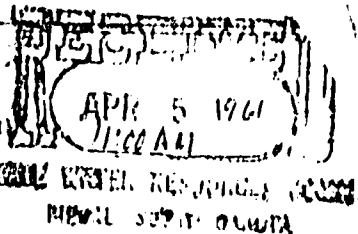


No. 773-3Water Division No. 3 Missouri River District 1
(Blanks to be filled by the Engineer for the W. R. C.)

VESTED RIGHT **APPLICATION FOR PERMIT**

To Appropriate Water within the State of South Dakota

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

1. Name of applicant South Dakota Department of Game, Fish and Parks
Postoffice address Pierre, County Hughes, State South Dakota

- I. If a corporation _____
(a) Name of same _____
(b) Date and place of incorporation _____
(c) Amount of capital stock _____
(d) Amount paid in _____
(e) Names and addresses of directors _____

(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) _____

- (b) Cash on hand, \$ _____ (c) Treasury stock, \$ _____
(d) Bonds to be issued, \$ _____ (e) Other resources, \$ _____

2. Name of diversion work Red lake - Brule County
As required to fill lake to outlet level - approximately 11,000
3. Amount of water claimed acre feet per year cubic feet per second _____
4. Source of water supply DRAWS AND REIMER CREEK
5. Location of point of diversion NW1/4 Sec. 21, NW1/4, NE1/4 Sec. 15, NW1/4 Sec. 19,
NE1/4 Sec. 17 - T. 103-3 70 on _____ bank _____ 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.) Sec. 19, 18, 17, 20, 8, 9, 16, 15,
10, 11, 14 and 21 all in T. 103 N. - R. 70 W. Brule County

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

- (a) Nature of use Public recreational purposes
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 _____

8. Estimated cost of work:

(a) Head Gates, \$.....

(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.)

II. Dimensions of works. Information requested not applicable, Red lake is a meandered

(a) Dam: Height lake, Maxima; depth is approximately 8 feet feet; length at top

.....feet; thickness at bottomfeet; thickness at top

feet; slope at front water face; slope at back face

material used in construction

(b) Reservoir: Capacity when filled 14,672 acre feet. Surface area at highwatermark 3867.87 acres.

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

(c)* Head gate: Width.....feet; heightfeet;

Material

(d) Canal: Total lengthmiles.

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 completed - not applicable - a meandered lake11. Time required for complete application of water to the proposed beneficial use completed years.12. Choice of newspaper for publication of notice of intention to appropriate not applicable

STATE OF SOUTH DAKOTA

County of Hickman

ss.

I, Walter J. Fillmore, 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

Subscribed and sworn to before me this

21

day of

March1916

Edward L. Johnson
Notary Public (or other qualified officer.)

Remarks by State Water Resources Commission:

"VESTED RIGHT" CLAIMED

STATE OF SOUTH DAKOTA
County of HUGHES } ss.

Pierre, South Dakota, JUNE 14, 1971.

This is to certify that the foregoing application was received by the Commission at 11:00 o'clock
a.m. upon the 5TH day of APRIL, 1961.

State Water Resources Commission

By:

Auston Jones
for Chief Engineer, Executive Officer

Number of permit 773-3

Date of first receipt of application APRIL 5, 1961

Date of return to applicant for correction, amendments or changes required as follows: _____, 19____

Date of receipt of corrected application _____, 19____

Date from which applicant may claim right 1889

Approved JUNE 14, 1971, Recorded in Book 12 Page 10

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

1971

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

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

COMPLETED

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

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 11,000 ACRES FEET ANNUALLY
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 course of the best husbandry and for the said appropriation must be limited to not more than one~~
~~seventieth (1/70) of one acre-foot of water per second of time for each acre-foot of water which water is actually~~
USED FOR PUBLIC RECREATION 1971

and beneficially ~~applied for irrigation~~ on or before JUNE 30, 1955; said water to be used
during the following described annual period:

CONTINUOUSLY

Witness my hand this 14TH day of JUNE, 1971.

State Water Resources Commission

By:

John L. Smith
Chief Engineer, Executive Officer

Certificate of Construction Issued JUNE 14, 1971

Water License Issued JUNE 14, 1971

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 773-3

(1) WHEREAS, On the 5th day of April A. D. 1961
the Department of Game, Fish and Parks

made Water Right Application No. 773-3 for a permit to use 11,000 acre feet annually of the waters
of Reimer Creek and dry draws

County of Brule, State of South Dakota, for public recreation
purposes; and

(2) WHEREAS, On the 14th day of June A. D. 1971
Vested Right Permit No. 773-3, with a date of priority of 1889

was issued to said applicant recognizing for the diversion of said water, ~~and for the completion of construction~~ of the water
supply system therein described ~~on or before the~~ day of ~~April 19~~ and for the
application to beneficial use of said water ~~on or before the~~ day of ~~April 19~~

and:

(3) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota
relating to completion of the construction of the water supply system and is entitled to divert 11,000 acre feet annually
~~per annum~~ of water for beneficial use and,

(4) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota
relating to the application of water to beneficial use of the following extent,
water is used in place for public recreational purposes

(5) 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 Department of Game, Fish and Parks

Pierre, South Dakota

Vested Right

the holder _____ and owner _____ of said permit No. **773-3** a water right, dating from **1889**

_____ to use of **11,000 acre feet annually** ~~_____ feet per annum~~ of the waters of **Reimer Creek and dry draws**

in the County of **Brule** and State of South Dakota, or so much thereof as may be necessary for the purposes hereinbelow mentioned, to be diverted at **points in the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 21, NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15, NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 19, and NE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 17, T103N, R70W**

and ~~conduct to irrigation~~ **stored in place**

for the purpose of **public recreation (Red Lake)**

Subject to any limitations listed in Water Right Permit No. **773-3** and subject to the laws of the State of South Dakota.

WITNESS, My hand and seal of our office at Pierre, South Dakota
this **14th** day of **June** A. D.

Nineteen Hundred and **Seventy - one**

WATER RESOURCES COMMISSION

By:

Chief Engineer, Executive Officer, J.W. GRIMES

Permit No. 773-3Water Diversion No. 3 MISSOURI RIVER Water District

CERTIFICATE OF CONSTRUCTION

This is to Certify, That the Department of Game, Fish and Parks

Vested Right #773-3 the holder of
 Permit No. , issued upon Application No. 773-3, bearing date of priority of 1889
11,000 acre feet annually
 authorizing the diversion of cfs. per second of the waters of
Reimer Creek and dry draws County of Brule State of South Dakota at
points in the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 21, NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15; NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 19,
and NE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 17, T103N, R70
 , for public recreation (Red Lakes)

purposes, has 8 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 recognized as
11,000 acre feet annually found in satisfactory
condition for diverting and conveying to the place of intended use cfs. per second of water.

Date June 14, 1971

WATER RESOURCES COMMISSION

By:

J.W. GRIMES, Executive Officer

Location No.

Water Division No. Water District

Proof of Application of Water to Beneficial Use

PETITION OF HOLDER

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

Ans. South Dakota Department of Game, Fish and Parks, Pierre, 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. _____

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

Ans. _____

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

Ans. Draw - NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 21, NW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 15, NWPNW $\frac{1}{4}$ Sec. 19, NE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 17 - T. 103 - R-70

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. A meandered lake - depth 8 feet - 3667.87 acres

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. Fish and wildlife propagation, conservation and recreation.

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

Ans. Used in place in lake or reservoir

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

Ans. As required to fill lake to outlet level - approximately 11,000 acre feet per year.

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. -- ~~A manured lake, ... Used by the public for uses specified except for that~~
~~amount lost by evaporation and seepage~~

(Sign)

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 Pierre, County of Hughes

State of South Dakota, on this 21 day of May A. D. 1961

Witnesses.

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.

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

**South Dakota Department of
Water & Natural Resources**

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

September 21, 1988

Richard Beringson, Secretary
Department of Game, Fish and Parks
Anderson Building
445 E Capitol
Pierre SD 57501

Dear Mr. Beringson:

I am writing to notify you that pursuant to the Notice of Intent to Validate Vested Water Right Claims dated June 20, 1988 that I intend to oppose validation of all Department of Game, Fish and Parks Vested Water Right Claims for lakes for the following reasons:

1. Until the outlet elevation for each lake is surveyed and the outlet elevation is set by the Water Management Board.
2. To allow the Vested Water Right Claim to be amended, if necessary, as follows:
 - a) Include the outlet elevation;
 - b) To correct the amount of water claimed;
 - c) To add the qualification that a vested claim is subject where necessary to installation of a concrete outlet structure to assure retention of the outlet as the established elevation; and
 - d) To add any amendments and qualifications necessary to clarify a Vested Right Claim.

Also, that I intend to oppose validation of all Department of Game, Fish and Parks Vested Water Right Claims for dams to allow the Vested Water Right Claim to be amended, if necessary, as follows:

1. To include the spillway elevation;
2. To correct the amount of water claimed; and
3. To add any amendments and qualifications necessary to clarify a Vested Right Claim.

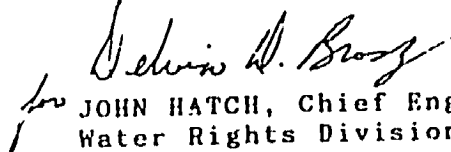


September 21, 1988
Richard Beringson, Secretary
Page 2

We will be working with your staff on these validations. We have already discussed setting outlet elevations before validating claims for lakes. Although the work necessary to complete the validation process will take several years to complete, the results should be of benefit to the public and to your Department. As the work is completed to validate each claim, the claim will be presented to the Water Management Board for validation.

Please advise if you have any questions.

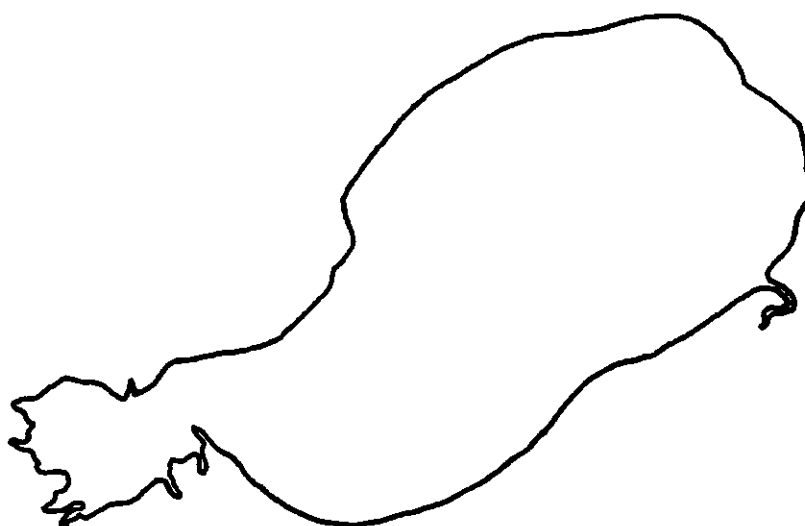
Very truly yours,


for JOHN HATCH, Chief Engineer
Water Rights Division
605 773-3352

cc: Ron Koth, Department of Game, Fish and Parks

RED LAKE, BRULE COUNTY

ORDINARY HIGH WATER MARK,
ORDINARY LOW WATER MARK, AND
OUTLET ELEVATION INVESTIGATION



Division of Water Rights



Department of Water and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

July 31, 1990

ABSTRACT

The South Dakota Department of Game, Fish and Parks (SD GF&P) requested that the South Dakota Department of Water and Natural Resources, Water Rights Division conduct an investigation of Red Lake, Brule County for the purpose of recommending elevations for the Ordinary High Water Mark (OHWM), the Ordinary Low Water Mark (OLWM), and the outlet.

Upon receipt of the SD GF&P request and pursuant to SDCL 43-17-1, 43-17-21 and 43-17-28, an investigation was conducted by the South Dakota Department of Water and Natural Resources, Water Rights Division, to recommend elevations for the OHWM, OLWM, and outlet for Red Lake, Brule County, South Dakota.

This report contains the results of the field investigation performed during the spring and early summer of 1990.

During the field investigation of Red Lake, the following easily recognizable characteristics were used in recommending elevations for the OHWM, OLWM, and outlet: erosion, changes in the character of the soil, boulder lines, and terrestrial vegetation.

Based on the findings in this report, the recommended elevations for the Red Lake, Brule County OHWM, OLWM, and outlet are 1558.5, 1553.4 and 1575.0 feet above mean sea level respectively.

Table of Contents

	Page
Abstract	1
List of Appendices	3
Review of Previous Hearings	4
Introduction	4
Meander Line	6
General Information	7
Water Rights	7
Field Investigation	8
Bench Mark Establishment and Collection of Field Data	8
Ordinary High and Low Water Mark Evidence	8
Erosion	8
Changes in the Character of the Soil	9
Boulder Lines	10
Terrestrial Vegetation	10
Outlet	11
Geology	11
Historical Water Levels	13
Water Quality Data	14
Climatological Data	14
Runoff Estimates	15
Man Made Influences	16
Analysis of Flowing Wells	18
Conclusions	21
Recommendation of Chief Engineer	23
Bibliography	24
Persons and Agencies Referenced	26

List of Appendices

	<u>Number</u>
Meander Line Survey of Red Lake, March 13, 1869	1
Plat Map of Brule Township, March 13, 1869	2
Lake Bottom Topographic Map of Red Lake	3
Area-Capacity Curves for Red Lake	4-5
Vested Right Claim No. 773-3	6-13
Erosion Characteristics	14-16
X-Section No. 1	17
X-Section No. 2	18
X-Section No. 3	19
X-Section No. 4	20
X-Section No. 5	21-22
X-Section No. 6	23-24
X-Section No. 7	25-26
X-Section No. 8	27-28
Soil Characteristics	29-31
Boulder Lines	32-33
Terrestrial Vegetation	34-37
Water Quality Data	38-39
Newspaper Record, June 1, 1881	40
Climatological Data; U.S. Department of Agriculture, Annual Summary, 1930	41
Climatological Data; Chamberlain, SD, 1924-1986	42
Climatological Data; Chamberlain, SD, Precipitation and Snow, July 20, 1990	43
Climatological Data; Academy, SD, Precipitation and Snow, July 20, 1990	44
Climatological Data; Pukwana, SD, Precipitation and Snow, July 20, 1990	45
Climatological Data; Average Temperatures and Departures from Normal, Total Precipitation and Departures from Normal for Academy, Chamberlain, Kennebec, Pukwana and White Lake, 1948-1955	46-49
Climatological Data; Precipitation Data, Earl Biskeborn, January 1980	50
Testimony, Anderson v. Ray, In the Supreme Court of the State of South Dakota, April term, 1915	51-58
Sixth Biennial Report of the State Engineer to the Governor of South Dakota, 1915-1916	59-62
South Dakota State Planning Board, Publication on Artesian Well Flow in South Dakota, January, 1937	63
Newspaper Record, March 9, 1916	64
Newspaper Record, June 17, 1920	65

REVIEW OF PREVIOUS HEARINGS

On August 7, 1984, the State Water Management Board heard testimony concerning the establishment of the OHWM, OLWM and outlet elevation for Red Lake, Brule County. At the conclusion of the Board meeting, the Water Management Board established the OHWM, OLWM and outlet elevations for Red Lake at 1558.5, 1553.6, and 1575.0 fmsl respectively.

Following the Board's August 7, 1984 decision, riparian landowners adjacent to Red Lake appealed the Board's decision to Circuit Court, Sixth Judicial Circuit. The Board's decision was reversed and remanded by Circuit Judge Robert A. Miller on May 19, 1986.

As suggested by Judge Robert A. Miller, the Department of Water and Natural Resources, Division of Water Rights, Pierre, South Dakota conducted additional studies on Red Lake. On March 26, 1987, the Board heard testimony from the Division of Water Rights and interested parties. At the conclusion of the Board meeting, the Water Management Board again established the OHWM, OLWM and outlet elevation for Red Lake at 1558.5, 1553.6, and 1575.0 fmsl.

Following the Board's March 26, 1987 decision, riparian landowners adjacent to Red Lake appealed the Board's decision to Circuit Court, Fourth Judicial Circuit. The Board's decision was reversed in its entirety by Circuit Judge Marshall Gerken on May 26, 1989.

The Department of Water and Natural Resources, Division of Water Rights, Pierre, South Dakota is once again studying Red Lake.

All of the field data presented in this report is from field investigations conducted in the spring and early summer of 1990. The conclusions and recommendations stated in this report are based upon the 1990 field investigation data.

The Division of Water Rights also retained the services of three independent consultants to study the soils, tree population and aquatic vegetation at Red Lake. The consultants were to study Red Lake and give an independent evaluation of Red Lake in their area of expertise.

INTRODUCTION

At the request of the Department of Game, Fish and Parks, Pierre, South Dakota in 1984, an investigation was conducted to recommend elevations for the Ordinary High Water Mark (OHWM), Ordinary Low Water Mark (OLWM) and outlet for Red Lake, Brule County. Following the Sixth Judicial Circuit Court reversal and remand of the Board's 1984 decision on Red Lake, on July 29, 1986, the Department of Game, Fish and Parks reaffirmed its request.

The OHWM is established by the processes of nature. The Water Management Board's setting thereof is merely a formal recognition of the mark established by nature (S.D. WILDLIFE FEDERATION v. WATER MGT. BD., 1986).

South Dakota Codified Law (SDCL) 43-17-2 provides that all navigable rivers and lakes are public highways within 50 feet landward from the water's nearest edge, provided that the outer boundary of such public highway may not expand beyond the OHWM and may not contract within the OLWM. Thus, the public has the right to use a strip of land up to 50 feet wide below the OHWM beginning at the water's edge or the OLWM for public purposes.

Further, while the public may use the 50 foot strip of land for only "public" purposes, the private adjoining landowner may use the land for any purpose not inconsistent with the rights of the public. Such purposes ordinarily would include but not limited to the right to graze and water livestock, to hay, or to build a boat dock.

SDCL 43-17-23 states that in determining the OHWM, natural factors take precedence. Man-made influences, either those that have been constructed to lower the mark or those constructed to raise the mark, shall be disregarded unless the influences have been lawfully constructed or have existed and been accepted for a period of time determined by the Water Management Board to be the equivalent of natural conditions.

When requested to do so, the Water Management Board is required by SDCL 43-17-21 and 43-17-28 to establish the OHWM for public lakes. SDCL 43-17-1 provides that the ownership of land below the OHWM, and of land below the water of a navigable lake or stream, is regulated by the laws of the United States or by such laws of the state as the Legislature may enact.

A lake is "navigable" if its waters constitute "public waters" (*Flisrand v. Madson* 35 S.D.457, 152 N.W. 796, (1915)). A lake is also "navigable" when, if maintained at the high-water mark, it is suitable for rowing, fishing, fowling and bathing (*Anderson V. Ray* (1916) 37 S.D.17, 156 N.W. 591).

Thirty-two lakes in South Dakota currently have OHWM's established. The Division measures 136 "lakes" biannually in the state. Potentially, an additional 102 OHWM requests could be submitted to the Division for investigation.

"Ordinary High Water Mark" according to SDCL 43-17-20(2) is defined in decisions rendered by the courts of this state. In the case of Flisrand v. Madson, 35 S.D.457, 152 N.W. 796, (1915) the Court wrote:

Neither high or low water mark means the highest or lowest point reached by the waters of a lake during periods of extreme and continued freshets, or periods of extreme and continued drought, but does mean the high and low points of variation of such waters under ordinary conditions, unaffected by either extreme.

In the case of Anderson v. Ray, 37 S.D.17, 156 N.W. 591 (1916) the South Dakota Supreme Court wrote:

In the case of freshwater rivers and lakes - in which there is no ebb and flow of the tide, but which are subject to irregular and occasional changes of height, without fixed quantity of time, except that they are periodical, recurring with the wet or dry seasons of the year - high water mark, as a line between the riparian owner and the public, is to be determined by examining the bed and banks, and ascertaining where the presence and action of the water are so common and usual, and so long-continued in all ordinary years, as to mark upon the soil of the bed a character distinct from that of the banks, in respect to vegetation, as well as respects the nature of the soil itself.

In the Waubay Lake decision, issued on January 17, 1986, the South Dakota Supreme Court stated the determination of these water marks is to be done on a case by case basis. The Court stated that:

“... under ordinary circumstances, the Ordinary High Water Mark will be set at a level where there is a distinct mark which evidences erosion, and changes in the character of the soil, and destruction of terrestrial vegetation, which have occurred under the ordinary and continuous conditions of the lake, disregarding periods of extreme and periodic freshets, and disregarding the highest water mark which does not evidence erosion and soil changes and destruction of vegetation occasioned under ordinary conditions. If a single distinct mark, occasioned under ordinary circumstances and evidencing all of the factors delineated above does not exist, i.e., there is conflicting evidence of the role of the Ordinary High Water Mark, it is the level where significant major, and substantial terrestrial vegetation ends, that the OHWM is to be set.” (cites omitted)

MEANDER LINE

A meander line, as the name implies, meanders and is not at a constant elevation. An OHWM and OLWM are at a constant elevation. Hence, a meander line is not and cannot be associated with an OHWM or OLWM. A meander line survey is established by man. OHWM's and OLWM's are established by nature and defined by man.

In the case of Flisrand vs. Madson, 1915, the South Dakota Supreme Court wrote: “The fact alone that the lake in question was meandered by the government survey does not directly control this matter, as a meander line is not considered a boundary line, but merely serves to define the sinuosities of the bank of the lake and a means of ascertaining the amount of land in the fractional tract subject to sale, which is to be paid for by the purchaser. St. Paul Ry. Co., Shurmeier 7 Wall 272, 19 L. Ed. 74, and note page 972.”

The meander line was surveyed around Red Lake in September and November of 1868 (see Appendix Nos. 1 and 2, U.S. Plat of 1868).

GENERAL INFORMATION

A lake bottom topographic map is available for Red Lake and is included in this report as Appendix No. 3 (Ducks Unlimited, 1983). Area-Capacity Curves (graphical representation of area/storage/elevation) were developed using the lake bottom topographic map, a Houston Instrument's TRUE GRID 8036 planimeter, EASYDIJ 5.9 software, and using the average area end method for determining volumes. Appendix Nos. 4 and 5 show the Area-Capacity curves developed for Red Lake.

Red Lake is located in Sections 3, 4, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, and 22, T103N R70W; and Section 24, T103N R71W. Red Lake is located approximately 5 miles east and 4 miles south of Chamberlain in Brule County, South Dakota.

All elevations in this report are referenced to a United States Department of the Interior, Geological Survey benchmark described as follows: a standard tablet stamped "T T 24 B 1940" located on the top of a concrete post in the SW1/4 NW1/4 SW1/4 of Section 17, T103N, R70W, 37 feet east of gravel road and 60 feet north of junction of driveway to house and on the north bank of Red Lake.

Temporary benchmarks were established by the Division of Water Rights along the perimeter of Red Lake at approximately 0.5 mile intervals. The locations and elevations of the temporary benchmarks are available from the Division upon request.

WATER RIGHTS

Vested Water Right Claim No. 773-3 held by the SD GF&P is the only existing claim on file for water in Red Lake (Division Files, 1990). However, domestic uses (i.e. livestock watering, dams, dugouts, etc.) are present within the Red Lake drainage basin.

Vested Right Claim No. 773-3 claims a 1889 priority date, and approximately 11,000 acre feet of water per year to fill to the Red Lake outlet level from draws and Reimer Creek for public recreational purposes, wildlife propagation and conservation (see Appendix Nos. 6 through 13). The location of the points of diversion are as follows: NW1/4 SW1/4 Section 21; NW1/4 NE1/4 and NE1/4 NE1/4 Section 15; NW1/4 NW1/4 Section 19; and NE1/4 NW1/4 Section 17, T103N, R70W.

The indicated location of water use is as follows: Sections 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, and 21 all in T103N R70W. It should be noted that Section 22, T103N R70W and Section 24, T103N R71W were not included in Vested Right Claim No. 773-3 even though water will flood portions of Sections 22 and 24 when Red Lake fills with water above the elevation of approximately 1554.0 fmsl.

Vested Right Claim No. 773-3 indicates a reservoir capacity (lake storage) when filled of 14,672 acre feet and a surface area at high water mark of 3667.87 acres. The 3667.87 acres indicated represents the State of South Dakota's acreage kept in trust for the public below the meander line survey conducted in 1868. The lake storage and surface area at high water mark

were estimated by the SD GF&P on April 5, 1961. The estimate was only an estimate and should not be construed as the actual lake storage or surface area at the OHWM.

Several corrections will need to be made to Vested Right Claim No. 773-3 before the claim can be validated. Action to validate Vested Right Claim No. 773-3 be made at a future date and will not be considered during the hearing to establish the OHWM, OLWM and outlet elevation for Red Lake, Brule County.

FIELD INVESTIGATION

BENCH MARK ESTABLISHMENT AND COLLECTION OF FIELD DATA

Temporary bench marks were established around Red Lake during the following dates: January 9 - 11, 1990; January 23 - 24, 1990; February 27 - March 1, 1990; May 7 - 11, 1990. Field data for Red Lake was collected on the following dates: May 7 - 11, 1990; June 11 - 15, 1990 and July 5, 1990.

Field data collected were given identification numbers. Soil information was identified as "WRS" while all other data was designated as "WR".

As stated earlier, temporary benchmarks were established by the Division of Water Rights along the perimeter of Red Lake at approximately 0.5 mile intervals. The locations and elevations of the temporary benchmarks are available from the Division upon request.

ORDINARY HIGH AND LOW WATER MARK EVIDENCE

Distinct physical evidence used in identifying an OHWM and OLWM are: erosion (change in slope of the bank), changes in the character of the soil, boulder lines, growth and destruction of terrestrial vegetation (FLISRAND v. MADSON, 1915; ANDERSON v. RAY, 1916; S.D. WILDLIFE FEDERATION v. WATER MGT.BD., 1986).

Erosion

Distinct erosional features (change in slope of the bank) around Red Lake are summarized in Appendix Nos. 14 through 16. Plotted cross-sections (Nos. 1 through 8) of the lake bank also show erosional features around Red Lake (see Appendix Nos. 17 through 28).

Cross-section No. 1 shows lake bank slope changes at 1556.8 and 1558.1 fmsl. The shoreline at Cross-section No. 1 appeared to have been disturbed by man. The cross-section profile may not be an accurate representation of natural erosional features.

Cross-section No. 2 shows lake bank slope changes at 1553.6, 1554.6, 1556.0, and 1557.5 fmsl. The shoreline at Cross-section No. 2 may also have been disturbed by man.

Cross-section No. 3 shows lake bank slope changes at 1555.6, 1556.0, 1556.9, 1557.3, 1558.7, and 1560.1 fmsl.

Cross-section No. 4 shows lake bank slope changes at 1555.5, 1556.0, 1557.0, 1558.1, and 1558.5 fmsl.

Cross-section No. 5 shows lake bank slope changes at 1553.5, 1554.0, 1555.1, 1557.3, 1559.6, 1560.0, 1560.6, 1561.8, and 1565.8 fmsl. Boulders have "armored" the shoreline at this location and inhibited shoreline erosion.

Cross-section No. 6 shows lake bank slope changes at 1553.4, 1554.6, 1557.1, 1558.8, 1559.5, 1559.9, 1560.6, and 1564.4 fmsl.

Cross-section No. 7 shows lake bank slope changes at 1554.6, 1556.2, 1558.4, 1559.0, 1559.9, 1561.1, and 1564.0 fmsl.

Cross-section No. 8 shows lake bank slope changes at 1554.9, 1556.3, 1556.5, 1558.7, 1562.5, and 1565.3 fmsl.

Consistent erosional features at Red Lake are found at the following elevations: 1553.2 - 1553.5, 1555.9 - 1556.6, 1557.1 - 1557.4, 1558.4 - 1558.8, 1559.9 - 1560.4. The major erosional features (changes in slope) are found at 1553.4 - 1553.5, 1556.0 - 1556.2, 1558.4 - 1558.8, 1559.9 - 1560.4.

Changes in the character of the soil

The Division of Water Rights retained the services of an independent consultant to study the soils at Red Lake. Dr. J. L. Richardson, North Dakota State University conducted the study and a detailed report of his findings is available upon request.

The soils observations noted in this report are predominately limited to surficial soil characteristics. Specifically, the formation of beaches, and existence of wave washed cobble pavements/rubble were the primary focus of the Division's soils investigation.

Soil stratification occurs around a lake when wave action washes the lake shore and leaves the larger parent materials (pebbles, cobbles, boulders) relatively stationary while the fine grained materials (sands, silts, clays, peats) are transported the greatest distance into the lake. An idealized lake shore progression would start with backshore boulder sized materials and terminate with clay sized materials deposited in the deepest portions of the lake. Historical lake levels can be inferred by locating areas showing remnant soil stratification.

Distinct surficial changes in the character of the soil found at Red Lake are summarized in Appendix Nos. 29 through 31.

Changes in the character of the soil occurs at Red Lake between the elevations of 1553.8 - 1559.4 fmsl.

Boulder Lines

In the spring, lake shorelines can be acted upon by ice sheets/wind action which form ice pushed ridges. The lake ice melts first near the shores because of the relatively rapid heating of the earthy material of the shore and the shallow bottom. An open lane of water is formed which is further widened by a rise in lake level from the water added by the melting snow of the surrounding slopes. If strong winds develop before the ice becomes rotten, the ice is blown about from side to side by the winds and pushed on the shores with almost irresistible force. The direction of shove is related to that of the winds and may vary along any shore even during a jam, if the winds shift considerably. The force of the push depends on the firmness and momentum of the ice, the latter being determined by the velocity and duration of the wind, the weight of the ice and to some extent the distance through which the ice is free to move. (Dionne, 1979)

Ice pushed ridges can be composed of foreshore and backshore materials. Ice pushed boulder lines are present at Red Lake. are summarized in Appendix Nos. 32 and 33. Base elevations of boulder lines ranged from 1556.5 - 1557.8, 1558.5 - 1559.1, 1559.7 - 1561.7, 1562.7 - 1563.6, 1565.1 - 1567.6.

Terrestrial Vegetation

The Division of Water Rights retained the services of an independent consultant to study the trees at Red Lake. Larry Helwig, Forestry Consultant, Brookings, South Dakota conducted the study and a detailed report of his findings is available upon request.

The tree population observations in this report are limited to easily recognizable characteristics such as species, diameter, height and elevation.

The tree population around Red Lake is predominately Cottonwood with Elm and Willow being of secondary and tertiary occurrence. Russian Olive trees have become established on the lower reaches of the lake bed. Growth of terrestrial vegetation around Red Lake is summarized in Appendix Nos. 34 through 37.

Destruction of terrestrial vegetation (i.e. Cottonwood trees) has occurred at Red Lake. Water inundation and fire has destroyed Cottonwood trees and left tree debris on the lake shore up to the elevation of 1559 fmsl.

Cottonwood trees at Red Lake range in diameter from 0.3 feet to 2.8 feet and grow between the elevations of 1553.6 and 1560.6 fmsl. The lowest terminal elevation for tree growth at Red Lake is at 1553.6 fmsl which would indicate that the OLWM is below this elevation.

Consistent elevations for various tree classes (diameters, heights) at Red Lake is difficult to determine from the field data collected. However, it does appear that there are two zones of tree growth present. The two zones are between the elevations of 1556.9 - 1557.7 fmsl and 1558.0 - 1559.1 fmsl. Various tree classes are present within the two zones. A clearer delineation of tree classes around Red Lake may be revealed in Larry Helwigs' report.

It is often thought that trees are unable to survive extended periods of flooding. However, previous OHWM field investigations indicate otherwise. Cottonwood Lake, Sully County has a remnant tree population that has survived periodic flooding. An 8 year old Willow tree survived water inundation from April 29, 1986 to April 18, 1988. Also, three Cottonwood trees survived water inundation from June, 1986, to April 21, 1987.

OUTLET

The outlet for Red Lake is located in the NW1/4 NE1/4 NW1/4 SE1/4 Section 3, T103N R70W. The outlet is at elevation 1575.0 fmsl and is the invert elevation of the concrete culvert under interstate I90. No field evidence was found that would indicate that the outlet has functioned in recent times.

GEOLOGY

There is limited information available concerning the geology near Red Lake and within the Red Lake watershed. The South Dakota Department of Water and Natural Resources, Division of Geological Survey has not conducted a geological study of Brule County.

Flint, 1955, indicates that the Red Lake watershed is composed of Pleistocene glacial drift. The glacial drift is chiefly composed of till with stratified drift in places along with ground and end moraines. Red Lake proper is located on a ground moraine. A ground moraine is material deposited from a glacier on the ground surface over which the glacier has moved. A ground moraine is bordered by lateral and/or end moraines.

A limited amount of well logs located in the watershed indicate that the area has been glaciated with till being the dominant glacial material.

Nelson Creek is incised into undifferentiated Pleistocene glacial outwash and alluvial material. Gravel, sand, silt, and clay deposited by glacial and post-glacial activity are found along the entire length of Nelson Creek (Flint, 1955; Division Well Logs, 1990).

Historically, it was believed that an underground gravel layer existed around Red Lake that would prevent the lake from "filling" with water because the gravel layer would drain water out of the lake.

On September 10 and 11, 1986, ten test holes were drilled by the South Dakota Department of Water and Natural Resources, Division of Geological Survey and Division of Water Rights. The ten test holes and existing well logs do not show any gravel layer capable of "draining" or "controlling" Red Lake water levels. Historical Red Lake water levels also indicate that a "controlling" gravel layer is not present (see HISTORICAL WATER LEVELS).

Sand and gravel deposits are present along Nelson Creek and also in the outlet area (Division Files, 1990). The groundwater level in Nelson Creek slopes toward Red Lake and would serve to add water to the lake.

The geological information available indicates that there is no significant stabilizing aquifer connection between Red Lake and a glacial aquifer. Groundwater does exist in the Red Lake vicinity as evidenced by water standing in Nelson Creek, and also in the dugout located on Jerome Feltman's property in the SE1/4 SW1/4 of Section 24, T103N, R71W. The groundwater present is believed to be only a few feet in total depth and nearly surficial. The aerial extent appears to be restricted to the lake bed proper and alluvial/glacial deposits associated with creeks and draws entering Red Lake.

HISTORICAL WATER LEVELS

Available historical water level measurements of Red Lake are shown in Table 1. The water level measurements were taken by the Division of Water Rights, the U.S. Department of Interior, Geological Survey, the U.S. Army Corps of Engineers (COE) and miscellaneous sources.

Table 1

<u>Date</u>	<u>Water Level of Red Lake (fmsl)</u>	<u>Comments and Measured by</u>
1881	1568	estimated based upon Ole C. Askland's testimony in 1915 (Anderson v. Ray)
1883	1566.5 - 1567	estimated based upon George W. Dody testimony in 1915 (Anderson v. Ray)
1915	"filled"	newspaper account, March 9, 1916
October 13, 1915	Unknown	Report of State Engineer,
June 20, 1920	1560.0 - 1566.0	estimated from State of SD Report on Red Lake, May, 1927 and also newspaper records concerning flooding around Red Lake,
May 27, 1927	1552.3	State of SD Report on Red Lake, May 27, 1927
?, 1936	1550.8	Artesian Well Flow in SD, South Dakota State Planning Board, January 1937, lake was dry except for four

		or five acre area which was maintained by two flowing wells (combined flow of 95 GPM)
April 17, 1951	1556.13	COE
May 28, 1951	1556.57	COE
June 29, 1951	1556.60	COE
August 1, 1951	1556.43	COE
August 31, 1951	1556.20	COE
October 1, 1951	1555.98	COE
November 1, 1951	1556.0	COE
December 29, 1951	1556.3	COE
March 4, 1952	1556.5	COE
June 3, 1952	1558.95	COE
July 24, 1952	1558.12	COE
August 26, 1952	1558.53	COE
October 30, 1952	1556.75	COE
November 25, 1952	1556.74	COE
January 8, 1953	1556.77	COE
February 2, 1953	1556.90	COE
March 5, 1953	1556.51	COE
April 9, 1953	1557.54	COE
January 18, 1954	1556.47	COE
February 11, 1954	1556.51	COE
March 8, 1954	1556.56	COE
April 1, 1954	1556.61	COE
April 30, 1954	1556.38	COE
August 6, 1954	1556.02	COE
September 1, 1954	1556.04	COE
October 5, 1954	1556.81	COE
November 24, 1954	1555.61	COE
December 27, 1954	1555.68	COE
January 24, 1955	1555.70	COE
May 23, 1955	1556.47	COE
July 11, 1955	1556.17	COE
August 9, 1955	1555.58	COE
September 9, 1955	1555.10	COE
October, 1964	1554 -	
	1554.5	estimated from computed average depth, Table 3, p. 25, State of South Dakota Water Resources Commission Report of Investigations NO. 1
September 12, 1983	1551.8	DWNR, Water Rights

April 6, 1984	1552.7	DWNR, Water Rights
April 18, 1984	1553.3	DWNR, Water Rights
May 15, 1984	1553.2	DWNR, Water Rights
June 5, 1984	1553.1	DWNR, Water Rights
July 5, 1984	1554.6	DWNR, Water Rights
July 16, 1984	1554.5	DWNR, Water Rights
October 12, 1984	1553.7	DWNR, Water Rights
May 9, 1985	1554.2	DWNR, Water Rights
October 11, 1985	1553.3	DWNR, Water Rights
May 9, 1986	1554.4	DWNR, Water Rights
September 11, 1986	1553.9	DWNR, Water Rights
October 22, 1986	1553.7	DWNR, Water Rights
April 27, 1987	1554.7	DWNR, Water Rights
October 20, 1987	1553.5	DWNR, Water Rights
April 29, 1988	1553.8	DWNR, Water Rights
September 30, 1988	1552.5	DWNR, Water Rights
May 15, 1989	1552.9	DWNR, Water Rights
June 11, 1990	1552.9	DWNR, Water Rights

Historical water levels can also be inferred from the existence of boulder lines. Boulder lines at Red Lake have formed because of ice action acting upon the lake bank. Although it is not possible to put a genesis date on boulder lines, they are indicative of historic water levels occurring at or near the boulder line elevations. Boulder lines are found at Red Lake at the following elevations (fmsl): 1567.6 - 1565.1, 1563.6 - 1562.7, 1561.7 - 1559.7, 1559.1 - 1558.5, 1557.8 - 1556.5.

WATER QUALITY DATA

Red Lake water quality data (total dissolved solids, TDS) have been estimated by the Division since 1984 using a conductivity meter. The estimated TDS values for Red Lake water are shown in Appendix No. 38. Water quality data for Red Lake were measured by the U.S. Geological Survey during the years of 1964 and 1965 and are shown in Appendix No. 39 (Petri, L. and Larson, L., 196?).

CLIMATOLOGICAL DATA

Climatological data for the Red Lake drainage basin is included in this report as Appendix Nos. 40 through 50. The climatological data is discussed in detail under the heading of RUNOFF ESTIMATES in this report.

RUNOFF ESTIMATES

Beginning soil moisture conditions refer to the degree that the drainage basin soils are saturated with water. During a "dry" year(s), the soil moisture becomes depleted due to plant use, evaporation, and natural drainage. A rainfall event during these depleted soil moisture conditions would not produce a relatively large runoff volume because the rain would soak

into the ground. On the other hand, during a “wet” year(s), the soil becomes saturated with water and isn’t capable of absorbing the rainfall event. Hence, the identical rainfall event during “wet” years will produce a much larger runoff volume than during “dry” years. The more saturated the soil becomes, the larger the runoff volumes generated during a rainfall event.

A single rainfall event whose duration is spread over a number of days or weeks generates a relatively small runoff volume. Conversely, a single rainfall event whose duration is only a few minutes or hours will generate a relatively large runoff volume. Hence, the runoff volume generated by any given rainfall event is dependent upon how rapidly the rain falls.

The largest runoff volumes for any drainage basin (Red Lake or any other lake) are generated when saturated soil moisture conditions are present going into the winter. The ground then freezes nearly solid/impermeable due to winter temperatures below 32 degrees Fahrenheit. Snow accumulations coupled with cold winter temperatures set the scene for the following springs’ major runoff event. A rapid temperature rise in the spring quickly melts the previous winters snow accumulation. The still frozen/saturated soil is not able to soak up any of the snow melt-water, hence, nearly all the snow melt-water arrives at terminal locations such as depressions, dams and lakes.

Yearly runoff entering Red Lake is dictated by a complicated set of circumstances that include general climatic factors, soil moisture conditions, and snow melt.

The question that needs to be asked is: “What would it take to “fill” Red Lake?”

One way Red Lake could “fill” in one year would be to have saturated soil conditions in the fall, frozen ground conditions throughout the winter, and snow accumulation through the winter. Red Lake has a drainage basin of 86,850 acres (135.7 square miles). Approximately 10 inches of snow is equivalent to 1 inch of water (SCS National Engineering Handbook, 1972). Simple multiplication yields the answer:

Assuming 100% snow melt runoff enters Red Lake (34 inches snow)

$$\frac{(86,850 \text{ acres}) \times (3.4 \text{ inches})}{(12 \text{ inches per foot})} = 24,608 \text{ acre feet}$$

Assuming 80% snow melt runoff enters Red Lake (43 inches snow)

$$\frac{(86,850 \text{ acres}) \times (4.3 \text{ inches})}{(12 \text{ inches per foot})} \times 0.80 = 24,897 \text{ acre feet}$$

Assuming 60% snow melt runoff enters Red Lake (57 inches snow)

$$\frac{(86,850 \text{ acres}) \times (5.7 \text{ inches})}{(12 \text{ inches per foot})} \times 0.60 = 24,752 \text{ acre feet}$$

It can be seen that it is possible to "fill" Red Lake in one spring runoff event. However, it is much more likely that two or three consecutive years of significant snowfall would be necessary to "fill" Red Lake. Available climatological data indicates that significant snowfall and subsequent melting has "filled" Red Lake.

The Chamberlain newspaper on June 1, 1881 (see Appendix No. 40) indicates 82 inches of snowfall between October 1880 and April 1881 in Morristown, Davison County, Dakota Territory. Ole C. Askeland testified (Anderson v. Ray, see Appendix No. 54) in 1916 that 18 feet of water was in Red Lake in 1881. George Dody also testified (Anderson v. Ray, see Appendix No. 56) that 16.5 - 17 feet of water was in Red Lake in 1883.

The U.S. Department of Agriculture records (1930 Annual Climatological Data Summary, see Appendix No. 41) show the comparative annual data from 1890 to 1930 for the entire state of South Dakota. In 1915, the state received an average of 28.54 inches of precipitation (of which 47.9 inches was snow). In 1919, the state received an average of 20.06 inches of precipitation (of which 56.2 inches was snow). In 1920, the state received an average of 27.44 inches of precipitation (of which 49.8 inches was snow).

The State Climatologist, South Dakota State University, Brookings, South Dakota provided information concerning precipitation and snow fall for towns near the Red Lake drainage basin (see Appendices 42 through 49). Appendix Nos. 43 and 44 show that in 1915, Chamberlain received 29.76 inches of precipitation (of which 35.6 inches was snow) and Academy received 29.18 inches of precipitation (of which 47.1 inches was snow). In 1919, Academy received 23.39 inches of precipitation (of which 50.5 inches was snow).

In 1951, 28.50 and 28.92 inches of precipitation fell at Academy and Chamberlain respectively (see Appendix No. 47). The normal average precipitation for Academy and Chamberlain is 21.06 and 19.87 inches respectively.

During the winter of 1951/spring of 1952 (December through March), 5.37 and 4.20 inches of precipitation occurred at Academy and Chamberlain respectively (see Appendix Nos. 47 and 48). Assuming 10 inches of snow per inch of precipitation (SCS, National Engineering Handbook, 1972), the snow fall for December through March was 53.7 for Academy. Chamberlain received 38.0 inches of snow during that time frame (see Appendix No. 42).

In summary, as shown by precipitation and snowfall data, all recorded high Red Lake water levels coincide with snow melt events or with large precipitation events. Snow melt is the dominate factor in producing large runoff volumes that will "fill" Red Lake.

MAN MADE INFLUENCES

Natural factors are given precedence in determining the ordinary high water mark. Man-made influences, either those that have been constructed to lower the mark or those constructed to raise the mark, shall be disregarded unless the influences have been lawfully constructed or have existed and been accepted for a period of time determined by the water management board to be the equivalent of natural conditions (SDCL 43-17-23).

Location notices on file with the Division indicates that potentially 214 dams and dugouts are constructed within the Red Lake drainage basin. The dams are capable of storing a maximum of 714 acre feet if they were empty. The dams, dugouts, and good soil conservation practices do affect Red Lake water levels during low runoff volume years by effectively preventing water from reaching Red Lake. In summary, dams, dugouts, and good conservation practices do affect already low Red Lake water levels during "normal" years by increasing the length and severity of low water periods. During years with large runoff volumes, the 714 acre feet of storage and good conservation practices become insignificant in comparison to the total runoff volume generated within the Red Lake watershed. The OHWM for a lake is established following large runoff events. Hence, man made influences caused by dams, dugouts, and good land conservation practices have not effected the Red Lake OHWM.

As previously discussed in the RUNOFF ESTIMATES portion of this report, all recorded high Red Lake water levels coincide with snow melt events or with large precipitation events. Based upon the climatological data and HISTORICAL WATER LEVELS included in this report, it is apparent that high historical Red Lake water levels in 1881 - 1883, and the 1950's were a result of natural runoff events. However, a discussion on the flowing wells entering Red Lake is included in this report for considering any man-made influences

Perhaps the best method of considering the flowing wells is to reconstruct a chronological history of well construction and amount of flow from the wells.

On July 8, 1914, the Brule County Commissioners opened bids for the construction of three flowing wells (Division Files, 1990). On January 9, 1915, the Brule County Commissioners paid Deisch & Meyers (well drillers) \$2838.70 for an artesian well constructed at Red Lake (Division Files, 1990). On July 15, 1915, the Brule County Commissioners paid Deisch & Meiers \$1466.40 for the second artesian well drilled (Division Files, 1990). On October 5, 1915, the Brule County Commissioners paid Deisch & Meiers the balance (\$3495.60) for drilling the three wells at Red Lake.

On October 13, 1915, the South Dakota State Engineer reported (see Appendices 59 through 62) that three artesian wells (two eight inches in diameter and one reduced to six inches in diameter) were drilled by the Brule County Commissioners on the bank of Red Lake. The State Engineer's comments were as follows:

"It is to be presumed that the wells have been drilled at these places so that their flows might replenish Red lake, for certainly they are of no other earthly use, except to help deplete the artesian flow all over the artesian well belt faster than almost any other instance that can be cited. If it was their object to raise Red Lake appreciably, certain they have failed in that respect, for a stratum of Tertiary sand carries away the surplus water, and the lake would not even be what it is today if it were not for the past few rainy seasons. ... The first well was put down to a depth of about 1,100 feet and it was estimated that its flow was about 1,200 gallons per minute. The illustration show conclusively that it has weakened in flow very much, and it has undoubtedly weakened the flow

of all wells reaching that horizon in the Dakota Sandstone for miles around. When the second well was sunk to the same depth, its flow was weak and became stronger only when continued to 1,200 feet."

Approximately 3,500 gallons per minute of water was being "wasted at Red Lake" via the three flowing wells (State Engineer, 1915). The two wells were drilled to a depth of 1,100 feet, and 1,200 feet (State Engineer, 1915), while the depth of the third well is unknown.

A fourth well was drilled by the South Dakota Fish and Game Department to a depth of 1050 feet between September 5, 1916 and April 15, 1917. A contract to construct the well was signed on September 5, 1916 by the Rassmussen Brothers (well drillers), H. S. Hedrick (State Game Warden, State Game and Fish Commission) and J. Kendall (representative for Brule County) (Division Files, 1990). Well construction was to begin on or before October 1, 1916 and be completed without unnecessary delay. The well was to be eight inches in diameter with a cost of \$3.40 per linear foot and be located in Section 16, T103N R70W. The flow from the fourth well is unknown and an estimate of 2,000 GPM will be used in the analysis of the flowing wells.

In 1924, the South Dakota Department of Game, Fish and Parks agreed with the County Board of Brule County to consider to drill another well because the season was very dry and Red Lake was receding very rapidly (Red Lake Report, 1927). It is important to note that the four flowing wells were not "maintaining" Red Lake at this time because Red Lake water levels were receding very rapidly (Red Lake Report, 1927). Voters of Brule County had turned down a request to drill another well. The well was drilled by the Department of Game, Fish and Parks between the years of 1924 and May 1927 (Red Lake Report, 1927) in NW1/4 SE1/4 Section 17, T103N R70W.

The well drilled by the Department of Game, Fish and Parks stopped flowing by May 1927. The casing had dropped out of sight in some unexplainable manner (Red Lake Report, 1927).

In summary, by May of 1927, nearly all the flowing wells at Red Lake had stopped flowing completely.

At 2:00 pm, August 6, 1946, the South Dakota Department of Game, Fish and Parks opened bids to drill a new artesian well in the NW1/4 SE1/4 Section 17, T103N R70W (Division Files, 1990). The well was completed by S. M. Norbeck before February 14, 1947 (Division Files, 1990). The flow from the well was estimated to be 1000 GPM. The flow from the well was measured on May 7, 1956 at a discharge rate of 1250 GPM (Davis, 1961).

Analysis of flowing wells

A review of the HISTORIC WATER LEVELS finds a high water period during 1951 - 1955. At this time, there was only one well flowing into Red Lake at an estimated discharge rate of 1250 GPM.

If one chose to ignore precipitation and snow accumulation data and looked at the recorded water levels between April 17 and June 3, 1952, one might think that the rising water levels were caused by water being added to the lake by the flowing well. However, when one looks at the recorded water levels between June 3, 1952 and April 9, 1953, fluctuating water levels would indicate that the flowing well water may not be related to the water levels. Then if one looks at the recorded water levels between April 9, 1953 and September 9, 1955, the steadily declining water levels do indicate that the flowing well was not responsible for the high water levels in Red Lake. If the flowing well had been responsible for high water levels in Red Lake, water levels would never have declined.

As indicated earlier, the State Engineer visited Red Lake On September 13, 1915 when three of the wells were constructed. By April 15, 1917, the combined discharge from the four wells had a maximum discharge of approximately 5,500 GPM.

In 1920, the 5,500 GPM flow is believed to be a high estimate because decreasing artesian head pressures and reduced artesian flows in the area (see Appendix No. 63).

A review of the HISTORIC WATER LEVELS finds a high water period during 1920. It is believed that Red Lake water levels attained the elevation of 1560 fmsl. At this time, there were four flowing wells constructed on the bed and banks of Red Lake.

Red Lake has a surface area of approximately 4,346 acres at an elevation of 1560.0 fmsl (Ducks Unlimited, 1990). Average annual evaporation losses for Red Lake are estimated to be 38 inches with 79% of those losses occurring between May and October (Spuhler, W., et al, 1971).

Two possible scenarios will be discussed concerning the effects of the flowing wells on Red Lake water levels. Both scenarios will neglect any seepage losses that may have occurred at Red Lake.

Scenario No. 1

Red Lake is filled to elevation 1560.0 fmsl. The estimated average annual evaporation losses for Red Lake when filled to the elevation of 1560 fmsl is shown below.

Evap. Loss Equation (Eq. No. 1)

$$\begin{aligned}
 &= \frac{(\text{lake surface area}) \times (\text{Average Annual Evaporation in inches})}{(12 \text{ inches})} \\
 &= \frac{(4,346 \text{ acres}) \times (38 \text{ inches})}{(12 \text{ inches})} \\
 &= 13,762 \text{ acre feet}
 \end{aligned}$$

In other words it would take 13,762 acre-feet on an average annual basis to maintain Red Lake Water levels at 1560.0 fmsl.

Assuming that the flowing wells were discharging 5,500 GPM (this is believed to be a very high estimate) in 1920, one can determine the amount of well water added to Red Lake on an annual basis. The amount of well water (in acre feet) added to Red Lake is shown below.

Yearly gallons discharged by flowing wells (Eq. No. 2)

$$= (\text{discharge rate}) \times (\text{Minutes Per year})$$

$$= (5,500 \text{ GPM}) \times (525,600 \text{ minutes})$$

$$= 2,890,800,000 \text{ gallons per year}$$

Convert gallons per year to acre feet per year (Eq. No. 3)

1 acre foot contains 325,851 gallons

$$= (2,890,800,000 \text{ gallons}) \times \frac{(1 \text{ acre foot})}{(325,851 \text{ gallons})}$$

$$= 8,872 \text{ acre feet or } 2.04 \text{ feet (24.5 inches) of water when Red Lake has a surface area of } 4,346 \text{ acres}$$

As noted previously, average annual evaporation is estimated to be 38 inches. The required precipitation to maintain Red Lake **once the lake filled** would be:

Needed precipitation

$$= (38 \text{ inches}) - (24.5 \text{ inches})$$

$$= 13.5 \text{ inches annually}$$

Scenario No. 2

Red Lake is filled to elevation 1554.0 fmsl. Red Lake has a surface area of approximately 3,463 acres. Average annual evaporation losses are shown below:

Evap. Losses Equation (Eq. No. 2)

$$= \frac{(3,463 \text{ acres}) \times (38 \text{ inches})}{(12 \text{ inches})}$$

$$= 10,966 \text{ acre feet}$$

From Eq. No. 3

= 8,872 acre feet or 2.56 feet (30.7 inches) of water when Red Lake has a surface area of 3,463 acres

As noted previously, average annual evaporation is estimated to be 38 inches. The required precipitation to maintain Red Lake **once the lake filled to 1554.0 fmsl** would be:

Needed precipitation

= (38 inches) - (30.7 inches)

= 7.3 inches annually

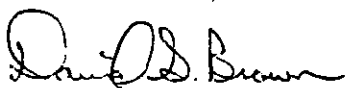
In summary, the high water level period during the early 1950's was unquestionably a result of natural factors and was not significantly affected by water from the flowing well. The high water level period during 1920 could have been affected by the flowing wells **assuming** that they were flowing at 5,500 GPM.

CONCLUSIONS

- 1) A meander line is not at a constant elevation and is not considered in determining the OHWM or OLWM for any given lake.
- 2) There is no significant stabilizing aquifer connection between Red Lake and a glacial aquifer.
- 3) Historical water levels indicate that Red Lake has "filled" with water during the years of 1881 - 1883, 1920, and 1951 - 1954.
- 4) Precipitation and snowfall data show that all the recorded high water levels in Red Lake coincide with snow melt events or with large precipitation events. However, there is some uncertainty associated with the 1920 high water period concerning the extent that flowing wells contributed to high water levels.
- 5) Man made influences caused by dams, dugouts, and good conservation practices have not affected the Red Lake OHWM.
- 6) Man made influences caused by the flowing wells are not responsible for the high water levels in Red Lake during 1881 - 1883, or 1951 - 1954.
- 7) Based upon the field data collected, potential OHWM elevations for Red Lake are as follows: Changes in the Character of the Soil occur between 1553.8 - 1559.4 fmsl, Boulder Lines occur between 1556.5 - 1557.8 fmsl and 1558.5 and 1559.1 fmsl, Major Erosion Features (changes in slope) occur at 1556.0 - 1556.2 fmsl and 1558.4 - 1558.8 fmsl, Dead Trees are present up to 1559.0 fmsl, Live Trees (predominately Cotton-

wood) are generally growing in two zones at 1556.9 - 1557.7 fmsl and 1558.0 - 1559.1 fmsl.

- 8) The most distinct, obvious, and permanent marks found at Red Lake are a result of erosion, and ice action (i.e. boulder lines). Trees provide limited guidance in the selection of the OHWM because no given elevation is solely delineated by tree growth or mortality.
- 9) There are two potential OHWM elevations for Red Lake based upon the field data summarized in conclusion numbers 7 and 8. The two elevations are 1556.1 and 1558.5 fmsl. Major erosional features are present at the two elevations and both exhibit well established beaches. The most obvious change in slope occurs at 1556.1 fmsl which represents the transition from lake bed to lake bank. Boulder lines are present at or near both erosional features with the most pronounced boulder lines occurring at 1558.5 fmsl. A great deal of lake evidence exists above 1558.5 fmsl, however, it is not associated with the formation of beaches. OHWM's are not associated with the highest possible limits of a lake bank but are associated with the upper limits of the lake bank. Since the strongest OHWM evidence exists at the elevation of 1558.5 fmsl, it is recommended that the OHWM be established at 1558.5 fmsl.
- 10) The recommended OLWM for Red Lake, Brule County is delineated by the absence of trees below 1553.6 fmsl and a change in slope of the lake bed at elevation 1553.4 fmsl. Therefore the recommended OLWM is at elevation 1553.4 fmsl.
- 11) The outlet elevation for Red Lake is at 1575.0 fmsl. The outlet elevation is not relevant to establishment of the OHWM or OLWM for Red Lake, Brule County.



David S. Brown
Natural Resources Engineer II
DWNr, Water Rights Division

Reviewed and approved by:



Gale N. Selken, P.E.
Natural Resources Engineer IV
DWNr, Water Rights Division

RECOMMENDATION OF THE CHIEF ENGINEER

Based upon the evidence presented in this report, the Chief Engineer is recommending the following concerning the establishment of the Ordinary High Water Mark, Ordinary Low Water Mark, and outlet elevation for Red Lake, Brule County:

- 1) That the Ordinary High Water Mark for Red Lake, Brule County be established at an elevation of 1558.5 fmsl.
- 2) That the Ordinary Low Water Mark for Red Lake, Brule County be established at an elevation of 1553.4 fmsl.
- 3) That the outlet elevation for Red Lake, Brule County be established at 1575.0 fmsl.

A handwritten signature in cursive script, reading "John Hatch".

John Hatch, P.E. Chief Engineer
DWNr, Division of Water Rights

Bibliography

- Anderson v. Ray, 37 S.D.17, 156 N.W. 591 (1916).
- Biskeborn, Earl, January 1980, Precipitation data approximately three miles south of Chamberlain, South Dakota, 1948 - 1980.
- Brule County Register of Deeds, Files and Records, Brule County Court House, Chamberlain, South Dakota.
- Chamberlain Register, June 1, 1881, Newspaper records.
- Davis, R.W., Dyer, C.F., Powell, J.E., Progress Report on Wells Penetrating Artesian Aquifers in South Dakota, Geological Survey Water-Supply Paper 1534, United States Printing Office, Washington, 1961, p. 42.
- Division Files and Records, 1990, Department of Water and Natural Resources, Foss Building, Pierre, South Dakota 57501.
- Ducks Unlimited, 1990, Contour Map of Red Lake, Brule County, 6115 East Main Avenue, Bismarck, ND 58501.
- Flint, R. F., Pleistocene Geology of Eastern South Dakota, Geological Survey Professional Paper 262, 1955.
- Flisrand v. Madson (1915) 35 S.D. 457, 152 N.W. 796.
- Hillebrand v. Knapp (1937), 65 S.D. 414, 274 N.W. 821.
- Hale Warner, Acting State Climatologist, July 1990, Precipitation and snowfall data for Chamberlain, Pukwana, and Academia, personal communication, South Dakota State University, Brookings, South Dakota 57007.
- Jean-Claude Dionne, Ice action in the Lacustrine Environment: a Review with Particular Reference to Subartic Quebec, Canada, Earth-Science Reviews, 15(3), 1979, pp. 185 - 212.
- Meander line survey and plat of Red Lake, March 13, 1869.
- Petri., L. and Larson, L., 196?, Quality of Water in Selected Lakes of Eastern South Dakota, State of South Dakota Water Resources Commission Report of Investigations No. 1, Prepared in Cooperation with the U.S. Geological Survey, pp. 48-49.
- S.D. Wildlife Federation v. Water Mgt. Bd. (1986), 382 N.W.2d 26.

- Spuhler, W., et al, 1971, Climate of South Dakota, Bulletin 582, November, 1971, Agricultural Experiment Station, South Dakota State University, Brookings, South Dakota, 57007
- State Engineer, Eighth Biennial Report of the State Engineer to the Governor of South Dakota, 1919-1920, pp. 42 - 43.
- State Engineer, Sixth biennial Report of the State Engineer to the Governor of South Dakota, 1915-1916, pp. 188 - 193.
- Red Lake Report May 1927, Red Lake in Red Lake Township, Township One Hundred Three, Range Seventy, Brule County, State of South Dakota Report.
- South Dakota State Planning Board, Publication on Artesian Well Flow in South Dakota, January, 1937.
- State v. Deisch (1917), 38 S.D. 560, 162 N.W. 365.
- U.S. Department of Agriculture, Annual Climatological Data Summary, 1930, Weather Bureau, Volume XXXV, No. 13.
- U.S. Department of Agriculture, National Engineering Handbook, Section 4. Hydrology, Soil Conservation Service, 1965, Reprinted with minor revisions, 1972, NEH Notice 4-103, June 1981, p. 21.3.
- U.S. Department of Agriculture, Soil Survey of Brule and Buffalo Counties, South Dakota, Soil Conservation Service, October, 1985.
- U.S. Department of the Army, COE, Red Lake water level records, 1984, Omaha, Nebraska.

Persons and Agencies Referenced

Archives, State Library Building, Pierre, SD 57501

Brule County Auditor, County Courthouse, Chamberlain, SD 57325

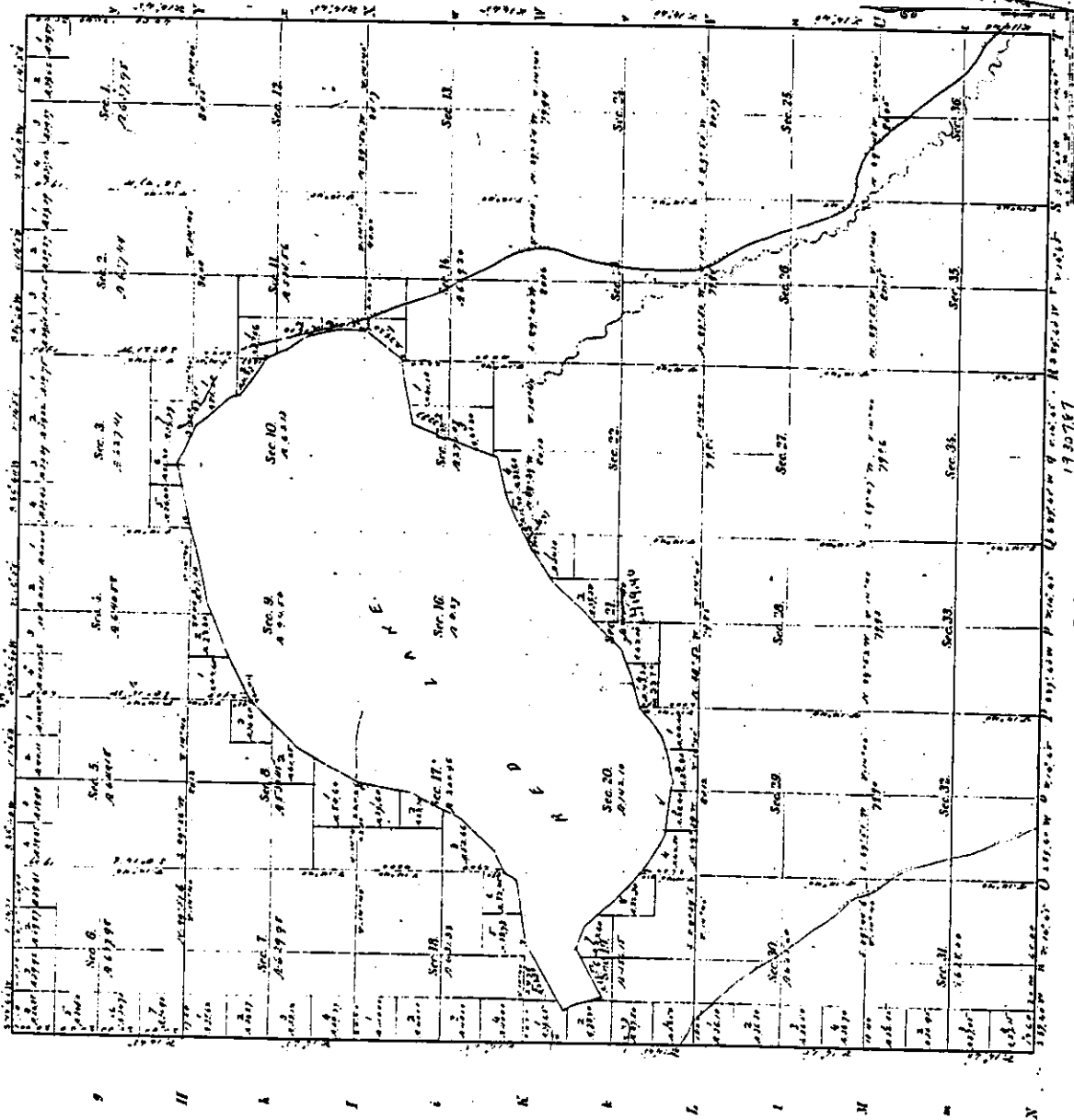
Brule County Register of Deeds, County Courthouse, Chamberlain, SD 57325

Register-Lakota Printing, 1300 North Jasper, P.O. Box 28, Chamberlain, SD 57325

State Climatologist, South Dakota State University, Brookings, South Dakota 57007

State Engineer, Foss Building, Pierre, SD 57501

TOWNSHIP N. 101 North RANGE N. 10 West of the 3rd Principal Meridian



Source	By whom Surveyed	Date of Survey	Amount of Survey	When Surveyed
Township Name	Surveyed by	Surveyed on	Surveyed by	Surveyed on
Subdivisions	Surveyed by	Surveyed on	Surveyed by	Surveyed on

19 10 1887

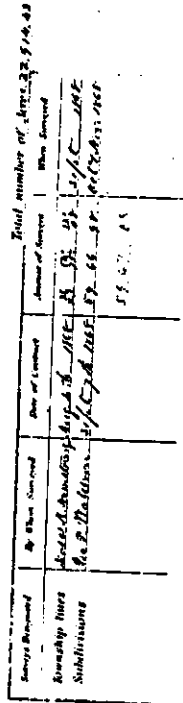
The above plat of Township N. 101 North, Range N. 10 West of the 3rd Principal Meridian is hereby confirmed to the field notes of the survey thereof on file in this office which have been examined and approved.

Witness my hand and the Great Seal of the United States at Washington this 10th day of October 1887.

Approved:
Commissioner of the General Land Office
GEO. H. WHEELER

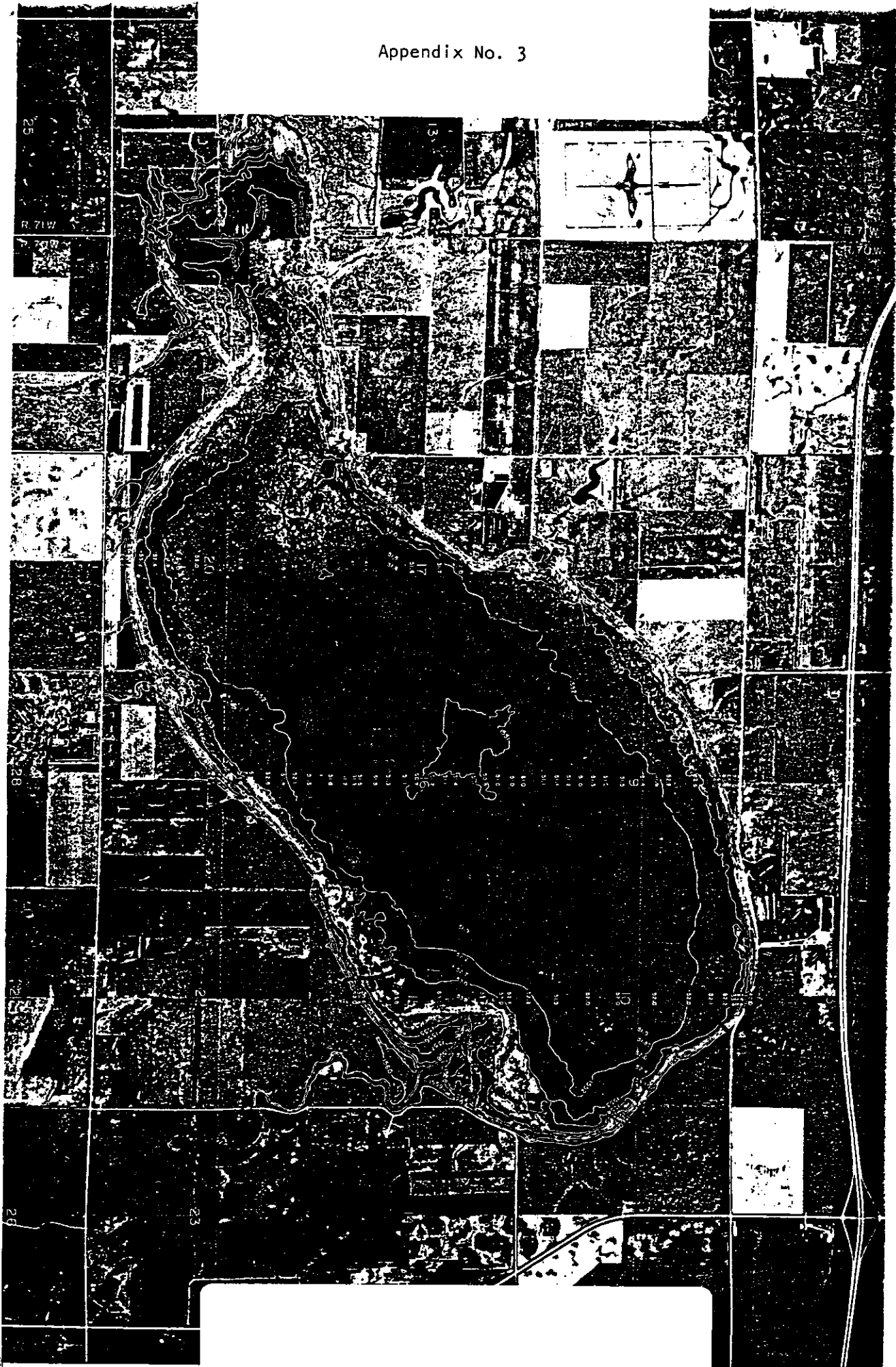
Section	Owner	Acres	Value	Assessment	Notes
1	...	...	...	...	...
2	...	...	...	...	...
3	...	...	...	...	...
4	...	...	...	...	...
5	...	...	...	...	...
6	...	...	...	...	...
7	...	...	...	...	...
8	...	...	...	...	...
9	...	...	...	...	...
10	...	...	...	...	...
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MERIDIAN

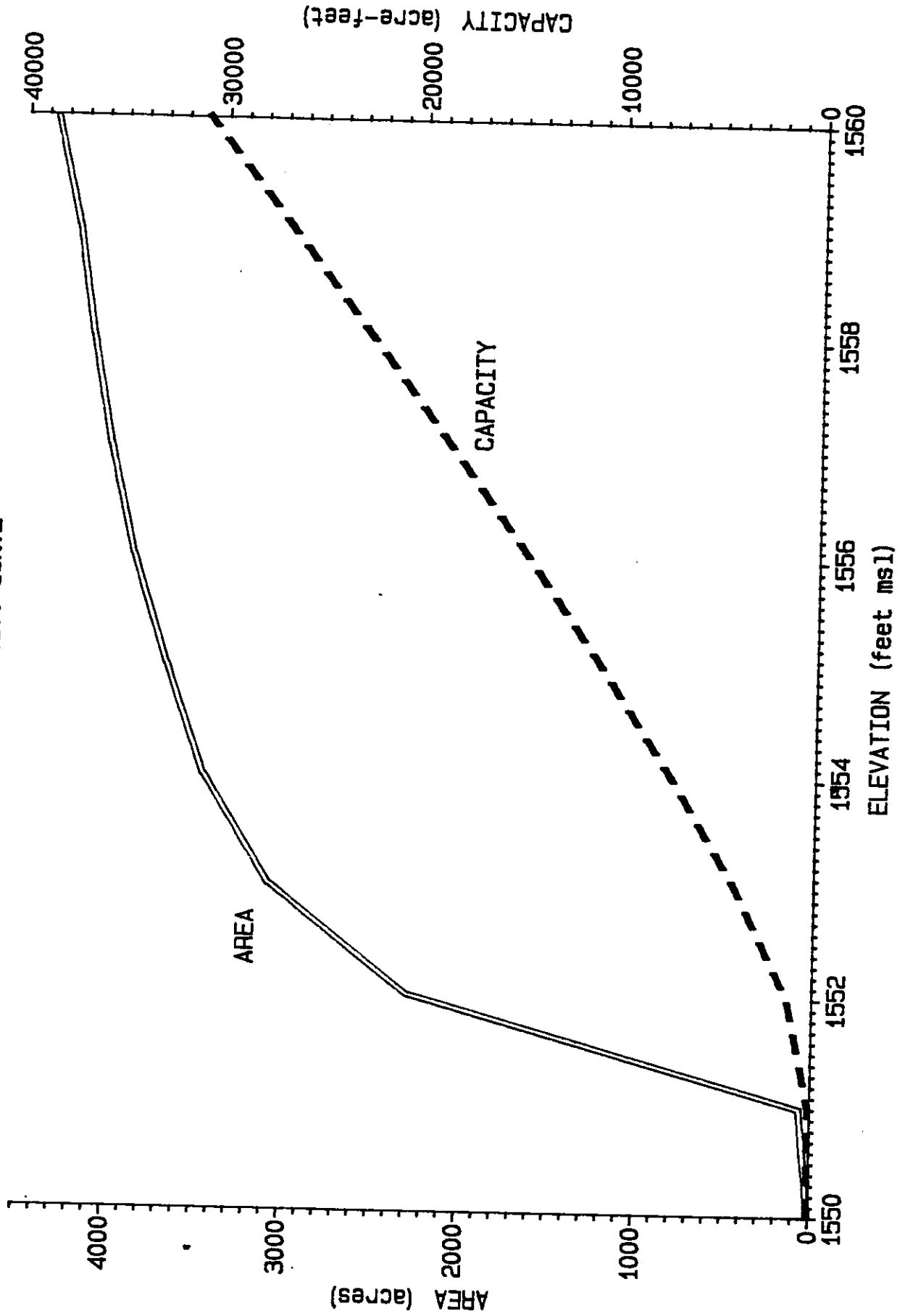


The above copy of Township 19th certificate of George, 1879, at 18 of this date
 of Winchester, Virginia, is hereby certified to be a true
 copy of the original on file in this office, which have been examined and approved.
 George, Winch. Office.
 Special Agent for the City.
 Chas. H. H.

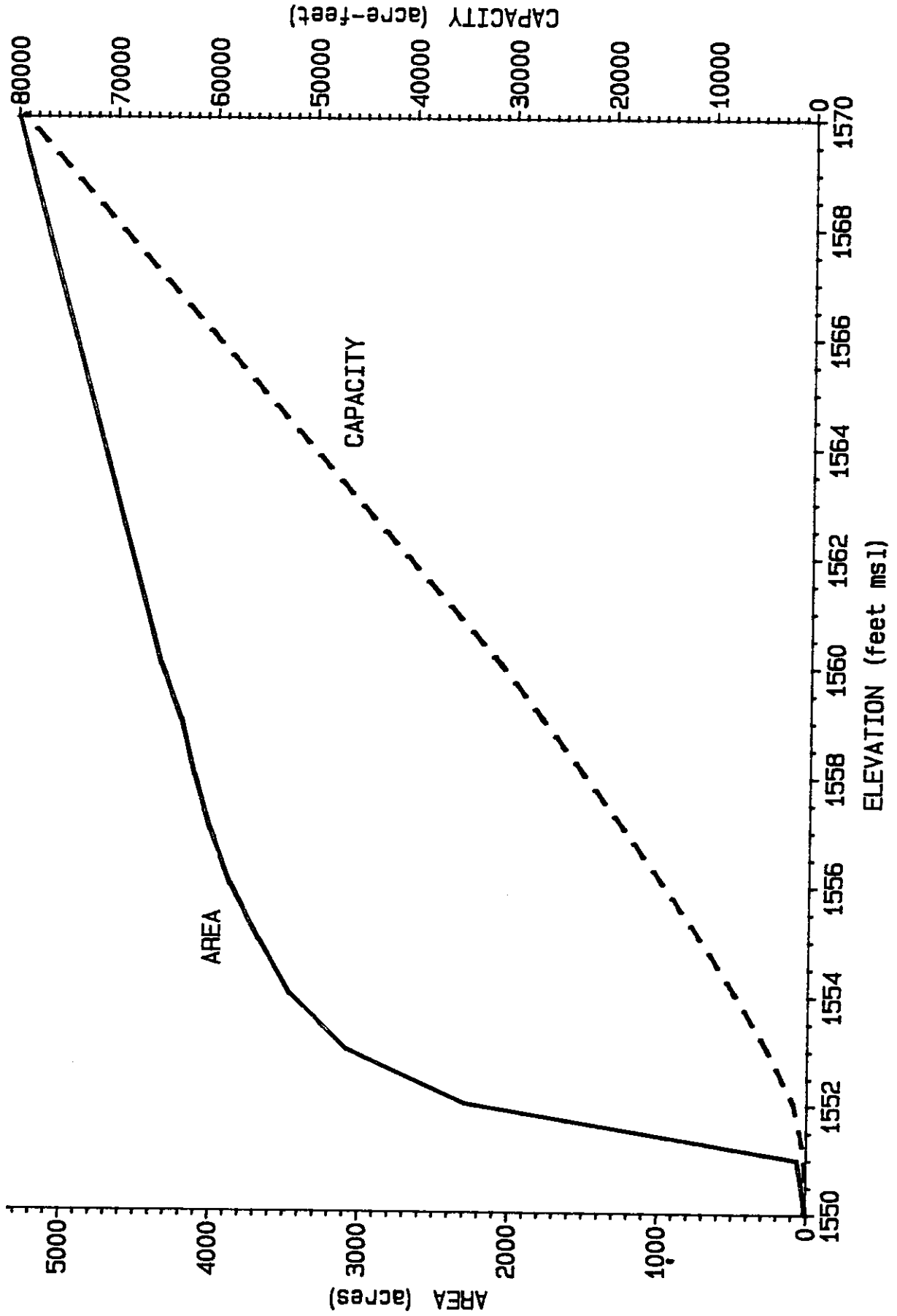
Appendix No. 3

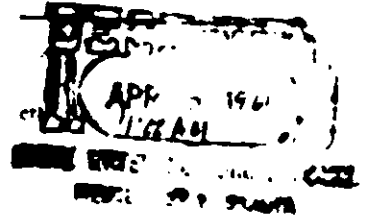


REDLAKE
AREA-CAPACITY CURVE



REDLAKE AREA-CAPACITY CURVE





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

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

1. Name of applicant South Dakota Department of Game, Fish and Parks
Postoffice address Pierre County Hughes State South Dakota

- I. If a corporation _____
- (a) Name of same _____
- (b) Date and place of incorporation _____
- (c) Amount of capital stock _____
- (d) Amount paid in _____
- (e) Names and addresses of directors _____

(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) _____

(b) Cash on hand, \$ _____ (c) Treasury stock, \$ _____

(d) Bonds to be issued, \$ _____ (e) Other resources, \$ _____

2. Name of diversion work Red lake - Brule County
As required to fill lake to outlet level - approximately 11,000

3. Amount of water claimed acres feet per year cubic feet per second _____

4. Source of water supply BRAYS AND REIMER CREEK

5. Location of point of diversion NW 1/4 Sec. 21, NW 1/4, NE 1/4, Sec. 15, NW 1/4, Sec. 12, NW 1/4, Sec. 17 - T. 103 - R. 70 on _____ bank _____ 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.) Secs. 19, 18, 17, 20, 8, 9, 12, 13, 10, 11, 14 and 21 all in T. 103 N. - R. 70 W. - Brule County

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

(a) Nature of use Public recreational purposes
Name an, 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 _____

6. Estimated cost

Appendix No. 7

(a) M

(c) P

(e) Other structures

ing plant, \$

Rock, \$

Total, \$

9. Description of diversion works:

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

II. Dimensions of works. Information requested not applicable, Red lake is a meandered lake.

(a) Dam: Height, lake, Maximum depth approximately 8 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 14,672 acre feet. Surface area at highwater mark 3867.87 acres.

DEPTH AT OUTLET-FEET	SURFACE AREA AT EACH DEPTH AT OUTLET-ACRES	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 completed - not applicable - a meandered lake

11. Time required for complete application of water to the proposed beneficial use completed

12. Choice of newspaper for publication of notice of intention to appropriate not applicable

STATE OF SOUTH DAKOTA

County of Hughes

I, Walter J. Fillmore

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 J. Fillmore

Subscribed and sworn to before me this 21 day of March 1961

Edward R. Brown

Remarks by State Water Resources Commission

"VESTED RIGHT" CLAIMED

Appendix No. 8

STATE OF SOUTH DAKOTA
County of HUGHES } ss.

Pierre, South Dakota, JUNE 14, 1971

This is to certify that the foregoing application was received by the Commission at 11:00 o'clock
9 a.m. upon the 5TH day of APRIL, 1961

State Water Resources Commission
By: Burton Stone
for Chief Engineer, Executive Officer

Number of permit 773-3

Date of first receipt of application APRIL 5, 1961

Date of return to applicant for correction, amendments or changes required as follows: _____, 19____

Date of receipt of corrected application _____, 19____

Date from which applicant may claim right 1839

Approved JUNE 14, 1971 Recorded in Book 12 Page 10

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~~ _____

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

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

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

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 11,000 ACRES FEET ANNUALLY 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~~ which water is actually
USED FOR PUBLIC RECREATION

and beneficially ~~applied for irrigation~~ on or before JUNE 30, 1955; said water to be used during the following described annual period:

CONTINUOUSLY

Witness my hand this 14TH day of JUNE, 1971

State Water Resources Commission

By: Burton Stone
Chief Engineer, Executive Officer

Certificate of Construction issued JUNE 14, 1971
JUNE 14, 1971

WATER LICENSE NO. 773-3

(C) WHEREAS, On the 5th day of April A.D. 1961
the Department of Game, Fish and Parks

make Water Right Application No. 773-3 for a permit to use 11,000 acre feet annually of the water of Reimer Creek and dry draws
County of Brule State of South Dakota for public recreation

(2) WHEREAS, On the 14th day of June A. D. 1971
 Vested Right Permit No. 773-3 with a date of priority of 1889
 was issued to said applicant recognizing for the diversion of said water, ~~and provided for~~ the completion of construction of the water
 supply system therein described ~~on or before the~~ day of July 1971 and ~~and~~ the
 application to beneficial use of said water ~~on or before the~~ date of July 1971

and.

(3) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota relating to completion of the construction of the water supply system and is entitled to divert 11,000 acre feet annually ~~one hundred~~ of water for beneficial use and;

(4) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota relating to the application of water to beneficial use of the following extent:

water is used in place for public recreational purposes

Appendix No. 10

(5) 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 Department of Game, Fish and Parks

Pierre, South Dakota

vested right

the holder _____ and owner _____ of said permit No. **773-2** a water right, dating from **1889**

_____ to use of **11,000 acre feet annually** of the water of **Reimer Creek and dry draws**

in the County of **Brule** and State of South Dakota, or so much thereof as may be necessary for the purposes hereinafter mentioned, to be diverted at **points in the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 21, NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15, NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 19, and NE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 17, T103N, R70W**

and ~~conduct to the~~ **stored in place**

for the purpose of **public recreation (Red Lake)**

Subject to any limitations listed in Water Right Permit No. **773-3** and subject to the laws of the State of South Dakota.

WITNESS, My hand and seal of our office at Pierre, South Dakota

this **14th** day of **June** A.D.

Nineteen Hundred and **Seventy - one**

WATER RESOURCES COMMISSION

by

Chief Engineer, Executive Officer, **J.W. CRIMES**

Appendix No. 11

Form 15

773-3

Permit No.

Water Diversion No. 3 MISSOURI RIVER Water District

CERTIFICATE OF CONSTRUCTION

This is to Certify, That the Department of Game, Fish and Parks

~~Vested Right~~ 773-3 the holder of
Permit No. 773-3 issued upon Application No. 773-3 bearing date of priority of 1889
authorizing the diversion of 11,000 acre feet annually of the waters of
Reimer Creek and dry draws County of Brule State of South Dakota at
points in the NW 1/4 SW 1/4, Section 21, NE 1/4 NE 1/4, Section 15; NW 1/4 NW 1/4, Section 19,
and NE 1/4 NW 1/4, Section 17, T103N, R70
for public recreation (Red Lakes)

purposes has 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 recognized as
11,000 acre feet annually satisfactory
condition for diverting and conveying to the place of intended use on the second of water

Date June 14, 1971

WATER RESOURCES COMMISSION

By

J.W. GRIMES, Executive Officer

Water Division No. _____ Water District _____

Proof of Application of Water to Beneficial Use

PETITION OF HOLDER

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

Ans. South Dakota Department of Game, Fish and Parks, Pierre, 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. _____

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

Ans. _____

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

Ans. Draw - NW1SW1 Sec. 21, NW1NE1, NE1NE1 Sec. 15, NWPW1 Sec. 19, NE1NW1 Sec. 17 - T. 103 - R-70

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. A meandered lake - depth 8 feet - 3867.87 acres

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. Fish and wildlife propagation, conservation and recreation

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

Ans. Used in place in lake or reservoir

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

Ans. As required to fill lake to outlet level - approximately 11,000 acre feet per year.

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. A beavered lake, Used by the public for uses specified except for that amount lost by evaporation and seepage

(Sign)

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

Sioux County of *Hutchinson* State of South Dakota, on this *21* day of *May* A. D. 19*21*

Witnesses

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.

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

Appendix No. 14 Erosion Characteristics

<u>ID</u> <u>Number</u>	<u>Elevation</u> <u>(fmsl)</u>	<u>Legal Description</u> <u>(all in T103N R70W)</u>	<u>Comments</u>
WR38	1559.9	NE1/4 NE1/4 NW1/4 Sec. 8	Scattered boulders with change in slope, photo taken
WR44	1559.3	NE1/4 NW1/4 NE1/4 Sec. 10	Line of 5 cottonwood trees (approx. 1.5 - 2.0 feet diameter), top of ice pushed ridge
WR46	1556.4	NE1/4 NW1/4 NE1/4 Sec. 10	Base of ice pushed ridge, see WR 44, ice pushed ridge is a matrix of sand, pebbles, cobbles, boulders
WR50	1558.8	NE1/4 NW1/4 NE1/4 Sec. 10	Continuation of ice pushed ridge, top
WR51	1559.1	NE1/4 NW1/4 NE1/4 Sec. 10	Base of boulder line and change in slope
WR60	1556.6	SE1/4 NW1/4 NE1/4 Sec. 10	Base of ice pushed ridge (same as WR 46), ice pushed ridge is a matrix of sand, pebbles, cobbles, boulders
WR61	1558.1	SE1/4 NW1/4 NE1/4 Sec. 10	Top of ice pushed ridge
WR66	1558.5	SE1/4 NW1/4 NE1/4 Sec. 10	Base of boulder line, above ice pushed ridge, change in slope
WR69	1561.7	SW1/4 NE1/4 NE1/4 Sec. 10	Change in slope, photo taken looking south
WRS10	1556.5	NE1/4 SE1/4 NE1/4 Sec. 10	Change in slope, base of ice pushed ridge
WR74	1557.8	NE1/4 SE1/4 NE1/4 Sec. 10	Top of ice pushed ridge, three photos taken
WRS8	1558.7	NE1/4 SE1/4 NE1/4 Sec. 10	Change in slope
WR105	1557.3	SW1/4 SE1/4 SE1/4 Sec. 18	Change in slope, photo taken looking west
WR116	1555.6	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope
WRS23	1556.1	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope
WRS22	1556.9	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope
WR114	1557.3	SE1/4 SW1/4 SE1/4 Sec. 18	Top of ice pushed ridge
WRS21	1557.3	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope

Appendix No. 15 Erosion Characteristics continued

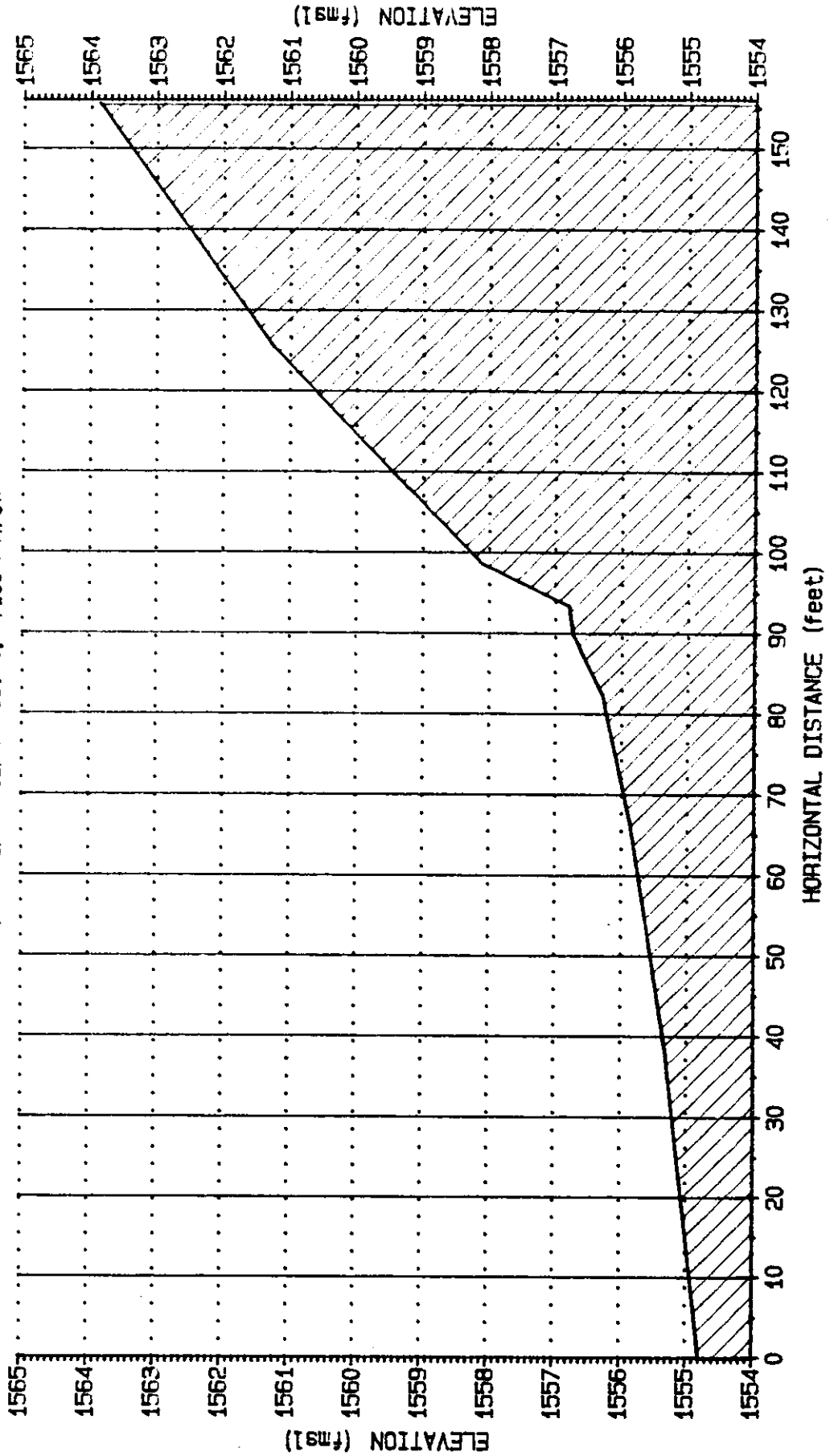
<u>ID</u> <u>Number</u>	<u>Elevation</u> <u>(fmsl)</u>	<u>Legal Description</u> <u>(all in T103N R70W)</u>	<u>Comments</u>
WRS20	1558.5	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope
WR109	1558.7	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope
WRS18	1560.1	SE1/4 SW1/4 SE1/4 Sec. 18	Change in slope associated with boulder line, photo taken
WRS29	1565.8	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WRS31	1561.8	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WRS32	1560.9	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WR131	1560.0	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WR134	1557.4	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WRS34	1555.1	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WRS37	1553.4	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope
WR141	1564.9	NE1/4 NE1/4 NE1/4 Sec. 21	Change in slope, gentle change
WR150	1562.7	NW1/4 NE1/4 NE1/4 Sec. 21	Change in slope associated with boulder line
WR152	1558.7	NW1/4 NE1/4 NE1/4 Sec. 21	Change in slope and top of washed cobble pavement
WR153	1560.4	NW1/4 NE1/4 NE1/4 Sec. 21	Change in slope, top of ridge
WR156	1559.0	NW1/4 NE1/4 NE1/4 Sec. 21	Change in slope, top of washed cobble pavement
WR157	1560.8	NW1/4 NE1/4 NE1/4 Sec. 21	Change in slope, base of washed boulders
WR160	1558.4	SE1/4 NW1/4 NE1/4 Sec. 21	Change in slope
WR161	1559.6	SE1/4 NW1/4 NE1/4 Sec. 21	Change in slope
WR162	1560.7	SE1/4 NW1/4 NE1/4 Sec. 21	Change in slope
WR163	1563.4	SE1/4 NW1/4 NE1/4 Sec. 21	Change in slope
WR164	1565.1	SE1/4 NW1/4 NE1/4 Sec. 21	Change in slope
WR170	1556.3	NE1/4 SE1/4 NW1/4 Sec. 17	Change in slope, six elm trees at approx. 1556.0
WR172	1559.7	NE1/4 SE1/4 NW1/4 Sec. 17	Change in slope, base of boulder line, photo taken
WR181	1553.7	NE1/4 SE1/4 NW1/4 Sec. 17	Change in slope, foreshore base of possible ice pushed ridge
WR183	1553.5	NE1/4 SE1/4 NW1/4 Sec. 17	See WR 181, backshore base of possible ice pushed ridge

Appendix No. 16 Erosion Characteristics continued

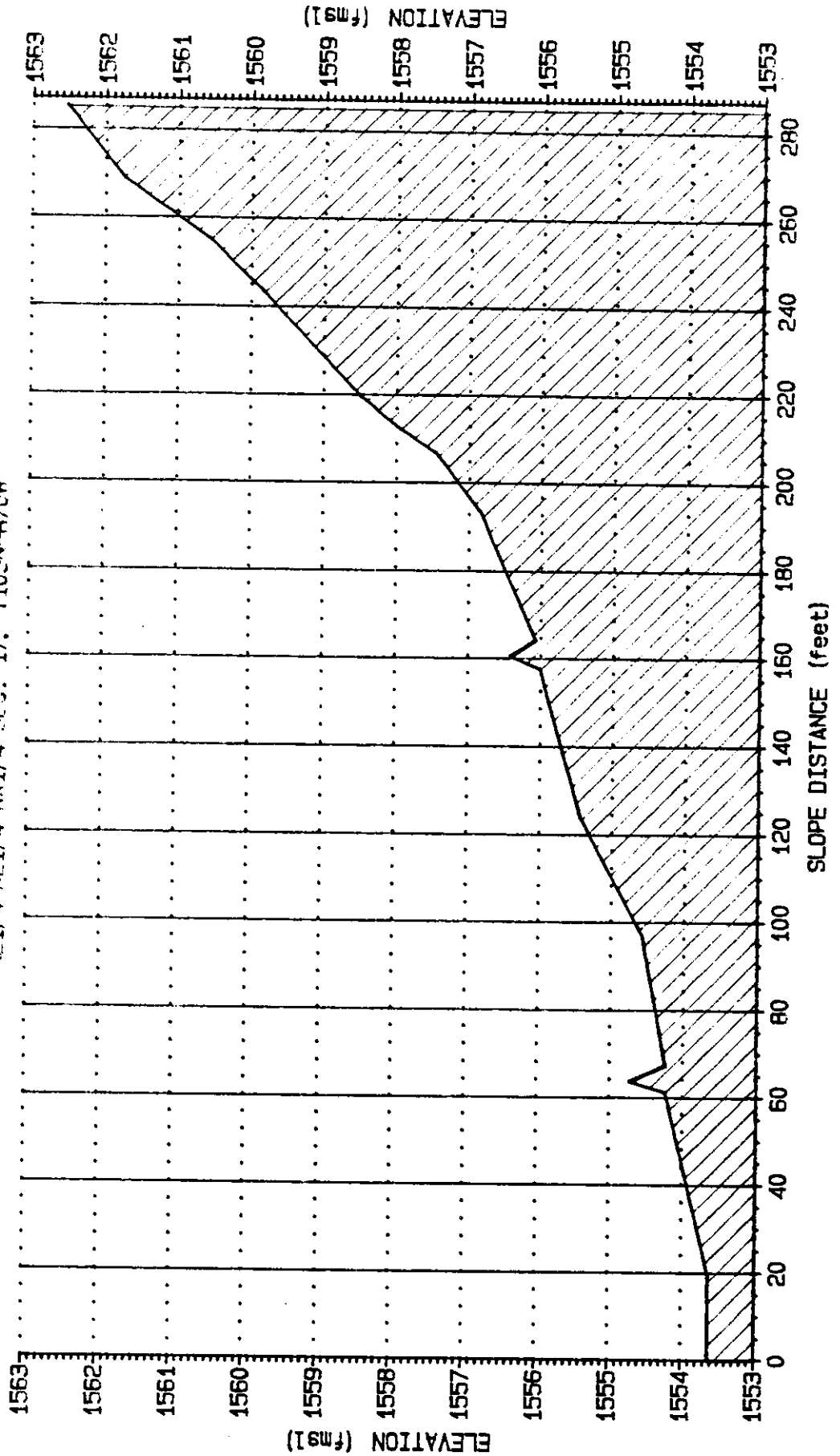
<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WR184	1555.2	NW1/4 NE1/4 SW1/4 Sec. 17	Change in slope
WR185	1555.6	NW1/4 NE1/4 SW1/4 Sec. 17	Change in slope
WR188	1554.8	NW1/4 NE1/4 SW1/4 Sec. 17	Change in slope
WR189	1556.2	NW1/4 NE1/4 SW1/4 Sec. 17	Change in slope
WR190	1558.0	NW1/4 NE1/4 SW1/4 Sec. 17	Change in slope associated with four boulders within 10 foot radius, mini boulder line
WR192	1557.2	NE1/4 SW1/4 SW1/4 Sec. 17	Change in slope associated with two boulders which may have been moved by man
WR194	1557.1	NE1/4 SW1/4 SW1/4 Sec. 17	Change in slope, few washed cobbles
WR195	1559.8	NE1/4 SW1/4 SW1/4 Sec. 17	Change in slope
WRS102	1564.4	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WRS104	1560.6	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WR206	1559.9	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WRS107	1558.8	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WR212	1555.9	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WRS112	1554.5	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WRS116	1553.2	SW1/4 SW1/4 SW1/4 Sec. 15	Change in slope
WR222	1556.0	NW1/4 SW1/4 NE1/4 Sec. 19	Change in slope
WR229	1558.1	NW1/4 SW1/4 NE1/4 Sec. 19	Change in slope
WR230	1558.8	NW1/4 SW1/4 NE1/4 Sec. 19	Change in slope

X-SECTION NO. 1

RAY STEMMERMAN PROPERTY
NE1/4 SW1/4 SE1/4 SEC. 8, T103N-R70W

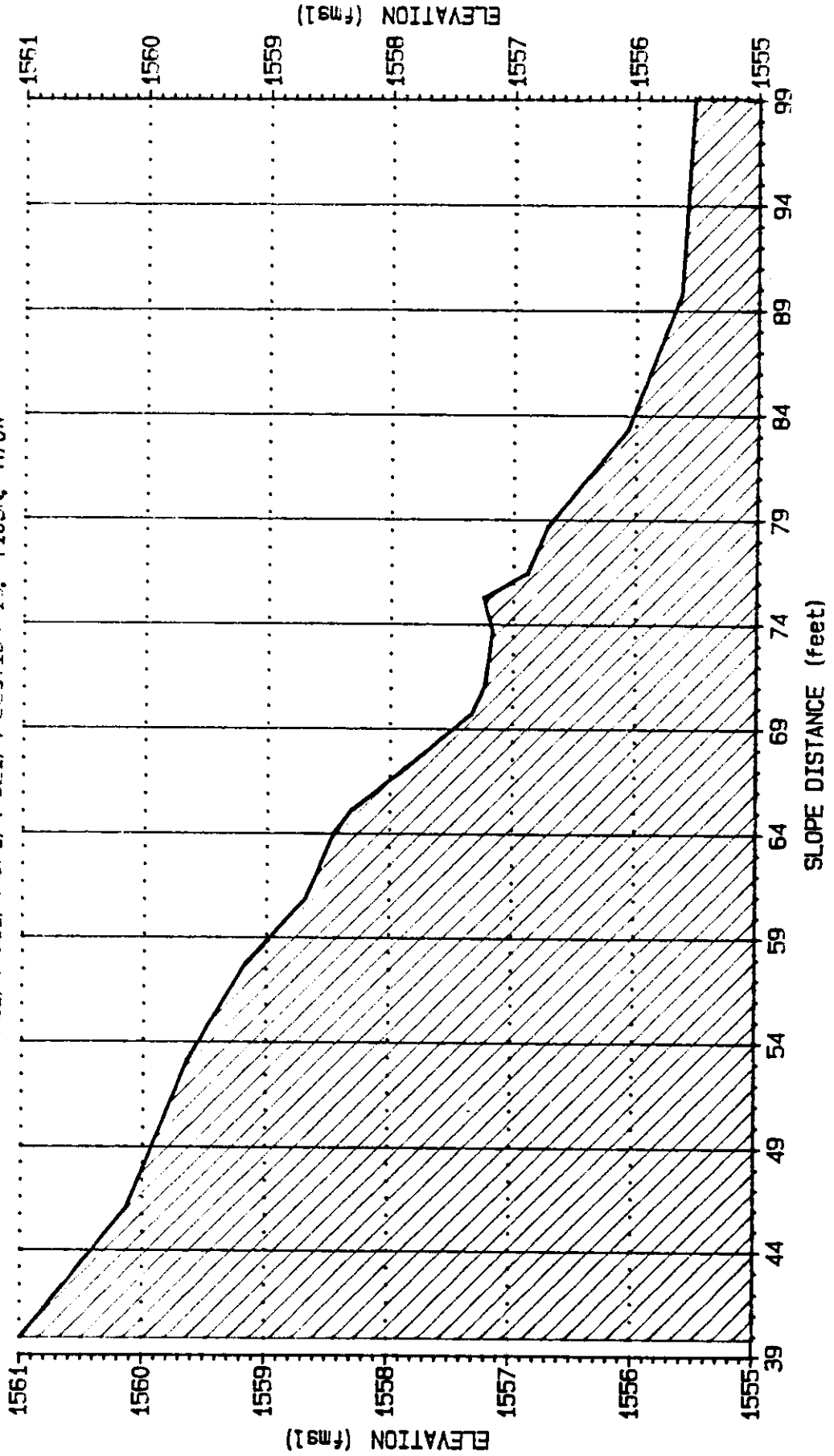


X-SECTION NO. 2
 RAY STEMMERMAN PROPERTY
 NE1/4 NE1/4 NW1/4 SEC. 17, T103N-R70W



X-SECTION NO. 3

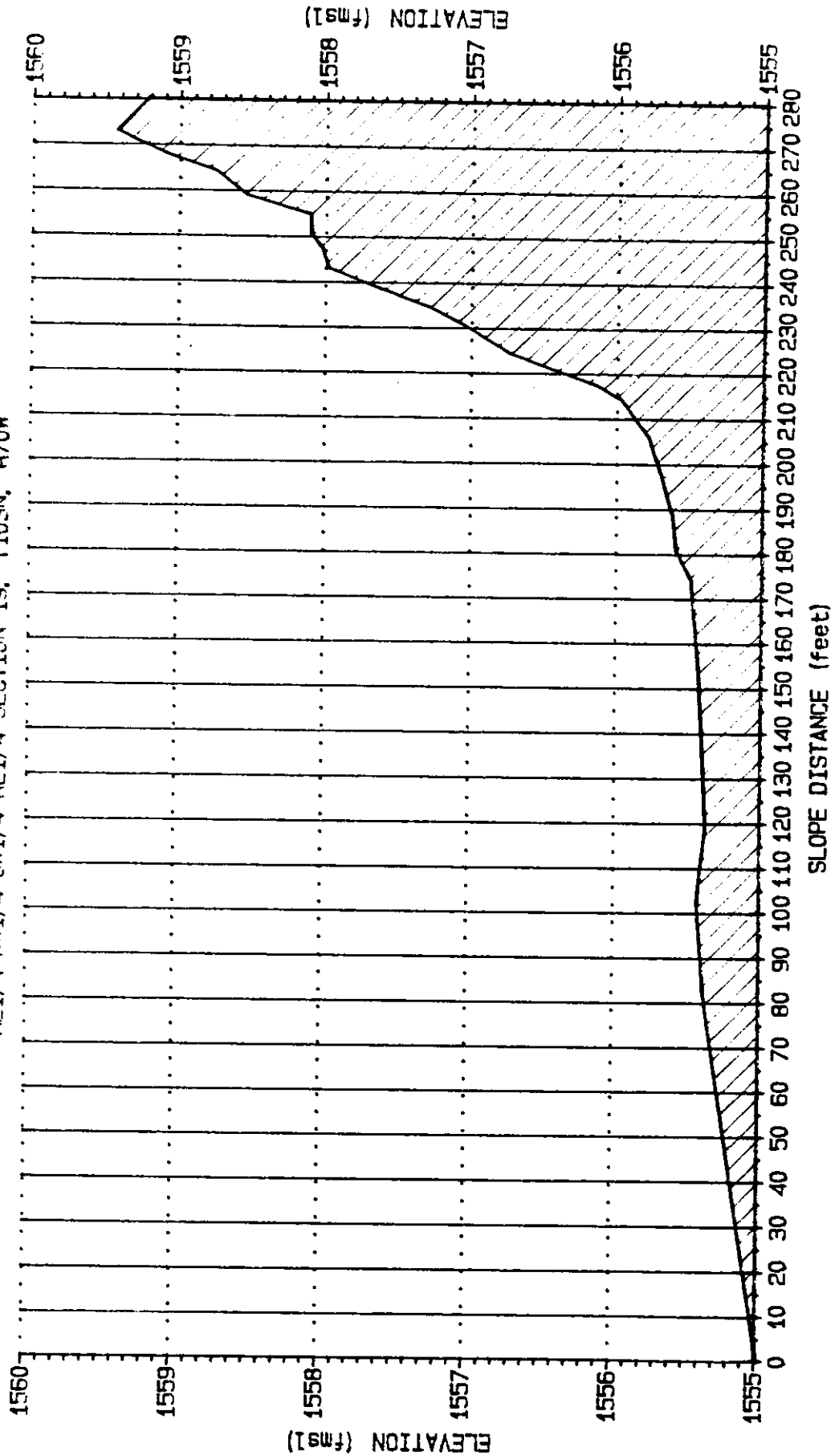
RAY AND SANDRA PANZANTE PROPERTY
NE1/4 SE1/4 SW1/4 SECTION 19, T103N, R70W



X-SECTION NO. 4

ROBERT STRUBLE PROPERTY

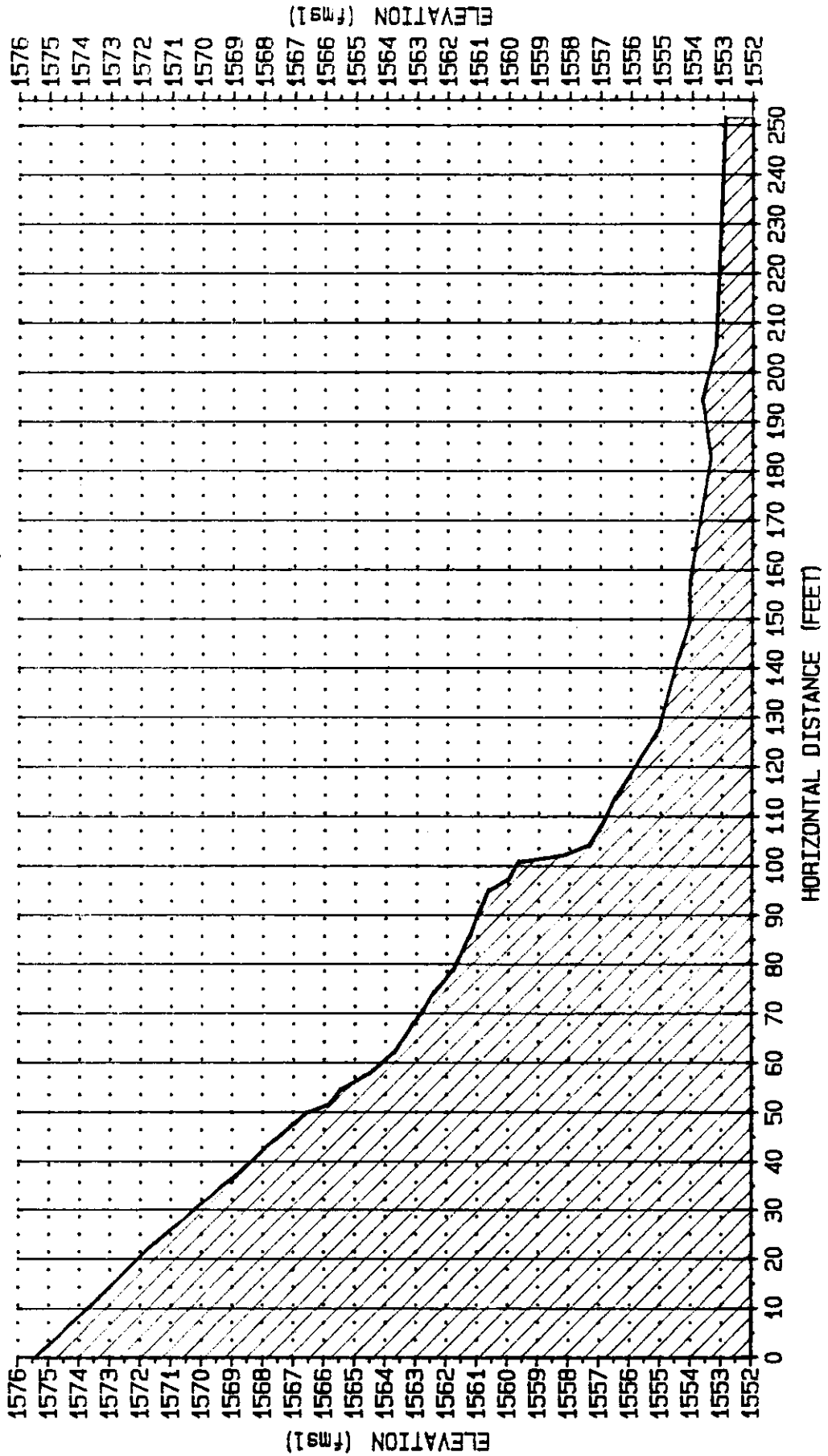
NE1/4 NW1/4 SW1/4 NE1/4 SECTION 19, T103N, R70W



X-SECTION NO. 5

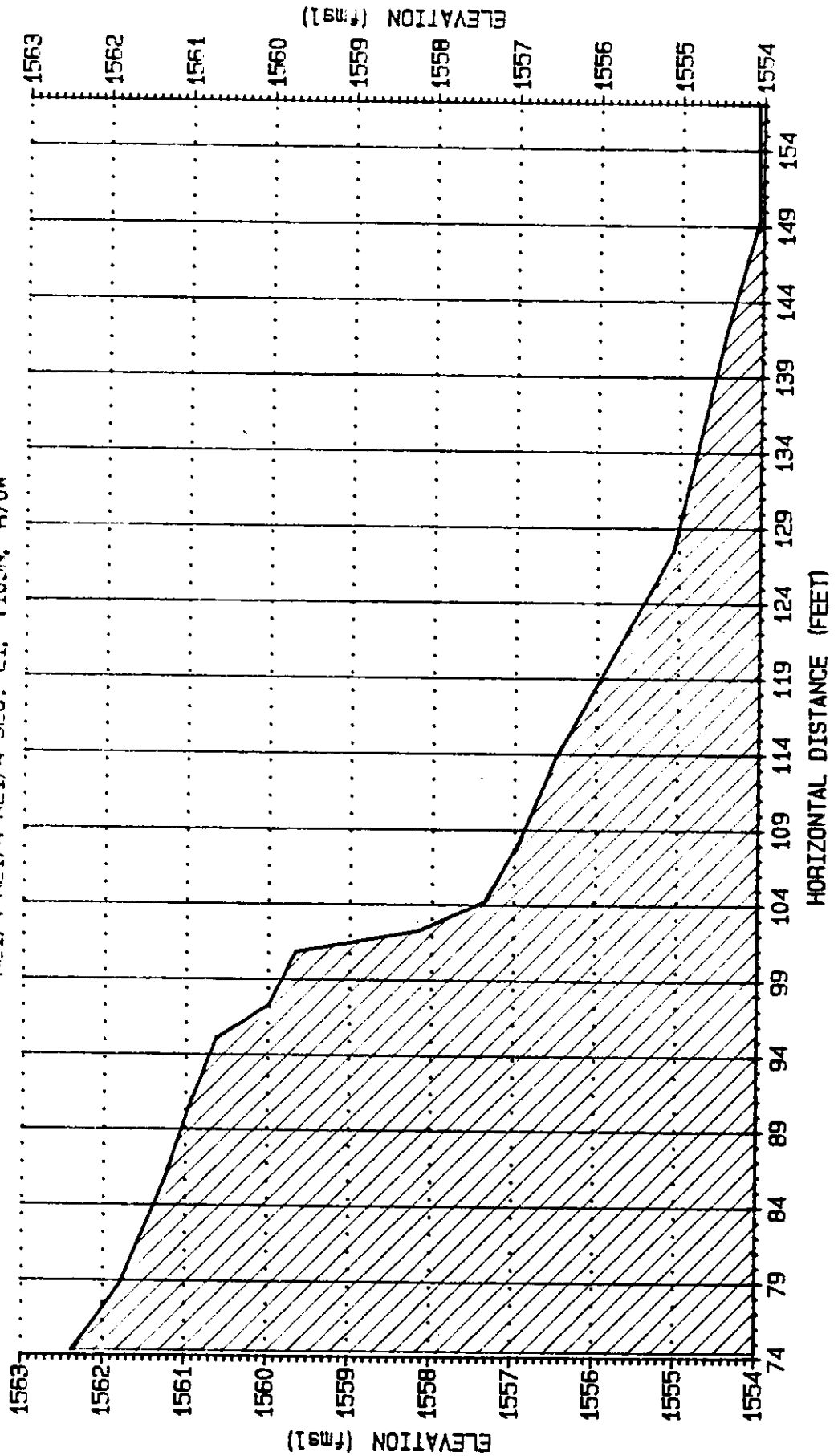
ROY SWANSON PROPERTY

NE1/4 NE1/4 NE1/4 SEC. 21, T103N, R70W

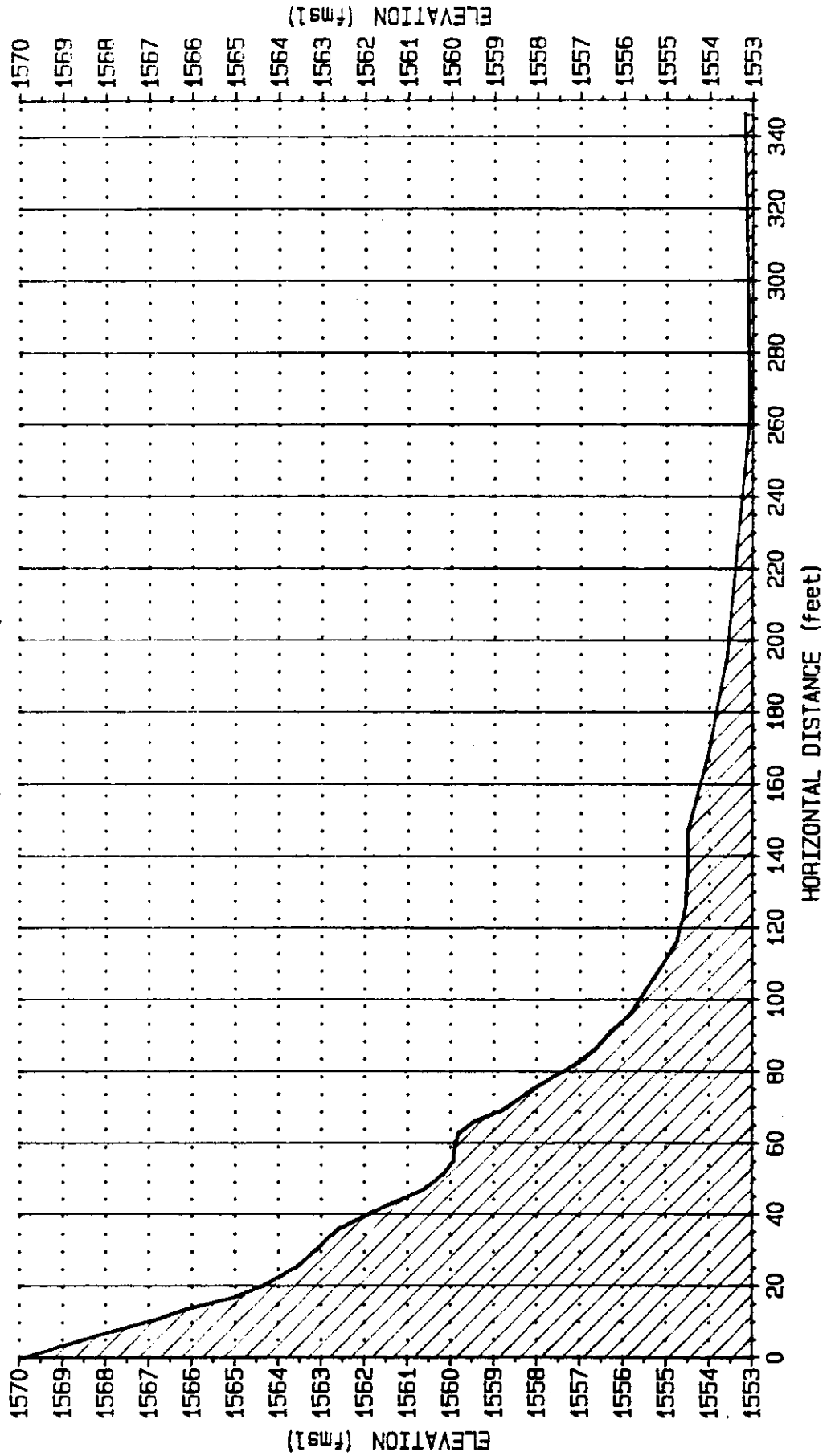


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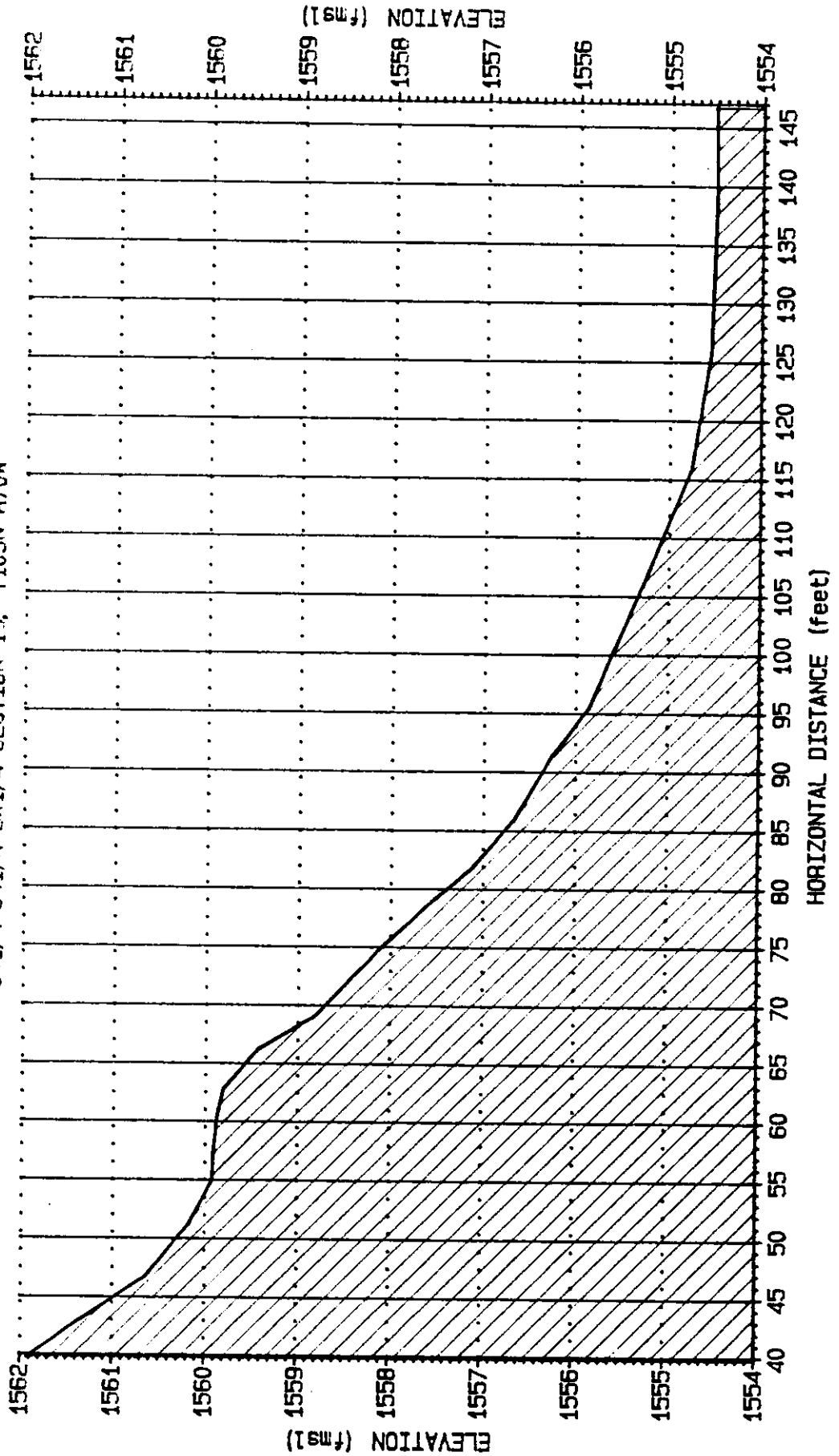
ROY SWANSON PROPERTY
NE1/4 NE1/4 SEC. 21, T103N, R70W



X-SECTION NO. 6
DALE ANDERSON PROPERTY
 SW1/4 SW1/4 SECTION 15, T103N R70W

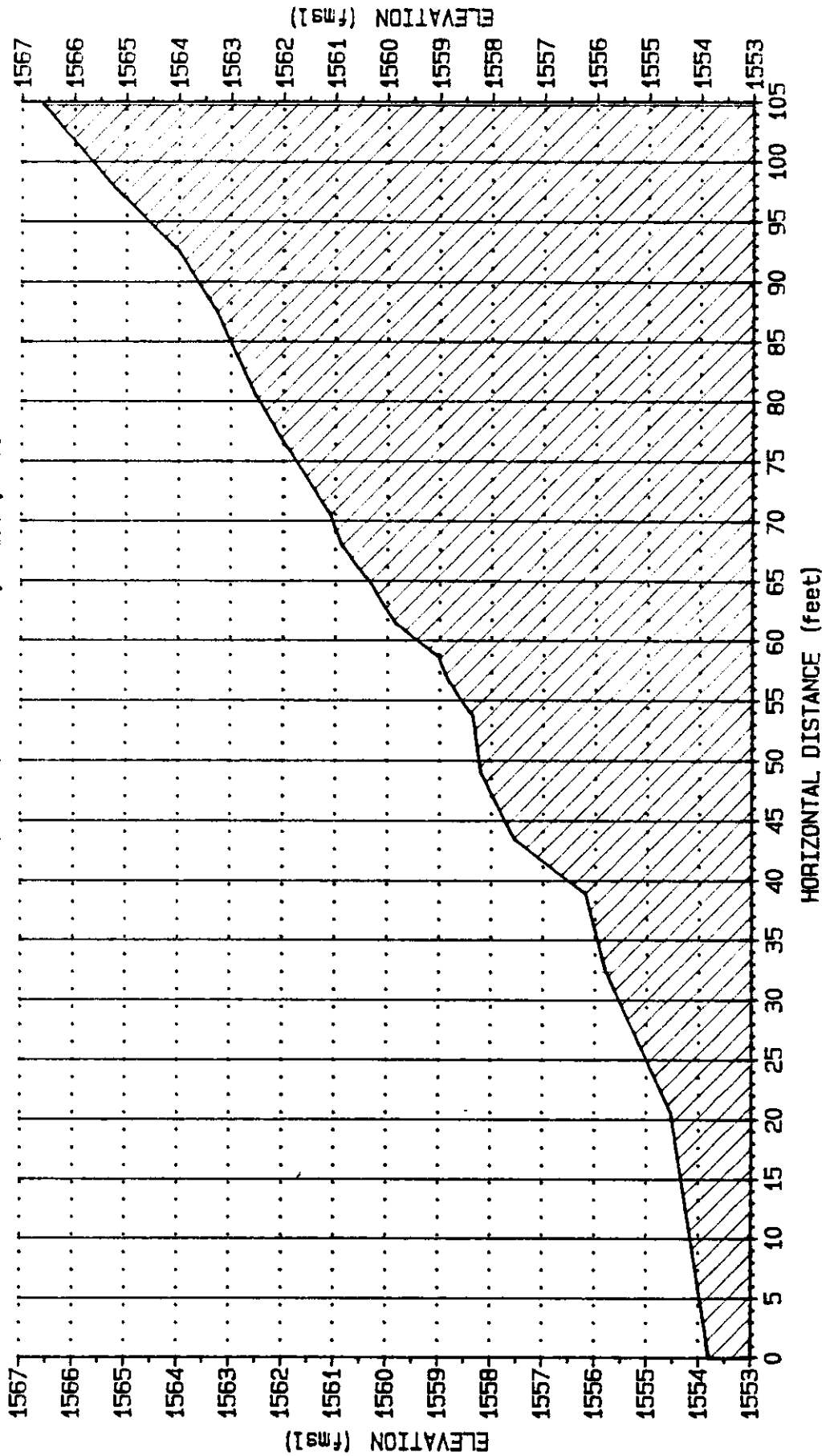


X-SECTION NO. 6
DALE ANDERSON PROPERTY
SW1/4 SW1/4 SECTION 15, T103N R70W



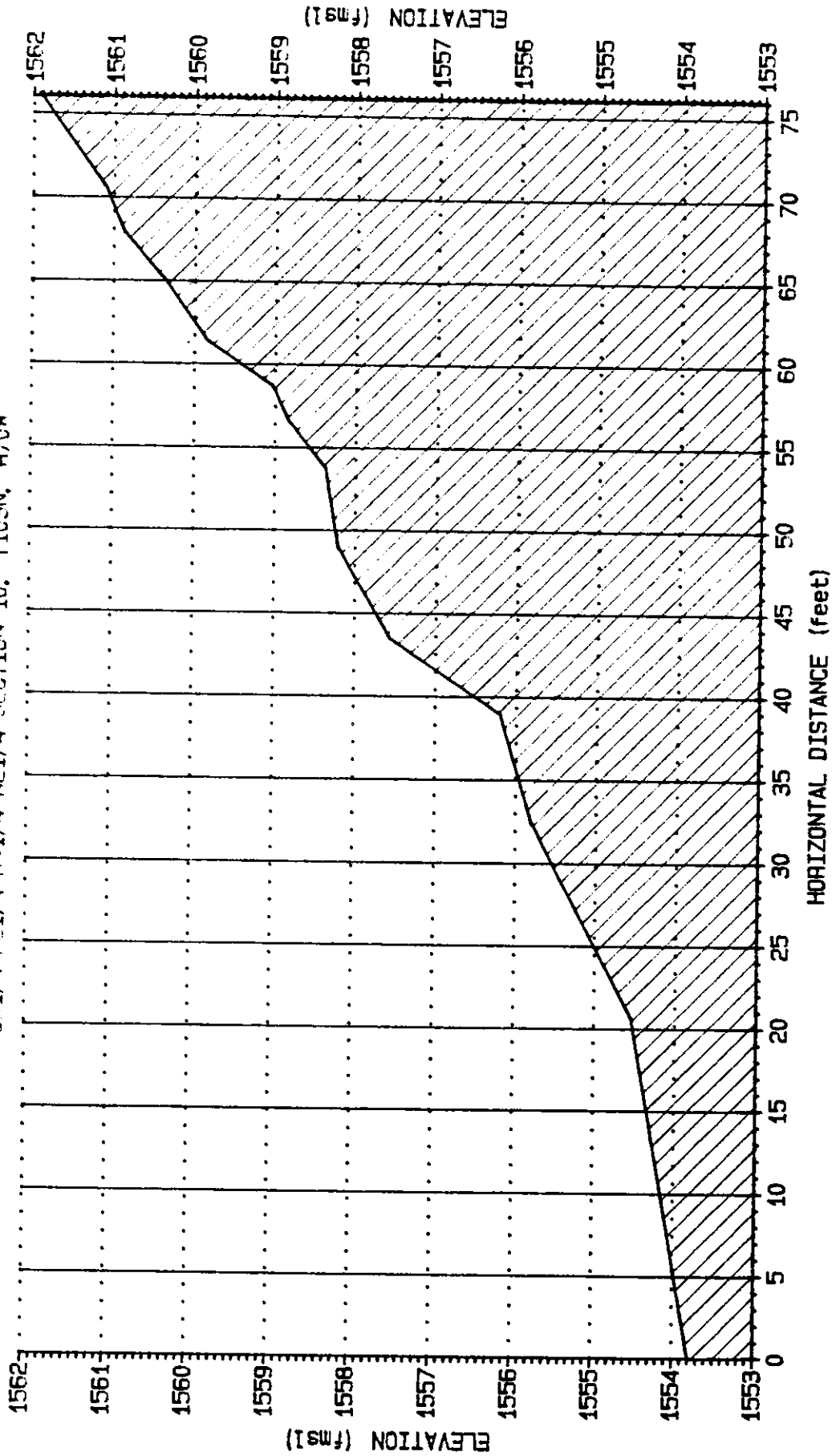
X-SECTION NO. 7

SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS PROPERTY
SW1/4 NE1/4 NW1/4 SECTION 10, T103N, R70W



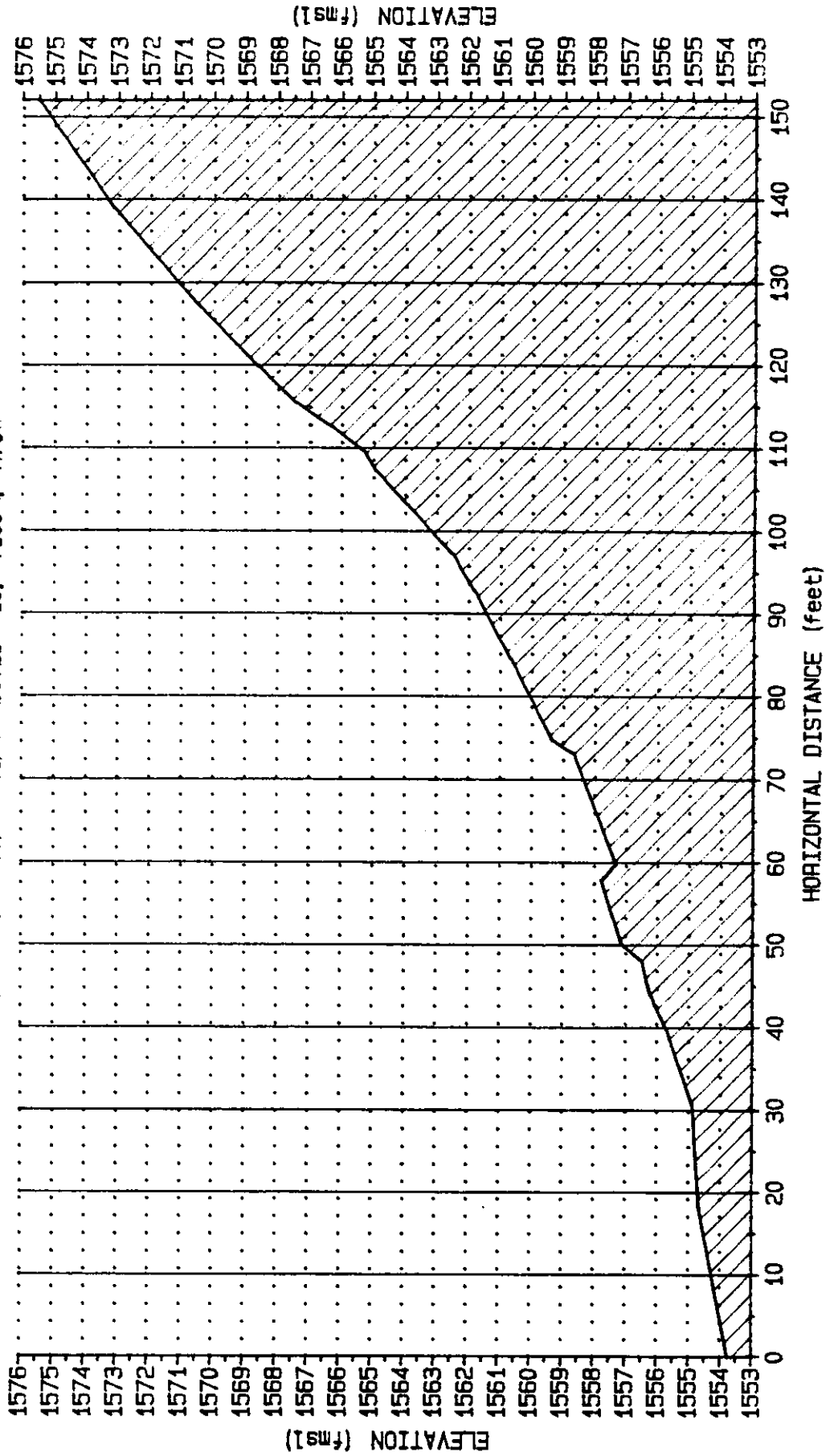
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SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS PROPERTY
SW1/4 NE1/4 NW1/4 SECTION 10, T103N, R70W



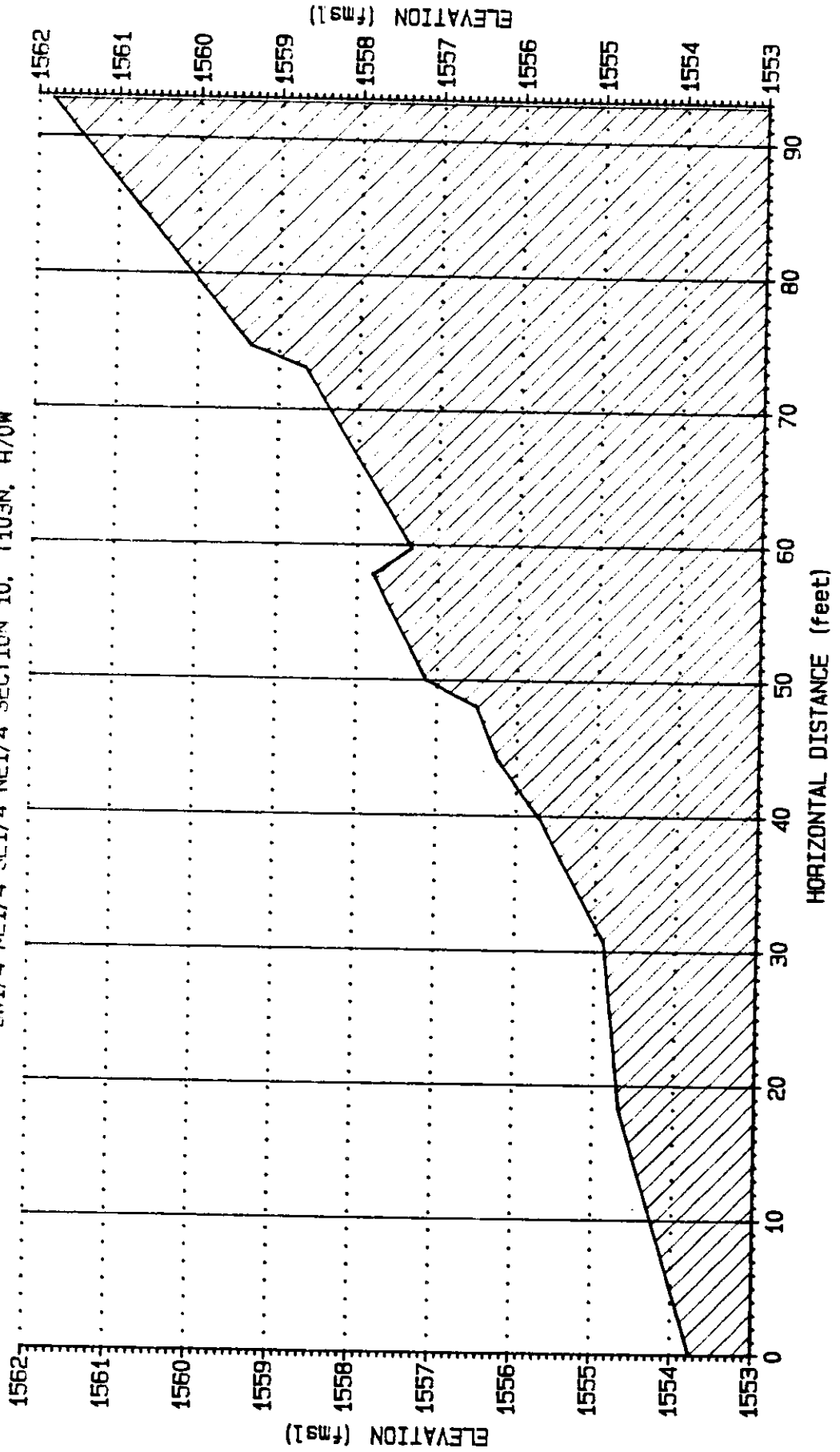
X-SECTION NO. 8

SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS PROPERTY
SW1/4 NE1/4 SE1/4 NE1/4 SECTION 10, T103N, R70W



X-SECTION NO. 8

SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS PROPERTY
SW1/4 NE1/4 SE1/4 NE1/4 SECTION 10, T103N, R70W



Appendix No. 29 Soil Characteristics

<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WRS1	1558.4	NE1/4 NW1/4 NE1/4 Sec. 10	0.0 - .75' surficial sand and gravel beach material, till at 0.75'
WRS2	1561.1	NE1/4 NW1/4 NE1/4 Sec. 10	0.0 - 1.0' topsoil, 1.0 - 2.0' sand and gravel beach material, till at 2.0'
WRS3	1563.3	NE1/4 NW1/4 NE1/4 Sec. 10	0.0 - 1.85' topsoil, 1.85 - 1.95' subangular pebbles, till at 1.95'
WRS7	1561.8	NE1/4 SE1/4 NE1/4 Sec. 10	0.0 - 1.7' topsoil
WRS8	1558.7	NE1/4 SE1/4 NE1/4 Sec. 10	0.0 - 2.0' topsoil with pebbles, beach material, till at 2.0'
WRS9	1557.3	NE1/4 SE1/4 NE1/4 Sec. 10	0.0 - 0.8' cobbles and other beach material, terminated on boulder
WRS10	1556.5	NE1/4 SE1/4 NE1/4 Sec. 10	0.0 - 1.2' topsoil with beach material, till at 1.2'
WRS13	1553.8	NE1/4 SE1/4 NE1/4 Sec. 10	0.0 - 1.2' topsoil, pebbles and cobbles, beach material
WR94	1558.2	SW1/4 SW1/4 SE1/4 Sec 18	washed cobbles and boulders
WR95	1557.5	SW1/4 SW1/4 SE1/4 Sec. 18	washed cobbles and boulders
WR101	1557.1	SW1/4 SE1/4 SE1/4 Sec. 18	sandy beach
WRS18	1560.1	SE1/4 SW1/4 SE1/4 Sec. 18	0.0 - 0.5' topsoil, 0.5' - 0.9' pebbles, gravel, cobbles, coarsening upward, beach material, 0.9 - 1.1' sand, beach material, 1.1 - 2.6' till
WRS19	1559.1	SE1/4 SW1/4 SE1/4 Sec. 18	0.0 - 0.6' gravel, pebbles, cobbles, coarsening upward, beach material, 0.0 - 0.9 sandy clay, beach material, 0.9 - 1.5' till

Appendix No. 30 Soil Characteristics continued

<u>ID</u> <u>Number</u>	<u>Elevation</u> <u>(fmsl)</u>	<u>Legal Description</u> <u>(all in T103N R70W)</u>	<u>Comments</u>
WRS20	1558.5	SE1/4 SW1/4 SE1/4 Sec. 18	0.0 - 0.3' thin layer of topsoil, pebbles, gravel, cobbles, coarsening upward, beach material, 0.3 - 0.6' silty sand, beach material, 0.6 - 1.0 till
WRS22	1556.9	SE1/4 SW1/4 SE1/4 Sec. 18	0.0 - 0.3' sandy topsoil, pebbles at 0.3', beach material, 0.3 - 1.0 gravelly, pebbly till
WRS23	1556.1	SE1/4 SW1/4 SE1/4 Sec. 18	0.0 - 0.2' silty clay with few cobbles, beach material, 0.2 - 1.0' till
WRS24	1555.5	SE1/4 SW1/4 SE1/4 Sec. 18	0.0 - 0.3' silty clay with pebbles at 0.3, beach material, 0.3 - 1.0' till
WRS116	1559.4	NW1/4 SW1/4 NE1/4 Sec. 19	0.0 - 3.4' sand and pebbles, 3.4' till
WRS120	1558.5	NW1/4 SW1/4 NE1/4 Sec. 19	0.0 - 2.9' sand, 2.9' till
WRS122	1557.3	NW1/4 SW1/4 NE1/4 Sec. 19	0.0 - 1.85' sand and pebbles, 1.85' till
WRS123	1556.4	NW1/4 SW1/4 NE1/4 Sec. 19	0.0 - 1.3' pebbles, sand and silt, 1.3' till
WRS125	1555.6	NW1/4 SW1/4 NE1/4 Sec. 19	0.0 - 1.7' silty clay
WRS28	1567.6	NE1/4 NE1/4 NE1/4 Sec. 21	0.0 - 0.7' topsoil, silty clay, 0.7 - 2.1' sand with pebbles, 2.1 - 2.8' blackish till with pebbles, 2.8 till
WRS30	1563.7	NE1/4 NE1/4 NE1/4 Sec. 21	0.0 - 0.8' topsoil, silty clay associated with boulders, 0.8 - 3.1 sand and pebbles

Appendix No. 31 Soil Characteristics continued

<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WRS31	1561.8	NE1/4 NE1/4 NE1/4 Sec. 21	0.0 - 0.8' topsoil with boulders, 0.8 - 1.5' sand with pebbles, 1.5' till
WRS32	1560.9	NE1/4 NE1/4 NE1/4 Sec. 21	0.0 - 1.0' topsoil, terminated on top of boulder
WRS34	1555.1	NE1/4 NE1/4 NE1/4 Sec. 21	0.0 - 0.1 topsoil, silty clay, 0.1 till
WRS35	1554.4	NE1/4 NE1/4 NE1/4 Sec. 21	0.0 - 0.1 topsoil, silty clay, 0.1 till
WR142	1558.4	NE1/4 NE1/4 NE1/4 Sec. 21	Top of washed cobble pavement
WR143	1555.6	NE1/4 NE1/4 NE1/4 Sec. 21	Base of washed cobble pavement
WR148	1555.3	NE1/4 NE1/4 NE1/4 Sec. 21	Base of washed cobble pavement
WR149	1558.7	NE1/4 NE1/4 NE1/4 Sec. 21	Top of washed cobble pavement
WR151	1555.1	NW1/4 NE1/4 NE1/4 Sec. 21	Base of washed cobble pavement
WR152	1558.7	NW1/4 NE1/4 NE1/4 Sec. 21	Top of washed cobble pavement
WR155	1554.4	NW1/4 NE1/4 NE1/4 Sec. 21	Base of washed cobble pavement
WR156	1559.0	NW1/4 NE1/4 NE1/4 Sec. 21	Top of washed cobble pavement
WR166	1555.0	NW1/4 SW1/4 NE1/4 Sec. 21	Base of washed cobble pavement
WR167	1556.9	NW1/4 SW1/4 NE1/4 Sec. 21	Top of washed cobble pavement
WR191	1557.5	NE1/4 NW1/4 SW1/4 Sec. 17	sandy beach
WR194	1557.1	NE1/4 SW1/4 SW1/4 Sec. 17	washed cobbles
WR209	1558.1	SW1/4 SW1/4 SW1/4 Sec. 15	washed cobbles
WRS108	1557.5	SW1/4 SW1/4 SW1/4 Sec. 15	washed cobbles

Appendix No. 32 Boulder Lines

<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WR4 & WR5	1556.7 - 1557.8	NW1/4 SW1/4 SE1/4 Sec. 8	photo taken, 330' long
WR18 & WR19	1566.6	NW1/4 SW1/4 SE1/4 Sec. 8	few boulders, photo taken
WR38	1559.9	NE1/4 NE1/4 NW1/4 Sec. 17	scattered boulders
WR42	1567.4	NE1/4 NE1/4 NW1/4 Sec. 17	sparse boulder line, photo taken
WR43	1562.7	NE1/4 NW1/4 NE1/4 Sec. 10	3'x3'x5' granite boulder
WR45	1561.2	NE1/4 NW1/4 NE1/4 Sec. 10	3'x4' granite boulder
WR51	1559.1	NE1/4 NW1/4 NE1/4 Sec. 10	base of boulder line
WR56	1562.5	NE1/4 NW1/4 NE1/4 Sec. 10	3'x3'x1' boulder
WR62	1558.6	SE1/4 NW1/4 NE1/4 Sec. 10	Base of boulder line
WR66	1558.5	SE1/4 NW1/4 NE1/4 Sec. 10	Boulder line, continuation of WR62
WR93	1560.4	SW1/4 SW1/4 SE1/4 Sec. 18	four boulders
WR97	1559.9	SE1/4 SW1/4 SE1/4 Sec. 18	Base of boulder line
WR98	1561.7	SE1/4 SW1/4 SE1/4 Sec. 18	Base of Boulder
WR102	1560.9	SW1/4 SE1/4 SE1/4 Sec. 18	Boulder line, photo taken
WR104	1554.7	SW1/4 SE1/4 SE1/4 Sec. 18	Boulder
WRS28	1567.6	NE1/4 NE1/4 NE1/4 Sec. 21	Base of uppermost boulder line
WR129	1561.3	NE1/4 NE1/4 NE1/4 Sec. 21	Top of second set of boulder lines
WR135	1556.5	NE1/4 NE1/4 NE1/4 Sec. 21	Base of most boulders
WR144	1557.4	NE1/4 NE1/4 NE1/4 Sec. 21	Base of boulder line
WR146	1563.6	NE1/4 NE1/4 NE1/4 Sec. 21	Base of boulder line, photo taken
WR147	1564.9	NE1/4 NE1/4 NE1/4 Sec. 21	Top of WR146 boulder line
WR150	1562.7	NW1/4 NE1/4 NE1/4 Sec. 21	Boulder line
WR172	1559.7	NE1/4 SE1/4 NW1/4 Sec. 17	Base of boulder line, photo taken
WR173	1560.5	NE1/4 SE1/4 NW1/4 Sec. 17	Top of WR172 boulder line
WR174	1566.2	NE1/4 SE1/4 NW1/4 Sec. 17	Boulder line, photo taken
WR176	1565.1	NE1/4 SE1/4 NW1/4 Sec. 17	Boulder line, continuation of WR174
WR190	1558.0	NW1/4 NE1/4 SW1/4 Sec. 17	Four boulders within 10' foot radius
WR192	1557.2	NE1/4 SW1/4 SW1/4 Sec. 17	Two boulders,

Appendix No. 33 Boulder Lines

<u>ID</u> <u>Number</u>	<u>Elevation</u> <u>(fmsl)</u>	<u>Legal Description</u> <u>(all in T103N R70W)</u>	<u>Comments</u>
WR240	1560.2	W1/2 NW1/4 NW1/4 Sec. 14	4'x4'x2' Base of six boulders
WR246	1557.9	W1/2 NW1/4 NW1/4 Sec. 14	Boulder, 4'x3'x1'
WR247	1557.6	W1/2 NW1/4 NW1/4 Sec. 14	Boulder, 3.3'x1.8'x1.0'
WR255	1556.4	W1/2 NW1/4 NW1/4 Sec. 14	Boulder, 2'x2'x0.5'
WR257	1557.4	W1/2 NW1/4 NW1/4 Sec. 14	Twelve boulders

Appendix No. 34 Terrestrial Vegetation

<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WR6	1555.4	NW1/4 SW1/4 SE1/4 Sec. 8	20 + Russian Olive and Elm trees, 0.4 to 0.6 foot diameter
WR20	1557.7	NE1/4 NE1/4 NW1/4 Sec. 17	Cottonwood, 30 feet tall, 0.9 foot DBH
WR22	1554.1	NE1/4 NE1/4 NW1/4 Sec. 17	three 0.4 foot DBH Russian Olive trees
WR37	1559.0	NE1/4 NE1/4 NW1/4 Sec. 17	fifteen foot tall Russian Olive tree
WR44	1559.3	NE1/4 NW1/4 NE1/4 Sec. 10	Line of five cottonwood trees 1.5 - 2.0 feet DBH, coincident with top of ice pushed ridge
WR51	1559.1	NE1/4 NW1/4 NE1/4 Sec. 10	Tree debris
WR62	1558.6	SE1/4 NW1/4 NE1/4 Sec. 10	Dead tree
WR65	1558.2	SE1/4 NW1/4 NE1/4 Sec. 10	Cottonwood tree, 1.1 feet DBH, 35' tall, photo taken looking north
WR92	1553.6	SW1/4 SW1/4 SE1/4 Sec. 18	Cottonwood tree, six trunks, 0.3' - 0.5' DBH, nearly dead, out in amongst the river bullrushes and cattails
WR99	1557.1	SE1/4 SW1/4 SE1/4 Sec. 18	Elm tree, 1.0 DBH, 40' tall, photo taken
WR100	1558.3	SE1/4 SW1/4 SE1/4 Sec. 18	Elm tree, 0.8' DBH, 40' tall, photo taken
WR136	1554.1	NE1/4 NE1/4 NE1/4 Sec. 21	Russian Olive tree
WRS36	1554.1	NE1/4 NE1/4 NE1/4 Sec. 21	Dead Russian Olive tree
WR139	1557.5	NE1/4 NE1/4 NE1/4 Sec. 21	Elm tree, 1.2' DBH, 25' tall, two photos taken
WR140	1557.4	NE1/4 NE1/4 NE1/4 Sec. 21	Elm tree, 1.2' DBH, 25' tall
WR165	1554.2	NW1/4 SW1/4 NE1/4 Sec. 21	Russian Olive trees (20+)
WR168	1557.1	NE1/4 SE1/4 NW1/4 Sec. 17	Elm tree, 1.3' DBH, 30'-35' tall, two photos taken
WR169	1557.7	NE1/4 SE1/4 NW1/4 Sec. 17	Elm tree, 1.2' DBH, 30' tall
WR170	1556.0	NE1/4 SE1/4 NW1/4 Sec. 17	Elm trees (six)

Appendix No. 35 Terrestrial Vegetation

<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WR171	1558.3	NE1/4 SE1/4 NW1/4 Sec. 17	Elm tree, 30' tall, four main trunks
WR178	1553.6	NE1/4 SE1/4 NW1/4 Sec. 17	Line of live Cottonwood trees, 0.5-1.1' DBH, in amongst bullrushes, roots exposed and washed
WR179	1553.6	NE1/4 SE1/4 NW1/4 Sec. 17	Line of Cottonwood trees, continuation of WR178, photo taken, 1.3' DBH
WR191	1557.5	NE1/4 NW1/4 SW1/4 Sec. 17	Cottonwood, 1.3' DBH, 40-45' tall, twin trunks, growing on clean sandy beach.
WR193	1557.0	NE1/4 SW1/4 SW1/4 Sec. 17	Cottonwood tree, 1.6 DBH, 40-45' tall, photo taken
WR232	1558.0	NW1/4 SW1/4 NE1/4 Sec. 19	Cottonwood tree, 1.2' DBH, 45' tall, two photos taken
WR233	1558.2	NW1/4 SW1/4 NE1/4 Sec. 19	Willow tree, 0.9' DBH, 40' tall
WR234	1557.5	NW1/4 SW1/4 NE1/4 Sec. 19	Two Cottonwood trees, 1.2 and 1.3' DBH, 50'tall, water washed root system
WR235	1557.8	NW1/4 SW1/4 NE1/4 Sec. 19	Cottonwood tree, 1.1' DBH, 35' tall, water washed root system
WR236	1558.0	NW1/4 SW1/4 NE1/4 Sec. 19	Cottonwood tree, dual trunks at 1.0 DBH, 40' tall
WR237	1558.8	NW1/4 SW1/4 NE1/4 Sec. 19	Cottonwood, 1.4' DBH, 40' tall, water washed root system, two photos taken
WR238	1557.8	NW1/4 SW1/4 NE1/4 Sec. 19	Cottonwood tree, 0.9 DBH, 25' tall
WR241	1559.4	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 1.5' DBH, 45' tall water washed root system, photo taken

Appendix No. 36 Terrestrial Vegetation

<u>ID Number</u>	<u>Elevation (fmsl)</u>	<u>Legal Description (all in T103N R70W)</u>	<u>Comments</u>
WR242	1560.6	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 2.3' DBH, 50' tall, largest tree in area
WR243	1558.0	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 0.5-1.0' DBH, water washed root system
WR244	1559.1	W1/2 NW1/4 NW1/4 Sec. 14	Three Cottonwood trees, 1.2 - 1.2 - 1.3' DBH, 45' tall
WR245	1558.0	W1/2 NW1/4 NW1/4 Sec. 14	Four Cottonwoods, 0.8' DBH, 35' tall, washed root system
WR248	1557.2	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood, 0.6' DBH, 20' tall
WR249	1558.8	W1/2 NW1/4 NW1/4 Sec. 14	Three Cottonwood trees, 0.7', 0.7' and 1.4' DBH; 30', 30', and 40' tall respectively
WR250	1558.9	W1/2 NW1/4 NW1/4 Sec. 14	Two Cottonwood trees, 1.3' and 1.4' DBH, both 45' tall
WR252	1557.0	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 0.8' DBH, 35' tall
WR253	1556.9	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 0.8' DBH, 15' tall, partially destroyed
WR254	1556.9	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 1.2 DBH, 45' tall
WR256	1557.0	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 2.3' DBH, 55' tall, photo taken
WR259	1558.1	W1/2 NW1/4 NW1/4 Sec. 14	Two Cottonwood trees, 2.0' and 2.8' DBH, 45' and 50' tall, root system is slightly water washed
WR260	1557.6	W1/2 NW1/4 NW1/4 Sec. 14	Willow tree, 1.0 DBH, 30' tall, five trunks
WR261	1558.6	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree with three trunks, 1.0', 1.1', and 1.3' DBH, 40' tall

Appendix No. 37 Terrestrial Vegetation

<u>ID</u> <u>Number</u>	<u>Elevation</u> <u>(fmsl)</u>	<u>Legal Description</u> <u>(all in T103N R70W)</u>	<u>Comments</u>
WR262	1558.1	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree with two trunks, 0.8' and 1.0' DBH, 40' tall
WR263	1558.9	W1/2 NW1/4 NW1/4 Sec. 14	Two Cottonwood trees, 1.2' and 1.6' DBH, 40' and 45' tall
WR264	1558.4	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 2.0' DBH, 45' tall, 80' south of bend in gravel road

Appendix No. 37 Terrestrial Vegetation

<u>ID</u> <u>Number</u>	<u>Elevation</u> <u>(fmsl)</u>	<u>Legal Description</u> <u>(all in T103N R70W)</u>	<u>Comments</u>
WR262	1558.1	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree with two trunks, 0.8' and 1.0' DBH, 40' tall
WR263	1558.9	W1/2 NW1/4 NW1/4 Sec. 14	Two Cottonwood trees, 1.2' and 1.6' DBH, 40' and 45' tall
WR264	1558.4	W1/2 NW1/4 NW1/4 Sec. 14	Cottonwood tree, 2.0' DBH, 45' tall, 80' south of bend in gravel road

Appendix No. 38

Water Quality Data for Red Lake, Brule
County, TDS was estimated using a
conductivity meter

Page No. 1
01/01/80

LAKE LEVEL ELEVATIONS

COUNTY	LAKE	DATE	ELEV. (FT)	TDS (PPM)	TEMP (C)	TOWNSHIP	RANGE	SECTION	LATITUDE (D,M,S)	LONGITUDE (D,M,S)
** BRULE	RED	9/12/83	1551.8	NM	NM	T103N	R70W	10AACC		
		4/6/84	1552.7	NM	NM					
		4/18/84	1553.3	NM	NM					
		5/15/84	1553.2	NM	NM					
		6/5/84	1553.1	NM	NM					
		7/5/84	1554.6	NM	NM					
		7/16/84	1554.5	NM	NM					
		10/12/84	1553.7	400	13					
		5/9/85	1554.2	200	20					
		10/11/85	1553.3	700	6					
		5/9/86	1554.4	420	17					
		9/11/86	1553.9	NM	NM					
		10/22/86	1553.7	500	14					
		4/27/87	1554.7	NM	NM					
		10/20/87	1553.5	460	3					
		4/29/88	1553.8	400	11					
		9/30/88	1552.5	1360	10					
		5/15/89	1552.9	1348	13					

South Dakota Department of Water and Natural Resources,
Water Rights Division, 1990

of the Lake Waters
million except as indicated)

Fluoride (F)	Hardness as CaCO ₃
Nitrate (NO ₃)	
Phosphorous as PO ₄	
Phosphate (PO ₄)	
Boron (B)	
Dissolved solids (residue at 180° C)	
Calcium, magnesium	
Noncarbonate	
Sodium-adsorption- ratio	
Specific conduc- tance (micromhos at 25° C)	
pH at time of sampling)	
Color	
Dissolved oxygen (DO)	
Detergents (MBAS)	
Temperature (°F)	
Copper (Cu)	
Zinc (Zn)	
Nitrite (NO ₂)	

near Florence—Continued

1.0	0.7	2.1	1.3	1.4	2/	66,100	41,000	39,800	12	41,200	7,616	6.5	0.3	56	0.14	0.33	0.0
1.1	1.0	1.1	7.8	11.7	2/	81,200	49,600	47,700	13	46,200	7.2	5.7	—	58	3.3	43	0.0

County of Middlesex

0.7	0.0	0.25	0.04	0.42	978	493	332	2.11	1.6308	3.18	11.2	0.0	50	0.00	0.02	0.0
4	3	33	13	48	1,110	592	368	2.2	1.5308	1.5	7.7	-1	37	0.09	0.5	0.0
1	3	22	06	36	908	511	344	2.0	1.3408	1.1	6.5	0.2	02	0.2	0.0	0.0
1	1	87	19	60	2/	980	368	2.3	1.3808	3.15	6.5	-	63	0.00	0.21	0.0

(County) at Lake Norden

0.3	1.6	0.33	0.33	0.42	2/	1.10	721	568	1.4	1.4008	5.355	12.0	0.0	53	0.00	0.02	0.0
1	3	0.55	0.33	0.51	2/	2.270	1,440	1,120	1.9	2.710	6.621	3.2	1	34	0.1	0.6	0.0
2	4	1.0	0.34	1.1		834	504	354	1.0	1.0072	4.423	7.5	0	61	0.2	0.1	0.0
3	73	4.5	2.7			711	423	289	1.0	9719	215	10.3	—	58	0.6	0.3	0.0

Country in Mind

0.4	1.5	0.85	0.82	0.38	368	2001	3	3.3	9198.3	927	10.5	0.0	49	0.01	0.00	0.0
1	3	60	42	27	684	255	25	3.5	10907.8	9	4.2	1	36	0.2	0.3	0
2	6	34	34	22	366	197	19	3.1	8818.1	25	6.1	1.5	57	0.3	0.6	0
3	1.1	1.1	1	31	637	223	13	3.5	9018.4	30	7.2	—	61	0.4	0.2	0

near Greenville

	0.2	0.8	0.24	0.09	0.10	484	233	38	0.2	482.8	3.22	10.8	0.0	34	0.00	0.02	0.0
1	21	1	43	16	10	344	292	57	21	543.6	4.1	12.1	1	33	0.2	0.2	0
2	3	31	06	07		276	233	39	1	418.8	4.17	7.9	1	33	0.2	0.2	0

County: Kent Castletown 1/

0.3	8.50	0.48	0.35	0.23	738	424	200	1.3	1.07	0.82	1.55	9.8	0.1	50	0.00	0.04	0.0
4.10	1.2	8.5	-40		964	563	246	1.6	1.42	0.61	1	9.0	-1	33	0.1	0.3	0
3	3.1	58	-36	-24	339	637	172	1.3	95.8	0.23	8.0	-0	1	0.1	0.1	0.3	0
4	3.5	-50	-40	-30	676	304	177	1.3	98.5	0.30	9.0	-	59	0.2	0.3	0	0

Near Chamberlain

1.4	1.0	0.71	0.63	0.20	2/	2.200	1.240	1.040	2.71	2.980	8.027	11.0	0.1	34	0.01	0.01	0.0
2.5	1.2	4.8	5.0	32	2/	7.010	4.120	4.420	4.3	7.980	7.339	0	0.1	33	0.02	0.07	0.0
1.5	1.8	1.2	1.2	20	2/	2.270	1.330	1.130	4.1	3.030	8.228	6.4	1.1	64	0.05	0.04	0.0
1.5	3	1.11	1	38	2/	3.560	1.970	1.830	3.21	4.060	9.370	11.7	—	60	0.05	0.01	3

('County') near Lake City

County	near Aberdeen	near Dundee	near Glasgow	near Inverness	near Perth	near Stirling	near Tweedmouth
1	0.3	1.0	0.29	0.09	0.10	3.36	6.6
2	0.4	1.0	0.29	0.09	0.10	3.36	6.6
3	4.3	3.0	3.9	1.7	1.7	5.28	41.2
4	3.0	6.6	1.5	1.2	1.1	3.33	26.0
5	3.1	6.6	1.5	1.2	1.1	3.33	26.0
6	3.1	6.6	1.5	1.2	1.1	3.33	26.0
7	3.1	6.6	1.5	1.2	1.1	3.33	26.0
8	3.1	6.6	1.5	1.2	1.1	3.33	26.0
9	3.1	6.6	1.5	1.2	1.1	3.33	26.0
10	3.1	6.6	1.5	1.2	1.1	3.33	26.0
11	3.1	6.6	1.5	1.2	1.1	3.33	26.0
12	3.1	6.6	1.5	1.2	1.1	3.33	26.0
13	3.1	6.6	1.5	1.2	1.1	3.33	26.0
14	3.1	6.6	1.5	1.2	1.1	3.33	26.0
15	3.1	6.6	1.5	1.2	1.1	3.33	26.0
16	3.1	6.6	1.5	1.2	1.1	3.33	26.0
17	3.1	6.6	1.5	1.2	1.1	3.33	26.0
18	3.1	6.6	1.5	1.2	1.1	3.33	26.0
19	3.1	6.6	1.5	1.2	1.1	3.33	26.0
20	3.1	6.6	1.5	1.2	1.1	3.33	26.0
21	3.1	6.6	1.5	1.2	1.1	3.33	26.0
22	3.1	6.6	1.5	1.2	1.1	3.33	26.0
23	3.1	6.6	1.5	1.2	1.1	3.33	26.0
24	3.1	6.6	1.5	1.2	1.1	3.33	26.0
25	3.1	6.6	1.5	1.2	1.1	3.33	26.0
26	3.1	6.6	1.5	1.2	1.1	3.33	26.0
27	3.1	6.6	1.5	1.2	1.1	3.33	26.0
28	3.1	6.6	1.5	1.2	1.1	3.33	26.0
29	3.1	6.6	1.5	1.2	1.1	3.33	26.0
30	3.1	6.6	1.5	1.2	1.1	3.33	26.0
31	3.1	6.6	1.5	1.2	1.1	3.33	26.0
32	3.1	6.6	1.5	1.2	1.1	3.33	26.0
33	3.1	6.6	1.5	1.2	1.1	3.33	26.0
34	3.1	6.6	1.5	1.2	1.1	3.33	26.0
35	3.1	6.6	1.5	1.2	1.1	3.33	26.0
36	3.1	6.6	1.5	1.2	1.1	3.33	26.0
37	3.1	6.6	1.5	1.2	1.1	3.33	26.0
38	3.1	6.6	1.5	1.2	1.1	3.33	26.0
39	3.1	6.6	1.5	1.2	1.1	3.33	26.0
40	3.1	6.6	1.5	1.2	1.1	3.33	26.0
41	3.1	6.6	1.5	1.2	1.1	3.33	26.0
42	3.1	6.6	1.5	1.2	1.1	3.33	26.0
43	3.1	6.6	1.5	1.2	1.1	3.33	26.0
44	3.1	6.6	1.5	1.2	1.1	3.33	26.0
45	3.1	6.6	1.5	1.2	1.1	3.33	26.0
46	3.1	6.6	1.5	1.2	1.1	3.33	26.0
47	3.1	6.6	1.5	1.2	1.1	3.33	26.0
48	3.1	6.6	1.5	1.2	1.1	3.33	26.0
49	3.1	6.6	1.5	1.2	1.1	3.33	26.0
50	3.1	6.6	1.5	1.2	1.1	3.33	26.0</

0.4	1.8	0.57	0.38	0
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0.4	1.9	0.57	0.38	0.24	591	186	0	3.9	997	8.0	20	10.9	0.0	50	0.00	0.03	0.0
3	6	37	20	31	718	241	0	4.1	1,120	7.0	10	5.7	1	36	.00	.03	0

21

Newspaper Records
June 1, 1881

Dakota Territory is equal to New York, Pennsylvania, all the New England States combined, with a soil and resources sufficient for the support and employment of forty millions of people. It is bounded on the North by British America; on the East by the Red River of the North and the Big Sioux river, which divide it from the States of Minnesota and Iowa; on the South by the Missouri and Niobrara rivers, and on the West by the Territories of Wyoming and Montana. It lies between the 42d and 49th degrees of North latitude, and between 100 and 107 degrees of longitude west from Washington.

Its soil is varied, capable of producing a great variety of crops.—The "Mighty Missouri" traverses the entire territory diagonally from the North-west to the South-east, with its hundreds of tributaries. Great valleys extend on either side of this vast river, while also many rich and beautiful "bottom lands" lie on the borders of the smaller streams, especially suited to the growth of corn and hay, while extensive tracts of rolling prairie, the finest of grain lands, lie waiting for the careful husbandman to claim and cultivate their rich and virgin soils.

Between the Missouri river and the Black Hills are broad, grassy plains, awaiting the enterprising stock-grower and farmer. These rich grass lands afford a wonderful field for the sheep farmer. The climate being dry, is especially adapted to the wide-awake sheep-grower, and the Chicago, Milwaukee & St. Paul Railway offers an easy outlet to the Eastern market, so that wool-growing is destined to become one of our chief industries. Still West of this lie the mineral lands of the Black Hills, offering untold wealth in gold, silver, and other valuable minerals. Why a region possessing all these natural advantages should lie unsettled for these many years, is only answered by the fact that the railroads are necessary to the development of any country to any considerable extent.

But with the advent into Southern Dakota of the Chicago, Milwaukee & St. Paul Railway, emigration began to pour in by the hundreds and thousands, and we now begin to see the beautiful and rich prairies dotted with the countless farm houses, villages and towns. Southern Dakota, with her rich pastures, fertile valleys and table-lands, adapted to the cultivation of Indian corn, hay, and all the small grains and a great variety of vegetables and root crops, her minerals, her fine water-powers, furnished by the many rivers and streamlets, the unparalleled opportunity for the poor and mid-dle classes to avail themselves of her proffered homes "without money and without price," is destined to become one of the best, if not the richest State in the Union.

concerning these lands, one of which is the famous Jim and its many tributaries.

Rainfall in Dakota.

We insert the following communication from Rev. John Morris, who has given special attention to the water fall in Dakota for a number of years:

MORRISTOWN, DAVISON Co., D. T.,
June 1, 1881.

S. D. COCK: Dear Sir:—Your note reached me only two or three days since. I cheerfully reply at the earliest available hour. The rainfall including snow-fall from the 1st of June, 1880, to the 1st of June, 1881, is as below:

June, 1880, inches of rain,	6 9-10
July, " " " "	1 8-10
Aug. " " " "	5 8-10
Sept. " " " "	2
Oct. " " of snow,	11
Nov. " " " "	1
Dec. " " " "	6
Jan. " " " "	18
Feb. " " " "	16
Mch. " " " "	15
Apr. " " " "	20
May " " of rain	7 4-10

Thus, we had, for the past 12 months, 23 and 9-10 inches of rain, and 6 feet of snow, which by condensation, gave 2 inches of water. The total precipitation therefore is very nearly 86 inches of water; but the snow-fall has been excessive.—The average for the past seven years has not exceeded 80 inches. After deducting the excess of 42 inches of snow, or its equivalent in water—7 inches—we shall arrive at the mean precipitation of the past seven years, which is 29 inches of water each year.

I shall be glad to give you any further details, and wish you success in your new paper. I am sir,
Truly yours,
JOHN MORRIS.

Legal Description

Section 9, T104N R60W
State Archives, Pierre, SD 57501
July 26, 1990

the northwest is no longer an experiment. Thousands of farmers in the valley of the Minnesota river and Northwestern Iowa are deriving their principal income from flax culture. We are glad to see our farmers sowing largely this spring. The pure, clear, rapid streams in Southern Dakota with their grassy valleys and adjoining slopes seem especially adapted to the bleaching of linen, while these rapid water courses will furnish cheap and efficient motive power for mills. There is a fine opening here for a large oil mill, and we hope to see parties with capital, looking up the matter.

years, though he must do so within seven years from date of entry.

If the settler does not wish to remain upon the land the full period required he can, after six months residence, prove up, but he will then be required to pay for the land at the government price. This is called commuting an entry.

Every soldier or sailor who has served in the army or navy of the United States for ninety days during the late rebellion and was honorably discharged and has remained loyal to the government, is entitled to receive on the period of residence required on his homestead the time of his service in the

ed a tract and on the set-
S. I land of-
ation and
rod affidavit.
ibes the land;
is forth the
ago, citizen-

to pay to the register and receiver of the land office the government fee and that part of the commission which is payable when the entry is made, according to the amount of land entered as follows: 160 acres, fee \$10, commission \$1, total \$14; 80 acres, \$5 fee, \$2 commission, total \$7; 40 acres fee \$5, commission \$1, total \$6.

When the applicant has settled on the land he desires to enter but is prevented by bodily infirmity, distance, or other good cause, from visiting the land office in person, the affidavit may be made before the clerk of the court for the county within which the land is situated; and the affidavit together with the application and money can be forwarded to the register and receiver.

Having selected and entered the land he will be required to establish an actual residence thereon within six months from the date of the entry, and that residence must be continued without abandonment for more than six months at any one time, for five years. If he has a family his family must also reside on the land. While the law allows a temporary absence (of not more than six months at any one time) it requires that the residence, and improvement of the land shall be actual and substantial. The settler cannot sleep on the land one night every six months and call it a residence. He can pile a few logs or poles together and call it a cabin. At the end of five years from date of entry, or within two years thereafter, he can submit to the land officers proof of his residence, cultivation, etc.—This proof can either be made before those officers or before the judge of a court of record of the county in which the land is situated. He will then be required to pay the balance of the commissions

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U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU.
CHARLES F. MARVIN, Chief.

CLIMATOLOGICAL DATA.

SOUTH DAKOTA SECTION

M. E. BLYSTONE, Meteorologist

VOL. XXXV HURON, S. DAK., ANNUAL, 1930 No. 13

GENERAL SUMMARY

The year 1930, as a whole, was unusually warm. There has been only one year since state-wide records began in 1890 with a higher average temperature for the year, and only one other year with as high an average. The warmer year was 1921 and the equally warm year 1900. There was one year, 1926, when the highest temperature of the year, 114 degrees, was higher than the highest for 1930, which was 113 degrees. January, 1930, was one of the coldest Januaries of record, while February was by far the warmest February of record. The average temperature for this month was nearly 4 degrees higher than the previous warmest February. March and April were moderately warm months, and for May and June the temperature was slightly below normal. During the greater part of July and the early part of August the weather was excessively warm, but thereafter until December monthly averages did not depart greatly from the normal. December was one of the warmest Decembers of record. The maximum temperature for the year at the various stations occurred in July or early August. The minimum for the year occurred at all stations in January. The average precipitation for the state was considerably less than normal. In February, April, August, October, and November the average for the state was slightly to considerably greater than normal, while in January, March, May, June, July, September, and December there was a slight to decided deficiency. Distribution throughout the state was not uniform. At several stations in the middle and western parts of the state there was an excess for the year. Shortly after the middle of August very heavy local rains occurred at many stations.

Stock suffered considerably from the severe weather of January but the mild weather of February was beneficial. Feeding in fields was possible during the greater part of the month. The soil was fairly well supplied with moisture at the beginning of the crop season, and conditions were fairly favorable for farm work during March and April. By the end of April small grain had mostly been seeded and much of it was up. Good rains in the first half of May placed the soil in fine condition, and the dry weather of the second half was favorable for planting corn. Small grains and grasses did well in May, and the moderate temperature was favorable for stooking. In June all crops did well over most of the state, though inadequate rainfall in some northern and western areas caused some deterioration. At the beginning of July crops were mostly in good condition but the heat and drouth of this month caused corn to deteriorate greatly. Small grains withstood the heat and drouth better than corn and good yields of these crops were harvested. Corn, alfalfa, meadows, and pastures deteriorated during the first half of August, but the rains of the second half benefitted these crops greatly. Corn was mostly matured by the end of September. It suffered very little damage by frost. The balance of the year was mostly favorable for seasonable farm work and for stock.

AVERAGES AND EXTREMES BY MONTHS, 1930

Months	Temperature				Precipitation			
	Mean	Departure	Highest	Lowest	Average	Departure	Greatest monthly	No. days 0.01 inch or more
January	5.9	-10.0	61	-36	0.53	-0.06	1.85	5
February	33.2	+15.2	78	-20	0.73	+0.02	2.60	6
March	52.3	+1.4	75	-11	0.60	-0.55	3.20	4
April	50.8	+5.8	94	11	2.20	+0.04	4.71	8
May	61.7	+0.8	96	20	2.59	-0.30	9.25	9
June	66.1	-0.1	105	30	2.60	-0.84	6.17	7
July	77.9	+6.0	112	35	0.94	-1.85	6.59	4
August	74.0	+4.3	113	42	2.81	+0.43	5.24	7
September	61.8	+0.7	98	20	1.24	-0.53	5.01	7
October	46.2	-2.4	92	6	2.21	+0.87	4.78	7
November	38.4	+1.8	78	-7	1.25	+0.65	2.80	4
December	26.9	+6.9	67	-11	0.17	-0.44	1.97	2
Year	47.1	+2.4	113	-36	18.10	-2.60	9.26	63

KILLING FROSTS.

Stations.	Last in spring.	First in autumn.	Stations.	Last in spring.	First in autumn.
Eastern Division.			Western Division.		
Aberdeen	May 17	Sept. 28	Winner	April 1	Oct. 13
Academy	May 17	Sept. 20	Yankton	April 1	Oct. 17
Alexandria	May 17	Oct. 14	Ardmore	May 22	Sept. 25
Arlington	May 17	Oct. 16	Bellefourche	May 18	Sept. 20
Armour	May 17	Oct. 16	Belvidere	April 22	Oct. 16
Ashton	May 24	Sept. 27	Camp Crook	May 18	Sept. 20
Bowdler	May 16	Sept. 26	Cedar View	April 24	Sept. 27
Britton	May 17	Sept. 28	Cottonwood	May 24	Oct. 16
Brookings	May 17	Sept. 28	Custer	June 26	Sept. 19
Canistota	May 17	Oct. 16	Deerfield	June 26	Sept. 2
Canton	May 17	Oct. 17	Dowling	April 23	Oct. 13
Castlewold	May 24	Sept. 27	Dumont	June 13	Sept. 20
Centerville	May 17	Oct. 17	Dupree	May 17	Sept. 26
Clark	May 17	Sept. 27	Eales	May 17	Sept. 20
De Smet	May 17	Sept. 29	Glenham	May 17	Sept. 26
Eureka	May 18	Sept. 28	Hardy Ranger Station	.....	.....
Fairfax	May 17	Oct. 16	Havermans Ranch	.....	Sept. 22
Faulkton	May 17	Sept. 27	Hermosa	June 6	.....
Flandreau	May 17	Sept. 27	Hopewell	May 17	Sept. 27
Forestburg	May 18	Sept. 27	Hot Springs	May 14	Oct. 15
Ganvalley	May 17	Sept. 20	Lead	May 23	Oct. 13
Gregory	May 17	Sept. 20	Lebanon	May 18	Sept. 26
Highmore	May 17	Sept. 20	Ladysmith	May 17	Sept. 26
Howard	May 17	Sept. 27	McIntosh	May 17	Sept. 26
Huron	May 17	Sept. 27	McLaughlin	May 17	.....
Ipawich	May 18	Sept. 27	McIntosh	May 17	Sept. 20
Kennebec	May 17	Oct. 16	Murdo	May 17	Oct. 16
La Belle	May 24	Sept. 17	Newell	May 10	Sept. 20
Laurel	May 24	Sept. 27	Oelrichs	May 24	Oct. 16
Marion	May 17	Sept. 27	Onida	May 17	Oct. 16
McIntosh	May 17	Sept. 27	Orman	May 24	Oct. 13
Menno	April 24	Sept. 20	Ottumwa	May 17	Sept. 26
Millbank	May 24	Sept. 27	Pierre	April 7	Oct. 15
Miller	May 17	Sept. 27	Pollock	May 24	Sept. 17
Mitchell	May 17	Oct. 16	Rapid City	April 1	Oct. 16
Onaka	May 17	Sept. 27	Redox	May 24	Sept. 20
Parkston	May 17	Oct. 17	Rochford	June 26	Aug. 30
Parkston	May 17	Oct. 16	St. Francis	May 18	Oct. 16
Redfield	May 24	Sept. 27	Seaford	April 22	Oct. 16
Sioux Falls	May 17	Sept. 27	St. Paul	May 18	Sept. 20
Tyndall	April 23	Oct. 17	Timber Lake	May 17	Sept. 20
Vermillion	April 24	Oct. 16	Vale	May 10	Sept. 20
Victor	May 17	Sept. 28	Vivian	April 24	Oct. 16
Wagner	April 8	Oct. 16	Waters Ranch	.....	.....
Watertown	May 24	Sept. 27	Wood	May 27	.....
Webster	May 17	Sept. 20	.....	.....	.....
Westworth	May 17	Sept. 20	.....	.....	.....
Washington	May 17	Sept. 27	.....	.....	.....
White Lake	May 17	Oct. 16	.....	.....	.....

*At stations where frost records are incomplete, the dates of the probable occurrence of last killing frost in spring and the first in autumn are determined by the occurrence of freezing temperature, considered in connection with the attendant weather conditions.

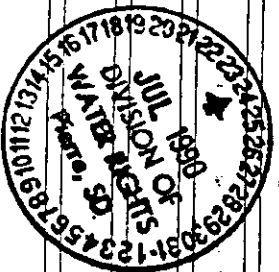
COMPARATIVE ANNUAL DATA FOR SOUTH DAKOTA

Year	Temperature			Precipitation			Number of days			Prevailing wind
	Mean	Highest	Lowest	Average	Greatest monthly	Average snowfall	No. days 0.01 inch or more	Clear	Partly cloudy	
1890	44.5	107	-31	16.43	10.53	.....	.....	.....	.....	.....
1891	44.3	112	-34	20.05	9.28	.....	.....	.....	.....	.....
1892	43.2	110	-40	24.41	9.59	.....	.....	.....	.....	.....
1893	42.8	110	-44	17.93	8.86	.....	.....	.....	.....	.....
1894	45.9	113	-39	16.30	7.55	.....	.....	.....	.....	.....
1895	44.0	112	-46	16.05	7.40	25.2	.....	.....	.....	.....
1896	44.0	109	-32	24.14	8.70	36.4	.....	.....	.....	.....
1897	43.5	109	-35	21.99	7.76	43.5	.....	.....	.....	.....
1898	45.0	113	-29	16.50	9.60	24.4	59	178	115	72
1899	43.8	111	-47	20.16	19.56	26.0	68	174	104	87
1900	47.1	115	-22	23.05	8.27	22.5	63	188	99	78
1901	46.2	115	-42	22.76	12.41	22.2	73	179	109	77
1902	44.8	111	-35	19.92	9.54	32.7	71	171	107	87
1903	44.2	110	-39	22.92	11.47	25.1	74	170	108	87
1904	44.1	110	-39	18.46	10.10	21.7	63	179	101	86
1905	44.6	108	-48	26.68	10.91	30.4	78	160	96	89
1906	45.0	107	-37	27.95	12.39	28.9	80	172	91	102
1907	43.6	107	-37	18.92	10.95	33.7	66	278	96	91
1908	46.4	110	-29	25.10	10.59	32.1	69	194	86	86
1909	43.9	108	-41	23.69	13.96	52.0	74	164	102	99
1910	46.4	116	-42	15.49	7.68	38.9	58	190	98	77
1911	46.2	109	-39	19.18	6.07	50.5	72	164	118	88
1912	43.8	106	-60	18.46	9.15	31.1	81	166	117	103
1913	46.0	110	-39	17.89	7.70	33.7	66	175	110	80
1914	46.1	110	-42	21.67	13.66	27.7	78	161	117	87
1915	43.8	102	-40	26.54	9.47	47.9	90	147	109	109
1916	42.7	105	-57	20.90	8.62	47.6	81	165	117	84
1917	41.8	111	-45	16.77	9.31	53.2	71	167	120	88
1918	45.3	106	-48	21.91	8.84	53.2	79	173	102	90
1919	44.6	111	-39	20.05	8.30	56.2	71	176	96	94
1920	45.1	109	-34	27.44	10.25	49.8	70	174	91	101
1921	48.8	109	-34	18.83	10.65	32.9	100	178	102	86
1922	45.1	108	-37	21.61	13.78	45.7	73	184	96	85
1923	46.1	106	-32	22.17	8.85	28.1	77	170	109	86
1924	43.5	105	-41	18.47	10.43	43.6	73	172	103	91
1925	46.8	108	-43	15.90	11.22	26.1	64	166	112	85
1926	46.4	114	-35	17.73	11.55	29.3	69	163	106	96
1927	44.1	104	-44	23.21	9.27	45.3	83	158	105	102
1928	45.1	109	-34	27.44	10.25	49.8	67	183	102	81
1929	43.5	111	-50	20.93	8.25	46.7	83	167	99	99
1930	47.1	113	-36	18.10	9.26	24.7	65	182	98	85

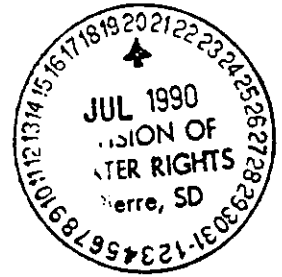
TOTAL SNOWFALL WITH ON GROUND (IN.)

YR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN
0-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16-17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17-18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19-20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20-21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24-25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26-27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27-28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29-30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30-31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Information from State Climatologist, SDSU, Brookings, South Dakota



South Dakota State University
Box 2120
Brookings, SD 57007-1496



Chamberlain, South Dakota
Brule County

*The earliest records we have for Chamberlain start in 1896.

	Precipitation	Snow
1915	29.76	35.6
1916	22.83	M
1917	11.72 M	3.8 M
1918	4.3 M	14.6 M
1919	M	M
1920	M	M
1921	M	M
1922	M	M
1923	M	M
1948		5.7
1949		21.5
1950		22.3
1951		37.2
1952		24.5
1953		43.2
1954		22.9
1955		35.4

Precipitation and Snow are measured in inches.

M - Some or all of the data is missing.

Normal Average Precipitation for Chamberlain is 19.87 inches.



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Information from State Climatologist, SDSU, Brookings, South Dakota



Academy, South Dakota
Charles Mix County

*The earliest records we have for Academy start in 1898.

	<u>Precipitation</u>	<u>Snow</u>
1915	29.18	47.1
1916	19.13	27.7
1917	22.12	44.1
1918	22.48	37.7
1919	23.39	50.5
1920	23.95	35.1
1921	20.70	15.0
1922	19.65	35.5
1923	20.80	13.9
1948		18.0
1949		21.5
1950		M
1951		M
1952		M
1953		M
1954		34.0
1955		34.0

Precipitation and Snow are measured in inches.
M - Some or all of the data is missing.

Normal Average Precipitation for Academy is 21.06 inches.



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Pierre, SD 57501

Information from State Climatologist, SDSU, Brookings, SD 57007



Fukwana, South Dakota
Brule County

*The earliest records we have for Fukwana start in 1920.

	<u>Precipitation</u>	<u>Snow</u>
1915	---	--
1916	---	--
1917	---	--
1918	---	--
1919	---	--
1920	7.58 M	M
1921	M	M
1922	M	M
1923	2.39 M	2.6 M
1948	23.24	2.9
1949	3.56	0
1950	9.92	17.5
1951	11.53 M	M
1952	12.02 E	M
1953	18.21	M
1954	18.77	23.9
1955	13.13	26.2

Precipitation and Snow are measured in inches.

M - Some or all of the data is missing.

E - Estimated

Not enough information for Fukwana to have a normal average precipitation.

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AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1948

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure
Aberdeen	7.8	-3.4	8.2	-3.6	23.2	-5.9	46.4	3.1	56.5	-1.8	63.8	-2.7	72.5	-1.3	70.4	-1.1	65.2	4.7	47.2	-1.1	32.2	2.2	15.6	-1.8	42.7	-1.8
Academy	18.3	-1.6	18.6	-2.6	31.0	-3.3	51.2	5.6	58.3	-1.9	65.7	-2.8	75.0	-1.8	74.0	-1.5	69.5	5.3	49.5	-2.1	36.9	-1.3	20.8	-3.8	47.7	-1.3
Chamberlain	17.9	-1.3	17.8	-3.7	29.2	-1.5	52.4	4.8	59.0	-1.1	64.4	-3.1	74.8	-1.1	71.1	-1.8	67.9	3.8	48.4	-1.8	33.9	-1.8	20.4	-8.8	46.6	-1.7
Kennecott	18.0	-1.9	17.8	-4.4	30.2	-4.7	54.0	5.3	60.7	-1.1	64.2	-3.3	75.4	-2.1	74.8	-1.8	68.1	3.2	49.8	-1.6	33.9	-1.8	20.4	-8.8	46.6	-1.7
Pulaski	18.0	-1.9	17.8	-4.4	30.2	-4.7	54.0	5.3	60.7	-1.1	64.2	-3.3	75.4	-2.1	74.8	-1.8	68.1	3.2	49.8	-1.6	33.9	-1.8	20.4	-8.8	46.6	-1.7
White Lake	15.3	-3.9	16.6	-5.9	25.6	-4.6	52.6	4.4	58.6	-1.1	65.2	-3.6	72.4	-4.7	72.4	-2.1	67.3	3.6	49.8	-1.6	33.9	-1.8	20.4	-8.8	46.6	-1.7

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1948

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure
Aberdeen	.18	-.62	.63	-.18	.39	-1.13	.66	-2.18	.28	-2.79	4.88	-.78	3.27	-.41	3.85	-.26	.95	-.96	1.30	-.20	.21	-.70	.66	-.69	15.46	-8.82
Academy	.97	-.18	.35	-.26	.35	-.61	2.35	-.11	1.87	-1.18	8.82	1.92	3.61	-.62	1.05	-1.61	1.09	-.66	1.17	-.19	.71	-.13	.45	-.13	18.45	-3.45
Chamberlain	.28	-.38	.38	-.32	.22	-.71	1.04	-.89	2.51	-.94	4.86	1.42	3.79	-.82	1.43	-.09	1.84	-.76	1.06	-.83	.84	-.65	.24	-.18	18.97	-6.03
Kennecott	.17	-.39	.40	-.12	.4	-.98	1.99	-.38	3.55	-.19	8.48	3.15	7.20	8.44	1.12	-.90	1.03	-.37	1.63	-.05	.26	-.32	.40	-.10	21.44	-6.03
Pulaski	.17	-.39	.40	-.12	.4	-.98	1.99	-.38	3.55	-.19	8.48	3.15	7.20	8.44	1.12	-.90	1.03	-.37	1.63	-.05	.26	-.32	.40	-.10	21.44	-6.03
White Lake	.13	-.37	.27	-.30	.49	-.44	3.07	-.94	1.96	-.74	6.72	3.20	6.85	4.63	1.09	-1.14	.79	-.79	-	-	-	-	-	-	-	-

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1949

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure	Temp.	Departure
Aberdeen AP CAA 2 E	6.1	-5.1	7.8	-7.2	28.1	-1.9	47.2	1.9	58.8	1.8	67.3	-7.7	73.0	-2.7	72.9	3.4	56.4	-4.1	46.2	-1.1	38.0	8.0	14.1	-2.8	43.0	-1.8
Academy	19.9	-1.1	17.8	-4.3	33.0	-1.3	50.6	3.0	61.5	3.9	70.0	-1.5	75.8	-1.7	75.4	1.9	60.1	-3.9	51.0	-6.4	45.2	8.6	23.8	-3.9	47.8	-1.8
Kennecott	8.1	-6.6	14.8	-4.7	31.4	-3.1	50.1	3.6	60.9	3.0	69.7	1.2	77.0	-8.7	75.5	1.8	59.1	-4.9	49.1	-8.4	43.8	9.0	20.3	-2.3	46.7	-1.6
Pulaski	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Lake	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1949

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure	Precip.	Departure
Aberdeen AP CAA 2 E	6.55	-1.08	6.18	-0.65	6.99	-.53	6.36	-2.46	6.36	3.39	6.83	-3.17	4.08	1.12	1.25	-1.36	2.00	-.09	2.71	1.21	0.68	-.83	0.82	-.67	20.29	-4.44
Academy	1.66	1.96	1.1	-.61	2.21	1.08	1.75	-.71	2.70	-.34	1.26	-3.64	5.35	-.94	2.11	-.45	3.62	1.28	2.75	1.39	0.42	-.16	1.50	-.62	23.71	2.81
Chamberlain	6.70	-.83	1.1	-.63	2.21	1.08	1.75	-.71	2.70	-.34	1.26	-3.64	5.35	-.94	2.11	-.45	3.62	1.28	2.75	1.39	0.42	-.16	1.50	-.62	23.71	2.81
Kennecott	1.99	-.83	1.1	-.63	2.21	1.08	1.75	-.71	2.70	-.34	1.26	-3.64	5.35	-.94	2.11	-.45	3.62	1.28	2.75	1.39	0.42	-.16	1.50	-.62	23.71	2.81
Pulaski	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Lake	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Taken from U.S. Department of Commerce, Weather Bureau, Climatological Data, South Dakota, Annual Summaries 1948 and 1949, Volumes LIII and LIV, No. 13.

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1950

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure
Aberdeen CAA AP 2 E	-3.1	-8.1	11.7	-3.1	24.1	-5.0	36.0	-8.3	52.6	-4.7	65.6	-9.0	87.2	-5.6	65.6	-4.7	38.5	-2.6	48.6	1.3	24.0	-4.0	13.2	-3.7	22.7	-4.6
Academy	6.2	-41.6	21.3	-6.2	25.2	-9.1	41.8	-5.7	54.9	-3.6	66.4	-1.1	89.7	-6.1	69.0	-4.8	62.3	-1.7	34.9	3.3	34.0	-2.6	23.6	-6.8	44.8	-3.8
Kennecott	4.9	-12.8	18.3	-3.2	26.2	-9.8	40.6	-6.9	54.2	-3.7	68.3	-1.1	79.4	-5.6	69.8	-3.8	61.6	-2.4	53.9	6.0	31.6	-3.2	22.2	-4.4	33.0	-37.7
Pukwana	4.7	-13.2	19.3	-4.3	23.6	-11.3	40.5	-6.3	53.3	-4.3	67.3	-2.8	87.9	-5.6	66.3	-8.8	59.8	-5.2	-	-	-	-	22.1	-1.1	-	-
White Lake	5.5	-12.6	19.2	-3.5	26.8	-9.6	39.2	-8.0	54.6	-5.1	67.3	-1.8	84.7	-5.4	68.8	-5.7	62.1	-2.6	53.4	1.6	32.8	-2.0	21.3	-1.7	43.1	-5.1

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1950

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure
Aberdeen AP CAA 2 E	0.96	.16	0.21	-.60	1.01	-.51	0.61	-2.23	5.30	-8.23	0.97	-8.13	4.32	1.25	2.13	-.69	1.29	-.62	0.66	-.94	0.15	-.76	0.59	-.16	16.09	-6.89
Academy	0.32	-.14	1.80	-.39	2.53	1.40	1.10	-1.34	2.60	-.27	1.84	-8.23	0.43	0.63	3.81	1.23	1.35	-.81	1.22	-.14	-	-	-	-	-	-
Chamberlain	0.53	-	-	-	3.28	-	0.64	-	2.64	-	0.34	-	0.61	-	3.92	-	4.71	-	1.30	-	0.34	-	0.30	-	-	-
Kennecott	0.37	-.19	1.96	-.67	2.37	1.44	0.83	-1.06	2.81	-.64	2.47	-.88	2.82	-.40	2.59	1.61	4.87	2.30	0.90	-.15	0.59	-.30	0.10	-.31	21.82	4.86
Pukwana	0.21	-.16	-	-	-	-	-	-	-	-	-	-	2.11	-.39	1.11	-.91	2.12	1.72	0.88	-.00	-	-	0.00	-.30	-	-
White Lake	0.43	-.07	1.51	-.94	1.70	-.77	1.74	-.25	2.62	-.12	0.63	-3.97	2.64	-.21	1.91	-.32	2.28	1.70	1.34	-.18	0.82	-.69	0.12	-.22	17.66	-.22

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1951

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure	Temp	Departure
Aberdeen AP CAA 2 E	-4.5	-6.7	18.0	4.2	15.9	-12.2	41.6	-3.7	57.5	-.8	59.4	-7.1	89.2	-3.6	64.4	-3.9	54.9	-.8	44.1	-3.2	26.0	-4.0	7.6	-9.9	38.8	-4.7
Academy	18.8	-0	29.2	7.1	24.1	-10.2	43.8	-3.4	54.0	-.8	62.5	-4.0	71.4	-4.4	70.8	-2.9	54.3	-5.7	49.1	-2.3	32.3	-4.1	12.8	-11.3	44.3	-3.7
Kennecott	15.9	-1.8	28.0	4.5	22.7	-11.0	44.3	-3.6	58.2	-.3	61.3	-7.2	72.9	-3.3	71.8	-2.1	54.3	-3.7	49.6	-.8	31.3	-3.6	12.0	-10.6	43.8	-3.8
Pukwana 3 E	15.0	-2.9	-	-	22.1	-11.8	44.3	-4.3	58.1	-.8	64.1	-8.4	71.2	-6.3	69.8	-5.2	57.8	-7.1	47.0	-4.4	30.0	-4.5	12.3	-10.9	-	-
White Lake	17.4	-.7	27.5	4.8	-	-	-	-	-	-	64.5	-4.5	71.4	-5.7	69.7	-4.9	57.1	-7.6	48.1	-3.7	30.3	-4.6	14.1	-8.9	-	-

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1951

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure	Precip	Departure
ABERDEEN CAA AP 2 E	.34	-.66	1.03	-.22	.69	-.63	1.97	-1.87	2.45	-.62	3.94	-.16	2.63	-.33	2.22	-.61	.22	-1.36	2.11	-.67	.17	-.74	1.59	-.94	18.71	-5.21
ACADEMY	.20	-.26	1.08	-.67	.81	-.32	3.03	-.59	5.24	2.18	4.41	-.91	3.23	-.64	3.09	-.43	2.93	-.59	1.82	-.47	.74	-.16	1.91	1.34	28.57	2.21
CHAMBERLAIN	.20	-.26	.96	-.67	.56	-.36	3.62	-.50	5.00	4.22	4.22	-.72	2.72	-.54	2.41	-.63	2.59	-.59	1.48	-.72	.72	-.16	2.14	1.34	28.57	2.21
KENNECOTT	.32	-.24	.27	-.26	.87	-.06	1.59	-.54	2.05	-.50	3.57	-.44	.95	-1.17	2.91	-.93	2.30	1.12	2.83	1.78	.13	-.36	-	-	-	-
PUKWANA 3 E	-	-	-	-	-	-	1.24	-.37	-	-	-	-	2.56	-.80	4.23	2.21	1.58	-.18	1.57	.59	.35	-.13	-	-	-	-
WHITE LAKE	.13	-.37	.61	-.04	-	-	-	-	-	-	-	-	13.92	1.67	3.48	1.23	-	-	12.06	.90	.46	-.15	1.99	1.55	-	-

Taken from U.S. Department of Commerce, Weather Bureau, Climatological Data, South Dakota, Annual Summaries 1950 and 1951, Volumes LV and LVI, No. 13.

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1952

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure
ABERDEEN AP CAA 2 E	46.8	- 0.4	47.3	2.5	49.2	- 0.9	47.6	2.3	56.1	- 1.2	68.4	1.9	71.6	- 1.8	66.2	- 1.1	61.7	2.7	47.0	- 4.4	31.6	1.0	26.3	3.4	62.7	- 0.8
ACADEMY	45.7	- 4.1	27.7	3.6	26.1M	- 8.3	48.0	3.3	59.3M	0.7	72.0M	4.3	74.4M	0.8	72.0M	- 0.6	67.8	3.0	48.9	- 2.7	35.0M	- 1.0	25.7M	1.1	40.2	0.2
CHANDLER BLAIN	11.8M	- 3.4	24.0M	3.3	23.6	- 10.1	48.0	2.4	57.9	0.0	70.0	1.3	75.0M	- 0.0	71.0M	0.7	60.0	4.0	48.2	- 1.7	33.9	- 0.9	22.6	0.0	40.7	- 0.6
RENNEREC	12.3M	- 3.4	25.3M	1.7	24.0	- 10.3	48.6M	0.0	58.0	1.3	72.0	2.8	75.0	- 3.1	73.0M	- 2.0	66.3M	1.0	47.7	- 3.7	34.4	- 0.1	23.2M	0.0	40.0	- 1.3
PUEBLA 3 W	13.3M	- 4.0	25.2	2.5	24.0	- 9.3	49.0	1.0	56.4	- 0.3	72.1	3.3	75.3M	- 1.0	72.7	- 1.0	67.7	3.0	47.8	- 4.0	34.0	- 0.1	24.0	1.0	47.3	- 0.9
WHITE LAKE																										

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1952

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure
ABERDEEN AP CAA 2 E	1.65	0.85	2.00	1.25	1.15	- 0.35	0.33	2.51	1.40	1.30	3.10	1.00	2.02	- 0.94	0.60	2.12	0.10	- 1.02	7	- 1.92	1.22	0.31	0.20	- 0.40	10.10	- 0.60
ACADEMY	1.22	0.70	1.00	0.40	1.15	- 0.05	0.65	1.30	2.75	- 0.81	2.77	- 1.13	1.40	- 1.13	1.60	0.90	7	- 1.34	0	- 1.30	0.02	0.24	0.00	- 0.40	210.35	- 0.97
CHANDLER BLAIN	0.85	0.65			0.50		7		2.40		2.00		1.03		1.04		7		0		1.34		0.90		11.80	
RENNEREC	0.94	0.40	0.52	- 0.01	0.50	- 0.43	0.37	1.02	2.75	- 0.20	2.61	- 0.50	0.52	- 1.00	2.30	0.32	7	- 1.10	0	- 1.03	2.17	1.00	0.34	- 0.10	212.00	- 3.00
PUEBLA 3 W	1.29	0.00	0.51	- 0.01	0.33	- 0.63	0.55	- 1.70	2.10	- 0.20	2.65	- 0.40	1.15	- 0.61	1.65	- 0.37	7	- 1.40	0	- 0.90	1.40	0.90	0.20	- 0.01	212.00	- 0.00
WHITE LAKE	1.51	1.01	1.02	0.45	0.60	- 0.04	0.60	1.01	2.00	- 0.60	3.15	- 0.37	0.57	- 1.72	1.60	- 0.20	0.07	- 1.51	7	- 1.10	0.05	0.20	0.11	- 0.75	12.90	- 0.00

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1953

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure
ABERDEEN CAA AP	43.4	2.2	48.8	4.0	49.0	0.8	58.0	- 0.4	56.2	- 3.1	68.7	- 0.8	65.0	- 1.0	71.7	1.4	60.6	- 0.9	53.2	5.0	35.4	4.4	10.2	2.3	60.7	0.7
ACADEMY	25.7M	5.0	24.3M	2.3	37.4M	3.1	47.0	- 4.0	57.7	- 0.0	70.4M	5.0	73.7	- 2.1	75.1M	1.4	69.0	- 0.9	57.9M	5.0	40.7M	4.1	26.4M	2.4	40.0	1.0
CHANDLER BLAIN	24.1	0.4	23.3	1.0	11.0	0.2	41.0	- 5.0	50.2	- 1.0	68.0	1.4	73.0M	- 3.0	75.0	1.0	64.5	0.5	57.1	7.0	40.0	5.2	26.4	3.0	40.0	1.5
RENNEREC	23.9M	- 4.0	27.0M	- 0.0	34.0M	- 0.1	41.4M	- 7.4	57.2M	- 0.4	69.0M	0.4	73.4	- 4.1	74.5	- 0.7	66.0M	- 0.8	56.0	4.4	30.7M	4.7	24.1M	2.5	45.4	0.7
PUEBLA 3 W	72.4	4.4	23.0	0.3	34.0	0.0	41.0	- 0.0	56.0	- 2.0	70.1	1.3	73.4	- 3.0	73.7	- 0.8	64.0	0.7	50.7	4.0	30.4	4.0	23.0	0.0	40.0	0.2
WHITE LAKE																										

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1953

Station		1953																									
		January		February		March		April		May		June		July		August		September		October		November		December		Annual	
		Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure
ABERDEEN CAA AD	P 11	0.95	0.14	1.07	0.20	1.07	0.45	5.13	2.20	2.80	- 0.10	0.43	4.31	1.20	1.70	4.21	1.40	- 4.0	- 1.51	5.0	0.07	- 0.0	0.00	- 7.0	0.01	27.40	3.71
ACADEMY		0.09	0.27	2.24	1.03	4.40	0.60	4.01	1.57	2.13	- 0.95	6.54	2.04	1.27	- 1.32	4.75	2.00	- 1.0	- 1.44	- 1.7	- 1.10	- 0.0	0.00	1.00	0.40	231.90	5.00
CHANDLER BLAIN		0.4	1.10			7.4		3.02		7.02		1.83		1.05		7.0		- 1.7		5.0		1.10		1.00		17.40	
RENNEREC		1.0	0.40	1.21	0.08	7.4	- 0.10	4.07	2.14	1.87	- 0.40	3.70	0.95	1.50	- 0.50	1.23	- 0.73	- 1.1	- 1.07	1.00	0.01	7.0	0.23	4.7	- 0.02	16.40	- 0.44
PUEBLA 3 W		0.87	0.40	1.47	0.95	5.4	- 0.44	3.50	1.93	2.03	- 0.33	4.24	0.93	1.03	- 0.73	1.70	- 0.24	7.0	- 1.70	3.0	- 0.43	1.40	1.01	0.6	0.44	14.1	2.10
WHITE LAKE		0.00	0.30	1.02	1.25	7.3	- 0.22	4.51	2.42	2.33	- 0.39	4.09	1.45	2.50	0.20	4.10	1.90	- 1.0	- 1.00	- 0.0	- 1.00	- 0.0	0.0	0.10	27.22	4.04	

Taken from U.S. Department of Commerce, Weather Bureau, Climatological Data, South Dakota, Annual Summaries 1952 and 1953, Volumes LVII and LVIII, No. 13.

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1954

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure
ANDERSON CAS AP	26.7	-2.0	30.1	16.3	26.0	-3.1	65.0	-2.3	51.1	-8.2	68.1	-1.2	73.0	-1.0	86.5	-1.7	58.7	-1.8	45.1	-2.0	38.0	-0.2	30.1	-2.8	63.0	-1.1
ACADEMY	30.9	2.8	41.2	18.1	28.9	-1.0	65.0	-1.2	51.1	-8.2	68.1	-1.2	73.0	-1.0	86.5	-1.7	58.7	-1.8	45.1	-2.0	38.0	-0.2	30.1	-2.8	63.0	-1.1
KENNEBEC	30.2	1.9	41.1	18.0	29.0	-0.1	65.0	-1.2	51.1	-8.2	68.1	-1.2	73.0	-1.0	86.5	-1.7	58.7	-1.8	45.1	-2.0	38.0	-0.2	30.1	-2.8	63.0	-1.1
PURMANA S W	34.0	3.0	40.0	18.0	28.0	-1.0	65.0	-1.2	51.1	-8.2	68.1	-1.2	73.0	-1.0	86.5	-1.7	58.7	-1.8	45.1	-2.0	38.0	-0.2	30.1	-2.8	63.0	-1.1
WHITE LAKE	33.1	3.0	38.0	16.0	28.0	-1.0	65.0	-1.2	51.1	-8.2	68.1	-1.2	73.0	-1.0	86.5	-1.7	58.7	-1.8	45.1	-2.0	38.0	-0.2	30.1	-2.8	63.0	-1.1

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

1954

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure
ANDERSON CAS AP	0.29	-0.51	0.30	-0.51	1.11	-0.51	2.17	-0.72	1.35	-1.52	2.30	-1.72	0.81	-3.15	2.37	-0.54	0.07	-0.10	0.00	-0.52	0.00	-0.51	0.35	-0.42	23.51	-0.17
ACADEMY	0.29	-0.51	0.30	-0.51	1.11	-0.51	2.17	-0.72	1.35	-1.52	2.30	-1.72	0.81	-3.15	2.37	-0.54	0.07	-0.10	0.00	-0.52	0.00	-0.51	0.35	-0.42	23.51	-0.17
CHAMBERLAIN	0.29	-0.51	0.30	-0.51	1.11	-0.51	2.17	-0.72	1.35	-1.52	2.30	-1.72	0.81	-3.15	2.37	-0.54	0.07	-0.10	0.00	-0.52	0.00	-0.51	0.35	-0.42	23.51	-0.17
KENNEBEC	0.29	-0.51	0.30	-0.51	1.11	-0.51	2.17	-0.72	1.35	-1.52	2.30	-1.72	0.81	-3.15	2.37	-0.54	0.07	-0.10	0.00	-0.52	0.00	-0.51	0.35	-0.42	23.51	-0.17
PURMANA S W	0.13	-0.72	0.00	-0.07	0.00	-0.09	1.01	-0.20	1.70	-0.64	2.00	-0.64	0.30	-1.02	0.00	-1.02	1.01	-0.21	1.18	-0.26	0.11	-0.29	0.00	-0.22	10.77	-0.03
WHITE LAKE	0.03	-0.64	0.03	-0.19	1.01	-0.52	1.00	-0.21	1.10	-0.64	2.00	-0.64	0.30	-1.02	0.00	-1.02	1.01	-0.21	1.18	-0.26	0.11	-0.29	0.00	-0.22	10.77	-0.03

AVERAGE TEMPERATURES AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1955

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure	Temperature	Departure
ANDERSON CAS AP	23.4	-3.0	17.0	-5.1	32.5	-1.8	56.9	0.3	66.3	5.9	66.1	-2.4	80.0	0.2	80.0	6.9	65.5	-0.2	51.9	-1.0	26.0	-10.0	16.2	-6.0	57.1	-0.7
ACADEMY	23.4	-3.0	17.0	-5.1	32.5	-1.8	56.9	0.3	66.3	5.9	66.1	-2.4	80.0	0.2	80.0	6.9	65.5	-0.2	51.9	-1.0	26.0	-10.0	16.2	-6.0	57.1	-0.7
KENNEBEC	23.4	-3.0	17.0	-5.1	32.5	-1.8	56.9	0.3	66.3	5.9	66.1	-2.4	80.0	0.2	80.0	6.9	65.5	-0.2	51.9	-1.0	26.0	-10.0	16.2	-6.0	57.1	-0.7
PURMANA S W	21.7	-3.0	16.0	-6.0	31.9	-3.4	55.7	6.9	63.0	6.2	65.9	-3.4	78.9	1.4	78.0	3.0	64.0	-0.8	51.0	-0.2	24.1	-10.0	10.0	-12.0	40.7	-1.3
WHITE LAKE	21.2	-3.1	15.5	-7.2	31.2	-3.4	55.3	7.1	64.1	4.4	66.1	-2.4	78.2	2.2	78.2	3.1	65.5	-0.2	51.0	-0.2	24.1	-10.0	10.0	-12.0	40.7	-1.3

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL

SOUTH DAKOTA
1955

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure
ANDERSON CAS AP	0.29	-0.46	1.33	-0.99	0.11	-1.02	1.76	-0.66	1.71	-1.25	3.21	-0.89	1.34	-1.25	1.19	-1.47	1.13	-0.81	0.31	-1.03	0.03	-0.33	0.17	-0.40	12.20	-0.47
ACADEMY	0.29	-0.46	1.33	-0.99	0.11	-1.02	1.76	-0.66	1.71	-1.25	3.21	-0.89	1.34	-1.25	1.19	-1.47	1.13	-0.81	0.31	-1.03	0.03	-0.33	0.17	-0.40	12.20	-0.47
CHAMBERLAIN	0.29	-0.46	1.33	-0.99	0.11	-1.02	1.76	-0.66	1.71	-1.25	3.21	-0.89	1.34	-1.25	1.19	-1.47	1.13	-0.81	0.31	-1.03	0.03	-0.33	0.17	-0.40	12.20	-0.47
KENNEBEC	0.10	-0.96	0.70	-0.17	0.11	-0.62	1.13	-0.00	2.33	-0.22	3.61	-0.42	1.24	-0.88	1.32	-0.44	1.14	-0.04	0.00	-0.97	0.19	-0.30	0.00	-0.20	12.70	-0.20
PURMANA S W	0.10	-0.79	1.37	-0.69	0.00	-0.50	0.81	-0.74	1.64	-0.78	2.63	-0.44	1.59	-0.20	1.73	-0.79	1.20	-0.11	0.00	-0.90	0.37	-0.11	0.71	-0.47	11.17	-0.00
WHITE LAKE	0.10	-0.40	0.70	-0.13	0.35	-0.33	1.98	-0.11	2.37	-0.34	2.48	-1.04	1.61	-0.84	1.09	-1.04	0.92	-0.44	0.22	-0.79	0.38	-0.24	1.12	-0.08	10.04	-0.34

Taken from U.S. Department of Commerce, Weather Bureau, Climatological Data, South Dakota, Annual Summaries 1954 and 1955, Volumes LIX and LX, No. 13.

January 1980

Exh. # 22

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Total
1948	.12	.35	.17	1.90	2.10	7.29	4.65	1.08	.87	.90	.15	.29	19.87
49	1.19	.00	1.73	1.38	1.93	3.64	4.25	3.48	2.57	2.12	.25	1.00	23.54
50	.21	1.54	2.42	.72	2.19	.38	2.55	3.44	4.79	1.32	.08	.05	19.69
51	.02	.21	.64	2.68	4.13	4.54	3.57	4.12	2.36	1.81	.33	1.29	25.70
52	.80	.44	.63	.22	2.15	2.06	1.16	2.14	.00	.00	1.05	.29	10.94
53	.81	1.40	.36	3.76	2.90	4.87	1.17	.96	.20	.46	1.60	.90	19.39
54	.17	.35	1.01	1.73	2.90	6.31	.36	4.05	1.99	1.37	.00	.42	20.66
55	.07	1.40	.91	1.01	1.98	3.66	2.39	2.11	1.37	.10	.21	1.57	16.78
56	.51	.47	.90	1.75	1.51	1.81	3.51	6.94	.69	2.20	2.07	.10	22.46
57	.26	.40	1.00	2.22	3.99	4.48	1.52	2.52	1.72	2.73	.90	.04	21.78
58	.13	.02	1.85	3.32	1.89	3.02	3.10	.76	.25	.05	.44	.17	15.00
59	.35	1.41	.63	1.21	3.77	3.46	1.71	2.39	4.21	1.81	.72	.44	22.11
60	.31	1.46	.62	2.84	4.20	3.35	1.12	2.98	1.71	.45	1.05	.67	20.76
61	.28	.30	.46	1.31	4.25	3.24	2.79	1.85	1.40	1.18	.15	.20	17.41
62	.27	1.64	1.24	1.16	7.41	5.94	6.01	2.76	1.06	.45	.12	.16	28.22
63	.67	.22	1.39	1.87	1.69	3.84	9.81	.66	3.93	.75	.47	.33	25.63
64	.15	.35	1.55	3.95	2.95	3.49	1.67	1.07	1.44	.00	.14	.72	17.48
65	.09	.16	.63	2.04	5.41	3.71	3.33	.55	4.01	.79	.30	.48	21.50
66	.26	.42	.48	2.30	.80	3.35	1.75	.86	1.51	1.41	.55	.24	13.93
67	.70	.70	.37	.56	.98	6.62	.65	2.00	1.41	1.91	.16	.42	16.48
68	.41	.30	.09	6.46	2.15	5.03	1.27	2.43	2.36	1.74	.68	.88	23.80
69	.43	1.16	.25	.74	2.07	2.04	3.14	1.34	1.45	1.05	.58	.57	14.82
70	.54	.18	1.33	3.04	2.35	4.76	1.01	1.51	.63	1.64	1.53	.54	19.06
71	.27	1.28	.34	4.29	2.56	1.01	3.84	.77	1.48	2.55	1.01	.71	20.11
72	.12	.56	.61	4.46	6.92	3.37	5.91	.76	1.26	1.86	2.74	.93	29.50
73	.66	.25	1.67	1.04	3.87	1.61	2.32	.75	4.59	1.59	1.29	.30	19.94
74	.12	.24	.85	2.53	3.55	2.46	2.28	.44	.43	.54	.03	.15	13.62
75	.74	.18	2.08	.94	3.69	4.53	1.78	1.80	3.42	1.09	.55	.55	21.35
76	.70	.26	.69	1.77	2.21	1.32	1.27	.50	2.65	.72	.16	.22	12.47
77	.35	2.39	5.22	3.66	5.02	4.04	1.63	2.93	3.39	2.71	1.43	.83	33.60
78	.14	.79	.10	5.04	2.37	2.01	4.85	3.01	.75	.27	.29	.42	20.04
79	1.27	.30	2.38	2.40	2.60	4.42	3.27	2.16	.31	2.08	.33	.00	21.52
80	.25	.53	.75	.50	1.44	3.33	1.09	5.60	.45	2.69	.25	.90	17.78

Monthly Averages Yearly Average

1948 Total	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1980	.40	.66	1.07	2.26	3.03	3.60	2.75	2.14	1.84	1.28	.65	.51	20.21

Recorded and prepared by Earl D. Skeborn

IN THE SUPREME COURT
OF THE
STATE OF SOUTH DAKOTA.
April Term, 1913.

O. P. Anderson, Christ Reither,
Fred C. Fastz and Albert F.
Fastz, Plaintiffs, and Appellants.

-v-

Fred Ray, H. L. Wilrodt, Louis
Richards, J. C. Seales and Magnus
Olson as members of the Board of
County Commissioners of Brule County,
South Dakota and John Maack as Auditor
of said County, and State of South Dakota,

Defendants and Respondents.

APPEAL FROM THE CIRCUIT COURT OF BRULE COUNTY,
HON. FRANK B. SMITH, JUDGE.

APPELLANTS' BRIEF.

Brown & Brown, of Chamberlain, South Dakota,
Attorneys for the Appellants.
Clark S. Rowe, Chamberlain, South Dakota
M. H. O'Brien, Highmore, South Dakota,
Attorneys for the Respondents.

that in the fall of 1888 I started to walk across it from a point near Julia Katz' residence and the weeds were very high and thick but there was not water from then until 1897. There may have been a little water in the spring ^{of several} ~~in different~~ years but it was always gone before fall. In the winter of 1896-1897 there was a big snow and as a result there was quite a lot of water but I don't remember just how long it stayed. Sometimes in the spring there has been a little water in the lake but I could not tell the years. I don't believe there has been any water there during the last six years but I could not say for certain. I have never made hay on the lake. (S.E. P. 47)

CROSS EXAMINATION.

I don't believe there was any water in the lake during the entire summer of 1889. There was a big blizzard in the winter of that year and there was a little water in the spring but the lake was dry by fall and I walked across it. The lake was not full then nor was it full in 1893-1897. It was perhaps two or three years after before it was entirely dry again.

I don't know of any boats on the lake except that Nelson's had a little boat on the creek. (S.E. P. 48)

J. W. Millikan testified on behalf of the plaintiffs as follows: I live in Osceola and am the official county surveyor for Bruce County. I made a survey of a part of the lake bed of Red Lake on June 10th, 1913. In making this survey I started on the township line between Polk and Red Lake Townships at the section corner between Sections 3 and 4 and ran South one mile to the ~~XXXXX~~ corner section corner of Sections 3-4 and 10 in Red Lake Township. According to the Government filed notes and plat of Red Lake this section corner is on the meander line of the lake. I then ran a line or level from there taking the ground at the meander line as a point from which to reckon depths - about 100 feet. and then ran a line across the middle of the lake as nearly as we could judge where we were. We ran South about 60 degrees West

from that point and went clear across the lake taking levels. We found that the deepest point in the lake was 2.7 feet below the meander line point from which we started. The lake bed is very flat and there was little difference in the level all the way across. The deepest point on the line was two and one half feet below the meander line point of beginning. When we crossed the lake we ran a branch line to some five or six hundred feet to one side of a point which some of the residents said was the clear place, the deepest place in the lake and found that this place was 2.7 feet below the meander line point of beginning. The lake bed was very nearly level. There was a little descent ^{toward} ~~and~~ the center but

These field notes show that the government survey of Red Lake was made in October, 1868, and the only creek mentioned in the field notes is a creek, referred to as a dry creek crossing the line between Sections 14 and 15, between 15 and 22, between 23 and 26, and between 25 and 36, and as a creek with ^{standing} ~~water~~ ^{at} ~~the~~ where it crosses the line between 25 and 26.

This is the creek referred to in the testimony of some of the witnesses as the Nelson creek and it as well as Red Lake is shown on the accompanying plat in this abstract. The course of the creek and the outline of the lake are shown approximately according-
X to the field notes on this plat. The field notes make no mention or reference to any other creek or to any outlet from the lake.

nearly full and sometimes the water was very low. I don't know just how many times since 1877 the lake has been full of water but there was a great deal in it up to 1881; then it was filled up full and the water stayed there for several years.

There was another heavy snow in 1893 and the lake was nearly full then. There was water in it after the winter of 1893-1897. It was quite full then and I have seen water in it several times since then. After the winter of 1898-1899 I could see water in it. I don't know whether there is any water in it now. I was by there a few days ago but did not notice any water.

Insert at
← page 19.

the lake then. I am familiar with Nelson Creek and have seen the water running into the lake from that. Not very recently but in the 1880s. I can recall several different occasions when I saw water running ~~into~~ that Creek toward the lake.

I have been on the lake myself in a boat and hunted ducks there and I have seen a number of boats on the lake. I never measured the depth of the water. (S.R. pp 66-67)

CROSS EXAMINATION.

I don't remember seeing any water in the lake prior to the spring of 1881. The water which came then gradually dried up until 1886 when there was no longer any water visible. I remember there was water in the fall of 1888 because I went duck hunting there and found that there were a great many weeds. I shot around the ~~xxxx~~ edge of the lake at that time. I don't think these weeds were so thick that you could not get through with a boat.

I think perhaps there was some water in the lake between 1889 and 1897 in the spring time but I would not be positive. I tried to drive through the lake one spring but had to turn back but I never tried to drive through in the summer time. When I started to drive through I went into a kind of road but got into the mud and turned back.

I don't know whether there has been any water there during the past six years. As a matter of fact I have not seen very much of the lake for the past ten or twelve years. Weeds grew up there thick at that time when I tried to drive through the lake. I think that was about twelve or fifteen years ago. (S.R. pp 66-71).

Old C. Oakland testified on behalf of the defendants as follows:

I am 63 years old and I have lived in Fule County since 1881. I saw the lake first in 1881. There was plenty of water in the lake then. That summer when I was building a house a fellow came along with a skiff and I took a 16 foot board and went out in the skiff about 15 or 20 rods and put the board into the water and I had

to put my arm in the water about two feet after the board before I could touch the bottom. That was about the Northwest quarter of Section 20, Red Lake Township. I went right out by the land that I am the owner of. I don't know how long after that there was water in the lake. I lived there all the time and never paid any attention to it. I never measured it any more because I had my stock there and it did not bother me any more. I just lived there. I seen water in it quite a bit but I don't remember the date because I don't pay no attention to nothing. I have seen lots of boats on the lake but I don't remember seeing any as late as 1906 and 1907. (S.P. pp72-73)

CROSS EXAMINATIONS.

I have seen lots of people rowing on the lake but I did not pay any attention to them. I cannot tell you the names of anybody I ever saw rowing on the lake. People come and gone, some come in and some go out and I don't know hardly any. I am getting so old these last years I can't hardly remember. I don't know whether the place I put the 16 foot board in the lake was a well or not. I know I never saw any wells in the lake. I don't know whether at that time the lake spread into Reule and Ola Townships. (S.P. pp74-75)

Thomas Taylor testified for the defendants as follows: I came to this County in April, 1878 and in the spring of 1881 our family moved out to the lake. My father and brother filed on horse-lands there and I was there continuously for about 14 years and I have known the lake off and on ever since. The lake was dry when I first saw it in 1887. In 1891 it was practically filled with water. At that time it contained the largest body of water I ever saw in the lake. The surface was smooth. A lot of hay had been cut and stacked in the center of the lake the year before. At that time I think it was about six or eight feet deep. We scoured it with bars.

I don't think the lake became entirely dry at any time before the year 1892 when the big blizzard brought a lot of snow and in

in the lake in places, at any rate enough so that we got stuck with our cars and we also found enough water to put in our cars. There were some fences there then but I did not pay much attention to them. (S.R. P. 145)

CROSS EXAMINATION.

We were out there with an automobile. Nelson was driving us and we started to go across the lake from the South side by the school section and went about a third of the way across. I think we went about a mile into the middle of the lake and came to a wet place and had to go back. We did not have to be pilled out by a team and got out under our own power. (S. R. p. 145)

George W. Dody testified in behalf of the defendants as follows: I live in Section 5, Red Lake Township. have lived there since 1880 except for two years. I live right near the meander line of the lake. I think about one-third of the time there has been water in it so that it would be worthless for cutting hay. I have been boating on it and one time I measured the depth of the water and found it was about 16½ feet or 17 feet deep. That was in 1883.

There are several Creeks or inlets that flow into the lake that run more or less each year. Nelson Creek is the largest and comes from up near Bijou Hills and flows practically every spring.

I remember one or two boys were drowned in the lake. At that time there was about two feet of water in the lake and there was about one and a half feet where they were found. The water spreads pretty generally over the lake. (S.R. 148-149)

CROSS EXAMINATION.

I had a 16 foot board when I found the water was 17 feet deep. I was not along with old man Askland. If the lake was that deep I do not think it would spread into Ole Township but it would cover some of Trule Township, perhaps half a section or a little further. (S.R.P. 150)

Appendix No. 57

A. F. Bantz.

1890-----Dry-----Burnt off.
1891-----Dry-----Herded cattle for Funston.
1892-----Dry-----Herded.
1893-----Dry-----Herded.
1894-----Dry-----Herded.
1895-----Dry-----Herded.
1896-----Dry-----Herded.
1897-----Water.
1898-----Water.
1899-----Dry.
1900-----Dry.
1901-----Dry.
1902-----Dry.
1903-----Dry.
1904-----Dry.
1905-----Dry-----Drove across when we went out West.
1906-----Water-----The boys drowned.
1907-----Water-----The first year I lived on Uncle's place.
1908-----Dry-----Ted and I hunted for water.
1909-----Dry.
1910-----Dry.
1911-----Dry.
1912-----Dry.
1913-----Dry.

Appendix No. 58

O. E. ANDERSON -V- BOARD OF COUNTY COMMISSIONERS.

1879	1882	1880	1880	1893
Julius Bantz.	O. E. Anderson.	Albert Bantz.	Fred C. Bantz.	Christ Rimer.
1879-----Dry	-----	-----	-----	-----
1880-----Dry	-----	-----	-----	-----
1881-----Water	-----	-----	-----	-----
1882-----Water	-----Water	-----	-----	-----
1883-----Water	-----Water	-----	-----	-----
1884-----Water	-----Water	-----	-----	-----
1885-----Water	-----Water	-----	-----	-----
1886-----Water	-----Don't know	-----	-----	-----
1887-----Dry	-----Don't know	-----	-----	-----
1888-----Dry	-----Don't know	-----	-----	-----
1889-----Dry	-----Dry	-----	-----	-----
1890-----Dry	-----Dry	-----	-----	-----
1891-----Dry	-----Dry	-----	-----	-----
1892-----Dry	-----Dry	-----	-----	-----
1893-----Dry	-----Dry	-----Dry	-----Dry	-----
1894-----Dry	-----Dry	-----Dry	-----Dry	-----Dry.
1895-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1896-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1897-----Water	-----Water	-----Water	-----Water	-----Water
1898-----Water	-----Water	-----Water	-----Water	-----Water
1899-----Dry	-----Water	-----Dry	-----Dry	-----Dry
1900-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1901-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1902-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1903-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1904-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1905-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1906-----Water	-----Water	-----Water	-----Water	-----Water
1907-----Water	-----Water	-----Water	-----Water	-----Water
1908-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1909-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1910-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1911-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1912-----Dry	-----Dry	-----Dry	-----Dry	-----Dry
1913-----Dry	-----Dry	-----Dry	-----Dry	-----Dry

REPORT OF STATE ENGINEER

139

ton head. Water is usually found in the upper part of the Dakota, but in the region around Kimball it has been necessary to sink deeper to a more porous layer from which a pressure at the surface of 7 to 20 pounds per square inch was originally obtained; however, at this time these latter wells no longer flow on account of the diminished artesian head in the last few years. On the higher lands the pressures used to exceed 50 pounds per square inch, and at some of the wells in Chamberlain there was more than 100 pounds pressure. Both the pressure and the volume of flow at wells all over this county are falling off at an alarming rate due to some of the extravagances in the use of water as shown in the illustrations of the wells at Red Lake and Chamberlain, and most of them are not now flowing and have to be pumped with windmills. The principal extractions that were made of the wells in this county are as follows:

Town of Kimball, owner.

Altitude, 1,784 feet.

The old town well was drilled about 1886. The new town well was drilled in 1914. Both of these wells are about 1,120 feet deep, and are 8 inches in diameter. The first well quit flowing about 20 years ago, and was pumped for a long time. The new well is being pumped with an air-lift outfit, and it is said that the water at the present time comes to within 122 feet of the surface. During the past 12 or 13 years the artesian head in this locality has fallen off at the rate of about 6 feet annually. The water is forced from a reservoir at the surface into an elevated tank, which gives a pressure of 57 pounds per square inch at the station when the tank is full, equivalent to a head of over 120 feet. The other wells all around Kimball have quit flowing.

Date of observation, October 13, 1915.

Town of Pukwana, owner.

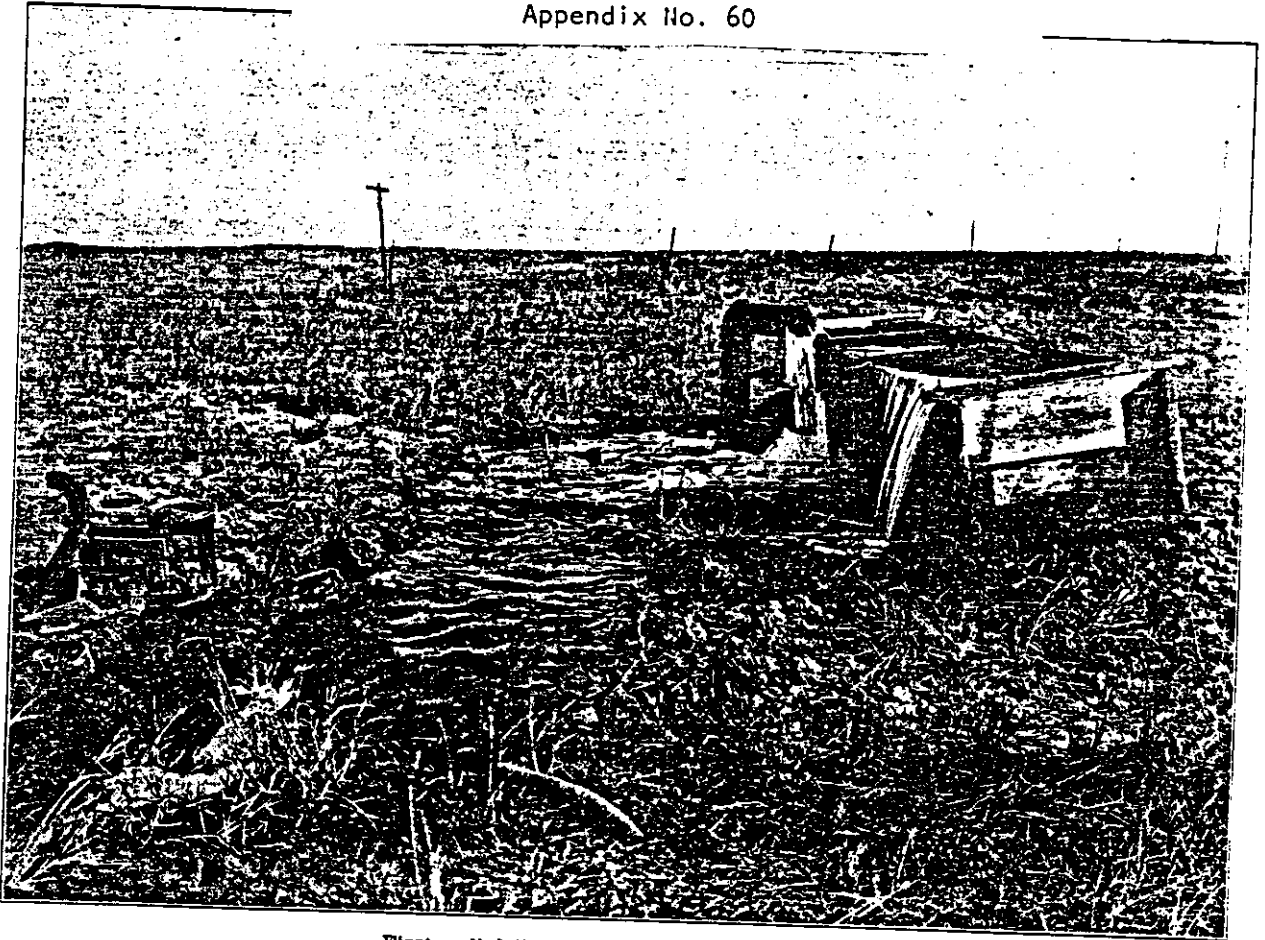
Altitude, 1,543 feet.

There are two town wells, and both are connected with the water mains. The pressure at the hydrants is 51 pounds per square inch. The first well was drilled about 1903, and is finished 2 inches in diameter. The second well is a 4 inch one, and was drilled in 1912. The depth of each is about 800 feet. The water is all used beneficially by the townspeople.

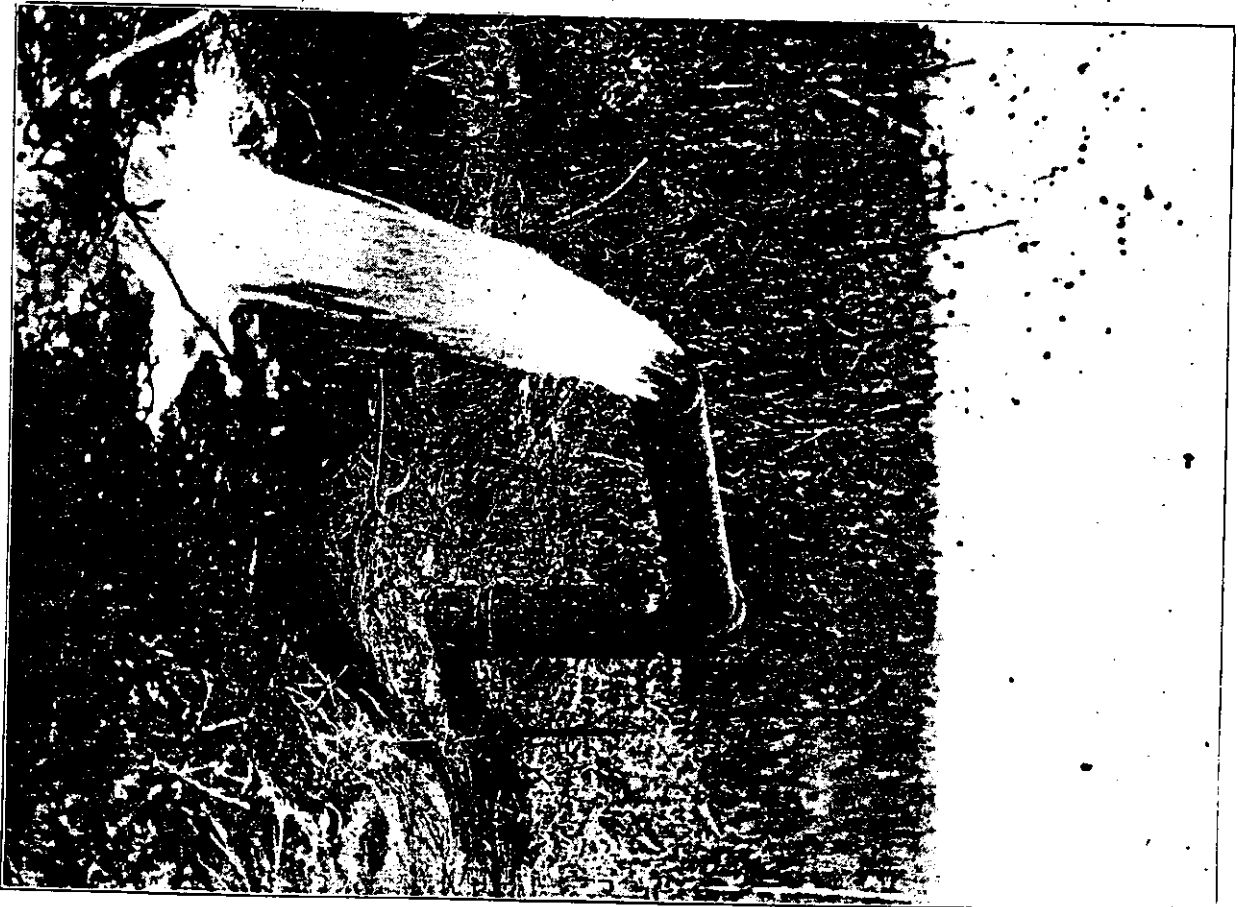
Date of observation, October 13, 1915.

It is next desired to call the reader's attention to the illustrations showing the three artesian wells that feed Red

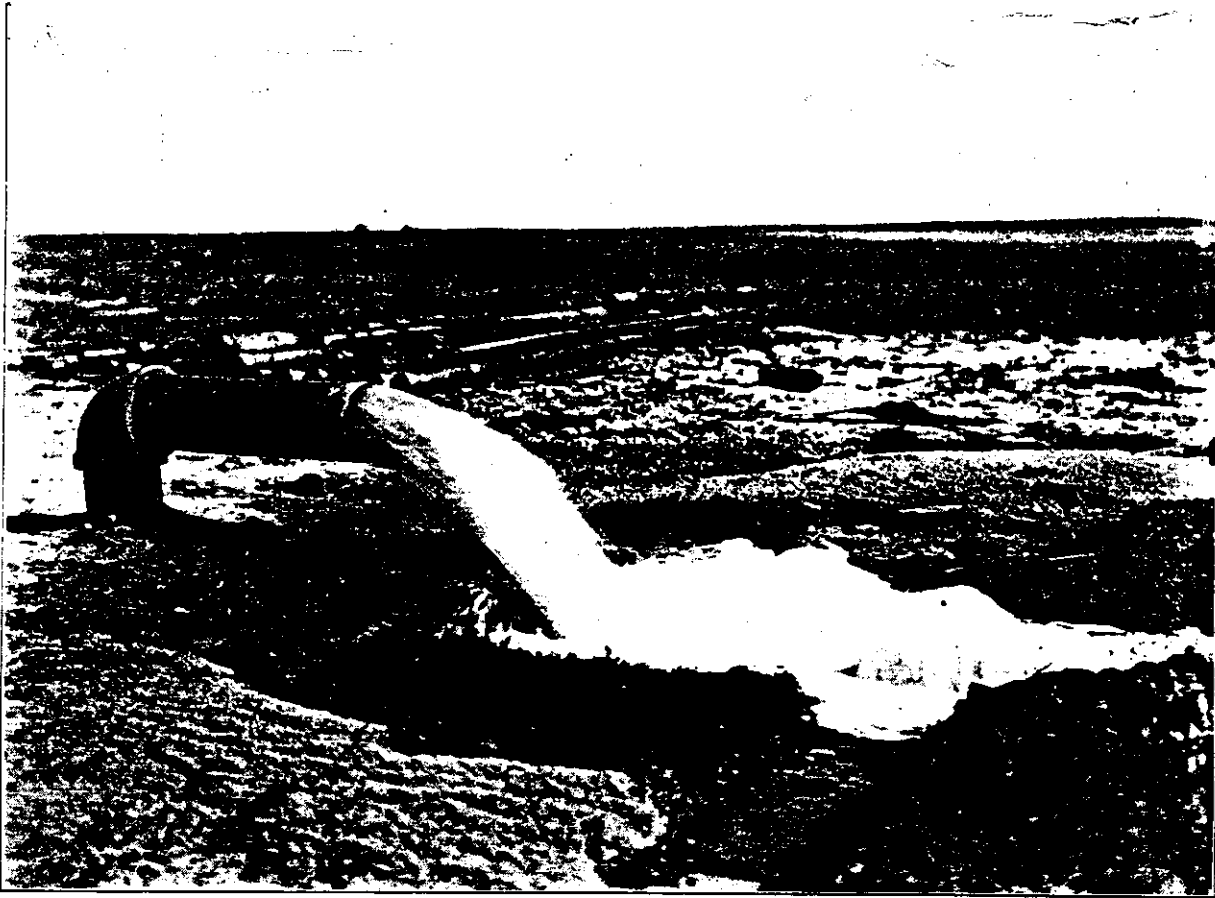
Lake. A glance at these pictures, taken October 13, 1915, is more convincing to the average person than any amount of words wasted. It is to be presumed that the wells have been drilled at these places so that their flows might replenish Red Lake, for certainly they are of no other earthly use, except to help deplete the artesian flow all over the artesian well belt faster than almost any other instance that can be cited. If it was their object to raise Red Lake appreciably, certainly they have failed in that respect, for a stratum of Tertiary sand carries away the surplus water, and the lake would not even be what it is today if it were not for the past few rainy seasons. Be that as it may and figure out the local benefits as high as you like, and then contrast the advantages with the value of the water you are taking from your fellow citizens and stockmen in counties like Sully, for instance, who are already on the ragged edge of the artesian flow, and many others who are fast coming to it. These wells are each 8 inches in diameter, except the second one which has been reduced to 6 inches. The first well was put down to a depth of about 1,400 feet and it was estimated that its flow was about 1,200 gallons per minute. The illustration shows conclusively that it has weakened in flow very much, and it has undoubtedly weakened the flow of all wells reaching that horizon in the Dakota sandstone for miles around. When the second well was sunk to the same depth, its flow was weak and became stronger only when continued to 1,200 feet. The picture at the third well was taken within a month after its completion—you will notice a part of the drillers' outfit still on the premises. The observer was not prepared to get the closed pressure on these large wells for they are running wide open and are not under control with valves; neither was he prepared at the time to measure the discharge of a river, so the exact amount of water being wasted from these wells is not known. A fair estimate, however, would be about 3,500 gallons per minute, or allowing 10 gallons per day per animal, enough water is being wasted at Red Lake alone to supply half a million head of stock. But some will say the formation of the lakes about the country will bring about a change of climate and increased rainfall. This is all balderdash, for it is a matter of scientific observation that dry air must travel over a surface of water for 1,500 miles to become saturated enough to fall in rain, and by that time it will have gotten so far away that it will do South Dakota no good. We are free to admit that the lakes of water are nice to look upon and are really beneficial in many ways to a few in their



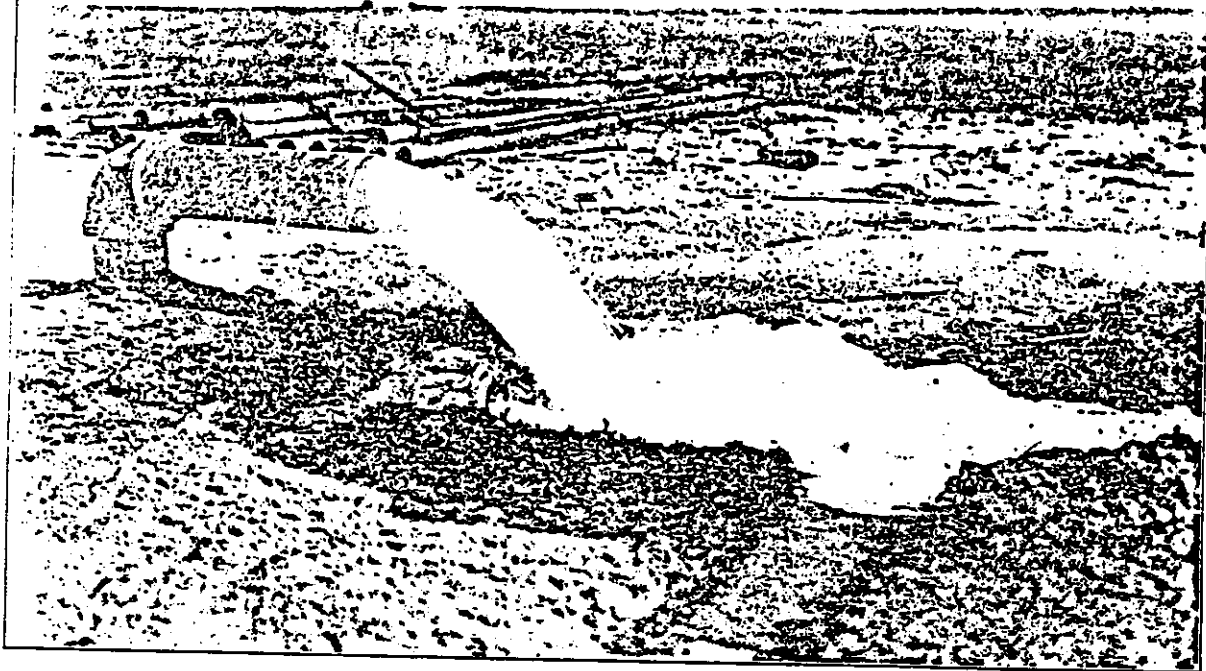
First well drilled at Red Lake, Brule County



Second well drilled at Red Lake, Brule County



Third well drilled at Red Lake, Brule County



Third well drilled at Red Lake, Brule County

immediate vicinity; but the underground waters of South Dakota, like its streams on the surface, belong to all the people, and individuals should not be allowed to waste a great natural resource which if conserved would benefit many people many years to come, but which at the present rate of waste will soon become exhausted.

Illustrations are also given herewith showing the amount of water being wasted into the Missouri River (about 3,000 gallons per minute,) from two 6-inch and one 8-inch well at Chamberlain. Control of these wells has been lost entirely on account of the casing having rusted out at some distance beneath the surface, and a pool about 200 feet in diameter and unknown depth has been formed by the earth caving in and being washed out to the Missouri River. Notice the goodly sized stream formed by the flow from these wells on its way to the Missouri River; the highway bridge which was undermined, the mill which had to be moved back from its foundation which is about to go out of sight, and the cracks in the earth as it is caving into the pool. It is somewhat of a problem to conquer this situation, for it seems that if something is not done to control the wells, eventually much greater damage will result.

Date of observation, October 13, 1915.

Most of the flowing wells of Brule County are in Union and Lyon townships along Smith Creek, and in the southeast part of Pleasant Grove and Torrey Lake townships on comparatively low ground. The two following wells were the only ones examined:

T. E. Thompson, owner.

Sec. 5, T. 105, R. 69.

Well drilled in 1910.

Altitude, 1,617 feet.

Pressure, 24 pounds per square inch.

Flow, 10 gallons per minute; said to have flowed 150 gallons when new.

Date of observation, June 4, 1916.

Mrs. Kitty Lally, owner; J. P. Jones, agent, Denison, Ia.

SE. 1-4 Sec. 15, T. 105, R. 69.

Well finished April, 1916.

Depth, 770 feet.

Size, 2-inch, 1 1-4 inch.

Altitude, 1,663 feet.

Pressure, 53 pounds per square inch.

Flow, 28 gallons per minute.

Beneficial use, water all flowing away to waste.

Date of observation, June 4, 1916.

SOUTH DAKOTA STATE PLANNING BOARD

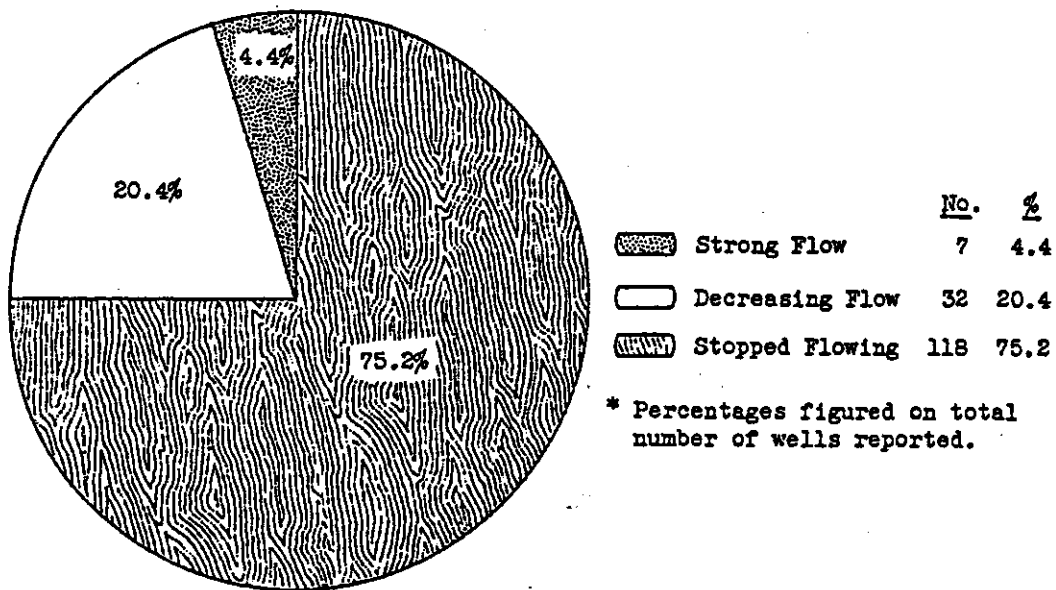
BRULE COUNTY

Brule County is located along the Missouri River in the south central portion of the state. A large part of the county is an elevated plateau or region of gently rolling plains rising three to four hundred feet above the river. The surface for the most part is covered by glacial drift underlain by Cretaceous sediments of which the Dakota sandstone is a member.

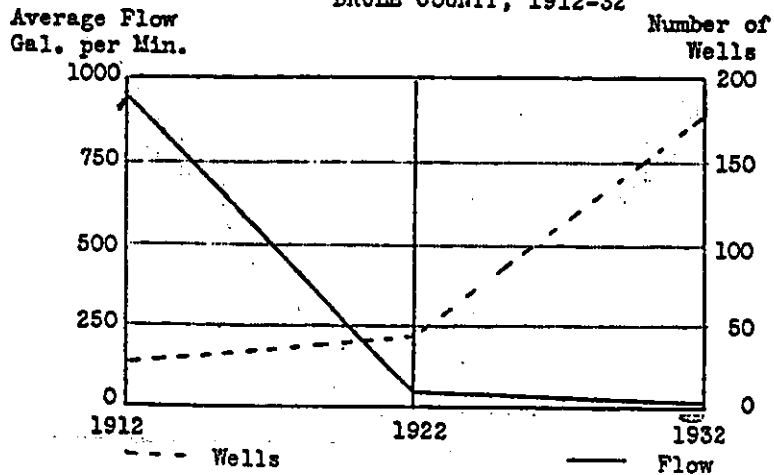
Approximately 157 artesian wells between 600 and 1300 feet in depth have been drilled to the Dakota sandstone and associated formations in this area.

The number of wells has increased more than three times during the period 1912-1932 in this section of the state, but the average flow per well has decreased very markedly.

PERCENTAGE DISTRIBUTION OF CONDITIONS OF FLOW
BRULE COUNTY, 1932 *



TRENDS IN WELLS DRILLED AND AVERAGE FLOW PER WELL
BRULE COUNTY, 1912-32



VOLUME XXXIV.

CHAMBERLAIN, SOUTH DAKOTA, THURSDAY, MAR. 9, 1916.

State Supreme Court in Decision
Holds Regarding First Issue that
Rights of Public are Im-
posed

The heavy rains of last year filled the Aragua and an association was formed in Brule county to keep the lake filled to that level. They secured recognition of the county commissioners and with joint funds several arbutus wells were sunk on the shore of the lake to keep the water supply up to the high level which it had reached from the rainfall. Property owners brought suit for damages, and asking that their rights be protected, such rights claimed under relation, and the damages to their privileges of pasture and hay in the lake bed in dry years. The lower court held against the property owners, and the supreme court has sustained the action of the lower court in that finding. The title of the case at issue being C. L. Anderson et al. vs. Fred Ray, et al.

Hoven.—Dynamite is the name of a sorrel cow pony belonging to Dan Schlect, a prominent young rancher near here, and to prove that he was rightly named, nearly killed his mus-
tee.

Examination showed an ugly gash on the back of Schlett's head requiring several stitches to close, a gash over the right eye and numerous other cuts and bruises, but miraculously nothing of a critical nature.

HOMESTEADER'S WIFE TAKES HER OWN LIFE

From the Mediterranean
arrangement for observ
proportion in Mexico an

**MISSOURI RIVER RISES SEVEN
FEET OVER NIGHT—GORGE
AT VERMILLION HOLDS**

The river this morning was seven feet higher than it was last night, and the situation is the most serious it has been since 1881.

**"BAD MAN" GREGORY, WHO
MADE THREAT TO KILL
JUDGE WILLIAMSON
IS SENT TO
PRISON**

HE'LL STOP HIM THIS TIME BY BAPT.



Merre.—A move looking toward

TAKES THE WORD OF INDIAN NOW

This spring the same Indian predicts that a flood on Bad River this year will be much higher than the one of last year, and Block is taking no chances after one successful prediction, but is hiking his buildings all to a hill where the water can't reach them unless the valley fills up.

FINDS DIAMOND IN HER SHOES

Miss Irene Matland, a student at Mechanics Institute, Rochester, N. Y., whose home is in Geneva, while walking on Main street at Rochester Friday felt what she thought was a pebble hurting her foot through the rubber. She tried to shake it off, but could not, as it was imbedded in

ISTEMILAN CANAL **EST**

Gen. Goethals has named Appropriations Committee \$300,000 for work because the Panama Canal is ruin and, additionally, \$25,000 for fertilization. He also proposes the erection of a prefecture to the zone to insure, during times of war, the uninterrupted resumption of traffic through it. He said that this is depending on shipping of the waterway, the quantity would amount to about 100 cubic yards. The zone is and the dredges are used to channel at a rate of 7,000 a month. There is political in this state of affairs the present inability of ships to move quickly, because two causes can be mentioned: possibility of danger in transit are a timely object of study. They were much in the mind when the canal was proposed, and seemed a long way off, but, indeed, that the danger dreamed it could be a fact by the year 1917. The survey of construction the country; engineering management; financial management by the state; it is one of the history of the world. No other country have built it without at least the existing interest charge. It is an enormous endeavor. The Senate had recently by which, for a number

PASSENGER TRAIN MAROONED FOR TWO DAYS NEAR RELIANCE WITH FLOODS RAGING ON BOTH SIDES

CLONDBURST SWEEPS AWAY
BRIDGES, RAILWAY TRACK,
HOUSES, BARNS AND LIVE
STOCK.

NO LIVES LOST SO FAR
AS KNOWN TODAY

Passengers on Train Numbered
About Sixty-Five—Lived on Pro-
visions Taken from Express Car
Until Relief Came Yesterday.

A regular clondburst was experi-
enced in the vicinity of Reliance
Tuesday morning. It is variously
reported that a rainfall of from eight
to nine inches was recorded within
an hour. The result was that the
whole country was covered with wa-
ter and every creek became a raging
torrent.

The passenger train west from
Chamberlain was late that morning,
and left here about 10 o'clock. Upon
leaving Oacoma, the passenger train
was followed not far behind by a
freight. Both trains got over
American creek, but when the pas-
senger reached King's dam this side
of Reliance, the track was washed
out. A back-up signal was given to
the freight, and both trains under-
took to return to Oacoma. The
freight succeeded in recrossing the
bridge over American creek, but be-
fore the passenger train reached it
a bank of water variously estimated
at from four to eight feet high came
down from the north, carrying with
it houses, barns and everything in
its path. A barn that was in the tor-
rent struck the bridge and it was
swept away instantly. Thus the
passenger train was cut off from
returning. The waters continued to
rise and the flood continued all day
Tuesday.

About sixty-five people were on
the passenger train, including the
crew. They were literally "ship-
wrecked on the prairie." The terri-
tory around them was devastated by
the flood, but there was no immedi-
ate danger. The train crew and the
men on board turned their attention

to saving the lives of persons resid-
ing in the territory of the flood, who
were being carried away with the
waters. It is reported that one
family of four were thus rescued.

Conductor Craig Wilson was in
charge of the train and he walked
two and a half miles to reach a farm
house that was still intact. He suc-
ceeded in phoning to Reliance and
reported conditions. His passengers
were safe from the flood, but there
were no provisions aside from what
might be found in the express car.
It so happened that there was a gen-
erous supply of provisions in trans-
it, and these were appropriated by
the passengers. Sometime yester-
day afternoon it was possible to
reach the stranded train from the
west and the passengers were trans-
ferred by various methods to Re-
liance, and thence to Kennebec.

Every railroad bridge between
Oacoma and Reliance is washed out,
together with more than 1500 feet
of track. Wagon bridges are also
gone and roads were absolutely im-
passable, hence the seriousness of
the situation may be realized.

The extent of the damage from the
flood is not known, but from the
length of time the flood lasted it
must have covered a large area. It
was probably a part of the same
storm that struck Wessington
Springs and did thousands of dollars
of in damage there. All of the coun-
try southwest from the Springs to
Reliance was visited by torrential
rains. The damage to crops and
buildings and the loss of live stock
will be enormous. It is said that
horses, cattle, pigs and chickens were
seen going down American creek to
the Missouri river, and of course
most of the stock was drowned.

It is not believed that any persons
lost their lives in the flood, at any
rate not authentic reports have been
received.

The Milwaukee railway has four
work trains and about 200 men at
work today repairing the bridges and
track, it is believed that traffic will
be resumed by Monday or Tuesday.

It was without doubt one of the
worst floods that ever visited this
section of South Dakota.

HARDING OF OHIO
C O P NOMINEE

not what was considered an active
candidate.

Harding is a United States sena-
tor from Ohio and is serving his
first term. He belongs to what is
known as the "standpat" wing of the

100 copies of this document were printed by the Department of Water and Natural Resources at a cost of \$1.73 per document.



WATER MANAGEMENT BOARD MEETING
October 3, 4 & 5, 1990

Place: Community Room, Brule County Courthouse, 300 S Courtland,
Chamberlain SD - Scheduled Hearing times are Estimates and May be
Delayed Due to Prior Agenda Items

October 3, 1990

- 8:30 am Call to Order
Approval of July 25 & 26 and September 6, 1990 Board Minutes
Set November 13, 1990 Special Meeting (Rapid City suggested)
Set January 3, 1991 Special Meeting (Mitchell suggested)
Set February 27 & 28, 1991 Meeting (Pierre suggested)
Status and Review of Water Right Litigation -- John Guhin
Administer Oath to Department of Water and Natural Resources
Staff
- Request to Advertise Proposed Stream Fence Crossing Rules -- Ron
Duvall
- Request to Advertise Stockwatering Rules -- Ron Duvall
- 8:45 am Consider Review of Future Use Permit No. 1833-2, Weston Heights
Home Owners Association -- Eric Gronlund
- 9:00 am Update on Breaching of Picton Dam, Denied Water Permit
Application No. 5410-3, Ronnie Kienow -- Gale Selken
- 9:15 am Consider Petition for Declaratory Ruling Regarding Legal Status of
Water Permit No. 4187-3, Wesley Toews -- Eric Gronlund
- 9:30 am Consider Well Drillers License, Leonard Albrecht -- Ken Buhler
- 9:45 am Break
- 10:00 am Introduction of DWNR staff, Board and Legislative Oversight
Committee
- Consider New Permit Applications and Vested Water Right Claims --
Eric Gronlund
- Consider Deferred Water Permit Application No. 1252-1, Leo
Weyrich -- Eric Gronlund
- Cancellation Considerations -- Eric Gronlund
- 10:30 am Consider Water Permit Application No. 2132-2, Brett Heath & Joy
Heath - Automatic Delay from July 25, 1990 -- Mark Rath
- 10:45 am Request for Water Quality Variance -- Joan Bortnem
- Lower French Creek Fish Improvement Project - U.S. Forest
Service
- Rotenone to the Fods Game Production Area, Madison - G,F&P
- Rotenone to Lake Herman State Park Pond - G,F&P

(continued)

12:00 Lunch

1:00 pm Consider Finding of Fact, Conclusions of Law and Final Decision
1) Approval of Water Permit Application No. 5456-3, Ulmer
Brothers
2) Approval of Water Permit Application No. 5447-3, J.Wm. Ulmer
3) Approval of Water Permit Application No. 5426-3, Kingbrook
RWS
4) Denial of Water Permit Application No. 5410-3, Ronnie Kienow
1:30 pm Consider Proposed Rules Chapter 74:08:01, Environmental Financial
Assurance Rules -- Steve Pirner

Recess

October 4, 1990

Reconvene

8:30 am Consider Ordinary High Water Mark, Ordinary Low Water Mark, and
Outlet Elevation for Red Lake, Brule County -- David Brown

Continue October 5, 1990 (if necessary)

Adjourn

Services, Inc., 210 W 9th St. Sioux Falls SD 57102 telephone number: (605) 336-1052.

The hearing was also tape recorded and a duplicate set of tapes may be obtained by contacting the Water Rights Division, Department of Water & Natural Resources, 523 E Capitol, Joe Foss Building, Pierre SD 57501-3181 telephone number: (605) 773-3352.

Meeting recessed at 4:00 pm.

Meeting reconvened at on October 4, 1990 at 8:30.

Ordinary High Water Mark, Ordinary Low Water Mark and Outlet Elevation for Red Lake, Brule County

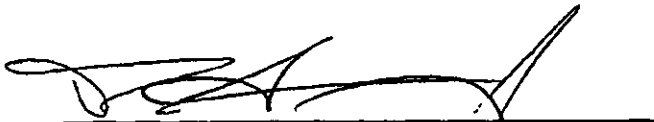
See the Court Reporter transcript for hearing testimony.

Following the hearing, the Board passed the following motion.

Mr. Brink MOVED, SECONDED by Mrs. Loucks that the Ordinary High Water Mark for Red Lake, Brule County be established at an elevation of 1556 feet mean sea level (fmsl). MOTION CARRIED with Mrs. Gunderson voting NO.

Mr. Brink MOVED, SECONDED by Mr. Rollag that the Ordinary Low Water Mark for Red Lake, Brule County be established at an elevation of 1553.4 fmsl and that the outlet elevation for Red Lake, Brule County be established at 1575.0 fmsl. MOTION CARRIED.

Meeting adjourned at 4:30 pm.


Rodney Freeman, Chairman
Bernita Loucks, Secretary



DENR
SOUTH DAKOTA

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

Memo to File

Red Lake in Brule County

VWR No. 773-3

The OHWM was set by the Water Management Board on October 4, 1990.

OHWM elevation 1556.0 fmsl NGVD29

The outlet elevation was set by the Water Management Board on October 4, 1990.

Outlet elevation 1575.0 fmsl NGVD29

The OLWM was set by the Water Management Board on October 4, 1990.

OLWM elevation 1553.4 fmsl NGVD29