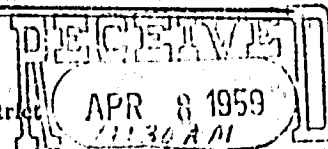


1. Considered June 17, 1959 Appl. No. 595-3
2. Name of Applicant City of Ouida
3. Post Office Address Ouida, South Dakota
4. Amount of water claimed 1.11
5. Source of water supply Surface formation
6. Water to be used for municipal
Acres to be irrigated _____
7. Water to be diverted and used in the city County about
miles of _____
8. Proof of Publication Received ✓
Not Received _____
9. Application Approved ✓
Subject to _____
Not approved _____
Action deferred _____

10. Remarks:

No. 595-EWater Division No. 3 Missouri River District
(Blanks to be filled by the Engineer for the W. R. C.)STATE WATER RESOURCES COMMISSION
PIERRE, SOUTH DAKOTA

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

(NOTE—Draw a line through items not applicable.)

1. Name of applicant CITY OF ONIDA
Postoffice address ONIDA, County SULLY, State SOUTH DAKOTA

I. If a corporation

(a) Name of same CITY OF ONIDA

(b) Date and place of incorporation

(c) Amount of capital stock

(d) Amount paid in

(e) Names and addresses of directors MAYOR: L. W. LEMMEL; COUNCILMEN: RAY BARTELS,WILBUR DAY, JOHN SCHAEFFER, ROBERT RAMLER, GERTRUDE SNELL, JAMES SUTTON, ALL OF
ONIDA, SOUTH DAKOTA

(NOTE—A certified copy of articles of incorporation must accompany the application.)

II. Method of accomplishing the work and financial resources of the applicant:

(a) Method of accomplishing work (Whether by contract, employment of others, or by direct labor)

CONTRACT

(b) Cash on hand, \$

(c) Treasury stock, \$

(d) Bonds to be issued, \$

(e) Other resources, BOND ISSUE \$125,000.002. Name of diversion work CITY WELL NO. 43. Amount of water claimed 500 gals. per min. or 1.11 cubic feet per second4. Source of water supply ARTESIAN GROUNDWATER (SUNDANCE FORMATION)5. Location of point of diversion Lot 3-4-5, Block 43, Court Addition SW 1/4 Sec. 1,2 T 114N R 72W on SULLY County.6. Annual period or periods during which water is to be used CONTINUOUSLY

7. To be used for:

I. Irrigation or domestic use: Gravity, overhead sprinkling or combination system?

(a) Number of acres to be irrigated _____ acres.

(b) Legal subdivisions to be irrigated

(NOTE—A list of lands to be irrigated, giving each subdivision and fraction with acreage thereof, should be written here, or may be appended as a part of this application. Same must also be shown on accompanying map.)

(c) Statement as to domestic use (giving location, etc.)

MUNICIPAL USE IN CITY OF ONIDA

II. Stockwatering, mining, milling, power, fish culture, fire protection and public recreation:

(a) Nature of use FIRE PROTECTION IN CITY

Name any of the above uses claimed

(b) Amount of power to be generated _____ horse power.

Amount claimed for engine cooling

(c) Location of plant

(d) Method of developing power

(e) Point where water will be returned to stream

Map No. 457-3

8. Estimated cost of work:

(a) Head Gates, \$----- Well \$20,000.00 (b) Pumping plant, \$-----
 (c) Fluming, \$----- (d) Canal-earth, \$----- Rock, \$-----
 (e) Other structures ----- \$----- Total, \$-----

9. Description of diversion works:

I. Nature of works: (Reservoir, dam, ditch, flume, pumping plant, etc.)

DEEP ARTESIAN WELL

II. Dimensions of works:

(a) Dam: Height ----- feet; length at bottom ----- feet; length at top ----- feet; thickness at bottom ----- feet; thickness at top ----- feet; slope at front water face -----; slope at back face ----- material used in construction -----
 (b) Reservoir: Capacity when filled ----- acre feet. Surface area at water mark ----- acres.

DEPTH AT OUTLET-Feet	SURFACE AREA AT EACH DEPTH AT OUTLET--ACRES	FEET	ACRE-Feet CAPACITY

(c) Head gate: Width ----- feet; height ----- feet; Material -----

(d) Canal: Total length ----- miles.

LOCATION BELOW HEADGATE	DEPTH	BOTTOM WIDTH	WIDTH AT WATER-LINE	GRADE PER MILE
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet

(Give dimensions where reductions in size are made.)

10. Time required for completion of work ONE years.
 11. Time required for complete application of water to the proposed beneficial use ONE years, additional.
 12. Choice of newspaper for publication of notice of intention to appropriate -----
ONIDA WATCHMAN, ONIDA, SOUTH DAKOTA

STATE OF SOUTH DAKOTA

County of SULLY

I, L. W. LEMMEL, ACTING FOR THE CITY OF ONIDA, SOUTH DAKOTA, being first duly sworn on my oath depose and say: That my relation to the above described undertaking is that of owner, that I have read the above foregoing statement, examined the map accompanying the same, and that I know of my own personal knowledge that the matters therein stated and shown are true.

Signed L. W. Lemmel

Subscribed and sworn to before me this 12 day of April 1959

Agnes A. Zinke
 Notary Public (or other qualified officer.)

REVISED MAY 25, 1959

9. (Continued)

III. Well Specifications

(a) Hole and casing

Size of drill hole or excavation 10" Hole 5-3/4" Hole Depth 400' 1650'
 Type of casing Steel: Grd. Surface - 400' Copper: Grd. Surface - 2050'
6" Steel (wood, concrete, steel, etc.) 0.280"
 Size of casing 2 1/2" Copper Thickness of casing 0.187" and 0.095"
 Length of casing See "Type" If collection gallery, length, size and depth of
Casing"
 gallery

(b) Screens

Type of perforated screen Perforated copper pipe
 Size of perforated screen 3" 30'
 (diameter) (length)
 Thickness of gravel pack None length of gravel pack

(c) Water Bearing Materials

Distance to water 1800' Character of water bearing materials
Sundance formation. Electric log of adjacent well, at
approx. 3' higher ground elevation, indicates "very coarse
sandstone and grit from 2020' to 2060'."
 Thickness of water bearing material 450 - 500 Feet

(d) Pump and Motor

Type of pump Flowing well
 (centrifugal, propeller, mixed flow, etc.)
 Name of pump size
 Kind of motor (gasoline, electric, diesel, etc.)
 Horsepower Name of Motor

(e) Complete well

Capacity at drawdown of Estimated cost

(f) Owner of land upon which well is located

Name

Address

(g) Distance to nearest existing wells in lineal feet

375' from Municipal Well #1 (Dakota-Lakota Sands)
 On same owner's property rods. On property owned by others rods
300' from Municipal Well #3 (Sundance Sands)

Form 2A — Wells (Supplement to Form 2)

9. (Continued)

III. Well Specifications

(a) Hole and casing

400 ft. 12 inch
Size of drill hole or excavation 1700 ft. 6 inch, Depth 2100 feet
Type of casing Copper (inner) Steel (outer) upper section.
(wood, concrete, steel, etc.)
400 ft. 8 in. steel
Size of casing 2100 ft. 4 in., Thickness of casing Standard weight
copper
Length of casing 2100 ft. total. If collection gallery, length, size and depth of
gallery

(b) Screens

Type of perforated screen Bronze or Stainless Steel; Johnson, or equal.
Size of perforated screen 3 inch (diameter), 20 ft. (length)
Thickness of gravel pack none, length of gravel pack

(c) Water Bearing Materials

Distance to water 2000 ft. Character of water bearing materials
Sundance Artesian formation

Thickness of water bearing material 100 feet

(d) Pump and Motor

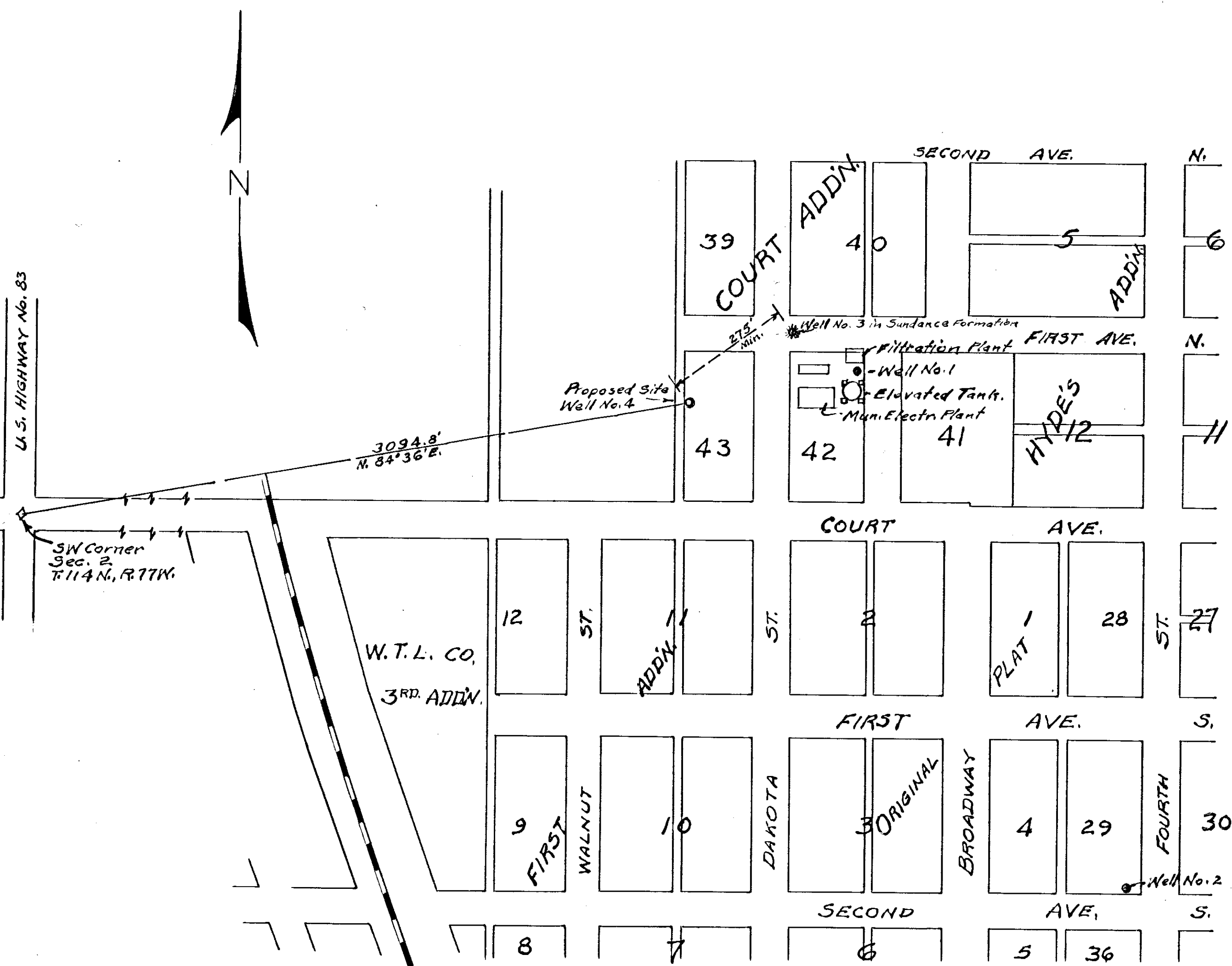
Type of pump none — flowing well expected
(centrifugal, propeller, mixed flow, etc.)
Name of pump, size
Kind of motor (gasoline, electric, diesel, etc.)
Horsepower, Name of Motor

(e) Complete well

Capacity, drawdown of, Estimated cost \$ 20,000

(f) Owner of land upon which well is located City of Onida
Name
Address

(g) Distance to nearest existing wells, in lineal feet
375 from Municipal Well No. 1
On same owner's property rods. On property owned by others rods
275 from Municipal Well in Sundance formation



LOCATION MAP
SCALE: 1"=200'

SURVEYOR'S CERTIFICATE

I, V.L. Rugg, a Registered Land Surveyor, do hereby certify that, at the request of the City of Onida, South Dakota, I determined the location of the site of the proposed Municipal Well No. 4 and prepared the above map, which is a true representation thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 4th day of April, 1959.

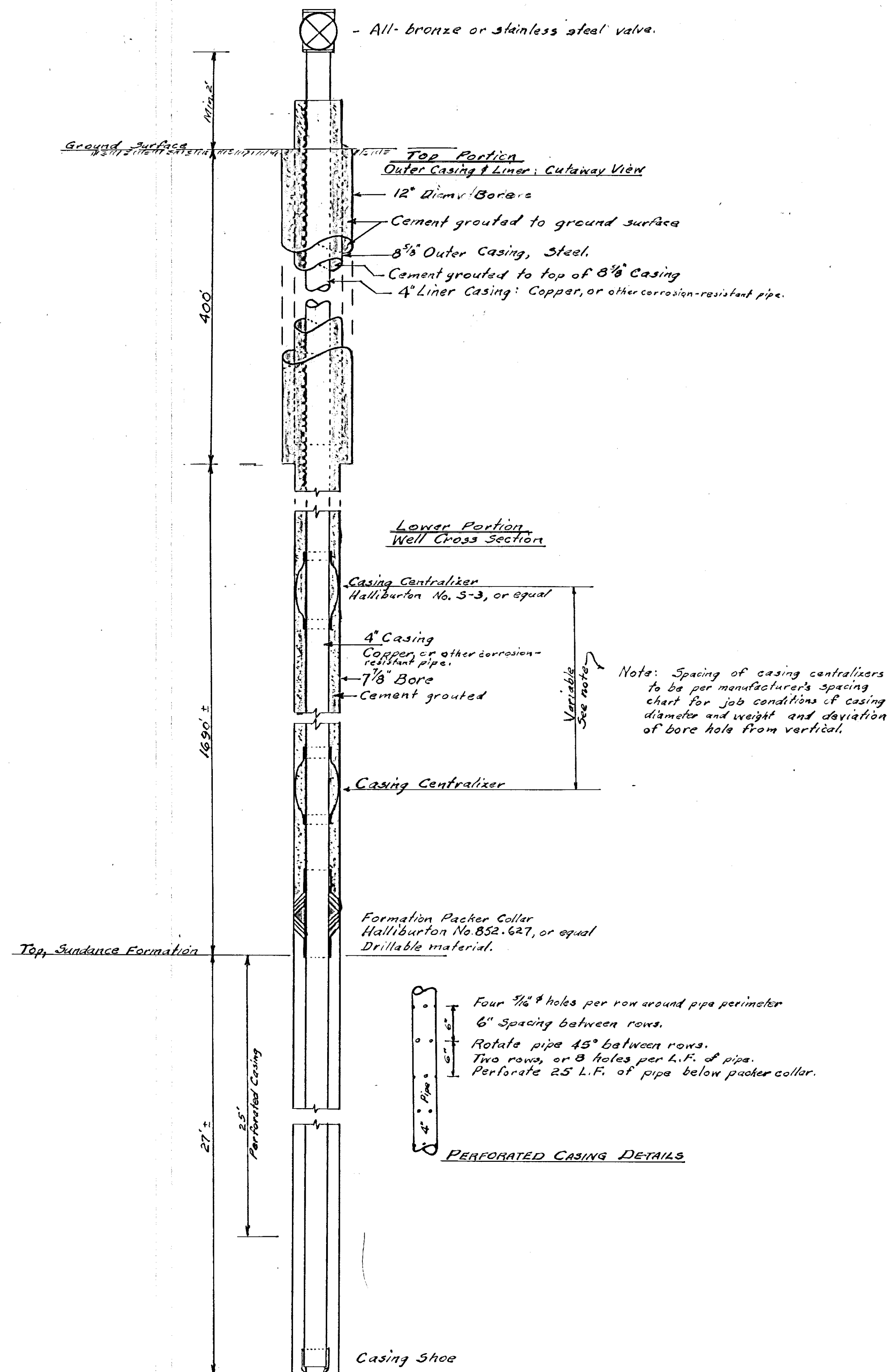
V.L. Rugg
Registered Land Surveyor

ACKNOWLEDGMENT

Subscribed and sworn to before me this 4th day of April, 1959

KENDALL T. EER NISSE - NOTARY PUBLIC
Punishing County, South Dakota
MY COMMISSION EXPIRES DEC. 20, 1960

Kendall T. Eer Nisse
Notary Public



TYPICAL WELL
DETAILS
NO SCALE

LOCATION MAP AND WELL DETAILS TO ACCOMPANY APPLICATION FOR PERMIT TO APPROPRIATE WATER FOR MUNICIPAL WATER SUPPLY

MUNICIPAL WELL No. 4
ONIDA, SOUTH DAKOTA

PREPARED FOR THE CITY OF ONIDA, SOUTH DAKOTA, BY:
STAVEN ENGINEERING CO.
RAPID CITY, SOUTH DAKOTA

APRIL, 1959

Map No. 457-3 (Appl. No. 595-3)

Remarks by State Water Resources Commission:

STATE OF SOUTH DAKOTA

County of

Hughes

ss.

Pierre, South Dakota,

June 20

1960

This is to certify that the foregoing application was received by the Commission at 10:30 o'clock

a.m. upon the

8th

day of

April

1959

State Water Resources Commission

By:

Donald J. Jones
for Chief Engineer, Executive Officer

Number of permit

595-3

Date of first receipt of application

April 8

1959

Date of return to applicant for correction, amendments or changes required as follows

Date of receipt of corrected application

Date from which applicant may claim right

April 8

1959

Approved

June 17

1959

Recorded in Book

6

Page

86

This is to certify that we have examined the foregoing application for a permit to appropriate water of the State of South Dakota, and we hereby grant the same as stated herein, subject, however, to the following limitations and conditions:

1st. The equivalent of at least one-fifth of the work above specified is to be completed on or before

December 17

1959

2nd. The whole of said work is to be completed on or before

June 17

1960

3rd. The limit of time for proof of beneficial use of water appropriated in accordance herewith is

June 17

1961

4th. The water appropriated shall be used for the purpose of

municipal use

5th. 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.

6th. The amount of the appropriation herein granted shall not exceed 1.11 cubic feet per second; neither shall it exceed the capacity of the above described system of diversion works, nor the least amount of water that experience may hereafter indicate as necessary for the production of crops in the exercise of the best husbandry; and further, said appropriation must be limited to not more than one acre of land to which water is actually applied for irrigation on or before June 17, 1961; said water to be used during the following described annual period:

continuously

Witness my hand this

20th

day of

June

1960

State Water Resources Commission

By:

Donald J. Jones

Chief Engineer, Executive Officer

Certificate of Construction issued

September 14, 1960

Water License issued

September 14, 1960

STATE OF SOUTH DAKOTA

WATER LICENSE No. 595-3

WHEREAS, On the 8th day of April A. D. 1959
the City of Onida

At County of Sully and State of
South Dakota duly made application (No. 595-3) to us for a permit to use 1.11
cubic feet per second of the waters of artesian ground water
County of Sully, State of South Dakota, for municipal
purposes; and

WHEREAS, On the 20th day of June A. D. 1960
Permit No. 595-3 was issued to said applicant for the diversion of said water, and providing for the
completion of the works of diversion therein described on or before the 17th day of
June A. D. 1960 and for the application to beneficial use of said
water on or before the 17th day of June A. D. 1961
and,

WHEREAS, On the 27th day of August A. D. 1960
the holder of said permit duly made proof of the completion of adequate works for the diversion of 1.11
cubic feet per second of said waters, as evidenced by our Certificate No. 595-3
dated September 11, 1960 confirming the completion of works of sufficient capacity for
diverting and conveying to the place of intended use 1.11 cubic feet per second of water, with date of
priority of April 8, 1959 and,

WHEREAS, On the 11th day of September A. D. 1960
proof was duly made of the application to beneficial use of 1.11 cubic feet per second of said water;
for municipal purposes

NOW, THEREFORE, By the virtue of the authority vested in us by the laws of the State of South Dakota,
We hereby grant and confirm to the City of Onida

of the holder and owner of said permit No. 595-3
a water right, dating from April 8, 1959 to the use of 1.11
cubic feet per second of the waters of artesian groundwater

In the County of Sully and State of South Dakota, or so much thereof as may be
necessary for the purposes hereinbelow mentioned, to be diverted at a point in Lot 3, Block 13,
Court Addition to City of Onida

and conducted to and used through the City water system

for the purpose of (b) pumping municipal needs for the City of Onida

subject, however, to the laws of the State of South Dakota applicable to a license for the use of the waters of the
State, and subject, also to the local or community customs, rules and regulations which have been or may be
adopted from time to time by a majority of the users from a common source of supply, canal or lateral from
which such water may be taken, when such rules and regulations have for their object the economical use of such
water.

WITNESS, My hand and seal of our office at Pierre, South Dakota,
this 11th day of September A. D. Nineteen
Hundred and sixty.

State Water Resources Commission

By:

J.W. GRIMES, pp

Chief Engineer, Executive Officer

STATE OF SOUTH DAKOTA

Water License No. _____

To _____

Source of Supply _____

County _____

Am't _____

c. f. s. _____

Point of Diversion _____

Place of Use _____

Purpose _____

Date of Priority _____

Recorded _____

In Book _____ of _____ Page _____

Permit No. 595-3Water Division No. 3 Missouri River Water District**Certificate of Completion of Works**

TO ALL WHOM IT MAY CONCERN:

This is to Certify, That the City of Onidaof Sully, County of Sully, and State ofSouth Dakota, the holder of Permit No. 595-3, issued upon ApplicationNo. 595-3, bearing date of priority of April 8, 1959, authorizing the diversion of1.11 cu. ft. per second of the waters of artesian ground waterCounty of Sully, State of South Dakota, at a point in Lot 3,Block 43, Court addition to City of Onida, in the SW 1/4 SE 1/4 Sec 2 T 114N R 77Wfor municipal

purposes, has fully complied with the provisions of the laws of the State of South Dakota relating to proof of completion of the works of diversion set out and described in said Permit; that said works are found in satisfactory condition for diverting and conveying to the place of intended use 1.11 cu. ft.

per second of water; and that the ~~here proposed use~~ use of said water are described as follows,to-wit: to be distributed through the City water system for municipaluseWitness my hand this 11th day of September A. D. 19 60

State Water Resources Commission

By:

J.W. ORMES, pp Chief Engineer, Executive Officer

(First Publication **before May 15**, 19**59**)

APPROPRIATION OF WATER

Office of State Water Resources Commission,

Pierre, S. Dak., May 1, 1959

Notice is hereby given that the City of Onida whose postoffice address is Onida S. Dak., has made an application in accordance with the provisions of the water laws of South Dakota for a permit to appropriate for beneficial use 1.11 (Sundance formation) cubic feet of water per second of time from xx artesian ground water through the City Well No. 4 the point of diversion of which is to be located xxxx in Lots 3-4-5, Block 43, Court Addition to the City of Onida.

xxxxxx

xxxxxx Said water to be used for xxxxxx

xxxxxx

municipal purposes in the city of Onida

This application will be taken up by the State Water Resources Commissioner, at their office at Pierre for consideration upon the 17th day of June, 1959, at 2:00 P.M. All interested persons may appear and be heard.

Appropriate action will be taken by the Water Resources Commission after suitable time has elapsed for the consideration of any or all information presented.

State Water Resources Commission

By:

~~XXXXXXXXXXXXXXXXXXXX~~
 Les Wyborny, Water Rights Engineer

cc E. L. Thompson, Publisher
The Onida Watchman
Onida, South Dakota

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA }
County Sully } ss.

E. L. Thompson being duly sworn, deposes and says the annexed printed copy of Notice of Intention to Appropriate Water was taken from the Onida Watchman a newspaper which during the whole time of publication of said notice herein after stated, has been and is printed and published in the City of Onida County, of Sully and State of South Dakota; that the said notice was published in said newspaper on the following dates:

May 7, 1959May 14, 1959May 21, 1959May 28, 1959

in each and every issue of the full number thereof, the first publication being made on the 7th day of May

1959 and the last publication on the 28th day of

May 1959, upon which days or times of publication aforesaid the newspaper was regularly published, and that during the whole time of said publication he was editor the printer and publisher of the said newspaper.

E. L. Thompson

Subscribed and sworn to before me this 28 day of May A. D. 1959

E. R. Crestaff

Notary Public Sully County, S. D.

APPROPRIATION OF WATER

Notice is hereby given that the City of Onida, whose post-office address is Onida, S. Dak., has made application in accordance with the provisions of the water laws of South Dakota for a permit to appropriate for beneficial use 1.11 cubic feet of water per second of time from artesian ground water (Sundance Formation) through the City Well No. 4, the point of diversion of which is to be located in Lots 3-4-5, Block 43, Court Addition to the City of Onida. Said water to be used for municipal purposes in the City of Onida.

This application will be taken up by the State Water Resources Commission at their office at Pierre for consideration upon the 17th day of June, 1959, at 2:00 p.m. All interested persons may appear and be heard.

Appropriate action will be taken up by the Water Resources Commission after suitable time has elapsed for the consideration of any or all information presented.

State Water Resources Commission

By: Les Wyborny,
12-15 Water Rights Engineer

RECEIVED
MAY 29 1959

STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

ENGINEER'S REPORT ON
CONSTRUCTION OF MUNICIPAL WELL NO. 4
AT ONIDA, SOUTH DAKOTA

The Contractor moved equipment onto the well site early in February 1960 and began drilling. The surface casing, 415 Lb of 8" steel pipe and the liner casing, 106 pieces of nominal 20' length, 4" copper pipe, purchased by the City of Onida, had been delivered and stored adjacent to the well site.

On February 8, 1960, Mr. Lemmel advised the writer that the Contractor planned to run in the 8" surface casing on the following day. Upon arrival at well site on February 9 it was found that the driller was still racking up casing preparatory to running in. Recirculating drilling mud to clean cuttings from hole. Very stormy; temperature about 12° F.

The Contractor's representative informed the writer that the Contractor planned to cement in the surface casing with their own equipment and personnel. This was not approved and the Contractor's representative was instructed to obtain the services of the Halliburton well cementing firm to do the work, per specifications. This he did and also ordered fresh cement from Rapid City. On the morning of February 10 the racking-up of casing was completed and the drill pipe string run out of the hole, completing run-out about noon. The 8" surface casing was run in during the afternoon and evening.

The driller had no thread-locking compound and, in any event, the temperature was too cold for its successful use without defrosting the pipe. Therefore, as a specification alternate, all joints were securely tack-welded.

An adapter swedge was fitted to the casing head and the drilling mud recirculated all night.

On February 11 the Halliburton cementing crew was on the job at 8:00 a.m. and the cement arrived about 9:00 a.m. It was necessary for the drilling crew to move and re-stack the 4" copper casing out of danger. It had been unloaded and piled, on bare ground without skids, northwest of the well site where it would have been flooded by washed out drilling mud, water and cement slurry if it were not moved. Much of the pipe was covered with a snow drift and the bottom layer was frozen down. It was re-stacked on skids, out of danger. About two hours were spent thawing out fire hose and filling Halliburton's tank.

Ran about five barrels of water ahead of the cement; starting at 12:15 p.m. and finishing cementing at 12:40 p.m. Ran 185 sacks, with estimated 20 to 30 sacks cement return, pumping the top plug down with water. After lunch, conferred with Contractor's representative and Halliburton crew chief relative to cementing the string of 4" casing and left Onida at 2:30 p.m.

On February 24, 1960, the writer drove to Onida from Pierre and inspected the drilling log and conduct of the work. Depth, at that time, was 1430 feet in soft, sticky formation. Discussed proposed mud weight and viscosity for anticipated pressure formation drilling

with the Contractor's driller and instructed him to advise us when approaching 2050' depth.

On March 4 Mr. Lemmel advised us that the hole was down to 1950'. At 7:15 a.m. on March 5 the driller, Mr. Anderson, advised that they were at 2050' depth, in shale with some sand showing. Everything was under control, with mud weight at 11.7#/Gal. He advised that he would have to change bits if necessary to go deeper. Instructed him to do so and left for Onida. At 4:00 p.m. the new bit was installed and string of drill stem started in the hole. Drilling was resumed about 11:00 p.m.

Advice from the office of the State Geological Survey indicated that in the original Sundance well "very coarse sandstone and grit" were encountered at 2020' to 2060', with finer sandstone from 2060' to 2080' and no samples obtained from 2080' to 2111' (recorded depth). Since we had not encountered such formations in the present well at those depths it was probable that they would exist at deeper depths and that further drilling would no doubt reveal them. It was recommended to Mr. Lemmel that this be done and he concurred with the recommendation. Continued drilling was authorized.

On the following morning, March 6, it was learned from the Contractor's personnel who were familiar with the drilling of the original Sundance well, that the driller's record for that well had indicated coarse sand from 2053' to 2111', a total thickness of 58'. At a depth of 2096' in the present well a medium coarse sand was found. If this was the top of the production sand stratum, and if the stratum should be of the same thickness as in the original Sundance well, this would indicate a bottom-out depth of 2154'. This would exceed the computed made-up length of copper casing and packer by about 15'.

It was important that the casing be resting firmly on the bottom of the hole when the packer was expanded because the packer setting pressure of from 800 to 1000 lbs. per square inch, if added to the weight of a fully suspended string of casing, would place a stress on the top joints of the string which would be dangerously close to the computed shear strength of the copper threads. Because of the relatively low collapse factor of the copper pipe, it would be impracticable to try to "float" the casing down in order to decrease the load. The maximum submergence of empty pipe would be held to less than 920', this being one-half the theoretical depth at which empty casing would collapse in 11.5# mud.

The only logical method to deal with this difficulty seemed to be to add such length of perforated 4" steel pipe to the bottom of the copper pipe as might be required to stand the string of casing firmly on the bottom, with the top of the copper casing projecting above the drilling table. Being unable to locate Mr. Lemmel to explain the necessity of this, the writer contacted Councilman Wilbur Day who concurred with the plan when apprised of the situation.

City personnel at the light plant were contacted to ascertain if the City had any 4" steel pipe on hand, but no usable pipe could be found. The writer authorized Mr. Arend, Contractor's representative, to secure the 4" steel pipe from their supply at Faulkton, same to be furnished to the City of Onida at cost. This was done to avoid a possible charge for rig stand-by time while the pipe was being ob-

tained by the City, whose responsibility it was to furnish the casing. A truck was immediately sent for the pipe.

At the well, the medium to coarse sand continued down to 2130', the drilling rate being quite rapid. At 2130' the drilling rate slowed abruptly and samples taken soon after indicated hard shale. The driller was instructed to stop drilling at 5:00 p.m., the depth being 2139'. Prior to this the total length of drill pipe, as shown by the drill pipe record, had been checked by the writer.

The bit was pulled back about a foot and the mud recirculated for slightly over two hours before bringing drill pipe out of the hole. There was still quite a showing of shale drill cuttings in the mud, but most of them were probably being recirculated through the mud pit where they had little chance to settle out cleanly, due to the small volume of the mud pit and a mud weight of 11.9#, with a viscosity estimated at about 80. However, it was felt that the well would purge itself of these with little difficulty after flow began. Finished bringing drill pipe out of the hole about 12:30 a.m. on March 7.

Copper casing run-in started at about 1:00 a.m., March 7.

Casing run in as follows:

Bottom of well.....	2139.0'
Perforated 4" steel pipe.....	10.0'
Copper pipe, 17 lengths @ 20.15' (bottom 3 perforated).....	342.5'
Cement basket 2' below packer. Bottom of packer @.....	1706.5'
Packer, made-up length.....	2.8'
Top of packer.....	1703.7'
Copper pipe to a point approximately 2' above the drilling table.	

The couplings on the stacked pipe had not been made up without thread-locking compound. Their use without this item was okayed, provided the joints in the first 150 feet above the packer were brazed or silver-soldered for security. The first joint was brazed to the packer body and the next joint silver soldered. The Contractor did not have slips adequate to support the weight of the pipe below the heat zone while sweating on the solder, without danger of slippage down to the coupling, with danger of shearing the hot threads. Also, it could not safely be supported by cable, due to increasing tension on hot threads. Instructed that further soldering be stopped, conditioned on the following:

- a. That the writer be present at the packer drill-out.
- b. That at least six days time be allowed for cement set-up, instead of the specified 72 hours, so that the increased cement bond on the pipe would adequately substitute for soldered joints, as insurance against loosening of the same under drilling torque.

To these conditions, Mr. Arend agreed.

Casing run proceeded. As insurance against casing collapse, the casing was filled with drilling mud every 30 lengths (600 feet). The casing started to "drag" at about 210' above bottom, probably due to thickening of drilling mud, and progress was further slowed by

mechanical difficulties with the rig, including breakage of a frozen mud circulation line. At about 3:20 p.m., a mud line hook-up was made with fittings furnished by Halliburton and circulation was broken loose at a pressure of about 450 p.s.i. In about 15 minutes the circulation pressure had dropped to an average 230 p.s.i., with large clots of mud gel being discharged.

The mud was circulated about one hour, then casing run, cemented and completed, with casing firmly on bottom, about 5:00 p.m. The mud line was connected again and mud recirculated until 6:00 p.m. The packer setting ball, having a falling rate of 200' per minute, was dropped at 6:04 p.m. It was agreed with Mr. Arend that packer drill-out would not be done before March 14.

Started cementing at 6:20 p.m. Packer pins sheared at 800 p.s.i. and circulation was strongly established at once. A sample of ingoing cement was taken, 396 sacks of cement being used. A faint streamer of cement appeared in about 25 minutes and a small sample was taken. Circulation stopped suddenly almost immediately afterward and the balance of the sample was dipped from the pool of slurry alongside the casing. The cementing truck operator had decreased the pressure on the cement slurry when the pressure had suddenly shot to 800 p.s.i.

At the cementing truck the Halliburton crew chief theorized that the cement had bridged at some point, prohibiting further flow of the cement slurry up the annular space outside the casing and asked about the advisability of surging the pressure to 1500 p.s.i., or higher, in an attempt to break the bridge. The writer informed both him and Mr. Arend that the manufacturing specifications specified a regular test pressure of 1000 p.s.i., with a theoretical bursting strength much higher. However, due to unknown stresses which might exist in the casing at the time, the application of any pressure in excess of 1000 p.s.i. would have to be done at their own risk. The pressure was raised to over 800 p.s.i. twice more in an unsuccessful effort to break the bridge and complete the cementing. The displacement fluid meter on the Halliburton truck indicated that at least 800 L.F. of the 4" copper pipe was still filled with the cement slurry. After some consultation, Mr. Arend left for Aberdeen. The writer reported the situation to the City Council at 7:30 p.m.

On the following morning, March 8, was advised that Mr. Arend would be coming down from Aberdeen to confer relative to next procedure on the well. By daylight, the cement return sample collected the night before appeared to be principally drilling mud with faint traces of cement. About noon the driller, Mr. Anderson, advised that Mr. Arend would not be here, probably due to the very stormy weather and icy roads. The writer again instructed Mr. Anderson that no drilling was to be done in the 4" casing until March 14, then advised Mr. Lemmel of the situation and left Onida about 12:30 p.m.

At Pierre, the writer conferred with Messrs Grimes and Driscoll, engineers for the State Water Resources Commission, relative to the situation at the well. They agreed that the probable cause of the bridge was the bleeding-off of cement into a weak formation, allowing the column of cement above it to come to a halt (while cement was flowing into the weak formation) long enough to allow it to start an initial set, or at least thicken to a point where extremely high pressure would have been required to start it moving again. They concurred

in the decision to start no cement drill-out before March 14.

On March 9, the Contractor requested permission to drill out the cement immediately. This was denied and March 14 was confirmed as earliest drill-out date by wire, a copy of which was mailed to Mr. Lemmel.

On March 14, the drilling crew started preparations for the cement drill-out. It was decided to use a 3-3/4" bit as being the largest size practicable to use without some danger of sand-locking or damage to the casing. Three strips of steel key stock were welded to the drill pipe adapter just above the bit to serve as a fluted guide to minimize the tendency of the bit to move sideways under pressure, with consequent damage to the copper casing. Also, had them fabricate an umbrella-type steel cap to fit snugly over the top of the surface casing. The cap had a 4" hole to take the copper casing and served to hold it in place and keep cement drill cuttings from falling into the annular space between the inner and outer casings.

Bit and drill pipe were run in the hole, using 915 L.F. to reach the rubber cementing plug. This indicated that 872 L.F. of copper pipe was filled with cement. Drilling on the rubber plug started early on the morning of March 15. After penetrating the plug it was found that progress averaged five feet per hour, or 1" per minute. Samples taken at frequent intervals showed very few traces of copper particles, indicating that no kinked or partially collapsed copper pipe had stopped the rubber plug. Samples taken at about two-foot intervals for a depth of 25' below the plug showed so little evidence of copper particles that the writer was convinced no measurable damage was being done to the copper pipe. Left Onida after requesting the driller to advise when within 50' of the packer.

On the afternoon of March 20, the driller advised that they had about 100' to go, approximately 20 hours of drilling time before reaching the packer. Upon arrival at the well site on March 21, found the crew engaged in cementing the shrink-back deficiency near the surface, between the 4" and 8" casings. The annular space was washed clean through a bevel-ended 1" pipe inserted to the bottom of the space and 28 sacks of cement, mixed to a pumpable slurry, were pumped to the bottom of the space until it flowed out the top of the 8" casing; then the steel cap was replaced.

After allowing the cement to set up, drilling out cement was resumed on March 25. On March 26, at 8:15 a.m., the packer was drilled out, and the drilling mud was sufficiently heavy to hold during the process of bringing drill pipe out of the hole. A 400' string of 1" pipe was run in the hole and clear water was pumped in. In about 15 minutes, at 10:30 a.m., the well began to flow slowly, the water carrying a heavy load of sand and mud. The flow had turned clear at 1:30 p.m. and had reduced greatly in volume.

The flow was measured at 56 GPH at 2:15 p.m. with a temperature of 800 F. Since all drilling personnel had apparently left, the writer obtained the services of three City employees to assist with the static and short-tube flow tests. The static pressure, by two trials, was determined to be 265 pounds per square inch. After being closed for a

few minutes, the discharge through a standard 2 1/2" short-tube was measured at 256 GPM. It was noted that, after a short period of closure, the flow increased greatly in volume for a fairly long time, the discharge being heavy with mud, sand and coarse shale drill cuttings which appeared to indicate that the well should be "worked" to dislodge material bridged back of the pipe perforations. This should properly be done by Contractor's personnel.

When ready to leave, Mr. Lermel could not be located. Therefore, the writer instructed the City Water Superintendent to padlock the valve or remove the hand wheel, which was done to prevent unauthorized tampering with the valve. Contacted the driller, Mr. Anderson, at Pierre and reported result of the tests, suggesting that he surge the well to break up the bridged material back of the perforations and increase the flow. This he agreed to do, and also to advise us when the job was cleaned up and ready for a final inspection.

On March 31, the Contractor called the writer requesting permission to surge the well with clear water at pressures greater than the natural well pressure in order to break up the bridged material. Since this was the only logical procedure to follow, permission was granted to do so, if done carefully and in a manner not to create dangerously high water hammer.

On April 7, having received no word from the Contractor, the writer called Mr. Lermel to learn the status of job cleanup. He advised that no Contractor's personnel appeared to be about the job and he was somewhat unsure of the actual status of job completion. It was decided to wait a little longer for word from the Contractor. Final inspection will be made as soon as feasible after receipt of notice from the Contractor or the City that the job is ready for the same.

COMMENT

1. The work was considerably hampered by the unusually long periods of cold and stormy weather during the months of February and March. During visits to the job it was noted that there was an almost continuous necessity to thaw frozen drilling mud from the wrenches when bringing drill pipe out of the hole, or thawing it from the drill pipe joints when running it in the hole.

2. With regard to bridging of the cement during the cementing of the 4" copper pipe, the writer has never noticed any negligence on the part of the Contractor's drilling personnel which might contribute in any way to conditions which could have brought about such bridging action. The personnel appeared to be competent, energetic, and familiar with the problems of their specialized trade. Nothing negligent or amiss could be found in the conduct of the Halliburton cementing crew which handled the job. The record graph of the pumping pressure during the job indicated a typical sustained pressure up to the moment bridging occurred and clearly indicates the pressure surges made in trying to break the bridge. And, certainly, no act on the part of the City or its employees contributed to any conditions causing such bridging. Contractor's personnel who had worked on the original Sundance well in 1957 were, no doubt, more familiar with the formations to be encountered and dealt with than anyone else.

In summary, it is the writer's opinion that none of the people performing the work were in any way responsible for what occurred. It appears, simply, to fall in the category of occupational hazards incidental to the business of drilling wells. Had the drilling been done on a time basis, as is sometimes done on exploration work, the difficulty and expense of dealing with unforeseen hazards would properly be borne by the Owner.

When, however, a drilling company contracts to drill a hole, or holes, of specified sizes and depths (with provision for additional depth payments) and install therein certain casings in a specified manner, all at the rate of specified amounts per lineal foot, it is our opinion that the expense of dealing with unforeseen occupational hazards should properly be borne by the Contractor. It is probable that some factor for such occupational hazards would certainly be included in his bid. Should the job prove to be free from such hazards, and completed at far less than the anticipated cost, the Contractor would not be expected to return to the Owner a portion of the larger-than-anticipated profit on the job. Conversely, if the job costs to the Contractor are greater than anticipated, through no fault of the Owner, we see no reason why the Owner should be expected to bear such added costs.

3. The result of the tests performed at the well by the writer were studied in conjunction with the flow characteristics of the column of 4" casing, as installed. The drilled-out cemented section was treated, for computation purposes, as 3-3/4" diameter concrete pipe; straight, and in good condition. The classification of the casing, as installed, was derived thus, lengths being given to the nearest foot:

Total depth of well.....	2139'	
* Steel pipe	10'	
Copper pipe (343') plus packer (2')	345'	
Clean pipe below top of packer		-355' -355'
Depth to top of packer	1784	
Depth to cementing plug		-915' -915'
Length of 3-3/4" diameter concrete pipe	869'	
* Length of clean 4" diameter copper pipe		1270'

* The 10' of steel pipe was assumed to have the same friction loss as copper pipe.

The analysis, therefore, was made between the friction losses in two casing strings having the following make-up"

- Case 1: Clean copper pipe, 4" diameter, 1270 feet long; plus
Clean cement pipe, 3-3/4" diameter, 869 feet long.
Case 2: Clean copper pipe, 4" diameter, 2139 feet long.

The original Sundance well at Onida was reported, in a State Water Resources Commission Report, to have a static pressure of 355 p.s.i. and a flow rate of 408 GPM; this data being cited for the purpose of comparison. This new well, as tested by the writer, had a static pressure of 265 p.s.i. and a flow, as determined by flowing pressure through a 2 1/2" diameter standard short tube, of 256 GPM. A flow of 250 GPM was assumed for analytical purposes. It is evident that the static pressure of the well, with the control valve shut and no water flowing, is used up in doing two things, in a free-flowing

well:

a. A portion is used up in forcing water from the producing formation into the casing. This may be termed the "feed in" requirement.

b. The residue is used up in overcoming friction in the string of casing leading to the outlet.

If the same "feed in" requirement is assumed in both cases, the flow rate through the two comparative casing strings should be, approximately, in inverse proportion to their friction losses. In other words, if the friction loss in the casing described under Case 1, above, were twice that of the friction loss of the casing described in Case 2, the flow through the Case 1 casing would be about one-half the flow of that through the Case 2 casing. It is recognized that, in hydraulic computations, "feed in" and "friction head" values will vary in curvilinear, rather than "straight line", proportions. However, it is safe to assume that "straight line" ratios may be used for the purpose of arriving at approximate flow-rate comparisons in the two strings of casing. Friction coefficients used in these computations are those recommended by recognized authorities in the field of hydraulic engineering.

At the assumed flow of 250 GPM, the friction loss through a composite string of casing described under Case 1 is equivalent to 144.69 feet of head. (A column of water 144.69 feet high.) The same flow through 2139 feet of clean copper pipe, described under Case 2, would have a friction loss equal to 88.55 feet of head.

The friction loss ratio between the two casings would be $\frac{144.69}{88.55}$, or 1.63. In other words, the Case 1 casing would have 1.63 times the friction loss of the Case 2 casing. Or, it may be stated that the flow through the casing, as installed, is 88.55, or approximately 61.2% of what it would be through a completely clean, 4" copper casing. This would indicate a probable flow of 408 GPM from the present well, if the copper casing were clean of cement for its entire length.

It may be noted that the static pressure in the new well was 265 p.s.i., as compared with that of 255 p.s.i. in the original well. This is a very small variance of less than 4% and not unusual in un-calibrated gages. It is probable that a calibrated pressure gage, certified by the Bureau of Standards, would have recorded identical static pressures for each well.

RECOMMENDED HEADWORKS:

Headworks recommended for the control and regulation of the well are shown in the drawing attached to this Report. Crane Company products are cited solely as a standard of comparison. Other products of equal construction, rating and performance characteristics may be used. In the writer's opinion, it is vital that any headworks embody the pressure relief valve shown at #7 and the throttling-type valve shown at #13. It is further recommended that:

1. The well control valve, #1, be left normally in "open" position and all flow regulation done with valve #13.

2. A compact sheet metal housing be made to house the entire headworks assembly and bolted down to the concrete slab. One side should be hinged to give free access to valves and fitted with a padlock to prevent unauthorized tampering with the valves. The inside of the housing should be insulated with $1\frac{1}{2}$ " to 2" thick glass wool, batt type insulation, or equal. Vents should be provided for the blow-off line from pressure relief valve #7 and the $1\frac{1}{2}$ " bleeder line from valve #14; the latter being normally in "open" position.

3. A $1\frac{1}{2}$ " copper line be led from valve #11 and fashioned, by means of $1\frac{1}{2}$ " return bends (180°) into a U-shaped heating coil to keep the headworks assembly from freezing in cold weather. This coil should be firmly secured to the cabinet to prevent dislocation under flowing pressure.

Respectfully submitted,

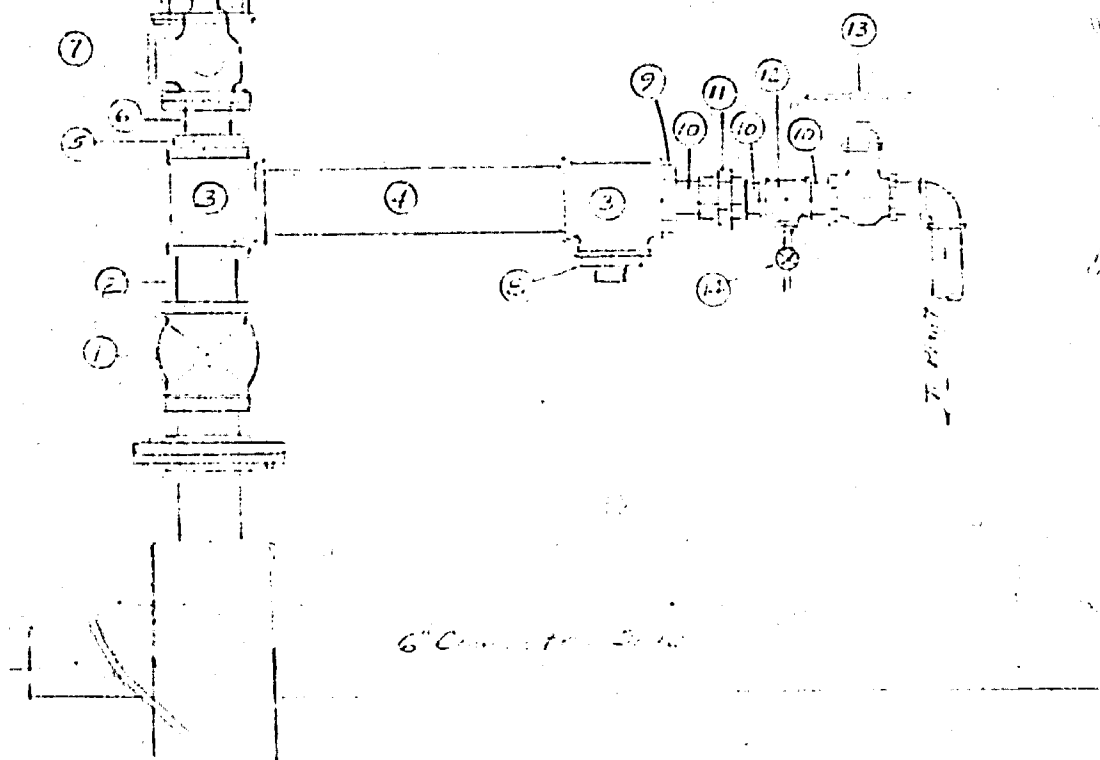
STAVEN ENGINEERING COMPANY

By:

V. L. Rugg
V. L. Rugg

April 19, 1960

RECOMMENDED HEADWORKS
FOR MUNICIPAL WELL No. 4.
CHAS. S. DRA.

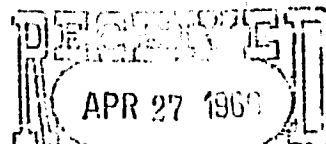


- (1) Well control valve installation under well control.
- (2) 4" Nipple, copper or brass.
- (3) 4" Tee, brass.
- (4) 4" Copper pipe, 18-24 feet. Distance to well casing entrance.
- (5) 4" x 3" bushing, brass. (6) 3" Nipple, brass.
- (7) Pressure relief valve, 3", with safety spring. Equal to Crane No 1113 L & L. Order with relief factory-set at 320 lbs. per sq. inch.
- (8) 4" Plug, brass. This outlet may be used for a well blow-off line or an emergency fire line to City main, if desired.
- (9) 4" x 2 1/2" bushing, brass. (10) 2 1/2" nipple, brass. (11) 2 1/2" tee, brass. (12) 2 1/2" tee, brass, tested to 1/2".
- (13) Regulating valve, 2 1/2" with tapered plug type disc & seat, constructed stainless steel. Equal to Crane etc. 352 P (import) or No. 354 P (imp. valve).
- (14) 1/2" Valve, brass or bronze.

Line from well to plug, with valve & fitting will be equal to 20' or 3" of pipe.
 Head loss (friction) in 3" of copper tube, approx. 1.1 ft. at 100 gpm (elevated)
 GPM 2" Tube 2 1/2" Tube 3" Tube Head loss (friction) in 20' of pipe, approx. 120'

150	73'	25'	11'
200	155'	54'	23'
250	263'	91'	35'

JOHN ENGINEERING CO.
 1000 CITY SQUARE
 AKA, 1960



STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

ENGINEER'S REPORT OF FINAL INSPECTION
MUNICIPAL WELL NO. 4
ONIDA, SOUTH DAKOTA

Supplementing Engineer's Report Dated April 19, 1960

On April 22, 1960, the writer inspected and tested the above well, being assisted by employees of the City of Onida during the tests. It was evident from the result of the tests that the surging and "working" of this well by the Contractor since March 26 had greatly improved the flow from the well. It was also evident from the flow that there was little or no cement left in the 4" copper pipe.

The flow analysis treated in the report of April 19 was prompted by the possibility that the less-than-expected flow from the well might be due to a cement lining left in a section of the pipe after the drilling-out operation. The flow characteristics of such hypothetical casing was analyzed to determine if such assumed condition would result in the flow rate measured on March 26; assuming the same "feed in" pressure requirement for this well as for the original Sundance well. The analysis indicated that such assumption fitted the measured flow fairly closely, but final opinion was reserved until the well could be tested again after it had been surged or worked by the Contractor. The strong showing of shale drill cuttings in the flow on March 26 indicated a strong possibility that the "feed in" pressure requirement might be unduly high due to bridging of such material behind the perforations in the bottom 70 feet of the casing. Final tests on April 22 indicate that such was undoubtedly the case.

The control valve and flanges were not screwed up tight, nor was the temporary supplementary valve and piping. These were tightened more snugly during the test. The static pressure was checked at 255 p.s.i. with two small leaks in the test head connections due to "dry" threads. In the test on March 26 those connections were "doped" and did not leak. The static pressure of 265 p.s.i. taken at that time is considered to be the correct static pressure.

The flow was measured by the running pressure through a 2 1/2" standard short tube, and determined to be 519 GPM. As a check, the flow was measured and computed by a trajectory formula to be 523 GPM. These methods are not quite as precise as measurement

through a standard water meter, but it may be safely assumed that, in round figures, the well flowed 520 GPM. A stake was placed at a point even with the point of impact of the water trajectory centerline with the ground surface.

During and after completion of the tests at 2:00 p.m., the water flowed quite a lot of sand, although no shale cuttings were noted. The flow cleared up free from sand in about one hour. At 7:45 p.m. the water was still clear and flowing at the same rate. At 9:00 a.m. the following morning the water was still clear and appeared to be flowing slightly more than the night before, as indicated by the stake.

At a meeting with the City Council on the evening of April 22, the writer recommended acceptance of the well from the Contractor, contingent on completion of contractual obligations to be listed in the Engineer's Final Estimate for the job. Claims by the Contractor for additional compensation for drilling out cement and "working" the well to remove bridged material back of the perforations were discussed and rejected on the grounds that these items represented a cost to be borne by the Contractor as an expense incidental to the fulfillment of his contractual obligations.

RECOMMENDATIONS:

1. That the supply line from the well to treatment plant be of 2 $\frac{1}{2}$ " copper tube, Type K, with flared, compression type fittings.
2. Referring to the Drawing attached to the Engineer's Report dated April 19, 1960, it is recommended that the regulating valve, No. 13, and the 1/2" vent valve, No. 14, be closed to bring the water column to a complete stop before closing the bronze control valve, No. 1. A metal sign should be firmly attached to the control valve No. 1 reading:

WARNING: IF FLOWING, MINIMUM CLOSING
PERIOD FOR THIS VALVE IS THREE MINUTES.

If the well is flowing at 520 GPM the 4" water column, weighing 11,636#, would be moving about 13 feet per second, representing an energy of about 151,270 foot-pounds. With a three-minute closing period the average energy dissipation would be at the rate of 840 foot-pounds per second, which is considerable, but within safe limits.

3. It is recommended that, for the purpose of obtaining actual job data concerning the relative life of steel and copper pipe, a small section at the end of the 1/2" heating coil be of 1/2" galvanized steel pipe. Small sections of pipe of other materials, such as plastic pipe, might be inserted to get an actual job test for the materials.

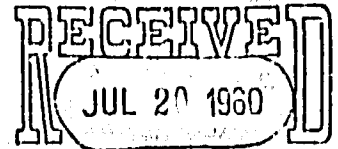
Respectfully submitted,

STAVEN ENGINEERING COMPANY

By

V. L. Ruge
V. L. RUGE

April 25, 1960

Permit No. 595-3Water Division No. 3Missouri River

STATE WATER RESOURCES COMM.

District PIERRE, SOUTH DAKOTA

NOTICE OF COMPLETION OF WORKS

This blank must be filled out by the holder of permit and forwarded to the Executive Officer at least 60 days before the time set for completion of works

(P. O.) ONIDA(Date) JULY 14, 1960

TO THE STATE WATER RESOURCES COMMISSION:
OF SOUTH DAKOTA, PIERRE:

DEAR SIR: Notice is hereby given of the completion of the works for the diversion of 500 gal per min or 1.11 cu. ft. per second of the waters of the state from well through the SUNDANCE FORMATION for MUNICIPAL USE IN CITY OF ONIDA purposes FIRE PROTECTION IN CITY in accordance with the terms and conditions of a certain permit heretofore issued by the Water Resources Commission of the State of South Dakota.

1. The name of the person or corporation holding said permit is CITY OF ONIDA

2. The postoffice address of such person or the place of business of such corporation is ONIDA
County of SULLY State of S. D.

3. The number of such permit is 595-3 and the date set for the completion of such work is April 19, 1960

4. Said water to be used for MUNICIPAL purposes.

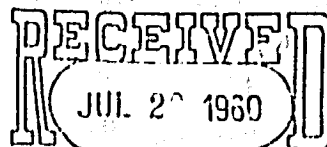
5. Said works of diversion will be fully completed on the date set for such completion, and the amount of water which said works are capable of conducting to the place of intended use, in accordance with the plans accompanying the application for such permit, is 1.11 cubic feet per second.

6. The amount of land for which said water is available is _____ acres, particularly described as follows: _____

I hereby certify that the facts set forth in the above notice are true.

(Signature of Owners)

City of Onida S.D.
Alfred McManis
Mayor

Permit No. 595-3
 Water Division No. 3 Missouri River District STATE WATER RESOURCES COMM.
 PIERRE, SOUTH DAKOTA

Notice of Application of Water to Beneficial Use

(This blank must be filled out by holder of permit and forwarded to the State Water Resources Commission at least sixty days before the time set for application of water.)

(P. O.) Onida(Date) July 14, 1960

TO THE STATE WATER RESOURCES COMMISSION OF SOUTH DAKOTA, PIERRE:

DEAR SIR: Notice is hereby given that on the 19 day of April
1960, at Onida County of Sully State of South Dakota,
 before Staven Engineers proof will be submitted of the application to beneficial use
 (Examining Engineer or Officer)
 of 1.11 cubic feet per second of the waters of ARTESIAN GROUNDWATER (SUMDANCE
FORMATION) in accordance with the terms and conditions of Permit No. 595-3
 heretofore issued by the Water Resources Commission of South Dakota.

1. The name and postoffice address of the person or corporation holding said permit are
CITY OF ONIDA
2. The use to which said water has been applied is MUNICIPAL USE IN CITY OF ONIDA
3. The amount applied to beneficial use is _____
4. The place where said water is used is (if for irrigation, give full and accurate description of the lands irrigated)

5. The name of the canal or ditch or other works by which said water is conducted to such place of use is

6. The right to take the water from such works is based upon permit No. 595-3
7. The source of supply from which such water is diverted is CITY WELL NO. 1
8. The date of priority which said user is prepared to establish is _____

(Sign)

City of Onida, S.D.
Alfred Moorman
Mayor

Permit No.

595-3

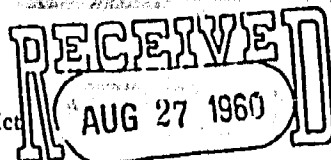
Water Division No.

3

MISSOURI

RIVER

Water District



Certificate of Examination of Works

STATE WATER RESOURCES COMM.
PIERRE SOUTH DAKOTA

Report of Examining Engineer

To the State Water Resources Commission, Pierre, South Dakota:

Dear Sirs: I hereby certify that in accordance with your letter of authorization dated July 22
1960, I have this day made a thorough examination of the diversion works constructed by

The City of Onida, of

Sully County, South Dakota, holder of Permit No. 595-3, issued

upon Application No. 595-3, bearing date of priority of _____, 19____, authorizing the

diversion of 1.11 cu. ft. per second of the waters of artesian aquifer for municipal

purposes. I have to report on the condition of the same as follows:

The diversion works comprise: Drilled well 2139 feet deep cased with standard
weight copper pipe, 4" I.D. cemented from 1784' depth to ground surface,
inside 8" steel casing (in 12" bore) cemented to 415' depth. A 2 1/2"
copper pipe line from well to iron removal plant. Provision to be made
for connecting a 4" emergency fire line to well control headworks.

and the system is in the following condition: Good. Surge relief valve on hand but not
yet installed. Well regulating valve proved faulty and will be replaced.
These will be installed when decreased water demand permits shutting down
well temporarily. The point of diversion is located in Block 43, Court Addn., City of Onida,

about 400' west of elevated water tank.

The works are capable of diverting and conveying to the place of use 1.11 cu. ft. per second of water,
which is to be used for municipal water supply, including fire protection

The legal sub-divisions to be irrigated are: None used for irrigation

_____ comprising a total of _____ acres of land.

The domestic use intended comprises Household uses; lawn and garden sprinkling

The utilization for power, mining, or other beneficial uses comprises: _____

Witness my hand, this 22nd day of August, A. D. 1960.

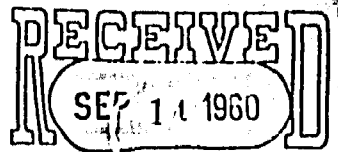
--SEAL--

T. L. Xupp
Examining Engineer.

Location No.

Water Division No.

Water District

STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

Proof of Application of Water to Beneficial Use

PETITION OF HOLDER

Ques. 1. State your name, residence, occupation and postoffice address.

Ans. Alfred Moninger

Onida, South Dakota

Ques. 2. If acting in behalf of a corporation, state its name, principal place of business (if a foreign corporation, give name and postoffice of statutory agent,) your position with reference to same, and your authority for appearing in its behalf.

Ans. Acting on behalf of the City of Onida, South Dakota, as Mayor of said

City of Onida

Ques. 3. State date of posting and date of recording notice of appropriation.

Ans. May 14, 1959

Ques. 4. State source of water supply and give exact location of point of diversion.

Ans. Flowing well in Block 13, Court Addition, in the City of Onida, Sully
County, South Dakota

Ques. 5. Describe your works of diversion giving length and height of each dam and state amount of water they are capable of conveying from point of diversion to place of use, and give name of canal or ditch or other works by which water is conducted to such place of use, and date of completion of same.

Ans. Copper-cased well 4" diameter, drilled to 2139' depth. 2 1/2" pipe line
to iron removal plant, elevated tank and City-wide water distribution
system

Ques. 6. State for what purpose water is used and describe place of use. (If for irrigation, name each subdivision in which used, and number of acres in each subdivision that have ACTUALLY been irrigated with said water.)

Ans. See Ques. 7.

Ques. 7. If for other than irrigation purpose, state how applied, amount of horse power generated, etc.

Ans. Water for general municipal use including fire protection.

Ques. 8. What is the minimum amount of water required for the use specified above?

Ans. At peak demand during a fire, approximately 500 GPM with auxiliary fire line
from well.

Ques. 9. If you are not the person or representative of the corporation to whom above mentioned permit was originally issued, please state how ownership was acquired by present holder.

Ans.

Ques. 10. State when, how, in what amount and to what extent, the water diverted under above mentioned permit has been used.

Ans. ~~Almost continuously during this (1950) summer water has been used for normal municipal purposes at the maximum capacity of the present iron removal plant. Reported by the Water Superintendent to be at the rate of 250 to 275 GPM.~~

(Sign) Alfred Mosman
Mayor

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me, at my office in ONIDA, County of SULLY

State of South Dakota, on this 13TH day of SEPTEMBER A. D. 1960

Alvin L. Posten
David Becker } Witnesses. Arthur J. Owens Jr.

I, the undersigned, do hereby certify that I am a duly qualified elector residing in the immediate vicinity of the diversion works designated in the foregoing testimony, that I have no interest in the works, water or land above described, that I have read the foregoing testimony and that I know of my own personal knowledge that the matters therein stated are true.

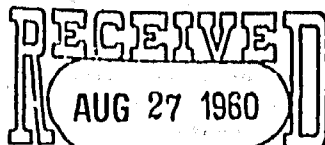
Earl Johnson
H. W. Ellis

Location No. _____	
PROOF OF APPLICATION OF WATER TO BENEFICIAL USE	
PETITION OF HOLDER	
Amount of Water _____ c. f. s.	
Source _____	
County _____	
Purpose _____	
Place of Use _____	
Date of recording _____	
Received and filed _____	

Permit No.

Water Division No.

Water District



Certificate of Examination of Works

STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

Report of Examining Engineer

To the State Water Resources Commission, Pierre, South Dakota:

Dear Sirs: I hereby certify that in accordance with your letter of authorization dated July 22
1960, I have this day made a thorough examination of the diversion works constructed by
The City of Onida, of
Sully County, South Dakota, holder of Permit No. 595-3, Issued
upon Application No., bearing date of priority of, 19...., authorizing the
diversion of 1.11 cu. ft. per second of the waters of artesian aquifer for municipal
purposes. I have to report on the condition of the same as follows:

The diversion works comprise: Drilled well 2139 feet deep cased with standard
weight copper pipe, 4" I.D. cemented from 178' depth to ground surface,
inside 8" steel casing (in 12" bore) cemented to 415' depth. A 2 1/2"
copper pipe line from well to iron removal plant. Provision to be made
for connecting a 4" emergency fire line to well control headworks.

and the system is in the following condition: Good. Surge relief valve on hand but not
yet installed. Well regulating valve proved faulty and will be replaced.
These will be installed when decreased water demand permits shutting down
well temporarily.

The point of diversion is located in Block 43, Court Addn., City of Onida,
about 400' west of elevated water tank.

The works are capable of diverting and conveying to the place of use 1.11 cu. ft. per second of water,
which is to be used for municipal water supply, including fire protection

The legal sub-divisions to be irrigated are: None used for irrigation

..... comprising a total of acres of land.
The domestic use intended comprises household uses; lawn and garden sprinkling

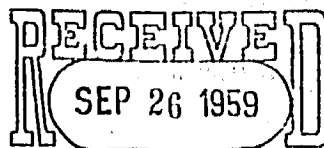
The utilization for power, mining, or other beneficial uses comprises:

Witness my hand, this 22nd day of August, A. D. 1960.

—SEAL—

[Signature]
Examining Engineer.

REVISED SEPT. 1959



STATE WATER RESOURCES COMMISSION
PIERRE, SOUTH DAKOTA

SPECIFICATIONS FOR
MUNICIPAL WELL NO. 4
ONIDA, SOUTH DAKOTA

Prepared By
Staven Engineering Company
Rapid City, South Dakota

1959

NOTICE TO CONTRACTORS

Sealed bids for furnishing materials, equipment, labor and performing all the work for the DRILLING AND CEMENTING MUNICIPAL
WELL NO. 4

at ONIDA, SOUTH DAKOTA, in accordance with the plans and specifications prepared by Staven Engineering Company, P. O. Box 508, Rapid City, South Dakota, will be received at the office of _____
THE CITY AUDITOR OF ONIDA, SOUTH DAKOTA until _____

on the _____ day of _____, 19____, at which time the bids will be publicly opened and read aloud. Award will be made as soon as practicable thereafter.

All proposals shall be made on forms provided and made part of the contract documents and shall be addressed to

CITY AUDITOR

ONIDA, SOUTH DAKOTA

and indorsed:

"PROPOSAL FOR MUNICIPAL WELL NO. 4"

A certified check, cashier's check or draft for five percent (5%) of the amount of the total bid, such check to be certified or issued by either a State or National Bank domiciled in the State of South Dakota and insured by the Federal Deposit Insurance Corporation made payable to

CITY TREASURER

ONIDA, SOUTH DAKOTA

must accompany each bid as guarantee that the bidder will enter into the proposed contract and furnish the required performance bond.

Proposal forms, contract documents, plans and specifications, are on file and may be examined AT THE OFFICE OF THE CITY
AUDITOR, ONIDA, SOUTH DAKOTA, OR in the office of the Staven

Engineering Company, Rapid City, South Dakota, and copies for use of contractors submitting bids may be obtained from the latter office upon request. Such request must be accompanied by a plans deposit in the amount of _____ dollars (\$_____), of which _____ dollars ^{TEN} (\$_____), will be ^{10.00} refunded by the Owner upon ^{EIGHT} return of the plans in ^{8.00} good condition within 15 days after the opening of bids. Checks or money orders shall be made payable to Treasurer of _____.

The contractor ^{ONIDA, SOUTH DAKOTA} shall be paid in cash.

The Owner reserves the right to reject any and all bids and to award to the bidder whom the Owner believes will serve its interest best.

JANICE LEMMEL

CITY AUDITOR

ONIDA, SOUTH DAKOTA

INFORMATION FOR BIDDERS

1. Sealed bids for furnishing all materials, equipment, and labor for the proposed improvement, summarized in the attached BRIEF OF PROJECT, will be received at the address shown until the hour specified. At the appointed hour, the bids will be publicly opened and read aloud. Award will be made as soon as practicable thereafter.

2. Bids must be submitted only upon the blank "Proposal" form provided and without alteration or detachment, and without additions unless alternates are specifically authorized in the specifications.

3. Proposals must be complete in every detail as indicated by the blanks on the form. No item may be left unentered.

4. Unit prices must be quoted both in writing and in figures of explicit and legible character for every item of the bid. Should sums be in error, extension of quantities times unit prices shall prevail.

5. Unbalanced bidding may be just and full cause for rejection of bid.

6. Each bid must be accompanied by a certified check, cashier's check or draft for five percent (5%) drawn on either a State or National Bank domiciled in the State of South Dakota and insured by the Federal Deposit Insurance Corporation. The check(s) or draft must be drawn in favor of and for deposit with the lawful fiscal agent of the Owner as guarantee that the bidder to whom award is made will enter into the contract and furnish required bond.

7. Guarantees accompanying the two bids most favorable to the Owner will be returned upon final execution of the contract and acceptance of the bond. Guarantees accompanying other bids will be returned as soon as the successful bid is determined or within ten (10) days after the letting.

8. Each bid must be signed by a person properly authorized to legally bind the contracting organization, whether individual, group, partnership or corporation. Such authorization must be known or shown to the Owner at the time of opening the bids. The status of the signer in the contracting organization and the business address of the contracting organization must appear with the signature.

9. Each bid, after complete execution, must be sealed in a plain envelope endorsed on the front as a proposal for the project bid upon, using the title and location given in the attached brief. The sealed bid shall be duly deposited with the person designated to receive the bids on or before the time fixed for opening. Bids appearing after this hour shall receive no consideration, but will be returned to the bidder.

10. Bidders must be prepared to present on call, satisfactory evidence that they are functionally and financially capable and prepared to complete the work in accordance with the contract.

11. Bidders are required to satisfy themselves as to local conditions affecting the contract and conduct of the work, including legal technicalities (if any), source, procurement, and character of all labor, materials, supplies and facilities.

12. The plans, specifications, and other contract documents are intended to be sufficiently comprehensive and self-explanatory to fairly conclude the project. If anyone who contemplates submitting a bid is in doubt as to the true meaning of any part of these data, he may submit to the Engineer a written request for interpretation thereof. Provided such request is received at least five days prior to closing of receipt of bids, the Engineer will issue an interpretation by an "Addendum", which will be delivered to all who, in his knowledge, have received a set of such documents. No other source is recognized for any explanations or interpretations.

13. Failure to comply with any of the above instructions will be considered as sufficient reason for rejecting any bid, but the right is reserved to waive any such defect.

14. Any bidder may withdraw his bid at any time prior to the scheduled closing time for the receiving of bids, but no bid shall be withdrawn for a period of ten (10) days after such closing time.

15. The right is reserved to reject any and all bids, and to award to bidder whom Owner believes will serve his interests best.

16. The purpose of the subject project is to insure to the Owner an improvement of utmost permanence and utility. The parties concerned with the project are:

(a) Owner. The person, group, body or organization desiring the improvement under the project; the party of the first part as defined in the contract.

(b) Contractor. The person, group, or organization providing and/or constructing the improvement under the project; the party of the second part as defined in the contract.

(c) Engineer. The Staven Engineering Company of Rapid City, South Dakota, retained by the Owner to design and inspect the construction of the subject improvement.

17. Payment on work performed and materials delivered on the job will be paid in cash by the Owner to the Contractor upon certification of the Engineer as provided by the contract.

18. Alterations in the terms, design, quantities and materials, whether involving substitutions, increasing or diminishing of the scope of work, or otherwise, shall be by written order of the Engineer only. Such written order shall include appropriate price adjustment, if any, and adjustments for duration of contract, if applicable. The order shall be approved by endorsement of the Owner and Contractor.

19. A performance bond satisfactory to the Owner in the amount equal to the sum of the contract will be required as part of the contract.

20. It is desired that the work be begun within ten (10) days after the award of the contract unless otherwise stipulated in the technical specifications or agreed upon at the time of award. Starting and completion times shall be given by the Contractor in his proposal.

21. Liquidation damages shall be as provided for in the contract.

22. The estimated quantities are not warranted as the final quantities upon which payment will be made, but are approximations intended to illustrate the scope of the work and provide a basis for comparison of the bids received.

23. Where proprietary items are called for, suitable substitutions may be used as authorized by the Engineer. References to specific products on the plans or in the specifications are used only as a measure of the type and quality of the materials required.

24. Each bidder shall submit with his bid the Drilling Record Form attached to the Proposal. Failure to submit this data may be considered grounds to reject his bid. Each bidder must also be prepared to list the equipment he proposes to use for the job at the time of bid openings, giving make, type, size or capacity, and age of equipment.

BIDDER'S
WELL DRILLING RECORD

1. LOCATION OF WELL _____ DEPTH _____ FT.
NAME AND ADDRESS OF OWNER _____
TYPE OF WELL: ☒ OIL _____ GAS _____ WATER _____
PUMPED OR FLOWING? _____
DIAMETER, PRODUCTION CASING _____
IF FLOWING, APPROXIMATE YIELD _____ GPM.
STATIC PRESSURE AT GROUND SURFACE _____ POUNDS PER SQUARE INCH.

2.

3.

4.

Give similar data on all wells listed.
If additional space needed append additional sheets.

P R O P O S A L

TO: THE MAYOR AND CITY COUNCIL
ONIDA, SOUTH DAKOTA
Project: MUNICIPAL WELL NO. 1

Gentlemen:

In compliance with your invitation for bids on the above project, the undersigned hereby proposes to furnish the materials and perform the work in strict accordance with the plans and specifications therefor and under faithful performance of all the terms of the contract of which this Proposal is a part. The undersigned further agrees to accept as consideration of the contract and in full compensation thereunder the prices named in the following Schedule of bid items and, except as otherwise provided under the Contract and Specifications, such prices and none other.

Being fully cognizant of and satisfied concerning the conditions affecting the project and the requirements and terms of the Contract Documents, including the plans and specifications, the undersigned agrees to begin work within _____ calendar days from notice of award and to complete the entire project within _____ calendar days.

Attached hereto is a certified check drawn on a bank insured by the Federal Deposit Insurance Corporation and made payable without recourse--in the amount of five percent (5%) of the total of the sums bid. This guarantee shall be forfeit if the undersigned, within ten (10) days after the prescribed contract forms are presented to him for signature, fails to enter into the written contract in accordance with the bid as accepted, and give bond with good and sufficient surety or sureties as may be required for the faithful performance and proper fulfillment of the contract.

Should the course of the work require the contingent items listed on the Schedule, the undersigned agrees that the prices quoted therefor shall apply to such quantities as may be pertinent to the project and order by the Engineer.

The undersigned bidder warrants that the well being bid herein will be completed and ready for use not later than March 15, 1960. He further agrees to the stipulation that if the well shall not be completed by April 1, 1960, liquidated damages at the rate of twenty-five dollars (\$25.00) per day may be withheld by the Owner from moneys due the Contractor for work done under this contract; beginning with the date of April 1, 1960, and ending on the date when said well is completed, in accordance with these specifications, unless such completion date shall have been amended by extensions granted by the Owner, as provided elsewhere in these specifications.

SCHEDULE OF BID ITEMS

Page 2 of Proposal

Item No.	Item	Quantity	Unit	Unit Prices		Total
				Written in Words	Figures	
	ALTERNATE A:					
	All casing material to be furnished by the Contractor.					
1.	Drill bore hole, nominal 12" diameter and install therein 8" black steel pipe surface casing, cemented in place.	400	L.F.			
2.	Drill bore hole, nominal 7½" diameter and install therein 4" copper pipe liner casing, cemented in place.	1,402	L.F.			
3.	Drill bore hole, nominal 5½" diameter and install therein 4" copper tube liner casing, not cemented, per specifications.	250	L.F.			
4.	Furnish and install 4" well control valve, per specifications.	LUMP	SUM			
TOTAL AMOUNT OF BID, ALTERNATE A:						\$

SCHEDULE OF BID ITEMS

Page _____ of Proposal

Item No.	Item	Quantity	Unit	Unit Prices		Total
				Written in Words	Figures	
	<u>ALTERNATE B:</u>					
	All casing materials, as listed in "Special Conditions", Section 3, "Materials", 3.1, to be furnished by the City of Onida, S.D.					
1.	Drill bore hole, nominal 12" diameter and install therein 8" black steel pipe surface casing, cemented in place.	400	L.F.			
2.	Drill bore hole, nominal 7 1/2" diameter and install therein 4" copper pipe liner casing, cemented in place.	1,402	L.F.			
3.	Drill bore hole, nominal 5 1/2" diameter and install therein 4" copper tube liner casing, not cemented, per specifications	250	L.F.			
4.	Furnish and install 4" well control valve per specifications.	LUMP	SUM			
	TOTAL AMOUNT OF BID, ALTERNATE B:					
BIDDER: _____				ADDRESS: _____		
BY: _____				TITLE: _____		

C O N T R A C T

THIS AGREEMENT, made and concluded this _____
day of _____, 19____, by and between _____
THE CITY OF ONIDA, SOUTH DAKOTA
Party of the First Part, hereinafter called the "Owner", and
_____ of _____

Party of the Second Part, hereinafter called the "Contractor."

WITNESSETH, that for and in consideration of the payments and agreements mentioned in the Proposal hereto attached to be made and performed by the Owner and according to the terms expressed in the Bond referring to these presents, the Contractor covenants and agrees with the Owner, at his own proper cost and expense to furnish all of the necessary materials and labor and to do all of the work in accordance with the plans and specifications hereinafter referred to and in full compliance with all the terms of this agreement and the requirements of the Engineer under it.

AND IT IS UNDERSTOOD AND AGREED that the Notice to Contractors, Information for Bidders, Proposal, Bond, General Conditions, Specifications and Plans pertaining to the Project and attached hereto are essential documents of this contract and are a part thereof.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed, as of the day and year first above written, in _____ counterparts, each of which shall for all purposes be deemed an original.

Attest:

Owner

By _____

Name: _____

Name and Title

Title: _____

(SEAL)

Contractor

Attest:

By _____

Name: _____

Title: _____

GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS

2. RIGHTS AND RESPONSIBILITY OF OWNER

- A. Engineering and Inspection
- B. Right of Access
- C. Conduct of Business and Collateral Work
- D. Alterations
- E. Failure by Contractor to Complete Work
- F. Payments
- G. Ownership of Premises
- H. Provision of Site

3. RESPONSIBILITY AND AUTHORITY OF ENGINEER

- A. Designation of Engineer
- B. Authority of Engineer
- C. Plans and Specifications
- D. Interpretation of Contract Documents
- E. Laying out of Work
- F. Sequence of Work
- G. Inspection
- H. Payment Estimates and Measurements

4. RIGHTS AND RESPONSIBILITIES OF CONTRACTOR

- A. Contractor and Foreman
- B. Subcontractors
- C. Persons Interested in Contract
- D. Bonds
- E. Observance of Laws and Ordinances
- F. Damages and Indemnity
- G. Insurance
- H. Materials and Workmanship
- I. Workmen and Equipment
- J. Time of Completion
- K. Patents and Copyrights
- L. Claims of Unpaid Bills
- M. Anticipated Profits
- N. Construction Plant
- O. Policing the Project
- P. Guarantees

5. ARBITRATION

GENERAL CONDITIONS

1. DEFINITIONS

The term Owner shall mean the Party of the First Part, as designated in the executed contract form, whether acting for self or through its legally authorized and constituted representatives.

The term Contractor shall mean the Party of the second part as designated in the executed contract form, whether acting for self or through its legally authorized and constituted representatives, heirs or assigns.

The term Engineer shall mean the Staven Engineering Company acting for the Owner and limited by the particular duties entrusted to the Engineer.

The terms, Surety and Sureties, shall mean the party, parties, or organization of whatever nature who has made secure the fulfillment of the contract by a bond and whose faith is pledged by signature of such bond.

The terms, Project, Work or Works shall mean the improvement to be constructed under this contract.

2. RIGHTS AND RESPONSIBILITIES OF OWNER

A. Engineering and Inspection

It is understood and agreed that the Owner shall be and hereby is authorized to be represented on the project by an Engineer and his necessary and duly authorized representatives for the purpose of supplying engineering data, inspection of materials and workmanship and assurance to the Owner that his best interests are being served under the terms of the contract. The scope of the Engineer's activity and authority shall be as provided under Section 3 of the General Conditions.

B. Right of Access

It is understood and agreed that the Owner shall have the right to enter the project, property or location on which the work herein contracted for is situated for the purpose of inspection, examination, the necessary conduct of his business outside of the contract, and the constructing or installing of such collateral work as he may deem necessary.

C. Conduct of Business and Collateral Work

It is understood and agreed that the Owner shall have the right to pursue his regular and necessary business upon the site of the project to an extent that will cause a minimum of hindrance to the necessary activities of the Contractor in the fulfillment of the contract.

It is further understood and agreed that the Owner may construct or install such collateral works as he may desire, by

such agents as he may select, and whether concurrently or not with the work embraced by the contract.

The Owner and Contractor mutually agree to cooperate under such circumstances to insure optimum conditions, one for the other, for the most efficient conclusions of the several works or activities.

D. Alterations

It is understood and agreed that the Owner shall have the right to alter and modify the plans and specifications in any particular or to change the quantities of work, thus making specific changes in connection with the construction, details or execution of the project and such changes, to be made by the Engineer, shall in no wise violate or invalidate the contract or bond.

The Contractor shall make such alterations or deviations as may thus be ordered by the Engineer, and in case such changes shall increase or diminish the cost of construction, the amount allowed the Contractor or Owner will be determined on the basis of contract prices, if applicable, or upon market prices prevailing at the time such alterations are ordered; and the price for such changes must be agreed upon in writing before such change is made, otherwise no allowance will be made by either party.

E. Failure by Contractor to Complete Work

It is understood and agreed that in the event that the Contractor shall at any time fail, refuse or neglect to supply proper workmen, materials, machinery or apparatus, or fail in the performance of any agreement herein contained, or hereafter made, such refusal, neglect or failure being certified by the Engineer, the Owner shall be at liberty after five days' written notice to the Contractor, to have full recourse upon the Surety and thereafter to: (1) provide any such labor, materials, machinery or apparatus and to complete the project; or (2) the Owner may relet the work; or (3) secure its completion by any means which the Owner deems satisfactory; or (4) deduct the cost thereof from any money then due, or thereafter to become due the Contractor under this contract. If the money so available is insufficient, the Contractor's Surety shall supply additional funds to secure completion.

F. Payments

Payment shall be made in cash by the Owner to the Contractor upon estimates prepared and certified by the Engineer as provided for in Section 3 or the General Conditions.

(1) Partial Payments--

Partial payments may be made monthly during the original term of the project. Such payments shall be in the amount of eighty percent (80%) of the work done and materials supplied.

Partial payments for materials shall be made only for materials delivered to the project. Such payments shall prevent removal, sale or disposition of the materials in any manner except to place in the work as intended. The materials shall still be subject to test and rejection and if rejected shall be replaced by materials meeting the specifications.

No partial payment will be made after the date specified for completion of the work.

(2) Final Payment--

Final payment will be made within thirty days after completion and approval by the Engineer of all work involved in this contract.

The Contractor shall receive the amount stipulated in the accepted "Proposal" plus value of extra work agreed to under this Contract, and less all partial payments or sums rightfully retained under this Contract, as full compensation for everything furnished and done by him; for all loss or damage arising out of the work; for unseen obstructions or difficulties encountered in the prosecution of the work; and for all expenses incurred by him in carrying out all of the provisions of this contract. Such final payment shall not release the contractor or his Sureties from any guarantees extending past the time of completion of the work.

Final payments may be withheld until satisfactory evidence is presented that all bills for materials, labor, damages or other claims have been paid by the Contractor.

(3) Delayed Payments--

Payment shall be made as soon as practicable after the date of any certified payment estimate, but shall become "overdue" thirty days after the date provided that the funds involved are not subject to retention by the Owner under the terms of this contract.

In case of "overdue" payments, the Owner shall pay the Contractor interest on the sum or sums involved at the rate of six percent (6%) per annum until the amounts "overdue" are paid in full.

The Contractor shall not be entitled to interest on any sum or sums which, by the terms of this contract, the Owner may be authorized to withhold or retain.

It is hereby agreed that such interest payments, if any, are in lieu of any claims of the Contractor for alleged damages; for breach of contract; or otherwise, on account of delayed payments.

G. Ownership of Premises

The premises are and remain in the sole, full and complete possession of the Owner. The Contractor and his employees have

the right of entry for the purpose of delivering material and construction of the project only. In no case will acceptance of any portion be construed because the Owner is in possession of the premises, has made partial payment for work done or materials delivered, or because of work done by other agents of the Owner about the premises.

H. Provision of the Site

The Owner will furnish all real estate and rights-of-way reasonably necessary for the work, including land needed for the construction, for borrow pits, for waste dumps, for camp sites and for access to the work.

In case of serious delays in the acquisition of the necessary land for this purpose, an extensions of time will be granted the Contractor sufficient to compensate therefor. The Contractor shall have no compensation for minor delays or interruption caused by the failure to secure land, but shall receive compensation for the actual losses occasioned by serious delays.

3. RESPONSIBILITY AND AUTHORITY OF THE ENGINEER

A. Designation of Engineer

It is understood and agreed that the Staven Engineering Company has been retained and is duly authorized to represent the Owner as Engineer under this contract and shall function as such unless it is specifically provided otherwise. This authorization obtains also to such representatives and employees as may be duly designated by him for that purpose.

B. Authority of the Engineer

It is mutually agreed that the Engineer shall have final authority under the contract as follows:

(1) To prepare (or approve) and interpret all the Contract documents, plans and specifications appertaining to the project.

(2) To supply engineering data and fix lines, grades and sequence of the work.

(3) To inspect and approve or reject any or all of the works, workmanship, materials and equipment.

(4) To determine the value of work and materials.

(5) To order extras or deletions with the consent of the owner.

(6) To alter or modify the plans and specifications as he may deem essential to the proper conclusion of the project.

(7) To exercise such other authority and duties as may be delegated to him elsewhere in the contract.

(8) The Engineer's decision shall be condition precedent to arbitration or any other recourse including payment.

C. Plans and Specifications

It is intended that the plans and specifications are sufficiently comprehensive to show all the work to be done and all the material to be furnished hereunder. However, any work or material not shown on the drawings or described in the specifications, but which may be fairly implied as included in any item of the contract shall be done and furnished by the Contractor without additional charge thereof.

Should there be any discrepancy between the plans, specifications or other contract documents, the Engineer shall define which is intended to apply to the work in hand and the Contractor shall be bound by such decisions.

D. Interpretation of Contract Documents

The interpretation of all contract documents and plans, the approval and inspection of all materials and work, and all tests for the determination of guarantees shall be made by the Engineer or under his direction.

E. Laying out of Work

The Engineer will survey and lay out all work, setting such reference points as may be required. The Contractor shall assist in the layout to familiarize himself with the layout and the respective values of the reference points. Thereafter, the Contractor shall furnish all equipment and supplies and perform the work necessary to properly employ the reference data to the work at hand. The Contractor shall safeguard and preserve these reference points and shall be liable for the cost of their replacement.

F. Sequence of the Work

The Engineer shall have the authority to fix the times, locations and manner for proceeding with any part of the work when such is necessary to: (1) the safe and proper conduct of the work; (2) the orderly conclusion of the work; or (3) the coordination of the work under this contract with other work or activities on the project.

The Contractor may submit work schedules for the approval of the Engineer. In any event, he must give the Engineer adequate notice before undertaking work which requires inspection or engineering services during or prior to the progress of the work in hand.

G. Inspection

The Engineer shall make such inspections and tests as he may deem necessary to assess the quality and value of the work in all its parts and the compliance with the terms of the contract.

(1) Inspectors--

Inspectors on the work shall be special agents of the Engineer assigned to the project to inspect the work and inquire into all details which concern the Engineer, to report to the Engineer, and when necessary, to order the work stopped until the Engineer

can give his decision on any disputed question concerning the fulfillment of the contract.

All decisions regarding the character of the work to be done or material to be furnished or the interpretation of the contract shall be referred to the Engineer in charge, and the inspectors shall make no changes or deviations from the specifications or allowances of any kind without written authority from the Engineer.

(2) Approval or Rejection--

It shall be within the province of the Engineer to approve or reject any of the material, workmanship, or equipment pertaining to the project. However, no failure or omission to condemn any defective work or materials shall release the Contractor from the obligation immediately to tear out, remove and properly replace the same at any time upon the discovery of said defective work or material.

(3) Right to Retain Imperfect Work--

If any part of the work done or material furnished under this contract shall prove defective and not in accordance with the plans and specifications, and if the imperfection of the same shall not be of sufficient magnitude or importance as to make the work dangerous or undersirable, or if the removal of such work will create conditions which are dangerous or undersirable, the Engineer shall have the right and authority to retain such work, but shall make such deductions in the final payment therefor as may be just and reasonable.

(4) Emergencies--

Whenever, in the opinion of the Engineer, the Contractor has not taken precaution for the safety of the public or the protection of the works or adjacent property or an emergency shall arise and immediate action shall be considered necessary in order to protect public, private, personal or property interests, then, and in that event, the Engineer, with or without notice to the Contractor, may provide suitable protection to said interests by causing such work to be done and material to be furnished and placed as may be necessary to insure protection.

The cost and expense of such emergency work and material shall be borne by the Contractor and if the same shall not be paid on presentation of the bills therefor, then the costs shall be deducted from any amounts accruing under the contract.

The performance of any such emergency work by the Engineer shall in no way relieve the Contractor from any damages which may occur because of the emergency or its relief.

H. Payment Estimates and Measurements

(1) The Engineer shall prepare estimates of the value of work done and materials delivered to the job on periodic dates to be specified at the beginning of the work and shall certify the same to the Owner within five days after such dates as a basis for Partial Payments under the Contract.

(2) The final payment estimate shall be prepared as soon as practicable after date substantiating full satisfaction of the contract are available.

(3) Estimate for Partial Payments shall not be required to be made by strict measurements or with exactness, but may be approximate only. Estimates for final payment shall be made in accordance with best engineering practice and shall include all items for which compensation is due.

No extra or 'custom' measurements of any kind will be allowed in measuring work done under these specifications; but the lump sum, actual length, area, solid contents, weight or number shall be considered in accordance with the "Units of Payment" as defined in the "Proposal", and the prices applying thereto as accepted by the Owner when the contract was awarded.

(4) The Engineer shall have access to the records and documents of the Contractor to the extent that proper value of materials and the work may be assessed for payment estimate purposes. The Contractor shall arrange all such records, the materials and construction so as to be readily inspected and shall furnish all assistance necessary to examine work and material.

The Contractor shall furnish to the Engineer a breakdown of lump sum items to show the value of identifiable portions of the items as a basis for computing partial payments.

4. RIGHTS AND RESPONSIBILITIES OF THE CONTRACTOR

A. Contractor and Foreman

The Contractor shall be responsible for the correctness of the work in accordance with the plans and specifications. The Contractor shall at all times maintain an office at or near the site of the project and shall have a competent person on the work to direct it, and to receive and carry out the instructions of the Engineer. Instructions given to such person shall be considered as given to the Contractor.

Both the address given in the proposal and that of the Contractor's office for the project are hereby designated as places to either of which notices, letters or other communications to the Contractor may be mailed or delivered.

B. Subcontractors

The Contractor shall not assign or sublet the work or any portion thereof without the consent of the Owner. No assignee or subcontractor will be recognized by the Owner independently of the Contractor. The Contractor shall be the responsible party in every transaction pertaining to his contract even though consent has been given by the Owner for subletting the work or portions thereof.

C. Persons Interested in Contract

The Contractor guarantees that no person or persons other than the Contractor signing the "Proposal" has any interest hereunder as Contractor.

This Contract shall be null and void if the Owner is a public body and any member of its government or an employee thereof shall become directly or indirectly interested in it as contracting party, partner, stockholder, surety or otherwise in the performance of this contract, or in the supplies, work or business to which it relates or in any portion of profits thereof; provided that incidental interest, such as ownership of stock or bonds in a railroad, telephone or other public utility, which may as an incident to its usual business, furnish services or supplies to the Contractors, shall not be included in the meaning of this provision.

D. Bonds

The Contractor shall furnish an approved Surety Bond, conditioned upon the faithful performance of the contract in all its particulars, the payment of all bills entering into the same, and the performance of all maintenance required by any guarantees herein.

The sum of the bond shall be one hundred percent (100%) of the contract amount.

E. Observance of Laws and Ordinances

The Contractor must be familiar with and observe all laws, ordinances and regulations which in any manner affect the contract the workmen or the public.

F. Damages and Indemnity

The Contractor shall be held responsible for all damages to property or accident to any or all persons through or in connection with the construction of the project.

The Contractor shall and hereby does bind himself, his heirs and assigns and Sureties on his bond to indemnify and save harmless the Owner from all damages, suits, or actions of every name or description brought against said Owner for or on account of any injuries or damages received or sustained by any person or persons by reason of the construction of the project or in consequence of any negligence in guarding the same, or any improper materials used in its construction, or by or on account of any act or omission of the Contractor or his agents whether the same relates to subcontractors, workmen, or strangers to this transaction. The Owner may withhold payments due or to become due so long as shall seem necessary to insure such indemnity.

G. Insurance

The Contractor shall insure, in a manner satisfactory to the Owner, all parts of the project as the work progresses, and shall assume all risks of loss or damage arising out of the nature of the work, the action of the elements, or otherwise until the com-

pletion and final acceptance of the project.

The Contractor shall carry adequate coverage in Public Liability, Property Damage and Workmen's Compensation Insurance in amounts sufficient to safeguard himself and his obligation to protect the Owner.

H. Materials and Workmanship

All materials are to be the best of the kind specified, and unless otherwise designated, are to be new and of standard weight and dimensions. All workmanship is to be first-class in every respect. Any work or materials not in accordance with the plans and specifications or in any way damaged or defective, shall be torn down on order of the Engineer and replaced or rebuilt in a suitable manner and to the satisfaction of the Engineer.

I. Workmen and Equipment

The Contractor shall employ competent skilled workmen. Whenever the Engineer shall inform him in writing that any man is, in his opinion, detrimental to safety, incompetent, unfaithful or disorderly, such men shall immediately be discharged from the project and shall not again be employed thereon.

The Contractor shall provide and use sufficient equipment of suitable character and efficiency to do the work in a safe and proper manner and within the time fixed for completion of the project.

The Engineer may instruct the Contractor to remedy deficiencies in plant or crew and the Contractor shall comply with such instructions. Failure of the Engineer to give such instructions shall not release the Contractor of his obligations to secure the safety of his men, the quality of the work, and the rate of progress required by this contract.

J. Time of Completion

The time of starting and completing the entire project shall be as stated on the Proposal form. Should the Contractor be obstructed or delayed in the prosecution of the work by an act of the Owner or its agents, or by abandonment of work by the Owner, or by damages which may happen by act of Providence, or by other causes fairly and justly beyond the control of the Contractor in the opinion of the Owner, the times fixed shall be extended for a period equivalent to the time lost by reason of any or all such causes; but no such allowance shall be made unless a claim therefor is presented in writing within forty-eight hours from the end of such delay.

Should time be of the essence for any unit of the project and completion times shall be given therefore in the Specifications, liquidated damages shall apply for these units in the amounts specified and if multiple units are so involved, the liquidated damages shall apply for each as specified and run concurrently with each other so long as such damages are assessable under the

Specifications.

It is mutually agreed that the aggregate of liquidated damages, as stipulated in the Specifications and provided for in the preceding paragraph shall constitute indemnity for liquidated damages sustained by the Owner by reason of failure of the Contractor to complete the work in the time contracted.

It is further agreed that if no liquidated damages are provided for elsewhere in the contract, the amount shall be Twenty-Five Dollars (\$25.00) a day for every calendar day over and beyond the time stipulated for completion of the project, as amended by such extensions as may have been granted by the Owner.

The Contractor shall provide and use sufficient plant and personnel to construct the project in the most expeditious manner and shall organize the elements of the work so that critical items requiring personal attention of the inspector shall be done concurrently or with minimum time lapse at periods agreed upon between the Engineer and Contractor.

In the event that progress of the work shall lag and shall cause service by the Engineer exceeding the initial Construction Layout Survey and _____ inspector days, the Contractor shall be liable for the additional engineering expense required. The Engineering expense shall be computed at the rate of \$35.00 per day (or part thereof) for one engineer-inspector and \$25.00 per day (or part thereof) for each additional man required to properly service the construction.

It is mutually understood and agreed that the extra service expense so incurred shall be shown on the face of the final estimate and such amount shall be withheld by the Owner from the final payment to the Contractor and paid to the Engineer as reimbursement for said extra service.

K. Patents and Copyrights

The Contractor hereby agrees to hold and save harmless from liability of any nature, including costs and expenses, for or on account of any patented, or copyrighted, or secret processes, compositions, inventions, articles, appliances or machinery used in the performance of this contract, or to be used by the Owner after accepting this contract.

L. Claims of Unpaid Bills

The Contractor hereby agrees to hold and save harmless the Owner from liability of any nature, including costs and expenses, for or on account of any claims for recovery made against materials furnished or work done under this contract or for any other obligations incurred by the Contractor in connection with this Contract.

The Contractor agrees to furnish the owner with satisfactory evidence that all obligations arising under this contract have

been liquidated or a legal release and indemnity from and against all such claims, before final payment shall be made.

M. Anticipated Profits

In case of the omission of any work called for by the original plans and specifications, or by the abandonment of the work by the Owner, the Contractor agrees that he will not claim or bring suit for any damages whether by way of loss of profit or otherwise, on account of not being allowed to do such work or to furnish such materials.

N. Construction Plant

The Contractor shall provide all labor, material, and machinery necessary in the prosecution and completion of the contract where it is not otherwise provided specially that the Owner shall furnish any part of the same, and it is also understood that the Owner shall not be responsible for the care or protection of any material, tool or machinery or for any part of the work until it is finally completed and accepted.

O. Policing the Project

The Contractor shall maintain the site of the project, his materials, equipment and appurtenances in a safe and orderly manner. He shall not dig up or occupy more of roads, streets, alleys or other public property than is absolutely necessary to the efficient conduct of the work. He shall provide and require the use of proper and adequate sanitary facilities. He shall not permit or suffer the presence or use of intoxicants on or about the project. He shall remove all debris or extraneous material resulting from the work and leave the site in a clean and approved condition.

P. Guarantees

The Contractor hereby expressly guarantees as follows:

(a) That he will use only materials that are the best of the kind specified and unless otherwise specifically provided, they shall be new and of standard weight and dimensions.

(b) That all workmanship shall be first class and performed by mechanics properly trained and experienced in the labor which they perform.

(c) That all parts of the project shall be guaranteed as called for in the specifications or if none are specified for the period of one year against defects in material and workmanship.

(d) If the Owner determines at any time during the guarantee period that defects in material and workmanship exist in the project, the Contractor will forthwith repair such defective workmanship or materials and complete the same so that in the end every provision of these specifications is met and without expense to the Owner beyond the contract price.

5. ARBITRATION

A. In the event that disputes arise which cannot be settled by the decision of the Engineer, or which the decision of the Engineer shall work undue and unwarranted hardship, it is understood and agreed that either party may appeal the dispute to arbitration as a condition precedent to further recourse by litigation, as follows:

B. The Engineer shall, within a reasonable time, decide all questions or claims of either party to this contract and all matters relating to the execution and progress of the work, or the interpretation of the plans, specifications and contract.

C. If the Engineer fails to make a decision within a reasonable amount of time, an appeal to arbitration may be taken as if his decision had been rendered against the party appealing. In such cases and in a case of an appeal from the Engineer's decision the demand for arbitration shall be filed with him in writing within ten days thereafter and in no case later than the time of final payment.

D. Arbitration shall proceed in conformity with the laws of the State in which the project is located, and wherever permitted by law, the decision of the arbiters may be filed in court to carry it into effect.

E. Arbitration shall be by a board of three persons; one named in writing by each party, and the third chosen by the two arbiters so selected; or if the arbiters fail to select a third within ten days, he shall be chosen by the Judge of the Circuit Court having jurisdiction over the area in which the project is located.

Should the party demanding arbitration fail to name an arbiter within ten days of the demand, his right to arbitrate shall lapse and the decision of the Engineer shall be final and binding upon him. Should the other party fail to choose an arbiter within ten days, the Engineer shall appoint such arbiter.

F. The arbiters shall act with promptness. Should either party refuse or neglect to supply any papers or information demanded in writing, the arbiters are empowered by both parties to take ex parte proceedings. The decision of any two arbiters shall be final and binding upon both parties except for recourse to review in Court under due process of law.

G. The arbiters, if they deem the case demands it, are authorized to award the party whose contention is sustained, such sums as they deem proper for the time, expense and trouble incident to the appeal; and if the appeal was taken without reasonable cause, damages for any delay concerned. The arbiters shall submit their decision in writing.

SPECIAL PROVISIONS FOR
MUNICIPAL WELL NO. 4
ONIDA, SOUTH DAKOTA

1.0 SCOPE OF WORK:

The well to be drilled under this contract shall be drilled by a party (individual or corporate) holding a current license as a well driller in the State of South Dakota and the work to be done under this contract shall comprise the following:

1.1 Drill a bore hole of nominal 12" diameter to a depth of 400 feet and cement therein an 8" (8-5/8" O.D.) steel casing, the cement grout to extend from the bottom of the casing to the ground surface. The depth of the 12" bore shall be not less than 390 feet nor more than 415 feet, as required to set the casing without cutting; the head of the casing to project not less than one foot above the ground surface.

1.2 Inside the above surface casing, drill a nominal 7½" diameter bore an additional 1,402 feet, more or less, as may be required, penetrating the top of the Sundance formation.

1.3 Drill a nominal 5½" diameter bore an additional 250 feet into the Sundance formation. Any increase or decrease in well depth, up to 100 feet over or under plan quantities, will be made in this category of bore size.

1.4 Run in the liner casing, consisting of 4" copper pipe (12.9#/LF) extending from a point approximately 2 feet above the top of the surface casing down to the point where the bore hole changes from 7½" diameter to 5½" diameter, and of 4" copper tube (6.51#/LF) extending from this point to a point approximately 2 feet above the bottom of the bore hole. The copper tube shall NOT extend to the bottom of the hole. The lower end of the tube shall remain above the bottom of the hole so that all the weight required to set the packer will be taken by the flanged fitting (below the cement basket) bearing on the shoulder of the bore. This liner casing shall be cemented in place, the grout extending from a point at, or near, the top of the Sundance formation to the top of the 8" surface casing.

1.5 The following data is obtained from a Report of the South Dakota State Water Resources Commission and is presented herewith as an indication of the job conditions that may be anticipated. A well having a total depth of 2,111 feet was drilled to tap the Sundance formation in 1954 at a location approximately 300 feet northeast of the well to be drilled under this contract. When completed, that well had a water pressure at the ground surface of 255 pounds per square inch. The well later got out of control and was eventually sealed after heavy expenditures of time, effort and money.

2.0 EQUIPMENT:

2.1 All drilling hereunder shall be done by rotary drilling equipment of such type and capacity as to handle the depths, diameters and anticipated pressures to be encountered, with a substantial operating margin of safety. THE DRILLING EQUIPMENT AND ACCESSORIES SHALL PROVIDE ADEQUATE MEANS FOR MAINTAINING THE DRILLING FLUID UNDER SUCH PRESSURE AS MAY BE REQUIRED TO KEEP ABSOLUTE CONTROL OF SUBSURFACE WATERS UNDER PRESSURE DURING ALL PHASES OF DRILLING, TESTING, INSTALLING CASING, OR CEMENTING THE SAME IN PLACE.

2.2 Equipment to be provided in the well during cementing of the 8" surface casing shall include a bottom plug to keep the cement slurry separated from the drilling fluid, and a top plug to reduce the possibility of channeling of displacement fluid through the cement. The plugs shall be Halliburton Type 5W. There shall also be provided a casing guide shoe and an adequate number of casing centralizers for 8-5/8" O.D. casing to center the casing in the hole. The centralizers shall be Halliburton Type S-3 and their spacing shall not exceed the maker's maximum spacing recommendation for the job conditions of casing diameter, hole diameter and hole deviation.

2.3 The equipment to be provided in the well for setting and cementing the 4 1/2" O.D. copper liner casing shall include a Halliburton formation packer set at, or near, the top of the Sundance formation to protect that formation from being sealed or contaminated during cementing operations; together with Halliburton Type 5W plugs: a bottom plug with rupturable top diaphragm to keep the drilling fluid and cement separated, and a top plug to clean the inside of the casing and reduce channeling of the displacement fluid through the cement. It shall be the responsibility of the Contractor to ensure that the threading of the formation packer shall match the threads on the copper liner pipe in type, pitch and number of threads per inch. If necessary, he shall cut and re-thread the pipe to effect a proper, tight-fitting make-up. Also included shall be a casing guide shoe at the bottom of the perforated casing section and an adequate number of casing centralizers between the cementing packer and the ground surface to ensure centering of the liner casing in the bore hole and surface casing. Centralizers shall be Halliburton S-3 and spacing of the same shall not exceed the maker's recommended maximum spacing for the job conditions of casing diameter, hole diameter and hole deviation.

2.4 All cementing shall be done by forcing the cement slurry down through the casing and up the annular space outside the casing to the ground surface. Equipment used during cementing operations shall be provided and operated by the Halliburton Oil Well Cementing Company, acting as subcontractor under the Contractor herein, to perform the cementing opera-

tions for both the surface casing and the liner casing. Cementing equipment shall be adequate to cement each string of casing from bottom to top in one continuous operation. The size, type and capacity of such equipment shall be determined by the cementing subcontractor from job conditions revealed by actual drilling operations.

3.0 MATERIALS:

3.1 The materials to be used for well casing shall conform to specifications, nominal dimensions and weights as follows:

(a) Surface Casing: Standard weight commercial black steel pipe conforming to AWWA Specification 7A.4.

(b) Liner Casing, from bottom of 7½" bore hole to ground surface: Seamless, hard drawn copper pipe conforming to ASTM Specification B42-43.

(c) Liner Casing, in 5½" diameter bore hole section: Seamless, hard drawn copper tube, Type K, conforming to ASTM Specification B88-41.

	Trade Size	O.D. Inches	Wall Thick. Inches	I.D. Inches	Wt. # Per LF.	V-Type Threads Per In.	Plan Footage
Black Steel Pipe	8"	8.625	0.277	8.071	25.0*	8	400
Copper Pipe	4"	4.500	0.250	4.000	12.9	8	1402
Copper Tube	4"	4.125	0.134	3.857	6.51	-	248**

* With threads and couplings.

** Any increase or decrease in total well depth will be made with this class of casing.

Under Alternate A of the Proposal the above casing materials will be furnished by the Contractor. Under Alternate B of the Proposal the above casing materials will be furnished by the City of Onida.

3.2 The Contractor shall furnish all other materials of any kind whatsoever which may be required to fully and adequately complete the well to the water production stage, whether such material be classified as "materials" or "expendable equipment"; including drilling fluids, portland cement, cementing admixture, centralizers, packers, and any other fittings or accessories that may be required.

3.2.1 After cementing operations, special care shall be used in drilling out cement plugs and/or packers so that the torque and vibration applied to the casing by drill-

ing-out pressure is not sufficient to unscrew or loosen the joints. As an added precaution, the joints in the first 100 feet of 8" steel casing above such plug shall be welded by four 3/16" fillet welds, 2" long, around the top and bottom of the couplings. The welds shall be stress-relieved by peening while warm.

3.2.2 The joint between the 4" copper liner pipe and the formation packer and each coupling in the first 150 feet of pipe above the same, shall have the couplings sweated to the pipe with a hard solder, known commercially as "silver solder", using a suitable flux. At least four solder feed holes, 1/8" to 5/32", shall be drilled into the couplings to allow two feed holes per pipe length. All threads in pipe or couplings shall be thoroughly clean. The joint shall be screwed up tight, then pre-heated and the joint fully sweated with solder.

3.2.3 Above the welded or sweated joint sections, referred to in Items 3.2.1 and 3.2.2, all joints shall be made up with a commercial thread locking compound approved by the Engineer. The compound shall be used in strict accordance with the manufacturer's recommendations. Joints in the 4" copper tube casing shall be made up with a hard solder ("silver solder") using a suitable flux.

3.2.4 The valves of the formation packer shall be tested for proper seating before the same is run in the hole. During the running-in of the copper liner pipe it may be subject to some shock stress in lowering. As a safety measure, the drilling fluid at this time shall have a high density so that its bouyant effect on the string of casing will materially reduce the shearing stress on the threads.

3.3 The Contractor may use a standard steel, round-opening, drilling-through valve as a part of his well control system during his operations. As a part of this contract, however, he shall furnish and install, at or near the top of the 4" liner casing, a new 4" valve for future well control, to be used when installing additional piping, throttling valves, etc. This 4" control valve shall have a full 4" opening and an operating pressure rating of not less than 300 pounds per square inch for water at a temperature of 100° F. and shall have the body and all working parts in contact with water of bronze, monel metal or stainless steel. It shall be a slow-opening type; not a fast-action 1/4-turn type. The maker's name and pressure rating of the valve shall be cast or stamped thereon, or there shall be furnished with the valve a certificate from the manufacturer warranting such rating for the valve. It shall be of such type that the stuffing box may, with the valve wide open, be repacked while under pressure.

The lower companion flange attaching the valve to the liner

pipe shall be of bronze or brass with a working pressure rating of not less than 300 psi (steam) or 500 psi (cold water) securely screwed to the liner pipe and sweated thereto with silver solder.

4.0 MISCELLANEOUS:

4.1 The following are made a part of the driller's contractual obligations. In conformity with the regulations of the South Dakota Water Resources Commission the driller shall:

- (a) File with the Water Resources Commission, before drilling is begun, a "Notice of Intent" to drill such a well.
- (b) Keep an accurate drilling record or log of the depth to the top and bottom of each stratum penetrated, the waters encountered and the completed depth of the well; and shall file or send a certified copy of said log to the South Dakota Water Resources Commission at Pierre, South Dakota. A certified copy of said log shall also be filed with the Engineer.
- (c) Obtain and preserve a sample of material taken from each 10 feet of drilling and at every change of formation. The driller shall tag, file and keep said samples in a suitable place for at least 18 months; or, at the request of the Commission before the end of that period, the samples shall be sent by the driller to the Commission at Pierre, South Dakota.

4.2 The portland cement grout used in cementing the casing shall contain not more than six gallons of water per cubic foot of cement; except that this ratio may be slightly modified by the use of admixtures to change the speed of hydration or specific gravity of the cementing slurry. Cement shall be allowed to set up for 72 hours before drilling is continued; however, if high early strength type of cement is used this period may be reduced to 24 hours.

4.3 Upon completion of drilling and cementing operations, and the installing of the control valve, the installation will be tested for acceptance by the City. After such acceptance, the Contractor shall remove the drilling mud from the slurry pit and waste the same at some nearby location satisfactory to the City; fill in the pit and level off the same. Trash, debris, cans, etc., shall be cleaned up and the site left in a neat and orderly condition.

4.4 An electric log will be run on the well by the South Dakota State Geological Survey. The Contractor shall cooperate with personnel of the Survey in running such log.

4.5 The proposed well is of concern not only to the City of

Onida, but to various State agencies as well. The Contractor shall permit free access to the job premises to authorized observers representing the State Water Resources Commission, the State Geological Survey, or the State Department of Health, and shall extend to such observers all due consideration and cooperation in the discharge of their duties. Any directions or instructions relative to the contract work shall be given the Contractor or his representative on the job by the Engineer only.

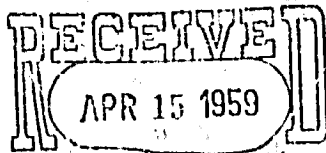
4.6 Item F(1) of Section 2 of the GENERAL CONDITIONS, relative to monthly payments, is deleted and the following basis of partial payment substituted:

(a) Upon completion of the cementing of the 8-5/8" surface casing in place in accordance with these specifications, the Contractor shall be paid 80 percent of the contract price for drilling 12" hole and cementing the 8-5/8" casing, upon certification by the Engineer that this stage of the contract is completed and acceptable. Such certificate shall be made within five days after completion of this stage.

(b) Items F(2) and (3) of said Section 2, GENERAL CONDITIONS, relative to final or delayed payments are to remain in full force and effect.

4.7 At completion of drilling operations for either the 12" hole or the 7 1/2" and 5 1/2" sections, the drilling slurry shall be recirculated until the discharge from the well is free from drill cuttings. Cementing of casing shall be done promptly after casing has been set in place. If not, the drilling slurry shall be thoroughly recirculated to avoid "freezing" of the casing in settled-out drilling slurry.

SOUTH DAKOTA
STATE DEPARTMENT OF HEALTH
PIERRE



STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

April 14, 1959

In reply,
refer to: Onida 5.2

C V. L. Rugg
Staven Engineering Company
Box 508
Rapid City, South Dakota

Dear Mr. Rugg:

O Attached in response to your April 9, 1959 personal request are three mineral analysis reports of water from the Gettysburg municipal supply. Analysis #619 is the latest for a Dakota-Lakota well drilled 35-40 years ago. Analysis #294 is of water from the now-plugged Sundance formation in the City's #3 well. Analysis #293 is believed to be an approximate 50-50 mixture of the two particular water supplies.

P The Sundance formation wells at Gettysburg and Onida were drilled contrary to the recommendations of this office and other State agencies. Our final opinion on the matter has not changed since that time. However, this office and the State Water Resources Commission are considering approval of the proposed Sundance well at Onida, providing that the City engages competent engineering assistance for design and supervision of construction. We believe that the City is well aware of the undesirable chemical quality of the water.

Y The attached photocopies of three articles from the Onida newspaper are included to give you some idea of the local trend of thought.

We trust that you will keep us informed of your actions concerning this problem.

FOR THE DIVISION OF SANITARY ENGINEERING.

Very truly yours,

J. Darrell Bakken
Sanitary Engineer
Water Sanitation Section

JDB:fw
cc: Water Resources Commission
Enclosures

SOUTH DAKOTA STATE DEPARTMENT OF HEALTH

Division of Sanitary Engineering

PIERRE, SOUTH DAKOTA

MINERAL WATER ANALYSIS REPORT

TOWN Gettysburg DATE
OWNER OF SUPPLY City LAB. NO. 293
COLLECTOR'S NAME MINERAL NO.
DATE COLLECTED DATE RECEIVED
REPORT TO:

FIELD DATA

City or Town
Source of supply Date source installed
(For well sources only) Well number Depth Diameter
(Lake, River, Spring, Gallery source, and water treatment plants)
Name
Raw or Treated sample Additional Information
Water treatment processes, Remarks Mixed water from existing Dakota formation
well and the new Sundance well. 50-50
Date of Collection
Source pumped Hours at GPM
Was sample free of turbidity when collected?
Temp. °C Alkalinity—P T
pH Iron

LABORATORY ANALYSIS

(Parts Per Million)

Specific Conductance K @ 25 °C 285, 71. x 10 ⁻³	Turbidity	
Insoluble Matter	Fe ₂ O ₃ + Al ₂ O ₃ + Mn ₂ O ₃ (R ₂ O ₃)	6.4
Total Solids 2150	Dissolved Solids	Total Iron (Fe) 0.76
Alkalinity P 0	Total 396	pH 7.6
and		
Potassium as K 431.1	Nitrate as N	0.9
Sodium as Na	Fluoride as F	3.2
Calcium as Ca 200.4	Chloride as Cl	302.0
Magnesium as Mg 32.33	Sulfate as SO ₄	805.5
Manganese as Mn 0.00	Bicarbonate as HCO ₃	483.1

Calculated Hardness as CaCO₃ 717.1 ppm 41.93 gpg
analyst O. D. Dunbar

Title

SOUTH DAKOTA STATE DEPARTMENT OF HEALTH

Division of Sanitary Engineering

PIERRE, SOUTH DAKOTA

MINERAL WATER ANALYSIS REPORT

TOWN Gettysburg DATE
OWNER OF SUPPLY City LAB. NO. 619
COLLECTOR'S NAME Dr. A. A. Buschler MINERAL NO.
DATE COLLECTED March 15, 1957 DATE RECEIVED March 16, 1957
REPORT TO: Mayor and Council
Gettysburg, South Dakota

FIELD DATA

City or Town Gettysburg
Source of supply Well Date source installed 1922
(For well sources only) Well number No. 2 Depth 1920' Diameter 8"
(Lake, River, Spring, Gallery sources and water treatment plants)
Name
Raw or Treated sample Raw Additional Information
Water treatment processes, Remarks
Date of Collection March 15, 1957
Source pumped Hours at GPM
Was sample free of turbidity when collected?
Temp. °C Alkalinity—P T
pH Iron

LABORATORY ANALYSIS
(Parts Per Million)

Specific Conductance K @ 25 °C	333.33 x 10 ⁻³	Turbidity	4.4
Insoluble Matter		Fe ₂ O ₃ + Al ₂ O ₃ + Mn ₂ O ₃ (R ₂ O ₃)	0.1
Total Solids	2165	Dissolved Solids	604
Alkalinity P	26	pH	8.25
and			
Potassium xxx	23.46	Nitrate as N	1.5
Sodium as Na	749.8	Fluoride as F	2.5
Calcium as Ca	9.61	Chloride as Cl	510.0
Magnesium as Mg	3.4	Sulfate as SO ₄	354.4
Manganese as Mn	0.00	Bicarbonate as HCO ₃	736.9
Calculated Hardness as CaCO ₃	38.17	ppm	2.23
gpg			
analyst	D. D. Dunbar		

Title

SOUTH DAKOTA STATE DEPARTMENT OF HEALTH

Division of Sanitary Engineering

PIERRE, SOUTH DAKOTA

MINERAL WATER ANALYSIS REPORT

TOWN Gettysburg DATE
OWNER OF SUPPLY City LAB. NO. 294
COLLECTOR'S NAME SWH MINERAL NO.
DATE COLLECTED November 24, 1954 DATE RECEIVED Nov. 24, 1954
REPORT TO: Mayor of Gettysburg
Gettysburg, South Dakota

FIELD DATA

City or Town Gettysburg
Source of supply Well Date source installed Nov. 1954
(For well sources only) Well number No. 3 Depth 2368' Diameter
(Lake, River, Spring, Gallery sources and water treatment plants)
Name
Raw or Treated sample Additional Information
Water treatment processes, Remarks
Date of Collection
Source pumped Gravity flow Hours at GPM
Was sample free of turbidity when collected? slight
Temp. °C Alkalinity—P T
pH Iron

LABORATORY ANALYSIS
(Parts Per Million)

Specific Conductance K @ 25 °C	235.29 x 10 ⁻³	Turbidity	
Insoluble Matter		Fe ₂ O ₃ + Al ₂ O ₃ + Mn ₂ O ₃ (R ₂ O ₃)	6.8
Total Solids	2285	Dissolved Solids	Total Iron (Fe) 1.5
Alkalinity P and	0	pH	7.35
Potassium as K	85.36	Nitrate as N	0.0
Sodium as Na		Fluoride as F	3.4
Calcium as Ca	406.4	Chloride as Cl	71.0
Magnesium as Mg	103.7	Sulfate as SO ₄	1282.9
Manganese as Mn	0.00	Bicarbonate as HCO ₃	105.4
Calculated Hardness as CaCO ₃	1444.2	ppm	84.45
analyst	O. D. Dunbar	gpg	

Title