

2.
40101

Water Right No. 1719-2

1. Considered JULY 24 1980
2. Name of Applicant EAST GREGORY COUNTY RURAL WATER ASSN, INC.
3. Post Office Address FAIRFAX, S.D.
4. Amount of Water Claimed .25
5. Source of Water Supply 6 WELLS #1-56'; #2-59'; #3-59'; #4-62'; #5-65' & #6-72'
6. Water to be used for RWS maximum
7. Acres to be irrigated --- acre feet
8. Water to be diverted and used in GREGORY County
about EAST OF CITY miles of BONESTEEL
9. PROOF OF PUBLICATION Received 7-16-80

*Re considered
11-19-80
new quantities*

Not Received _____
Approved 7-24-80
Subject to DW
Not Approved _____
Action deferred _____

Priority
6-26-80

Date Received 6-26-80 Application Complete (yes) no FEE N/A

Remarks WITHIN 1/4 mile of Bill Fairfax
Bonesteel wells - should be some
portions of the rule they are pump - the well.
Date information and/or fee or corrected Application received Include Draft on this
Period of Annual use Continuously

~~WATER~~
QUALITY
N/A

Received yes _____ no _____ APPROVED/CONDITIONAL (Circle one)

W-1 Description same as application yes _____ no _____ Remarks _____

Disapproved _____

Returned _____

Diversion Point S-SIX WELLS

LOCATED IN SW⁴NE⁴

6-95N-R6BW

lands to be irrigated _____

WELL
LOG

Remarks _____

Driller Jeracek Well Dring Licensed (yes) no

Depth 56' to 72'

MAP Map No. 1478-2 Map located in Water Right X Map file _____

Type of Map DRAWN Prepared by P.E. - E. Lyle Karpert

+++++

REVIEWED This Application was reviewed within 30 days of date received, accepted as complete, Number assigned and written up for advertisement before the Board on July 24, 1980.

D. W. Woodard
(Signed)

+++++

PROTESTS Letters/Petitions in File - yes _____ no _____ Remarks _____

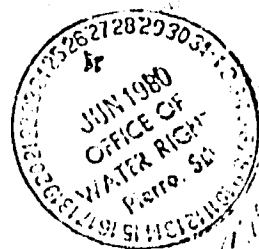
REMARKS Date
F.F. & C Final Decision, including F.F. & C of Law were adopted _____

OF LAW Date

FINAL Final Decision mailed to parties and/or parties notified that Final Decision

DECISIONS was adopted _____

ETC. Remarks _____

No. 1719-2Map No. 1472-2 Water Division No. 2 MISSOURI RIVER District
Above for Office Use 10140101

APPLICATION FOR PERMIT To Appropriate Water within the State of South Dakota

Check one of the following:

New X Vested Right _____ Future Use _____

Change in Diversion _____ Additional Diversion _____

Change in Acreage _____ Additional Acreage _____

- Name of Applicant East Gregory County Rural Water Ass., Inc. Phone No. (605) 654-2248
Post Office Address _____ Fairfax, _____ State South Dakota 57335
(Street, RR, or Box) (Town) (Zip Code)
If a corporation show date and place of incorporation January 10, 1980, at South Dakota
- Method of accomplishing work (contract, employment of others, or by direct labor) Employment of others
- Name of diversion work East Gregory County Rural Water Ass., Inc., non-profit rural water corporation
- Amount of water claimed (cubic feet per second) 1/4 cubic foot per second .25 cfs
- Source of water supply Ground water (6 WELLS)
- Location of point of diversion The Southwest Quarter (SW 1/4) of Section Six (6), Township Ninety-Five (95) North, Range Sixty-Eight (68), West of the 5th P.M., Gregory County, South Dakota - see registered professional engineer and land surveyor's map attached.
- Annual period or periods during which water is to be used All year long
- Use to be made of water, (irrigation, industrial, municipal, commercial, recreation etc.) Rural water system and supplement to Town of Fairfax.
- For irrigation use, ***NA*** Total number of acres to be irrigated NA

List below each forty acre subdivision, or lot, or fraction thereof and show number of acres to be irrigated in each.

Land Description	No. Acres Irr.	Land Description	No. Acres Irr.
NOT APPLICABLE		NOT APPLICABLE	

Attach sheet if more space is needed

- Time required to complete construction of water supply system One years. Additional time required to complete application of water to the proposed beneficial use One years.

- Choice of county newspaper for publication of Notice of Intent to Appropriate Water Bonesteel Enterprise, Bonesteel, South Dakota
- Principal Features of the Proposed Water Supply System

A. Works proposed to divert water from its natural source

Series of small wells.

B. Works proposed to transport water to place of use.

Approximately 76 miles of rural water pipeline and Fairfax town mainline.

C. Works proposed to apply water to beneficial use.

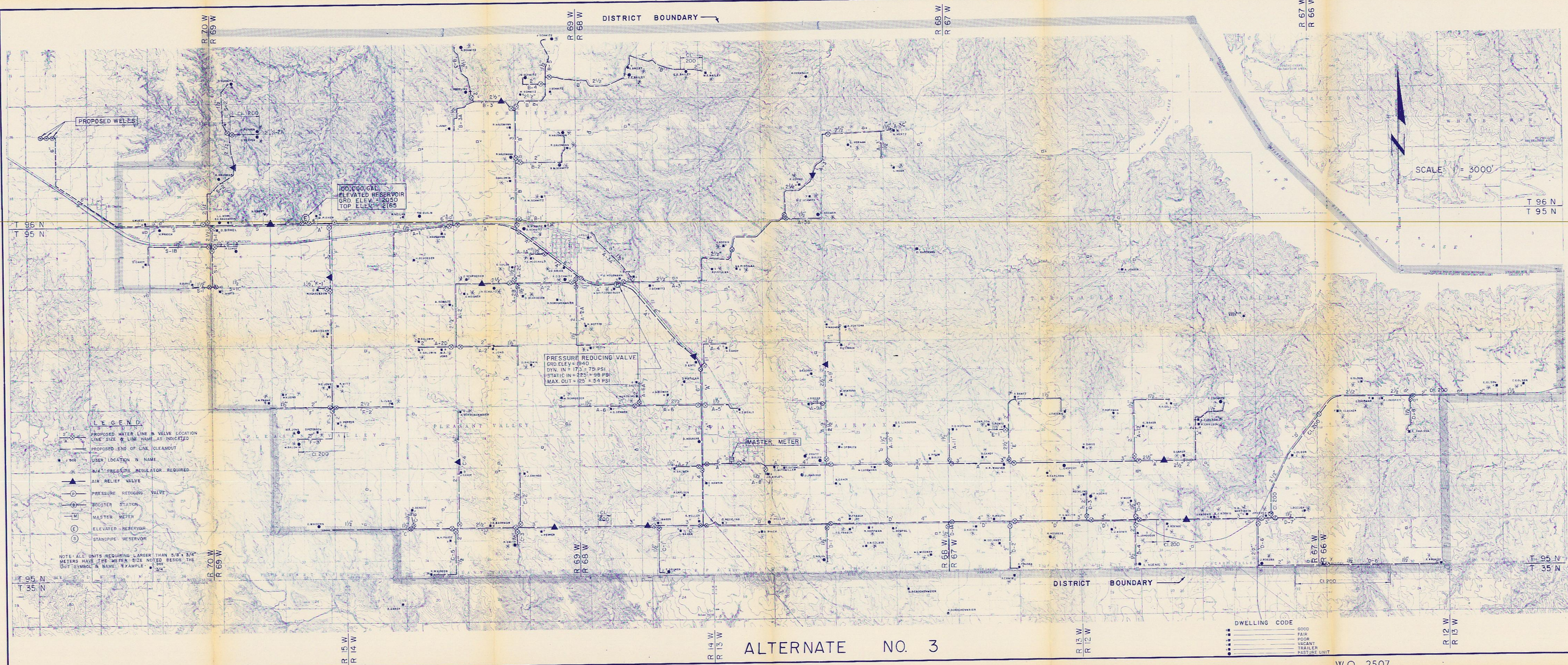
Fairfax storage tanks, pumping facilities and rural water lines.

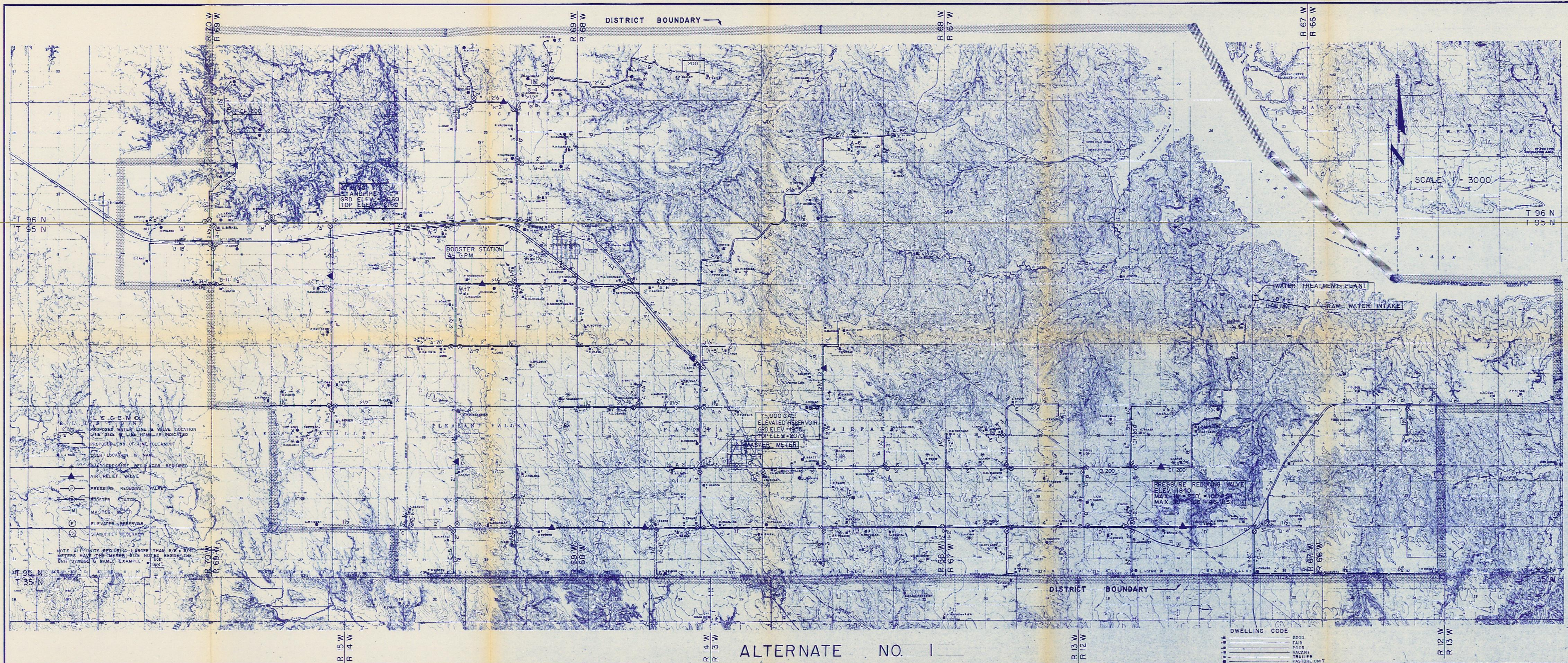
Estimated Total Cost \$ 750,000.00

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map. (see instructions concerning preparation.)

STATE OF SOUTH DAKOTA)
)ss.
County of Gregory)I, East Gregory County Rural Water Ass., Inc. the applicant, certify that I have read the foregoing application and have examined the attached map and that the matters therein stated are true and that I intend, and am able to complete the necessary constructionBY: Edward K. Carlson
Signed _____ PRESIDENTSubscribed and sworn to before me this 23 day of June, 1980

Notary Public (or _____) (Notary Public or Notary Public (or _____) (Notary Public or _____)





WATER RIGHT APPLICATION APPROVAL

The Water Management Board hereby approves Water Right Application No. 1719-2

EAST GREGORY COUNTY RW ASSN, INC. FAIRFAX
(Applicant) (Post Office Address)
SOUTH DAKOTA 57335 With the following qualifications
(State)

Date of first receipt of application JUNE 26, 1980
 Date of return to applicant for correction, amendments or changes required _____, 19____
 Date of receipt of corrected application _____, 19____
 Approved JULY 24, 1980, Recorded in Book 21 Page 216

WATER RIGHT PERMIT NO. 1719-2

The Water Management Board hereby grants and issues this Water Right Permit No. 1719-2 authorizing the construction of the water use system and the putting of water to beneficial use as stated in the Application and as qualified in the Water Right Application approval, subject, however, to the following limitations and conditions:

1. The date from which applicant may claim right is JUNE 26, 1980
2. The equivalent of at least one-fifth of the work above specified is to be completed on or before JANUARY 24, 1981
3. The whole of said work is to be completed on or before JULY 24, 1981
4. The limit of time from proof of beneficial use of water appropriated in accordance herewith is JULY 24, 1982
5. The water appropriated shall be used for the purpose of A RURAL WATER SYSTEM
6. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be injuriously affected by this appropriation.
7. The amount of the appropriation herein granted shall not exceed .25 cubic feet per second; neither shall it exceed the capacity of the above described water supply system, nor shall it exceed the amount of water needed for ~~beneficial uses served, and if for irrigation purposes said appropriation must be limited to not more than 2 acre feet per acre per year and be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually and beneficially applied~~
USED FOR A RURAL WATER SYSTEM
 for irrigation on or before JULY 24, 1982, said water to be used during the following described annual period: CONTINUOUSLY

Witness my hand this 28th day of JULY, 1980

THE WATER MANAGEMENT BOARD

By: _____
 Chief Engineer, Water Rights

Certificate of Construction Issued _____, 19____

Water License Issued _____, 19____

WATER RIGHT APPLICATION APPROVAL

The Water Management Board hereby approves Water Right Application No. 1719-2
East Gregory County Rural Water Association, Inc. Fairfax
 (Applicant) (Post Office Address)
South Dakota 57335
 (State) With the following qualifications

This Permit No. 1719-2 supercedes prior approval of Permit 1719-2, with the following qualifications:

The wells 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 ~~the~~ ^{their} ~~irrigation~~ withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in wells having prior water rights.

IF THE WELLS APPROVED UNDER THIS PERMIT ARE USED IN CONJUNCTION WITH WATER SOURCES OWNED BY THE TOWN OF FAIRFAX, THE COMBINED WATER SOURCES MUST BE OPERATED SO AS TO MEET MANDATORY FEDERAL AND STATE WATER QUALITY STANDARDS TO THE GREATEST EXTENT POSSIBLE BASED ON RESULTS OF WATER QUALITY SAMPLES FROM EACH SEPARATE DIVERSION POINT TAKEN AT A FREQUENCY SPECIFIED BY THE SD DEPARTMENT OF WATER AND NATURAL RESOURCES AND VERIFIED BY WATER METER READINGS AT THE SAME INTERVAL FROM EACH SEPARATE DIVERSION POINT.

Date of first receipt of application June 26, 19 80

Date of return to applicant for correction, amendments or changes required _____, 19 _____

Date of receipt of corrected application _____, 19 _____

Approved November 19, 19 80, Recorded in Book 21 Page 216

WATER RIGHT PERMIT NO. 1719-2

The Water Management Board hereby grants and issues this Water Right Permit No. 1719-2 authorizing the construction of the water use system and the putting of water to beneficial use as stated in the Application and as qualified in the Water Right Application approval, subject, however, to the following limitations and conditions:

1. The date from which applicant may claim right is June 26, 19 80
2. The equivalent of at least one-fifth of the work above specified is to be completed on or before May 19, 19 81
3. The whole of said work is to be completed on or before November 19, 19 81
4. The limit of time from proof of beneficial use of water appropriated in accordance herewith is November 19, 19 82
5. The water appropriated shall be used for the purpose of _____
a RURAL WATER SYSTEM

6. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be injuriously affected by this appropriation.

7. The amount of the appropriation herein granted shall not exceed .25 cubic feet per second; neither shall it exceed the capacity of the above described water supply system, nor shall it exceed the amount of water needed for ~~beneficial uses served, and if for irrigation purposes said appropriation must be limited to not more than 2 acre feet per acre per year and be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually and beneficially applied~~ ^{used for a rural water} system November 19, 19 82

~~for irrigation~~ on or before _____, 19 _____; said water to be used during the following described annual period: Continuously

Witness my hand this 8th day of December, 19 80

THE WATER MANAGEMENT BOARD

By

John Hatch
 Chief Engineer, Water Rights
 JOHN HATCH

Certificate of Construction Issued _____, 19 _____

Water License Issued _____, 19 _____

NOTATION: See separate Well Driller's logs for six wells, marked as Well #1, Well #2, Well #3, Well #4, Well #5 and Well #6, attached hereto and made a part hereof by reference.

Form 2A - Wells, Dugouts or Water Storage Dams (Supplement to Form 2)

12. Principal Features of the Proposed Water Supply System (continued)

D. Well Information

- (1) Drill Hole, Diameter _____, Depth _____
- (2) Casing, Type _____, Diameter _____, Thickness _____
(wood, concrete, steel, etc.)
- (3) Screen, Type _____, Diameter _____, Length _____
- (4) Gravel Pack, Thickness _____, Length of gravel pack _____

E. Dugout Information or Estimates - Not Applicable

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials. (Attach a copy of test well log)

- Depth to top of water bearing material _____
- Depth to bottom of water bearing material _____
- Depth to water (ground surface to water level) _____

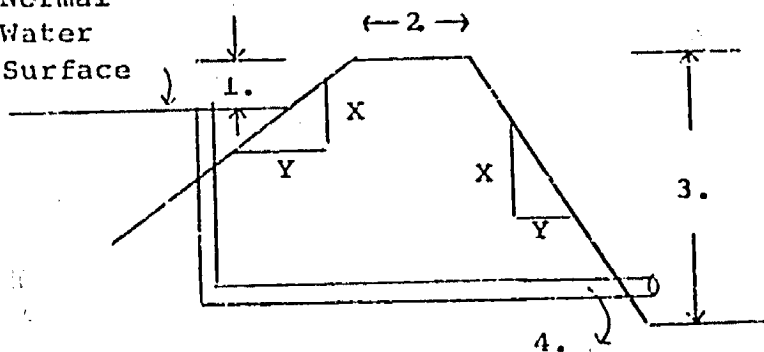
(2) Distance to nearest existing household or livestock watering well.

- On same owner's property _____ 100 _____ rds.
- On property owned by others _____ 150 _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.

Normal
Water
Surface



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
Pipe diameter _____
Spillway width _____
- X & Y slope:
Upstream _____
Downstream _____
Surface area of impoundment _____
Drainage area above dam _____

NOTATION: Wm. J. Hausman and Joan Hausmann, the owners of the land upon which the diversion point is located, have signed an easement for the construction of these test wells and the placement of the necessary pipeline and roadway accesses. If the Water Rights Commission desires to see a copy of this agreement, please advise.

EAST GREGORY COUNTY RURAL WATER ASS., INC.
BY:

Reynold K. Carlson
Signature _____
PRESIDENT

Well # 1

Form 2A - Wells, Dugouts or Water Storage Dams (Supplement to Form 2)

12. Principal Features of the Proposed Water Supply System (continued)

D. Well Information

- (1) Drill Hole, Diameter 3 1/2", Depth 71'
- (2) Casing, Type Concrete, Diameter 24" O.D., Thickness 2"
(w/od, concrete, steel, etc)
- (3) Screen, Type Haydnt, Diameter 24" O.D., Length 37'
- (4) Gravel Pack, Thickness 6", Length of gravel pack 40'

E. Dugout Information or Estimates

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials. (Attach a copy of test well log)

- Depth to top of water bearing material 17'
- Depth to bottom of water bearing material 56'
- Depth to water (ground surface to water level) 42'

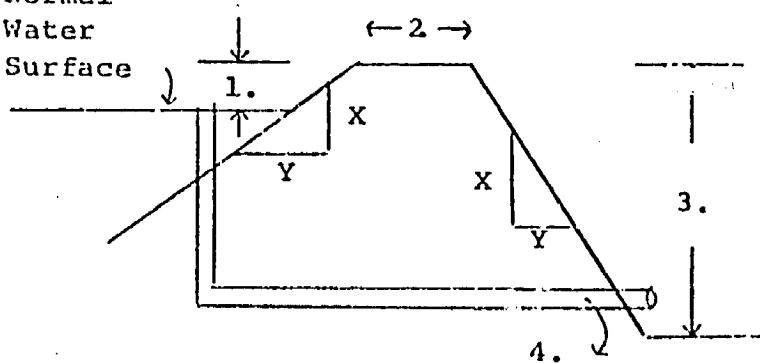
(2) Distance to nearest existing household or livestock watering well.

- On same owner's property _____ rds.
- On property owned by others _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.

Normal
Water
Surface



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
Pipe diameter _____
Spillway width _____
- X & Y slope:
Upstream _____
Downstream _____
- Surface area of impoundment _____
- Drainage area above dam _____

Signature _____

PLEASE COMPLETE
ENTIRE FORM

WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

Well # 1

6/60

Well Owner:
Name Fairfax Rural Water
Address _____

Well Location: North

+

+

+

+

Mark location with an "X"

1 mile

County Cargory
_____ 1/4 _____ 1/4 Sec. _____ Twp. _____ Rg. _____

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

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

Well Construction:
Diameter of Hole 34"
Depth 71'
Casing ☐ Steel ☒ Concrete
☐ Plastic ☐ Other
If other, specify _____

Was casing end left open _____
Was a well screen installed _____
Describe Well Screen
Diameter _____ Material _____
Slot size _____
Was well gravel packed ☒
Was well grouted _____
Was water sample taken _____

Remarks:

Water Level Information:
Static water level 47 below land surface
If flowing: closed in pressure _____ PSI
rate of flow _____ GPM
Controlled by:
☐ Valve ☐ Reducers ☒ Other
If other; specify _____

Well Test Data:
☐ Pumped _____
☒ Bailed Describe: _____
☐ Other _____
Pumping Level Below Land Surface
_____ ft. After _____ Hrs. pumped 20 GPM
_____ " " " " " "
_____ " " " " " "

Formation	Depth	
	From	To
Top Soil	0	3'
sand	3'	25'
max. sand	25'	29'
fine sand	29'	47'
fine sand	47'	56'
fine shale	56'	71'

(Use Back if Necessary)

Date Completed: Feb 10 80

Driller: Juanita Wall Boring # 5
Driller's or Firm's Name License NO.

Bunk S. DAK
Address

Juanita Wall Boring
Signed By Date

Jan 20 80
Date

cell # 2

12. Principal Features of the Proposed Water Supply System (continued).

D. Well Information

- (1) Drill Hole, Diameter 34", Depth 73'
- (2) Casing, Type concrete, Diameter 24" O.D., Thickness 3"
(wood, concrete, steel, etc)
- (3) Screen, Type hand-c, Diameter 24" O.D., Length 32'
- (4) Gravel Pack, Thickness 6", Length of gravel pack 40'

E. Dugout Information or Estimates

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials. (Attach a copy of test well log)

- Depth to top of water bearing material 48'
- Depth to bottom of water bearing material 58'
- Depth to water (ground surface to water level) 48'

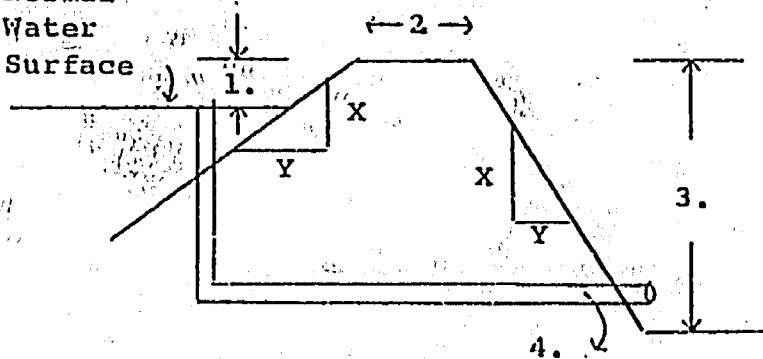
(2) Distance to nearest existing household or livestock watering well.

- On same owner's property _____ rds.
- On property owned by others _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.

Normal
Water
Surface



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
Pipe diameter _____
Spillway width _____
X & Y slope:
Upstream _____
Downstream _____
Surface area of impoundment _____
Drainage area above dam _____

Signature

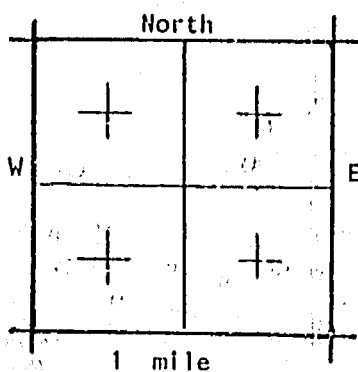
PLEASE COMPLETE
ENTIRE FORM

WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

Well # 2
6/60

Well Owner:
Name Fairfax Rural Water
Address _____

Well Location:



Mark location
with an "X"

County Gregory
____ 1/4 ____ 1/4 Sec. ____ Twp. ____ Rg. ____

Proposed Use:

☐ Domestic ☐ Municipal ☐ Test
Holes
☐ Irrigation ☐ Industrial ☐ Stock

Method of Drilling:

☐ Forward Rotary ☒ Bored ☐ Jetted
☐ Reverse Rotary ☐ Cable ☐ Other

Well Construction:

Diameter of Hole 34"
Depth 73'
Casing ☐ Steel ☒ Concrete
☐ Plastic ☐ Other
If other, specify _____

Was casing end left open _____

Was a well screen installed _____

Describe Well Screen _____

Diameter _____ Material _____
Slot size _____

Was well gravel packed ☒

Was well grouted _____

Was water sample taken _____

Remarks:

Water Level Information:

Static water level 48' below land surface
If flowing: closed in pressure _____ PSI
rate of flow _____ GPM

Controlled by:

☐ Valve ☐ Reducers ☐ Other

If other; specify _____

Well Test Data:

☐ Pumped

☒ Bailed

Describe: _____

☐ Other

Pumping Level Below Land Surface

____ ft. After _____ hrs. pumped. 2.6
____ " " " " " "
____ " " " " " "

Well Log:

Formation	Depth	
	From	To
Top Soil	0	4
MAP SAND	4	21
clean sand	21	40
gray sand	40	48
sandy water	48	58
Blue Shale	58	73

(Use Back if Necessary)

Date Completed: Feb - 7 - 80

Driller:

Turner & Well Drilling
Driller's or Firm's Name

#5
License NO.

Burns Co. DAK.
Address

Signed By

David Turner

Date

Jan - 23 - 80

Well #3

12. Principal Features of the Proposed Water Supply System (continued)

D. Well Information

- (1) Drill Hole, Diameter 3 1/2", Depth 70'
- (2) Casing, Type Concrete, Diameter 24" O.D., Thickness 2"
(wood, concrete, steel, etc.)
- (3) Screen, Type Haydite, Diameter 24 O.D., Length 40'
- (4) Gravel Pack, Thickness 6", Length of gravel pack 50'

E. Dugout Information or Estimates

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials. (Attach a copy of test well log)

- Depth to top of water bearing material 49'
- Depth to bottom of water bearing material 59'
- Depth to water (ground surface to water level) 49'

(2) Distance to nearest existing household or livestock watering well.

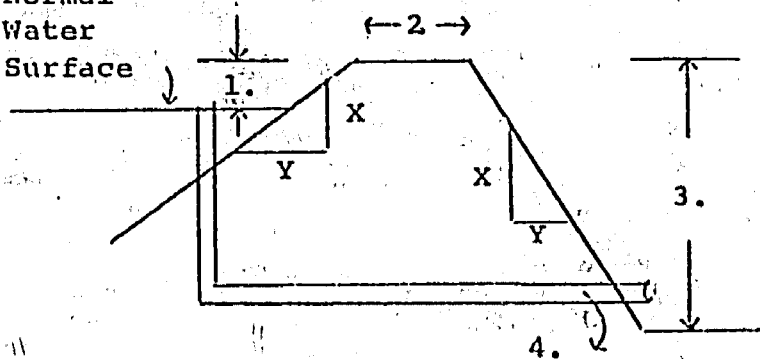
On same owner's property _____ rds.

On property owned by others _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.

Normal
Water
Surface



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
Pipe diameter _____
Spillway width _____
- X & Y slope:
Upstream _____
Downstream _____
Surface area of impoundment _____
Drainage area above dam _____

WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

Well - 172

6760

Water Level Information:
 Static water level 48 below land surface
 If flowing: closed in pressure PSI
 rate of flow GPM
 Controlled by:
☐ Valve ☐ Reducers ☐ Other
 If other: specify

Well Test Data:

☐ Pumped

☒ Bailed Describe: _____

☒ Other _____

Pumping Level Below Land Surface

ft. After	Hrs. pumped	GPM
" "	" "	" "
" "	" "	" "

[illegible]

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

Well Construction: 1
 Diameter of hole 3 1/2
 Depth 70
 Casing ☒ Steel ☐ Concrete
☐ Plastic ☐ Other
 If other, specify

Was casing end left open	
Was a well screen installed	
Describe Well Screen	
Diameter	Material
Slot size	
Was well gravel packed	
Was well grouted	
Was water sample taken	

Date Completed: MAY - 1964

Driller: Tracy Well Boring License No. 45
Driller's or Firm's Name License No.

Bunko St. Det. (1)

Signed By David J. [Signature]

Date: June 18, 1964

Remarks:

Well # 4

Form 2A - Wells, Dugouts or Water Storage Dams (Supplement to Form 2)

12. Principal Features of the Proposed Water Supply System (continued).

D. Well Information

- (1) Drill Hole, Diameter 34", Depth 74'
- (2) Casing, Type Concrete, Diameter 24" O.D., Thickness 2"
(wood, concrete, steel, etc.)
- (3) Screen, Type Haydite, Diameter 24" O.D., Length 30'
- (4) Gravel Pack, Thickness 6", Length of gravel pack 35'

E. Dugout Information: Estimates

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials. (Attach a copy of test well log)

- Depth to top of water bearing material 54'
- Depth to bottom of water bearing material 62'
- Depth to water (ground surface to water level) 54'

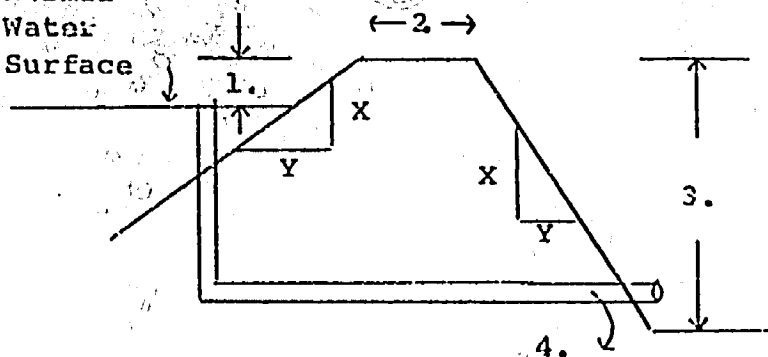
(2) Distance to nearest existing household or livestock watering well.

- On same owner's property _____ rds.
- On property owned by others _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.

Normal
Water
Surface



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
Pipe diameter _____
Spillway width _____
- X & Y slope:
Upstream _____
Downstream _____
Surface area of impoundment _____
- Drainage area above dam _____

PLEASE COMPLETE
ENTIRE FORM

WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

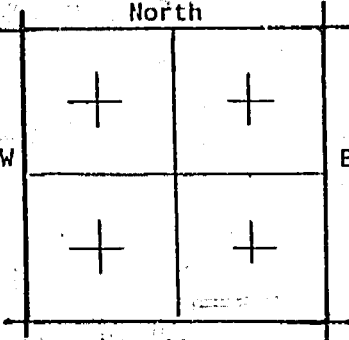
Well # 4

6/60

Well Owner:
Name Fairfax Rural Water
Address _____

Well Location: North

Mark location with an "X"

W  E

_____ mile

County Conroy
_____ Sec. _____ Twp. _____ Rg. _____

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

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

Well Construction:

Diameter of Hole 34"
Depth 74'
Casing ☐ Steel ☒ Concrete
☐ Plastic ☐ Other
If other, specify _____

Was casing end left open _____
Was a well screen installed _____
Describe Well Screen _____
_____ diameter _____ Material _____
_____ slot size _____
Was well gravel packed ☒
Was well grouted _____
Was water sample taken _____

Remarks:

Water Level Information:
Static water level 54' below land surface
If flowing: closed in pressure _____ PSI
rate of flow _____ GPM
Controlled by:
☒ Valve ☐ Reducers ☐ Other
If other; specify _____

Well Test Data:

☐ Pumped
☒ Bailed Describe: _____
☐ Other _____
Pumping Level Below Land Surface
_____ ft. After _____ Hrs. pumped 10 GPM
_____ " " _____ " " _____ " "
_____ " " _____ " " _____ " "

Well Log:

Formation	Depth	
	From	To
Top Soil	0	5'
Mag	5'	22'
Sand (dry)	22'	31'
Sand + Mag	31'	54'
Sand + water	54'	62'
Blue shale	62'	74'

(Use Back If Necessary)

Date Completed: MAY - 5 - 80

Driller: JURACK Well Boring # 5
Driller's or Firm's Name License NO.
BURKE, S.O. DAK
Address
David Jurack MAY-18-80
Signed By Date

well #5

12. Principal Features of the Proposed Water Supply System (continued)

D Well Information

- (1) Drill Hole, Diameter 34", Depth 7.5'
- (2) Casing, Type Concrete (wood, concrete, steel, etc.), Diameter 24" O.D., Thickness 2" walls
- (3) Screen, Type Hydrite, Diameter 24" O.D., Length 2.5'
- (4) Gravel Pack, Thickness 6", Length of gravel pack 3.5'

E. Dugout Information or Estimates

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials. (Attach a copy of test well log)

Depth to top of water bearing material 55'

Depth to bottom of water bearing material 15'

Depth to water (ground surface to water level) 55'

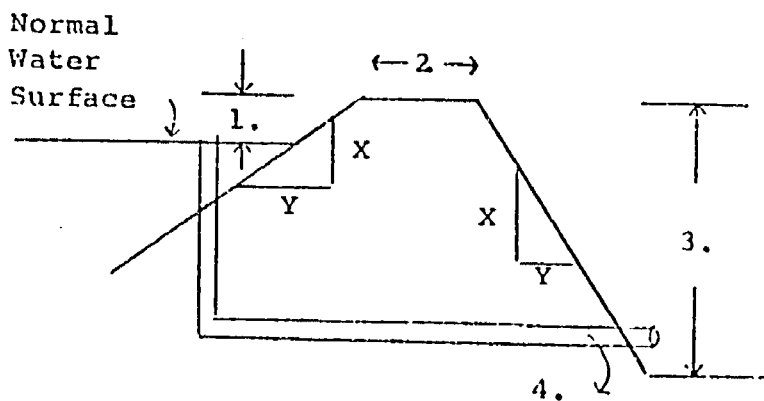
(2) Distance to nearest existing household or livestock watering well.

On same owner's property _____ rds.

On property owned by others _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
 Pipe diameter _____
 Spillway width _____
- X & Y slope:
 Upstream _____
 Downstream _____
- Surface area of impoundment _____
- Drainage area above dam _____

Well #6

12 Principal Features of the Proposed Water Supply System (continued)

D Well Information

- (1) Drill Hole, Diameter 34", Depth 79'
- (2) Casing, Type Concrete (wood, concrete, steel, etc), Diameter 24 O.D., Thickness 2"
- (3) Screen, Type Hand Forged, Diameter 24 O.D., Length 55'
- (4) Gravel Pack, Thickness 6", Length of gravel pack 31'

E. Dugout Information or Estimates

- (1) Surface dimensions, _____, Depth _____

F. Fill out for Either a Well or a Dugout.

(1) Water Bearing Materials (Attach a copy of test well log)

Depth to top of water bearing material 61'

Depth to bottom of water bearing material 72'

Depth to water (ground surface to water level) 61'

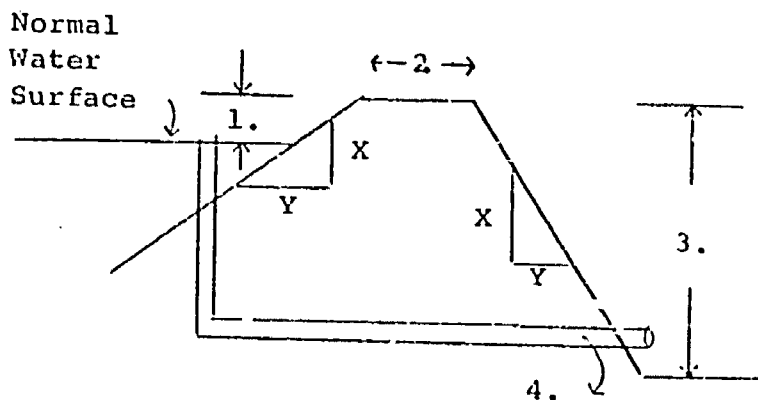
(2) Distance to nearest existing household or livestock watering well.

On same owner's property _____ rds.

On property owned by others _____ rds.

G. Water Storage Dams

If the proposed water use system contains one or more water storage dams, please show in the space below, the height, length, maximum water depth, surface area, drainage area, storage capacity, dam slope, dimensions, location and size of outlet works, of each storage dam. The location of each water storage dam should be shown on the water right map.



1. Freeboard _____
2. Crest width _____
3. Height of Dam _____
4. Outlet dimensions:
 - Pipe diameter _____
 - Spillway width _____
- X & Y slope:
 - Upstream _____
 - Downstream _____
- Surface area of impoundment _____
- Drainage area above dam _____

WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

6/6/9

Well Owner: Name <u>Fowler Rev. Master</u> Address _____ Well Location: Mark location with an "X" County <u>Cacery</u> <u>"</u> <u>1</u>/<u>4</u> Sec. <u>"</u> Twp. <u>"</u> Rg. <u>"</u> Proposed Use: ☐ Domestic ☐ Municipal ☐ Test Holes ☐ Irrigation ☐ Industrial ☐ Stock Method of Drilling: ☐ Forward Rotary ☒ Bored ☐ Jetted ☐ Reverse Rotary ☐ Cable ☐ Other Well Construction: Diameter of Hole <u>34"</u> Depth <u>79'</u> Casing ☐ Steel ☒ Concrete ☐ Plastic ☐ Other If other, specify _____ Was casing end left open _____ Was a well screen installed _____ Describe Well Screen Diameter _____ Material _____ Slot size _____ Was well gravel packed ☒ Was well grouted _____ Was water sample taken _____ Remarks:	Water Level Information: Static water level <u>61'</u> below land surface If flowing: closed in pressure _____ PSI rate of flow _____ GPM Controlled by: ☒ Valve ☐ Reducers ☐ Other If other; specify _____ Well Test Data: ☐ Pumped _____ ☒ Bailed Describe: _____ ☐ Other _____ Pumping Level Below Land Surface _____ ft. After _____ Hrs. pumped <u>20</u> GPM _____" " _____" " _____" _____" " _____" " _____" Well Log: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Formation</th> <th colspan="2">Depth</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td>Ty Soil</td> <td>0</td> <td>3'</td> </tr> <tr> <td>Mud & sand</td> <td>3'</td> <td>12'</td> </tr> <tr> <td>clean clay Sand</td> <td>12'</td> <td>15'</td> </tr> <tr> <td>Mud & Sand</td> <td>15'</td> <td>36'</td> </tr> <tr> <td>Mud</td> <td>36'</td> <td>49'</td> </tr> <tr> <td>Mud & sand</td> <td>49'</td> <td>61'</td> </tr> <tr> <td>Silt + water</td> <td>61'</td> <td>73'</td> </tr> <tr> <td>Blt. shale</td> <td>73'</td> <td>79'</td> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table> (Use Back if Necessary) Date Completed: <u>JUN-20-70</u> Driller: <u>SURGECK Well Boring</u> Driller's or Firm's Name/ <u>BUNKER SO. DICK.</u> Address <u>[Signature]</u> Signed By Date <u>JUN-20-70</u>	Formation	Depth		From	To	Ty Soil	0	3'	Mud & sand	3'	12'	clean clay Sand	12'	15'	Mud & Sand	15'	36'	Mud	36'	49'	Mud & sand	49'	61'	Silt + water	61'	73'	Blt. shale	73'	79'																		
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Paper mailed
6/30/80
Re: no.
App. during
on air notice
BW

No. 1719-2

Publish first publication, on or before July 3, 1980

NOTICE OF HEARING ON
APPLICATION TO APPROPRIATE WATER

Pierre, South Dakota 57501

June 27, 1980

East Gregory County Rural
Water Association, Inc.

Notice is hereby given that _____ whose post office

address is Fairfax, South Dakota, has made an application in accordance with the provisions of SDCL 46-1-1 thru 46-1-9, 46-1-14; 46-2-9 thru 46-2-11, 46-2-13; 46-5-1 thru 46-5-8; 46-5-10 thru 46-5-22, 46-5-41; 46-6-3, 46-6-3.1, 46-6-5, 46-6-6.1, 46-6-10, 46-6-14 and Board Rules ARSD 52:01:01 thru 52:01:01:13, for a permit to appropriate for beneficial use .25 cubic feet of water per second of time from groundwater (six wells) through the East Gregory County Rural Water Assn., Inc. non-profit rural water corp. the point(s) of diversion of

which ~~xx~~(are) to be located in the SW 1/4 NE 1/4

of Section 6, Twp. 95N, Range 68W. Said water to be used for the purpose of providing ~~xxxxxx~~ water supplies for a rural water system

This Application No. 1719-2 will be considered by the Water Management Board at Meeting Room #1, Kneip Building Church & Illinois, Pierre, South Dakota upon the 24th day of July, 1980.

at 10 A.M. The Board is authorized to make a determination on this application at the hearing. All interested persons may appear and be heard. Any person who may be affected by a Board decision who desires to present evidence or cross-examine witnesses according to SDCL 1-26 may notify the Board in writing prior to the hearing or orally at the hearing.

This hearing is an adversary proceeding. Any person has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised at the hearing. Decisions of the Board may be appealed to the Courts as provided by

Any handicapped persons wishing to attend this hearing can contact the Water Rights Division, DWR, Joe Foss Building, Pierre SD, prior to the hearing date for assistance to assure access to the hearing.

WATER MANAGEMENT BOARD

cc: East Gregory Co. Rural Water Assn. BETTY WESTLUND
Fairfax, Water Rights Specialist
South Dakota 57355

WNR-806A-7/79
GROUNDWATER

No. 1719-2

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)

County Gregory) ss.

I, Donald A. Smith hereby

certify that the annexed printed copy of Notice of Intent to Appropriate

Water was taken from the Prairie Dog Creek

A newspaper which during the whole time of publication of said notice
herein after stated, has been and is printed and published in the _____

Times of Pierre

County of Gregory and State of South Dakota;
that the said notice was published in said newspaper on the following
two dates:

July 2 and 3, 1980

PUBLIC NOTICE

NOTICE OF HEARING ON
APPLICATION TO
APPROPRIATE WATER

Pierre, South Dakota 57501
June 27, 1980

Notice is hereby given that East Gregory County Rural Water Association, Inc. whose post office address is Fairfax, South Dakota, has made an application in accordance with the provisions of SDCL 46-1-1 thru 46-1-9, 46-1-14; 46-2-9 thru 46-2-11, 46-2-13; 46-5-1 thru 46-5-8; 46-5-10 thru 46-5-22, 46-5-41; 46-6-3, 46-6-3.1, 46-6-5, 46-6-6.1, 46-6-10, 46-6-14 and Board Rules ARSD 52:01:01:01 thru 52:01:01:13, for a permit to appropriate for beneficial use .25 cubic feet of water per second of time from groundwater (six wells) through the East Gregory County Rural Water Assn., Inc., non-profit rural water corp., the point(s) of diversion of which are to be located in the SW 1/4 NE 1/4 of Section 6, Twp. 95N, Range 68W. Said water to be used for the purpose of providing water supplies for a rural water system.

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WATER MANAGEMENT BOARD
BETTY WESTLUND
Water Rights Specialist

cc: East Gregory Co. Rural Water Asso.
Fairfax, South Dakota 57335
WNR-806A-7/79
GROUNDWATER
Pub. July 3-10



BEST IMAGE POSSIBLE
FROM POOR ORIGINAL

USDA FmHA
Form FmHA 442-7
(Rev. 8-12-76)

Position 1
OPERATING BUDGET

Schedule 1

Name East Gregory County Rural Water Ass., Inc.		Address Fairfax, S.D. 57335				
Applicant Fiscal Year From 1-1 To 12-31		County Gregory		State (Including ZIP Code) South Dakota 57335		
OPERATING INCOME		19 80 (1)	19 81 (2)	1982 (3)	19 (4)	First Full Year (5)
1. 90 hook-up fees @ \$250.		22,500.				
45 users @ 36.90 for 6/mo.			9,963.			
90 users @ 26.90 for 6/mo.			19,926.			
90 users @ 36.90 for 12/mo.				39,850.		39,850.
5. Miscellaneous						
6. Less: Allowances and Deductions						
7. Total Operating Income (Add Lines 1 through 6)		72,500.	29,889.	39,850.		39,850.
OPERATING EXPENSES						
8. Lease City of Fairfax		-0-	3,000.	6,000.		6,000.
9. Leg. & ADM.		500.	500.	1,500.		1,500.
10. Ins. & Bond		1,000.	1,000.	1,000.		1,000.
11. Repairs			-0-	2,000.		2,000.
12. Utilities & Fuel			600.	1,000.		1,000.
13. Labor			2,000.	2,000.		2,000.
14. Interest (FmHA)		-0-	10,000.	20,000.		20,000.
15. Depreciation						
16. Total Operating Expense (Add Lines 8 through 16)		1,500.	17,100.	33,500.		33,500.
17. NET OPERATING INCOME (LOSS) (Line 7 less 16)		21,000.	12,789.	6,350.		6,350.
NONOPERATING INCOME						
18. Int.		-0-	-0-	300.		300.
19. Total Nonoperating Income (Add 17 and 20)		-0-	-0-	300.		300.
20. NET INCOME (LOSS) (Add Lines 17 and 19) (Transfer to line A Schedule 2)		21,000.	12,789.	6,650.		6,650.

Budget and Projected Cash Flow Approved by Governing Body

Attest: [Signature] Secretary 3-5-80 Date
[Signature] Appropriate Official 3-5-80 Date

RECEIVED

157 3 850

BEST IMAGE POSSIBLE FROM POOR ORIGINAL

PROJECTED CASH FLOW

Schedule 2

	19.80	19.81	19.82	19.	First Full Year
A. Line 22 from Schedule 1 Income (loss)	21,000.	12,789.	6,650.		6,650.
B. Items in Operations not Requiring Cash:					
1. Depreciation (line 16 Schedule 1)					
2. Others					
C. Cash Provided From:	200,000.	200,000.	-0-		
1. Proceeds from FmHA loan/grant	200,000.	-0-	-0-		
2. Proceeds from others					
3. Increase (Decrease) in Accounts Payable, Accruals and other Current Liabilities					
4. Decrease (Increase) in Accounts Receivable, Inventories and Other Current Assets (Exclude Cash)					
5. Other					
D. Total all A, B and C Items	691,000	212,789.	6,650.		6,650.
E. Less: Cash Expended for:					
1. All Construction, Equipment and New Capital Items (loan and Grant funds)	690,000	200,000.	-0-		
2. Replacement and Additions to Existing Property, Plant and Equipment		6,000			
3. Principal Payment FmHA Loan		-0-	3,712.		3,712.
4. Principal Payment Other Loans					
5. Other					
F. Total E 1 through 5	690,000	206,000	3,712.		3,712.
G. Ending Cash Balances	2,169.	3,169.	9,958.		19,958.
H. Beginning Cash Balances	3,169.	9,958.	12,896.		12,896.
I. Ending Cash Balances (Total of D Minus E 6 Plus F)					
J. Item G Cash Balances Composed of:					
1. Construction Account					
2. Reserve Account		3,000.	3,000.		3,000.
3. Debt Payment Account	3,169.	4,587.	5,154.		5,154.
4. Cash Account	-0-	2,371.	4,742.		4,742.
5. Reserve Account					
6. Funded Depreciation Account					
7. Others					
K. Total - Agrees with Item G	3,169.	9,958.	12,896.		12,896.

BEST IMAGE POSSIBLE FROM POOR ORIGINAL

USDA FmHA

Form FmHA 442-45
(Rev. 1-25-77)

Position 1

PROJECT SUMMARY - WATER AND WASTE DISPOSAL AND OTHER UTILITY-TYPE PROJECTS

A. APPLICANT:

Name: East Gregory County Rural Water Ass., Inc. Address: Fairfax, SD
State: South Dakota County: Gregory Zip Code: 57332 Congressional District: II
Tax-Exempt Public Body ☐ Yes ☒ No ☐ Other Non-Profit Corporation
(Specify)

B. SERVICE TO BE PROVIDED: ☒ Domestic Water ☐ Sewage Collection ☐ Sewage Treatment
☐ Solid Waste Disposal ☐ Storm Drainage ☐ Other _____
(Specify)

C. FmHA LOAN:

Interest Rate: 5 % Repayment: 40 Years Deferred Principal Payment: 2 Years
Maximum Repayment Period Authorized by State Law: 40 Years

D. SECURITY: (Check the appropriate item(s))

☐ General Obligation Bonds - Amount \$ _____ ☐ Special Assessments - Amount \$ _____
☒ Revenue Bonds or Notes - Amount \$ 400,000.00
☐ Statutory Lien ☒ Assignment of Income
☐ Real Estate _____ acres mortgage ☐ Other (Explain) _____
☒ Chattel Mortgage or Financing Statement

E. LAND AND RIGHTS:

	Fee Simple	Lease	Purchase Price	Present Market Value
To be acquired: (Acres)	-0-	-0-	\$ -0-	\$ -0-
Now owned: (Acres)	-0-	-0-	\$ -0-	\$ -0-

Describe other rights, if any, now owned or to be acquired (water rights, etc.) Easements and mortgage on pipelines and appurtenances, water rights from state of South Dakota

F. DEVELOPMENT COST SUMMARY (Total Project Costs): (Identify source in columns (C) & (D))

(A) Item	(B) Applicant Contribution	(C) Other Funds	(D) Other State or Federal Funds	(E) FmHA Grant	(F) FmHA Loan	(G) Total Amount	Percent of Project Cost
1. Water	\$20,000	\$375,000	\$95,000	\$-0-	\$400,000	\$890,000	100%
2. Sewage Collection							
3. Sewage Treatment							
4. Solid Waste							
5. Storm Drainage							
6. Other							
7. TOTALS	20,000	375,000	95,000	-0-	400,000	890,000	100%

BEST IMAGE POSSIBLE FROM POOR ORIGINAL

2

G. BRIEF DESCRIPTION OF PROPOSED FACILITY: (Describe)

It is proposed to drill 4 wells capable of producing a total of 76 gallons per minute to supplement the Houston Springs production of 36 gpm. The wells will be pumped into an existing 15,000 gallon concrete ground storage reservoir along with the flow from the springs. The water will be pumped from the ground storage reservoir using the existing Fairfax pumps, chlorination plant, and 4' line to the existing Fairfax 50,000 gallon elevated storage reservoir. The 90 farm and ranch users will be served by gravity from the elevated storage through the rural pipeline distribution system.

H. USER CONSIDERATION:

1. Total possible users in the service area 110

2. Median Income \$ 4921

Before Improvement
(Existing Systems Only)

After Improvement
(First Full Year of Operation)

(A) Total Users

- (1) Number of users required for Loan Closing
- (2) FmHA Debt Per User
- (3) Total Debt Per User
- (4) Other Loan and Grant Assistance Per User
- (5) Total Project Cost Per User

Water	Waste	Water	Waste
0		90	
0		4444	
0		4444	
		5222	
		9889	

(B) Users - Residential Size Service

- (1) Number of Users
- (2) Contribution Per User
- (3) FmHA Grant Per User
- (4) Minimum Monthly User Cost
(After FmHA Grant, If Any)
- (5) Average Monthly User Cost
(After FmHA Grant, If Any)
- (a) GO Bond or Tax Assessments (If Applicable)
- (b) User Fees (If Applicable)
- (6) Average Monthly User Cost Without an FmHA Grant
- (7) Average Monthly User Cost for Similar Systems

		90	
		222.22	
		-0-	
		20.00	
		35.00	
		35.00	
		N/A	
		25.00	

(All users must be actual users not equivalent users)

I. MANAGEMENT AND REPAYMENT ABILITY:

1. Basis for Annual Income Estimate:

Rate Schedule:

(A) Water - Residential size service

Minimum bill	<u>20.00</u>	for	<u>2,000</u>	gallons
Next	<u>4,000</u>	gallons for \$	<u>3.00</u>	per <u>1000</u> gallons
Next	<u>4,000</u>	gallons for \$	<u>2.00</u>	per <u>1000</u> gallons
Next	<u>5,000</u>	gallons for \$	<u>1.00</u>	per <u>1000</u> gallons
Next		gallons for \$		per _____ gallons
All over	<u>15,000</u>	gallons for \$	<u>0.60</u>	per <u>1000</u> gallons

(B) Water - Other than residential
Minimum bill
Next

BEST IMAGE POSSIBLE FROM POOR ORIGINAL

3

(B) Water - Other than residential size service

Minimum bill _____ for _____ gallons

Next _____ gallons for \$ _____ per _____ gallons

Next _____ gallons for \$ _____ per _____ gallons

Next _____ gallons for \$ _____ per _____ gallons

Next _____ gallons for \$ _____ per _____ gallons

All over _____ gallons for \$ _____ per _____ gallons

Use and Income Estimate:

(C) Water	O/O						
12	13	2000	20.00	240.00			
2	2	3000	23.00	46.00	per user = \$		monthly
6	7	4000	26.00	156.00	per user = \$		monthly
2	2	5000	29.00	58.00	per user = \$		monthly
5	6	6000	32.00	160.00	per user = \$		monthly
2	2	7000	34.00	68.00	per user = \$		monthly
6	7	8000	36.00	216.00	per user = \$		monthly
8	9	9000	38.00	304.00	per user = \$		monthly
7	8	10,000	40.00	280.00	per user = \$		monthly
3	3	11,000	41.00	123.00	per user = \$		monthly
6	7	12,000	42.00	252.00	per user = \$		monthly
4	4	13,000	43.00	172.00	per user = \$		monthly
8	9	14,000	44.00	352.00	per user = \$		monthly
4	4	15,000	45.00	180.00	per user = \$		monthly
4	4	16,000	45.60	182.40	per user = \$		monthly
3	3	17,000	46.20	138.60	per user = \$		monthly
1	1	18,000	46.80	46.80	per user = \$		monthly
5	6	20,000	48.00	240.00	per user = \$		monthly
1	1	26,000	51.60	51.60	per user = \$		monthly
1	1	33,000	55.80	55.80	per user = \$		monthly

90 Total Users

Total = \$ 3322.20 monthly x 12 = \$ 39,866.40 annually
 $3322.20 \div 90 \text{ users} = \$36.91 / \text{month/user}$

2. Basis for Annual Income Estimate:

Rate Schedule:

(A) Waste Disposal (Explain the waste disposal rates and charges)

Minimum bill \$ _____

BEST IMAGE POSSIBLE FROM POOR ORIGINAL

USDA-FHA 442-14 (Rev. 11-3-73)

CASE NUMBER

ST 47 CD 27 BORROWER NO.

Source of Funds: ☒ 1 - Insured ☐ 2 - Direct

Type of Substitution: ☐ 1 - Initial ☐ 2 - Subsequent

Type of Assistance: ☒ 1 - Loan ☐ 2 - Grant ☐ 3 - Loan & Grant

Type of Organization: ☐ 1 - PSTE ☒ 2 - Non-TE

Date of Application: 3-6-80

Loan and/or Grant Approved: ☐ 3 - Re-creation ☐ 4 - Grazing ☐ 5 - Irrigation, Drainage, or Other Soil Conservation Measures

ASSOCIATION PROJECT FUND ANALYSIS

TYPE OF LOAN AND/OR GRANT: ☒ 1 - Operating Water System ☐ 2 - Waste Disposal System ☐ 3 - Sewer Collection ☐ 4 - Sewage Treatment ☐ 5 - Solid Waste Disposal ☐ 6 - Storm Drainage ☐ 7 - Flood Prevention (PL-434) ☐ 8 - R&D ☐ 9 - Watershed (PL-266) ☐ 10 - Flood Prevention (PL-434) ☐ 11 - Community Facilities ☐ 12 - Grants (PL-42-419) ☐ 13 - Eas. (Insured)

NAME OF APPLICANT: Gregory County Rural Water Ass., Inc.

ADDRESS: Fairfax, S.D. 57335

NAME OF COUNTY: Gregory

FINANCE USE ONLY

LN CR FY

MA DP

Land Shaded: Acres in Project

Recreational Visitor Day Capacity Annual

Number of users directly benefiting from this action: Residential 90 Other -0-

ITEM	CASH CONTRIBUTION	DHUD OTHER		FUND ANALYSIS - (ALL AMOUNTS IN HUNDREDS OF DOLLARS)										FHA LOAN		TOTALS					
1. Development		0	0	3	4	2	0	0	0	9	5	0	0	0	2	9	3	0	0	0	0
2. Land and Rights		0	0					0	0							6	0	0	0	0	0
3. Legal Services		0	0					0	0							1	0	0	0	0	0
4. Architectural Eng. and Planning Service		4	0	0	0	1	5	0	0	0					6	0	0	0	0	0	0
5. Interest		0	0					0	0						2	0	0	0	0	0	0
Equipment		0	0					0	0								0	0	0	0	0
7. Other Agencies		0	0		1	8	0	0	0						5	0	0	0	0	0	0
8. Refinancing	1	6	0	0	0			0	0									0	0	0	0
9. Initial O & M		0	0					0	0									0	0	0	0
10. Initial Reserve		0	0					0	0									0	0	0	0
11. TOTAL	2	0	0	0	0	3	7	5	0	0	0	9	5	0	0	0	0	0	0	0	0

**South Dakota Department of
Water & Natural Resources**
Water Rights Division
605 773-3352
Joe Foss Building
Pierre, South Dakota 57501

September 30, 1980

Alfred K. Carlson, President
East Gregory County Rural Water System
Fairfax, SD 57335

Dear Mr. Carlson:

RE: 1719-2

This letter is in reference to the East Gregory County Rural Water Association Water Permit No. 1719-2 which was approved by the Water Management Board, July 24, 1980. Because of discrepancies between testimony presented by you July 24, (copies of pages 12 & 16, July 24, 1980, Minutes enclosed) and the Town of Fairfax, September 15, 1980, the Board has determined that approval of Permit No. 1719-2 should be reconsidered.

Your testimony (July 24) indicated the Town of Fairfax would abandon their springs water supply after connection to the rural water system. Testimony by the Town of Fairfax (September 25) was that the springs would not be abandoned. The Farmers Home Administration Project Summary included with the application stated water from the springs would also be used. A letter from Dale Benson, Attorney for the Rural Water System which was submitted with the application for a water permit also stated the springs supply would be blended with the well supply.

The original staff position was that the East Gregory application should be deferred because of the prior Fairfax water rights which could be affected and because of a prior deferred irrigation application. Following your testimony, the East Gregory application was approved.

The Rural Water System will also need a permit to use water from the springs. The Fairfax water rights do not include delivery of water to a rural water system.

I believe you were present when the Town of Bonesteel testified concerning low water levels in their new well and limited yield from a well of the same construction as your wells (24" concrete tile and Baylite screen with gravel pack). Such construction is usually not expected to provide a satisfactory higher capacity well. The screen used (limited open area) does not allow for proper development of the well or optimum well capacity; the gravel pack tends to become plugged with fines and silt from adjacent aquifer sands and

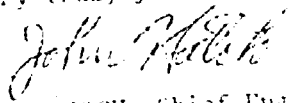
Equal Opportunity Employer

September 26, 1980
Alfred E. Carlson
Page 2

gravel. A well constructed with a screen (maximum open area) and gravel pack designed and sized for the aquifer sands and gravels and properly developed would be expected to provide a higher capacity sand free well without the reported excessive drawdown. The water level in an observation well located about 1/2 mile from the Bonesteel well has only fluctuated 1 1/2 feet since it was installed and developed during 1978. We understand your wells were not submitted for approval to the Water Quality Division.

We will provide notice of the time and place for the reconsideration hearing at the November 19 and 20, 1980 meeting to be held in Madison. Please let us know if you have questions on this matter.

Very truly yours,


JOHN HATCH, Chief Engineer
Water Rights Division

JH:kw

enclosure

cc: Bruce McCollum
Dale Benson, Attorney
Dwight Kallweber, IHA
Robert Guertout, IHA
Del Brosz, DSHS
Jim Nelson, DSHS



Department of Water & Natural Resources

Joe Foss Building
Pierre, South Dakota 57501

Water Rights Division
605 773-7352

November 5, 1980

TO: Persons Interested in Permit No. 1719-2, East Gregory Rural Water System
FROM: John Hatch, Chief Engineer, Water Rights Division
SUBJECT: Reconsideration of Approval of Permit No. 1719-2

The Water Management Board will reconsider approval of Water Permit No. 1719-2 in Gregory County at 3:15 pm on November 19, 1980 at the Karl Mundt Library, Dakota State College, Madison SD.

This reconsideration hearing will be conducted in accordance with the provisions of SDCL 46-1-1 thru 46-1-9; 46-1-14; 46-2-9 thru 46-2-11; 46-2-13; 46-5-1 thru 46-5-8; 46-5-10 thru 46-5-22; 46-5-41; 46-6-3; 46-6-5; 46-6-6.1; 46-6-10; 46-6-3.1; 46-6-14 and Board Rules ARSD 52:01:01:01 thru 52:01:01:13.

This Permit was previously approved by the Board based on testimony at the July Board meeting. A report on the permit has been prepared by the Water Rights Staff and is available upon request.

After reconsideration of the permit the Board can approve, conditionally approve, defer, or deny all or part of the Permit.

This hearing is an adversary proceeding. Any person has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised at the hearing. Decisions of the Board may be appealed to the Courts as provided by law.

You are also notified that SDCL 1-26 provides any interested party the opportunity to meet informally with the Water Rights Division Staff to discuss proposed recommendations by the staff to the Board prior to the scheduled hearing. If we do not hear from you, we will assume that the opportunity for an informal meeting is being waived and you wish to proceed directly to the hearing on the permit before the Board.

Any handicapped person wishing to attend this hearing can contact the Water Rights Division, DWNR, Joe Foss Building, Pierre SD, prior to the hearing date for assistance to assure access to the hearing.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Division

JH:kw

Equal Opportunity Employer

GREGORY COUNTY
Application No. 1719-2
EAST GREGORY RURAL WATER SYSTEM

November 10, 1980

Introduction

Application No. 1719-2 for East Gregory Rural Water System was approved by action of the Board at the July 24, 1980 meeting.

The Staff recommended that Application No. 1719-2 be deferred. The recommendation was based on a prior deferred application and on data indicating a possible adverse affect on springs which supply water to the Town of Fairfax.

Mr. Alfred K. Carlson, President of East Gregory Rural Water System, stated at the July meeting (excerpts from tape),

"The Corporation of the Town of Fairfax is going to switch over from springs over to the wells when they get in operation, because they do have a selenium problem from the Fairfax springs and EPA has given them a variance on that. They want to switch over to these wells."

Later during the July meeting, Mr. Carlson stated,

"The plan is, in Fairfax, it is going to pump through the Fairfax transmission lines or their tower, and the town will use the same water. The springs will eventually be abandoned."

The Staff based on Mr. Carlson's testimony withdrew the recommendation to defer Application No. 1719-2 with the understanding that Fairfax was abandoning the springs.

Application No. 1719-2 was then approved and the Staff was directed to bring Application No. 1469-2 (Herman Schochenmaier) up for reconsideration at the September 25, 1980 meeting.

September 25, 1980 Board Meeting

Application No. 1469-2 was reconsidered by the Board with the Staff making the following conclusion and recommendation:

Conclusions

1. The possible adverse affects on Permit No. 266-2 and No. 1304-2 (Town of Fairfax) will still exist, but the Town will be receiving water from Permit No. 1719-2.
2. Application No. 1469-2 has a priority date of October 26, 1976 and Permit No. 1719-2 which was approved July 25, 1980 has a priority date of June 26, 1980; therefore, in accordance with the first in time first in right doctrine No. 1469-2 should be approved.

North

1000 ft

500 ft

1000 ft

500 ft

1000 ft

500 ft

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500 ft

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500 ft

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3719-2

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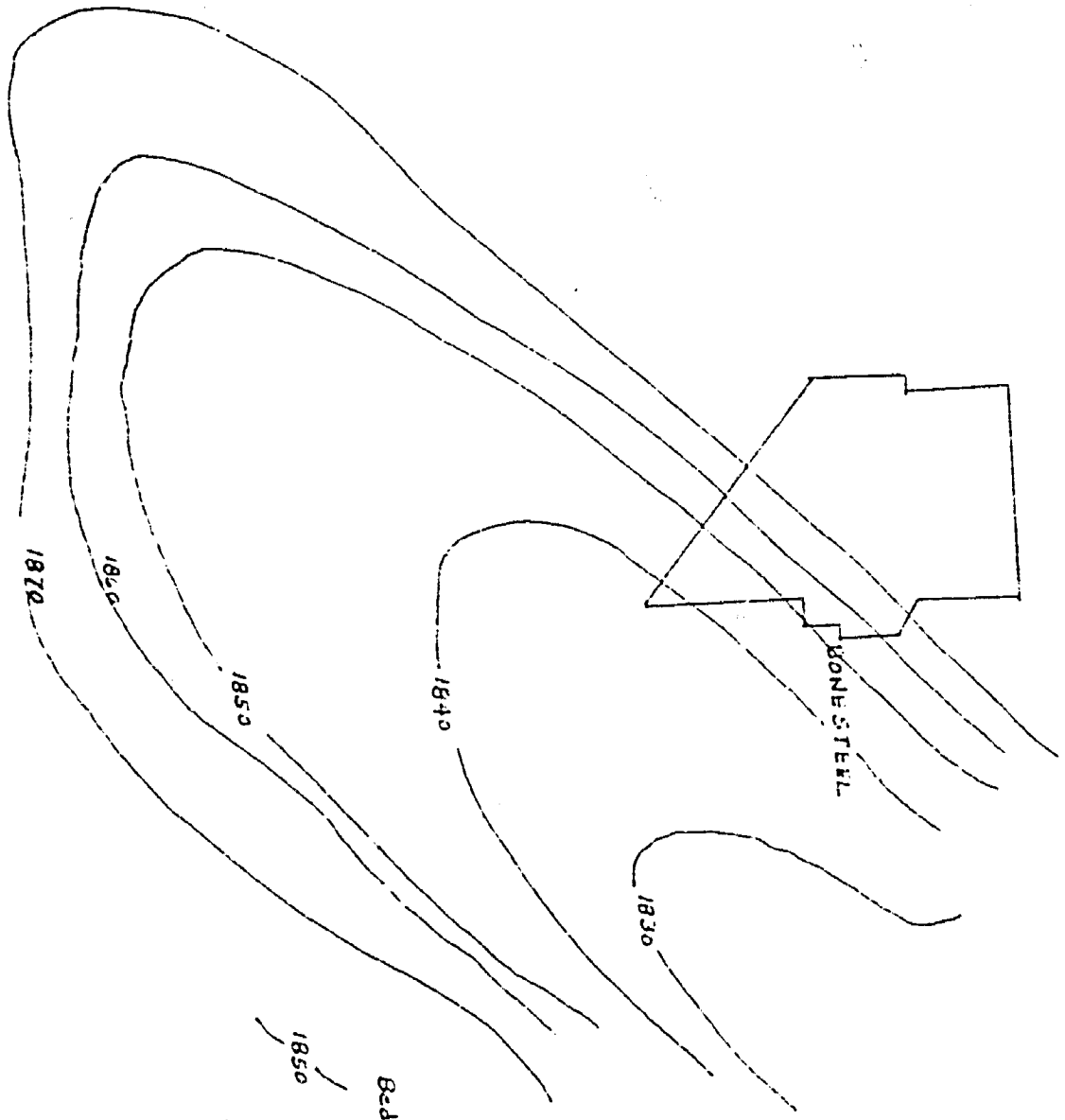
500 ft

CV78C

1459-2

CV78D

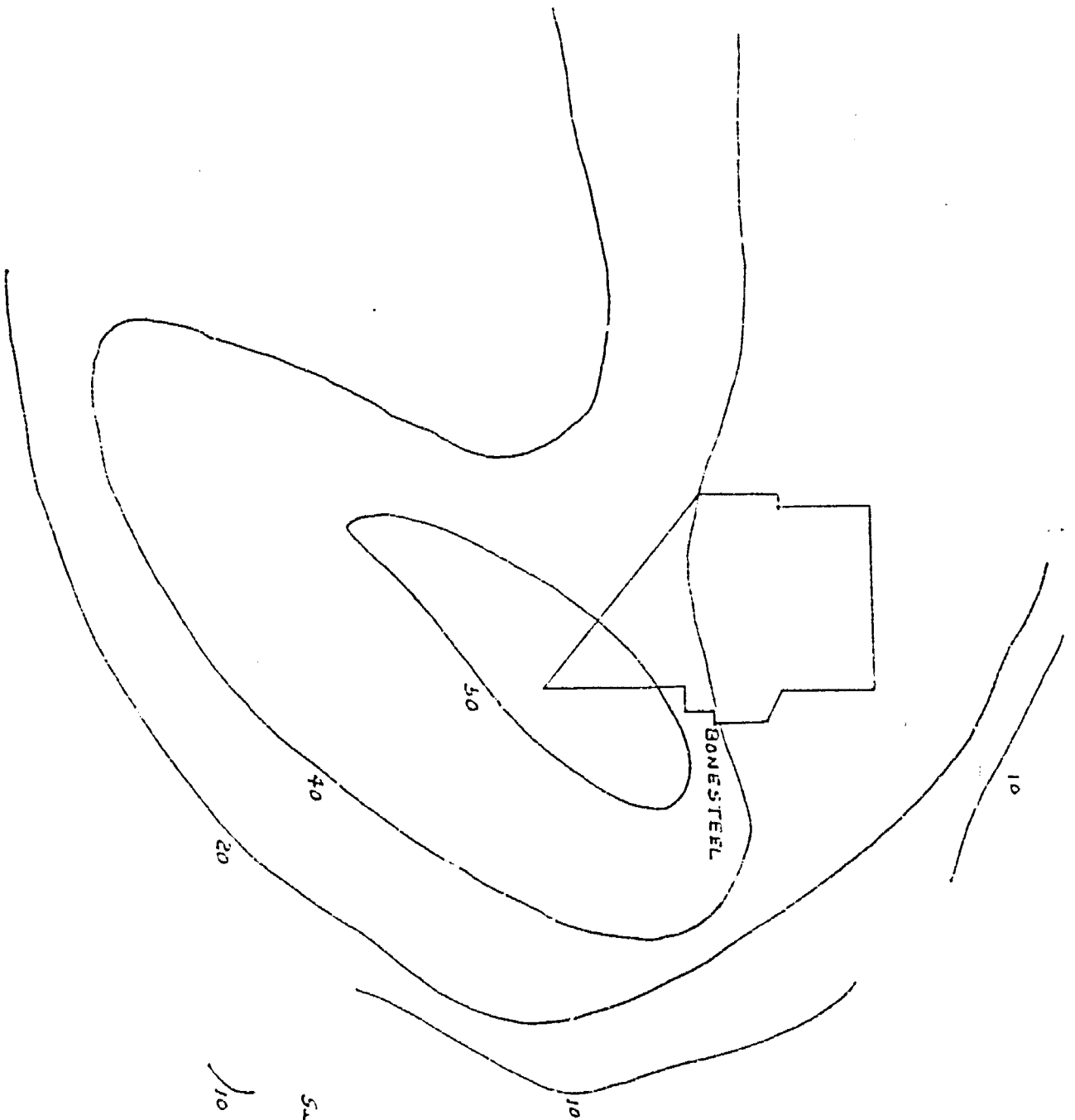
1421-2



HONESTEEL

Bedrock Elevation map
1850 Elevation of bedrock
in feet above mean
sea level

1830



Saturated Thickness map
 10 Feet of Saturated
 Material

5H

 **Department of
Water & Natural Resources**
Joe Foss Building
Pierre, South Dakota 57501

February 5, 1981

Alfred Carlsen, Chairman
East Gregory Rural Water System
Fairfax, South Dakota 57335

Re: East Gregory Rural Water System Approval

Dear Mr. Carlsen:

Since our recent letter of January 21, 1981 to you, we have received a letter from Robert C. Swartout, Chief of Community Programs, for the Farmers Home Administration. Mr. Swartout's letter contained a list of suggested conditions that FmHA would require in regards to our letter to allow your system to start up operations this spring. A copy of his letter is enclosed. On February 3, 1981, Mr. Swartout met with the Staff Engineer and I in the Pierre office on this matter.

Although the Department of Water and Natural Resources (DWR) does not approve of the six existing wells as constructed and located, based on past experience with similarly designed wells, we agree that to drill new wells into an aquifer with questionable water quality and capacity to produce could result in further unnecessary expenditure of funds. Therefore, at this time, temporary approval to use the existing wells until November of 1981, or until problems develop with the quality or production of the wells, whichever occurs first, is granted subject to the following conditions:

1. That FmHA conditions will be carried out as outlined in their letter to me on January 26, 1981.
2. That further exploration be continued with a complete water quality testing program being conducted for selenium and nitrates of existing farm wells, irrigation wells, etc., in the area to determine if a better source is available. A report should be submitted of these results by June 1, 1981, which is the expiration date of Fairfax's exemption as given under Safe Drinking Water Act Interim Regulations by the Region VIII U.S. Environmental Protection Agency.
3. That an alternative Plan (B) be submitted to the Department of Water and Natural Resources by June 1, 1981, confirming the source

Equal Opportunity Employer

Alfred C. Nelson
Page 2
February 5, 1981

and/or type of treatment that shall be used if this system can not meet standards. An example of an alternative could be installing of a reverse-osmosis unit or the construction of a pipeline from the Randall Rural Water System.

4. All wells will be metered. Daily readings will be provided to DWR and the peak daily pumping capacity recorded and submitted monthly.
5. In addition to EPA's Bacteriological Sampling Requirements, weekly samples will be taken from each well at the well head and analyzed for the presence of coliform organisms. Each well must also be analyzed monthly for nitrates and selenium. If the concentration of either contaminant in any of the wells exceeds the maximum contaminant level, the continued use of that well must be reassessed.
6. That funds be retained in reserve by FmHA for further expenditure whether it is for drilling new wells for this source or another source that will meet the Water Quality Standards.

We will continue to assess the results of water quality tests and well yields until November 1981, at which time we will discuss an extension of this approval by deciding whether to put in drilled wells or to proceed with the alternate Plan (B) if results are unsatisfactory.

Sincerely,

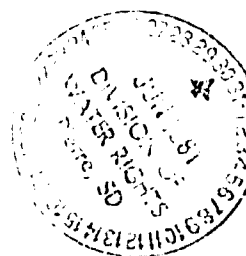


James D. Nelson, Director
Division of Water Quality
Department of Water and Natural Resources
Phone: (605) 773-3351

Enclosures

cc: Robert C. Swartout, Chief of Community Programs, FmHA
Roger L. Williams, Regional Administrator, EPA
Bruce McCollom, Engineer, Bartlett and West Consulting Engineers
Mark Stelchen, Office of Drinking Water, DWR
Ray Birchem, Staff Engineer, DWR

B21402RB



June 29, 1981

Alfred Carlson, Chairman
East Gregory County Rural Water Users
Fairfax, South Dakota 57731

Dear Mr. Carlson:

On June 24, Park Stetson City staff spoke with you regarding the status of the East Gregory County Rural Water Users Association. That the first three wells started pumping water on June 24, 1981, and the other three wells were scheduled to start pumping water on June 25, 1981. Right now all the 171-2 for your well field is scheduled to be completed with a water quality sampling program established by the South Dakota Department of Agriculture. In a letter to you on June 24, 1981, South Dakota Department of Agriculture to Kyle Johnson in May by the State Health Department so that the samples could be properly collected. To date we have received no water samples for selenium, nitrate or bacteriological analysis. We have not received the required reports containing the results of additional water quality testing in the area and an alternative plan for obtaining water. Neither have we received any information on the daily pumping capacity of the wells.

We will be doing nitrate and selenium analyses on a number of water rights observation wells in Gregory County in the near future. The attached analyses from two observation wells south of Doneston show relatively low nitrate levels. The water bearing formation is also quite thick in this area. Further consideration should be given to the area for your drilled well.

Please advise us as to your intentions for compliance with the conditions of your water permit within ten days.

Alfred Carlsson
Page 2
June 29, 1981

You should be aware that your permit can be suspended by the Water Management Board for violation of the permit.

Sincerely,



James C. Nelson, Director
Division of Water Quality
Phone: (605) 773-3296

Attachments

cc: John Hatch, Director, Division of Water Rights
Bruce McCollon, Engineer, Bartlett and West
Bob Swariout, Chief of Community Programs, FIDA
Kevin Janousek, Water Operator

B64506HS

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 1719-2

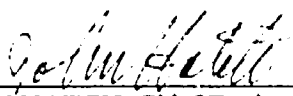
(1) East Gregory County Rural Water Association, Inc., Box 217, Fairfax SD 57335 made Application No. 1719-2, June 26, 1980 for a water permit to appropriate 0.25 cubic feet of water per second from groundwater (six wells), Gregory County, South Dakota for rural water system purposes. Permit No. 1719-2, with a priority date of June 26, 1980 was approved November 19, 1980 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before November 19, 1981 and for the application to beneficial use of said water on or before November 19, 1982.

The wells authorized under Permit No. 1719-2 are standby wells for the rural water system and used for emergency purposes only.

(2) It is certified that the applicant 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 0.20 cubic feet of water per second for beneficial use. The location of the diversion points are: Well #1 - 460 feet north & 725 feet east; Well #2 - 660 feet north & 990 feet east; Well #3 - 860 feet north & 925 feet east; Well #4 - 990 feet north & 590 feet east; Well #5 - 1190 feet north & 460 feet east; Well #6 - 1220 feet north & 790 feet east; all from the center of Section 6-T95N-R68W (SW 1/4 NE 1/4).

(3) The applicant 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 East Gregory County Rural Water Association, Inc., Box 217, Fairfax SD 57335 the holder and/or owner of Water Permit No. 1719-2 is issued a license to appropriate water, the right to use 0.20 cubic feet of water per second from groundwater (six wells) with a priority date of June 26, 1980 from the location specified in (2) of this license. The water to be used for the purpose of rural water system use. This license is subject to any limitations or qualifications listed in Water Permit No. 1719-2 and subject to South Dakota State Law.


 JOHN HATCH, Chief Engineer
 Water Rights Program
 Department of Environment and Natural Resources

DEC 18 1995
 date



GREGORY COUNTY
Application No. 1719-2
EAST GREGORY RURAL WATER SYSTEM

November 10, 1980

Introduction

Application No. 1719-2 for East Gregory Rural Water System was approved by action of the Board at the July 14, 1980 meeting.

The Staff recommended that Application No. 1719-2 be deferred. The recommendation was based on a prior deferred application and on data indicating a possible adverse effect on springs which supply water to the Town of Fairfax.

Mr. Alfred K. Carlson, President of East Gregory Rural Water System, stated at the July meeting (excerpts from tape),

"The Corporation of the Town of Fairfax is going to switch over from springs over to the wells when they get in operation, because they do have a selenium problem from the Fairfax springs and EPA has given them a variance on that. They want to switch over to these wells."

Later during the July meeting, Mr. Carlson stated,

"The plan is, in Fairfax, it is going to pump through the Fairfax transmission lines on their tower, and the town will use the same water. The springs will eventually be abandoned."

The Staff based on Mr. Carlson's testimony withdrew the recommendation to defer Application No. 1719-2 with the understanding that Fairfax was abandoning the spring.

Application No. 1719-1 was then approved and the Staff was directed to bring Application No. 1-89-2 (Herman Schochenmaier) up for reconsideration at the September 16, 1980 meeting.

September 16, 1980 Board Meeting

Application No. 1-89-2 was reconsidered by the Board with the Staff making the following conclusion and recommendation:

Conclusions

1. The possible adverse affects on Permit No. 266-1 and No. 1334-2 (Town of Fairfax) will still exist, but the Town will be receiving water from Permit No. 1719-2.

2. Application No. 1-89-2 has a priority date of October 26, 1978 and Permit No. 1719-1 which was approved July 16, 1980 has a priority date of June 16, 1980; therefore, in accordance with the first in time first in right doctrine No. 1-89-2 should be approved.

Recommendation

The staff recommended that Application No. 1459-2 be approved with the well interference qualification.

Mr. Gene Hanson, representing the Town of Fairfax, stated,

"In relation to Mr. Selken's report, we have no intention of abandoning these springs. The water permit from the rural water will not handle the town and the rural water system. We are going to pump both systems into the mutual main, of the rural water and the Town of Fairfax."

After a lengthy discussion Application No. 1459-2 was approved by action of the Board. The Board also moved that Application No. 1719-2 for East Gregory Rural Water System be reconsidered and the staff was directed to prepare a report.

Application No. 1719-2, East Gregory Rural Water System

Application No. 1719-2 proposes to supply 0.35 cubic feet per second of water from six wells located in NW 1/4 Sec. 8, T24N, R66W for the East Gregory Rural Water System and as a supplemental source to the Town of Fairfax.

Hydrologic Data

Application No. 1719-2 proposes to withdraw water from an aquifer consisting of unconsolidated sandstone and siltstone. The aquifer varies in saturated thicknesses from less than ten feet to approximately fifty feet (see attachment).

The hydraulic gradient is from the west-northwest to a discharge area (springs) by Bonesteel.

An estimate of the amount of water in storage and the amount of water appropriated indicates that 85 of the water in storage is appropriated. A reasonable estimated value for annual average recharge is approximately equal to the amount appropriated.

The effects of the pumping of the Rural Water wells on the spring flows can be calculated using the Theis nonequilibrium formula. By using values estimated from the well logs the drawdown on the spring after 365 days of continuous pumping at 65 gallons per minute would be 1.11 feet. Essentially no effect.

Conclusions

1. Observation wells are present to monitor water withdrawals.
2. The estimated recharge to the hydrologic system approximately equals the maximum withdrawals permitted.
3. The production wells of the rural water system if managed properly will have little effect on the spring flows.

Recommendations

1. Application No. 1719-2 be approved with the following qualification:

The ~~irrigation~~ well approved under this Permit will be located near domestic wells & other ~~irrigation~~ wells which may obtain water from the same aquifer. The ~~irrigation~~ well owner, under this Permit, shall control his irrigation withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in ~~irrigation~~ wells having prior water rights. This Permit is approved subject to the irrigation water use questionnaire being submitted ~~each year~~.

Permit No. 1719-2
Missouri River - Water District

Report Of Examination Of Works And/Or Application of Water To Beneficial Use

TO: Chief Engineer, Division of Water Rights, DENR, Joe Foss Bldg., Pierre, SD 57501

On this day, April 3, 1995, I made a thorough examination of the water use system constructed by East Gregory County Rural Water Association, Incorporated of Box 217, Fairfax, SD 57335 holder of Permit No. 1719-2, bearing the priority of June 26, 1980 authorizing diversion of 0.25 cu. ft. of water per second from groundwater for commercial purposes, in Gregory County.

I have to report on the conditions of the same as follows:

A. Works used to divert the water:

6 wells with diversion rates of 15 GPM each.

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

BOOSTER PUMPS:

Pump:

- 1) Make Paco
- 2) Serial No. XH93R2028201B
- 3) Capacity 150 GPM
- 4) Impellar 9.3 inches

Motor:

- 1) Make US Motor
- 2) Frame No. 256 JM
- 3) Horsepower 25 HP

Pump:

- 1) Make Paco
- 2) Serial No. XH93R2028201A
- 3) Capacity 150 GPM
- 4) Impellar 9.3 inches

Motor:

- 1) Make US Motor
- 2) Frame No. 256 JM
- 3) Horsepower 25 HP

DISTRIBUTION LINES:

- | | | |
|--------------------|-------------------------|----------------------------|
| 1) Type <u>PVC</u> | 2) Size <u>2</u> inches | 3) Length <u>1120</u> feet |
| 1) Type <u>PVC</u> | 2) Size <u>4</u> inches | 3) Length <u>1320</u> feet |

C. Works used to apply water to beneficial use:

Buried pipeline to serve users on the Rural Water System.

The system is in the following condition: good. The point of diversion is located (6 Wells) #1: 460 feet N & 725 feet E; #2: 660 feet N & 990 feet E; #3: 860 feet N & 925 feet E; #4: 990 feet N & 590 feet E; #5: 1190 feet N & 460 feet E; #6: 1220 feet N & 790 feet E; all from the center of Section 6; T95N R68W (SW1/4 NE1/4). The works are capable of diverting and conveying to the place of use 0.20 cu. ft. of water per second which is to be used for commercial use. Water has been put to beneficial use to the maximum extent as follows:
Providing Water to the city of Fairfax and other rural users.

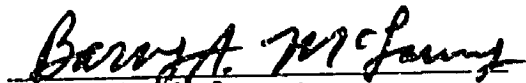
The license should be issued for 0.20 cfs for standby purposes.

****NOTE:**

These wells are currently not used by the RWS. They are still connected to the system, but only pumped in case of an emergency. All wells have pumps and can be operated at any given time. This permit should be licensed for standby purposes only.

Permit qualifications have been complied with: Yes ☒ No

Exceptions to compliance are: None Date: April 3, 1995



Barry A. McLaury
Environmental Scientist
DENR, Water Rights Division

REPORT ON INSPECTION OF PERMIT NO. 1719-2

DATE OF INSPECTION: April 3, 1995

Other permit(s) associated with the project: 1846-2 & 1846A-2

Name of inspection contact: Kevin Janousek

Contact relationship to permit holder: Operator of the RWS

Name/address of permit holder: East Gregory County Rural Water System Association, Incorporated, Box 217, Fairfax, SD 57335

DIVERSION POINTS LEGAL LOCATIONS: (6 Wells) #1: 460 feet N & 725 feet E; #2: 660 feet N & 990 feet E; #3: 860 feet N & 925 feet E; #4: 990 feet N & 590 feet E; #5: 1190 feet N & 460 feet E; #6: 1220 feet N & 790 feet E; all from the center of Section 6; T95N R68W (SW1/4 NE1/4).

WELL INFORMATION:

- 1) Well Drilling Firm: Juracek Well Drilling
- 2) Well No. #1

- 3) Depth(s) 71 feet
- 4) Well log is available Y

Casing:

- 1) Diameter 24 inches
- 2) Length 34 feet
- 3) Type concrete

Screen:

- 1) Type concrete
- 2) Length 37 feet
- 3) Static water level 47 feet

Motor:

- 1) Make Franklin Electric
- 2) Model No. Submersible
- 3) Horsepower 3/4 HP

Pump:

- 1) Make Jacuzzi
- 2) Model No. Submersible
- 3) Capacity 15 GPM

- 1) Well Drilling Firm: Juracek Well Drilling
- 2) Well No. #2

- 3) Depth(s) 73 feet
- 4) Well logs are available Y

Casings:

- 1) Diameter 24 inches
- 2) Length 34 feet
- 3) Type concrete

Motor:

- 1) Make Franklin Electric
- 2) Model No. Submersible
- 3) Horsepower 3/4 HP

- 1) Well Drilling Firm: Juracek Well Drilling
- 2) Well No. #3

Casings:

- 1) Diameter 24 inches
- 2) Length 30 feet
- 3) Type concrete

Motor:

- 1) Make Franklin Electric
- 2) Model No. Submersible
- 3) Horsepower 3/4 HP

- 1) Well Drilling Firm: Juracek Well Drilling
- 2) Well No. #4

Casings:

- 1) Diameter 24 inches
- 2) Length 44 feet
- 3) Type concrete

Screen:

- 1) Type concrete
- 2) Length 32 feet
- 3) Static water level 48 feet

Pump:

- 1) Make Jacuzzi
- 2) Model No. Submersible
- 3) Capacity 15 GPM

- 3) Depth(s) 70 feet
- 4) Well log is available Y

Screen:

- 1) Type concrete
- 2) Length 40 feet
- 3) Static water level 48 feet

Pump:

- 1) Make JAcuzzi
- 2) Model No. Submersible
- 3) Capacity 15 GPM

- 3) Depth(s) 74 feet
- 4) Well log is available Y

Screen:

- 1) Type concrete
- 2) Length 30 feet
- 3) Static water level 54 feet

Motor:

- 1) Make Franklin Electric
- 2) Model No. Submersible
- 3) Horsepower 3/4 HP

- 1) Well Drilling Firm: Juracek Well Drilling
- 2) Well No. 5

Casings:

- 1) Diameter 24 inches
- 2) Length 50 feet
- 3) Type concrete

Motor:

- 1) Make Franklin Electric
- 2) Model No. Submersible
- 3) Horsepower 3/4 HP

- 1) Well Drilling Firm: Juracek Well Drilling
- 2) Well No. #6

Casings:

- 1) Diameter 24 inches
- 2) Length 24 feet
- 3) Type concrete

Motor:

- 1) Make Franklin Electric
- 2) Model No. Submersible

Pump:

- 1) Make Jacuzzi
- 2) Model No. Submersible
- 3) Capacity 15 GPM
- 3) Depth(s) 75 feet
- 4) Well log is available Y

Screen:

- 1) Type concrete
- 2) Length 25 feet
- 3) Static water level 55 feet

Pump:

- 1) Make Jacuzzi
- 2) Model No. Submersible
- 3) Capacity 15 GPM
- 3) Depth(s) 79 feet
- 4) Well log is available Y

Screen:

- 1) Type concrete
- 2) Length 55 feet
- 3) Static water level 61 feet

Pump:

- 1) Make Jacuzzi
- 2) Model No. Submersible

3) Horsepower 3/4 HP

3) Capacity 15 GPM

BOOSTER PUMPS:

Pump:

- 1) Make Paco
- 2) Serial No. XH93R2028201B
- 3) Capacity 150 GPM
- 4) Impellar 9.3 inches

Motor:

- 1) Make US Motor
- 2) Frame No. 256 JM
- 3) Horsepower 25 HP

Pump:

- 1) Make Paco
- 2) Serial No. XH93R2028201A
- 3) Capacity 150 GPM
- 4) Impellar 9.3 inches

Motor:

- 1) Make US Motor
- 2) Frame No. 256 JM
- 3) Horsepower 25 HP

DISTRIBUTION LINES OR CANALS:

- 1) Type PVC 2) Size 2 inches 3) Length 1120 feet
- 1) Type PVC 2) Size 4 inches 3) Length 1320 feet

PERMIT QUALIFICATIONS AND REGULATIONS:

- 1) Special qualifications to permit being abided by Y
- 2) All structures, wells and lands on map Y
- 3) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period N/A

****NOTE:**

These wells are currently not used by the RWS. They are still connected to the system, but only pumped in case of an emergency. All wells have pumps and can be operated at any given time. This permit will be licensed for standby purposes.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

July 20, 1995

1719-2

Alfred K. Carlson, President
East Gregory County Rural
Water Association, Inc.
Box 217
Fairfax, SD 57335

Dear Mr. Carlson:

The inspection of your water use system and the inspection of the extent of application of water to beneficial use, as developed under Water Permit No. 1719-2, has been completed. Your final water right document, the Water License, can now be issued.

Statutes require that we charge a \$50.00 fee for the inspection and issuance of the Water License. Upon receipt of the \$50.00 fee from you, we will begin processing your Water License.

Please remit fee to:
Department of Environment & Natural Resources
Water Rights Program
523 E. Capitol
Pierre, SD 57501-3181

South Dakota Water Law 46-5-30.1 requires that a permit holder may not divert water until the \$50.00 license fee has been paid. Please contact us if you have any questions.

Sincerely,

Cheryl F. Frost
Secretary
Water Rights Program
(605) 773-3352

NOTE: On check or money order, please specify your permit number. This will insure proper handling of the fee.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

October 3, 1995

SECOND NOTICE
Permit No. 1719-2

NOTICE OF WATER LICENSE INSPECTION FEE REQUIREMENT

Alfred K. Carlson, President
East Gregory County Rural
Water Association, Inc.
Box 217
Fairfax, SD 57335

Dear Mr. Carlson:

On July 20, 1995, you were notified the final inspection fee of \$50.00 is due before Water License No 1719-2 can be issued. As of this date, the fee has not been received.

The fee is a final step in the legal process of obtaining and perfecting a water right and is required by SDCL 46-2-13(3). Upon receipt of the \$50.00 fee, your Water License will be sent to you. This is the final document for the perfection of your Water Right. A perfected water right is similar to a property right and once a water right is perfected, it cannot be lost as long as the water is used.

Please remit fee to:
Department of Environment & Natural Resources
Water Rights Program
523 E. Capitol
Pierre, SD 57501-3181

According to South Dakota Water Law 46-5-30.1, you may not divert water until the License fee is paid. Please submit the required fee immediately to avoid jeopardizing your water permit.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
(605) 773-3352

c: Kevin Janousek, Manager, East Gregory County Rural Water Association, Inc.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

to wish to receive the
ing services (for an extra

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

1719-2

Alfred K. Carlson, President
East Gregory County Rural
Water Association, Inc.
Box 217
Fairfax, SD 57335

4a. Article Number

Z 348 312 506

4b. Service Type

- | | |
|---|---|
| ☐ Registered | ☐ Insured |
| ☒ Certified | ☐ COD |
| ☐ Express Mail | ☐ Return Receipt for Merchandise |

7. Date of Delivery

10/4/95

8. Addressee's Address (Only if requested and fee is paid)

5. Signature (Addressee)

Alfred K. Carlson

6. Signature (Agent)

Thank you for using Return Receipt Service.

UNITED STATES POSTAL SERVICE



PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE, \$300



Official Business



Print your name, address and ZIP Code here

DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES
DIVISION OF WATER RIGHTS
523 E. CAPITOL JOE FOSS BLDG.
PIERRE, SOUTH DAKOTA 57501

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

1719-2

Kevin Janousek, Manager
East Gregory County Rural
Water Association, Inc.
Box 217
Fairfax, SD 57335

4a. Article Number

Z 348 312 507

4b. Service Type

- | | |
|---|---|
| ☐ Registered | ☐ Insured |
| ☒ Certified | ☐ COD |
| ☐ Express Mail | ☐ Return Receipt for Merchandise |

7. Date of Delivery

10-5-95

8. Addressee's Address (Only if requested and fee is paid)

5. Signature (Addressee)

6. Signature (Agent)

Thank you for using Return Receipt Service.

UNITED STATES POSTAL SERVICE

Official Business



Print your name, address and ZIP Code here

DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES
DIVISION OF WATER RIGHTS
523 E. CAPITOL JOE FOSS BLDG.
PIERRE, SOUTH DAKOTA 57501



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

DEC 18 1995

1719-2

Alfred K. Carlson, President
East Gregory County Rural
Water Association, Inc.
Box 217
Fairfax, SD 57335

Dear Mr. Carlson:

Enclosed is Water License No. 1719-2. This is the final water right document completing your process of obtaining a Water Right. Enclosed is Receipt No. 414638 in the amount of \$50.00 which you paid for the inspection and issuance of the Water License.

For your information SDCL 46-6-27 requires that if the owner of an existing well, such as the well authorized by Water Right No. 1719-2, 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.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
(605) 773-3352

rd
enclosures

RECEIPT

1779-2
414638

Division of Water Rights

South Dakota Department of Environment and Natural Resources

Pierre, _____ October 10, 19 95

RECEIVED OF East Gregory County RW Assoc, Inc., PO Box J7, Fairfax, SD 57335

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

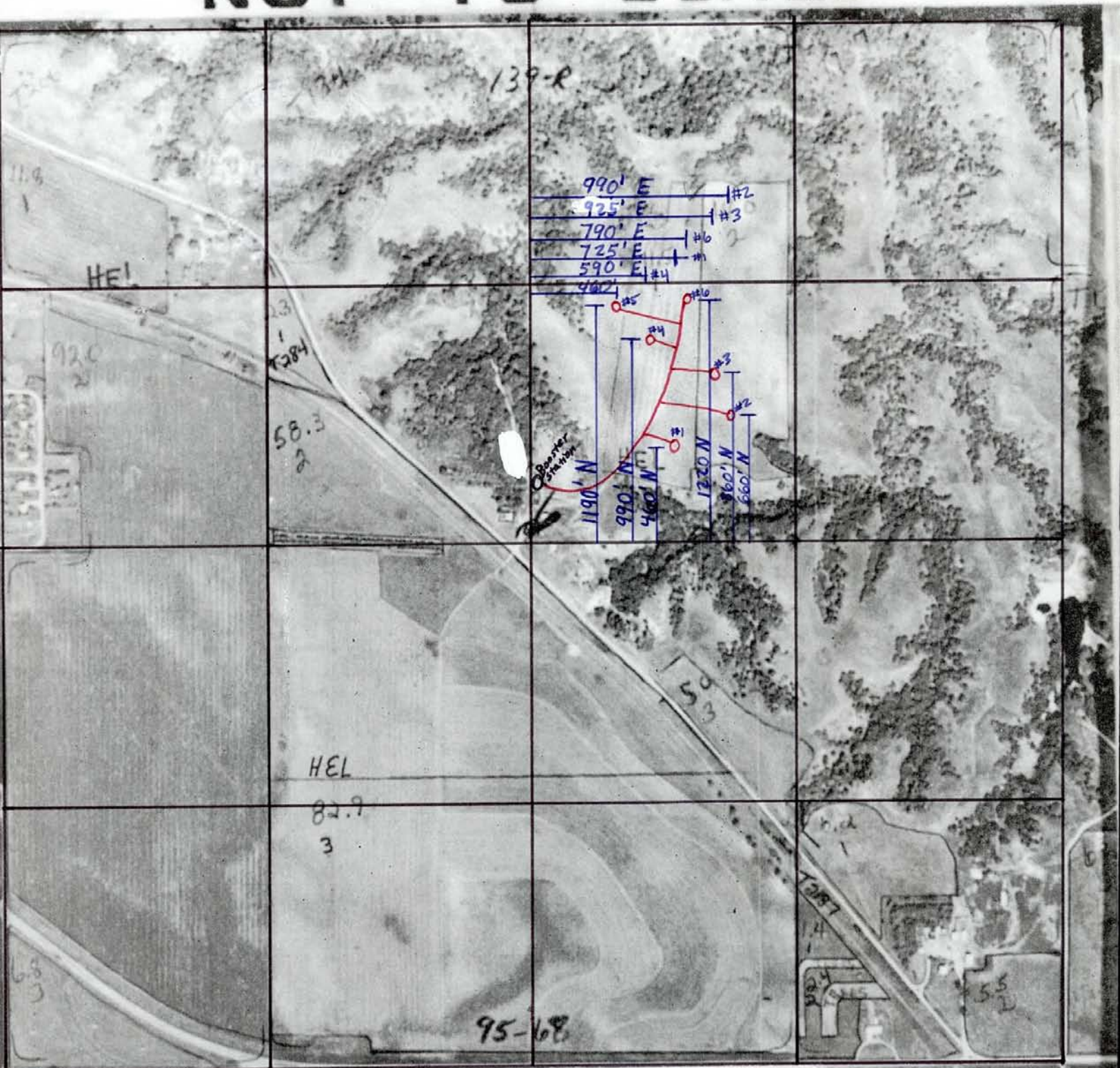
Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use _____		
Fee for Application for Permit No. _____ to Appropriate Water, for Future Use _____		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>1719-2</u>	50	00
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for _____		

(Any Other Work Provided by Law)	Total	50 00

By

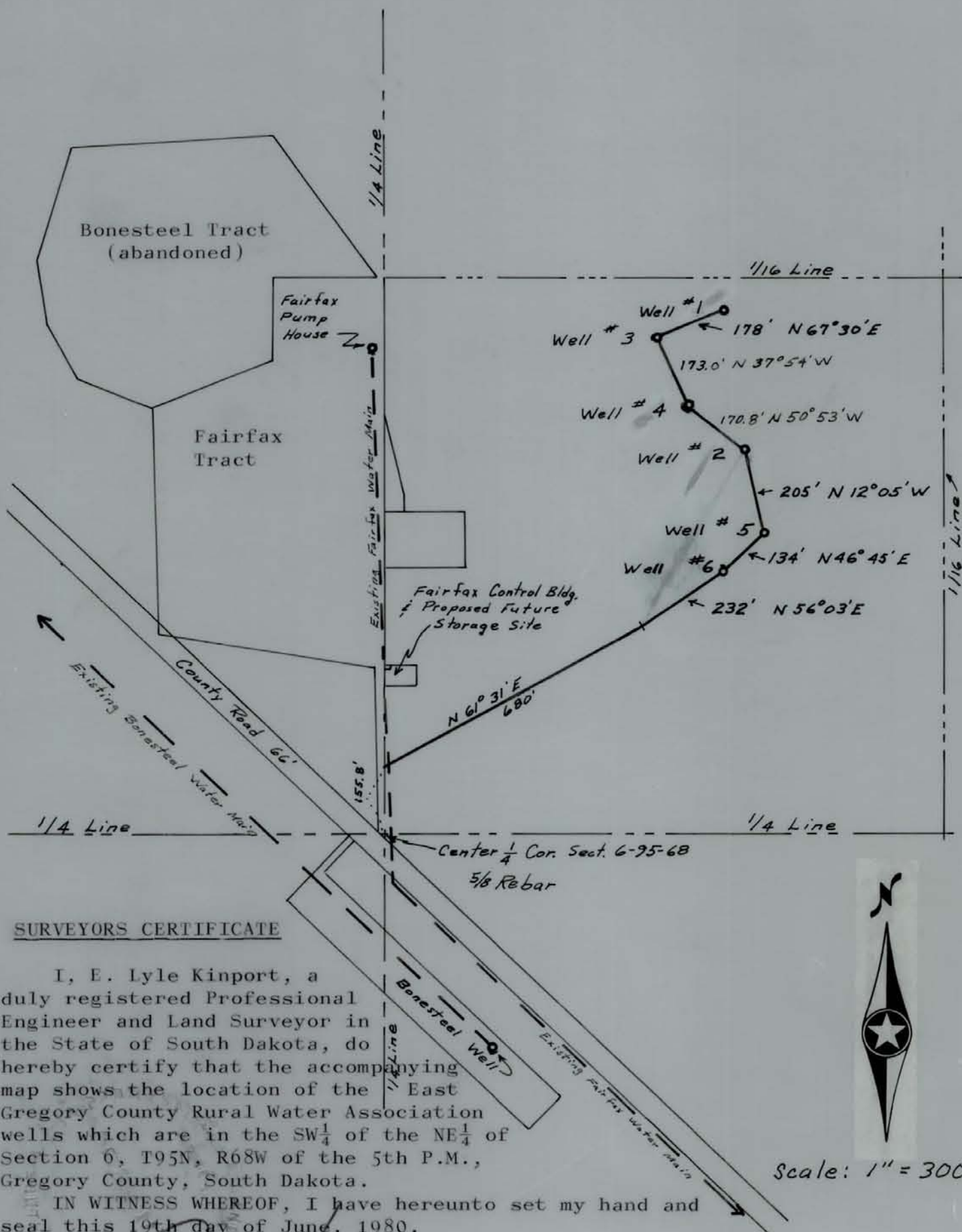
Chief Engineer

NOT TO SCALE



Barry McLaury *Barry A. McLaury*
 Environmental Scientist
 Division of Water Rights
 Date 7-13-95

WATER WELL LOCATION MAP
EAST GREGORY COUNTY RURAL WATER ASSOCIATION



SURVEYORS CERTIFICATE

I, E. Lyle Kinport, a duly registered Professional Engineer and Land Surveyor in the State of South Dakota, do hereby certify that the accompanying map shows the location of the East Gregory County Rural Water Association wells which are in the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 6, T95N, R68W of the 5th P.M., Gregory County, South Dakota.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 19th day of June, 1980.

E. Lyle Kinport
Professional Engineer and Land Surveyor
STATE OF SOUTH DAKOTA)
COUNTY OF DAVISON) ss

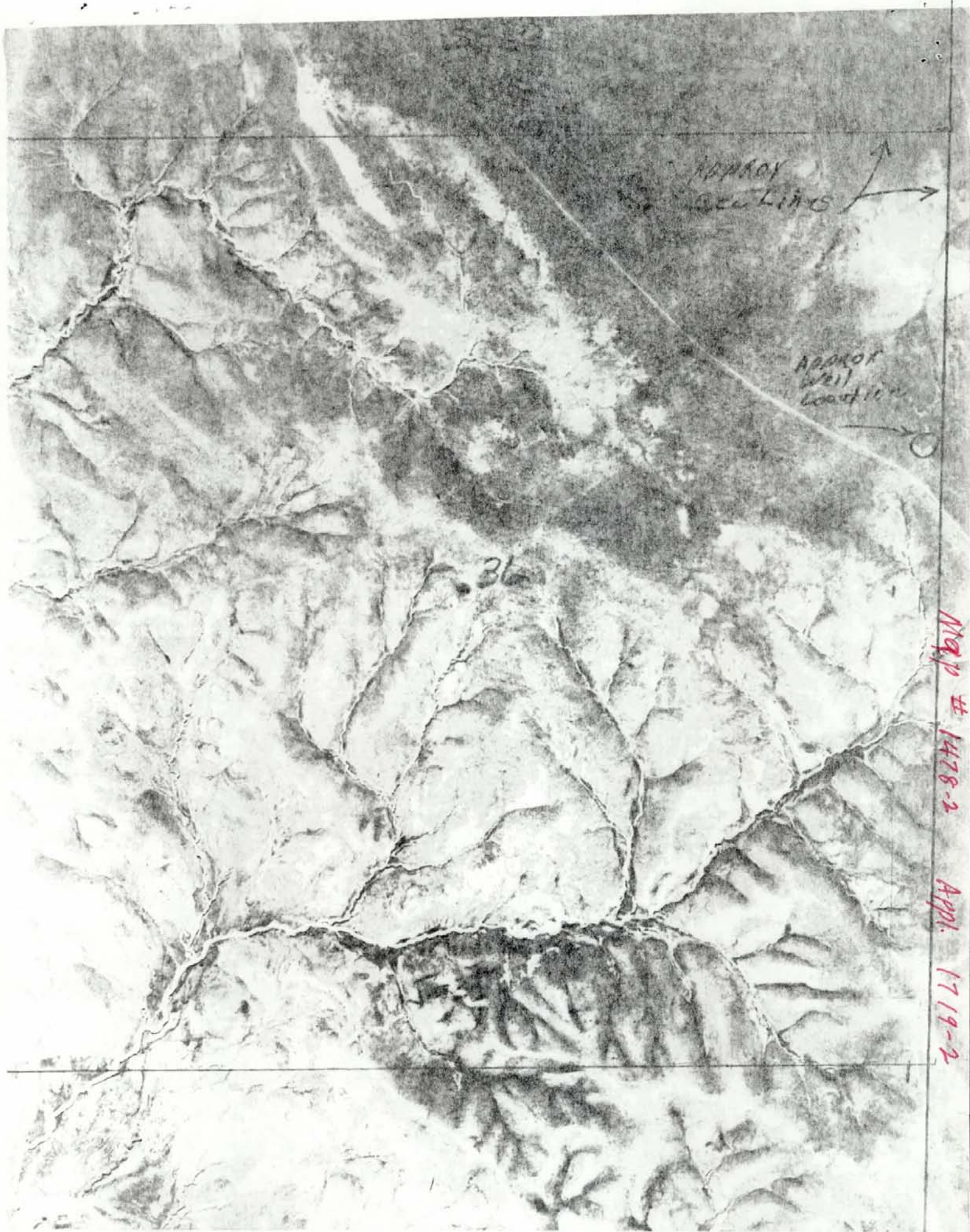
On this 19th day of June, 1980, before me the undersigned officer personally appeared E. Lyle Kinport, known to me to be the person whose name is subscribed to the within SURVEYORS CERTIFICATE and he acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

My Commission Expires: 2-28-83

Ruth J. Huffman
Notary Public

~~DAVIS~~ 1478-2 APPL 1719-2



APPROX
Sec Line

APPROX
Well
Location

36

Map # 1478-2

Appl. 1719-2

R 30 E

14

1000

23

I.R.

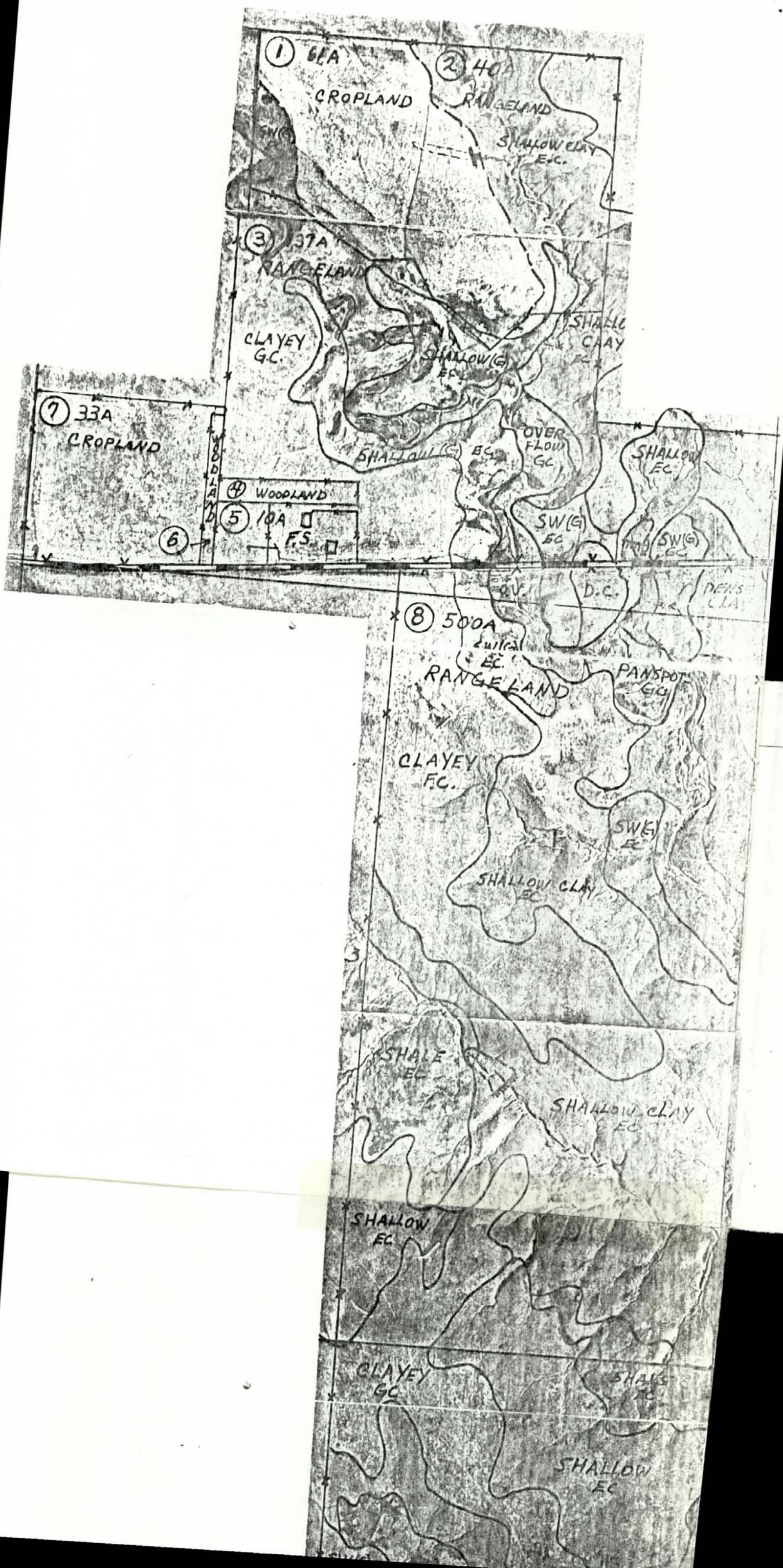
Well 2

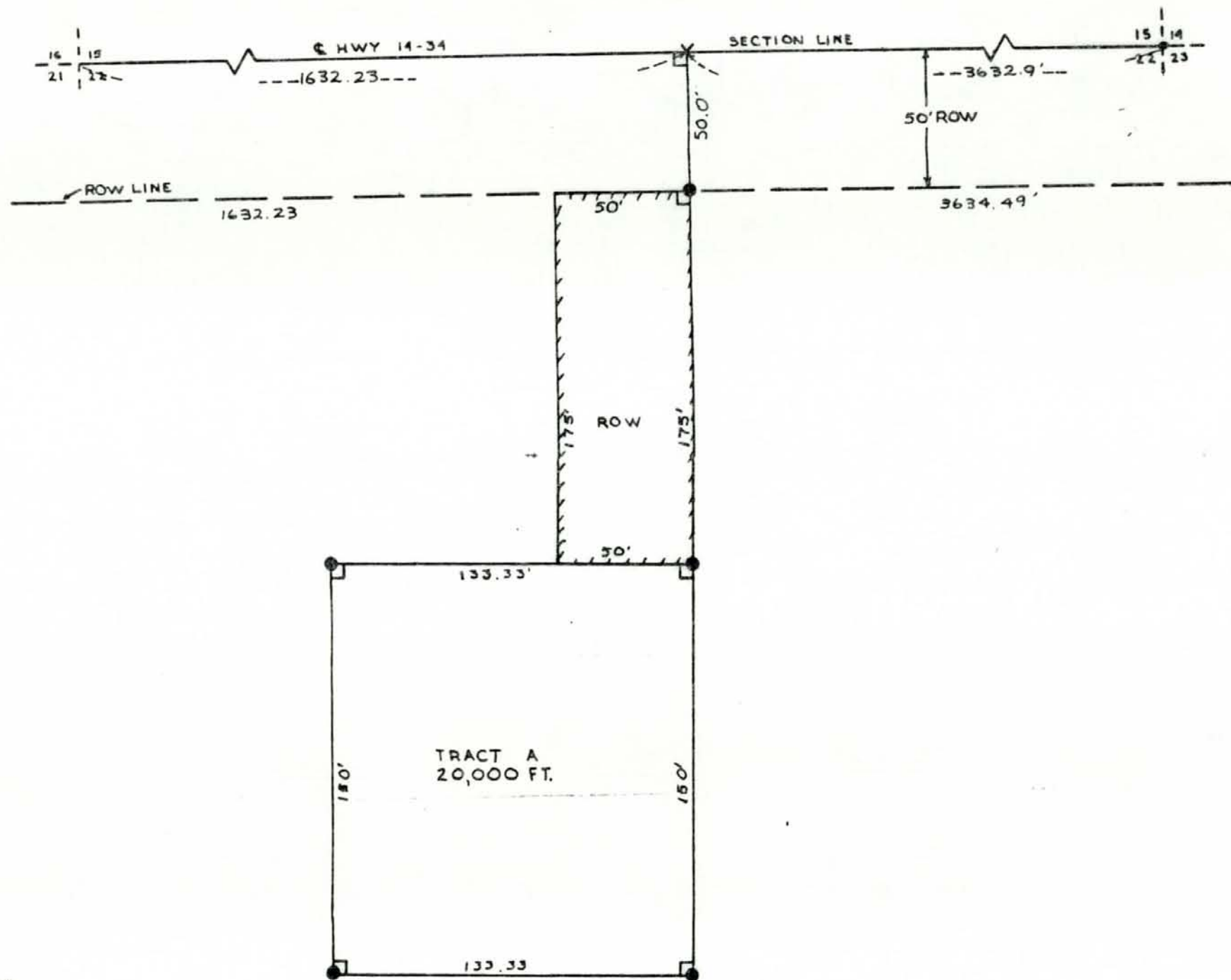
26

Artesian Well is Located
325 Ft. South & 17 Ft. West
of the NE Corner of the
N.W. 1/4 Sec. 26-T5N-R30E

Wm. L. Somers
Registered Land Surveyor
No. 637

4-7706
7706



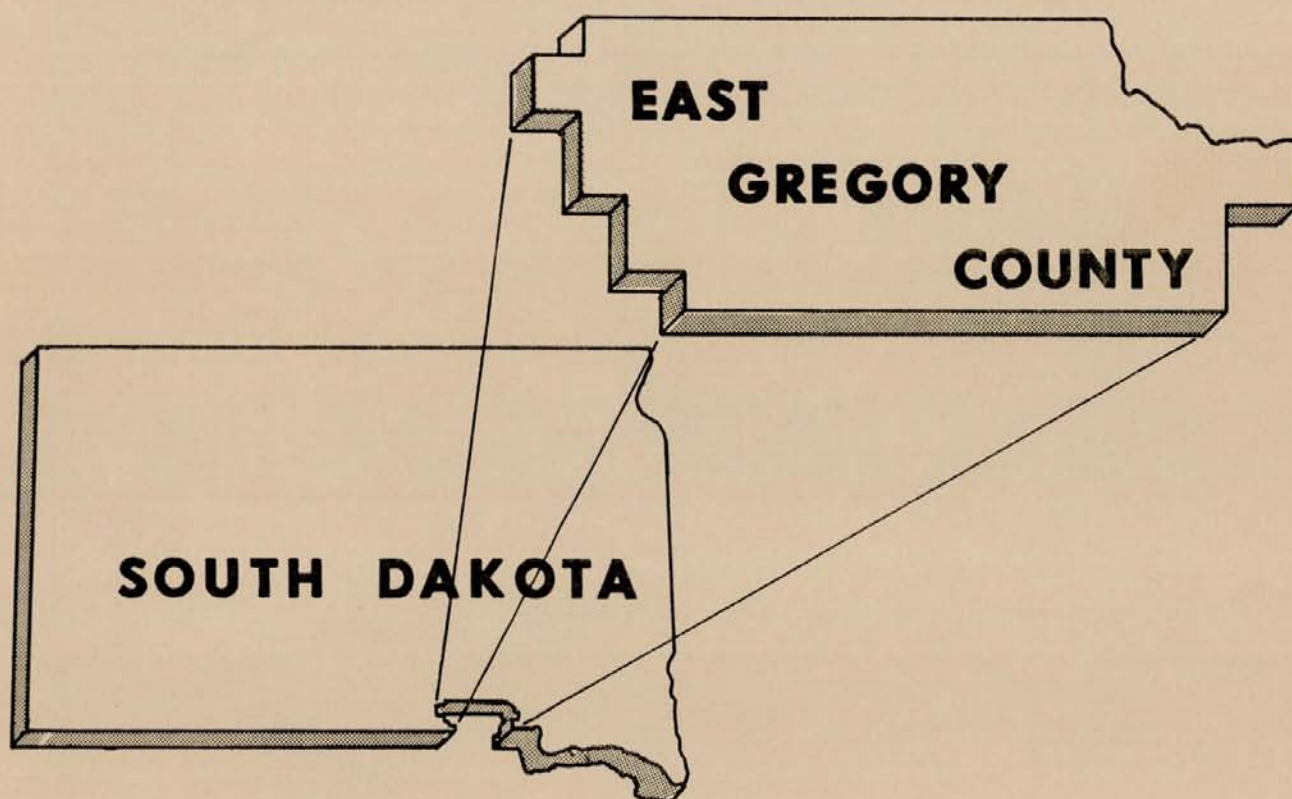


DATE: 10-17-79
SCALE: 1" = 50'

NOTES:
 X DENOTES SET SPIKE
 O DENOTES SET 1/2" REBAR
 --- DENOTES DEDICATED PUBLIC
 ROW LINE
 --- DENOTES DEDICATED PUBLIC
 ROW LINE

PRELIMINARY ENGINEERING REPORT
PROPOSED RURAL WATER SYSTEM
EAST GREGORY COUNTY, SOUTH DAKOTA
ADDENDUM NO. 1

1977

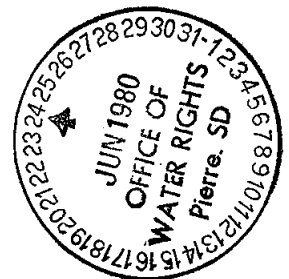


PREPARED BY

Bartlett & West - Consulting Engineers P.A.
310 WEST 33RD STREET - TOPEKA, KANSAS

APRIL 1977
W. O. 2507

ADDENDUM TO THE
PRELIMINARY REPORT FOR THE
PROPOSED EAST GREGORY COUNTY
RURAL WATER DISTRICT



W.O. 2507
April 1977

BARTLETT & WEST, CONSULTING ENGINEERS, P.A.
310 West 33rd Street Topeka, Kansas 66611

INDEX

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DISTRIBUTION SYSTEM LAYOUTS FOR ALTERNATES 1 & 3

Back Maps

SECTION I - GENERAL

This report shall serve as an addendum to the Preliminary Engineering Report for the Proposed East Gregory County Rural Water District prepared in June 1976. The original report should be used in conjunction with this addendum since there were several sections in the report that are not included in this addendum.

At the time the report was prepared, it appeared that both Fairfax and Bonesteel were interested in purchasing water from the proposed water district. Since that time, the City of Bonesteel has lost interest in participating in the rural system. Even though the City of Fairfax has progressed with their own water system improvement project, there remains considerable interest in obtaining a water supply from the District. Therefore, this addendum is prepared from the standpoint of serving the rural users plus the City of Fairfax. Should Fairfax decide not to purchase water from the District, then only minor changes would need to be made in the system design and economic structure of the District.

The East Gregory County Rural Water District is faced with the problem of finding a suitable water supply. In the preliminary report we discussed two water supply alternatives. Alternate No. 1 was designed using treated lake water as a source and Alternate No. 2 was based on purchasing water from the Proposed Boyd County Rural Water District in Nebraska. We found that purchasing water from the Boyd County system was not a viable solution since there was no guarantee as to when their system would be in operation and the quantity of water furnished to the East Gregory District would be limited.

We did not include a ground water supply as an alternate in the preliminary report for several reasons. After discussions with both state and federal public health officials, we felt that the source should meet the water quality standards as outlined in the "National Interim Primary Drinking Water Regulations". The South Dakota Geological Survey recommended a test well location approximately one mile northwest of St. Charles. The test well was able to produce an adequate quantity of water and the general quality of the water was good, but the samples taken contained nitrate levels greater than the recommended limits of 10 ppm nitrate nitrogen. Analysis by the Geological Survey showed nitrate levels in samples taken from the test well to be 13 to 15 ppm nitrate as nitrogen. More samples were taken at a later date and confirmed the nitrate levels in the first samples. In an effort to find a suitable well source, more samples were taken within the district boundaries. Thirty-one samples were tested for nitrate as nitrogen (NO_3 as N) concentrations including samples published in a 1976 report by the South Dakota Geological Survey. Out of the thirty-one samples tested for nitrates, five samples contained over twenty ppm nitrate nitrogen, six samples contained between ten and twenty ppm nitrate nitrogen, eleven samples contained between five and ten ppm nitrate nitrogen, five samples contained between one-half and five ppm nitrate nitrogen, and four samples contained less than one-half ppm nitrate nitrogen. Three of the samples with less than one-half ppm nitrate nitrogen were from artesian wells around 1200 feet deep with high total hardness and total solids concentrations.

The South Dakota Geological Survey indicated that the source of the nitrate could be from material within the aquifer or from material immediately above the shale. However with the data presently available, the exact source of the nitrate is not known. A study has been proposed by the Geological Survey to determine the source of the nitrate in the aquifer and to hopefully develop a well design that would decrease the nitrate content in the water taken from the aquifer.

Because of the high nitrate concentrations throughout the district and since, at this time, the Geological Survey has no recommendations for additional test well locations, the district cannot justify drilling more test wells.

Investigating the possibility of using water from the city of Fairfax springs, we found that the nitrate concentrations were high, the selenium concentration exceeded the recommended standard and the engineer for Fairfax could not determine the quantity of water that could be furnished to the district.

Due to the high costs of constructing and operating a water treatment plant, the Farmers Home Administration asked that we again investigate the possibility of using a ground water source. To give the District, the Farmers Home Administration, and public health officials a basis for comparing all of the alternatives, we have designed a system using a well supply at our test well location. We shall refer to this system as Alternate Number 3.

This addendum to the Preliminary Report compares the design and public health aspects of Alternate No. 1 and Alternate No. 3. We suggest that the data herein presented be studied carefully to determine the best solution to the East Gregory County water supply problems.

SECTION II - COMPARISON OF ALTERNATIVES

A. GENERAL SYSTEM DESCRIPTION:

1. Alternate No. 1 - The Alternate No. 1 system is basically as described in the preliminary report. The treatment plant would be built near Joe Days Bay on Lake Francis Case with a 200 gpm capacity. The treated water would be pumped to a 75,000 gallon elevated reservoir near Fairfax. The water would then flow by gravity to a pump station near Bonesteel and then pumped to a 10' x 100' standpipe reservoir located three miles east of St. Charles.

2. Alternate No. 3 - The Alternate No. 3 wells would be located approximately one mile northwest of St. Charles at the test well location. Three wells should be used, each with a capacity of 120 gpm. One well would be used during average water use periods, two would be used during maximum use periods, and the third well would act as a standby only. The wells would pump directly into a 100,000 gallon elevated reservoir and the entire district will be served by gravity from this point.

B. WATER QUALITY COMPARISON:

The quality of the water source has become the most important consideration in selecting a supply for the East Gregory County system. To give an overall picture of the ground water quality throughout the district as compared to the quality of the water from Lake Francis Case, we present the following table of water sample test results.

TEST WELL LOCATIONS

WB-1 SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 6, T. 95 N., R. 68 W. ✓
 WB-2 SE $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 6, T. 95 N., R. 68 W. ✓
 WB-3 SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 1, T. 95 N., R. 69 W.
 WB-4 NW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 6, T. 95 N., R. 68 W. ✓
 WB-5 SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 6, T. 95 N., R. 68 W. ✓
 WB-6 NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 36, T. 96 N., R. 69 W.
 WB-7 NE $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 2, T. 95 N., R. 69 W.
 WB-8 NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 1, T. 95 N., R. 69 W.
 WB-9 SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 1, T. 95 N., R. 69 W.
 WE-1 SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 27, T. 96 N., R. 70 W.
 WE-2 SW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 26, T. 96 N., R. 70 W.
 WE-3 SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 26, T. 96 N., R. 70 W.
 WE-4 NW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 34, T. 96 N., R. 70 W.
 WE-5 SW $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 22, T. 96 N., R. 70 W.
 WE-6 NW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 34, T. 96 N., R. 70 W.
 WE-7 SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 36, T. 96 N., R. 71 W.
 WE-8 SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 23, T. 96 N., R. 71 W.
 WE-9 NW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 29, T. 96 N., R. 70 W.
 WE-10 NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 28, T. 96 N., R. 70 W.
 WE-11 NE $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 6, T. 95 N., R. 68 W. ✓
 WE-12 SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 33, T. 96 N., R. 70 W.
 WE-13 SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 24, T. 96 N., R. 71 W.
 WE-14 SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 22, T. 96 N., R. 70 W.
 WE-15 SE $\frac{1}{4}$ SEP SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 27, T. 96 N., R. 70 W.
 WG-1 NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 20, T. 95 N., R. 66 W.
 WG-2 SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 26, T. 95 N., R. 67 W.
 WG-3 SW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 23, T. 95 N., R. 67 W.
 WG-4 SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 30, T. 95 N., R. 67 W.
 WG-5 SE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 26, T. 95 N., R. 68 W.
 WG-6 NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 22, T. 95 N., R. 68 W.
 WG-7 SE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 17, T. 95 N., R. 68 W.
 WG-8 NE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 25, T. 95 N., R. 69 W.
 WG-9 NW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 15, T. 95 N., R. 69 W.
 WG-10 SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 31, T. 96 N., R. 69 W.
 WG-11 NE $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 27, T. 96 N., R. 69 W.
 WG-12 SE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 24, T. 96 N., R. 69 W.
 WG-13 NW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 25, T. 96 N., R. 68 W.

Test Well - Center of Sec. 27, T. 96 N., R. 70 W.

Lake Water - Taken from Joe Days Bay

TABLE I - WATER SAMPLE TEST RESULTS

Sample No.	Well Depth	Calcium (ppm)	Sodium (ppm)	Magnesium (ppm)	Chlorides (ppm)	Sulphate (ppm)	Iron (ppm)	Manganese (ppm)	Nitrate Nitrogen (ppm)	Fluoride (ppm)	pH	Hardness CaCO ₃ (ppm)	Total Solids (ppm)	Selenium (ppb)
Recommended Limits		75(5)		125(2) 50(5)	350(5) 250(2)	250(2)	.05(4) .3(2)	.01(4) .05(2)	11(3) 10(1)	2.4(1)	--	100 to 500(3)	1000	10
WB-1	113'	110	--	26	45	35	0.06	0	25+	--	7.4	380	360	
WB-2	Springs	90	--	23	40	86	0.06	0	2	--	8.0	320	800	
WB-3	30'	123	--	20	36	100	0.08	0	--	--	7.2	385	600	
WB-4	116'	95	--	10	5	40	0.05	0	--	--	7.5	275	400	
WB-5	--	123	--	20	8	100	0.05	0	--	--	7.6	385	560	
WB-6	30'	63	--	15	3	50	0.03	0	--	--	7.4	220	280	
WB-7	50'	175	--	30	50	75	0.1	0	--	--	7.5	560	1280	
WB-8	--	110	--	47	34	70	0.1	0	--	--	7.5	470	920	
WB-9	--	110	--	30	29	85	0.09	0	--	--	7.4	400	800	
WE-1	22'	95	50	15	9.8	<50	0.3	0.1	12	--	--	300	316	2.5
WE-2	16'	95	50	15	11.76	<50	<.05	<.05	9	--	--	300	312	1.2
WE-3	56'	95	45	10	8.82	<50	<.05	<.05	7.5	--	--	280	264	1.4
WE-4	50'	95	40	12	4.9	<50	<.05	<.05	7.5	--	--	290	288	1.1
WE-5	59'	85	45	8	3.92	<50	0.6	<.05	9	--	--	250	248	1.0
WE-6	50'	100	40	10	3.92	50	0.1	<.05	7.5	--	--	300	228	1.3
WE-7	34'	80	50	7	5.88	60	<.05	<.05	5	--	--	230	204	1.9
WE-8	56'	150	40	12	15.68	50	<.05	<.05	22	--	--	420	468	1.1
WE-9	27'	110	45	15	11.76	50	<.05	<.05	16	--	--	340	356	1.5
WE-10	80'	70	30	8	3.92	50	0.05	<.05	6.5	--	--	210	176	1.3
WE-11	Springs	--	--	--	--	--	--	--	3.5	--	--	--	684	25.7
WE-12	--	--	--	--	--	--	--	--	7.5	--	--	--	276	1.5
WE-13	--	--	--	--	--	--	--	--	11.5	--	--	--	452	1.5
WE-14	60'	50	<5	26	4	<50	<.05	<.1	6.7	--	--	230	388	--
WE-15	--	40	<5	26	10	<50	<.05	5.1	6.4	--	--	210	352	1.4
WG-1	1200'	190	30	70	95	960	3.8	0.15	<0.5	--	--	760	1420	--
WG-2	1250'	185	55	65	125	800	0.2	0.05	<0.5	--	--	727	1360	--

W.O. 2507
April 1977

TABLE I - WATER SAMPLE TEST RESULTS (cont.)

Sample No.	Well Depth	Calcium (ppm)	Sodium (ppm)	Magnesium (ppm)	Chlorides (ppm)	Sulphate (ppm)	Iron (ppm)	Manganese (ppm)	Nitrate Nitrogen (ppm)	Fluoride (ppm)	pH	Hardness CaCO ₃ (ppm)	Total Solids (ppm)	Selenium (ppb)
Recommended Limits		75(5)		125(2) 50(5)	350(5) 250(2)	250(2)	.05(4) .3(2)	.01(4) .05(2)	11(3) 10(1)	2.4(1)	—	100 to 500(3)	1000 (6)	10
WG-3	1150'	175	55	65	70	840	3.1	0.1	<0.5	—	—	702	1330	—
WG-4	55'	30	80	15	<10	55	<0.1	<0.05	9.5	—	—	136	440	—
WG-5	50'	95	88	<0.05	25	400	<0.1	<0.05	<0.5	—	—	384	930	—
WG-6	50'	75	100	22	12	190	0.1	<0.05	3.0	—	—	277	600	—
WG-7	60'	70	72	22	41	85	—	—	0.5	—	—	264	490	—
WG-8	20'	<5	830	<5	85	1690	<0.1	<0.05	21	—	—	<30	2920	—
WG-9	40'	75	68	20	20	140	<0.1	<0.05	14.2	—	—	268	560	—
WG-10	40'	20	68	<5	20	<25	<0.1	<0.05	3.5	—	—	50-70	110	—
WG-11	40'	75	68	22	30	<25	<0.1	<0.05	26	—	—	277	520	—
WG-12	60'	65	68	16	10	<25	<0.1	<0.05	17.5	—	—	227	—	—
WG-13	50'	200	190	88	460	330	<0.1	<0.05	40	—	—	859	2340	—
Test Well	100'	61	22	12	16	24	0.13	0	14.7	0.1	—	202	—	—
Lake Water	—	63	70	22	14	223	0.1	0	<1	1.4	—	248	534	—

- (1) 1977 Federal Interim Primary Drinking Water Standards
- (2) 1962 USPHS Recommended Limits
- (3) World Health Organization, European (1961)
- (4) AWWA Recommended Potable Water Quality Goals (1968)
- (5) World Health Organization, International (1963)
- (6) Table 10 AWWA No. M21

In Table I we have shown the concentrations of all constituents that were tested for in each sample. Generally, the quality of the ground water in the area is consistent with the exception of the deep artesian wells.

The quality of the water from the District's test well is generally good except for the nitrate content. In fact, the well water is of slightly better quality than the water from Lake Francis Case. If the district decides to use the well supply, then either a portion of the nitrates must be removed or the district must apply for a variance from the nitrate maximum contaminant level.

Nitrate removal is a delicate process, requiring constant control and maintenance. Ion-exchange is generally the most economic method of removing nitrates from a water supply. A conventional water softener is used with an ion-exchange resin to reduce the nitrate concentrations. The effectiveness of the process is greatly influenced by the concentrations of the other constituents in the water. Other anions such as sulfates, chlorides, silicates, and phosphates, compete with the nitrate ion in the reduction process, thereby decreasing the effectiveness of the system. Iron concentrations greater than 0.1 ppm in the water cause a brown cake to form on top of the exchange resin which prevents satisfactory backwash and regeneration. The cake cannot be removed by backwashing or salt regeneration. Instead, the system must be shut down and cleaned with hydro-chloric acid. Due to an iron concentration of 0.13 ppm in the test well, an iron removal system would have to be installed in conjunction with the ion-exchange unit.

A brine solution is created as a waste product of the ion exchange system since a sodium chloride solution is used in regeneration of the resin. Disposal of the brine solution becomes a serious problem in geographic locations other than coastal areas, since the solution is not

concentrated enough for lagooning. Studies show that the cost of trucking and disposing of the wastes approaches 50 percent of the total cost of operating the ion-exchange system.

Because of the high operating costs and maintenance problems involved, we feel that nitrate removal is not economically feasible for the East Gregory County Rural Water District.

At the time the system is put in operation, the water district can apply for a variance from the maximum contaminant level if the nitrate concentration still exceeds the recommended limits. This could be done through the Federal Environmental Protection Agency (EPA).

The maximum contaminant level of 10 ppm for nitrate as nitrogen (NO_3 as N) or 45 ppm as nitrate was established on the basis that water with concentrations greater than the MCL had an adverse effect on infants and calves. Nitrate in drinking water is associated with a temporary blood disorder in infants known as infantile methemoglobinemia. The disease is not irreversible but if the infant is not removed from the nitrate water source, it is sometimes fatal. Rather than explaining the cause and nature of the disease, we have included a report on the subject in the Appendix of this report. The report was prepared by E. F. Winton, M.D., Chief of Disease Studies, Division of Epidemiology and Biometrics, and presented at the 90th Annual American Water Works Association Conference in June of 1970.

A variance is an allowance to deviate from or to exceed a maximum contaminant level (MCL) for an indefinite period of time. The variance can be granted because the raw water source that is reasonably available cannot meet the MCL with the best economical treatment technique applied.

Since nitrate removal is not feasible for the rural water district and because of the high cost of a surface water treatment plant, the District has reasonable justification for requesting a variance.

If the variance was granted, the District must submit a schedule to the state within one year of the date the variance was granted showing some progress toward meeting the maximum contaminant level and any control measures as required by the state.

There can be no unreasonable risk to health in granting a variance. The District can claim that no unreasonable health risk is presented since the ground water source used is generally better quality than most of the individual farm wells presently being used to serve the people in the area. If a well supply is used, there will actually be no significant change in the nitrate content from the water presently being pumped from individual farm wells.

No bacteria testing has been performed on the test wells; however chlorination facilities would have to be installed in the well pump building in order to maintain a chlorine residual throughout the system.

If a surface water treatment plant were used, the water would be treated with alum, fluoride, and chlorinated. Filtering the settled water completes the treatment process. The quality of the water produced by the wells is approximately the same as the water from the treatment plant with the exception of the nitrate concentration in the well supply.

SECTION III - SYSTEM REVISIONS

A. Water Use

The Farmers Home Administration felt that the area within the water district boundary had not been canvassed as well as it should and that more water users could be obtained. We, therefore, made a dwelling survey of the area in January 1977 and showed all dwellings on the master layout drawings. The homes were coded as good, fair, poor, vacant, or trailers. The water district board members contacted the owners of all occupied homes that were not already shown as users and obtained an additional 21 potential users.

We added the 21 new users to the plans and water use data tabulation sheets and deleted a number of users that were prohibitively expensive to serve. After all changes were made, Alternate No. 1 serves 182 users and Alternate No. 3 serves 181 users. Of these users, 37 are pasture meter settings. The revised water use data is as follows:

Average Use:

Fairfax - 200 people x 75 gpd =	15,000 gals./day
Rural Users - from data sheets =	<u>57,351 gals./day</u>
Estimated Average Water Use =	72,351 gals./day

Maximum Use - Winter Months

Use maximum rural plus city average

Fairfax - 200 people x 75 gpd =	15,000 gals/day
Rural Users - from data sheets =	<u>220,734 gals/day</u>
Estimated Maximum Water Use =	235,734 gals./day

Maximum Use - Summer Months

Use maximum rural plus maximum city use

Fairfax - 200 people x 75 gpd x 2.5 = 37,500 gals./day

Rural Users - from data sheets = 220,734 gals./day

Estimated Maximum Water Use = 258,234 gals./day

or

Average use/rural user 300 gpd/user = 9,000 gals./month

Maximum use/rural user 1200 gpd/user

The data appears to be slightly high for average monthly use; therefore the estimated average monthly use has been lowered to 8,500 gals./month.

The minimum supply required to meet the district's needs during peak water use periods is calculated as follows:

Max. Water Use + 10% Loss and Flushing

= 258,234 gals./day = 25,823 gals./day = 284,057

$\frac{284,057 \text{ gals./day}}{24 \times 60} = 197 \text{ gals./min} \approx 200 \text{ gals./min.}$

By using two 120 gpm pumps, they would supply approximately 200 gpm running together. Under average use conditions, only one pump would be run at a time. The size of each pump may change in the final design of the project, due to possible piping changes which would affect the pumping head conditions on the pump. However the total required pumping capacity of 200 gals./min. will not change unless the number of users served changes.

B. Storage Required

The storage capacity for the district has been reduced to a minimum. No allowance has been made for drawdown in the tanks prior to activation of the pumps; however, with the high pumping capacity, the storage should

be adequate to serve the 182 original users. After the system is in operation for a number of years, more storage could be added to the district if necessary.

The present storage required is the difference between the maximum water use over a 12 hour period and the maximum supply during that same 12 hour period. The water use and supply rate for the City of Fairfax is deleted from these calculations.

Supply Rate = 200 gpm - 30 gpm (to Fairfax) = 170 gpm

Supply in 12 hrs. = 170 gpm x 12 x 60 = 122,400 gals./day

Water Use = 220,734 gals./day (from data sheets)

Storage Required = 220,734 gals/day

-122,400 gals/day

98,334 gals/day

Use 100,000 gal. total storage capacity

One 100,000 gallon elevated reservoir would be required for Alternate No. 3. Alternate No. 1 is designed with a 75,000 gallon elevated reservoir near Fairfax and a 10' x 100' standpipe west of Bonesteel which provides approximately 26,000 gallons usable storage. Only the top 45 feet of the standpipe can be considered as usable storage in this instance.

C. Decrease in Pipe Sizes

In most cases, we found that the pipe sizes could not be decreased except in the smaller pipe sizes. Much of the 2 inch pipe was changed to 1½ inch pipe to the last user on the line and some of the 2½ inch pipe was changed to 2 inch pipe. The 1½ inch service pipe is run into the water users house rather than setting an outside meter box. Pasture meter settings, however, will be made with a standard outside meter setting.

D. Changes in Economic Analysis

As requested by the Farmers Home Administration, we have lowered the unit prices on many items in the preliminary cost estimate. The unit prices used reflect the cost of construction at the time of the report without an allowance for inflation. Every effort was made to decrease the total project cost. We feel that any additional decreases in the cost estimate would be unrealistic.

The method of calculating the contribution from the City of Fairfax has been revised. Instead of using a percentage of the construction cost method of figuring the contribution, we used an increased cost method. In other words, Fairfax would be asked to pay only the additional costs to increase the system's pipe and fitting sizes, pumping capacity, and treatment plant or well capacity. By using this method, the amount of the City's contribution may be lowered from the figures in the preliminary report. The Fairfax connection charge is estimated based on the following cost of increasing the system to provide the 30 gpm service to Fairfax:

Alternate No. 1:

9,500' of 6" Cl. 200 pipe to 8" Cl. 200 pipe = \$16,625.00

5,300' of 4" Cl. 160 pipe to 6" Cl. 160 pipe = 4,240.00

1 Master Meter = 1,800.00

Increased Treatment Plant Cost = 25,000.00

Total Connection Charge = \$47,665.00

Use \$48,000.00

Alternate No. 3:

16,000' of 4" Cl. 160 pipe to 6" Cl. 160 pipe = \$12,800.00

1 Master Meter = 1,800.00

Increased Well Capacity = 15,000.00

Total Connection Charge = \$29,600.00

Use \$30,000.00

Fairfax would be required to pay a percentage of the operation and maintenance costs as outlined in that section of this report. No estimated water rates are included in this addendum since the exact amounts of the loan and grant will be determined by Farmers Home Administration.

SECTION IV - PRELIMINARY COST ESTIMATE

A. Alternate No. 1

DISTRIBUTION SYSTEM

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extension</u>
1	8" Cl. 200 P.V.C. Pipe	29,100	L.F.	\$ 3.90	\$113,490.00
2	6" Cl. 160 P.V.C. Pipe	59,200	L.F.	1.85	109,520
3	4" Cl. 160 P.V.C. Pipe	77,600	L.F.	1.05	81,480.00
4	3" Cl. 160 P.V.C. Pipe	79,200	L.F.	0.78	61,776.00
5	2½" Cl. 160 P.V.C. Pipe	103,900	L.F.	0.67	69,613.00
6	2" Cl. 200 P.V.C. Pipe	8,700	L.F.	0.59	5,133.00
7	2" Cl. 160 P.V.C. Pipe	89,600	L.F.	0.58	51,968.00
8	1½" Cl. 200 P.V.C. Pipe	158,700	L.F.	0.50	79,350.00
9	8" M.J. Butterfly Valve	3	Ea.	300.00	900.00
10	6" M.J. Butterfly Valve	10	Ea.	200.00	2,000.00
11	4" M.J. Butterfly Valve	13	Ea.	175.00	2,275.00
12	3" G.J. Gate Valve	10	Ea.	150.00	1,500.00
13	2' G.J. Gate Valve	16	Ea.	125.00	2,000.00
14	2" G.J. Gate Valve	21	Ea.	100.00	2,100.00
15	1½" S.J. Gate Valve	30	Ea.	80.00	2,400.00
16	1½" E.O.L. Cleanout	57	Ea.	100.00	5,700.00
17	5/8" x 3/4" Meter	182	Ea.	50.00	9,100.00
18	Inside Meter Setting	74	Ea.	50.00	3,700.00
19	Inside Setting w/Tdm. Setter	71	Ea.	80.00	5,680.00
20	Pasture Meter Setting	18	Ea.	150.00	2,700.00
21	Pasture Setting w/Tdm. Setter	19	Ea.	200.00	3,800.00

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<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extension</u>
22	Service Line 1½" P.V.C. Pipe	36,000	L.F.	\$ 0.50	\$18,000.00
23	1" Master Meter	1	Ea.	1,800.00	1,800.00
24	Air Release Valve	12	Ea.	400.00	4,800.00
25	Pressure Reducing Valve (2")	1	Ea.	4,000.00	4,000.00
26	Booster Station, 50 gpm	1	Ea.	25,000.00	25,000.00
27	Highway Service Crossing	14	Ea.	500.00	7,000.00
28	Hwy. Crossing, 10" St. Enc.	1	Ea.	1,500.00	1,500.00
29	Hwy. Crossing, 8" St. Enc.	3	Ea.	1,200.00	3,600.00
30	Hwy. Crossing, 6" St. Enc.	8	Ea.	1,000.00	8,000.00
31	Hwy. Crossing, 4" St. Enc.	6	Ea.	750.00	4,500.00
32	R.R. Crossing, 10" St. Enc.	1	Ea.	2,000.00	2,000.00
33	R.R. Crossing, 8" St. Enc.	2	Ea.	1,700.00	3,400.00
34	R.R. Crossing, 6" St. Enc.	4	Ea.	1,300.00	5,200.00
35	R.R. Crossing, 4" St. Enc.	2	Ea.	1,100.00	2,200.00
36	Stream Crossing, 6" P.V.C. Enc.	2	Ea.	400.00	800.00
37	Stream Crossing, 4" P.V.C. Enc.	4	Ea.	300.00	1,200.00
38	Elevated Res. (75,000 gal)	1	Ea.	85,000.00	85,000.00
39	Standpipe Res. (10' x 100')	1	Ea.	45,000.00	45,000.00
40	Flush Hydrants (4")	2	Ea.	1,000.00	<u>2,000.00</u>

TOTAL DISTRIBUTION SYSTEM CONSTRUCTION COST = \$ 841,185.00

WATER TREATMENT PLANT & INTAKE EQUIPMENT:

1	Water Treatment Units	Lump Sum	85,000.00
2	Raw Water Pumps (2)	Lump Sum	8,000.00
3	High Service Pumps (3)	Lump Sum	13,000.00

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4	Alum Feeders (2)	Lump Sum	\$ 5,000.00
5	Chlorine Systems (2)	Lump Sum	5,000.00
6	Automatic Valves	Lump Sum	4,000.00
7	Pressure Control Valves	Lump Sum	1,000.00
8	Air/Air Vacuum Release Valves	Lump Sum	800.00
9	Radio Control System	Lump Sum	<u>15,000.00</u>
	TOTAL PLANT EQUIPMENT COST		= \$ 136,800.00

1	Mobilization	Lump Sum	3,000.00
2	Site Site Work, Fencing & Seeding	Lump Sum	2,000.00
3	Site Earthwork	Lump Sum	15,000.00
4	Excavation	Lump Sum	2,000.00
5	Reinforced Concrete, Type I	Lump Sum	30,000.00
6	Non-Rein. Concrete, Type III	Lump Sum	3,000.00
7	Yard Piping & Plumbing	Lump Sum	5,000.00
8	Plant Piping & Valves	Lump Sum	18,000.00
9	Electrical, Heating, Ve.t & A.C.	Lump Sum	14,000.00
10	Misc. Metal Work	Lump Sum	4,000.00
11	Plant Bldg., Fixtures & Furn.	Lump Sum	65,000.00
12	Intake Bldg., Fixtures & Furn.	Lump Sum	14,000.00
13	Intake Casing Lines	Lump Sum	30,000.00
14	Raw Water Trans. Main	Lump Sum	<u>16,000.00</u>
	TOTAL		\$ 221,000.00
	TOTAL PLANT EQUIPMENT COST		<u>136,800.00</u>
	TOTAL TREATMENT PLANT CONSTRUCTION COST		357,800.00
	TOTAL DISTRIBUTION SYSTEM CONSTRUCTION COST		<u>841.185.00</u>
	TOTAL CONSTRUCTION COST		\$ 1,198,985.00

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TOTAL CONSTRUCTION COST	1,198,985.00
Engineering (\$65,400 plus 5.25% of const. cost over 1 M	76,000.00
Geological Investigations	4,000.00
Legal @ 1½%	18,000.00
Abstracting	5,000.00
Land Acquisition	5,000.00
Inspection	30,000.00
Construction Interest	40,000.00
Repayment of loan for well drilling	8,000.00
First Year Payment (Interest Only)	30,000.00
First Year's Operation	25,000.00
Contingencies	<u>30,000.00</u>
 TOTAL PROJECT COST	 \$ 1,469,985.00
 District Contribution (\$300.00 x 181 Users)	 54,600.00
Fairfax Contribution	<u>48,000.00</u>
Total Contribution	\$ 102,600.00
 Total Federal Funds Required	 = \$ 1,367,385.00
Funds/User Required (182 Users)	= \$ 7,513.00

B. ALTERNATE NO. 3

DISTRIBUTION SYSTEM

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extension</u>
1	6" Cl. 160 P.V.C. Pipe	78,300	L.F.	1.85	144,855.00
2	4" Cl. 160 P.V.C. Pipe	40,500	L.F.	1.05	42,525.00
3	3" Cl. 200 P.V.C. Pipe	1,600	L.F.	0.85	1,360.00
4	3" Cl. 160 P.V.C. Pipe	98,200	L.F.	0.78	76,596.00
5	2½" Cl. 200 P.V.C. Pipe	16,800	L.F.	0.72	12,096.00
6	2½" Cl. 160 P.V.C. Pipe	105,600	L.F.	0.67	70,752.00
7	2" Cl. 200 P.V.C. Pipe	20,500	L.F.	0.59	12,095.00
8	2" Cl. 160 P.V.C. Pipe	84,000	L.F.	0.58	48,720.00
9	1½" Cl. 200 P.V.C. Pipe	158,300	L.F.	0.50	79,150.00
10	6" M.J. Butterfly Valve	9	Ea.	200.00	1,800.00
11	4" M.J. Butterfly Valve	5	Ea.	175.00	875.00
12	3" G.J. Gate Valve	17	Ea.	150.00	2,550.00
13	2½" G.J. Gate Valve	19	Ea.	125.00	2,375.00
14	2" G.J. Gate Valve	20	Ea.	100.00	2,000.00
15	1½" S.J. Gate Valve	30	Ea.	80.00	2,400.00
16	1½" E.O.L. Cleanout	59	Ea.	100.00	5,900.00
17	5/8" x 3/4" Meter	181	Ea.	50.00	9,050.00
18	Inside Meter Setting	54	Ea.	50.00	2,700.00
19	Inside Meter Setting w/ Tdm Str.	90	Ea.	80.00	7,200.00
20	Pasture Meter Setting	12	Ea.	150.00	1,800.00
21	Pasture Meter Stg., w/Tdm. Str.	25	Ea.	200.00	5,000.00
22	Service Line 1½" P.V.C. Pipe	36,000	L.F.	0.50	18,000.00

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Extension</u>
23	1" Master Meter	1	Ea.	1,800.00	1,800.00
24	Air Release Valve	11	Ea.	400.00	4,400.00
25	Pressure Reducing Valve (2")	1	Ea.	4,000.00	4,000.00
26	Highway Service Crossing	13	Ea.	500.00	6,500.00
27	Hwy. Crossing 10" St.Enc.	5	Ea.	1,500.00	7,500.00
28	Hwy. Crossing 6" St.Enc.	6	Ea.	1,000.00	6,000.00
29	Hwy. Crossing 4" St.Enc.	5	Ea.	750.00	3,750.00
30	R.R. Crossing 10" St. Enc.	1	Ea.	2,000.00	2,000.00
31	R.R. Crossing 8" St. Enc.	1	Ea.	1,700.00	1,700.00
32	R.R. Crossing 6" St. Enc.	3	Ea.	1,300.00	3,900.00
33	R.R. Crossing 4" St. Enc.	2	Ea.	1,100.00	2,200.00
34	Str. Crossing 6" P.V.C. Enc.	3	Ea.	400.00	1,200.00
35	Str. Crossing 4" P.V.C. Enc.	4	Ea.	300.00	1,200.00
36	Elevated Res. (100,000 gal.)	1	Ea.	110,000.00	110,000.00
37	Flush Hydrants (4")	1	Ea.	1,000.00	1,000.00
38	3 - 120 gpm Wells & Equip.	Lump Sum			85,000.00
	TOTAL CONSTRUCTION COST				\$791,949.00
	Engineering (\$36,650 plus 5.75% of Const. cost over 5 M)				53,500.00
	Geological Investigations				2,000.00
	Legal @ 1½%				12,000.00
	Abstracting				5,000.00
	Land Acquisition				5,000.00
	Inspection				20,000.00
	Construction Interest				30,000.00

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Repayment of Loan for Well Drilling		8,000.00
First Year Payment (Interest Only)		22,000.00
First Year Operation		14,000.00
Contingencies		<u>25,000.00</u>
TOTAL PROJECT COST		\$ 988,449.00
District Contribution (\$300.00 x 181 users)	=	54,300.00
Fairfax Contribution	=	<u>30,000.00</u>
Total Contribution	=	\$ 84,300.00
Total Federal Funds Required	=	904,149.00
Funds/User Required (181 Users)	=	4,995.30

SECTION V - OPERATION & MAINTENANCE

A. Alternate No. 1

1. WATER USE:

Rural Units		
182 Units @ 300 gpd/Unit	=	54,600 gpd
City of Fairfax		
200 People x 75 gpd	=	15,000 gpd
Total Estimated Average Water Use	=	69,600 gpd

Use 70,000 gpd or 2,100,000 gals./month average water use.

2. ELECTRICAL COST:

Treatment Plant (Assume 12 hrs./day operation or 360 hrs./month)

Plant Building:

Lighting	=	5 KW
Heating	=	10 KW
Misc. Equip.	=	<u>5 KW</u>
Total	=	20 KW

KWH = 20 KW x 360 hrs. = 7,200 K.W.H.

Cost = 7,200 KWH x \$0.04/KWH = \$288.00/month

Intake Building:

Lighting	=	0.7 KW
Heating	=	3.0 KW
Misc. Equip.	=	<u>2.0 KW</u>
Total	=	5.7 KW

KWH = 5.7 KW x 360 hrs. = 2052 K.W.H.

Cost = 2052 KWH x \$0.04/KWH = \$82.00/month

Raw Water Pumps:

Pumping Time = $\frac{70,000 \text{ GPD}}{120 \text{ GPM} \times 60 \text{ min.}}$ = 10 hrs./day

Pumping Head		
Treatment Plant Elev.	=	1800 U.S.G.S.
Raw Water Intake	=	1310 U.S.G.S.

Static Head	=	490 feet
Head Required at Plant	=	20 feet
Friction Loss	=	<u>15 feet</u>

Total Working Head	=	525 feet
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Pump Size:

$\frac{525' \text{ T.W.H.} \times 120 \text{ gpm}}{3960 \times 65\% \text{ Eff.}}$	=	25 H.P.
--	---	---------

Use 25 H.P. Motors

Pumping Cost:

Input	=	25 H.P.
Time	=	10 hrs./day = 300 hrs./month
K.W.	=	25 H.P. x .746 = 19 K.W.
K.W.H.	=	19 K.W. x 300 hrs. = 5700 K.W.H.
Cost	=	5700 K.W.H. x \$0.04/KWH = \$228/month

High Service Pumps:

Pumping Head		
Top of Main Reservoir	=	2070 U.S.G.S.
Plant Elevation	=	<u>1800 U.S.G.S.</u>

Static Head	=	270 feet
Friction Loss	=	<u>50 feet</u>
Total Working Head	=	320 feet

Pump Size:

$\frac{320 \text{ TWH} \times 120 \text{ GPM}}{3960 \times 65\% \text{ Eff}}$	=	15 H.P.
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Use 15 H.P. Motors

Pumping Cost:

Input	=	15 H.P.
Time	=	10 hrs./day = 360 hrs./month
K.W.	=	15 H.P. x .746 = 11 K.W.
K.W.H.	=	11 K.W. x 300 hrs = 3300 K.W.H.
Cost	=	3300 K.W.H. x \$0.04/KWH = \$132.00/month

TOTAL TREATMENT PLANT POWER COST:

Plant Building	=	\$288.00/month
Intake Building	=	\$ 82.00/month
Raw Water Pumps	=	\$228.00/month
High Service Pumps	=	\$132.00/month

Booster Pump:

Pumping Time = $\frac{15,300 \text{ gals.}}{50 \text{ gpm} \times 60 \text{ min.}}$ = 5 hrs./day

Pumping Head
 Top of Elevated Reservoir = 2165 U.S.G.S.
 Booster Station Elevation = 1960 U.S.G.S.

Static Head = 205 feet
 Friction Loss = 20 feet

Total Head = 225 feet
 Less Incoming Head = 68 feet

Total Working Head = 157 feet

Pump Size

$\frac{157 \text{ T.W.H.} \times 50 \text{ gpm}}{3960 \times 65\% \text{ Eff}}$ = 3.0 H.P.

Use 3 H.P. Motors

Pumping Cost:

Input	=	3.0 H.P.
Time	=	5 hrs./day = 150 hrs./month
K.W.	=	3.0 H.P. $\times$.746 = 2.24 K.W.
K.W.H.	=	2.24 K.W. $\times$ 150 hrs. = 336 K.W.H.
Cost	=	336 K.W.H. $\times$ \$0.04/K.W.H. = \$13.44/Month

SUMMARY OF POWER COST:

Treatment Plant Power Cost	=	\$730.00/month
Distribution Pumping Cost	=	<u>13.44/month</u>
TOTAL POWER COSTS		\$743.44/month

3. CHEMICAL COST:

Alum:

Feed Rate = 10 ppm or 0.075 lbs./1000 gals.
Daily Use = 70,000 gals./day x 0.075 lb/1,000 gals.
= 5.25 lbs./day
Daily Cost = 5.25/lbs./day x \$8.60/100 lbs. = \$0.45/day

Polyelectrolyte:

Feed Rate = .004 lbs./1,000 gals.
Daily Use = 70,000 gals./day x .004 lbs./1000 gals.
= 0.3 lbs./day
Daily Cost = 0.3 lbs/day x \$30.00/100 lbs. = \$0.09/day

Sodium Fluoride:

Feed Rate = .005 lbs./1,000 gals.
Daily Use = 70,000 gals./day x .005/1,000 gals.
= 0.35 lbs./day
Daily Cost = 0.35 lbs./day x \$40.70/100 lbs. = \$0.14/day

Chlorine:

Feed Rate = 20 ppm or .15 lbs./1000 gals.
Daily Use = 70,000 gals./day x .15 lbs./1000 gals.
= 10.5 lbs./day
Daily Cost = 10.5 lbs./day x \$21/150 lbs. = \$1.47/day

Summary of Chemical Costs:

Alum	=	\$ 0.45/day
Polyelectrolyte	=	0.09/day
Sodium Fluoride	=	0.14/day
Chlorine	=	<u>1.47/day</u>
Total	=	\$ 2.15/day = \$64.50/month or \$0.03/1000 gals.

4. MANAGEMENT COSTS:

Maintenance	
Labor and Mileage	\$800.00/Month
Clerical	400.00/Month
Office Supplies	15.00/Month
Insurance and Bonds	50.00/Month
Miscellaneous	<u>15.00/Month</u>
TOTAL	\$1,280.00/Month

5. OPERATION AND MAINTENANCE SUMMARY:

Electrical Costs	\$743.44/Month
Chemical Costs	64.50/Month
Management Costs	<u>1,280.00/Month</u>
TOTAL O & M	\$2,087.94/Month

Fairfax O & M Share (15,000 gpd/69,000 gpd or 21.6%) = \$ 5,399.84/Year

Rural O & M Share (54,600 gpd/69,600 gpd or 78.4%) = \$19,655.44/Year

or \$9.00/Mo./User

B. Alternate No. 3

1. WATER USE: Same as shown for Alternate No. 1

Average Water Use = 70,000 Gals./day

2. ELECTRICAL COSTS:

Well Pumps:

Pumping Time = $\frac{70,000 \text{ gals.}}{120 \text{ gpm} \times 60 \text{ min.}}$ = 10 hrs./day
= 300 hrs./month

Pumping Head:

Top of Elevated Reservoir = 2165 U.S.G.S
Elevation of Wells = 2140 U.S.G.S.
Well Depth = 100 feet

Static Head = 125 feet
Friction Loss = 60 feet

Total Working Head = 185 feet

Pump Size :

$\frac{185 \text{ TWH} \times 120 \text{ GPM}}{3960 \times 65\% \text{ Eff.}}$ = 8.6 H.P.

Use 10 H.P. Motors

Pumping Cost:

Input = 8.6 H.P.
Time = 10 hrs./day = 300 hrs./month
K.W. = 8.6 H.P. x .746 = 6.42 K.W.
K.W.H. = 6.42 K.W. x 300 hrs. = 1926 K.W.H.
Cost = 1926 K.W.H. x \$0.05/KWH = \$77.04/Month

Well House Electrical:

Lighting = 0.5 K.W.
Heating = 2.0 K.W.
Misc.Equip. = 2.0 K.W.
TOTAL = 4.5 K.W.

K.W.H. = 4.5 K.W. x 360 hrs. = 1620 K.W.H.
Cost = 1620 K.W.H. x \$0.04/KWH = \$64.80/month

Summary of Power Costs:

Well Pumping Cost = \$77.04/Month
Well House Electrical Cost = 64.80/month
Total Power Cost = 141.84/month

3. CHEMICAL COSTS:

Chlorine:

Feed Rate	=	20 ppm or .15 lbs./1000 gals.
Daily Use	=	70,000 gals./day x .15 lbs/1000 gals.
	=	10.5 lbs./day
Daily Cost	=	10.5 lbs./day x \$21/150 lbs, = \$1.47/day
		= 44.10/Month

4. MANAGEMENT COSTS:

Maintenance:

Labor & Mileage	\$500.00/month
Clerical	400.00/month
Office Supplies	15.00/month
Insurance & Bonds	30.00/month
Miscellaneous	15.00/month
	<u>\$960.00/month</u>

5. OPERATION AND MAINTENANCE SUMMARY:

Electrical Costs	=	\$141.84/month
Chemical Costs	=	44.10/month
Management Costs	=	<u>960.00/month</u>
TOTAL O & M		\$1,145.94/month
		\$13,751.28/year
Fairfax O & M Share (21.6%)		\$ 2,970.28/year
Rural O & M Share (78.4%)		\$10,781.00/year
or		\$ 4.96/mo./user

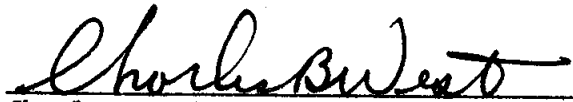
SECTION VI - RECOMMENDATIONS

The East Gregory County Rural Water District and the Farmers Home Administration should review the water quality data and cost estimates as presented in this report and decide on a course of action. Only the District, guided by the Farmers Home Administration, can choose between Alternate No. 1 and Alternate No. 3. The choice between the surface water source and the ground water source is completely contingent upon the nitrate level in the aquifer. If the nitrate level was less than the recommended maximum contaminant level, we would certainly suggest that the wells be used as the supply. However, since there is some question as to the water quality, we can only present the data available and let the District make the decision between the two alternates.

We suggest that this report be studied carefully, to determine the most viable solution to the water supply problems in East Gregory County.

Respectfully Submitted,

BARTLETT & WEST, CONSULTING ENGINEERS, P.A.



Charles B. West, P.E.



Michael K. Dunnaway, E.I.T.

SECTION VII - APPENDIX

A. PUBLIC HEALTH ASPECTS OF NITRATE IN DRINKING WATER

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PUBLIC HEALTH ASPECTS OF NITRATE IN DRINKING WATER:

Current Research and Recommendations

by

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Nitrate in drinking water was first associated in 1945 with a temporary, but sometimes fatal, blood disorder in infants. Since then, approximately 2,000 cases of this disease, infantile methemoglobinemia, have been reported from North American and Europe(1) and about 7-8% of the infants died(2,3,4). Because the disease is not required to be reported, we have no idea of its true incidence, but one investigator estimates that the reported cases represent only 10% of those observed(3).

In an effort to prevent this disease, public health officials have set recommended limits for nitrate in water that is to be used for infant feeding. When limits such as the nitrate recommendation are exceeded in public water supplies it is the water suppliers along with local health officials who are out front on the "firing line." It seems appropriate, therefore, to bring this group up-to-date on the basis for the recommended limit for nitrate in drinking water.

Nitrate, Nitrite and Methemoglobin

A basic knowledge of the development of the disease is essential to understanding the rationale behind protective measures (Figure 1). The development of methemoglobinemia, largely confined to infants less than three months old, is dependent upon the bacterial conversion of the

relatively innocuous nitrate ion to nitrite. Nitrite then converts hemoglobin, the blood pigment that carries oxygen from the lungs to the tissues, to methemoglobin. Because the altered pigment can no longer transport oxygen, the physiologic effect of methemoglobinemia is that of oxygen deprivation, or suffocation.

There are several physiological and biochemical features of early infancy that explain the susceptibility of the infant less than three months of age to this disorder. First, the infant's total fluid intake per body weight is approximately three times that of an adult(5). In addition, the infant's incompletely developed capability to secrete gastric acid allows the gastric pH to become high enough (pH of 5-7) to permit nitrate-reducing bacteria to reside in the high gastrointestinal tract. From this position, the bacteria are able to reduce the nitrate before it is absorbed into the circulation(6). To further predispose the infant, the predominant form of hemoglobin at birth, hemoglobin F (fetal hemoglobin), is more susceptible to methemoglobin formation than the adult form of hemoglobin (Hemoglobin A)(7). Finally, there is decreased activity in the enzyme predominantly responsible for the normal methemoglobin reduction (NADH-dependent methemoglobin reductase)(8).

The variables involved in the development of a case of methemoglobinemia can be grouped into 1) factors that influence dose, 2) factors that influence the bacterial reduction of nitrate to nitrite, and 3) factors involved in the biochemical equilibrium of hemoglobin and methemoglobin. Control over any one of the groups of variables would reduce the incidence or even prevent the disease, but from a practical standpoint, preventive measures are centered on factors that determine the dose of nitrate. Because the level of nitrate in drinking water is the initial factor determining dose, the recommended limit for nitrate in drinking water is of prime importance in preventing the disease.

Ideally, the most appropriate recommended limit would be one that offered maximum protection to infants while at the same time is not so stringent as to impose unnecessary burdens on water suppliers or owners of private wells. Of the number of ways to determine how much protection is offered at various levels of nitrate in water, I will discuss three.

Retrospective Epidemiology

The retrospective epidemiologic method has been used most extensively, and consists of collecting reported

cases of infantile methemoglobinemia and noting the level of nitrate in the water associated with each case. In 1962, Sattelmacher(3) compiled all the reported cases from 14 different countries. Of the 1,060 cases he collected, in only 467 (44.0%) were the nitrate levels recorded. Of these 467 cases, 39 cases (10.5%) were associated with nitrate in water below 100 mg/l. and 418 (89.5%) with over 100 mg NO_3^-/l . (Table 1)

In another retrospective study, Simon(4) collected by questionnaire 745 cases that had occurred in Germany, from 1956 to 1964. Of the 249 cases for which nitrate data was recorded, 4.4% of the cases were associated with water below 50 mg NO_3^-/l , 11.8% with nitrate between 50 and 100 mg/l, and the remaining 83.8% with nitrate over 100 mg/l. In this series, 2.7% of the 249 cases were associated with municipal water supplies. (Table 2)

Retrospective studies such as these have been useful, and to a large extent have been the basis for the USPHS recommended limit. These studies, however, have serious shortcomings. The main problem is that methemoglobinemia is so rare, that one physician will probably not see more than a few cases, and collections of cases are therefore comprised of the observations of many different persons. The result is a lack of uniformity in the data. For

example, some cases were not documented with methemoglobin determinations, while in other cases the possibility of exposure to methemoglobin-forming medicines was not ruled out. There are hereditary defects in the methemoglobin-reducing enzymes that result in increased susceptibility to nitrite-methemoglobinemia. In cases that are associated with very low levels of nitrate in the water, it would be especially interesting to have information on the activity of these methemoglobin-reducing enzymes. Finally, not only is the reproducibility of some types of nitrate determinations unsatisfactory, but also the water for nitrate analysis is sometimes collected weeks or months after the disease occurs, and the nitrate content by that time could be changed considerably(2).

Hypothetical Approach

Hypothetical toxicology, or the "armchair, slide-rule approach," is another method useful in determining safe limits. In the example that follows, the hypothetical dose of NO_3^- (mg/kg) capable of converting 10% of the total hemoglobin to methemoglobin is calculated. (Table 3) The 10% methemoglobin level is chosen because it is at this level that the disorder first becomes clinically detectable due to the methemoglobin producing a slate-grey appearance, or "cyanosis." The hemoglobin (gm/100 ml) per total body

weight (Hgb/BW) is calculated from 1) the hemoglobin concentration in the blood, 2) the total blood volume, and 3) the total body weight(5,9). Estimates on the molar ratio of the NO_2^- , hemoglobin reaction have varied from 1 mole NO_2^- for 2 moles hemoglobin(10), to 4 moles NO_2^- for 1 mole hemoglobin(11). Although still a debated topic, on the basis of reports from several investigators(12,13,14), a mole to mole ratio was chosen for this calculation. Corrected for molecular weight, 0.7 mg of nitrite should convert 1 gm of hemoglobin to methemoglobin. The number of mg NO_2^- /kg capable of converting 10% hemoglobin is then calculated from the Hgb/BW. The bacterial reduction of nitrate to nitrite has been estimated to be optionally 80%(15). Using this factor and correcting for molecular weight difference of the two anions, the hypothetical nitrate dose (mg/kg) capable of converting 10% hemoglobin to methemoglobin results. (Table 4) The average dose calculated at various ages is approximately 2 mg NO_3^- /kg. Because enzymes in the red cells are continuously reducing methemoglobin, this dose must be delivered periodically to keep the methemoglobin level elevated. The rate of methemoglobin reduction in an infant is hard to evaluate(16), but for purposes of this calculation it is assumed that this nitrite-produced methemoglobin (i.e. 1.0-1.5 gm/100 cc) can be reduced every four hours. This four-hour interval corresponds

approximately to the time between feedings, and if the 2 mg/kg NO_3^- dose is given with each bottle, it is theoretically possible that the infant will remain "barely-blue." Figuring a maximum of six feedings per day, a 24-hour dose of approximately 10-15 mg NO_3^- /kg is derived.

With so many assumptions, such calculated doses must be interpreted with caution. There are some variables that, for lack of data, I have not attempted to build into the calculation. One such factor, the renal loss of NO_2^- would make the calculated dose too low, while another, the increased susceptibility of fetal hemoglobin to methemoglobin formation, would tend to make the dose too high for the first few months. The hypothetical dose should be considered a very rough estimate and by itself cannot serve as a sound basis for a recommended limit.

Prospective Epidemiology

Although most expensive and time-consuming, the prospective epidemiologic method has the potential of yielding the most meaningful information. With this approach, a planned program of information collection is conducted in the real-life setting. Pertinent to the nitrate recommendation, we have recently conducted such a study(17) designed to determine the dose of nitrate (mg/kg) that

infants received from various concentrations of nitrate in the drinking water, and to ascertain the minimum dose of nitrate that can produce detectable methemoglobin elevations.

The study, conducted in both Southern California and Central Illinois, involved 111 infants with ages ranging from less than 2 weeks to 6 months of age. The mother of each infant was questioned concerning fluid intake of the infant in the past 24 hours, method of formula preparation, inclusion of any other source of nitrate in the diet such as vegetables, and administration of possible methemoglobin-forming medicines. The infant was then examined and weighed, and a sample of blood was obtained for hemoglobin and methemoglobin analysis. In addition, a sample of water used in the preparation of formula was taken and analyzed quantitatively for nitrate and bacteria.

For each infant, the dose of nitrate received from water during the previous twenty-four hours was calculated. The variables that determined the dose were the total daily fluid intake per body weight (TDFI), the percent of water comprising that intake, and the NO_3^- level in the water. (Table 5) Although not observed in our study, the TDFI is known to increase in hot climates(18) and with fever. The percent of TDFI comprised of water varied greatly depending

on feeding practices. The infants who were fed formula made with powder received about 90% of their TDFI from tap water; those fed formula made with concentrate or evaporated milk received about 50%, and babies who were breast-fed or given "ready-to-feed" formulas usually received less than 10% of TDFI from tap water. In a few cases, mothers boiled the water excessively before mixing it with the formula, increasing the nitrate concentration of the water by as much as 40%. Considering the combined effect of all these variables, (Figure 2) a dose of over 10 mg/kg can be obtained from water with nitrate as low as 50 mg/l.

In the study group, there were 63 infants who were exposed to less than 1.0 mg NO_3^- /kg, 23 infants exposed to between 1.0-4.9 mg NO_3^- /kg, 20 between 5.0-9.9 mg NO_3^- /kg, and 5 infants exposed to 10.0-15.5 mg NO_3^- /kg. There were three infants who appeared to have methemoglobin levels above normal due to nitrate in water. These infants were the three youngest of the five receiving a nitrate dose of over 10 mg/l. The highest methemoglobin level (5.3% compared to a normal range of 0-2.9%, mean 1.6%) was found in a 30-day old baby receiving 15.5 mg NO_3^- /kg from the water. When these infants were switched to low-nitrate water, their methemoglobin levels fell to within normal range. The infants had no signs of methemoglobinemia,

and also had no clinical evidence of a gastrointestinal upset. Were a gastrointestinal disturbance present, they would be expected to be more susceptible to methemoglobinemia from nitrate(6).

The Recommended Limit

The lack of reported cases of infantile methemoglobinemia in some locales with public water supplies exceeding the recommended limit, sometimes by a factor of two, suggested that the 45 mg/l recommendation on nitrate was too conservative and placed an unnecessary burden on water suppliers. Actually, when our review of the nitrate recommendation was initiated, it was with some hope that a higher level might be just as reasonable from the public health standpoint. A final decision on the most appropriate recommendation awaits the results of further research. At this time, however, there is insufficient evidence to permit us to raise the recommended limit, and there are some indications that the current recommendation may offer the respectable safety-factor needed to cover all reasonable situations.

Despite the shortcomings of the retrospective studies, it is hard to ignore the evidence suggesting that some cases of infantile methemoglobinemia may have been associated with nitrate levels only slightly above, and even below,

the current recommended limit. From our studies, there is the suggestion that daily nitrate doses of 10 or 15 mg/kg given to infants less than three months of age may cause elevations of methemoglobin above normal, and it is entirely possible to obtain such a dose from water with as little as 70-100 mg NO_3^-/l , providing powdered formula is used. If the water were boiled excessively or the infant's TDFI were elevated because of climate or fever, the 10-15 mg/kg dose could be obtained from substantially lower levels of nitrate in the tap water. In addition to nitrate from water, we must consider the possibility that infants may receive substantial quantities of nitrate from vegetables. In our study, 36% (16 of 45) of the mothers had introduced vegetables into the infant's diet by two months of age, and 45% (20 of 65) by three months. There are common medicines that are administered to infants (e.g., the antipyretic acetophenetidine, and the expectorant guaiacolate) that can form methemoglobin, and their effect compounding the nitrite reaction must also be considered.

The development of a case of methemoglobinemia from nitrate in drinking water is a complicated process depending on a number of steps and many variables. At each step, whether the formula preparation, bacterial reduction of nitrate, or the reactions of nitrite with hemoglobin, there

are variable, that determine if methemoglobinemia occurs or does not occur. The content of nitrate in drinking water is the initial, or index variable in this disease process; and the lower the nitrate level, the more things have to go wrong at various steps before the disease develops. The USPHS recommendation for a limit on nitrate in drinking water is based on the premise that we have little control over feeding practices or any of the other variables. The fact that there are no reported cases from some areas with nitrate routinely exceeding the recommended limit may be explained by protective factors that have occurred naturally. For example, in the areas we have studied that had the higher nitrate levels in the water, the use of powdered formula was quite rare. In addition, there is a trend toward increased use of "ready-to-feed" formulas, requiring no added water. In the study area with the highest water-nitrate, the water was objectionable, mainly because of hardness, and all who could afford to do so used bottled water for drinking and infant feeding purposes.

The application of the recommended limit to public water supplies understandably creates problems. Water suppliers and public health officials are not only faced with enforcing a recommendation that some have regarded as arbitrary, but if they do enforce it, new questions arise.

There is currently no well-proven, relatively economic method for removal of nitrate from drinking water, and enforcement of the limit eventually requires warning new parents to substitute an alternate source of water for tap water in infant feeding. Who should assume the responsibility for the warning? In two water supplies in Southern California, for example, a warning is printed on every water bill, and a further warning is sent to new parents from the county health department. And who is responsible for supplying an alternate source of water? While the owner of a private well with high-nitrate water pays for the bottled water he uses, a citizen served by a public water supply may reason that the water supplier has an obligation to supply the alternate source of water.

The long-range solution to the problem of nitrate in water, from both a public health and ecologic standpoint, is best served by enforcing the recommended limit and by solving the immediate problems this creates. However, with the water industry's goal to supply high quality water that can be used for any reasonable purpose, a warning on the water bill or the supply of an alternate source of water for infant feeding can only be viewed as undesirable, although necessary temporary measures. Our energies should

be directed to the development of economic nitrate-removal processes, and most important, to preventing further nitrate pollution of our water resources.

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DISTRIBUTION OF REPORTED CASES OF INFANTILE METHEMOGLOBINEMIA BY
NITRATE CONCENTRATION IN THE WATER - SATTELMACHER, 1962

	REPORTED CASES	DEATHS	NITRATE CONC. IN WATER, MG/L				
			UNKNOWN	KNOWN	0-40	41-80	81-100
NUMERICAL	1060	83	593	467	14	16	19
PERCENT	100	7.8	56.0	44.0	3.0*	3.4*	4.1*
							89.5*

* PERCENT OF CASES WITH NITRATE CONCENTRATION KNOWN

Table 1.

DISTRIBUTION OF REPORTED CASES ON INFANTILE METHEMOGLOBINEMIA

BY NITRATE CONCENTRATION IN WATER - SIMON, 1964

	REPORTED CASES	DEATHS	NITRATE CONC. IN WATER, MG/L			
			UNKNOWN	KNOWN	< 50	50-100 > 100
NUMERICAL	745	64	496	249	11	29 209
PERCENT	100	8.6	66.5	33.5	4.4*	11.8* 83.8*

* PERCENT OF CASES WITH NITRATE CONCENTRATION KNOWN

Table 2.

METHOD USED TO CALCULATE THE HYPOTHETICAL DOSE OF NO_3^- (MG/KG) CAPABLE
OF CONVERTING 10% HEMOGLOBIN (HGB) TO METHEMOGLOBIN (MHGB)

1. HGB/BODY WEIGHT (GMS/KG) =

$$\frac{\text{HGB CONCENTRATION (GMS/100 ML)} \times \text{BLOOD VOLUME (ML)} \times 0.01}{\text{BODY WEIGHT (KG)}}$$

2. NO_2^- (MG) TO CONVERT 1 GM HGB =

$$\frac{1 \text{ GMW NO}_2^-}{1 \text{ GMW HGB}} = \frac{46,000 \text{ MG}}{68,000 \text{ GM}} = 0.7 \text{ MG NO}_2^-/\text{GM HGB}$$

3. NO_2^- (MG/KGM) NECESSARY TO CONVERT 10% HGB =

$$0.1 \times \text{HGB/BODY WEIGHT (GM/KG)} \times 0.7 \text{ MG NO}_2^-/\text{GM HGB}$$

4. NO_3^- (MG/KGM) DOSE CAPABLE OF CONVERTING 10% HGB -- MHGB =

$$\text{NO}_2^- \text{ (MG/KG) (FROM \#3)} \times 1.7^*$$

* CORRECTION FOR MOLAR CONVERSION TO NO_3^- (1.35) AND CORRECTION FOR 80%
EFFICIENCY OF BACTERIAL REDUCTION (1.25) = 1.7.

Table 3.

HYPOTHETICAL DOSE OF NO₃⁻ (MG/KG) CAPABLE OF CONVERTING 10% HGB → M_{HGB}, BY AGE

AGE	TBW (KG)	HGB (GM/100 ML)	BLOOD VOLUME (L)	HGB/TBW (GM/KG)	NO ₃ ⁻ (MG/KG) 10% HGB-M _{HGB}	(NO ₃ ⁻ MG/KGM) 10% HGB-M _{HGB}	NO ₃ ⁻ -MG/KG PER 24 HRS.
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Months

1	3.6	16	500	22.2	1.6	2.7	16.2
2	4.5	12	550	14.7	1.0	1.7	10.2
3	5.4	11	600	12.2	0.9	1.5	9.0
5	6.8	11	750	12.2	0.9		
10	9.5	12	1000	12.7	0.9		

Years

3	14.1	13	1500	13.8	1.0		
5	20.4	13	2250	14.4	1.0		
ADULT	70.0	14	6300	12.6	0.9		

Total 4.

THE VARIABLES THAT DETERMINE THE DOSE OF NITRATE

1. TOTAL DAILY FLUID INTAKE (l) PER BODY WEIGHT (KG) (TDFI):
INCREASES IN HOT, ARID CLIMATE, OR WITH FEVER.
2. PERCENT TDFI COMPRISED OF TAP WATER, (% H₂O)
 - A) POWDERED FORMULA: TAP WATER COMPRISES 90% OF TDFI
 - B) CONCENTRATED FORMULA:
EVAPORATED MILK ; TAP WATER COMPRISES 50% OF TDFI
 - C) BREAST FEEDING ;
"READY-TO-FEED" FORMULA: TAP WATER COMPRISES 10% OF TDFI
3. NITRATE LEVEL OF WATER (MG/L), (NO₃⁻): INCREASES SUBSTANTIALLY WITH EXCESSIVE BOILING.
(RULE OF THUMB: 1% INCREASE / MINUTE BOILING)

$$\text{DAILY DOSE OF NO}_3^- \text{ (MG/KG)} = \text{TDFI, (l/KG)} \times \% \text{ H}_2\text{O} \times 100 \times \text{NO}_3^- \text{ (MG/L)}$$

Table 5.

BASIC REACTIONS IN THE DEVELOPMENT OF METHEMOGLOBINEMIA FROM NITRATE IN WATER

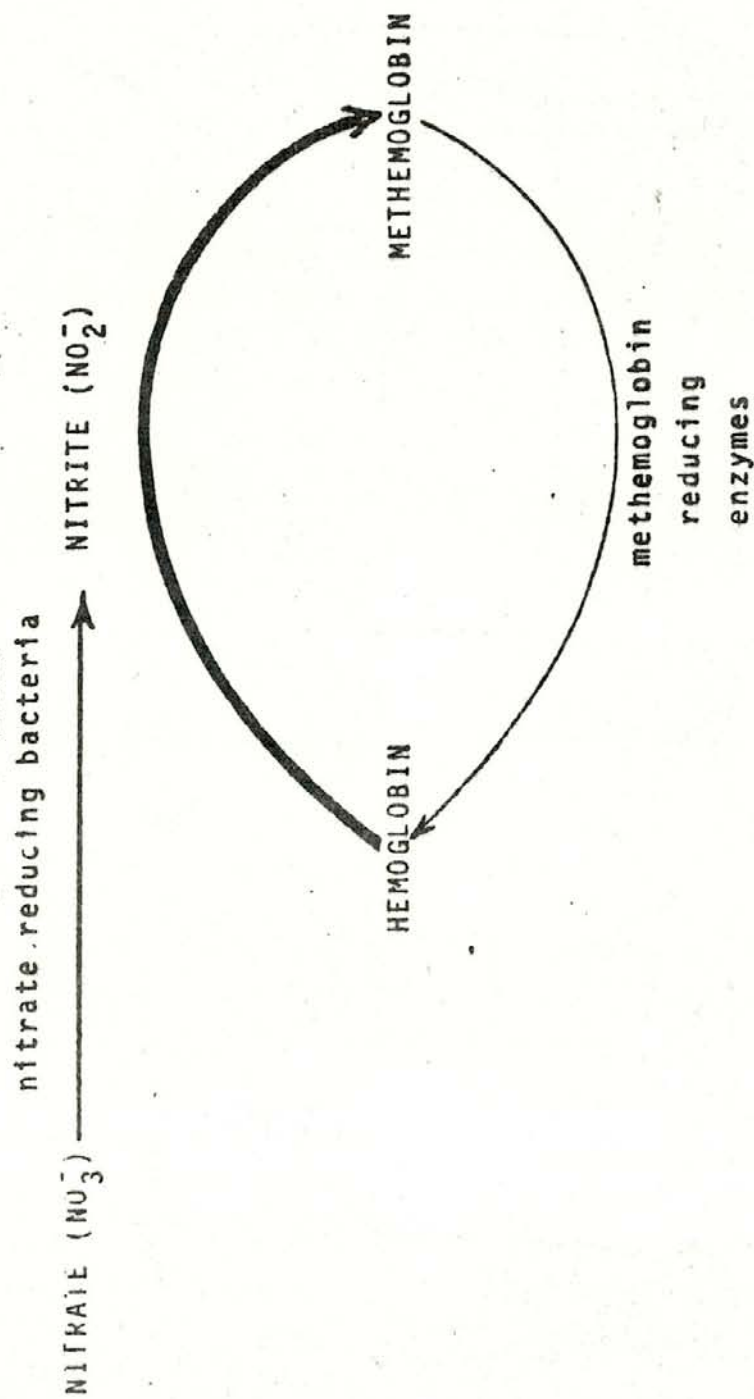
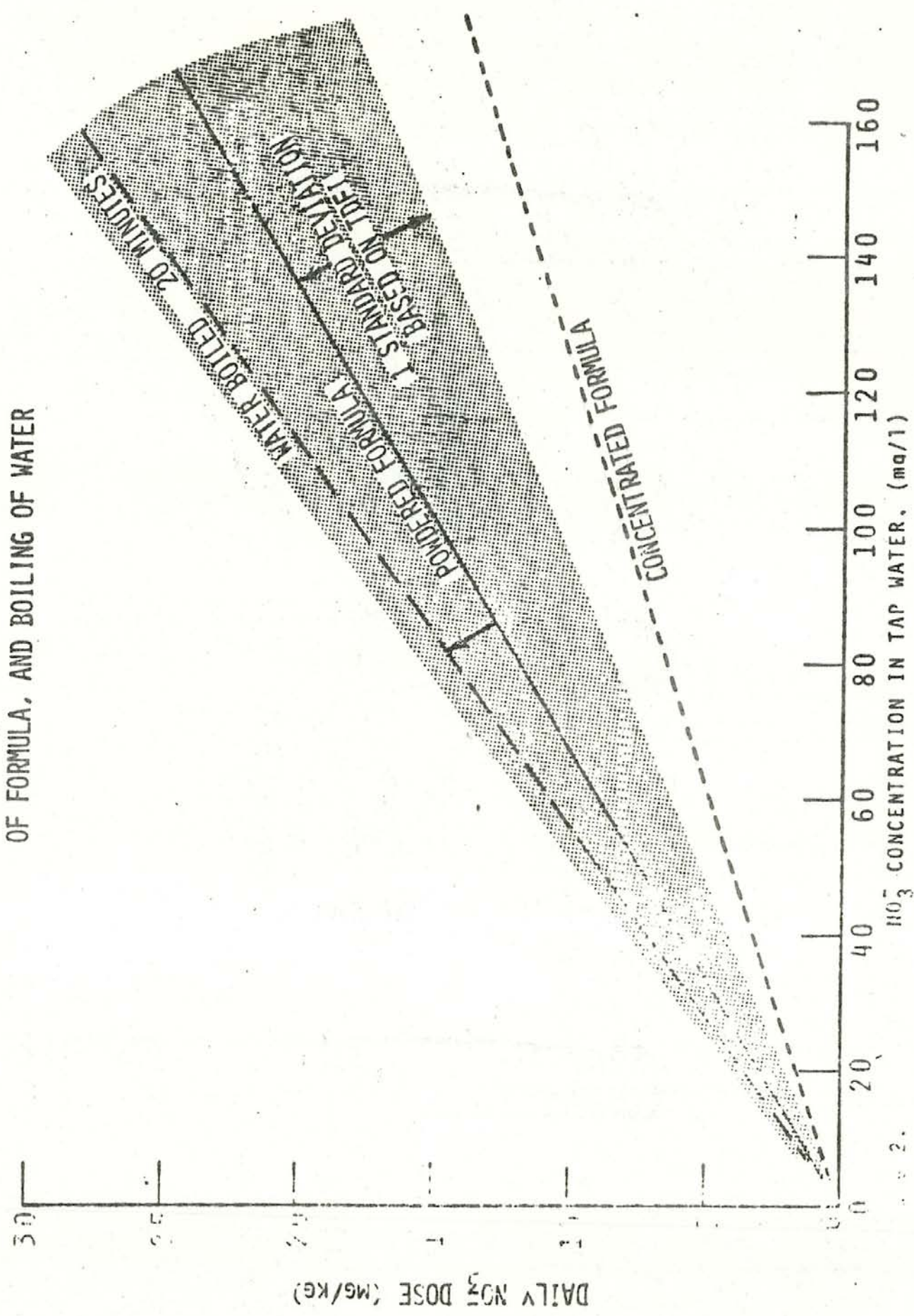


Figure 1.

DAILY NO_3^- DOSE (MG/KG) OF INFANTS UP TO 3 MONTHS OF AGE,
 AS INFLUENCED BY NO_3^- CONCENTRATION IN WATER (MG/L), TYPE
 OF FORMULA, AND BOILING OF WATER





1719-2
DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

August 24, 2017

1719-2
2435-2

Russ Phillips, Mgr
Tripp County Water User District
1052 W 1st St
Winner SD 57580

Dear Mr. Phillips:

I am writing in regard to Water Right Nos. 1719-2 and 2435-2, held by the East Gregory County Rural Water Association. Enclosed are copies of the water rights for your review.

On August 23rd, John Farmer, a staff engineer with our program spoke with you regarding the wells authorized under these water rights. It is our understanding the wells are now the property of the Tripp County Water User District. The water rights should be transferred to the district to reflect current ownership.

Enclosed are partially completed Notice of Transfer of Ownership forms for filing the ownership changes. Please complete as needed and return them to our office with a required filing fee of \$50.00 each (total of \$100). The check or money order for the fee can be made payable to the Water Rights Program.

If you have any questions regarding the enclosed materials, let me know. You can keep the copies of the water rights; the only things you need to return are the transfer forms and filing fees.

Sincerely,

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

enclosures

**Tripp County Water User District
1052 West 1st Street
Winner, South Dakota 57580**

RECEIVED 1719-2
SEP 19 2017
**WATER RIGHTS
PROGRAM**

Phone (605) 842-2755

Fax (605) 842-1621

September 12, 2017

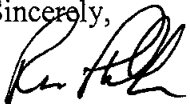
Chief Engineer
Water Rights Program, DENR
523 E. Capitol
Pierre, SD 57501-3181

RE: Water Right Transfer Ownership

Dear DENR,
Please find enclosed the paperwork to transfer the ownership of the old East Gregory RWS Water Rights to Tripp County Water User District. Also please find enclosed a check for \$100.00, which is to cover the filing fees.

Thank you

Sincerely,



Russ Phillips
Manager

RTP/lks

ENC: (2) Two - Notice to Transfer Ownership of Water Rights /CR# 20298 - \$100.00
CC: File

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date September 19 2017

RECEIVED OF Tripp County Water User District 1052 W 1st St Winner, SD 57580-2704

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

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	50	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. _____		
Fee for Filing Transfer Form <u>1719-2</u>		
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. _____	50	00
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	50 00

No. **08335**

By

Jeanne Goodman
Chief Engineer

vm

RECEIVED

SEP 19 2017

WATER RIGHTS
PROGRAM

NOTICE OF TRANSFER OF OWNERSHIP

To: Chief Engineer
Water Rights Program, DENR
523 E. Capitol
Pierre, SD 57501-3181

No. 1719-2

Date: 9/7/17

I/We request that Water Right No. 1719-2

formerly owned by: East Gregory County RWS

be transferred to: (name & address) Tripp County Water User Dist
1052 West 1st Street
Winner SD 57580 Telephone No. 842-2755

Title to the following described land(s)/property has been transferred as described above:

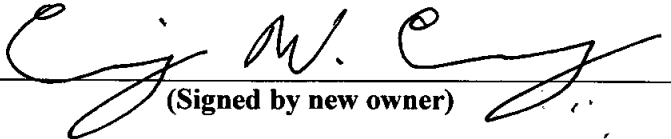
six wells located in the SW ¼ NE ¼ Section 6, T95N, R68W

I/We understand that the validity of Water Right No. 1719-2 has not been determined by this transfer action. If I/We have any questions on validity, I/We understand that only the Water Management Board has the authority to determine if a water permit/right is valid (see note).

You are requested to file this "Notice of Transfer" in the appropriate file with the Water Rights Program, as evidence of the change of ownership.

A fee of Fifty Dollars (\$50.00) is required to cover the filing fees as required under SDCL 46-2-13. This form must be signed by the new owner.

I/We Tripp County Water User, the new owner, certify that the above information is true and
Dist. correct.


(Signed by new owner)

NOTE: Water permits may be cancelled for nonconstruction after the five year construction period has expired. Once a water permit is developed and the water used, the permit becomes a right. A water right may be lost for three reasons:

1. Abandonment - no intent to use water and use is abandoned.
2. Forfeiture - no use of water for three year period without legal excuse.
3. For a third violation of a condition of a water permit/right.

1719-2



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

September 19, 2017

1719-2
2435-2

Russ Phillips, Mgr
Tripp County Water User District
1052 W 1st St
Winner SD 57580

Dear Mr. Phillips:

I am writing to acknowledge receipt of the transfer forms and filing fees you submitted for changing ownership on Water Right Nos. 1719-2 and 2435-2.

The ownership changes have been completed. Water Right Nos. 1719-2 and 2435-2, formerly held by East Gregory County RWS are now listed under Tripp County Water User District.

Thank you for following up on the ownership changes. Enclosed for your records are Receipt Nos. 08335 and 08336. If you have any questions, please contact me.

Sincerely,

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

enclosures