

No. 1471-3
 Water Division No. 3 BIG SIOUX RIVER District STATE WATER RESOURCES COM.
 (Blanks to be filled by the Engineer for the W. & C.)

TESTED 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

- 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) 2

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

2. Name of diversion work LAKE KETCHUM - Deuel County
 As required to fill lake to outlet level - approximately 240
 3. Amount of water claimed at feet per second cubic feet per second
 4. Source of water supply Dry draw
 5. Location of point of diversion NW 1/4 SEC 2, T115N, R49W
no visible sign on Deuel 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.) To the ordinary high water mark
of the inundated portion of Sec. 2, T 115, R 49 and Sec. 35, T 116, R 49.

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. Lake Ketchem is a meandered lake. Maximum depth is approximately 9 feet

(a) Dam: Height ----- feet; length at bottom ----- feet; length at top

----- feet; thickness at bottom ----- feet; thickness at top

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

material used in construction -----

(b) Reservoir: Capacity when filled ----- 288 ----- acre feet. Surface area at highwater mark ----- 80 ----- acres.

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

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

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

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

(Give dimensions where reductions in size are made.)

10. Time required for completion of work ----- years.

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

12. Choice of newspaper for publication of notice of intention to appropriate -----

STATE OF SOUTH DAKOTA

County of -----

Hughes

ss.

I, R. A. Hodgins, 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

R. A. HodginsSubscribed and sworn to before me this 8th day of December, 1967.H. E. Bowers
Notary Public (or other qualified officer.)

*Each diversion must have a headgate or measuring device.

H. E. Bowers, Notary Public
My Comm. -----

Remarks by State Water Resources Commission:

"VESTED RIGHT" CLAIMED

STATE OF SOUTH DAKOTA
County of HUGHES } ss.

Pierre, South Dakota, FEBRUARY 7, 1968

This is to certify that the foregoing application was received by the Commission at 10:30 o'clock
a.m. upon the 11TH day of DECEMBER, 1967

State Water Resources Commission

By:

Burton Jones
for Chief Engineer, Executive Officer

Number of permit 1471-3

Date of first receipt of application DECEMBER 11, 1967

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, 1968

Approved JANUARY 10, 1968 Recorded in Book 10 Page 77

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 240 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 irrigation of the land but hereby provided that said appropriation must be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually~~ USED FOR PUBLIC RECREATION WAS

and beneficially ~~used for irrigation~~ on or before JUNE 30, 1965; said water to be used during the following described annual period:

CONTINUOUSLY

Witness my hand this 7TH day of FEBRUARY, 1968

State Water Resources Commission

By:

W. J. Rinner
Chief Engineer, Executive Officer

Certificate of Construction Issued FEBRUARY 7, 1968

Water License issued FEBRUARY 7, 1968

Permit No. 1471-3Water Division No. 3 BIG SIOUX Water District
RIVER**Certificate of Completion of Works**

TO ALL WHOM IT MAY CONCERN:

This is to Certify, That the Department of Game, Fish and Parksof Pierre, County of Hughes, and State of
South Dakota, the holder Vested Rightof Permit No. 1471-3, issued upon Application
No. 1471-3, bearing date of priority of 1889, authorizing the diversion of
240 acre feet annually of the waters of dry drawsCounty of Deuel, State of South Dakota, at a point in the
NW 1/4 NE 1/4, Section 2, T115N, R49Wfor public recreationpurposes, has fully complied with the provisions of the laws of the State of South Dakota relating to proof of
completion of the works of diversion set out and described in said Permit; that said works are recognized as
condition for diverting and conveying to the place of intended use 240 acre feet annuallyof water; and that the lands proposed to be irrigated by the use of said water are described as follows,
to-wit: to be used in place for public recreationWitness my hand this 7th day of February A. D. 1968

State Water Resources Commission

By:

J.W. GRIMES
Chief Engineer, Executive Officer

STATE OF SOUTH DAKOTA

WATER LICENSE No. 1471-3.

WHEREAS, On the 11th day of December A. D. 1967
 the Department of Game, Fish and Parks

of Pierre County of Hughes and State of
South Dakota duly made application (No. 1471-3) to us for a Vested Right
Annually permit to use 240 acre feet
~~240 acre feet annually~~ of the waters of dry draws
 County of Deuel State of South Dakota, for public recreation
 purposes; and

WHEREAS, On the 7th day of February A. D. 1968
Vested Right Permit No. 1471-3 was issued to said applicant... for the diversion of said water, and recognizing
 the completion of the works of diversion therein described on or before the day of
February 10, 1968 and for the application to beneficial use of said
 water on or before the day of
 and,

WHEREAS, On the 11th day of December A. D. 1967
 the holder... of said permit duly made proof of the completion of adequate works for the diversion of
240 acre feet annually
~~240 acre feet annually~~ of said waters, as evidenced by our Certificate No. 1471-3
 dated February 7, 1968 confirming the completion of works of sufficient capacity for
240 acre feet annually
 diverting and conveying to the place of intended use ~~240 acre feet annually~~ of water, with date of
 priority of 1889 and,

WHEREAS, On the 11th day of December A. D. 1967
 proof was duly made of the application to beneficial use of 240 acre feet annually
~~240 acre feet annually~~ of said water;
to be used in place for public recreation purposes

NOW, THEREFORE, By the virtue of the authority vested in us by the laws of the State of South Dakota,
We hereby grant and confirm to the Department of Game, Fish and Parks
of Pierre the holder and owner of said vested Right permit No. 1471-3
a water right, dating from 1889- to the use of 240 acre feet
annually of the waters of dry draws
in the County of Daual and State of South Dakota, or so much thereof as may be
necessary for the purposes hereinafter mentioned, to be diverted at a point in the NW 1/4 NE 1/4,
Section 2, T115N, R69W
and ~~conveyed~~ stored in place

for the purpose of public recreation subject to any limitations listed
in the Permit to Appropriate Water, and

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

WITNESS, My hand and seal of our office at Pierre, South Dakota,
this 7th day of February A. D. Nineteen
Hundred and Sixty-eight

State Water Resources Commission

By:

J. W. GRINES
Chief Engineer, Executive Officer

STATE OF SOUTH DAKOTA

Water License No. _____

To _____

Source of Supply _____

County _____

Am't _____ c. f. s.

Point of Diversion _____

Place of Use _____

Purpose _____

Date of Priority _____

Recorded _____

In Book _____ of _____ Page _____

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. Dry draw - no visible sign

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 9 feet - 80 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 240 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 meandered lake - used by the public for uses specified except for that
amount lost by evaporation and seepage

(Sign)

RA Hodajins

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 8th day of December A. D. 1967.

Witnesses.

H. E. Bowers, Notary Public

My Commission Expires

July 25th, 1968

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 _____

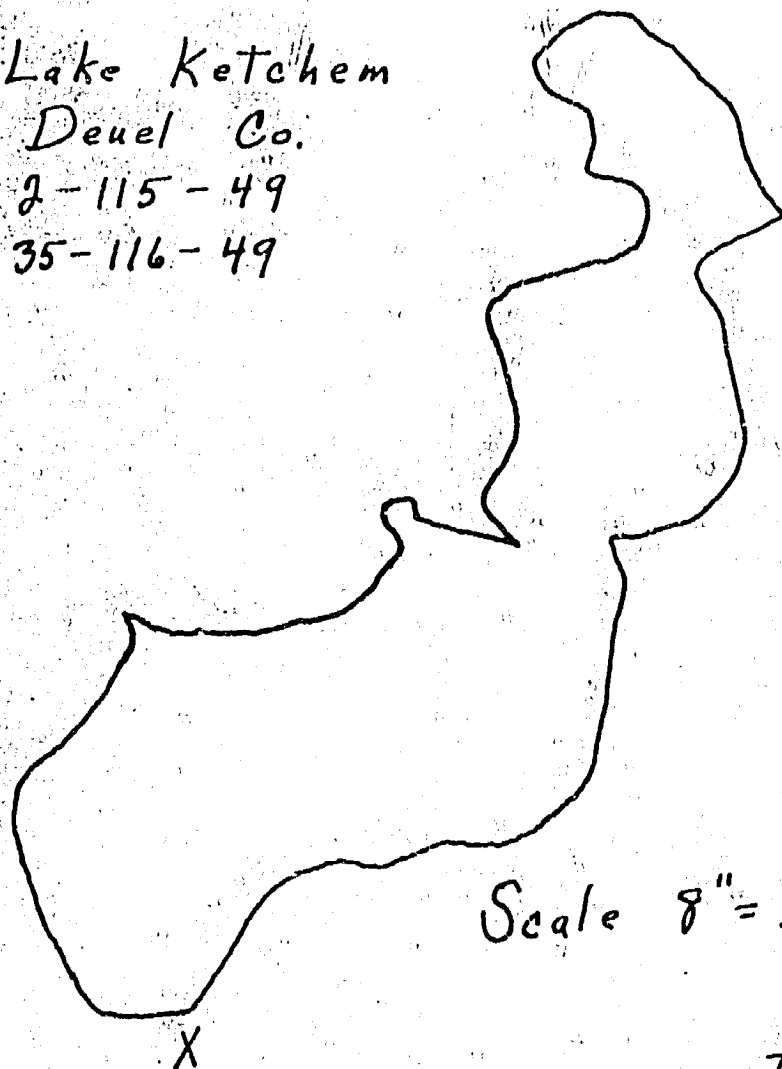
Received and filed _____

Lake Ketchum

Deuel Co.

2-115-49

35-116-49



35	36
2	1

Scale 8" = 1 mile

John Popowski
Feb. 2, 1959

1471-3

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

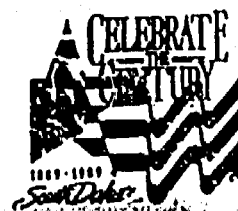
Dear Mr. Beringson:

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

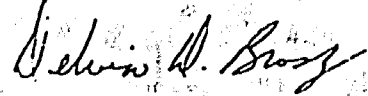
Richard Beringson, Secretary

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,

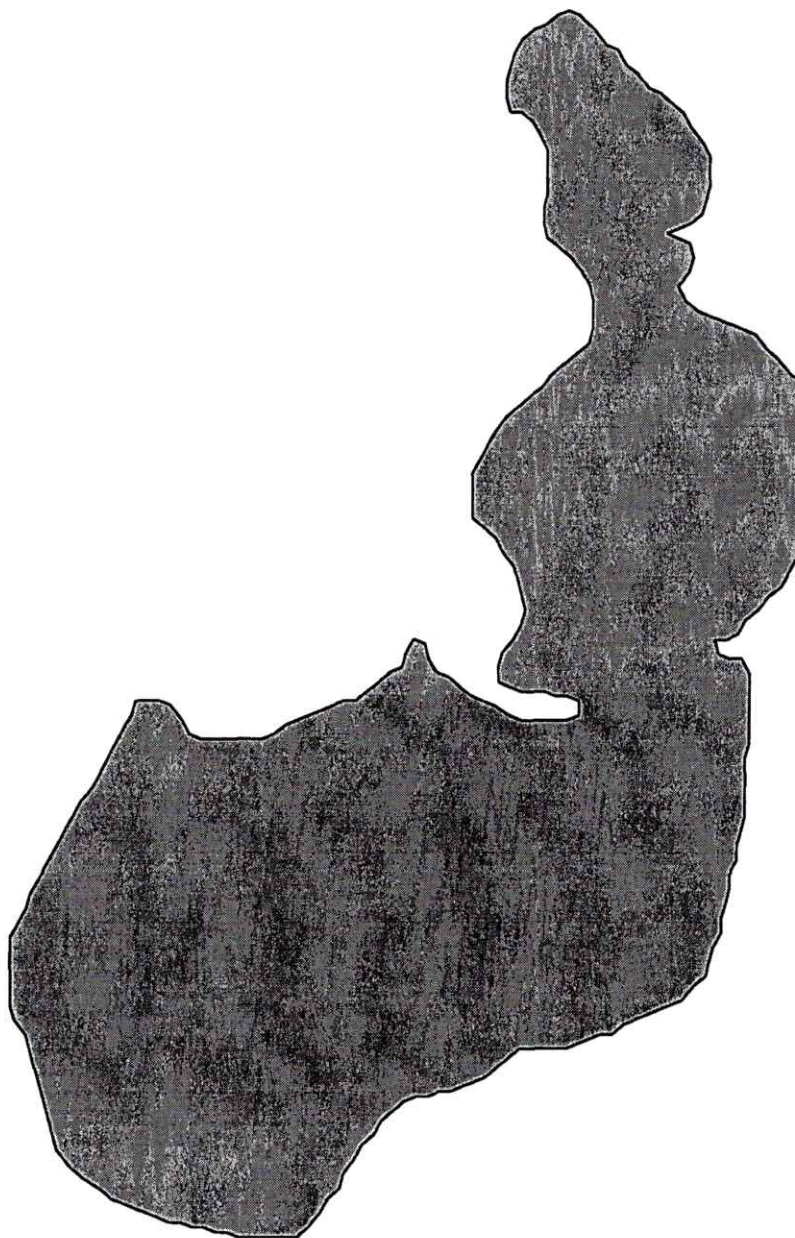


for JOHN HATCH, Chief Engineer
Water Rights Division
605 773-3352

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

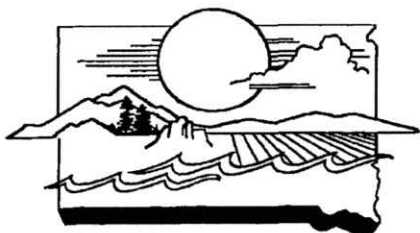
KETCHUM LAKE - DEUEL COUNTY

ORDINARY HIGH WATER MARK
AND OUTLET ELEVATION



WATER RIGHTS PROGRAM

March 18, 1996



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

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ABSTRACT

John M Corothers, RR 2, Box 1, Clear Lake, South Dakota 57226, and twenty seven electors of the state (Appendix No. 9), have requested the Water Management Board to establish the Ordinary High Water Mark (OHWM) and outlet elevation for Ketchum Lake in Deuel County.

In response to the request and pursuant to SDCL 43-17-1, 43-17-21, 43-17-24 and 43-17-28, an investigation was conducted by the South Dakota Department of Environment and Natural Resources, Water Rights Program acting on behalf of the Water Management Board.

This report contains the results of the field investigation conducted October 17 through 19, 1995.

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

Based on the finding in this report, the recommended elevations for the Ketchum Lake OHWM and outlet are 1829.5 and 1828.6 feet above mean sea level respectively.

INTRODUCTION

On February 10, 1993, the Water Rights Program received a written request for the establishment of an Ordinary High Water Mark and outlet elevation for Ketchum Lake from John M Corothers and twenty seven electors of the state. Based upon their request, an investigation was conducted to determine elevations to be recommended for the Ordinary High Water Mark (OHWM) and outlet.

OHWM is defined by SDCL 43-17-20(2), which states:

“Ordinary high water mark,” the term as defined in decisions rendered by the courts of this state.

An OHWM is established by the processes of nature. The Water Management Board's (Board) setting thereof is merely a formal recognition of the mark established by nature.

An Ordinary Low Water Mark (OLWM) was not established for Ketchum Lake. The high water conditions at Ketchum Lake hid the evidence for an OLWM from view.

State law (SDCL 43-17-2) provides that all navigable rivers and lakes are public highways within 50 feet landward from the water's 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.

South Dakota Codified Law (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 Board to be the equivalent of natural conditions.

When requested to do so, the 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).

"Ordinary" 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, is a line that meanders and is not at a constant topographic elevation (Appendix No. 2). An OHWM is at a constant topographic elevation. Hence, a meander line is not and cannot be associated with an OHWM. A meander line survey is established by man for surveying and mapping purposes and is not a property line. OHWM's are established by nature and defined by man.

In the case of *Flisrand v. 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 Ketchum Lake in 1872.

GENERAL INFORMATION

Ketchum Lake is located in central Deuel County 3 miles north of the city of Clear Lake. Ketchum Lake is located in Section 2, T115N, R49W and Section 35, T116N, R49W. The present outlet elevation is 1829.51 feet above mean sea level (fmsl) and is located on the southeastern part of the lake in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 2, T115N, R49W (see Appendix No. 1).

All elevations in this report are referenced to a United States Department of Commerce, Environmental Sciences Services Administration, Coast and Geodetic Survey benchmark with a 1934 sea-level datum described as follows:

The benchmark is located about 2.1 miles north along U.S. Highway 77 from the Chicago, Rock Island & Pacific Railway station at Clear Lake, Deuel County, at a 10 foot concrete culvert, in the northwest concrete wing wall, and about level with the highway. A standard disk at elevation 1806.821 feet above mean sea level, stamped "C 56 1934".

Temporary benchmarks were established by the Water Rights Program along the perimeter of Ketchum Lake. The locations and elevations of the temporary benchmarks are available from the Water Rights Program upon request.

WATER RIGHTS

Vested Water Right Claim No. 1471-3 held by the South Dakota Department of Game, Fish and Parks (SD GF&P) is the only existing claim on file for water in Ketchum Lake (Water Right files, 1996). However domestic uses (i.e. livestock watering, dams, dugouts, etc.) are present within the Ketchum Lake drainage basin.

Vested Water Right Claim No. 1471-3 claims an 1889 priority date, and approximately 240 acre-feet of water per year to fill Ketchum Lake for public recreational purposes. The location of the point of diversion is in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 2, T115N, R49W.

1471-3

Vested Rights Claim No. ~~1840-3~~ indicates a reservoir capacity (lake storage) when filled of 240 acre-feet and a surface area of 80 acres at a maximum depth of 9 feet. The lake storage and surface area at full water level were estimated by the SD GF&P on November 13, 1969. The estimate was only an estimate and may not be the actual lake storage or surface area at the OHWM. There are 85 acres below the 1872 meander line survey.

A correction will need to be made to Vested Claim No. 1471-3 before the claim can be validated. The claim will need to be amended to correct the amount of water claimed from 240 acre-feet annually to "sufficient water to fill Ketchum Lake to the outlet elevation".

GEOLOGY AND HYDROLOGY

Ketchum Lake is underlain by approximately 700 feet of glacial drift (Beissel and Gilbertson, 1987). Within the glacial drift are lenticular bodies of outwash known as the Prairie Coteau Aquifer. These bodies of outwash are enclosed within the till and may not be hydraulically connected (Kume, 1985). The layer of till under Ketchum Lake would make it difficult for water to move between the lake and the Prairie Coteau Aquifer. Water in the Prairie Coteau Aquifer is under artesian conditions. The static water level is approximately 148 feet below the land surface in properly constructed wells. (Kume, 1985)

The Altamont Aquifer lies directly on or very close to the bedrock surface. The thickness of this aquifer is only 10 to 20 feet in the Ketchum Lake area (Kume, 1985). There is little chance of a hydraulic connection between Ketchum Lake and the Altamont Aquifer. Water in the Altamont Aquifer is under artesian conditions. The static water level is approximately 146 feet below the land surface in properly constructed wells. (Kume, 1985)

Some discharge to Ketchum Lake may occur from the surrounding till. Evidence of a spring was found at the northeast end of the lake. The formation of springs at Ketchum Lake may be due to the saturated condition of the surrounding till. The saturated conditions have been brought on by more than normal precipitation over the last few years. Ketchum Lake discharges to Lake Sutton, see Appendix No. 2. Water from Lake

Sutton travels to Clear Lake which discharges to Hidewood Creek and ultimately to the Big Sioux River.

MEASURED WATER LEVELS

Available measured water level measurements of Ketchum Lake are shown in Appendix No. 4. The water level measurements were taken by the Water Rights Program.

However, historical water levels can be inferred from the existence of boulder lines. Boulder lines at Ketchum Lake have formed as a result of ice and wave action modifying the lake bank. Although it is not possible to put a genesis date on the boulder lines, they are indicative of historic water levels occurring at or near the boulder line elevations. The base of boulder lines are found at Ketchum Lake at the following elevations (fmsl): 1825.8, 1826.4, 1827.5, 1828.2, 1828.6 and 1829.0. The top of boulder lines are found at the following elevations (fmsl): 1829.2, 1829.5, 1829.8, 1830.1 and 1830.5. See Appendix No. 5.

CLIMATOLOGICAL DATA

Climatological data for Ketchum Lake is included in this report as Appendix No. 7. The Climatological data is discussed in detail under the heading of RUNOFF FACTORS in this report.

RUNOFF FACTORS

Beginning soil moisture conditions refer to the degree that a soil is saturated with water. During a "dry" year(s), the soil moisture becomes depleted due to plant use, evaporation, and natural drainage. Runoff Volume from a rainfall event during depleted soil moisture conditions would be reduced due to the rain soaking 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 particular rainfall event.

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

The potential for the largest runoff volumes for any drainage basin (Ketchum Lake or any other lake) are generated when saturated soil moisture conditions are present going into the winter. The ground then freezes nearly solid and becomes impermeable due to winter

temperatures below 32 degrees Fahrenheit. Snow accumulations coupled with cold winter temperatures set the scene for a major runoff event the following spring.

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 snow melt-water arrives at terminal locations such as depressions, dams and lakes or discharge to streams.

As previously shown, yearly runoff entering Ketchum Lake is dictated by a complicated set of circumstances that include general climatic factors, soil moisture conditions, and snow melt.

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 Board to be the equivalent of natural conditions (SDCL 43-17-23).

There appears to be only one manmade influence at Ketchum Lake and as on many other lakes the influence is in the outlet area. Area residents reported that a beaver dam once existed in front of the outlet and high water conditions washed in out. Apparently rock was placed in the outlet to stabilize erosion. However, no one had seen rock being placed in the outlet. Area residents believe water may have eroded the dirt and left the rocks in place.

Upon investigation the rock appears to have been placed, see Photo No. 3. There is no evidence of erosion leaving the same type of rocks in the channel next to the outlet. The rocks are of varying sizes from 1.5 feet to three inches. The top of the rocks occur at 1829.51 fmsl and the toe elevation is 1827.64 fmsl. Due to the erosion and placement of the rock, the original outlet elevation could not be determined.

The above man-made influences have apparently had an affect on the OHWM but have been in place for such a time they probably constitute natural conditions.

FIELD INVESTIGATION

BENCH MARK ESTABLISHMENT AND COLLECTION OF FIELD DATA

Temporary bench marks were established around Ketchum Lake. The locations and elevations for the temporary bench marks are available from the Water Rights Program upon request.

Field data for Ketchum Lake was collected on the following dates: October 17, 18 and 19, 1995. The field information contained in this report is from natural outcrops along the perimeter of Ketchum Lake. The data collected can be found in Appendix No. 5.

ORDINARY HIGH WATER MARK EVIDENCE

Distinct physical evidence used in identifying the OHWM 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; Red Lake, Brule County Ordinary High Water Mark and Ordinary Low Water Mark, and Outlet Elevation Investigation Report).

Erosion

Distinct erosional features around Ketchum Lake are summarized in Appendix No. 5.

Consistent erosional features at Ketchum Lake consist of cutbanks, washed root systems, and changes in slope. These features are found at the following elevations: 1827.4 to 1828.5 fmsl, 1828.9 to 1829.5 fmsl, and 1829.9 to 1831.2 fmsl. The erosion elevations at or near 1829 fmsl are consistent with water levels measured since May 12, 1993.

Changes in the character of the soil

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 (sand, 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 and peat materials deposited in the deepest portions of the lake. Historical lake levels can be inferred by locating areas showing remnant soil stratification.

Lake water levels limited the amount of visible soil changes. The few soil characteristics observed were found at elevations of 1828.5 to 1828.9 fmsl for top of cobble stones, and 1828.9 to 1829.5 fmsl for the top of sandy beach and beginning of top soil. Distinct surficial changes in the character of the soil at Ketchum Lake can be found in Appendix No. 5.

Boulder Lines

In the spring lake shores 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/boulder lines can be composed of foreshore and backshore materials. There are boulder lines present around Ketchum Lake. The boulder lines present are related to ice action and wave erosion acting upon the lake bank. The boulder lines are found at the base of steeply sloping hillsides as residuum.

Boulder lines are summarized in Appendix No. 5. Base elevations of boulder lines range from 1825.8 to 1826.7 fmsl, 1827.3 to 1827.6 fmsl and 1828.0 to 1829.0 fmsl.

Terrestrial Vegetation

The tree population observations in this report are limited to easily recognizable characteristics such as species, diameter and elevation. The tree population around Ketchum Lake is predominately elm with cottonwood and willow being of secondary occurrence. Growth of terrestrial vegetation around Ketchum Lake is summarized in Appendix No. 5.

Certain species of trees are able to survive periods of flooding better than others. Elm trees are the predominant tree on Ketchum Lake's shore. Elm trees are considered intermediately tolerant to flooding. this means an elm tree with good vigor can survive occasional inundation between 20 and 30 percent of the growing season. (Hightshoe, 1988)

The ability for certain trees to survive occasional flooding may be due to the formation of lateral roots at or just above the waterline (Gill). Photo Nos. 5 and 12 show lateral roots washed by wave action. the base of these washed root systems occur at 1829.5 in Photo No. 5 and 1829.0 in Photo No. 12. The top of the washed root systems occur at 1831.0 in Photo No. 5 and 1830.9 in Photo No. 12.

Destruction of terrestrial vegetation (i.e. trees) has occurred at Ketchum Lake. Water inundation has destroyed elm and cottonwood trees on shore at elevation 1828.0 to 1828.9 fmsl. Using trees on Ketchum Lake without other OHWM evidence would suggest that the OHWM elevation lies between the elevation of predominant destruction of terrestrial vegetation and the top of the washed root systems.

Elm trees measured at Ketchum Lake range in diameter from one to two feet and have grown between the elevations of 1828.19 and 1829.6. Two live cottonwood trees three feet and six feet in diameter were found at elevation 1830.1 and 1830.4 fmsl. The lowest terminal elevation for live trees at Ketchum Lake is at 1828.2 fmsl.

Consistent elevations for various tree classes (diameters) at Ketchum Lake were determined from the field data collected. There are three zones of tree growth. The three zones are between elevations of 1828.0 and 1828.7 fmsl for one to two foot diameter

trees, 1828.9 to 1829.6 fmsl, and at 1830.1 to 1830.4 fmsl where two live cottonwood trees, three and six feet in diameter were found.

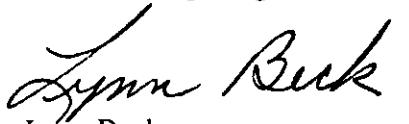
OUTLET

The outlet for Ketchum Lake is located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 2, T115N, R49W. The existing outlet is filled with rocks of varying size, see Photo No. 3. The elevation at the top of the rocks is 1829.51 fmsl. At the time of the field investigation water was trickling through the rocks at an elevation of 1828.7 fmsl.

As stated under manmade influences it appears as though rocks were placed in the outlet to control erosion. Due to the erosion and rock fill, the original outlet elevation could not be determined.

CONCLUSIONS

1. The term "Ordinary" for any given lake, as defined by established OHWM's can be synonymous with average, normal and yearly. "Ordinary" can also take into consideration periodic fluctuating water levels based upon prevailing climatic conditions and watershed characteristics.
2. A meander line is not at a constant elevation and is not considered in determining the OHWM for any given lake.
3. Historical water levels indicate that Ketchum Lake has experienced 6 feet of fluctuation since May 1, 1984.
4. Man made influences caused by erosion protection at the outlet may have affected the Ketchum Lake OHWM.
5. Based upon the field data collected, potential OHWM elevations for Ketchum Lake are as follows: Visible changes in the character of the soil occur between 1828.2 to 1828.9 fmsl and 1828.9 to 1829.5 fmsl; base of boulder lines occur between 1825.8 to 1826.7 fmsl, 1827.3 to 1827.6 fmsl and 1828.0 to 1829.0 fmsl; visible erosional features occur at 1827.4 to 1828.5 fmsl, 1828.9 to 1829.5 fmsl, and 1829.9 to 1831.2 fmsl; dead trees are present up to 1828.9 fmsl with the majority at or near 1828.9 fmsl; the lowest terminal elevation for live trees is at 1828.2 fmsl.
6. Based upon the field data summarized in conclusion number 5, a potential OHWM elevation for Ketchum Lake is 1829.5 fmsl. Data from erosional features and soil characteristics were limited due to the water level in the lake. However, boulder lines and terrestrial vegetation afforded strong evidence with supportive evidence from erosional features and soil characteristics. OHWM's are not associated with the highest limits of a lake bank but are associated with the upper limits of a lake bank. The majority of the indicators show the OHWM exists at the elevation of 1829.5 fmsl, it is recommended that the OHWM be established at 1829.5 fmsl.
7. The outlet elevation for Ketchum Lake is currently at 1829.51 fmsl, though at a lake level of 1828.7 water trickles through the outlet. In order to maintain the OHWM elevation around Ketchum Lake at 1829.5 fmsl, during those times when the lake is full and spilling, an outlet elevation of 1828.6 fmsl is recommended.


Lynn Beck
Natural Resources Engineer III
Water Rights Program


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

**RECOMMENDATION OF CHIEF ENGINEER ON ESTABLISHMENT OF AN
ORDINARY HIGH WATER MARK AND OUTLET FOR
KETCHUM LAKE, DEUEL COUNTY**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning establishment of an Ordinary High Water Mark for Ketchum Lake in Deuel County.

The Chief Engineer of the Water Rights Program recommends that the:

- 1) Ordinary High Water Mark for Ketchum Lake, Deuel County be established at an elevation of 1829.5 feet mean sea level (fmsl).
- 2) The outlet elevation for Ketchum Lake, Deuel County be established at an elevation of 1828.6 fmsl.

See report for additional information.

A handwritten signature in cursive script, appearing to read "John Hatch".

JOHN HATCH, Chief Engineer
March 28, 1996

Bibliography

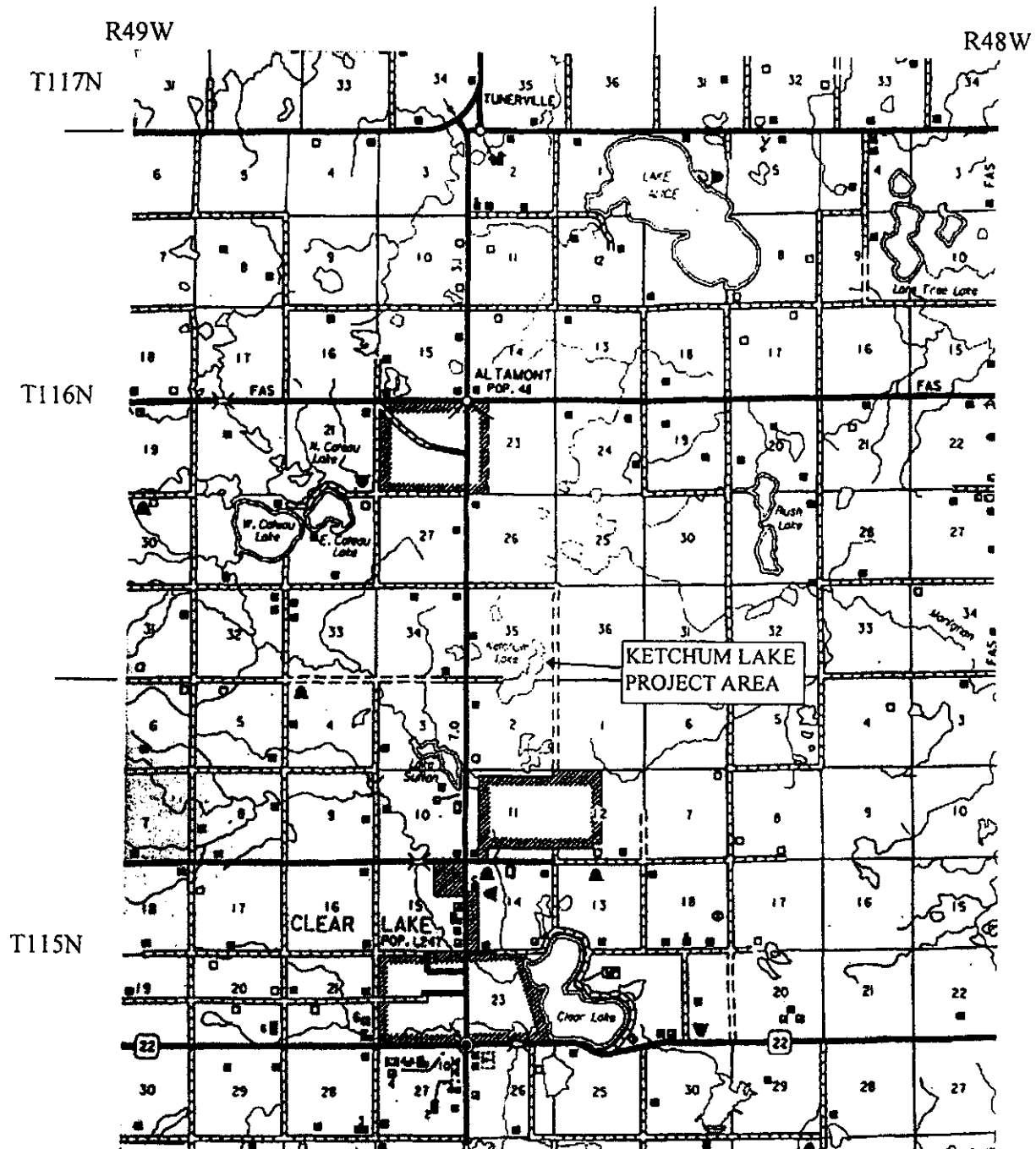
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- Water Rights Program Files, 1996, Department of Environment and Natural Resources, Joe Foss Building, 523 East Capitol, Pierre, SD 57501.

Persons and Agencies Referenced

- Archives, State Library Building, Pierre, SD 57501
- Deuel County Register of Deeds, County Courthouse, Milbank, SD 57252
- State Climatologist, South Dakota State University, Brookings, SD 57007

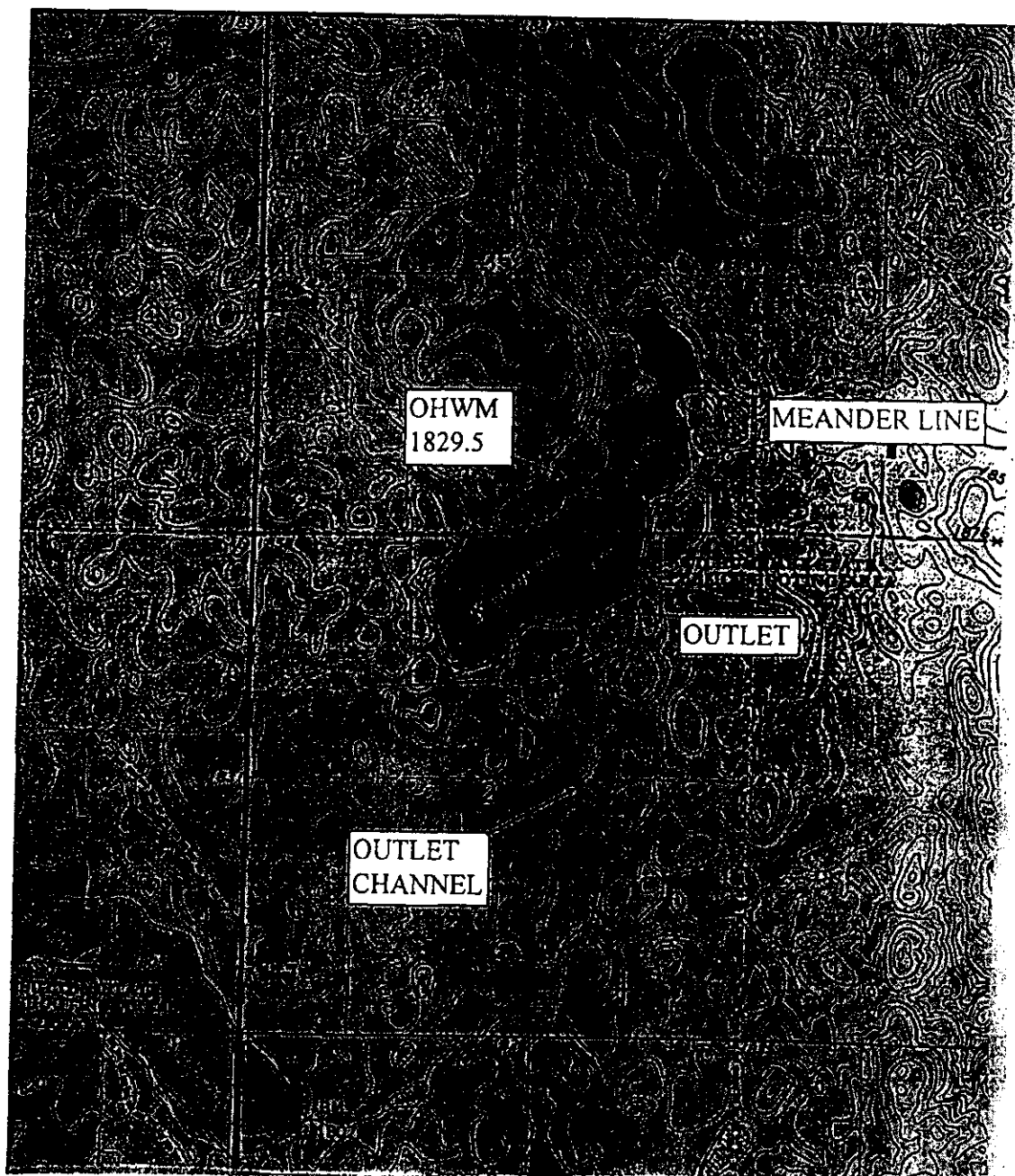
**GENERAL HIGHWAY MAP
DEUEL COUNTY
SOUTH DAKOTA**

prepared by the
SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION
in cooperation with the
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
1989

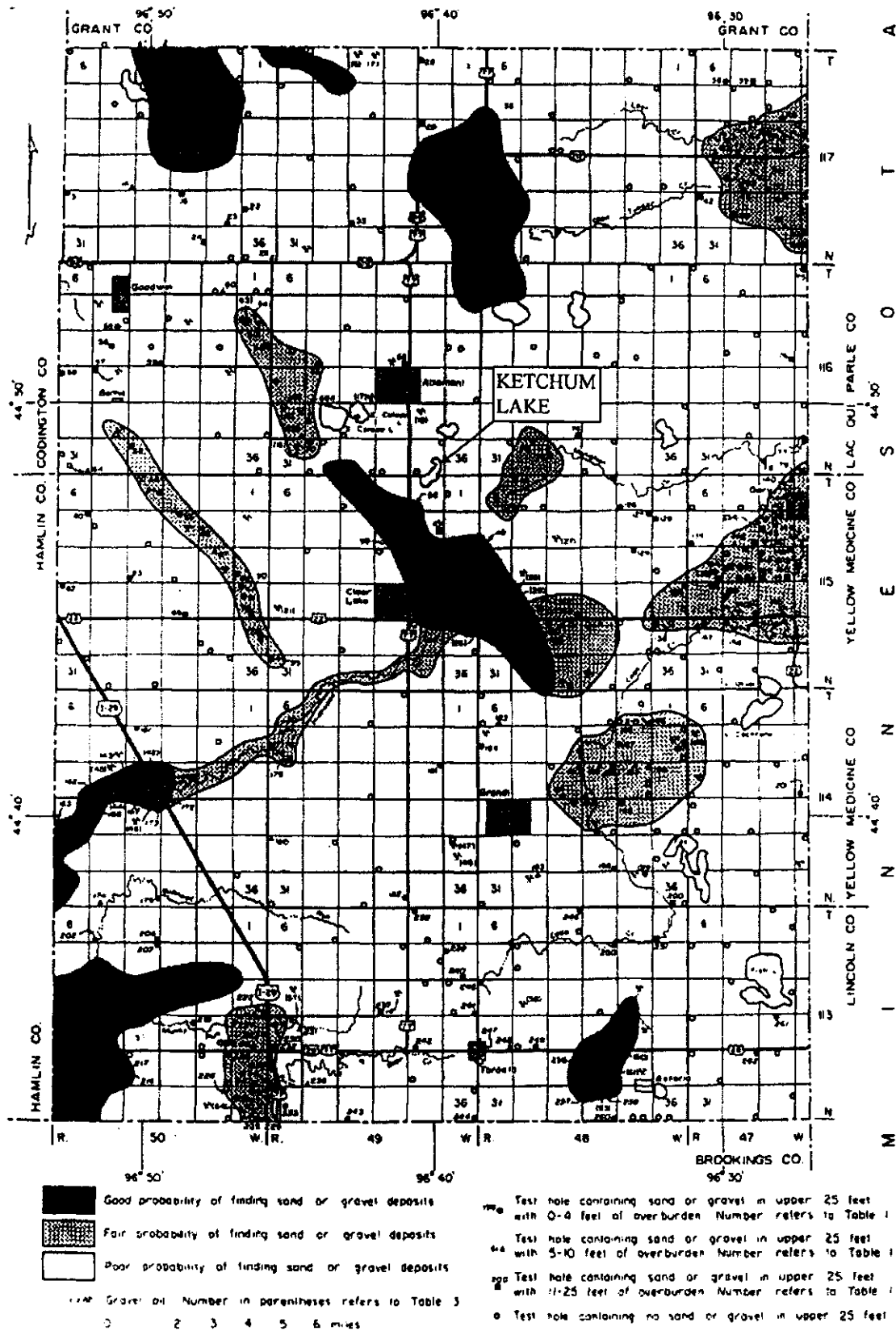


Appendix No. 2

CLEAR LAKE NORTH QUADRANGLE
SOUTH DAKOTA - DEUEL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Appendix No. 3
**SAND AND GRAVEL RESOURCES IN
 DEUEL COUNTY, SOUTH DAKOTA**



Appendix No. 4

**MEASURED WATER LEVELS
FOR
KETCHUM LAKE, DEUEL COUNTY**

DATE	WATER LEVELS
5-1-84	1829.2
9-27-84	1828.3
5-8-85	1829.2
10-10-85	1829.1
5-8-86	1830.1
10-8-86	1829.0
4-28-87	1828.8
8-13-87	1827.7
10-8-87	1827.2
4-20-88	1827.5
9-22-88	1824.4
4-26-89	1826.0
10-18-89	1824.5
5-2-90	1824.3
9-19-90	1824.1
5-1-91	1824.3
10-2-91	1824.0
4-29-92	1824.3
9-16-92	1828.3
5-12-93	1829.8
9-22-93	1828.8
5-4-94	1829.4
9-14-94	1828.9
5-10-95	1829.5
10-17-95	1828.7

Measurements by Water Rights Program

Appendix No. 5

OHWM EVIDENCE

EROSIONAL CHARACTERISTICS:

Elevation (fmssl)	Legal Description	Comments
1833.06	NW 1/4 NE 1/4 Sec. 2, T115N, R49W	Top of cutbank
1831.93	"	"
1829.12	"	Bottom of cutbank
1829.19	"	"
1830.99	NE 1/4 NW 1/4 Sec. 2, T115N, R49W	Top of cutbank
1831.24	"	"
1829.17	"	Bottom of cutbank
1829.29	"	"
1828.96	"	"
1829.09	SE 1/4 SW 1/4 Sec. 35, T116N, R49W	Bottom of cutbank
1830.99	NE 1/4 SE 1/4 Sec. 35, T116N, R49W	Top of cutbank
1831.02	"	"
1830.45	"	"
1829.04	"	Bottom of cutbank
1829.45	"	"
1829.15	"	"
1831.11	SE 1/4 SE 1/4 Sec. 35, T116N, R49W	Top of cutbank
1831.23	"	"
1830.74	"	"
1828.99	"	Bottom of cutbank
1828.88	"	"
1829.08	"	"
1829.38	"	"
1830.45	NW 1/4 NE 1/4 Sec. 2, T115N, R49W	Top of washed root system
1830.11	"	"
1830.21	"	"
1831.04	"	"
1827.74	"	Base of washed root system
1827.37	"	"
1828.54	"	"
1828.52	"	"

Erosional characteristics continued:

Elevation (fmsl)	Legal Description	Comments
1830.44	NE 1/4 NW 1/4 Sec. 2, T115N, R49W	Top of washed root system
1830.69	"	"
1829.99	"	"
1828.59	"	Base of washed root system
1829.54	"	"
1828.29	"	"
1830.29	SE 1/4 SE 1/4 Sec. 35, T116N, R49W	Top of washed root system
1830.85	"	"
1830.89	"	"
1829.93	"	"
1830.28	"	"
1830.58	"	"
1828.61	"	Base of washed root system
1829.03	"	"
1828.91	"	"
1828.39	"	"
1828.44	"	"
1828.23	"	"
1829.49	NE 1/4 NW 1/4 Sec. 2, T115N, R49W	Debris line
1829.39	"	"

SOIL CHARACTERISTICS:

Elevation (fmsl)	Legal Description	Comments
1829.39	NE 1/4 NW 1/4 Sec. 2, T115N, R49W	Top of sandy beach
1829.32	"	"
1830.39	"	Begin black top soil and change in slope
1829.97	"	"
1833.93	"	Top of bank
1834.11	"	"
1828.88	SE 1/4 SE 1/4 Sec. 35, T116N, R49W	Top of cobblestones
1828.53	"	"
1828.86	"	Top of sandy beach
1829.33	"	"
1829.46	"	Begin black top soil
1828.97	"	"

BOULDER LINES:

Elevation (fmsl)	Legal Description	Comments
1829.77	NW 1/4 NE 1/4 Sec. 2, T115N, R49W	Top of boulder line
1830.11	"	"
1829.22	"	"
1829.19	"	"
1827.56	"	Base of boulder line
1827.37	"	"
1826.42	"	"
1826.69	"	"
1830.21	NE 1/4 NW 1/4 Sec. 2, T115N, R49W	Top of boulder line
1830.44	"	"
1829.53	"	"
1830.48	"	"
1826.37	"	Base of boulder line
1826.39	"	"
1825.79	"	"
1826.34	"	"
1825.85	"	"
1828.98	"	"
1828.99	"	"
1830.48	SE 1/4 SW 1/4 Sec. 35, T116N, R49W	Top of boulder line
1829.24	"	"
1827.50	"	Base of boulder line
1827.54	"	"
1828.49	NE 1/4 SE 1/4 Sec. 35, T116N, R49W	Top of boulder line
1830.15	"	"
1830.02	"	"
1830.42	"	"
1827.44	"	Base of boulder line
1828.19	"	"
1828.01	"	"
1827.62	"	"
1830.33	SE 1/4 SE 1/4 Sec. 35, T116N, R49W	Top of boulder line
1829.43	"	"
1829.12	"	"
1830.17	"	"
1828.29	"	Base of boulder line
1828.18	"	"
1828.52	"	"
1828.62	"	"

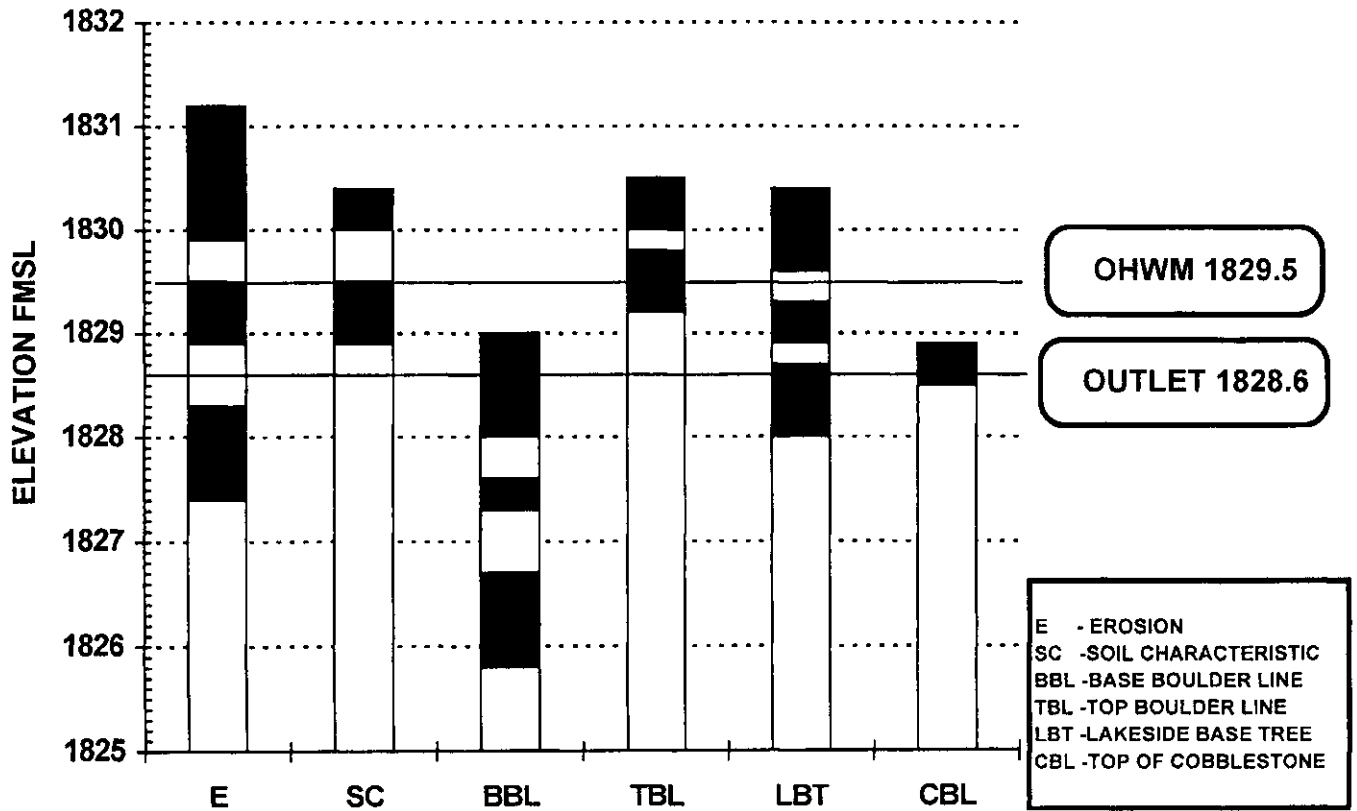
TERRESTRIAL VEGETATION:

Elevation (fsml)	Legal Description	Comments
1828.00	NW 1/4 NE 1/4 Sec. 2, T115N, R49W	Lakeside 3-2' diameter trees, dead
1828.67	"	" 2-2' diameter trees, dead
1828.69	"	" 3-1' diameter trees, dead
1829.59	"	" 1' diameter tree
1831.01	"	Landside 3-2' diameter trees, dead
1830.69	"	" 2-2' diameter trees, dead
1831.19	"	" 3-1' diameter trees, dead
1831.19	"	" 1' diameter tree
1830.09	NE 1/4 NW 1/4 Sec. 2, T115N, R49W	Lakeside 3' diameter cottonwood
1830.42	"	" 6' diameter cottonwood
1829.32	"	" 3' diameter willow
1830.87	"	Landside 3' diameter cottonwood
1831.93	"	" 6' diameter cottonwood
1830.50	"	" 3' diameter willow
1828.91	"	Lakeside 1.5' diameter tree, dead
1830.05	"	" 9" diameter tree, dead
1828.89	"	" tree, dead
1831.07	"	Landside 1.5' diameter tree, dead
1830.99	"	" 9" diameter tree, dead
1830.50	"	" tree, dead
1828.19	"	Lakeside 1' diameter elm
1828.44	"	" 2' diameter elm
1831.23	"	Landside 1' diameter elm
1829.09	SE 1/4 SE 1/4 Sec. 35, T116N, R49W	Lakeside 2' diameter tree
1829.03	"	" 15" diameter tree
1828.53	"	" 1' diameter elm
1828.83	"	" 1.5' diameter elm
1828.53	"	" 1' diameter elm
1828.93	"	" 1' diameter elm
1829.63	"	" 2-1' diameter elms
1828.88	"	" 3' diameter tree
1831.67	"	Landside 2' diameter tree
1830.73	"	" 15" diameter tree
1831.28	"	" 1' diameter elm
1831.73	"	" 1.5' diameter elm
1830.23	"	" 1' diameter elm
1831.58	"	" 1' diameter elm
1831.83	"	" 2.1' diameter elm

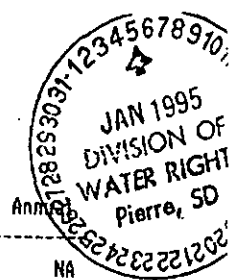
Appendix No. 6

OHWM EVIDENCE GRAPH

The blue bar segments represent bands of evidence along Ketchum Lake's shore. Each segment is a group of a particular category of evidence found at or near the same elevation.



Appendix No. 7



Monthly Precipitation for Clear Lake Station number: 39177707													Annual
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1938	NA	NA	NA	NA	NA	NA	NA	4.55	2.55	0.28	0.73	0.19	NA
1939	1.59	0.75	0.71	1.31	2.54	5.78	7.18	4.21	1.10	1.03	0.00	0.05	26.25
1940	0.05	0.45	2.80	1.78	1.01	4.94	1.13	7.26	0.31	1.36	1.23	0.47	22.79
1941	0.75	0.21	0.17	4.66	1.64	3.29	1.94	1.58	1.58	2.64	0.25	0.65	19.36
1942	0.00	0.09	2.68	2.15	7.29	3.19	2.14	2.83	4.99	0.70	0.01	0.40	26.47
1943	0.57	0.67	1.43	0.43	3.36	4.37	4.69	4.11	0.98	1.64	1.38	0.00	23.63
1944	1.05	0.49	0.60	2.28	2.71	4.01	1.88	5.10	2.17	0.17	0.95	0.12	21.53
1945	0.29	0.81	0.58	1.55	4.09	5.15	5.82	1.55	1.62	0.47	0.73	1.48	24.14
1946	0.00	1.31	1.91	0.92	4.37	6.05	4.20	1.75	5.86	4.09	1.18	0.48	32.12
1947	0.64	0.25	1.03	4.81	1.33	6.59	0.32	2.11	3.31	1.84	3.07	0.12	25.42
1948	0.07	1.94	0.45	2.99	0.74	5.14	5.94	5.37	2.68	1.08	1.34	0.13	27.87
1949	0.79	0.00	1.74	0.43	2.27	4.24	5.33	0.97	3.70	1.82	1.47	0.95	23.71
1950	0.68	0.00	2.32	1.21	4.70	1.41	2.51	1.56	1.82	1.71	0.43	0.56	18.91
1951	0.44	0.64	2.73	2.70	3.81	4.31	4.36	5.90	0.84	1.85	0.49	2.19	30.26
1952	1.77	1.49	1.59	0.52	1.42	7.46	1.29	1.35	0.84	0.00	0.84	0.32	18.89
1953	1.12	1.82	0.82	4.53	3.26	5.96	5.09	1.38	0.32	0.54	1.16	1.81	27.81
1954	0.27	0.69	2.71	2.45	2.44	3.74	1.79	1.65	3.57	1.69	0.94	0.08	22.02
1955	0.47 MM		0.34	2.30	0.67	4.84	4.78	3.03	0.79	0.35	NA	1.93	NA
1956	0.80	0.15	1.39	1.85	3.47	6.51	4.67	5.74	1.77	0.57	1.24	0.16	28.44
1957	0.43	0.95	0.68	2.38	5.44	2.58	1.91	3.20	4.60	3.02	1.30	0.76	27.25
1958	0.13	0.67	0.73	2.75	1.57	3.48	2.42	1.80	3.06	0.15	1.86	0.29	18.91
1959	0.38	0.68	0.12	1.21	4.68	1.63	3.01	1.59	1.73	2.37	1.10	1.56	20.06
1960	0.72	0.00	1.11	2.42	2.27	5.12	2.06	8.31	1.75	0.85	0.94	1.06	26.61
1961	0.04	0.52	0.57	1.43	5.40	4.27	1.64	3.04	2.64	1.73	0.26	0.54	22.08
1962	NA	NA	NA	NA	4.25	4.95	6.59	0.59	1.89	0.84	0.56	0.06	NA
1963	0.33	0.38	1.82	2.53	1.65	3.22	9.19	0.77	3.20	1.56	0.56	0.52	25.73
1964	0.00	0.09	1.42	2.70	1.52	2.36	4.15	5.77	1.14	0.05	0.41	0.42	20.03
1965	0.75	0.32	2.26	3.13	7.45	2.68	2.38	3.57	4.60	0.77	0.80	0.51	29.22
1966	0.22	0.88	0.67	1.75	1.69	2.12	4.10	4.24	2.28	0.26	0.38	0.34	19.53
1967	0.88	0.96	0.18	2.39	0.64	6.94	1.14	1.72	0.85	1.16	0.17	0.39	17.42
1968	0.24	0.00	0.74	4.36	2.22	3.90	2.12	2.06	2.85	4.84	0.86	2.02	25.41
1969	1.75	2.01	0.44	1.79	2.33	2.65	5.22	2.04	0.80	3.04	0.21	1.07	23.35
1970	0.24	0.03	1.31	3.85	4.44	3.86	4.86	1.43	2.04	4.20	3.26	0.22	29.74
1971	0.10	0.98	0.03	1.77	1.77	6.72	3.78	2.63	1.03	4.57	2.54	0.36	26.28
1972	0.50	0.31	0.89	3.03	8.51	1.02	5.98	2.10	0.65	3.34	1.26	1.37	28.96
1973	0.22	0.44	2.17	1.15	3.78	0.47	1.35	2.74	1.99	1.40	0.84	0.77	17.32
1974	0.00	1.20	1.07	1.75	4.39	2.90	1.56	3.07	0.66	0.83	0.50	0.14	18.07
1975	1.93	0.32	4.21	4.50	1.13	4.70	1.83	3.99	1.81	0.81	0.92	0.19	26.34
1976	0.84	0.56	1.41	1.00	0.38	1.52	1.60	NA	NA	0.39	0.09	0.54	NA
1977	0.50	1.53	5.29	1.94	2.10	4.36	2.34	4.50	5.60	3.60	3.48	1.42	36.66
1978	0.19	0.41	1.12	3.37	4.87	2.83	2.14	4.87	2.51	0.32	0.99	0.54	24.16
1979	2.39	0.55	1.75	3.02	2.48	4.01	2.62	6.04	0.66	3.62	0.22	0.16	27.52
1980	0.32	0.67	0.69	0.13	2.54	7.97	2.72	4.64	0.78	1.16	0.06	0.14	21.82
1981	0.39	1.38	1.41	1.26	1.21	4.16	2.96	1.13	0.75	2.03	1.22	0.90	18.80
1982	1.75	0.27	1.14	1.43	5.33	2.65	6.80	3.73	2.60	3.47	1.34	0.41	30.92
1983	1.00	0.09	4.09	1.46	1.63	3.23	2.48	1.64	2.62	1.57	5.21	0.67	25.69
1984	0.57	0.75	2.06	3.28	2.56	7.92	1.18	1.09	3.55	6.85	0.02	0.78	30.61
1985	NA	0.22	3.09	2.35	2.94	2.43	5.03	4.33	5.30	1.20	1.72	0.66	NA
1986	0.38	0.76	1.35	5.85	4.15	3.42	5.85	2.34	4.43	0.50	0.42	0.00	29.45
1987	0.17	0.43	2.20	0.70	1.42	1.35	4.93	1.95	2.78	1.16	0.87	0.92	18.88
1988	1.35	0.37	1.08	1.21	1.74	0.48	2.27	6.34	2.34	0.17	1.24	0.39	18.98
1989	0.21	0.82	2.95	1.82	1.10	1.89	2.48	4.66	3.15	1.55	0.74	0.05	21.42
1990	0.00	0.38	1.53	1.44	3.88	8.46	5.10	3.02	1.12	1.65	0.07	0.42	27.07

Monthly precipitation for Clear Lake, Station number 39177707 continued:

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1991	0.27	0.68	1.15	4.67	4.38	5.82	3.03	3.59	2.45	0.72	1.14	0.03	27.93
1992	0.99	0.77	1.41	2.00	1.39	16.12	4.10	2.73	2.08	0.58	2.29	0.75	35.21
1993	1.13	0.70	1.92	2.67	4.99	8.41	5.51	2.14	2.85	0.51	2.55	0.97	34.55
1994	1.94	1.00	0.57	3.02	1.89	6.84	2.70	4.27	3.07	2.16	0.85	0.41	28.72
1995	0.53	0.27	3.95	5.05	4.37	1.58	5.45	1.86	4.14	2.71	0.82	0.26	30.99

Appendix No. 8

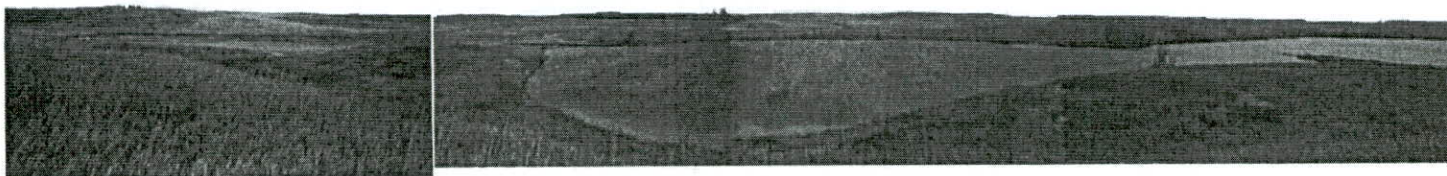


Photo No. 1

Ketchum Lake panoramic view from the north to the south.



Photo No. 2

Ketchum Lake outlet (right end of photo) and outlet channel. Located in the NW 1/4 NE 1/4
Section 2, T115N, R49W.



Photo No. 3

Outlet located in the SE 1/4 NW 1/4 NE 1/4 Section 2, T115N, R49W. Top of the rock fill elevation is 1829.51 fmsl, flow elevation is approximately 1828.6 fmsl.



Photo No. 4

Three, two foot diameter, dead trees located in the SE 1/4 NW 1/4 NE 1/4 Section 2, T115N, R49W. Lakeside base of tree elevation is 1828.00 fmsl.



Photo No. 5

Two, two foot diameter dead trees and boulder line along the shore, located in the SE 1/4 NW 1/4 NE 1/4 Section 2, T115N, R49W. Lakeside base of tree elevation is 1828.67 fmsl and the bottom of the washed root system is 1827.37 fmsl - top is 1830.11 fmsl. The base of the boulder line elevation ranges from 1826.42 to 1827.59 fmsl - top ranges from 1829.19 to 1830.11 fmsl.



Photo No. 6

One foot diameter dead tree and boulder line along the shore located in the SE 1/4 NW 1/4 NE 1/4 Section 2, T115, R49W. Lakeside base of tree elevation is 1829.59 fmsl. The bottom elevation of the washed root system is 1828.52 fmsl - top is 1831.04 fmsl. The base of the boulder line elevation ranges from 1826.42 to 1827.59 - top ranges from 1829.19 to 1930.11.



Photo No. 7

Line of 15 inch to two foot diameter elm trees and boulder line along the shore located in the SW 1/4 SE 1/4 Section 35, T116N, R49W. Lakeside base of tree elevation ranges from 1828.53 to 1829.09 fmsl. The bottom elevation of the washed root system ranges from 1828.23 to 1828.44 fmsl - top elevation ranges from 1829.93 to 1830.58 fmsl. The base of the boulder line elevation ranges from 1828.18 to 1828.29 fmsl - top elevation ranges from 1829.43 to 1830.33.



Photo No. 8

Nine inch diameter dead tree and boulder line along the shore located in the NE 1/4 NW 1/4 Section 2, T115N, R49W. Lakeside base of tree elevation is 1830.05 fmsl. The base of the boulder line elevation is 1826.4 - top elevation is 1830.21 fmsl.

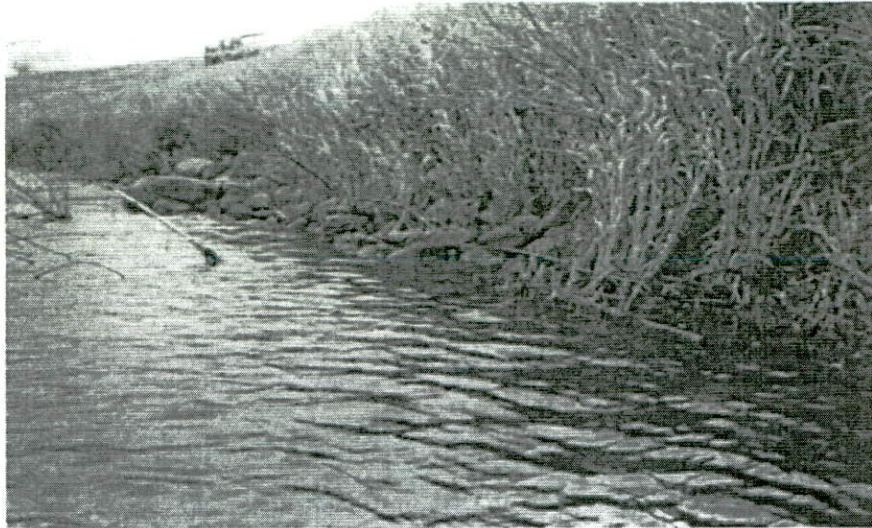


Photo No. 9

Boulder line along the shore at the SW end of the lake located in the NE 1/4 NW 1/4 Section 2, T115N, R49W. The base of the boulder line elevation ranges from 1825.79 to 1826.34 fmsl - top elevation ranges from 1829.53 to 1830.48 fmsl.



Photo No. 10

Boulder line along the shore on the east side of the lake located in the SW 1/4 SE 1/4 SE 1/4 Section 35, T116N, R49W. The base of the boulder line elevation ranges from 1828.18 to 1828.62 fmsl - top elevation ranges from 1829.12 to 1830.33 fmsl.



Photo No. 11

Three foot diameter tree with a washed root system located in the SW 1/4 SE 1/4 SE 1/4 Section 35, T116N, R49W. Lakeside base of the tree elevation is 1828.88 fmsl. The elevation of the bottom of the washed root system is 1829.03 fmsl - top elevation is 1830.85 fmsl.



Photo No. 12

The above three foot diameter tree showing more of the washed root system. Notice lateral root pattern.

wastewater lagoon must be at least ninety percent of the Standard Procter Density (ASTM D 6980-70).

5. Permit No. 5918-3 is subject to compliance with the following applicable Water Management Board rules:
 - a. Chapter 74:03:15 Ground Water Quality Standards,
 - b. Chapter 74:03:16 Ground Water Discharge Permit,
 - c. Chapter 74:03:02 Surface Water Quality Standards,
 - d. Chapter 74:03:04 Uses Assigned to Streams, and
 - e. Chapter 74:03:17 through 74:03:26 Surface Water Discharge Provisions.

The motion carried.

Chairman Rollag declared a recess at 11:50 a.m. He called the meeting back to order at 1:15 p.m.

ESTABLISHMENT OF AN ORDINARY HIGH WATER MARK (OHWM) AND OUTLET ELEVATION FOR LAKE KETCHUM, DEUEL COUNTY

Lynn Beck provided the board with copies of the Ketchum Lake report (copy on file). She pointed out a typographical error on page 7, paragraph 3. The vested right claim number should be 1471-3, rather than 1840-3. On page 13, number 6, the proposed OHWM elevation for Ketchum Lake is 1829.5 fmsl, rather than 1829.0 fmsl.

Referring to Appendix No. 6, the OHWM evidence graph, Ms. Beck noted that the bar segments represent bands of evidence along Ketchum Lake's shore. Each segment is a group of a particular category of evidence found at or near the same elevation. The graph also shows the OHWM and the outlet elevation.

The Water Rights Program received a written request for the establishment of OHWM and outlet elevation for Ketchum Lake in Deuel County from John Corothers and 27 electors of the state. Based on that request an investigation was conducted to determine the elevations.

Ms. Beck referred to the Deuel County highway map showing Ketchum Lake located about two miles north of Clear Lake. The meander line survey on the lake was conducted in 1872. Ms. Beck noted that Appendix No. 2 is a topographic map that shows the meander line survey around the lake, the OHWM contour, and the location of the outlet channel.

There is one vested water right claim on Ketchum Lake, Vested Water Right Claim No. 1471-3, which is held by the SD Department of Game, Fish and Parks Department. This right claims a priority date of 1889, and approximately 240 acre-feet of water per year to fill Ketchum Lake for public recreational purposes. Ms. Beck presented a graph showing Ketchum Lake water levels

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and water year precipitation. Water levels measured by the Water Rights Program show a six foot fluctuation in lake levels in the past twelve years.

Ms. Beck stated that there appears to be only one manmade influence at Ketchum Lake and as on many other lakes the influence is in the outlet area. Area residents reported that a beaver dam once existed in front of the outlet and high water conditions washed it out. Ms. Beck said it appears that rock was placed in the outlet to stabilize erosion, although the residents do not recall seeing anyone place rocks in the outlet.

Field data for the OHWM was collected on October 17, 18, and 19, 1995. The distinct physical evidence used to identify the OHWM were erosion, changes in character of the soil, boulder lines, and growth and destruction of terrestrial vegetation. The erosion line for Ketchum Lake occurred at or near elevation 1829 feet mean sea level (fmsl), which is consistent with the measured water levels since May 12, 1993. Ms. Beck stated that the lake levels limited the amount of visible soil changes. The few soil characteristics observed were cobble stones, top of sandy beach and the beginning of top soil.

Ms. Beck stated that the tree population around Ketchum lake was observed. Certain species of trees are able to survive periods of flooding better than others. Elm trees are the predominant tree around Ketchum Lake. Elm trees are considered intermediately tolerant to flooding. This means an elm tree can survive occasional inundation between 20 and 30 percent of the growing season. Also a factor in survival is the formation of lateral root systems at or just above the water line. The base of the washed root systems occur at 1829.5 fmsl. The top of the washed root systems occur at 1831.0 fmsl. Ms. Beck reported that water inundation is destroying some trees at elevation 1828.0 to 1828.9 fmsl. Using trees on Ketchum Lake without other OHWM evidence would suggest that the OHWM elevations lies between the elevation of predominant destruction of terrestrial vegetation and the top of the washed root systems.

Ms. Beck reported that the outlet is located in Section 2, T115N, R49W. The outlet channel travels south and west into another small lake called Lake Sutton. The outlet is filled with rocks of varying size. The elevation at the top of the rocks is 1829.51 fmsl. At the time of the investigation the water was measured at 1828.7 fmsl and water was trickling through the rocks and through the outlet.

Ms. Beck read her conclusions into the record (see report).

The chief engineer recommended that the OHWM for Ketchum Lake, Deuel County, be established at an elevation of 1829.5 fmsl; and the outlet elevation for the lake be established at an elevation of 1828.6 fmsl.

Responding to a question from Bernita Loucks, Ms. Beck stated that notice was provided to the 27 parties requesting establishment of the OHWM and outlet elevation, the county commissioners, and the Department of Game, Fish, and Parks.

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Diane Best requested that the department's file be admitted into evidence. Chairman Rollag accepted the exhibit.

Ms. Beck noted that the Department of Game, Fish, and Parks had submitted a letter requesting that it be made a party of record in the proceedings for this matter.

MOTION by Gunderson, SECONDED by Loucks, that the ordinary high water mark for Ketchum Lake, Deuel County, be established at an elevation of 1829.5 fmsl; and the outlet elevation for the lake be established at an elevation of 1828.6 fmsl. Motion carried.

WATER PERMIT APPLICATION NO. 5894-3, RICHARD BAYSINGER

Eric Gronlund provided the board with copies of the report prepared by Tim Schaal for Water Permit Application No. 5894-3 (copy on file). He presented a map showing the location of the application.

The application is to impound 40 acre-feet of water in a dam in Sanborn County. The water will be used for fish and wildlife production. The dam, which was designed by the US Fish and Wildlife Service, will be 5.7 feet high with 30 foot wide earth spillway with three feet of freeboard, giving the spillway the capacity to pass about 400 cfs without overtopping the embankment. Safety of Dams rules do not apply so plans and specifications were not required.

Mr. Gronlund stated that the dam is located immediately above Redstone Creek about 10 miles upstream of the confluence of Redstone Creek and the James River. There are no downstream water permits/rights on Redstone Creek between the proposed dam and the James River.

The chief engineer recommended approval of the application with the standard qualification that is placed on all impoundments of this nature.

Mr. Gronlund reported that the application was advertised. The department received a petition from Sanborn County objecting to the application due to a road adjacent to the area. The county withdrew its petition following a meeting with the US Fish and Wildlife Service.

MOTION by Brink, SECONDED by Rickenbach, to approve Water Permit Application No. 5894-3, Richard Baysinger, with the following qualification:

Water Permit No. 5894-3 authorizes a dam with storage capacity of 40 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.

Mr. Rickenbach asked why Sanborn County withdrew its objection. Mr. Gronlund said he believes that Sanborn County was concerned that water would be impounded right next to one of



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Memo to File

Lake Ketchum in Deuel County

VWR No. 1471-3

The OHWM was set by the Water Management Board on May 1, 1996.

OHWM elevation 1829.5 fmsl NGVD29

The outlet elevation was set by the Water Management Board on May 1, 1996.

Outlet elevation 1828.6 fmsl NGVD29