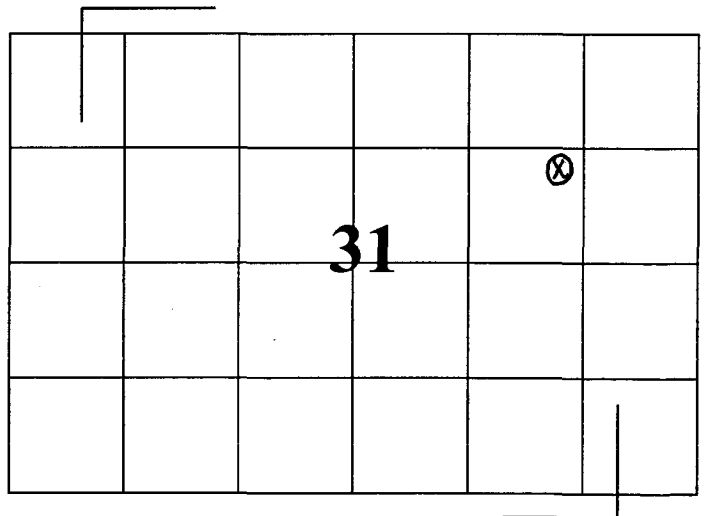
Type of Map: aerial

Prepared by: Mitchell B Kertzman, PE

Reviewed and the Number Assigned on: 1-3-07

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



FORM 2: Application for uses other than irrigation
(type or print)

Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	No. <u>1874-1</u> (office use only) Hydrologic Unit <u>10120111</u>
	Basin <u>Upper Cheyenne</u>
	Newspaper <u>Meade Co Times Sturgis SD</u>
	<u>605-347-2503</u> <u>52785</u>

RECEIVED
JAN - 3 2007
WATER RIGHTS
PROGRAM

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

Check use(s) of water:

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

Type of Application: ☒ New ☐ Vested Right (Use predates Mar 2, 1955) ☐ Future Use Reservation
(check one) ☐ 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.) _____

- Name of Applicant VIEWFIELD RURAL WATER ASSOCIATION INC. Phone 605-754-6900
(check one) ☒ Owner ☐ Tenant/lessee
Mailing Address P.O. Box 157 NEW UNDERWOOD State SD 57761
(Street, RR, or Box and City) (Zip Code)
- Amount of water claimed 0.29 *CFS or 130 **GPM ***AF
(*Cubic Feet per Second) (**Gallons per Minute) (**Acre Feet - storage capacity of dam/dugout or annual use if applicable)
- Source of water supply INYAN KARA AQUIFER
- Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) One well in
SE 1/4 - NE 1/4 SECTION 31 - TWP 3N - R4E 11E
County MEADE
- County or counties where water will be used MEADE
- Annual period during which water is to be used JANUARY 1 THROUGH DECEMBER 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)

PLEASE REFER TO ATTACHED DOCUMENTS.

STATE OF SOUTH DAKOTA)

County of PENNINGTON SS

PAUL GNIRK, MEMBER OF VIEWFIELD
I, RURAL WATER ASSOC. INC.,

the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

Applicant's signature Paul Gnirk

Subscribed and sworn to before me this 29th day of December 20 06

Rita K. Kaufman

Notary Public signature

My Commission Expires: 5-27-09

**SOUTH DAKOTA
WATER PERMIT NO. 1874-1**

Date of first receipt of application January 3, 2007.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 1874-1 to Viewfield Rural Water Association Inc., PO Box 157, New Underwood SD 57761 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. 1874-1 appropriates 0.29 cubic feet of water per second from one well to be completed into the Inyan Kara aquifer (approximately 2700 feet deep) located in the SE ¼ NE ¼ Section 31-T3N-R11E.
2. The water appropriated shall be used for the purpose of rural water system 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. 1874-1 is April 2, 2007.
5. The date from which applicant may claim right is January 3, 2007.
6. One-fifth of the construction is to be completed on or before October 2, 2009.
7. All construction is to be completed on or before April 2, 2012.
8. Water is to be put to beneficial use on or before April 2, 2016.
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. The well authorized by Permit No. 1874-1 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
3. Viewfield Rural Water Association shall report to the Chief Engineer annually the amount of water withdrawn from the Inyan Kara Aquifer.

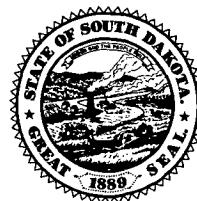
WATER MANAGEMENT BOARD

By: Garland Erbele

Garland Erbele, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

APR 26 2007

date



Supplemental Information

(type or print in ink)

1. Well Information - Proposed Construction

- a) Drill Hole Diameter 8 $\frac{3}{4}$ " - 6 $\frac{1}{4}$ " Depth 4100' - 2,700'
- b) Casing Type STEEL Diameter 7" O.D. - 4 $\frac{1}{2}$ " O.D. Thickness 23 #/ft. 44.6 #/ft.
- c) Screen Type _____ Diameter _____ Thickness _____
- d) Gravel Pack _____ Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material 2,470 ft.
- f) Depth to Water (ground surface to water level) 110 ft.
- g) Distance to nearest existing domestic well:
On applicants property _____ On property owned by others 5 miles

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

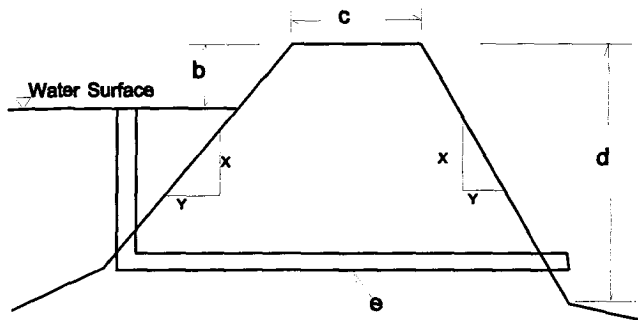
- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

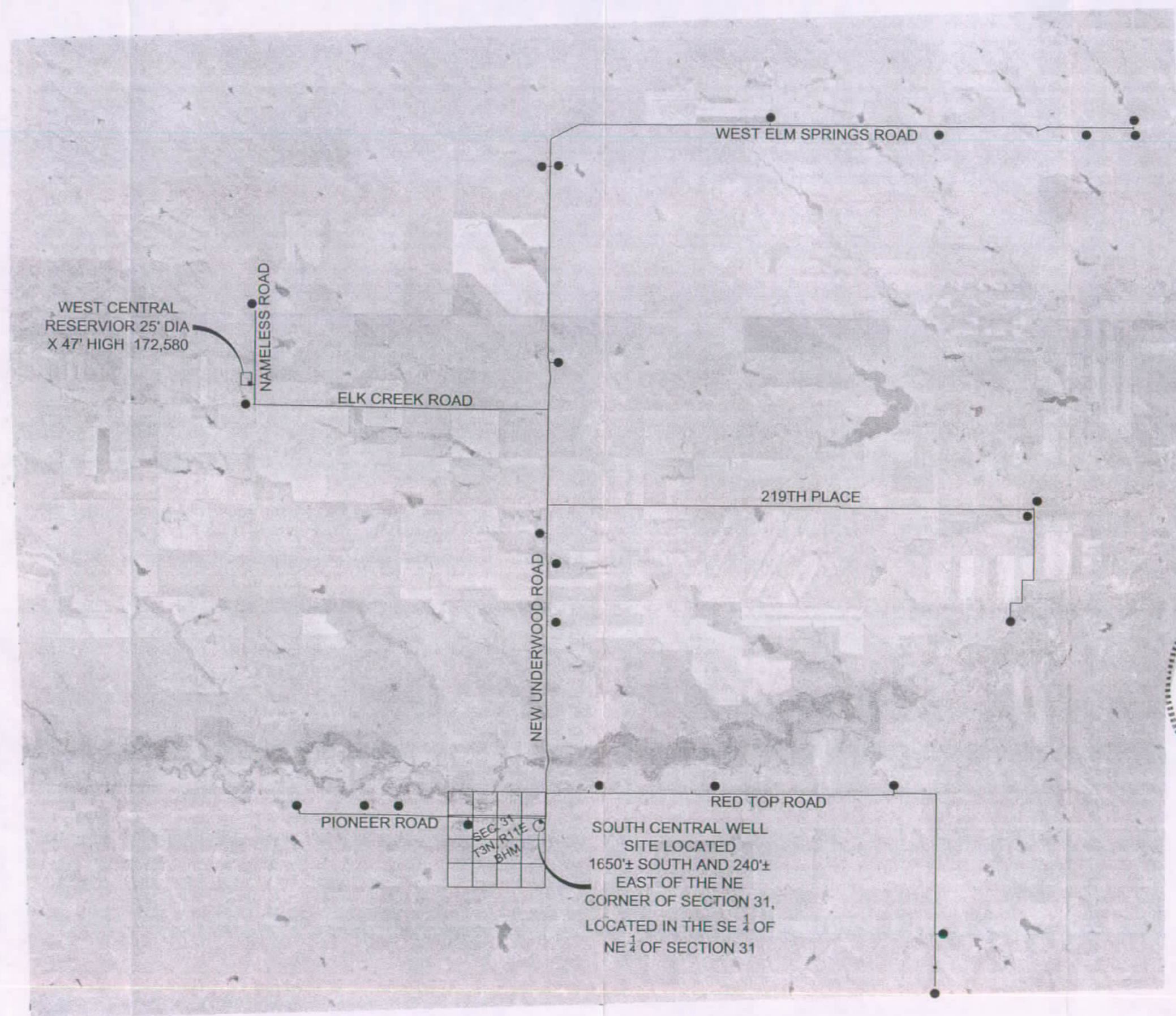
4. Water Storage Dams

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 _____
Upstream _____
Downstream _____
- h) Surface Area of Impoundment _____
- i) Storage _____ Acre Feet
- j) Drainage Area Above Dam _____ Acres





WEST CENTRAL
RESERVIOR 25' DIA
X 47' HIGH 172,580

NAMELESS ROAD

ELK CREEK ROAD

WEST ELM SPRINGS ROAD

219TH PLACE

NEW UNDERWOOD ROAD

PIONEER ROAD

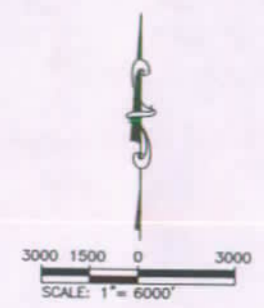
SEC 31
T3N, R11E
BHM

RED TOP ROAD

SOUTH CENTRAL WELL
SITE LOCATED
1650± SOUTH AND 240±
EAST OF THE NE
CORNER OF SECTION 31,
LOCATED IN THE SE 1/4 OF
NE 1/4 OF SECTION 31



● SERVICE TAP LOCATIONS



 Renner Associates, LLC. 818 8th St. • Rapid City, SD 57701 • 605/721-7310 FAX: 605/721-7313 • E-MAIL: Gary@rennerassoc.com Spearhead Office: 605/717-0018	
Prepared By: _____	
Scale: _____	
Designed By: _____	Drawn By: _____
Design Date: _____	Print Date: _____
Surveyed By: _____	Survey Date: _____
Revisions: _____	
RURAL WATER SYSTEM VIEWFIELD, SD LOCATED IN T3N, T3N, T4N, R10E AND T3N, T4N, R11E MEADE COUNTY, SOUTH DAKOTA	
Prepared For: VIEWFIELD RURAL WATER ASSOCIATION, INC. 22014 NEW UNDERWOOD ROAD NEW UNDERWOOD, S.D. 57781	
Internal Job No: #2252	
Sheet Title: PROPOSED WELL LOCATION	
Sheet: _____ of _____	



09-14-06
TELEPHONE
CALL TO RANDY

RALPH L. TAYLOR, JR. (Randy)
KIM E. TAYLOR

August 28, 2006

TELEPHONE:
Office: (605) 348-3600
After Hours: (605) 341-5417
cell: (605) 787-4989

Randy

Larry Gossard FAX# 605-754-6760 390-9438
Viewfield Coop Water Association

(cell) 390-3233

This estimate is for a Water Well drilled & completed into the Inyan Kara Formation.
Estimated depth: 3,000 feet.

60'	13½" Drilling	@ \$ 75.00/ft.	\$ 4,500.00
62'	9 5/8" O.D./36#/ft. Steel casing	@ \$ 32.00/ft.	1,984.00
Lump Sum	Pressure grout 9 5/8" casing w/cement grout		950.00
1040'	8 3/4" Drilling	@ \$28.75/ft.	29,900.00
1102'	7" O.D. 23#/ft. Steel casing	@ \$22.25/ft.	24,519.50
15	7" Casing centralizers	@ \$53.95/ea.	809.25
Lump Sum	Pressure grout 7" Casing w/cement grout		8,000.00
1900'	6½" Drilling	@ \$ 23.00/ft.	43,700.00
1940'	4½" O.D. 11.6#/ft. Steel casing	@ \$ 14.00/ft.	27,160.00
25	4½" Casing centralizers	@ \$ 46.95/ea.	1,173.75
1	4½" Left hand coupling		350.00
1	4½" Float insert check valve		125.00
Lump Sum	Pressure grout 4½" casing w/cement grout		8,500.00
Lump Sum	Chlorimate Well		250.00
Lump Sum	Geophysical Logging & casing Perforation		8,000.00
12 Hours	Air Development & Testing Production	@ \$150.00/Hr.	1,800.00
If needed--Acoustic cement bond log & casing perforation			5,000.00
			\$166,721.50
Excise Tax 2.041%.....			3,402.79
TOTAL ESTIMATE...			\$170,124.29

THANK YOU FOR CONSIDERING TAYLOR DRILLING

MAILING ADDRESS: P.O. BOX 7738 • RAPID CITY, SOUTH DAKOTA 57709-7738

09-14-06 tel. w/ Randy

Drill Hole to Madison
• top string = 10 in. casing
• inter. bottom casing = 7½ in. casing
• 6 3/4" hole to Madison

brakota
• 80 gpm above avg.
• 65 gpm avg.
NU Well (N of I-90) = really good thick brakota

est. \$30,000 for:
Sub pump
drop pipe
installation

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date January 3, 20 06

RECEIVED OF Viewfield Rural Water Association Inc., PO Box 157, New Underwood sd 57761

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

Fee for Application for Permit No. <u>1874-1</u> to Appropriate Water, to construct and to put water to beneficial use	225	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>1874-1</u>	50	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	275.00

No.

C2748

By

David E. Erbe

Chief Engineer

gm

Corporate Officers

Ralph Carlson, President
605-754-6201

Charles Larsen, Vice-President
605-754-6562

Pamela Cox, Secretary
605-754-6752

Larry Gossard, Treasurer
605-754-6760

Viewfield Rural Water Association Inc.

P.O. Box 157
New Underwood SD 57761



MEMORANDUM

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181

RECEIVED
JAN - 3 2007
WATER RIGHTS
PROGRAM

xc: Ralph Carlson, President, Viewfield Rural Water Association Inc.
Renner & Associates, LLC

FROM: Paul Gnirk
Member
Viewfield Rural Water Association Inc.
22014 New Underwood Road
New Underwood, SD 57761

PF / 12-29-06

DATE: December 29, 2006

SUBJECT: Transmittal of Application for Permit to Appropriate Water Within the State of SD.

Please find attached two copies of the following:

- {1} Form 2A--Application for Permit to Appropriate Water within the State of SD, as submitted by the Viewfield Rural Water Association Inc., together with (a) Form 2A Supplemental Information, (b) a copy of an estimate prepared by Taylor Drilling Co. for drilling a well into the Inyan Kara formation, and (c) a map, as prepared by Renner & Associates, showing the location of the proposed well.
- {2} A copy of the report entitled "Viewfield Rural Water System--Vol. II: Program Narrative Statement", which was submitted to the SD-DENR as a part of the Association's Consolidated Water Facilities Construction Program Application.
- {3} A copy of a portion of the report entitled "Viewfield Rural Water System--Vol. III: Engineering Design and Cost Estimate--Preliminary Design Report", which was submitted to the SD-DENR as a part of the Association's Consolidated Water Facilities Construction Program Application and which contains Appendix B "Siting the Deep-Aquifer Water Wells", together with logging data for one water well and two wildcat wells into the Inyan Kara Formation that were drilled to the south and to the north of the proposed well.

In addition, please find enclosed a check in the amount of \$275.00 to cover the filling fee.

If you should have any questions or need additional information, please do not hesitate to contact me [Tel. 605-754-6900/Cell 605-390-9319], or Ralph Carlson [Tel. 605-754-6201], or Mitch Kertzman of Renner & Associates [Tel: 605-721-7310].

Consolidated Water Facilities Construction Program

VIEWFIELD RURAL WATER SYSTEM

Vol. II: Program Narrative Statement

Submitted To

**Division of Financial and Technical Assistance
Department of Environment and Natural Resources
523 East Capitol Avenue
Pierre, SD 57501-3182**

By

**Viewfield Rural Water Association Inc.
P. O. Box 157
New Underwood, SD 57761**

December 29, 2006

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FOREWORD

[REDACTED] at the direction of the Board of Directors of the Viewfield Rural Water Association Inc., and is based, in part, on information provided by Renner & Associates LLC, the Consulting Engineering Firm employed by the Association, and contained in Vol. III: Engineering Design and Cost Estimate---Preliminary Design Report---for the Viewfield Rural Water System.

A. PROJECT DESCRIPTION

The Viewfield area is centered around the old town site of Viewfield which is located 8 miles North of New Underwood, SD, as shown in Figure A-1. The area is bounded, more or less, on the South by the Meade County line and on the North by the Belle Fourche river, and encompasses an estimated 225 square miles of land dedicated to farming and cattle ranching. Elk Creek is situated in the lower South part of the Viewfield area, traversing from West to East.

At this point in time, the Project involves establishing the engineering design, compiling a reliable cost estimate, and securing the required finances necessary to develop and operate a rural water system in the Viewfield area. The water system will be required to provide, at peak demand, an estimated 170,000 gpd to twenty-five water taps located along thirty-two miles of pipeline. The water supply for the system will be obtained from a single well, approximately 2,800 ft. in depth, in the Inyan Kara aquifer. The water reservoir tank, with a storage capacity of 172,580 gal, will be located at an elevation that will provide gravity flow of water to the twenty-five water taps in the event of a failure of electrical power. Approximately 84% of the water will be used for livestock consumption, 8% for crop spraying and 7% for domestic use. The pipeline has been sized to accommodate the maximum daily water demand, with no allowance for fire protection.

Cost quotations have been obtained from contractors and suppliers for drilling and outfitting the water well, constructing the pipeline, installing the water-tap pits, purchasing the water meters, and the like. The total cost of the Project, including construction, engineering fees, and legal fees is estimated to be \$1,800,300.00. Easement documents have been prepared for the entire pipeline route and issued to landowners for their signatures.

B. ELIGIBILITY

The Viewfield Rural Water Association Inc. submitted its Application to the State Water Plan on September 29, 2006, and was included in the State Water Plan at the November 2, 2006, meeting of the Board of Water and Natural Resources in Pierre, SD. In addition, the Association is a nonprofit South Dakota Corporation {Certificate of Incorporation---Organizational ID # NS013238} and chartered to "...develop and operate a deep aquifer well and attendant water distribution system, and any and all other business incidental thereto and connected therewith..."

C. NEED/PROBLEM IDENTIFICATION

The principal water supply for domestic use in the Viewfield area is provided by shallow wells, 40 to 60 ft. in depth, or by hauling water from the city of New Underwood. A few of these wells are located in gravel deposits along Elk Creek or in isolated gravel deposits above Elk Creek. Most of the shallow water wells, however, are located in the shale formation that constitutes the surface geology of the area. The waters from these wells commonly exhibit considerable hardness and high concentrations of sodium and sulfate. For the purpose of this project, fifteen water wells were tested for water quality. One-third of the wells contained waters with hardnesses in excess of 50 grains per gal, sodium concentrations ranging from 175 to 760 mg/L, and sulfate concentrations ranging from 361 to 2,700 mg/L. Another one-third of the wells contained waters with acceptable hardness, but with sodium concentrations ranging from 160 to 615 mg/L and sulfate concentrations ranging from 278 to 1,260 mg/L. Seven of the wells contain waters with total coliform present, and one with fecal coliform present. Several households have been hauling water from New Underwood for domestic use for at least ten years, and many of the other households purchase bottled water for drinking purposes.

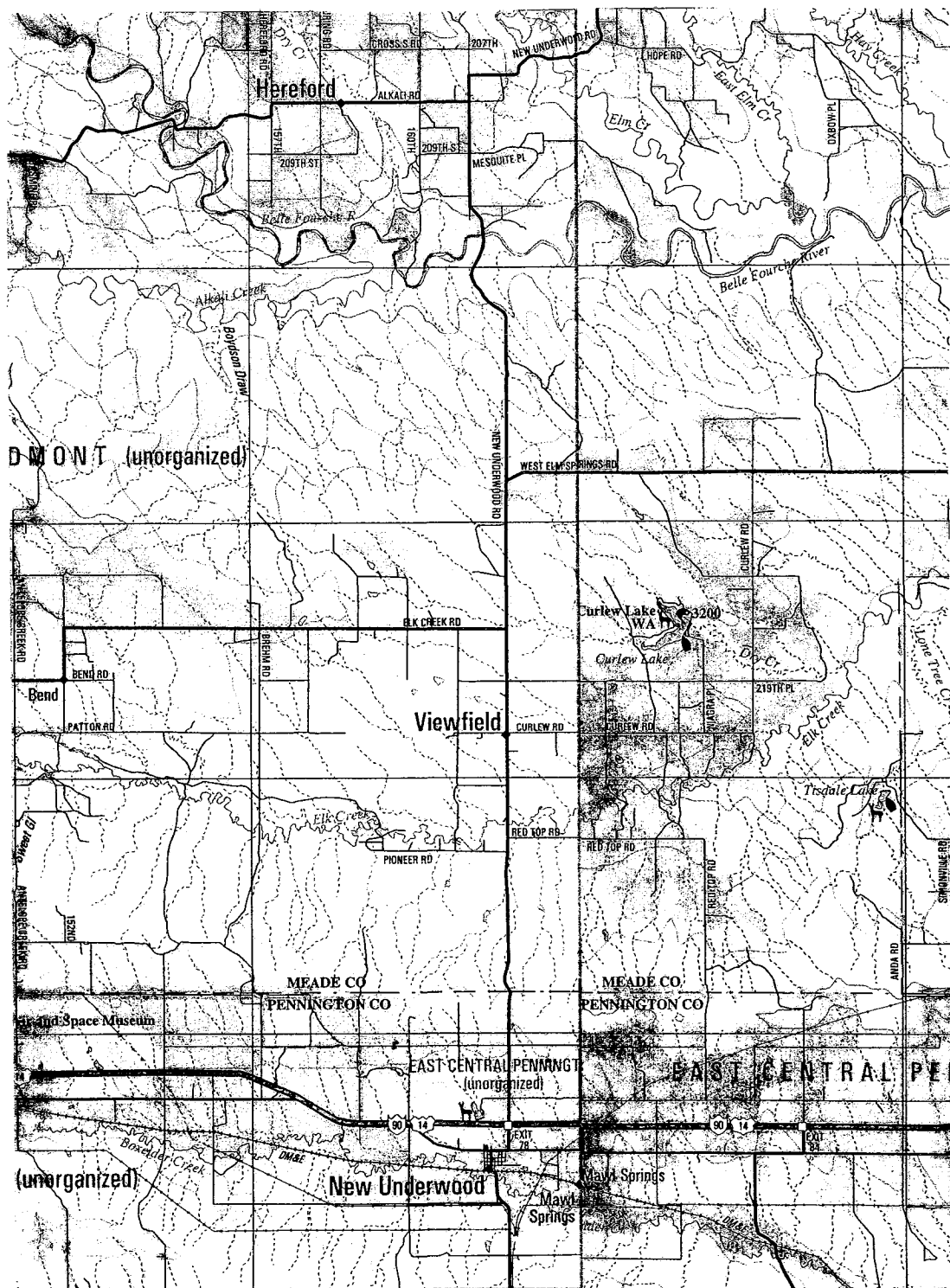


Figure A-1. Map of the Viewfield Area located North of New Underwood, SD.

For the estimated 9,000 head of cattle and horses in the service area of the proposed pipeline, water is commonly provided by stock dams, shallow water wells, springs, and Elk Creek. Because of the persistent drought in western South Dakota, many of the shallow water wells and springs provide little or no water, particularly during the Fall and Winter months, the stock dams contain less than 30% of full water capacity or are dry for most of the year, and the water flow in Elk Creek is nonexistent. During the late summer months with high day-time temperatures, the quality of the waters in the stock dams begins to degrade quite rapidly. At this point in time, the current livestock numbers are certainly 30% less than the 9,000 head than the service area would support during the years of average precipitation. Additionally, most of the water required for crop spraying is provided by the water system in New Underwood.

In summary, the quantity and quality of water available for domestic use and livestock consumption in the Viewfield area is marginal at best. The net effect is an adverse economic impact to the community.

D. PROJECT DESIGN/PROPOSED METHOD OF ACCOMPLISHMENT

The peak water demand for the proposed system is estimated to be 170,000 gpd. This estimate is based on the water requirements for 33 households, 4,215 cow-calf pairs, 734 bulls, yearlings, and horses, and crop spraying. In particular, approximately 84% of the water will be used for livestock consumption, 8% for crop spraying, and 7% for domestic use. These data were compiled on the basis of personal interviews with the twenty-three landowners who are members of the Association, and using a fixed quantity of water for each category of water usage, such as 30 gpd per cow-calf pair and 360 gpd per household. Based on the number of cow-calf pairs and a local rule-of-thumb of twenty acres per cow-calf pair, together with approximately one acre of farm land for each three acres of pasture land, the total service area is of the order of 175 sq. miles, or about 112,000 acres.

The map of the Viewfield area, shown in Figure D-1, provides a geometric layout of the proposed main pipeline. The pipeline is approximately 32 miles in length, and consists of PVC-200 psi pipe with inside diameters of 6 in., 4 in., 3 in. and 2 in. buried at a depth of 5.5 to 6 ft. The pipe diameters are sized to accommodate the quantities of water required by the users at the water taps under peak demand conditions and at acceptable hydraulic pressures. The twenty-five water-taps along the pipeline are denoted by the solid circles. An in-line booster pump is required at the southeast segment of the pipeline in order to maintain useful hydraulic pressures at two of the water taps during periods of peak demand. Shut-off valves are located at key points such that various segments of the pipeline can be isolated independently in the event of a serious water leak.

The water well site is located at the south central end of the service area at a surface elevation of 2,720 ft. The well will be drilled into the Inyan Kara aquifer to a depth of 2,700 to 2,800 ft., and is expected to produce water at a rate of about 120 gpm during periods of peak demand. Electric power for the submersible pump will be provided by a nearby three-phase electrical power line that is owned and operated by West River Electric Cooperative. The reservoir storage tank, with a water storage capacity of 172,580 gallons, will be located at the west central end of the service area at a surface elevation of 2,920 ft. In the event of an electrical power failure, the tank will provide water to all twenty-five water taps by mean of gravity flow.

The hydraulic modeling of the entire water system, including the pipeline, well, and reservoir storage tank, was performed by Renner & Associates with the WaterCad v6.5 computer program. Various system scenarios were evaluated, including a situation in which the peak demand was increased by 173% to simulate increased water consumption during daylight hours in the summer.

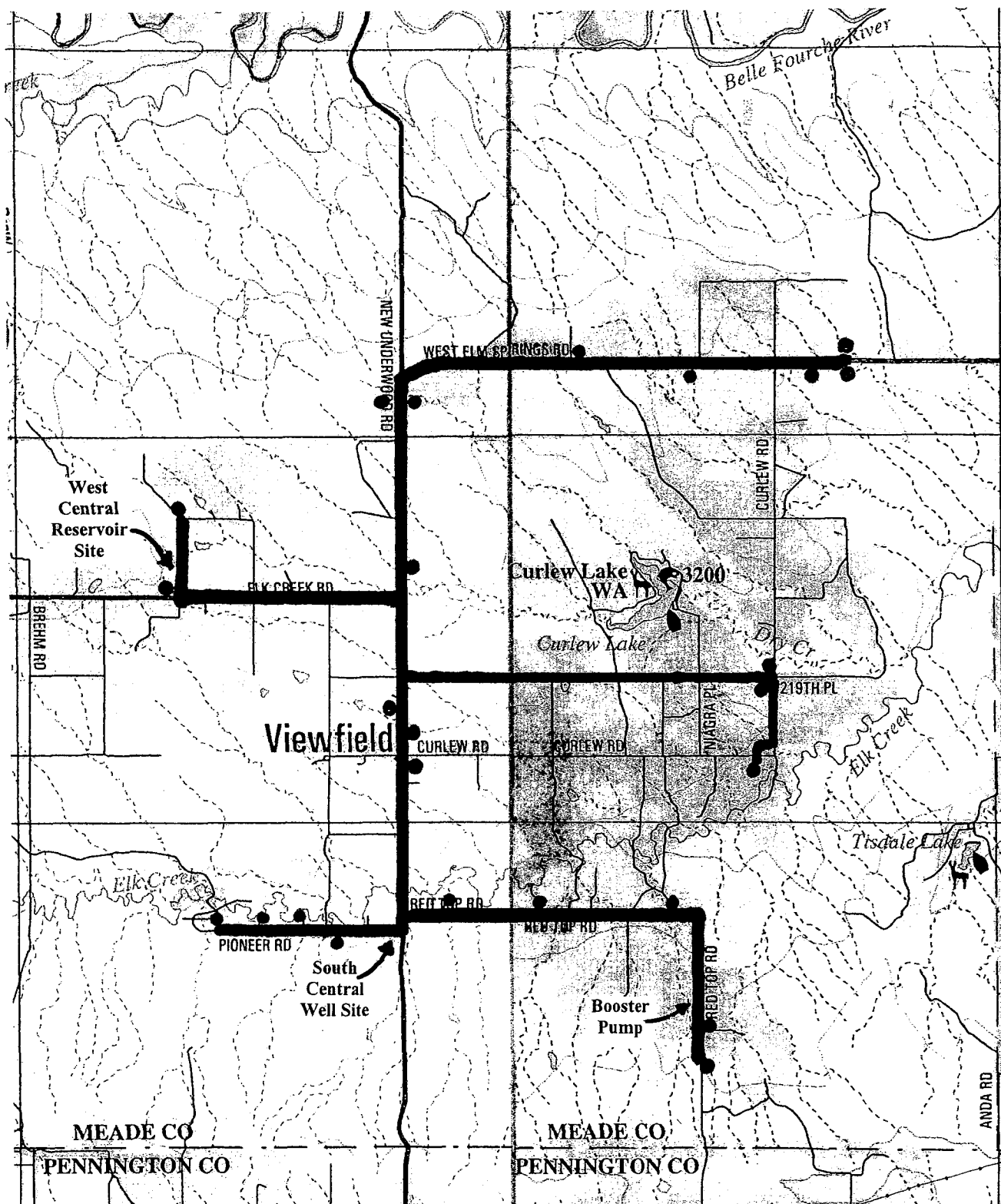


Figure D-1. Layout of the proposed main water-system pipeline in the Viewfield area.

E. REQUIRED PERMITS AND EASEMENTS

E-1. PERMITS

On November 9, 2006, Paul Gnirk, representing the Viewfield Rural Water Association Inc., met with the Meade County Commissioners for the purpose of describing the proposed route of the main pipeline for the Viewfield Rural Water System and the necessary proposed pipeline installations in road ditches and across county roads. As recorded in the Proceeding of that Meeting, it is stated that "... all Commissioners voted yes to give conceptual approval to the Viewfield Rural Water Association, Inc. and in that conceptual approval the Board would include the suggested road crossings, use of roads and section lines, with the understanding that the Meade County Highway Superintendent Ken McGirr would be included in final process of same."

On December 29, 2006, the "Application for Permit to Appropriate Water Within the State of South Dakota" was submitted to the SD Water Rights Program for a new well into the Inyan Kara aquifer, located in the NE ¼ of the NE ¼ of Section 31, Range 11E, Township 3N, Meade County, South Dakota, for a water production rate of 130 gpm.

E-2. EASEMENTS

In late October and early November, 2006, members of the Board of Directors and a member of the Viewfield Rural Water Association Inc. contacted some forty landowners in person and by mail, including the office of the Commissioner of School and Public Lands, to discuss acquiring easements for pipeline and water-tap installations on their properties. None of these landowners expressed an unwillingness to sign the necessary easements. As such, in mid-November, the Meade County Title Company was employed by the Association to conduct the requisite title searches. In early December, Curtis Jensen, Attorney for the Association, began the process of preparing the easement documents, including the plats of the easements as prepared by Renner & Associates. As of December 23, 2006, all ninety easement documents had been issued to the landowners for their signatures, and, as of December 29, some thirty-seven signed easements have been returned to the Law offices of Curtis Jensen. It is anticipated that all of the necessary easements with landowner signatures will be in hand by mid-January, 2007.

On December 20, 2006, Ralph Carlson, President of the Viewfield Rural Water Association Inc., met with the Meade County Commissioners for the purpose of requesting {a} easements to install water lines across various Meade County roads and within road ditch right-of-ways, and {b} permits to occupy unimproved section line right-of-ways. As recorded in the Minutes of that Meeting, it is stated that "...all Commissioners voted yes to approve the road crossings, cuts and borings that have been detailed for the project identified as the Viewfield Rural Water Association, Inc. ...".

F. DEBT RESERVES REQUIREMENT

In Section 5.5, entitled "User Rate Impacts", of Vol. III: Engineering Design and Cost Estimates, consideration is given to a time-dependent scenario of the water-system operation, involving a "Start-Up Operation" time period followed by the "Full-Scale Operation". The duration of the "Start-Up Operation" time period is expected to be four to five years because of the adverse impact of the drought on recovering the cattle-carrying capacity of the Viewfield area and, as well as the time required for individual landowners to implement their NRCS-EQIP practices, such as constructing water lines and watering tanks in pastures. As such, during this time period, the annual water usage is assumed to average 70% of peak demand during the months of March through October and 55% of peak demand during the remaining months. As the drought subsides and the NRCS-EQIP practices are implemented, the water system will begin to operate as

designed for peak demand usage. Thus, for "Full-Scale Operation", the annual water usage is assumed to average 90% of peak demand during the months of March through October and 75% of peak demand during the remaining months.

The annual gross revenues are calculated for both of the above time periods for user rates of \$2.50 and \$3.00 per 1,000 gallons of water usage and a water-tap fee that remains fixed at \$50.00 per month. The annual Operation & Maintenance costs are assumed to remain fixed at \$56,000.00 during the early years. This assumption is reasonable when considering that the decrease in the cost of water-quality testing with time will approximately balance the increase in personnel and material costs due to inflation, and that the annual electrical power costs are based on the system operating at peak demand rather than at reduced demand. The annual payments for a Consolidated Loan of \$300,000.00 and a Rural Development Loan of \$126,000.00 are fixed throughout their respective periods of amortization.

After reducing the annual gross revenue by the amount of the fixed costs, the annual net income for the period of the "Start-Up Operation", for a user rate of \$3.00 per 1,000 gallons of water usage, is estimated to be of the order of \$48,000.00. This surplus allows for {a} a debt reserve equal to the sum of the two annual loan payments, and {b} approximately \$17,000.00 to be set-aside for capital asset purchases and capital improvements.

During the period of "Full-Scale Operation", the annual net income is projected to be of the order of \$58,000.00 for a user rate of \$2.50 per 1,000 gallons of water usage. This surplus allows for {a} a debt reserve equal to the sum of the two annual loan payments, and {b} approximately \$27,000.00 to be set-aside for capital asset purchases and capital improvements.

For the above time-dependent scenario of water-system operation, and assuming no major pump or well failures, the cumulative debt-reserve fund would amount to \$152,415.00 during the first five-year period of operation and the cumulative set-aside fund would be \$85,000.00. The surplus would probably be greater than that calculated above for the "Start-Up Operation" time period because the water usage would be ramping upwards as the drought subsides and the NRCS-EQIP practices are implemented.

The three failures of major proportion that could occur in the system are:

----- Booster pump failure: Estimated replacement and installation cost is \$3,000.00.

----- Submersible pump failure: Estimated replacement and installation cost is \$30,000.00.

----- Deep-aquifer well failure: Estimated cost of drilling and completing a new well is \$170,000.00.

In the unlikely event that the deep-aquifer water well proposed for this Project is not capable of producing the amount of water required to meet the peak demand, then consideration would have to be given to the construction of a second deep-aquifer well. The estimated cost, including the submersible pump, drop pipe, etc., would be of the order of \$200,000.00.

G. ACQUISITION OF NECESSARY LANDS

The site of the proposed deep-aquifer water well is located in the NE corner of the NE ¼ of the NE ¼ of Section 31, Range 11E, Township 3N, Meade County, South Dakota. The property is owned by William C. and Sharon K. Gikling, husband and wife, and they have agreed by written Agreement to donate one acre of land, free and clear, by means of warranty deed, to the Viewfield Rural Water Association Inc. for the development and operation of a deep-aquifer water well, and, if and when required, for the construction and operation of a second water reservoir tank.

The site of the proposed water reservoir tank is located approximately 1,000 feet North of the Elk Creek Road along the East side of the SE ¼ of the SE ¼ of Section 3, Range 10E, Township 3N, Meade County, South Dakota. The property is owned by Boydston's Inc., a South Dakota Corporation, and the Corporation has agreed by written Agreement to donate one acre of land, free and clear, by means of warranty deed, to the Viewfield Rural Water Association Inc. for the construction and operation of a water reservoir tank, and, if and when required, for the development and operation of a second deep-aquifer water well.

H. PREVIOUS ACTIONS

During the third week in August, 2006, Paul Gnirk and Larry Gossard mailed invitations to forty-two landowners in the Viewfield area to attend a meeting on August 24, 2006, at the New Underwood Community Center to discuss the possibility of developing a rural water system. At that meeting, which was attended by approximately forty individuals, Paul Gnirk and Larry Gossard presented a preliminary layout of a proposed main pipeline, a proposed site for a deep-aquifer water well, a cost estimate for construction of the deep-aquifer water-well and some thirty-seven miles of pipeline, and details of the NRCS-EQIP cost-share program. It was the decision of the attendees that the exploratory process should continue, and that interested landowners be interviewed as to their water needs for livestock consumption, crop spraying, and domestic use and that the pipeline layout and cost estimate be reconfigured to conform to those needs.

A Subscriber sign-up form was mailed to forty-two landowners on August 30, 2006, together with a Newsletter describing the sign-up form, details of a water tap, water-usage pricing data, deep-aquifer water-well drilling quotes, and sources of potential loan funds. On September 1, 2006, Paul Gnirk and Larry Gossard met with David Ryan of the SD Department of Environment and Natural Resources for a briefing on the Consolidated Water Facilities Construction Program. Subsequently, two more Newsletters were issued to the landowners on September 1 and 8, 2006, explaining the details of the Consolidated Water Facilities Construction Program, listing the Subscribers, and describing the process for re-configuring the main pipeline based on the estimated water needs of the Subscribers.

On September 14, a second meeting of the interested landowners was held at the New Underwood Community Center. Paul Gnirk and Larry Gossard presented a re-configured layout of the main pipeline, together with a revised cost estimate, and provided the NRCS-EQIP forms to the attendees with an explanation of the manner in which the forms were to be completed and submitted to the NRCS offices in Sturgis and Rapid City, SD. It was the decision of the attendees to incorporate as the Viewfield Rural Water Association and to proceed with the development of a Preliminary Engineering Design Requirements report to accompany the submittal of the State Water Plan Application Form.

The Articles of Incorporation for the Viewfield Rural Water Association Inc. were prepared by Mr. Curtis Jensen, Attorney, on September 18, 2006 and approved by the Secretary of State on September 19, 2006. Subsequently, the Articles, together with the proposed By-Laws, were distributed to the Subscribers and other interested landowners. Additionally, a fourth Newsletter was issued which described the Articles of Incorporation, provided the agendas for the Organizational Meeting of the Corporation and the first meeting of the Board of Directors, and specified a corporation membership fee of \$500.00 that had to be paid prior to the Organizational Meeting. On September 22, 2006, the Organizational Meeting was held at the New Underwood Community Center, at which the Articles of Incorporation and By-Laws were ratified by the members and a Board of Directors was elected.

On September 29, 2006, the State Water Plan Application Form, together with the Engineering Design Requirements Report, was submitted to the SD-DENR. Subsequently, on October 24, 2006, the Board of Directors decided to employ Renner and Associates L.L.C. to prepare an engineering design report for the Viewfield Rural Water System for submittal to the SD-DENR, as a

part of the Consolidated Water Facilities Construction Program Application Form, and to the NRCS-EQIP Program. In November, the route of the main pipeline was established and surveyed by GPS by Renner and Associates, and the landowners were identified for purposes of acquiring pipeline and water-tap easements. In early December, the landowner title searches were completed by the Meade County Title Company. Subsequently, some ninety easements were prepared and mailed to landowners by Curtis Jensen of the Law Firm of DeMersseman Jensen Christiansen Stanton & Huffman, LLP. On November 9 and December 20, 2006, representatives of the Association met with the Meade County Commissioners for the purpose of obtaining their approvals for construction of the pipeline in certain road ditches and across section-line and county-road right-of-ways.

I. LOCAL INVOLVEMENT

The response of the landowners to the development and operation of a rural water system in the Viewfield area has been positive since the first community meeting was held on August 24, 2006. At each of the four community meetings held in August and September, the attendees were apprised of the potential cost of developing a rural water system and advised that there were no guarantees of obtaining grant, loan, or cost-share funds to defray such cost. Additionally, the attendees were advised that there was no guarantee as to the amount of water that could be expected from a well into the Inyan Kara aquifer. As such, twenty-three landowners agreed to move forward with the process and invest their money, by means of membership fees and water-tap hook-up fees, in the engineering design of the rural water system and the legal costs of acquiring easements for the main pipeline and water-tap installations. There has been no opposition to the cost of a membership or to the cost of water-tap hook-up.

J. PROJECT SCHEDULE

The two key dates in the Project Schedule are (1) January 26, 2007, at which time the USDA-NRCS office is notified by the USDA-NRCS State Office that the consolidated EQIP application for the Viewfield Rural Water Association Inc. will, or will not, be funded; and, (2) some time in March, 2007, at which time the SD-DENR notifies the Viewfield Rural Water Association Inc. that its application under the Consolidated Water Facilities Construction Program has been approved, or not approved, for funding by means of a consolidated grant and a consolidated loan in the aggregate amount of \$600,000.00.

Assuming that both of the above funding requests are approved, then the following activities are scheduled to take place [see Section 6 of Vol. III—Engineering Design and Cost Estimate for a more detailed Project Schedule]:

- March:** Submission of the New Water System Application and Business Plan for the Viewfield Rural Water System to the SD-DENR.
- March-April:** Submission of an application for a Rural Development loan.
- April:** Submission of the Plans and Specifications for the Viewfield Rural Water System to the SD-DENR.

Assuming that the New Water System Application, the Business Plan, and the Plans and Specifications are approved by the SD-DENR, then the following activities are scheduled to take place:

- May:** (1) Pre-construction meeting with the SD-DENR, together with submission of the construction schedule; (2) Issuance of the Bid Package to the Drilling Contractors for drilling of the deep-aquifer water well, together with the purchase

and installation of the submersible pump, drop pipe and cable, and controls; (3) Selection of the Drilling Contractor.

- June: (1) Completion of drilling, casing installation, casing perforation, and testing of the deep-aquifer water well, and installation of the submersible pump, drop pipe and electric cable, and controls. (2) Construction inspection by SD-DENR personnel.
- July: (1) Issuance of Bid Packages to Contractors and Suppliers for all aspects of the main pipeline construction, water reservoir tank, booster pump installations, pump house, etc.; (2) Selection of the Contractors and Suppliers.
- August: Submission of the Operations and Maintenance Manual to the SD-DENR for review and approval.
- August-Sept.: (1) Construction of all aspects of the main pipeline including water-tap and booster-pump installations, construction of the pump house, installation of the water storage tank, etc.; (2) Construction inspections by SD-DENR personnel.
- October: (1) Finalize testing of the water system; (2) Submission of the Notice of Completion to the SD-DENR; (3) Issuance of the Certificate of Approval of the water system; (4) Selection of a Contractor to handle the water sampling/testing and to operate and maintain the water system.
- November 1: Begin full-scale operation of the Viewfield Rural Water System.

K. LONG RANGE PLANNING

The proposed Viewfield Rural Water System was designed specifically to accommodate the estimated water needs of the twenty-three landowners who are members of the corporation. Because of cost constraints, it was not possible to design and construct a system that could accommodate the water needs of additional landowners who may wish to purchase water taps after the system is in operation. The system would require the construction of a second deep-aquifer water well in order to handle even a moderate increase in the peak demand. At this point in time, and quite probably into the future, there are no plans or thoughts of increasing the capacity of the system beyond the design proposed herein.

L. ECONOMIC IMPACT TO THE VIEWFIELD AREA

The performance and health of cattle can be compromised by the consumption of water with a high salt content, because of reduced water and feed intake, toxic levels of sulfur ingestion, and induced trace mineral deficiencies {ref.: Patterson and Johnson, 2003}. A study performed in Alberta, Canada found that beef calves gained an average of 0.5 lbs more per day when drinking trough (clean) water than beef calves drinking dugout/pond (muddy) water {ref.: Willms, et al, 2002}. Other studies, such as the four-year investigation by Agriculture and Agri-Food Canada and the Western Beef Development Centre, have demonstrated that, by drinking clean water, mature cattle maintain better conditioning during the hot and dry months of summer and calves gain more weight and experience less medical problems as they mature. These quantitative results have been known qualitatively by farmers and ranchers for decades. On hot summer days, when water is available in pasture tanks and water is also available in nearby stock dams, cattle will drink water from the tanks and stand in the dam water to cool off.

The economic impact to the Viewfield area because of watering livestock from a rural water system can be quantified as follows. The assumption can be reasonably made that a calf will

gain, on average, ten lbs more per month by drinking clean water than the same calf would gain by drinking stock dam water. For the time period of June through October, a period of five months, a calf born in March would gain an additional fifty lbs of weight by drinking clean water at it matures. The assumption can also be reasonably made that at least 90% of the cows in the service area will produce live calves. During this past October and November, the sale price of a 400 lb to 500 lb calf ranged from, say, \$1.25 per lb to \$1.50 per lb. Thus, the projected economic impact to the Viewfield community can be quantified as follows:

Economic Impact {at \$1.25 per lb} = $90\% \times 4,215 \text{ cows} \times 50 \text{ lbs} \times \$1.25 \text{ per lb} = \$237,200.00$

Economic Impact {at \$1.50 per lb} = $90\% \times 4,215 \text{ cows} \times 50 \text{ lbs} \times \$1.50 \text{ per lb} = \$284,500.00$

This dollar impact, by itself, represents something like a 13% to 16% annual return on an investment of \$1,800,300.00 in a rural water system. The actual impact has be greater than the above dollar calculations when the better conditioning of cows, bulls, yearlings, and horses is taken into account, as well as the enhancement of human health because of clean drinking water.

References:

Agriculture and Agri-Food Canada and the Western Beef Development Centre: "The Effects of Water Quality on Weight Gain---Results of Study Years 1999-2002".

Troy Patterson and Pat Johnson: "Effects of Water Quality on Beef Cattle", Proc. of the Range Beef Cow Symposium XVIII, Mitchell, NE, 2003.

W. D. Willms, et al: "Effects of Water Quality on Cattle Performance", Journal of Range Management, 2002.

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Consolidated Water Facilities Construction Program

VIEWFIELD RURAL WATER SYSTEM

VOL. III: ENGINEERING DESIGN AND COST ESTIMATE --- PRELIMINARY DESIGN REPORT---

Submitted To

**Division of Financial and Technical Assistance
Department of Environment and Natural Resources
523 East Capitol Avenue
Pierre, SD 57501-3182**

By

**Renner and Associates, LLC
616 6th Street
Rapid City, SD 57701**

For

**Viewfield Rural Water Association Inc.
P. O. Box 157
New Underwood, SD 57761**

December 29, 2006

Civil Engineering -- Commercial and Residential Site Design - Municipal Engineering Street
Design - Utility Design - Drainage Design & Flood Certificates
Track & Field Design

FOREWORD

This document was prepared by Renner & Associates LLC, by direction of the Board of Directors of the Viewfield Rural Water Association Inc. Sections 3, 4, 5, and Appendix E and F, dealing with the water-system modeling and design, plans preparation, and construction cost estimates, were prepared by Gary Renner, PE/LS, and Mitch Kertzman, PE, with consultation by Dr. Paul Gnirk, representing the Association, and by Steven Quissell, PE, of the USDA-NRCS office in Rapid City, SD. Sections 1, 6, 7 and A [REDACTED] and are based, in part, on the contents of the Preliminary Engineering Design Requirements report that was submitted by the Association, together with its Application to the State Water Plan, to the SD-DENR on September 29, 2006. In addition, Renner & Associates LLC prepared sixty-seven easement exhibits along the pipeline route for Curtis Jensen of the Law Firm of DeMersseman Jensen Christiansen Stanton & Huffman, LLP.



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Appendices:

Appendix A.	Water System Design Considerations
Appendix B.	[REDACTED]
Appendix C.	Construction Cost Quotes
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Appendix F.	Half-sized (11 x 17) copy of the preliminary plans

APPENDIX B. SITING THE DEEP-AQUIFER WATER WELL

To establish the location of a deep-aquifer water well in the Viewfield area, the following individuals were consulted:

- Dr. Perry Rahn: Professor Emeritus, Department of Geology and Geological Engineering, South Dakota School of Mines and Technology, Rapid City, SD
- Fred Steece: Oil & Gas Supervisor, SD Department of Environment and Natural Resources, Rapid City, SD
- Jim Goodman: Natural Resources Administrator, SD Department of Environment and Natural Resources, Pierre, SD
- Dan Driscoll: Hydraulic Engineer, United States Geological Survey, Rapid City, SD

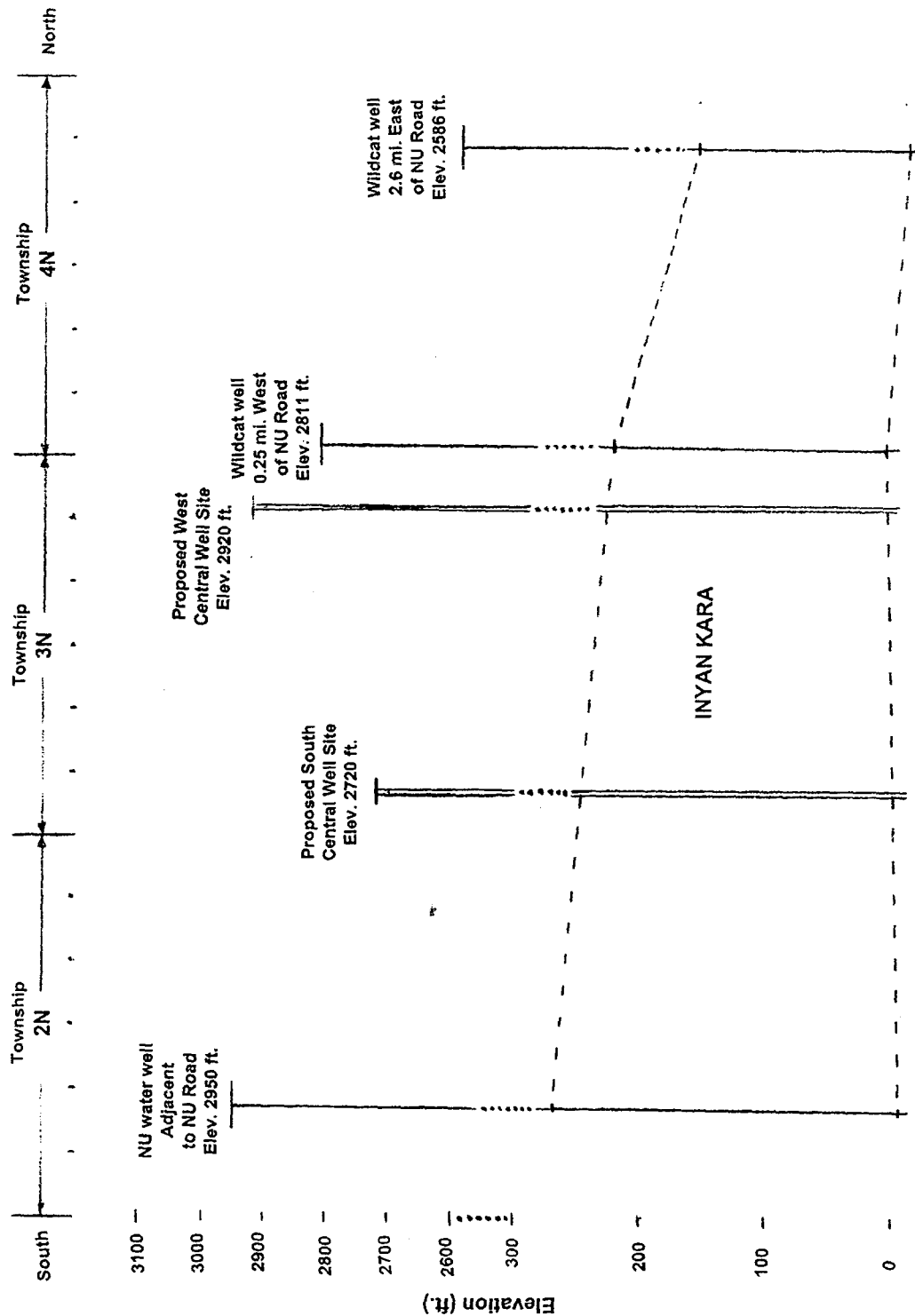
Primary consideration was given to the Inyan Kara aquifer which is known to provide good quality water and should be situated at a depth of 2,600 to 2,700 ft in the Viewfield area. According to the USGS Water-Resources Investigations Report 03-4049, the average saturated thickness of the formation immediately East of Rapid City ranges from 300 to 400 ft, and the wells in that area exhibit rates of water production ranging from a few gpm to in excess of 250 gpm. According to Table B-1, the production zone for the well located in the SE corner of Section 9, R9E, T3N, approximately 10 miles directly West of the center of the Viewfield area, is 140 ft thick and capable of a water yield of 150 gpm. The production zone for the well located in the NW corner of Section 29, T2N, R11E, approximately 7 miles directly south of the center of the Viewfield area, is 273 ft thick and capable of a water yield of 200 gpm.

Figure B-1 illustrates the projected cross-section of the Inyan Kara formation parallel to New Underwood Road, beginning approximately 5 miles South of the intersection of New Underwood Road and Pioneer Road and ending approximately 2.5 miles North of the intersection of New Underwood Road and East Elm Springs Road. This cross-section is based on detailed electrical and observational logs from three wells either adjacent to, or within 2.5 miles, of New Underwood Road. The thickness of the Inyan Kara formation ranges from 273 ft on the South end to 166 ft on the North end.

The south-central site of the proposed primary deep-aquifer well is located in the NE corner of Section 31 [Rge 11 E, Twp 3 N], adjacent to the intersection of New Underwood Road and Pioneer Road. The elevation of the site is 2,720 ft, and a three-phase electric power line borders the New Underwood Road. The projected thickness of the Inyan Kara formation at this site is expected to be of the order of 250 ft, with the top of the formation situated at a depth of 2,470 ft and the bottom at a depth of 2,720 ft. The depth of the static water level should be about 115 ft. According to the tabulations in Section 3.2.2 and Appendix A, the maximum water demand from the 25 water taps in the Viewfield area was determined to be 170,000 gpd, or 118 gpm. Based on the water yields of 150 to 200 gpm from wells located approximately 10 miles West and 5 miles directly South, respectively, a projected peak demand of 120 gpm from the proposed well into the Inyan Kara formation appears feasible.

The west-central site of the proposed secondary deep-aquifer well is located approximately 1,000 ft. North of Elk creek Road along the East side of Section 3 [Rge 10E, Twp 3 N]. The elevation of the site is 2,920 ft., and a single-phase electric power line borders Elk Creek Road. The projected thickness of the Inyan Kara formation at this site is 220 ft., with the top of the formation situated at a depth of 2,690 ft. and the bottom at a depth of 2,910 ft. The depth of the static water level should be about 315 ft.

Figure B-1. Projected Cross Section of the Inyan Kara



GOODWELL, INC.

GAMMA RAY-NEUTRON

UPTON, WYOMING

FILING NO. 	COMPANY CITY OF NEW UNDERWOOD		
WELL CITY WELL #2			
FIELD NEW UNDERWOOD			
COUNTY PENNINGTON STATE SOUTH DAKOTA			
LOCATION: SEC. 29 TWP. 2N RGE. 11E			OTHER SERVICES: CALIPER
PERMANENT DATUM: GROUND LEVEL, ELEV. 2950' LOG MEASURED FROM G.L. FT. ABOVE PERM. DATUM DRILLING MEASURED FROM G.L.			ELEV.: K.B. D.F. G.L. 2950'

DATE	3-26-1988		
RUN NO.	ONE		
TYPE LOG	G/R-N/N		
DEPTH-DRILLER	2960'		
DEPTH-LOGGER	2956'		
BOTTOM LOGGED INTERVAL	2956'		
TOP LOGGED INTERVAL	2200'		
TYPE FLUID IN HOLE	CHEM GEL		
SALINITY, PPM CL.			
DENSITY			
LEVEL	FULL		
MAX. REC. TEMP., DEG F.			
OPERATING RIG TIME	1 HOUR		
RECORDED BY	T. BICKETT		
WITNESSED BY	MR. TAYLOR/DR. GRIES		

RUN	BORE-HOLE RECORD				CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO	
1		0'	30'	12 3/4		0'	30'	
2	9 7/8"	30'	1220'					
3	7 7/8"	1220'	2960'					

THIS HEADING AND LOG CONFORMS TO API RP 33

FOLD HERE

JOHN PAUL GRIES

Consulting Geologist

238 ST. CHARLES STREET

RAPID CITY, SOUTH DAKOTA

Geologist's report on the drilling and completion of New Underwood #2 well.

North of
1-90

Geology and hydrology.

The geologist followed the drilling closely below 1,000 feet. Sample cuttings, saved by the drilling crew, were taken to the School of Mines where they were washed, dried, and studied under the binocular microscope. The successive strata were encountered at essentially the same depths as predicted in a memorandum dated August 31, 1987. Drilling was stopped at the base of the Lakota formation.

<u>Formation</u>	<u>predicted</u>	
Surface gravel	0 - 30	0 - 30
Pierre shale	30 - 1175	30 - 1140
Niobrara chalk	1175 - 1375	1140 - 1416
Carlile shale	1375 - 1800	1416 - 1800
Greenhorn limestone	1800 - 1850	1800 - 1876
Belle Fourche shale	1850 - 2400	1876 - 2406
Newcastle sandstone	2400 - 2450	2406 - 2448
Skull Creek shale	2450 - 2675	2448 - 2683
Fall River-Lakota sandstones	2675 - 2950	2683 - 2956
Morrison green shale		

The Fall River section was 81 feet thick in well No. 1, and is the sole source of water in that well. In well No. 2, the good porous Fall River sand is only 26 feet thick. Deeper drilling showed the Lakota sandstone to be 100 feet thick, with the lower 54 feet showing excellent porosity.

After perforating casing opposite the Fall River sandstone, the static level corresponded with that in the No. 1 well when correction was made for difference in surface elevation. When the lower sand was also perforated, no measurable difference in static level could be found. Water samples of the Fall River, and of the combined Fall River and Lakota waters were very similar. It was decided to leave both sands open in the final completion.

JOHN PAUL GRIES

Consulting Geologist

238 ST. CHARLES STREET
RAPID CITY, SOUTH DAKOTA

Logging and perforating New Underwood No. 2 Deep Well.

Goodwell, Inc., Upton, Wyoming, ran open hole logs on March 26, 1988. The gamma ray - neutron log extended from total depth of 2956 up to 2200 feet, and a caliper log covered the entire interval 2956 - 10 feet.

A logging unit from the Rapid City office of the U. S. G. S. attempted to run resistivity logs, but the sond persisted in hanging up on a shoulder at 1500 feet.

When casing was run and cemented, cement did not reach back to the surface. Goodwell, Inc. ran a cement bond log, a tremie line was run down the annular space between the hole wall and the casing, and the casing was cemented back to surface.

On March 30th, Goodwell, Inc. ran a gamma ray - casing collar log, and perforated the favorable zones selected by the engineer, geologist, and the driller. 22.7 gram glass jets were used. On the first run, 52 shots (2/ft) were placed in the interval 2687 - 2713 feet. Based on the poor porosity of the sandstone, based on the GR-N log, the interval from 2830 to 2850 was perforated with one shot per foot, and the porous interval 2850 - 2900 feet was perforated with two shots per foot.

The well was air developed as per contract; no sand showed in the bucket or in the ditch below the discharge after about one hour. At the end of the development period, water samples were taken for submission to Travis laboratory, Rapid City.

The U. S. G. S. returned on April 28th, after the well was completed, and ran a gamma ray - neutron log from near the surface to a depth of 2800 feet, the limit of their equipment.

JOHN PAUL GRIES

Consulting Geologist

238 ST. CHARLES STREET
RAPID CITY, SOUTH DAKOTA

City of New Underwood

Loc: SW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 29, T. 2 N., R. 11 E. (1118' FNL, 120' FWL)

Pennington County, South Dakota

Elevation: 2950' Total Depth 2956 ft.

Drilled 1988 by Taylor Drilling Company, Rapid City, S. D.

Engineer: Bruce Erickson for Jerry Thomas, Assoc.

Geologist: J. P. Gries

Terrace gravels

0 - 30

Pierre Shale

- 30 - 1040 Shale, gray, cuttings not saved
- 1060 shale, slate gray, weakly fissile; trace fossil fragments,
2 pieces speckled
- 1080 shale, same
- 1100 shale, same, none is speckled
- 1120 shale, same, much pyrite

Niobrara Formation. Sample top @ 1140

- 1120 - 1160 shale, medium to dark gray, speckled
- 1180 shale, medium gray, pyritic; trace speckled
- 1200 shale, same, few speckled fragments
- 1220 shale, gray; some Inoceramus shell fragments and concretionary
limestone with golden calcite veinlets; some caved sur-
face gravel. 9 7/8 in. csg set at 1220
- 1240 shale, gray to nearly black; trace speckled
- 1260 shale, gray, few speckled pieces
- 1280 shale, medium to dark gray, few pieces speckled
- 1320 shale, medium to dark gray, virtually all speckled
- 1420 shale, same, all heavily speckled

Carlisle Formation. Sample top 1420; electric log top 1416.

- 1420 - 1440 shale, medium to dark gray; speckled is caved
- 1460 shale, same, even less speckled
- 1480 shale, same
- 1500 shale; this sample lost in blizzard which shut down drilling
for one week
- 1540 shale, medium gray, not fissile
- 1580 shale, darker gray, much pyrite
- 1600 shale, medium to dark gray
- 1620 shale, same; trace dirty salt-and-pepper sandstone (Turner)
- 1640 shale, dark gray, trace sandstone as above
- 1660 shale, same, with some fragments of fish remains
- 1720 shale, medium gray; trace sandstone in each
- 1740 shale, same; more sandstone
- 1760 shale, same, no sand
- 1780 shale, same, more sandstone
- 1800 shale, medium gray; shale dark gray, speckled, with golden
calcite fragments

Greenhorn Formation. Sample top 1780; electric log top 1806

- 1800 - 1820 shale, dark gray, speckled; no limestone
- 1840 shale, dark gray, speckled; trace limestone
- 1880 shale, dark gray, much coarsely crystalline golden brown calcite

Belle Fourche Formation. Electric log top 1876

- 1880 - 1900 shale, same; still much caved speckled shale
- 1940 shale, still some speckled shale and golden limestone, caved
- 1980 shale, medium gray
- 2060 shale, medium to dark gray
- 2120 shale, same, with traces of caved greenhorn shale
- 2220 shale, medium gray, still cavings
- 2300 shale or claystone, light to medium gray
- 2320 shale, same; traces sandstone, fine, tight
- 2340 no sample
- 2380 shale, light gray; much caved(?) sandstone and limestone

Newcastle Formation. Sample top 2390. Electric log top 2397'

- 2380 - 2400 shale, same, 90%; sandstone, fine, tight, micaceous, 10%.
trace new bentonite
- 2420 shale, same, 80%; sandstone, same but possibly glauconitic, 20%
- 2440 same mixture plus much caved Greenhorn limestone
- 2450 shale, same, 70%; sandstone, same, 30%
- 2460 shale, same. Several fragments Minnekahta limestone introduced
from top
- 2470 shale, 90%; sandstone, same, 10%; some medium to coarse free
frosted sand grains

Skull Creek Formation. Sample top 2480. Electric log top 2470'

- 2470 - 2480 shale, 80%; sand and sandstone, 20%
- 2490 shale with much fine, tight, micaceous sandstone, caved
- 2500 shale, similar
- 2510 shale, medium gray, still much sandstone circulating in mud
- 2520 shale, same; less sandstone but some coarse grains
- 2530 shale, same; much less sand
- 2550 shale, same; hole caving
- 2570 shale, medium to dark gray, nearly free of caved material
- 2590 shale, same; much free pyrite
- 2600 shale, med to dark gray; first large glauconite grains
- 2650 shale, same, still some glauconite probably caving
- 2660 no sample
- 2690 shale, medium to dark gray
- 2700 shale, about same

Fall River-Lakota Formation Sample top 2700'; Electric log top 2683'.

- 2700 - 2710 sandstone, fine to medium, glassy; porous to tight; sample
still mostly shale

Fall River Formation (cont'd).

- 2710 - 2720 sandstone, better sample
- 2730 sandstone, same; much drills to fine, free sand
- 2740 Decrease in amount of fine sandstone and siltstone; probably broken sand and clay of the Fuson member
- 2790 Sandstone, siltstone and light clay
- 2800 Sandstone and siltstone, fairly well cemented
- 2830 sandstone, fine, fairly well cemented
- 2850 sandstone, drills to free sand
- 2890 sandstone, medium to coarse, rounded; drills to free sand
- 2900 sandstone, same; some very coarse
- 2910 sandstone, same
- 2930 sandstone; less sand but coarser
- 2950 sandstone, finer
- 2960 sandstone, drills hard; trace gray shale may be Morrison or a parting in the lower Lakota sandstone

Note: These cuttings have been placed on permanent file at the School of Mines. Refer to Sample Set 675. One set of GammaRay - Neutron logs also on file.

JOHN PAUL GRIES

Consulting Geologist
238 ST. CHARLES STREET
RAPID CITY, SOUTH DAKOTA

Pumping test, New Underwood No. 2 Deep Well, April 11 - 12, 1988.

Static level 345 feet below datum, which was 3.0 feet above land surface. A 40-horsepower submersible test pump was set with the intake at 570 feet. A 24-hour, 3 step drawdown test was run, with no recovery period between steps. The test extended from 3:10 PM on April 11, 1988 to the same hour on the afternoon of the 12th. Recovery was measured from 3:11 PM the 12th to 1:00 PM April 18, 1988.

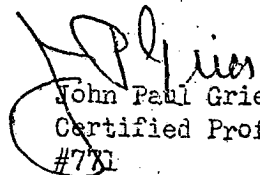
First stage. With the pump choked down to 129 gpm and a back pressure of 72 psi, the pumping level at the end of 6 hours was drawn down to 400 feet, and was still dropping at a rate of 0.8 feet per hour.

2nd stage. With the pump choked down to 179 gpm and a back pressure of 32 psi, the pumping level at the end of 14 hours (total elapsed time) stood at 431 feet and was still dropping at the rate of 0.32 feet per hour.

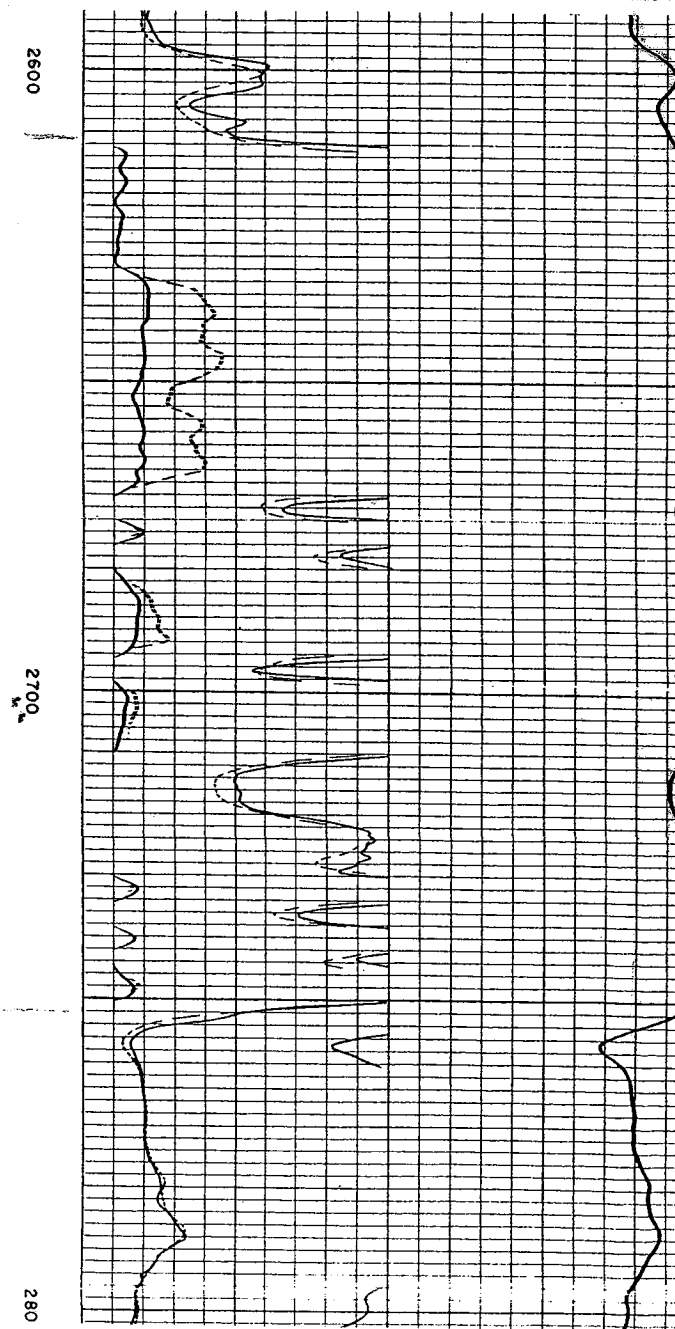
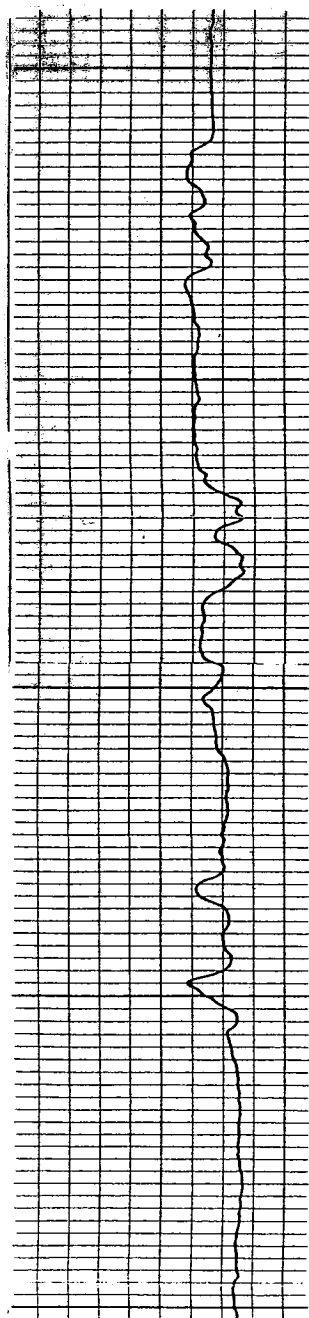
3rd stage. With the pump wide open and no pack pressure, the pumping level dropped to 458 feet in 10 hours, and the level was dropping at 0.2 feet per hour. Pumping rate dropped slowly from an initial 210 gpm to 202 gpm where it appeared to have stabilized.

Recovery. When the pump was shut off at 3:10 PM, the water level rose from 458 to 458 to 385 feet within the first minute. At the end of 24 hours it stood at 355.10 feet, after 43 hours it rose to 353.4 feet, and at the end of 72 hours it was up to 351.9 feet below datum.

A plot of the recovery curve after the first minute is appended.


John Paul Gries
Certified Professional Geologist
#781

COUNTY MEADE FIELD or WILDCAT LOCATION SEC. 31-4N-11E WELL STATE "B" #1 COMPANY MIDLAND OIL CORP.	537 COMPANY MIDLAND OIL CORPORATION		B DEC - 1 1969
	WELL STATE "B" #1		
	FIELD WILDCAT		
	COUNTY MEADE STATE SOUTH DAKOTA		
	LOCATION NE SE Sec. 31 Twp. 4N Rge. 11E		Other Services: FDC-GR CST
Permanent Datum: GROUND LEVEL, Elev. 2811 Log Measured From KB, 6 Ft. Above Perm. Datum Drilling Measured From KB			Elev.: K.B. 2817 D.F. G.L. 2811



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

SCHEDULED

WELL LOG

No. A4-11-31 da
OTHER Nos. Midland #1 State "B"

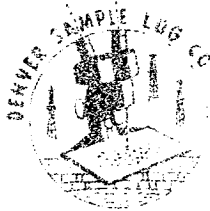
State S. Dak County Miner Subarea _____
Owner Midland Oil Co Lease - "1 State B"
Location See special log file for more information (J.D. 288151)

Drilled by J. D. 288151 Address _____
Date 11-19-69 Casing diam. PHILLED 4" ID Land-surf. alt. 2817 RPA Basking
Source of data induction - E log, & resistivity logs & PI
(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
<u>Handls</u>			<u>PI</u>
<u>1212 1055</u>	<u>Nubarn</u>		<u>703</u>
<u>1512 1305</u>	<u>Cochila</u>		<u>[Turner] 1163</u>
<u>1109 1702</u>	<u>Granular</u>		<u>1747</u>
<u>1322 1512</u>	<u>Granular</u>		<u>[Heavy] 2106</u>
<u>1807 2320</u>	<u>Dakota (Newcastle)</u>		<u>[Muddy] 2329</u>
<u>432 5205</u>	<u>Skull Creek</u>		<u>2365</u>
<u>718 2559</u>	<u>Indiana Kona</u>		<u>[Dakota] 2588</u>
	<u>Fusion</u>		<u>2711</u>
	<u>Lakota</u>		<u>2720</u>
	<u>Morrison</u>		<u>2805</u>

RECORD BY _____ DATE _____

SHEET _____ OF _____



DENVER SAMPLE LOG COMPANY

LOG NOB-71

SEC. 9 TWS. 4N RGE. 11E FARM: GOV'T-LIBERTIN #1
SURVEY SW SW NE COMPANY: LION

STATE	SOUTH DAKOTA	COMPANY	LION OIL CO.
COUNTY	MEADE	FARM	GOV'T-LIBERTIN #1
SEC.	9	TOTAL DEPTH	4346'
TWS.	4N	COMMENCED	12-17-53
RGE.	11E	COMPLETED	1-31-54
SURVEY	SW SW NE	PRODUCTION	D. & A.
AREA	WILDCAT	CASING	9 5/8" @ 225'
ELEVATION	2595' K.B.; 2586' G.L.	SCHLUMBERGER	☒ LANE WELLS ☐
PERTINENT RADIOACTIVE DATA		GAMMA RAY	NEUTRON
NEUTRON SOURCE STRENGTH & TYPE			
SOURCE SPACING - INCHES			
TIME CONSTANT - SECONDS		2	
CORE DATA #1 1583-93 Rec. 10' - 8988 Lam, lt gr, v f g, lmy ss w/abd fish frg, lt gr lmy sh w/wh spec, fish frg & sd g; 88-93 Sh, v dk gr, hd w/fw wh spec, fish frg; #2 2194-2208 Rec 14'; #3 2208-22 Rec 14'			
DRILL STEM DATA #1 1576-93 20 min shut in 20 min; fair/m blow immediately, lasting for 5 min; weak intermittent blow rest of test.			
SAMPLE QUALITY		100%	
REMARKS		SAMPLES ADJUSTED TO ELECTRIC LOG	

GAMMA RAY

DETAIL STRATIGRAPHIC STUDY

RESISTIVITY

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10000

9 5/8" @ 225'

Start smp study @ 250'

Sh, gr/lt gr, fl, abd sid nod

Tr grn bent

Sh, lt gr/gr, fl

W/sid nod

Sh, lt gr/gr, firm

Sl fl

Sh, lt gr/gr, firm in pt

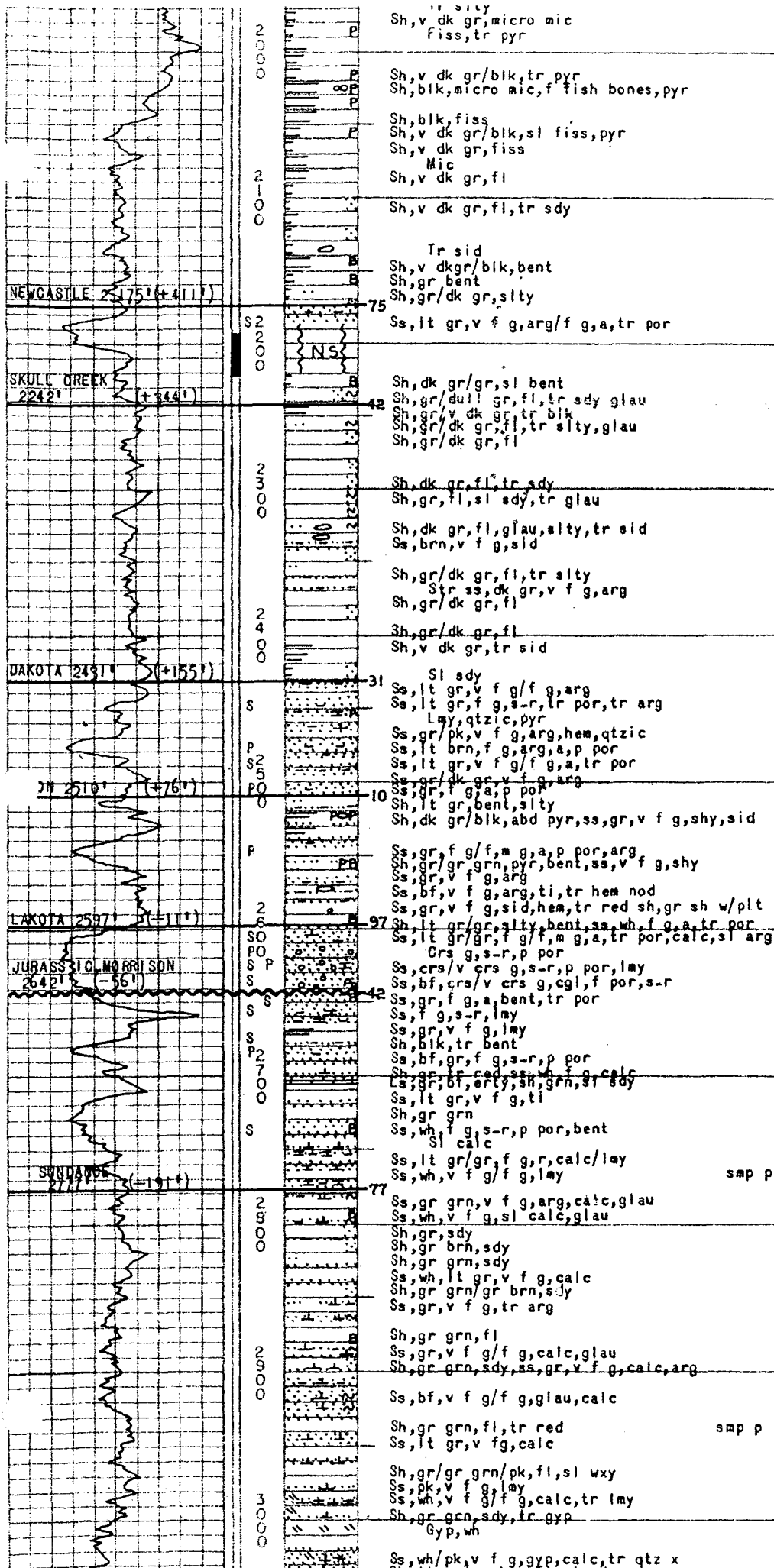
Tr pyr, micro mic

Sh, lt gr, soft, fl, tr sid

Firm in pt

Sh, lt gr, fl, micro mic

LONG NORMAL RESIST TO 240'



6" NORMAL RESIST TO T.D.

sap p

smp p



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

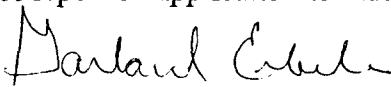
**REVISED RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1874-1, Viewfield Rural Water Association, Inc.**

Pursuant to SDCL 46-2A-2, the following is the revised recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 1874-1, Viewfield Rural Water Association, Inc., c/o Paul Gnirk, PO Box 157, New Underwood SD 57761.

The Chief Engineer is recommending APPROVAL of Application No. 1874-1 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. The well authorized by Permit No. 1874-1 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
3. Viewfield Rural Water Association shall report to the annually the amount of water withdrawn from the Inyan Kara Aquifer.

See report on application for additional information.


Garland Erbele, Chief Engineer
March 2, 2007

WATER PERMIT APPLICATION NO. 1874-1
VIEWFIELD RURAL WATER ASSOCIATION, INC.
FEBRUARY 1, 2007

Water Permit Application No. 1874-1-2 proposes to appropriate 0.29 cubic feet of water per second from one well to be completed into the Inyan Kara aquifer (approximately 2,700 feet deep) located in the SE¼ NE¼ Sec. 31, T3N-R11E, Meade County. The water will be used to supply a rural water system.

AQUIFER: Inyan Kara (INKR)

GENERAL:

The Inyan Kara Group consists of the Fall River Formation and the underlying Lakota Formation. The Fuson Shale sometimes separates these two formations, but it is often difficult to differentiate the bottom of the Fall River from the top of the Lakota. For all practical purposes, the Fall River Formation and the Lakota Formation can be considered a single hydrologic unit in this area. In general, the Inyan Kara aquifer consists of interbedded sandstone (thin bedded to massive), siltstone, and shale.

The Inyan Kara aquifer is areally extensive, underling over 36,000 square miles of western South Dakota (Allen and others, 1985). The aquifer underlies 2,107,520 acres and contains an estimated 36,354,720 acre-feet of recoverable water in storage in Meade County alone (Allen and others 1985). The top of the Inyan Kara is projected to be approximately 2,350 feet below grade at this proposed well site, and the aquifer is estimated to be 300 feet thick at this site (Allen and others, 1985). The thickness of the Inyan Kara Aquifer does however vary considerably within short distances. The Inyan Kara is under confined conditions in this area and the static water level of an Inyan Kara well at this site is expected to be around 125 feet below grade.

Yields from wells completed into the Inyan Kara aquifer are unpredictable but it is not unreasonable to anticipate a well capable of producing the 130 gallons per minute requested by this application.

The water quality of the Inyan Kara aquifer is generally good. However, radionuclides have been detected in a number of public water systems supplied from the Inyan Kara aquifer (e.g. Kadoka, New Underwood, Hermosa, Rainbow Water Company). Radionuclides are not a persistent problem with wells completed into the Inyan Kara aquifer; in fact levels were below detection limits in wells supplying the City of Wall and West River/ Lyman Jones Rural Water System (Rob Kittay, SD DENR Drinking Water Program, Pers. comm., Feb. 20, 2007).

The transmissivity of the Inyan Kara ranges from 0.86-6,000 ft²/d (Driscoll and others, 2002). Recent work done for West River/Lyman Jones RWS near Quinn, SD and near Creighton, SD indicate transmissivity values of 561 ft²/d and 588 ft²/d respectively (Water Rights, 2005). The transmissivity at the City of Wall is reported to be 578 ft²/d (Gries and others, 1976).

The specific capacity of wells completed into the Inyan Kara aquifer is reported to range from 1.7-7.9 gallons per minute per foot of drawdown (gpm/ft), (Rahn, 1979). Specific capacities reported for wells completed into the Inyan Kara in this area are shown in Table one.

WELL	Wall #1	Wall #2	Wall #3	Wall #4	WR/LJ Quinn	WR/LJ Creighton	New Underwood				
							1961	1977	1981	1982	1984
Specific Capacity (gpm/ft)	1.68	.87	.74	.83	2	.41	5.4	2.2	5.5	1.7	1.6

*City of Wall well information from (Rahn and others, 1986)

** West River/ Lyman Jones (WR/LJ) well information from Water Rights, 2005

*** New Underwood well information from J.P. Gries in Water Right No. 1947-2, (Water Rights, 1985)

Table 1. Specific Capacities of some area Inyan Kara wells

WATER AVAILABILITY:

The availability of water for this proposed appropriation can be evaluated by considering SDCL 46-6-3.1 which requires that:

“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.”

It must be noted that the exception identified by this statute applies to this permit application since the Inyan Kara aquifer is stratigraphically lower than the Greenhorn Formation and the proposed use is to supply a water distribution system. However, a comparison of recharge with withdrawals is useful to characterize the resource.

Recharge to the Inyan Kara aquifer occurs through infiltration of precipitation and streamflow losses at the outcrop; and possibly through upward leakage from underlying aquifers (Bredehoeft and others, 1983). The total recharge to the aquifer just from infiltration at the outcrop, consequently a minimum value, is estimated to be 11,600 acre-feet per year (Driscoll and others, 2002).

There are 166 water rights/permits appropriating water from the Inyan Kara aquifer in South Dakota representing diversion authority of 36.31 cfs for non-irrigation use and irrigation rights for 957.65 acres (Water Rights, 2007). If the worst case assumptions are made that (1) permits/rights with an annual withdrawal limitation (ac-ft/yr) will use the maximum allowable; and (2) permits/rights that are limited by a diversion rate only, will use 60% of the maximum allowable (considered reasonable for water distribution systems); the total water use from the Inyan Kara aquifer would be around 15,000 acre-feet per year. The actual amount of water used from the Inyan Kara is considerably less than this estimate. For example, in the study area of the “Black Hills Hydrology Study”, the aforementioned “worst case” methodology estimates a maximum annual

water use by appropriative rights of about 10,000 acre-feet per year (106 Water Rights/Permits, 18.378 cfs, 765.65 acres irrigated). Withdrawals from wells completed into the Inyan Kara aquifer were estimated to be 1,400 acre-feet annually from 1950-1998 in the Black Hills area (Driscoll and others, 2002).

Comparison of the estimated annual recharge to the Inyan Kara with the water use estimated from the aquifer suggests that withdrawals from the aquifer have not exceeded recharge. A water budget is not intended to suggest that all of the water that is in storage in the Inyan Kara or that all of the recharge is available for this appropriation, merely to demonstrate that in general the Inyan Kara aquifer is an immense resource that is relatively untapped.

The Water Rights Program does not monitor any observation wells completed into the Inyan Kara aquifer in this area and water level information is limited. Water level declines of five feet per year between 1961 and 1984 were reported at New Underwood (Water Rights, 1985). Data suggests that water levels in the City of Wall declined about 150 feet between 1961 and 1987 (winter, 1994). The decline of water levels, actually localized drawdown, is probably the result of increased development and usage rather than an indication of over appropriation. Large temporal fluctuations of the water level of the Inyan Kara are not expected in this area due to the distance to the recharge area.

EXISTING WATER RIGHTS:

There are 14 Water Rights/Permits supplied from the Inyan Kara aquifer within approximately 15 miles of the well site proposed by this application. These existing water rights/permits are shown in table 2. In addition to the appropriations listed in table 2, the Town of New Underwood holds Future Use Permit No. 1780-2 which reserves 142 acre-feet of water (Water Rights, 2007).

PERMI T NO	NAME	USE	CFS
1278-2	LAKESIDE WATER USERS DIST	RWS	0.50
1488-1	A WAYNE VIG	SHD	0.20
1689-2	CITY OF BOX ELDER	MUN	0.36
1947-2	TOWN OF NEW UNDERWOOD	MUN	0.41
2165-2	TIGHTLINE LAKE PTRSHP	COM	0.07
591-2	A WAYNE VIG	COM	0.18
660-2	TOWN OF NEW UNDERWOOD	MUN	0.45
870-2	CITY OF BOX ELDER	MUN	0.18
934-2	CITY OF BOX ELDER	MUN	0.24
1799-1	KASKI HOMES INC	SHD	0.17
1861-1	DUANE E ROBBINS LLC	SHD	0.19
2442-2	RAINBOW WATER CO INC	SHD	0.20
2443-2	CARLTON PETERSON	IRR	0.13
2528-2	MOCCASIN SPRINGS LLC	SHD	0.55
2538-2	JKRK PROPERTIES LLC	SHD	0.24

Table 2. Water Rights/Permits supplied from the Inyan Kara aquifer within 15 miles of 1874-1

Water Right No. 1947-2, the Town of New Underwood, is the nearest Inyan Kara appropriation to the well site proposed by this application. The well supplying Water Right No. 1947-2 is located approximately five miles south of the well proposed by Application No. 1847-1. Well interference is not expected to be adverse given the distance between wells.

Water Management Board rules 74:02:04 and 74:02:05, which were promulgated pursuant to SDCL 46-6-6.1, provide protection for existing wells only to the degree necessary to maintain an adequate depth of water in wells that have the ability to produce water independent of artesian pressure. Simply put, the pump placement in a prior appropriator's well is not necessarily protected. In fact, in past action, the Water Management Board it has concluded that if increased cost or decreased production is considered an adverse impact, it could be in conflict with SDCL 46-1-4, which requires South Dakota's water resources to be put to beneficial use to the fullest extent of which they are capable. In this area, the Inyan Kara aquifer has around 2,200 feet of artesian head pressure. Therefore well interference is not likely to adversely impact existing uses, including domestic.

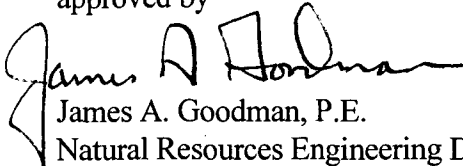
CONCLUSIONS:

1. The Inyan Kara Aquifer is a viable aquifer in this area, and water is available for this appropriation.
2. Well interference should not be a problem at this proposed well site.



Ken Buhler
Natural Resources Engineering Specialist

approved by



James A. Goodman, P.E.
Natural Resources Engineering Director

REFERENCES:

- Allen, J.C., Iles, D.L., and Petres, A.K., 1985, Analysis of Groundwater and Streamflow Data, Western Dakotas Region of South Dakota, Tasks 3A.B.C. AND 4A.B: Groundwater Resources Inventory: US Army Corps of Engineers Contract DAWC 45-82-C-0151, SD DENR- Geological Survey, Vermillion SD
- Bredehoeft, J.D., Neuzil, C.E. and Milly, P.C.D., 1983, Regional Flow in the Dakota Aquifer: A Study of the Role of Confining Layers: U.S. Geological Survey Water-Supply Paper 2237, 45 p.
- Driscoll, D.G., Carter, J.M., Williamson, J.E., and Putnam, L.D., 2002, Hydrology of the Black Hills Area, South Dakota: USGS Water-Resources Investigations Report 02-4094, 150 p.
- Gries, J.P., Rahn, P.H., and Baker, R.K., 1976, A Pump Test in the Dakota Sandstone at Wall, South Dakota: South Dakota Geological Survey Circular 43, 9 p.
- Rahn, P.H., 1979, Ground Water Resources of Western South Dakota: U.S. Army Corps of Engineers, SDSM&T Project #2533
- Rahn, P.H., Gries, J.P., and Barari, A., 1986, Report on Pump Test Conducted in the Fall River/Lakota Aquifer for the City of Wall, South Dakota in November, 1985 (On file in Water Right No. 2465-2)
- Water Rights Program, 1985, "Water Permit File 1947-2, City of New Underwood," DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501
- Water Rights Program, 1988, "Water Permit File 1982-2, City of Wall," DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501
- Water Rights Program, 2005, "Well Completion Report for West River/Lyman Jones "Quinn #1 Well," Well Completion Report Files DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501
- Water Rights Program, 2007, "Water Right/Permit Files" DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501
- Winter, D.R., 1994, Water Levels through 1989 in Bedrock Aquifers in South Dakota, U.S. Geological Survey Open-File Report 94-320,

Form 8

RECEIVED
MAR 22 2007
WATER RIGHTS
PROGRAM

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
County of Meade) SS

I, Pam Beehler

certify that the attached printed Notice was taken

from the Meade Co Times
Tribune

printed and published in Sturgis

County of Meade and

state of South Dakota. The notice was published

in the newspaper on the following two dates:

March 14, 2007

March 21, 2007

Cost of Printing 43.01

Pam Beehler
(Signature)

office Manager
(Title)

3 / 21 / 07
(Date Signed)

NOTICE OF APPLICATION NO.

1874-1 to Appropriate Water

Notice is given that Viewfield Rural Water Association, Inc., c/o Paul Gnirk, PO Box 157, New Underwood SD 57761 has filed an application for a water permit to appropriate 0.29 cubic feet of water per second from one well to be completed into the Inyan Kara aquifer (approximately 2700 feet deep) located in the SE 1/4 NE 1/4 Section 31-T3N-R11E. The water is for a rural water system use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1874-1 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. In accordance with SDCL 46-2A-23, the Chief Engineer will act on these applications, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. 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.

Any person interested in opposing or supporting this application or recommendations 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 2, 2007.

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. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application.

Steven M. Pirner,
Secretary,
Department of Environment
and Natural Resources.
Meade County Times Tribune
Publ. March 14 & 21, 2007



March 5, 2007

MEADE COUNTY TIMES AND TRIBUNE
PO BOX 69
STURGIS SD 57785

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application No. 1874-1 to Appropriate Water to be published twice. Please publish the first notice on March 14, 2007 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

The applicant must verify to you that the notice is to be published, before you make the first publication. **Please BILL the APPLICANT for the cost of publication.** The APPLICANT is Viewfield Rural Water Assn Paul Gnirk PO Box 157 New Underwood SD 57761(Ph # 605-764-6900).

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

No. 1874-1

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of March 5, 2007 enclosing Notice to Appropriate Water by Application No. 1874-1 which was first published in our issue of _____. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

Name Newspaper



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

PMB 2020
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PIERRE, SOUTH DAKOTA 57501-3182
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NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

March 5, 2007

PAUL GNIRK
PO BOX 157
NEW UNDERWOOD SD 57761

Dear Mr. Gnirk:

Water Permit Application No. 1874-1 for rural water system use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Publisher of the Meade County Times and Tribune printed at Sturgis SD (Ph # 605-347-2503). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendations of the Chief Engineer and reports on the applications 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 Notices and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization, the publisher has been instructed to publish your notice once each week for two consecutive weeks. 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 applications.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(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.

Instruction to Newspaper - Publish first Notice on March 14, 2007 with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF APPLICATION NO. 1874-1 to Appropriate Water

Notice is given that Viewfield Rural Water Association, Inc., c/o Paul Gnirk, PO Box 157, New Underwood SD 57761 has filed an application for a water permit to appropriate 0.29 cubic feet of water per second from one well to be completed into the Inyan Kara aquifer (approximately 2700 feet deep) located in the SE ¼ NE ¼ Section 31-T3N-R11E. The water is for a rural water system use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1874-1 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. In accordance with SDCL 46-2A-23, the Chief Engineer will act on these applications, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. 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.

Any person interested in opposing or supporting this application or recommendations 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 2, 2007.

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. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.



APR 26 2007

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

VIEWFIELD RURAL WATER ASSOCIATION INC
PO BOX 157
NEW UNDERWOOD SD 57761

Dear Sir:

Enclosed is Water Permit No. 1874-1 authorizing construction of your 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,

Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

Report of Examination of Works and/or Application of Water to Beneficial Use For Permit Nos. 1874-1

I have this day, June 5, 2017 made a thorough examination of the water use system constructed by **Viewfield Rural Water Association Inc., 16195 Pioneer Rd, New Underwood, SD 57761** of Permit No. **1874-1**, bearing the priority of **1/3/2007** authorizing the diversion of **0.29** cu. ft. per second of the water from one well for **rural water system use** in **Meade** County.

Inspection contact & relationship to permit holder, if applicable: **Larry Gossard, President**
605-515-3613

A. Works used to divert the water:

Well Information:

- 1) Well Drilling Firm: Taylor Drilling (2008)
- 2) No. of Wells 1
- 3) Depth(s) 2,810 feet
- 4) Well log is available Yes

Casing:

- 1) Diameter 9 5/8" 0 to 60' surface casing
7" +2' to 1,200'
4 1/2" 1,155' to 2,810'
- 2) Length 2,812 feet
- 3) Type steel

Screen:

- 1) Type shot perforated
- 2) Length 87 feet (350 shots)
- 3) Static water level 123 feet

Pump:

- 1) Make Grundfos
- 2) Model 85S300-27
- 3) Size 6"
- 4) Capacity 95 GPM (metered rate) This is an 85 gpm rated pump delivering 95 gpm, using a variable speed controller. Pump set at 1,100 ft. with est. drawdown at 700 ft.
- 5) Horsepower rating 30 hp

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

- 1) Type PVC
- 2) Size Varies from 8" to 3"
- 3) Length approximately 35 miles

C. Works used to apply water to beneficial use:

The well pumps to a 279,000 gallon steel storage tank located 5.4 miles to the northwest. The storage gravity feeds to supply 70 metered connections. The system is also served by a second well located at the storage tank location (Permit Nos. 1893-1 and 1898-1) and provides water to 65 homes and approximately 5,000 head of livestock.

D. Compliance with Permit Requirements:

- 1) Permit qualifications being abided by: Yes
- 2) Exceptions to compliance are: none

E. Condition and Location:

1. The system is in good condition with the point of diversion located as follows:
1,485' S and 180'' W of the NE corner Section 31 T3N R11E (44.178923, -102.830072)
2. The works are capable of diverting and conveying to the place of use .212 cu. ft. per second (95 gpm) of water which is to be used for **rural water system** use and the license should be issued for .212 cfs
3. All structures, wells and lands on map: **No, well location only.**

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

Viewfield Rural Water System is also served by a second well authorized by Permit Nos. 1893-1 and 1898-1.

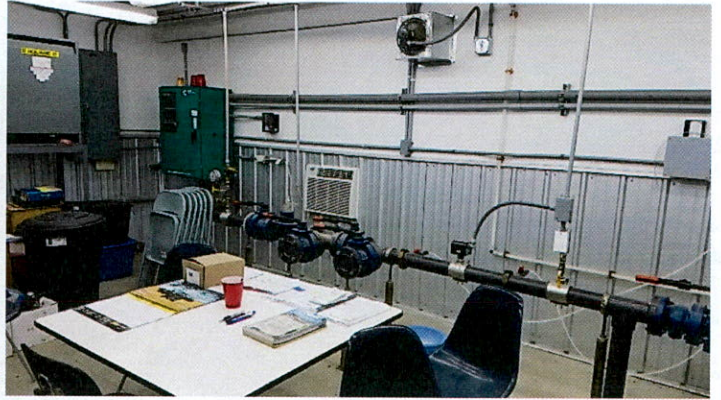


Steven Quissell
Water Rights Inspector
DENR Water Rights Program

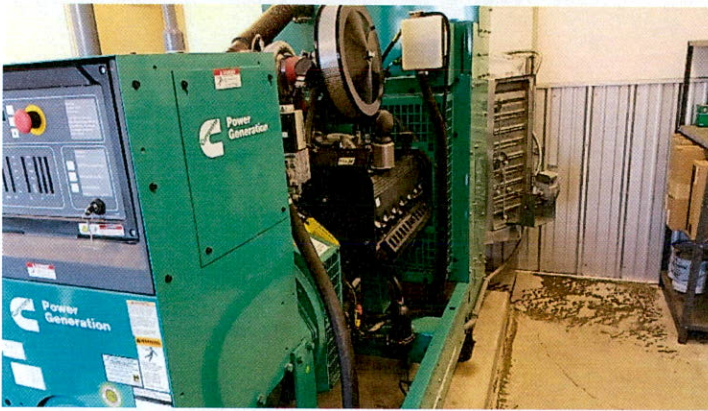
Date Report Completed: 6/5/2017



Well and pump house

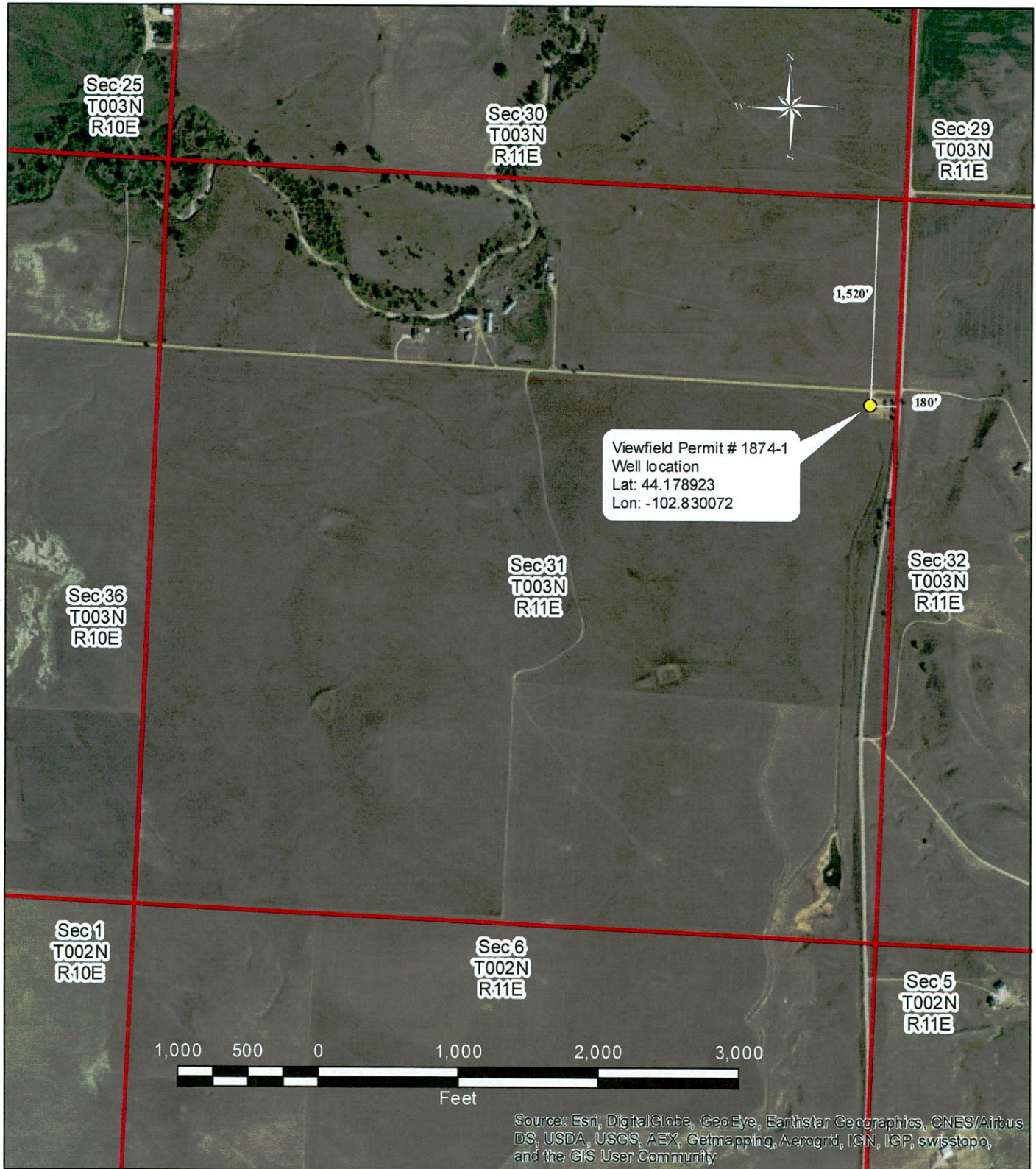


Pump house appurtenances



Auto Start Generator

Water Right # 1874-1
Viewfield Rural Water Association
6/5/2017



Steven Quissell
Water Rights Inspector
DENR Water Rights Program

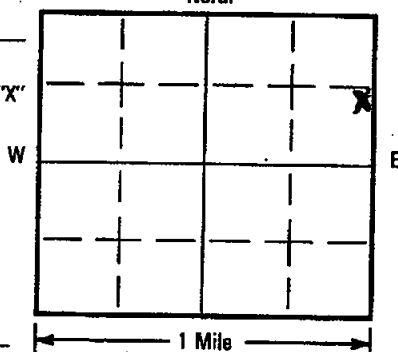


SOUTH DAKOTA WATER WELL COMPLETION REPORT

07-92

Location SE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 31 Twp 3N Rg 11E
County Meade

Please mark well location with an "X"



Well-Completion Date

June 9, 08

LOCATION:

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)? 120 ft. from Septic (identify source).PROPOSED USE: X Rural water system
☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring well

METHOD OF DRILLING:

Rotary - Mud

CASING DATA:

☒ Steel ☐ Plastic ☐ Other

If other describe _____

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
<u>36</u> LB/FT	<u>9 3/8</u> IN	<u>0</u> FT	<u>60</u> FT	<u>13 1/2</u> IN
<u>23</u> LB/FT	<u>7</u> IN	<u>+2</u> FT	<u>1200</u> FT	<u>8 3/4</u> IN
<u>11.6</u> LB/FT	<u>4 1/2</u> IN	<u>1855</u> FT	<u>2810</u> FT	<u>6 1/4</u> IN

GROUTING DATA

Grout Type	No. of Sacks	Grout Weight	From	To
<u>Cement</u>	<u>70/100</u>	<u>13/15</u> lb./gal	<u>0</u> ft.	<u>1200</u> ft.
<u>Cement</u>	<u>90/120</u>	<u>11.5/15</u> lb./gal	<u>1155</u> ft.	<u>2810</u> ft.

Describe grouting procedure The 9 3/8 - 7 - 4 1/2 were Pressure grouted through casingSCREEN: ☐ Perforated pipe ☐ Manufactured

Diameter _____ IN Length _____ FEET

Material _____

Slot Size _____ Set From _____ Feet to _____ Feet

Other information _____

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: chlorinesolutions

Laboratory sent to for water quality analysis

Mid ContinentWell Owner: View Field Rural Water Assoc. Inc.

Business Name: _____

Address: P.O. Box 157New Underwood S.D. 57761

WELL LOG:

FORMATION	DEPTH	
	FROM	TO
<u>TAN clay, Gravel, Gr. - TAN shale</u>	<u>0</u>	<u>35</u>
<u>Pierre</u>	<u>35</u>	<u>895</u>
<u>NIOBRARA</u>	<u>895</u>	<u>11504</u>
<u>Carlisle</u>	<u>1154</u>	<u>1506</u>
<u>Green Horn</u>	<u>1506</u>	<u>1628</u>
<u>Belle Fourche - Mowry</u>	<u>1628</u>	<u>2174</u>
<u>Newcastle</u>	<u>2174</u>	<u>2210</u>
<u>Skull Creek</u>	<u>2210</u>	<u>2440</u>
<u>TYNAN KARA</u>	<u>2440</u>	<u>2644</u>
<u>MADISON - SUNDANCE</u>	<u>2644</u>	<u>2810</u>

STATIC WATER LEVEL 123 Feet

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other _____

Reduced Flowrate _____ GPM

Can well be completely shut in? _____

WELL TEST DATA:

☐ Pumped Describe: Air Developed☐ Bailed _____☒ Other _____

Pumping Level Below Land Surface

1120 ft. After 6 Hrs. pumped 100 GPM900 ft. After 2 Hrs. pumped 80 GPM

If pump installed, pump rate _____ GPM

REMARKS The 4 1/2" casing was Jet Perforated
2442-2472 - 4 Per/FT. 124 shots
2480-2486 - 2 Per/FT. 13 shots
2569-2596 4 Per/FT. 112 shots
2616-2640 4 Per/FT. 101 shotsThis well was drilled under license # 331

And this report is true and accurate.

Drilling firm Taylor DrillingSignature of License Representative: K T J L

Signature of Well Owner or Equitable Property Holder: _____

Date: _____

7-28-08

STATE OF SOUTH DAKOTA
WATER LICENSE NO. 1874-1

(1) Viewfield Rural Water Association Inc., 16195 Pioneer Rd, New Underwood SD 57761 made Application No. 1874-1, January 3, 2007 for a water permit to divert 0.29 cubic feet of water per second from ground water, one well (Inyan Kara Aquifer), Meade County, South Dakota for rural water system purposes. Permit No. 1874-1, with a priority date of January 3, 2007 was approved April 2, 2007 and issued to the applicant for diversion of water with construction of the water supply system to be completed on or before April 2, 2012 and for the application to beneficial use of water on or before April 2, 2016.

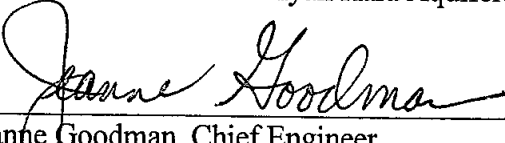
(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 0.212 cubic feet of water per second for beneficial use. The location of the diversion point is 1,485'S and 180'W of the NE corner of Section 31, T3N, R11E (NE ¼ SE ¼). ***The rural water system is also served by a second well authorized under Water Right No. 1898-1.***

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

(4) Pursuant to South Dakota Water Law 46-5-30.1 Viewfield Rural Water Association Inc., 16195 Pioneer Rd, New Underwood SD 57761 the holder and/or owner of Water Right No. 1874-1 is issued a license to appropriate water, the right to use 0.212 cubic feet of water per second from ground water, one well (Inyan Kara Aquifer) with a priority date of January 3, 2007 from the location specified in (2) of this license for rural water system purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 1874-1 and subject to the following qualifications:

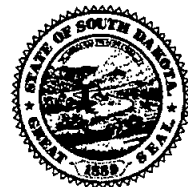
- The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
- The well authorized by Permit No. 1874-1 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with the Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28. ***The well was drilled in June, 2008 by Taylor Drilling. A copy of the well completion report is on file with the Water Rights Program.***
- Viewfield Rural Water Association shall report to the Chief Engineer annually the amount of water withdrawn from the Inyan Kara Aquifer.



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

JUN 21 2017

date



1874-1



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

JUN 21 2017

1874-1
1893-1
1898-1

Larry Gossard, President
Viewfield Rural Water Association Inc
16195 Pioneer Rd
New Underwood SD 57761

Dear Mr. Gossard:

Enclosed are Water License Nos. 1874-1 and 1898-1. These are the final water right documents completing your process of obtaining Water Rights. Included with each 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.

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

Sincerely,

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

enclosures

Note: Upon licensing, the applicable portions of Water Permit No. 1893-1 were incorporated into Water License No. 1898-1.