

WATER PERMIT NO. 6077-3

Name of Applicant: Bill Cooper

Address: PO Box 243, Salem SD 57058

Phone:

Amount of Water Claimed: 31 acre-feet

Total Acres:

Source of Water Supply: runoff

Water to be used for: fish & wildlife production

County: McCook

Type of Waste Disposal System: NA

Location: 2 miles southwest of Canistota

PRIORITY Date Received: 5-12-1998

Fee: \$150.00

Corrected Application Received:

Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: SW ¼ SW ¼ Sec 8-T101N-R54W

Water Impounded: SW ¼ Sec 8-T101N-R54W

Depth of Well: NA

Well Driller:

Remarks:

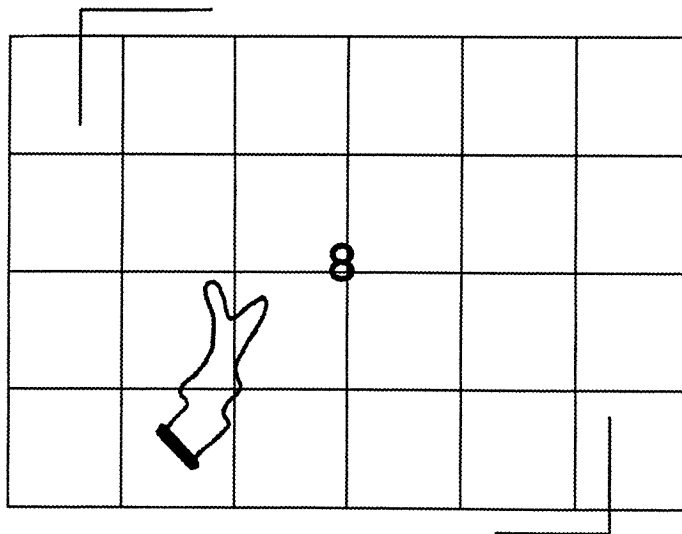
Type of Map: plat

Prepared by: Denny Merchen, SCS

Reviewed and the Number Assigned on: 5-13-1998

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



No. 6077-3 Hydrologic Unit 10170102
Map No. _____ Basin Vermillion River
Newspaper Canistota Clipper, Canistota, SD

Water Rights Div.
DWNR, Foss Bldg.
Pierre, SD 57501
(605) 773-3352

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

Check use of water: Industrial ☐ Commercial ☐ Municipal ☐ Other Common Distribution System ☐
Rural Water System ☐ Suburban Housing ☐ Geothermal Heat ☐ Institutional ☐ Recreational ☐
Domestic ☒ (above 18gpm) Other ☒ Fish + Wildlife
Livestock Watering

Type of Application: Check one or more of the following

New ☒ Vested Right ☐ Future Use ☐ Change Use ☐

☐ Amend Permit No. _____ with old priority date retained

Change diversion point(s) ☐ Add diversion point(s) ☐ Other ☐ _____

☐ Application to: Change diversion point(s) ☐ Add diversion point(s) ☐ on Permit No. _____

☐ Construction to use water reserved by Future Use Permit No. _____

1. Name of Applicant Bill ~~Copper~~ Cooper Phone No. _____
Post Office Address PO Box 243 SALEM State SD. 57058
(Street, RR or Box) Zip Code
2. Amount of water claimed (c.f.s) 31 AF
3. Source of water supply Runoff from drainage area
4. Location of point of diversion Embankment
Water
Impounded: SW 1/4 of Section 8 T101N R. 54 W
Div. pt.: SW 1/4 SW 1/4 Sec. 8-T101N-R54W County McCook
5. Counties where water will be used McCook
6. Annual period during which water is to be used Year Round Jan 1-Dec 31
7. Give a brief description of proposed project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

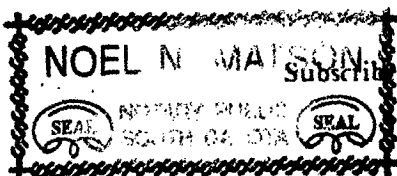
Embankment to store water for fish and other wildlife
See plans enclosed

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

STATE OF SOUTH DAKOTA)
County of _____)

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

Signed Wilmer S. Cooper

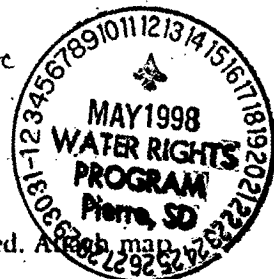


Subscribed and sworn to before me this 5th day of May 19 98

Paul Matson

Notary Public (or other qualified officer)

My commission expires 2/23/2001



Supplemental Information

(type or print in ink)

1. Well Information - Proposed construction

- a) Drill Hole Diameter _____ Depth _____
- b) Casing Type _____ Diameter _____ Thickness _____
- c) Screen Type _____ Diameter _____ Thickness _____
- d) Gravel Pack Thickness _____ Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material _____
- f) Depth to Water (ground surface to water level) _____
- g) Distance to nearest existing domestic well:
- On applicants property _____ On property owned by others _____

2. Dugout Information Estimates

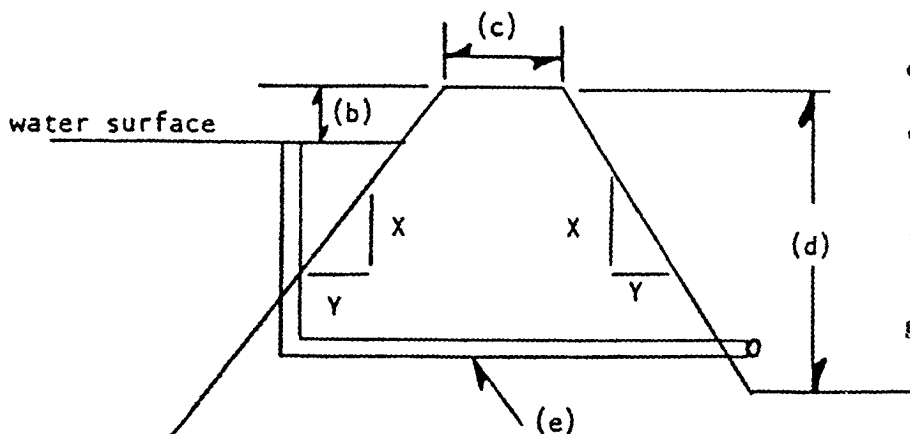
- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

3. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below. The locations of each dam should be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam please give their name and address

Natural Resource Conservation Service
RD. Box 489 Salem, SD 57058-0489



- b) Freeboard 5.7' @ P.S., 3.0' @ E.S.
- c) Crest Width 10'
 Crest Length 240'
- d) Height 20.5'
- e) Primary Outlet Capacity _____
 If Pipe, diameter 18"
- f) Secondary Spillway Capacity 262 CFS
 Spillway width 70'
- g) X & Y Slope
 Upstream 3:1
 Downstream 2:1
- Surface Area of Impoundment 4.5 A
- Storage 31 ps 44 Es, 60.7 T^{0.4D} acre feet
- Drainage area above dam 570

Signature of Applicant

Wilmer S. Looper

SOUTH DAKOTA
WATER PERMIT NO. 6077-3

Date of first receipt of application May 12, 1998.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 6077-3 to Bill Cooper, PO Box 243, Salem SD 57058 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 6077-3 authorizes impoundment of 31 acre-feet of water from runoff by constructing a dam located in the SW ¼ SW ¼ Section 8 with water impounded in the SW ¼ Section 8; all in T101N-R54W. This permit authorizes impoundment of water sufficient to maintain water at an outlet elevation of approximately 1,450 feet mean sea level.
2. The water appropriated shall be used for the purpose of supplying water for fish and wildlife propagation and livestock water and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 6077-3 is June 8, 1998.
5. The date from which applicant may claim right is May 12, 1998.
6. One-fifth of the construction is to be completed on or before November 8, 2000.
7. All construction is to be completed on or before June 8, 2003.
8. Water is to be put to beneficial use on or before June 8, 2007.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

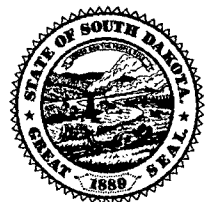
1. Water Permit No. 6077-3 authorizes a dam with storage capacity of 31 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

WATER MANAGEMENT BOARD

By: John Hatch
John Hatch, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JUN 12 1998

date





United States Department of the Interior

FISH AND WILDLIFE SERVICE

Madison Wetland Management District

P.O. Box 48

On Hwy. 19, 3/4 mile South of Hwy. 34 Junction

Madison, SD 57042

Telephone: (605) 256-2974

May, 6, 1998

Tim Schaal
DENR
Joe Foss Bldg.
523 E. Capital
Pierre, SD 57501-3181



Tim:

Here is the Water Rights Permit for Bill Coopers embankment in McCook Co.. I have enclosed a set of plans for the structure with the Permit. Please notify me of the publication and send the bill to me and my office will handle the payment.

Sincerely,

Noel N. Matson
Madison WMD

RECEIPT

Water Rights Program

South Dakota Department of Environment and Natural Resources

415762

Pierre, May 12, 19 98

RECEIVED OF Bill Copper, P.O. Box 243, Salem, SE 57058
the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>6077-3</u> to Appropriate Water, to construct and to put water to beneficial use _____	150	00
Fee for Application for Permit No. _____ to Appropriate Water, for Future Use _____		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____		
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for _____		

(Any Other Work Provided by Law)	Total	150 00

By _____
Chief Engineer

John Hatch (signature)



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Field Support Office
520 Third Avenue
P.O. Box 626
Brookings, SD 57006-0626

February 10, 1998

Tim Schaal, Natural Resources Engineer
SD Department of Environment and Natural Resources
523 East Capitol Avenue
Pierre, SD 57501



Dear Tim:

Enclosed please find a set of plans and specifications as well as design data for a dam that was built in McCook County. I am sending this information per a phone conversation with Mark Rath. The location notice and application for a water permit will be sent by the landowner.

The Natural Resources Conservation Service (NRCS) designed this dam; however, an oversight was made in that the plans and specifications were not submitted to your office for safety of dams review. The dam has since been constructed under the direction of the Fish and Wildlife Service (FWS). The original design was modified by FWS without approval from NRCS. The enclosed plans show the original design. Also enclosed is a copy of our letter to FWS which describes in detail the construction deficiencies observed after the dam was built.

If you have any questions, please contact me at 605-692-2344.

Sincerely,

MICHELLE M. BURKE
Agricultural Engineer

Enclosures

cc: Gary Coplan, Assistant State Conservationist, NRCS, Brookings (w/o encl.)
Dwight Hale, State Conservation Engineer, NRCS, Huron (w/o encl.)
Dan Mehlhaf, District Conservationist, NRCS, Salem (w/o encl.)



February 10, 1998

Carl Madsen
Fish & Wildlife Service
P.O. Box 247
Brookings, SD 57006

I am writing to make you aware of construction deficiencies that were observed during an inspection of a dam that FWS built for Bill Cooper in McCook County.

NRCS designed and staked the dam which was built by FWS in November 1997. NRCS provided a complete set of plans and specifications. After construction, Dan Mehlhaf, Resource Conservationist, and Danny Merchen, Soil Conservation Technician, field checked the dam. Following that field check, Dan Mehlhaf requested that the dam be inspected by Michelle Burke, Agricultural Engineer. This inspection was completed on December 4, 1997.

Following this inspection, Michelle Burke was told by FWS that they had modified the NRCS design to reduce costs. After checking the design, she also discovered that the structure meets the classification of a dam according to South Dakota Codified Law, and therefore, the dam would be regulated by the Department of Environment and Natural Resources. In addition, she found that an oversight had been made by NRCS in that the original design had not been sent to the Water Rights Division at DENR for review prior to construction in accordance with "Safety of Dams" regulations.

Beyond the concern we have about this structure complying with the safety of dams regulations, we also are concerned about whether a water right was obtained. NRCS did not provide direct assistance to the landowner in completing the application for a water rights permit. Unless FWS assisted Mr. Cooper with the application, he may not have proper claim to the water impounded by this dam.

This dam collects runoff from 570 acres. At the principal spillway elevation, it holds 31 acre-feet of water. At the emergency spillway elevation, it holds 44 acre-feet with a surface area of 4.5 acres. At the crest of the dam, the storage capacity is 60 acre-feet.

The following items were noted in Michelle Burke's inspection:

1. NRCS was not asked to be on site during construction and therefore, did not have a representative on the job to inspect the critical items.
2. If the core trench was installed, we do not know if it met specifications since there was no NRCS construction inspection. The absence of a core trench or improper installation of a core trench could result in seepage (loss of water) through the weak layer of foundation material and could cause failure of the dam at the foundation.
3. The principal spillway pipe was observed to be skewed both vertically and horizontally. The Hancor Sure-Lok Hi-Q 10.8 (corrugated polyethylene (CPE)) pipe used in this dam is only certified to be watertight up to an axial misalignment of 1.5 degrees at the joint. This misalignment is equivalent to a 0.5-foot change in direction in a 20-foot length. The misalignment observed

on-site appears to be of this magnitude or greater. If the pipe is not watertight, the water flowing through the pipe can create a suction that pulls soil from the embankment through the pipe and creates a "sink hole" effect. Without construction inspection, we also do not know if the backfill under the haunches of the pipe was properly compacted. With little or no support under the haunches and loading on top of the pipe, deflection will occur (the pipe becomes egg-shaped). This could result in cracking of the pipe material which could lead to a potential wash-out of the pipe.

4. The principal spillway pipe was not placed in the location specified on the plans. It was placed at the west end of the dam, and the emergency spillway was built at the east end. Normal installation for a principal spillway is near the center of the dam where it will discharge above the lowest point in the draw.
5. The corrugated metal pipe (CMP) which was specified in the NRCS design was not installed. The CMP was to be used to sleeve the inlet and the outlet of the CPE pipe for structural support. The CMP sleeve at the inlet was supposed to be cut at an angle to function as the hooded inlet. A metal baffle was also supposed to be attached to the hood to prevent vortex action. The CPE pipe will not carry the design capacity without the hood and baffle; this condition will cause the emergency spillway to flow more frequently and increase the potential for gully erosion. A timber pipe support was also supposed to be installed at the inlet; it was not present. Since FWS intends to cut the hood in the plastic pipe, we would recommend installing timber pipe supports at the inlet and the outlet. These supports are critical to prevent excessive vibrations (due to slug flow) from pulling the pipe apart at the joints. It is also critical to secure the CPE hood to the timber inlet support with a lag bolt and large washer to prevent the CPE pipe from being sucked inside of itself. We have had this happen to a dam in the past.
6. The sand anti-seep drain was not installed. The sand drain is another item that is critical to the functioning of the dam. If water finds a gap between the pipe and the earth fill, it follows the pipe toward the outlet causing internal erosion which could eventually wash out the pipe. The sand drain is necessary to collect any water moving along the side of the pipe and safely transport it out of the structure. Instead of using this method as specified in the plans, FWS substituted Hancor anti-seep diaphragms. This is an acceptable substitution provided that: 1) the size of the diaphragms is the same as specified in our Job Plan for butyl rubber diaphragms, and 2) the number of diaphragms installed is consistent with the requirements in South Dakota NRCS Standard 378.
7. The principal spillway pipe outlet was located on what appeared to be embankment but was actually a portion of the side hill above the toe of the dam. The outlet of the pipe ended immediately after daylighting from the embankment. The pipe outlet was supposed discharge above the channel, and it was supposed to extend 5 feet downstream from the toe of the dam. FWS will be placing field rock at the outlet; however, since the outlet is several feet above the bottom of the valley, the water that leaves the rock splash pad will flow down the hill, possibly creating a gully which could undermine the rock and the pipe.
8. There was no level section through the emergency spillway, and the side slopes were very irregular. The emergency spillway was slightly parabolic in shape rather than being level. As a result, the flow through the emergency spillway will be concentrated; this situation could likely create a gully in the emergency spillway.
9. A significant amount of topsoil had been stripped from the hills on each end of the dam. This seemed excessive, and a larger area than planned will have to be seeded. Fill could have been borrowed from the pool area.
10. The side slopes of the embankment were not constructed to a uniform slope. The downstream face of the dam was composed of uncompacted fill and some slightly compacted fill. The downstream face was undulating, with ridges and valleys as deep as 1.5 feet. The ridges and valleys ran perpendicular to the centerline of the dam, thus promoting rill and gully

erosion during snowmelt and rainfall events. Large clods were left on both faces and will inhibit the seeding operation. Any frozen material placed in the embankment could leave voids after thawing because it is uncompacted.

11. The elevations of the principal spillway inlet and the emergency spillway crest had not been checked, but they appear to be high. This will affect the hydraulics of the flow through pipe and could result in flow through the emergency spillway on a more frequent basis than planned, thereby increasing the potential for gully erosion.
12. The bid packet that FWS provided to the contractor only contained the table of quantities from our plans. NRCS always provides the landowner and contractor(s) with a complete copy of plans and specifications.

This dam does not appear to meet any of our specifications, and it was not built according to the set of plans we provided. Significant changes were made by FWS which could jeopardize the safety of the structure. Based on the design changes made by FWS and the construction deficiencies observed, this dam will have a much shorter life than the NRCS design of 25 years. Therefore, NRCS cannot be held responsible for any partial or complete failure of the structure.

If you have any questions, please give me a call at 605-692-2344.

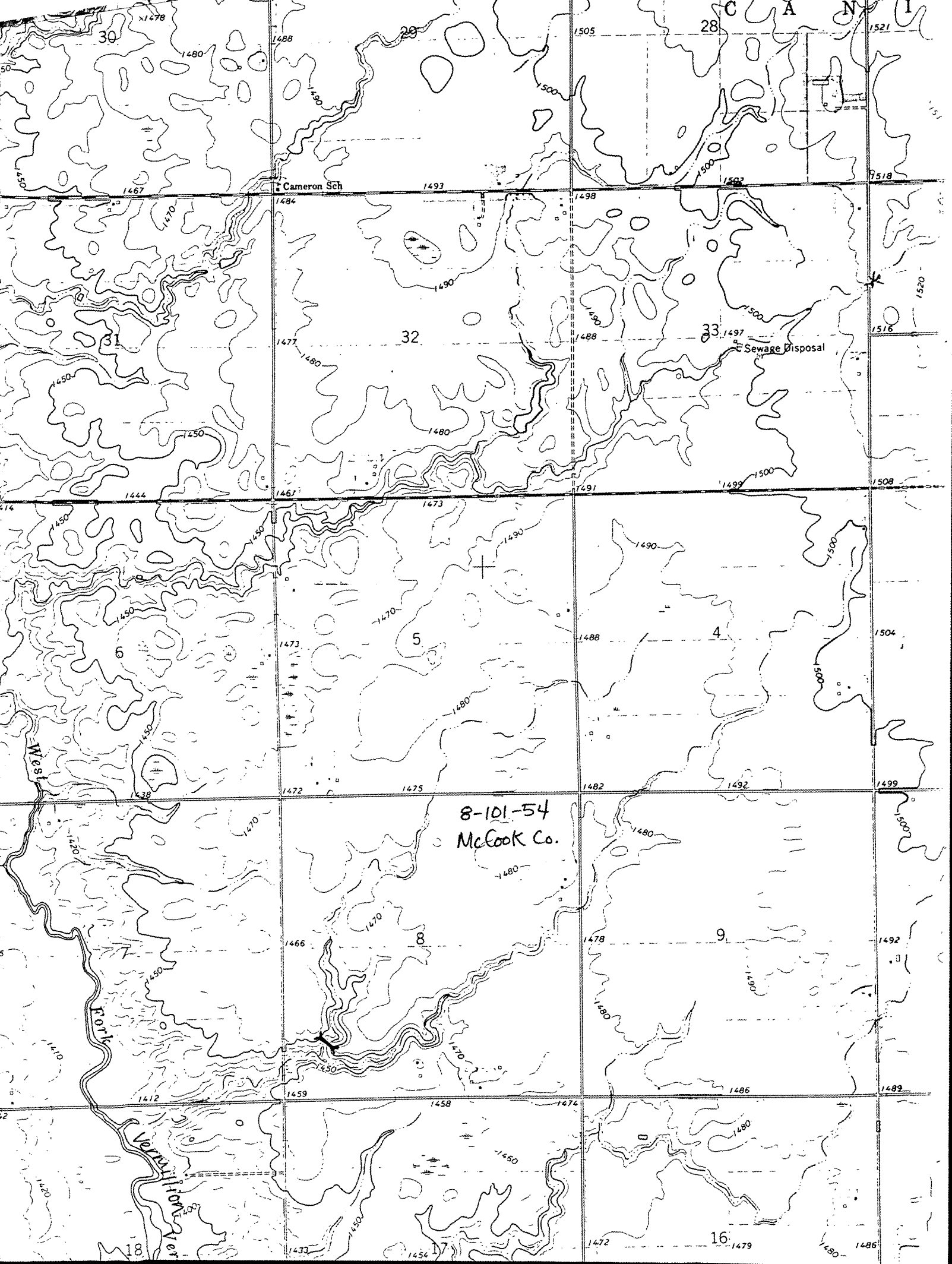
Sincerely,



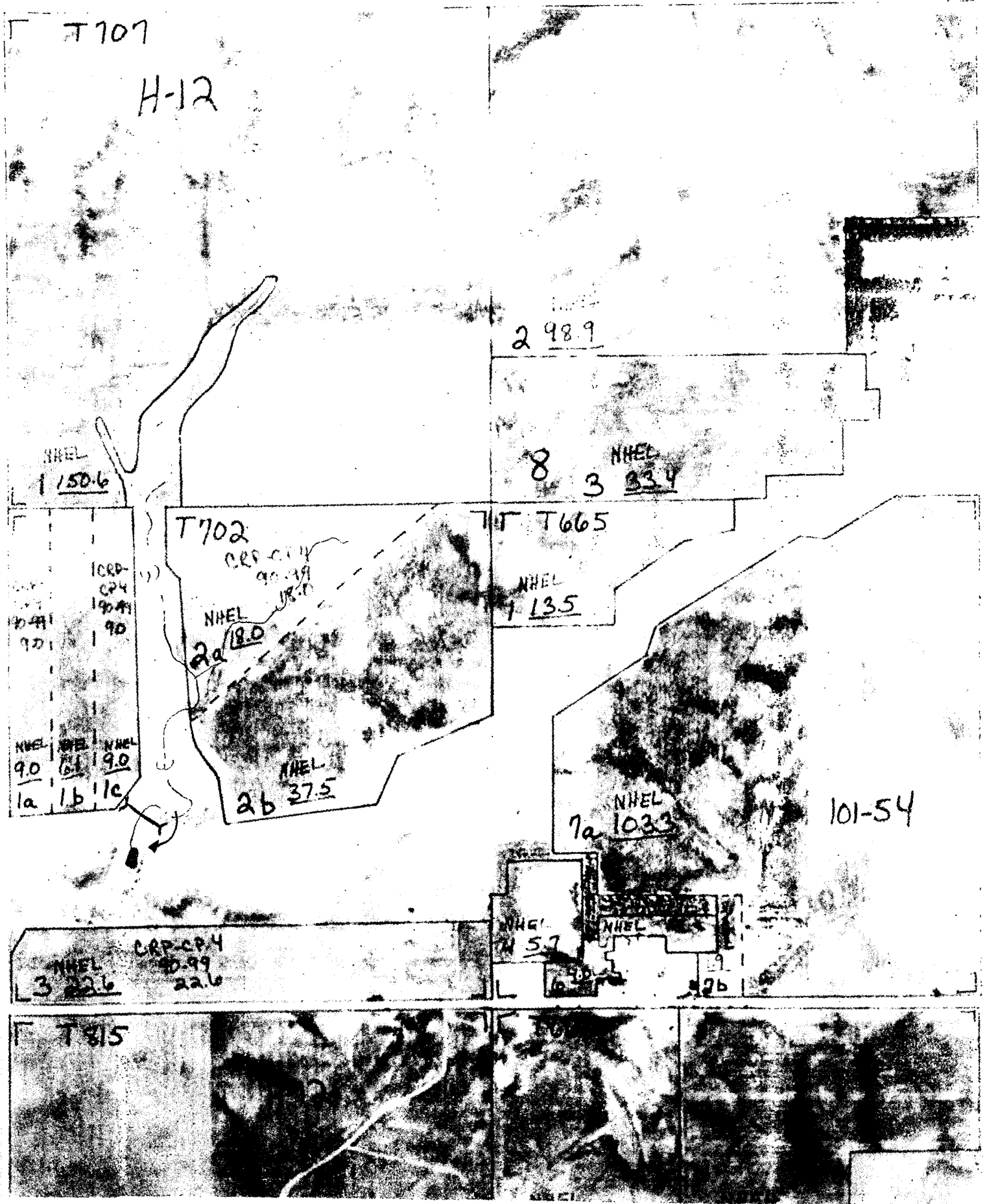
GARY J. COPLAN

Assistant State Conservationist (Field Operations)

cc: Tim Schaal, Natural Resources Engineer, DENR, Pierre
Dean Fisher, State Conservationist, NRCS, Huron
Dwight Hale, State Conservation Engineer, NRCS, Huron
Michelle Burke, Agricultural Engineer, NRCS, Brookings
Dan Mehlhaf, District Conservationist, NRCS, Salem
Danny Merchen, Soil Conservation Technician, NRCS, Parker
Pete Anderson, Agricultural Engineer, NRCS, Brookings



NOT TO SCALE



Client : Bill Cooper

By: dlm

Date: 07-30-96

County : McCook

State: sd

Checked: _____

Date: _____

Practice: pond

Drainage Area : 570 * Acres
 Curve Number : 72 *
 Watershed Length : 10000 Feet
 Watershed Slope : 1.83 Percent
 Time of Concentration: 3.12 Hours
 Rainfall Type : II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr Rainfall (in)	2.1	2.6	3.4	3.9	4.6	5.2	5.7
Ia/P Ratio	0.37	0.30	0.23	0.20	0.17	0.15	0.14
Runoff (in)	0.34	0.58	1.06	1.39	1.89	2.35	2.75
Unit Peak Discharge (cfs/acre/in)	0.187	0.210	0.225	0.231	0.238	0.242	0.245
Peak Discharge (cfs)	36	70	136	183	257	325	384

* - Value(s) provided by CN subroutine (F9)

EFM-2 ESTIMATING RUNOFF AND PEAK DISCHARGE VERSION 1.10
Curve Number Computation

Client : Bill Cooper By: dlm Date: 07-30-96
County : McCook State: sd Checked: Date:
Practice: pond

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
Acres (CN)				
CULTIVATED AGRICULTURAL LANDS				
Row crops SR + Crop residue good	-	430(75)	-	-
OTHER AGRICULTURAL LANDS				
Pasture, grassland or range good	-	140(61)	-	-
Total Area (by Hydrologic Soil Group)	570			
	=====			

TOTAL DRAINAGE AREA: 570 Acres WEIGHTED CURVE NUMBER: 72

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

SD-ENG-29
Rev. 12/84

HYDROLOGIC DATA SHEET

Operator: Bill Cooper Farm No.: _____

Structure or Practice: Pond

Location: 101-54-8 SW 1/4 County: McCook

Computations by: Danny Merham Date: 11-22-95

PEAK RATE AND VOLUME OF RUNOFF
(See Chapt. 2, Eng. Field Manual)

Soil Group	Land Use and Condition	Curve Number	Acres	(CN) (Acres)
	SEE OHIO Version			

TOTAL

Weighted CN = _____

Average Watershed Slope _____ Slope Factor _____

Weighted CN	Design Storm	P Inches Rainfall	Q Inches Runoff	q (ft ³ /s) Peak Flow	Storm Volume Ac.-In.

ANNUAL YIELD

% Chance	Freq.	Isogram No.	Area Acres	Inches	Ac.-In.	Ac.-Ft.
50	2 year	3	570	.54	347	28.9

U. S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

SD-ENG-45
2-83

LOG SHEET FOR EARTH BORINGS

Cooperator B. A. Cooper Practice Dam

CD _____ County _____

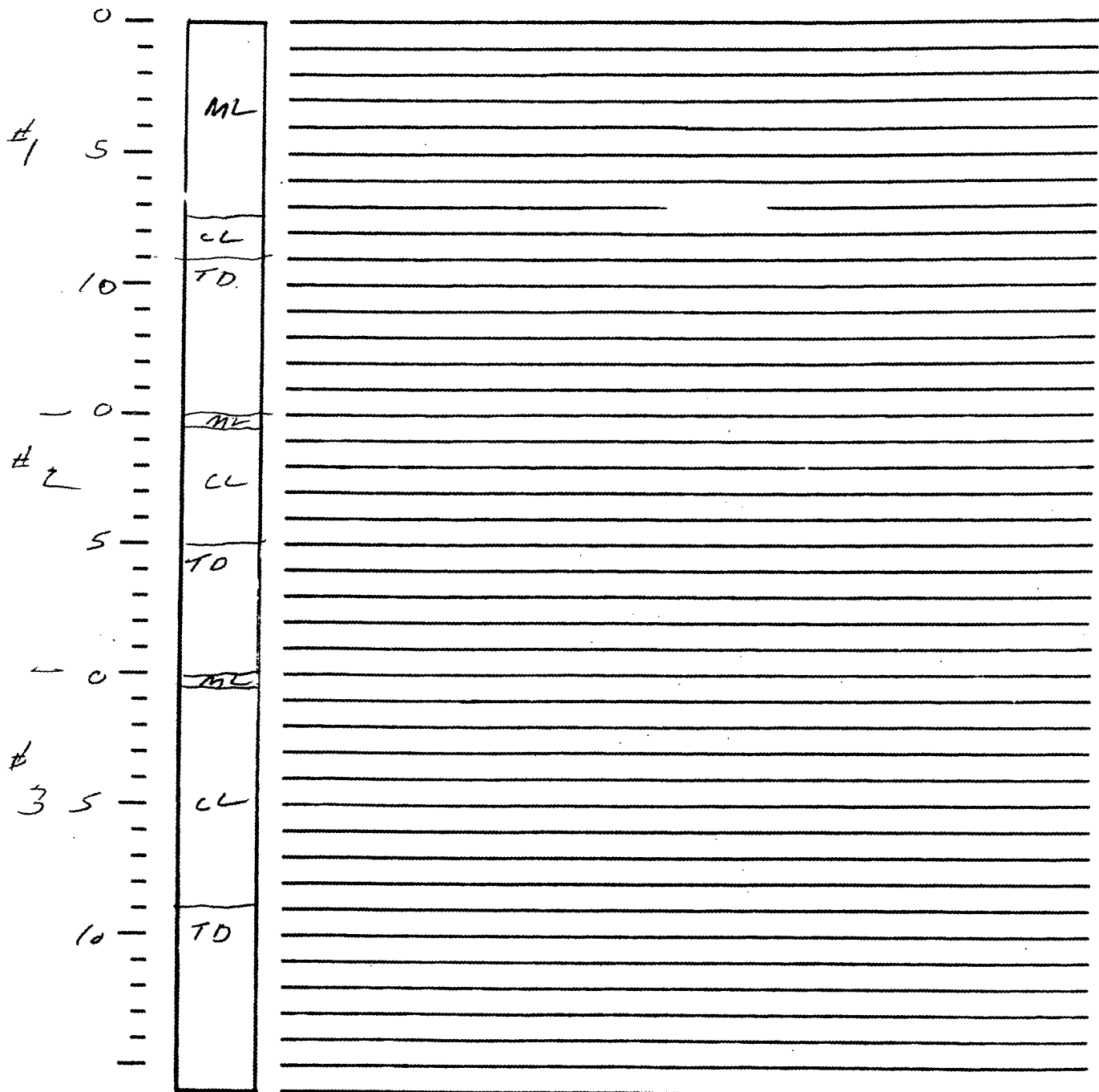
Farm, I.D. No. _____ Technician D. Branson D. Meacham Date 12/5/95

Sec. _____ T _____ R _____ Hole No. 1-2-3 Hole Elevation _____

Drilling Location #1 E Channel + Dam #2 75' south E Channel

Unified Soil _____

Class Symbol _____ Description of Material #3 E Spwy + E Dam



New Version (72)

Hydrology and Hydraulic Design -- Principal Spillway

Landowner: Bill Cooper Site: Livestock Dam
Location: SW1/4 8 101-54 in McCook County, SD

Computer Operator: dlm -- Routed on 07-30-1996 @ 13:40:12

<< Hydrology Input >>

Drainage Area = 570 acres -- P - 2 24 Hour Rainfall = 2.6 Inches

Type II Storm

Runoff Curve Number = 72 Time of Concentration = 2.00 Hours

<< Principal Spillway Data for a Hood Inlet >> Pipe type = SPP >>

Pipe Diameter = 18 Inches

Type of Principal Spillway Outlet >> Cantilever

Estimated Conduit Length = 90 Feet Mannings roughness coefficient = 0.010

Inlet Elevation = 91.9 Principal spillway outlet = 77.8

Elevation of the ditch bottom at the centerline of fill = 77.1

Storage below crest = 31.02 ac. ft. Aer. sediment storage = 0.00 ac. ft.

<< Elevation-Storage-Outflow Table >				
Elevation (Ft.)	Storage (Ac. Ft.)	Outflow (CFS)	*	Elevation (Ft.)
91.9	0.00	0.00	*	98.0
92.0	0.45	0.15	*	99.0
93.0	5.08	3.53	*	100.0
94.0	9.96	15.23	*	101.0
95.0	15.09	33.05	*	102.0
96.0	20.47	34.05	*	103.0
97.0	26.10	35.02	*	

The emergency spillway is set at elevation << 94.6 >>
with a temporary storage of << 13.04 >> acre feet
and a total storage to this elevation of << 44.06 >> acre feet

The <<TR-60>> product for this structure
is 771 and the effective fill height is 17.5 feet

The P- 2 year rainfall of 2.6 inches
produces a peak runoff of 96 cfs

Owner: Bill Cooper

- Principal Spillwa

TIME HR.	INFLOW CFS	OUTFLOW CFS	ELEVATION FEET	STORAGE ACRE-FT	TIME HR.
11.0	0.02	0.00	91.91	0.02	18.6
11.2	0.02	0.00	91.91	0.02	18.8
11.4	0.02	0.00	91.91	0.02	19.0
11.6	0.03	0.00	91.91	0.02	19.2
11.8	0.03	0.00	91.91	0.02	19.4
12.0	0.04	0.00	91.91	0.02	19.6
12.1	0.56	0.00	91.91	0.03	19.7
12.2	1.61	0.00	91.91	0.04	19.8
12.3	4.20	0.01	91.91	0.06	19.9
12.4	7.84	0.03	91.92	0.11	20.0
12.5	13.03	0.06	91.94	0.20	20.1
12.6	19.77	0.10	91.97	0.33	20.2
12.7	28.07	0.19	92.02	0.53	20.3
12.8	38.44	0.39	92.08	0.80	20.4
12.9	49.05	0.65	92.15	1.16	20.5
13.0	59.67	0.97	92.25	1.60	20.6
13.1	68.21	1.35	92.36	2.12	20.7
13.2	76.75	1.78	92.49	2.70	20.8
13.4	87.12	2.74	92.77	4.02	21.0
13.6	95.85	4.43	93.08	5.48	21.2
13.8	88.08	7.83	93.37	6.90	21.4
14.0	82.36	10.84	93.63	8.15	21.6
14.2	72.68	13.43	93.85	9.23	21.8
14.4	64.21	15.69	94.03	10.12	22.0
14.6	56.95	18.20	94.17	10.84	22.2
14.8	51.51	20.21	94.28	11.42	22.4
15.0	46.06	21.80	94.37	11.88	22.6
15.2	42.13	23.04	94.44	12.23	22.8
15.4	38.19	24.00	94.50	12.51	23.0
15.6	34.87	24.69	94.54	12.71	23.2
15.8	32.18	25.18	94.56	12.85	23.4
16.0	29.49	25.49	94.58	12.94	23.6
16.2	27.83	25.67	94.59	12.99	23.8
16.4	26.17	25.74	94.60	13.01	24.0
16.6	24.62	25.72	94.59	13.01	24.2
16.8	23.17	25.62	94.59	12.98	24.4
17.0	21.72	25.44	94.58	12.93	24.6
17.2	20.89	25.21	94.57	12.86	24.8
17.4	20.06	24.95	94.55	12.78	25.0
17.6	19.24	24.65	94.53	12.70	25.2
17.8	18.41	24.33	94.52	12.60	25.4
18.0	17.58	23.97	94.50	12.50	25.6
18.2	17.06	23.60	94.47	12.40	25.8
18.4	16.55	23.22	94.45	12.29	26.0

- Emergency Spillwa

TIME HR.	INFLOW CFS	OUTFLOW CFS	ELEVATION FEET	STORAGE ACRE-FT	TIME HR.
11.0	7.73	0.01	91.91	0.05	18.6
11.2	9.20	0.06	91.94	0.19	18.8
11.4	11.05	0.11	91.98	0.36	19.0
11.6	13.25	0.21	92.02	0.56	19.2
11.8	16.20	0.38	92.07	0.80	19.4
12.0	19.88	0.59	92.14	1.08	19.6
12.1	23.78	0.72	92.17	1.26	19.7
12.2	31.57	0.88	92.22	1.48	19.8
12.3	44.43	1.11	92.29	1.79	19.9
12.4	62.86	1.42	92.38	2.22	20.0
12.5	85.26	1.86	92.51	2.82	20.1
12.6	112.72	2.44	92.68	3.62	20.2
12.7	146.34	3.21	92.91	4.66	20.3
12.8	183.41	5.66	93.19	5.99	20.4
12.9	219.65	9.50	93.52	7.60	20.5
13.0	255.90	13.98	93.90	9.46	20.6
13.1	282.09	24.16	94.31	11.53	20.7
13.2	308.27	43.64	94.73	13.69	20.8
13.4	347.54	113.86	95.50	17.80	21.0
13.6	337.57	154.24	96.12	21.15	21.2
13.8	312.26	281.88	96.40	22.70	21.4
14.0	281.55	291.28	96.42	22.81	21.6
14.2	241.95	266.36	96.36	22.51	21.8
14.4	208.13	231.79	96.29	22.09	22.0
14.6	180.09	201.44	96.22	21.72	22.2
14.8	159.61	176.19	96.17	21.41	22.4
15.0	139.13	154.56	96.12	21.15	22.6
15.2	125.42	152.88	96.07	20.84	22.8
15.4	111.72	157.03	95.95	20.19	23.0
15.6	100.47	143.47	95.81	19.45	23.2
15.8	91.70	131.01	95.68	18.77	23.4
16.0	82.93	119.78	95.57	18.15	23.6
16.2	77.08	110.05	95.46	17.57	23.8
16.4	71.24	101.27	95.36	17.05	24.0
16.6	66.18	93.26	95.28	16.58	24.2
16.8	61.90	86.11	95.20	16.15	24.4
17.0	57.62	79.66	95.13	15.77	24.6
17.2	54.92	73.68	95.06	15.44	24.8
17.4	52.22	68.43	95.01	15.15	25.0
17.6	49.74	64.10	94.96	14.89	25.2
17.8	47.48	60.29	94.92	14.67	25.4
18.0	45.22	56.86	94.88	14.47	25.6
18.2	43.98	53.85	94.84	14.29	25.8
18.4	42.73	51.27	94.81	14.14	26.0

<<Earthfill quantities based of centerline of fill section>>
Under file code BillCoo.xse

(Includes berm, main fill, core trench & spway dike)

Landowner ----- Bill Cooper Site no.----- Livestock Dam
District ----- McCook County
Location ----- SW1/4 8 101-54
Computed by --- dlm
Date ----- 07-30-1996 @ 13:40:49

Top of fill elev ----- 97.6
Top width ----- 10 Feet
Emergency spillway elev. ----- 94.6
The emergency spillway is located on the left side
Upstream fill slope = 3.0:1 Downstream fill slope = 2.0:1
Elevation of crest ----- 91.9
Berm width ----- 0 feet

Core trench depth = 9.0 feet with a length of 174.3 feet
(Core trench assumed 10.0 ft. bottom w/ 1.0:1 sideslopes)

Spillway dike length = 1 feet with a 12 % sidehill slope
Emergency dike topwidth = 4 feet with sideslopes of 3.0:1 and 3.0:1
with a fill height of 3.0 feet

* * * * *	Station	Elevation	Yardage x 2	*
* -----	-----	-----	-----	*
* 90.0	103.8	0.0	*	
* 156.0	100.9	0.0	*	
* 200.0	96.6	0.0	*	
* 216.4	94.6	0.0	*	
* 222.4	93.9	21.9	*	
* 236.0	92.2	126.6	*	
* 237.5	91.9	18.3	*	
* 286.0	82.4	1823.8	*	
* 320.0	77.1	2871.4	*	
* 359.0	77.0	4166.7	*	
* 393.0	86.6	2435.3	*	
* 411.8	91.9	457.0	*	
* 428.5	96.6	119.4	*	
* 431.9	97.6	3.5	*	
* 440.0	100.0	0.0	*	
* 460.0	103.0	0.0	*	
* * * * *	* * * * *	* * * * *	* * * * *	

Main fill including berm (if any berm) ----- 6020.0 cu. yds. *See SD-ENG-47*
Emergency spway dike fill ----- ~~270~~ cu. yds.
Core trench ----- ~~1015.1~~ cu. yds. *See SD ENG. 42*
Total structure yardage ----- 7038.1 cu. yds.

<<< Notes >>>

Fill yardage includes stripping 0.50 ft. deep plus (berm yardage)
Emergency dike yardage based on depth plus 0.50 ft. deep stripping
Core trench yardage based on depth minus 0.50 ft. deep stripping
Settlement of 5.0 % was used on the earthfill computations

<< Structure Summary >>

Computed by: dlm on 07-30-1996 @ 13:40:54

Owner's Name ----- Bill Cooper
Site name or number ----- Livestock Dam
District ----- McCook County, SD
Location ----- SW1/4 8 101-54
Drainage area ----- 570 Acres

Permanent pond area ----- 4.48 acres
Permanent storage below crest ----- 31.02 acre feet
Temporary storage to the emergency spillway ----- 13.04 acre feet
Total storage to the emergency spillway ----- 44.06 acre feet
Total storage to the top of fill ----- 60.65 acre feet

Fill height at centerline of fill ----- 20.5 feet at time
Effective fill height ----- 17.5 feet of staking
Overall fill height to downstream toe ----- 20.5 feet Pete Anderson

TR-60 product > > > 771 < < <

<< Principal Spillway Hydrology Design >>

Rainfall Distribution Type >>II << Runoff Curve Number 72
P 2 - 24 hr. rainfall = 2.6 inches -- time of concentration = 2.00
Peak runoff = 96 cfs -- Peak runoff volume = 27.62 ac. ft.

<< Principal Spillway >>

⁷⁸
~~80~~ Lin. Feet of 18 inch diam. SPP with a Hood inlet
Mannings Friction value 'n' = 0.0100

<< Emergency Spillway Hydrology Design >>

P 25 - 24 hr. rainfall = 4.6 inches
Peak runoff = 348 cfs -- Peak runoff volume = 89.99 ac. ft.

<< Emergency Spillway >>

Bottom width of the emergency spillway = 70 feet
Vegetated Retardance = 'B' Crest Length = 100 feet
Emergency spillway flow = 261.7 cfs with a velocity of 5.0 ft./
Minimum exit slope = 1% -- Maximum exit slope = 8%

<< Structure Summary continued >>

Computed by: dlm on 07-30-1996 @ 13:40:58

Owner's Name ----- Bill Cooper
Site name or number ----- Livestock Dam
District ----- McCook County, SD
Location ----- SW1/4 8 101-54

* * * Pipe layout dimensions * * *

Top of constructed fill = 98.6
Settled top of fill = 97.6
Upstream fill slope = 3.0:1
Emergency spillway = 94.6
Pipe outlet = 77.8
Elevation of crest = 91.9
Frontslope dimension = 20.1 feet
Length of pipe beyond toe = ~~4.0~~ 2.0 feet
Length of pipe from pipe outlet to elbow = 16.0 feet
Fabricate a 11 degree elbow located 16.0 feet from the outlet

Top width = 10 feet
Downstream fill slope = 2.0:1
Downstream toe elevation = 77.1
Elbow elevation = 78.2
Berm width = 0
Backslope dimension = 43.0 feet

**** Cost Estimate ****

6023 cubic yards earth fill @ 1.25 = 7528.98
1015 cubic yards core trench @ 0.80 = 812.08
80 lin. ft. of 18 in. diameter SPP conduit @ 15.63 = 1250.40

Total estimated cost 9591.46

CONSTRUCTION SPECIFICATIONS

for

Bill Cooper
Fish Pond
101-54-8 SW 1/4

Prepared by:

USDA-NATURAL RESOURCES CONSERVATION SERVICE

Salem field office

Assisting:

McCook Conservation District

CHECKLIST

SOUTH DAKOTA CONSTRUCTION AND MATERIAL SPECIFICATIONS

CONSTRUCTION SPECIFICATIONS

Check Column	Specification No. SD-	Title
	1	Clearing 6/82
	2	Clearing and Grubbing 6/82
	3	Structure Removal 6/82
✓	4	Stripping 6/82
✓	5	Excavation 6/82
	6	Excavated Ponds (Dugouts) 6/82
	7A	Earth Fill - Class A - (Controlled Compaction) 6/82
✓	7S	Earth Fill - Class S - (Method Type Compaction) 6/82
	7U	Earth Fill - Class U - (Uncompacted) 8/71
	8	Rock Riprap and Bedding 6/82
	9	Drain Fill and Filter 6/82
✓	10	Salvaging and Spreading Topsoil 6/82
	11	
	12A	Concrete (Class 3500) 6/82
	12B	Concrete for Minor Structures (less than 5 c.y.) 6/82
	13	Steel Reinforcement 8/71
	14	
✓	15	Corrugated Metal Pipe Conduits 11/87
	16	Timber Fabrication and Installation 7/77
✓	17	Metal Fabrication and Installation 11/87
	18	Wire Mesh Gabions 6/82
	19	

CONSTRUCTION SPECIFICATIONS

Check Specification	Column No. SD-	Title
20		Pipeline-Plastic (Irrigation) 6/82
20B 20A		Corrugated Polyethylene Tubing with 5mm i.d. Pipeline-Plastic (Stockwater and/or Domestic) 6/82 5/92
21		Steel Pipelines 6/82
22		Concrete Pipelines 6/82
23		Asbestos Cement Pipelines 8/71
24		Land Leveling 11/77
25		Diversion 6/82
26		Terraces 6/82
27		Waterway Improvement 8/71
28		Seeding (Requires Specific Site Recommendations) 8/71
29		Sodding (Requires Specific Site Recommendations) 8/71
30		Fencing 6/82
31		Cathodic Protection 11/79
32		Well 8/86
33		Mulch Blankets and Nets 10/86
		MATERIAL SPECIFICATIONS
50		Zinc-Coated Iron or Steel Corrugated Pipe 8/71
51		Aluminum Corrugated Pipe 8/71
52		Steel Pipe and Fittings 8/71
53		Concrete Irrigation Pipe, Drainage Pipe, and Drain Tile 10/75
54		Asbestos-Cement Pipe 6/82
55		Plastic Pipe 6/82

CONSTRUCTION SPECIFICATION

SD-4 STRIPPING

4.1 SCOPE

The work shall consist of removing topsoil and other undesirable materials from borrow areas and foundations of structures and earth fills.

4.2 GENERAL

The stripping excavation shall extend to a depth sufficient to expose subsoil reasonably free of roots and other perishable material. Excavated earth material deemed satisfactory by the technician shall be used for earth fill. All waste material shall be disposed of in areas shown on the drawings or as directed by the technician. Stripped material suitable for topsoil shall be stockpiled and respread over disturbed areas as directed by the technician.

4.3 STRIPPING FOUNDATIONS

Stripping excavation shall extend to consolidated subsoil and shall be to reasonably smooth surfaces free of unconsolidated or loose soil. Unless otherwise shown on the drawings, foundation slopes shall be excavated to one to one, or flatter slopes.

4.4 STRIPPING BORROW AREAS

The areas from which borrow is to be taken shall be stripped to sufficient depth to expose material suitable for the earth fill.

CONSTRUCTION SPECIFICATION

SD-5 EXCAVATION

5.1 SCOPE

The work shall consist of all excavations to the lines and grades as shown on the drawings and the use and disposal of the excavated materials.

5.2 CLASSIFICATION

Common excavation shall be defined as the excavation of all materials that can be removed and transported by heavy duty construction equipment having a power rating of at least 200 net peak flywheel horsepower 1/, and includes boulders and loose rock less than 1 cu. yd. in volume.

Rock excavation shall be defined as the excavation of all hard compacted or cemented materials requiring blasting or larger equipment than defined under common excavation, including boulders and loose rock 1 cu. yd. or greater in volume.

5.3 USE OF EXCAVATED MATERIALS

Excavated materials deemed satisfactory by the technician shall be used for earth or rock fill to the extent needed.

5.4 DISPOSAL OF WASTE MATERIAL

All surplus or waste material shall be disposed of in areas shown on the drawings or as directed by the technician, and left in a neat, sightly condition and sloped to provide drainage.

5.5 BRACING AND SHORING

Excavated surfaces too steep to be stable shall be supported to prevent soil movement. The contractor shall furnish, place, and subsequently remove the supports.

5.6 STRUCTURE AND TRENCH EXCAVATION

Structure or trench excavation shall be approved by the technician before any structure, pipe, or earth fill is placed in the excavation.

5.7 BORROW EXCAVATION

When quantities of suitable materials obtained from specified excavations are insufficient to construct specified fills.

1/ D8 Caterpillar or equivalent

additional materials shall be obtained from the designated borrow area as directed by the technician.

Borrow pits shall be excavated and finely dressed in a manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions.

5.8 BLASTING

The transportation, handling, storage, and use of dynamite and other explosives shall be directed by a person of proven experience and ability in blasting operations.

Blasting shall be done in such a way as to prevent damage to the work or unnecessary fracturing of the foundation.

CONSTRUCTION SPECIFICATION

SD-7S EARTH FILL-CLASS S

7S.1 SCOPE

The work shall consist of the construction of compacted earth fills where the amount of compaction is to be controlled by a method type of specification.

7S.2 MATERIALS

All fill materials shall be obtained from required excavations and designated borrow areas. The selection, blending, routing and disposition of materials shall be subject to approval by the technician.

Fill materials shall not contain frozen material, sod, brush, roots, or other perishable materials, or rocks larger than 8 inches in diameter. Fill shall not be placed on a frozen surface.

7S.3 FOUNDATION PREPARATION

After stripping (see stripping specification), the foundation shall be prepared. The foundation area shall then be compacted by the process used on the fill.

7S.4 PLACEMENT

All foundation excavations and/or preparation shall be completed before placing fill. The fill shall be placed such that the distribution of materials is essentially uniform throughout the entire fill and is free from lenses, pockets, streaks, or layers of materials differing substantially from surrounding material.

Fill, adjacent to structures, shall be placed in a manner that will prevent damage to the structures and allow the structures to assume the backfill loads gradually and uniformly. Equipment weighing more than 400 pounds shall not be operated within 2 feet of any structure.

Fill shall be placed in approximately equal horizontal layers. Fill layer thicknesses shall not exceed 9 inches for machine compaction or 4 inches for hand compaction (including hand directed power tampers adjacent to structures).

7S.5 MOISTURE CONTENT

The fill material shall have a moisture content that when kneaded in the hand will form a ball which does not easily crumble when struck sharply with a pencil or which does not crumble when pressed between the hands.

If the soil is too wet, it will yield free water when kneaded in the hand. The fill may have to be wetted or dried to achieve proper moisture control.

7S.6 COMPACTION (CLASS S)

The fill shall be compacted by one of the following methods.

- a. By routing the hauling and spreading equipment such that all points of the fill is traversed by at least one tread track of the loaded equipment, parallel to the centerline of the fill.
- b. By at least two passes of a tamping (sheepfoot) roller weighing at least 100 pounds per square inch of bearing area.

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers or plate vibrators. Heavy equipment shall not be operated within 2 feet of any structure.

Compaction of fill adjacent to concrete structures shall not be started until the following time limits have elapsed after placement of the concrete.

<u>Structure</u>	<u>Time Interval</u>
Walls and counterforts	14 days
Conduits and Spillway Risers (cast in place)	14 days
Conduits, precast, cradled	2 days
Conduits, precast, bedded	1 day
Anti-seep Collars and Cantilever pipe props	3 days

CONSTRUCTION SPECIFICATION

SD-10 SALVAGING AND SPREADING TOPSOIL

The work shall consist of salvaging topsoil from borrow pits or other excavation and spreading it in the designated areas to the specified depths.

10.2 QUALITY OF TOPSOIL

Topsoil shall consist of friable soil reasonably free of grass, roots, weeds, sticks, stones, or other foreign materials.

10.3 EXCAVATION

Topsoil shall be removed after clearing and grubbing and removing vegetation and shall be stockpiled at locations approved by the technician. Objectionable materials shall be removed and buried, or disposed of, at locations approved by the technician.

10.4 SPREADING

Spreading shall not be done when the ground or topsoil is frozen, excessively wet or otherwise in a condition detrimental to the work. Surfaces to be covered shall be lightly scarified just prior to the spreading operation.

All earth fills not to be submerged shall be covered with topsoil to a depth of 6 to 18 inches measured normal to the surface of the fill and placed to the neat lines shown on the drawings.

After placement is completed, the topsoil surface shall be left in a condition that will permit seeding equipment to be operated without excessive smoothing.

Hydrology and Hydraulic Design -- Emergency Spillway

Landowner: Bill Cooper Site: Livestock Dam
Location: SW1/4 8 101-54 in McCook County, SD

Computer Operator: dlm -- Routed on 07-30-1996 @ 13:40:30

<< Hydrology Input >>

Drainage Area = 570 acres -- P - 25 24 Hour Rainfall = 4.6 Inches

Type II Storm

Runoff Curve Number = 72 Time of Concentration = 2.00 Hours

<< Principal Spillway Data for a Hood Inlet >< Pipe type = SPP >>

Pipe Diameter = 18 Inches

Type of Principal Spillway Outlet >> Cantilever

Estimated Conduit Length = 90 Feet Mannings roughness coefficient = 0.010

Inlet Elevation = 91.9 Principal spillway outlet = 77.8

Elevation of the ditch bottom at the centerline of fill = 77.1

Storage below crest = 31.02 ac. ft. Aer. sediment storage = 0.00 ac. ft.

<< Elevation-Storage-Outflow Table >				
Elevation (Ft.)	Storage (Ac. Ft.)	Outflow (CFS)	*	Elevation (Ft.)
91.9	0.00	0.00	*	97.0
92.0	0.45	0.15	*	97.1
93.0	5.08	3.53	*	97.6
94.0	9.96	15.23	*	98.0
94.6	13.04	33.05	*	98.1
95.0	15.09	67.89	*	99.0
95.1	15.63	77.71	*	100.0
95.6	18.32	123.17	*	101.0
96.0	20.47	162.62	*	102.0
96.1	21.03	146.90	*	103.0
96.6	23.85	378.94	*	

Elevation of the emergency spillway = 94.6

Bottom width of the emergency spillway = 70 feet

Vegetated Retardance = ' B ' Crest Length = 100 feet

Flow depth of the water in the emergency spillway = 1.83 feet

Emergency spillway flow = 261.7 cfs with a velocity of 5.0 ft./sec.

Minimum exit slope = 1% -- Maximum exit slope = 8 %

Maximum water surface in the emergency occurs at elevation 96.4

The P- 25 year rainfall of 4.6 inches
produces a peak runoff of 348 cfs

The total storage to the top of fill elevation 97.6 equals 60.7 acre feet

CONSTRUCTION SPECIFICATION

SD-15 CORRUGATED METAL PIPE CONDUITS

The work shall consist of furnishing and placing circular, arched, or elliptical corrugated metal pipe shown on the plans.

15.2 MATERIALS

Pipe and fittings shall conform to the requirements of Material Specification 50 or Material Specification 51, whichever is specified. When specified, caulked seam corrugated metal pipe shall conform to the following additional requirements:

- (1) Caulked seam corrugated metal pipe shall have all circumferential and horizontal seams caulked with an asphalt compound before riveting. This shall be accomplished by applying a uniform bead (1/4 inch minimum diameter) of the asphalt compound to the inner lap surface before riveting such that when the rivets are placed all voids are filled and a coating of asphalt is between the lap surfaces.
- (2) The asphalt compound shall consist of an asphalt base combined with asbestos fiber and other inert filler material to form a heavy-bodied compound that will not sag or run out of the seam. The compound should contain 63 to 68 percent solids by weight. It shall be similar in type and equal in quality to Trumbull 5X Asphalt Mastic, knife grade, as manufactured by the Trumbull Asphalt Company of Delaware.

15.3 HANDLING THE PIPE

The Contractor shall furnish such equipment as is necessary to place the pipe without damaging the pipe or coatings. The pipe shall be transported and handled in such a manner as to prevent bruising, scaling, or breaking of the zinc, bituminous or plastic coating.

Whenever the coating or zinc coated pipe is damaged in any individual area larger than 12 square inches, or if more than 0.2 percent of the total surface area of the pipe is damaged, the section will be rejected.

Whenever the coating on bituminous or plastic coated pipe is damaged in any individual area that exceeds 36 square inches or when the total area of breaks exceeds 0.5 percent of the total surface area of the pipe, the section will be rejected.

15.4 REPAIR OF DAMAGED COATINGS

Breaks, scuffs or other damage to the various coatings shall be repaired as follows:

- (1) Zinc Coating - by thoroughly wire brushing and cleaning the damaged area with solvent. Then painting two coats of zinc dust-zinc oxide primer conforming to Federal Specification TT-P-641, Type III or zinc dust paint conforming to Military Specification MIL-P-21035.
- (2) Bituminous Coating - by the application of two coats of hot asphaltic paint or a coating of cold-applied bituminous mastic. The repair coating shall be at least 0.05 inches thick after hardening and shall bond securely and permanently to the pipe. The material shall meet the physical requirements of the original coating.
- (3) Plastic or Vinyl Coating - by using a plastic coating similar and equal to Daubond 1/ DC 8702 elastomeric culvert coating, to achieve a thickness equal to the original coating.

15.5 LAYING AND BEDDING THE PIPE

Unless otherwise specified, the pipe shall be installed in accordance with the manufacturer's recommendations. The pipe shall be laid with the outside laps of circumferential joints pointing upstream and with longitudinal laps at the sides at about the vertical midheight of the pipe. Field welding or corrugated galvanized iron or steel pipe will not be permitted. Unless otherwise specified, the pipe sections shall be joined with water-tight coupling bands, with a minimum width of 12 inches, or flanges for a flange-type connection. The area between pipe and coupling band shall be coated with either an asphalt cement to insure a water-tight joint or a rubber neoprene gasket 3/8 inch thick and as wide as the connecting band $\pm$ 1 inch.

The trench or foundation width in or on which the pipe will be laid should be at least: (a) 2 times the pipe diameter, or (b) the pipe diameter plus 2 feet, whichever is the greater.

Pipe should be laid on a moist, compacted foundation (not wet nor hard and dry). Just before the pipe is laid, spread a 2 to 3 inch layer of moist loose soil for the pipe to be placed on. The pipe should make uniform contact with the soil along its entire length.

Perforated pipe shall be laid with perforations down and oriented symmetrically about a vertical centerline. Perforations shall be clear on any obstructions at the time the pipe is laid.

1/ Daubert Chemical Company, 1200 Jorie Blvd., Oak Brook, Ill. 60521

15.6 BACK FILLING

The pipe shall be loaded sufficiently during backfilling around the side to prevent its being lifted from the bedding.

Backfill around the pipe shall be placed in layers not more than 4 inches thick before compaction. Each layer of backfill shall be compacted with power tampers or hand tamping to the same density requirements as specified for the adjacent embankment. Backfill over and around the pipe shall be brought up uniformly on all sides and shall extend a minimum of 2 feet over the pipe before earth embankment with earth moving equipment over the pipe is started. Special care shall be taken not to disturb the grade and alignment during backfill operations.

CONSTRUCTION SPECIFICATION

SD-17 METAL FABRICATION AND INSTALLATION

17.1 SCOPE

The work shall consist of furnishing, fabricating, and installing metal work including metal parts of composite structures.

17.2 MATERIALS

a. Steel

Except as noted below, steel shall be carbon steel of a malleable, weldable quality.

High strength, weather resistant steel shall conform to the requirements of ASTM A242, A588, or A514.

Bolts, nuts, washers, rods, rivets, etc., shall be of material equal to the steel being fastened.

b. Aluminum

Aluminum alloy products shall be Alloy 6061-T6.

17.3 PROTECTIVE COATINGS

a. Galvanizing

If specified on the drawings, steel shall be galvanized. Galvanizing shall conform to ASTM A386, A153, A164 Type RS, or A165 Type TS.

b. Painting

Unless shown otherwise on the plans, non galvanized metal shall be cleaned and painted using the following procedure.

- (1) Cleaning - Remove all dirt, oil, and grease by means of mineral spirit cleaning. Next, thoroughly wet the metal with a dilute (about 5 percent strength) phosphoric acid solution. Allow the acid to dry and then thoroughly rinse the surfaces with clear water and again allow to dry.
- (2) Paint - Apply three full coats of Zinc Dust - Zinc Oxide Primer (Federal Specification TT-P-641, Type III).

- (3) Application - Paints shall be thoroughly mixed at the time of application. The first coat of paint shall be applied by brushing. All other coats may be applied by brush or spray. Each coat shall be applied in such a manner as to produce a continuous paint film of uniform thickness.

Paint shall not be applied when the temperature of the item to be painted or of the surrounding air is less than 50°F. Painting shall be done only when the humidity and temperature of the surrounding air and the temperature of the metal surfaces are such that evaporation rather than condensation will result during the application and drying time.

The finished surface of each coat shall be free from runs, drops, ridges, laps, or excessive brush marks and shall present no variation in color, texture, and finish. Surfaces shall be thoroughly dry before application of each coat of paint. The surface of each dried coat shall be cleaned as necessary before application of the next coat. After installation of the metalwork, all damage to painted surfaces shall be repaired.

17.4 FABRICATION

Metal items shall be fabricated to close fit, closely conforming to the drawings. Joints to be welded, shall be welded all around, in a manner developing as much strength as possible.

17.5 ERECTION

The metal shall be erected true and plumb, closely conforming to the drawings.

Riveting and welding shall not be done until as much of the structure as will be stiffened thereby has been properly aligned.

MATERIAL SPECIFICATION

SD-20B CORRUGATED POLYETHYLENE TUBING WITH SMOOTH LINING

20B.1 SCOPE

This specification covers the quality of corrugated polyethylene (PE) tubing as specified on the drawings.

20B.2 MATERIAL QUALITY

The compound used in manufacturing the pipe shall meet the requirements of the following materials:

a. Polyethylene (PE) shall meet the requirements of ASTM D-1248.

<u>Material</u>	<u>Code Classification</u>	<u>Designation</u>
Grade P14, Class C	IC-P14	PE 1404
Grade P23, Class C	IIC-P23	PE 2306, PE 2305
Grade P33, Class C	IIIC-33	PE 3306
Grade P34, Class C	IVC-34	PE 3406

The pipe shall be homogeneous throughout and free from visible cracks, splits, holes, foreign inclusions, or other defects. The pipe shall be as uniform as commercially practicable in color, density, and other physical properties.

20B.3 PIPE REQUIREMENTS

Pipe shall meet the requirements of the following ASTM specifications for materials:

a. Polyethylene (PE)

b. D-2737 - Polyethylene (PE) Plastic Tubing

20B.4 FITTING AND COUPLER REQUIREMENTS

All fittings and couplers shall meet or exceed the same pressure rating as the pipe for which they are used. Fittings and/or couplings shall be manufactured from materials that are recommended for use with the pipe specified.

The pipe shall be furnished with separate couplers and fittings which are suitable for joining the pipe and appurtenances by means of a wrap around band or other methods recommended by the pipe manufacturer. Plastic fittings shall be made from the same type of plastic material as the pipe.

Sleeves for wrap around clamp-type joints shall provide a minimum of 4 inches of overlap between the sleeve and the pipe.

20A.5 PIPE MARKING REQUIREMENTS

Pipe specified for use shall be labeled in the manner as provided by the applicable ASTM or AASHTO Specifications and shall carry the following markings:

- a. Nominal pipe size
- b. AASHTO designation of pipe being used (AASHTO M294 Type S)
- c. Manufacturer's name (or trademark)
- d. Gaskets ASTM F-447

CONSTRUCTION SPECIFICATION

SD-28 SEEDING

28.1 SCOPE

The work shall consist of furnishing all labor, equipment, and materials for seeding a permanent grass mixture on the areas shown on the drawings.

28.2 GENERAL

The seeding and related operations shall be performed at such times as designated below.

Dates: _____

28.3 FERTILIZER

The fertilizer, where required, shall be a regular commercial fertilizer (including liquid form) meeting the requirements of the applicable state laws, and shall be in such physical condition to insure uniform application over the area to be fertilized. Rates of application per acre shall be as specified below. Organic fertilizers may be used when specifically authorized.

Types and Rates: _____

28.4 SEED

The seed shall be delivered to the site in tagged and labeled bags to show the percentage of purity and germination. The seed shall have been tested within six months prior to the date of seeding and shall conform to the latest seed laws of the United States and of the state. Species, the source of production if native grasses are used, and rates of seeding shall be as specified below.

28.5 PREPARATION OF SEEDBED

The entire area to be seeded shall be reasonably smooth and firm and all washes and gullies shall be filled to conform to the desired cross section before actual seedbed preparation is begun. At this stage of the operation, the fertilizer, if required, shall be applied uniformly and incorporated into the top 3 inches of the soil with suitable tillage equipment. The Contractor shall suspend operations when the soil is too wet or too dry.

28.6 COVER CROP

For spring seeding of a grassed waterway immediately after final shaping, a protective cover crop should be seeded as stated below (example, oats at the rate of 1.5 bushels per acre, or milo at a rate of 9 pounds per acre). Clip the cover in late boot stage, leaving a 6-10 inch stubble. Then seed the grass mix between approximately August 1 and September 1.

28.7 NURSE CROP

When waterway construction is completed after approximately August 1 and soil moisture is adequate for germination, the grass mix will be seeded at the same time as an oats nurse crop. The seeding rate for oats should be one-half of normal rate as specified below.

28.8 SOWING THE SEED

Unless otherwise specified, the seeding operation shall be performed immediately after preparation of the seedbed. The seed shall be drilled or broadcast with approved types of equipment that will insure uniform distribution of the seed.

When a grassed waterway is seeded, all machinery operations will be performed by traveling in a figure eight or serpentine pattern for the entire width of the seeded portion of the waterway. All operations in the center portion of the waterway will be at a skew to the direction of flow.

28.7 MULCHING

Grassed waterways should be mulched and/or netted when seeding cannot be accomplished before approximately September 1.

The required mulching shall be performed as soon as possible after seeding unless otherwise specified. The mulch shall be applied uniformly over the area. The type, rate, and methods of anchoring shall be as specified below.

MATERIAL SPECIFICATION

SD-50 ZINC-COATED IRON OR STEEL CORRUGATED PIPE

50.1 SCOPE

This specification covers the quality of zinc-coated iron or steel corrugated pipe and fittings.

50.2 PIPE

Zinc-coated iron or steel corrugated pipe and fittings shall conform to the requirements of Federal Specification WW-P-405 for the specified classes and shapes of pipe, and to the following additional requirements:

- a. Unless otherwise specified, circumferential shop riveted seams shall have a maximum rivet spacing of 6 inches, except that 6 rivets will be sufficient for 12-inch diameter pipe.
- b. When close riveted pipe is specified: (1) the pipe shall be fabricated so that the rivet spacing in the circumferential seams shall not exceed 3 inches, except that 12 rivets will be sufficient to secure the circumferential seams in 12-inch pipe, and (2) in those portions of the longitudinal seams that will be covered by the coupling bands the rivets shall have finished flat heads or the rivets and holes shall be omitted and the seams shall be connected by welding to provide a minimum of obstruction to the seating of the coupling bands.
- c. Double riveting or double spot welding of pipe less than 42 inches in diameter may be required. If specified, the riveting or welding shall be done in the manner specified for pipe 42 inches or greater in diameter.

50.3 COATING

Coating shall conform to the requirements of Federal Specification WW-P-405 for the specified types of coatings.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

May 15, 1998

Bill Cooper
PO Box 243
Salem, SD 57058

Dear Mr. Cooper:

We have reviewed the plans and specifications for your dam located in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 8-T101N-R54W, in McCook County. The plans and specifications as submitted are approved. Approval of the plans and specifications does not authorize construction of the project. Construction of the project may not begin until Water Permit Application No. 6077-3 is approved.

Our review was to determine compliance with the requirements of the Water Management Board Safety of Dams Rules, Chapter 74:02:08. Approval of these plans and specifications does not release you, as the owner of the dam, from the responsibility for operating and maintaining the dam in good repair to ensure the safety of the dam.

The Bill Cooper Dam will be classified as a small size Category 3 dam with an embankment height of 20.5 feet, a normal storage capacity of 31 acre-feet and a maximum storage capacity of 60 acre-feet.

If you have any questions, please feel free to contact us.

Sincerely,

Gale N. Selken, P.E.
Natural Resources Engineer IV
for John Hatch, Chief Engineer
Water Rights Program
(605) 773-3352

c: Noel N. Matson, USFWS, Madison
Dan Mehlhaf, NRCS, Salem
Michelle M. Burke, NRCS, Brookings

Water Permit Application No. 6077-3

B:11 Cooper

Top of Dam Elev. - 97.6
 P. Spillway Elev. - 91.9
 2nd. Spillway Elev. - 94.6
 DIS Toe Elev. - 77.1

Height = 20.5'

Cat. 3
 Low Hazard Dam

Normal Storage Capacity = 31 Ac-Ft
 Int. Storage Capacity = 44 Ac-Ft
 Max. Storage Capacity = 60 Ac-Ft

Int. Storage Capacity x Eff. Height = $44 \times 17.5 = 770 < 3000 \therefore$
Minimum Spillway Design = 25 yr. flood

From USGS WRI 80-80 "Tech. for Est. Flood Peaks, ... in SD"

DA = 570 ac. = 0.89 mi.²
 Slope = 20 ft/mile
 SI = 3.33

$$Q_{25} = 83.4 A^{.60} S^{.44} S_i^{-.72}$$

$$= 83.4 (.89)^{.60} (.20)^{.44} (3.33)^{-.72}$$

$$= 83.4 (.93) (3.74) (0.42)$$

$$= \underline{122 \text{ cfs}}$$

$$Q_{100} = 132 A^{.65} S^{.46} S_i^{-.67}$$

$$= 132 (.89)^{.65} (.20)^{.46} (3.33)^{-.67}$$

$$= 132 (.93) (3.97) (0.45)$$

$$= \underline{218 \text{ cfs}}$$

2nd Spillway Flow

$$Q = CLH^{3/2} \quad C = 2.6$$

$$= (2.6)(70)(3)^{1.5} \quad L = 70$$

$$= \underline{945 \text{ cfs}} \quad H = 3$$

Section 74:02:08:09

1. Top Map - OK
2. Dam Axis Profile - OK
3. Dam Max. X-Sec. - OK
4. Area Capacity - OK
5. Outlet Details - OK
6. Spillway Rating - OK
7. Spillway Details - OK
8. Specs. std NRCS - OK
9. EPP - N/A Cat. 3 - OK

NRCS Annual Yield

CN = 72, DA = 570, ISO = 3

10% = 2.2

$2.2 \times 570/12 = \underline{105 \text{ Ac-Ft}}$

50% = 0.43

$0.43 \times 570/12 = \underline{21 \text{ Ac-Ft}}$

80% = 0.15

$0.15 \times 570/12 = \underline{7 \text{ Ac-Ft}}$

REPORT ON
WATER PERMIT APPLICATION No. 6077-3

Bill Cooper
May 15, 1998

Water Permit Application No. 6077-3 has been filed by Bill Cooper to appropriate 31 acre-feet of water annually from local runoff by constructing a dam located in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 8-T101N-R54W, in McCook County. The water will be used to provide habitat for and fish and wildlife production and livestock watering.

Discussion:

The Bill Cooper Dam has been designed by the Natural Resources Conversation Service (NRCS) and the plans and specifications have been reviewed and will be approved; however, construction of the project can not begin until Water Permit Application No. 6077-3 is approved. The dam will be classified as a small size Category 3, Low Hazard dam. It will have an embankment height of 20.5 feet, a normal storage capacity of 31 acre-feet with a reservoir level at the spillway elevation, and a maximum storage capacity of 60 acre-feet with a reservoir level at the top of dam elevation. A dam of this size and hazard classification is required to have a minimum spillway design capable of passing a 25-year frequency event.

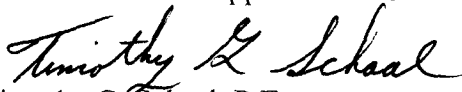
The dam is designed to have a 18 inch CPE conduit with 24 inch CMP sleeves at the inlet and outlet ends as the primary spillway structure and a 70 foot wide earthcut channel as the secondary spillway. The dam will have a drainage area of 570 acres (0.89 square miles). A 25-year frequency event for this drainage area produces a peak runoff of 122 cfs, a 100-year event produces a peak runoff of 218 cfs. The 70 foot wide earthcut spillway with 3 feet of head has a spillway capacity of approximately 945 cfs.

The annual yield for the drainage area above the dam with a 80 percent chance of occurrence, or 8 out of 10 years, is expected to be 7 acre-feet. The annual yield with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 21 acre-feet, and the annual yield with a 10 percent chance of occurrence, or 1 out of 10 years, is expected to be 105 acre-feet.

The Bill Cooper Dam will be located in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 8-T101N-R54W on an unnamed tributary to the West Fork of the Vermillion River about 1 mile upstream of the confluence. There are no existing Water Rights/Permits located on the unnamed tributary between the proposed dam and the West Fork of the Vermillion River.

Conclusions:

1. Water Permit Application No. 6077-3 should be approved since unappropriated water is available and approval should not have any adverse effect on existing Water Permits/Rights.
2. If approved, the low flow bypass requirement for downstream domestic use should be a qualification on Water Permit Application No. 6077-3.



Timothy G. Schaal, P.E.
Natural Resources Engineer III

Approved by:



Gale N. Selken, P.E.
Natural Resources Engineer IV

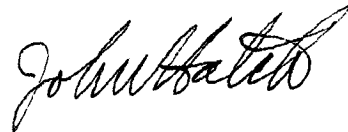
**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 6077-3, Bill Cooper**

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 Water Permit Application No. 6077-3, Bill Cooper, PO box 243, Salem, SD 57058 .

The Chief Engineer is recommending APPROVAL of Application No. 6077-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. Water Permit No. 6077-3 authorizes a dam with storage capacity of 31 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

See report on application for additional information.



JOHN HATCH, Chief Engineer
May 15, 1998



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

May 15, 1998

Noel N. Matson
US Fish & Wildlife Service
Madison Wetland Management District
P.O. Box 48
Madison, SD 57042

Dear Mr. Matson:

Water Permit Application No. 6077-3 for fish and wildlife production has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of hearing has been sent to the Publisher of the Canistota Clipper printed at Canistota, SD (Ph # (605) 296-3181). For your information, a copy of the notice, the recommendation of the Chief Engineer and a report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice of Hearing and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting. The newspaper has been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

c: Bill Cooper, P.O. Box 243, Salem, SD 57058.

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

May 15, 1998

Canistota Clipper
Box 128
Canistota, SD 57012-0128

ATTENTION: Legal Department

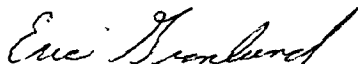
Enclosed is a Notice of Hearing on Application No. 6077-3 to Appropriate Water to be published twice. Please publish the first notice on May 21, 1998, with the second publication 7 days later.

The applicant must verify to you that the notice is to be published, before you make the first publication. **Please BILL the FOLLOWING for the cost of publication:** Noel N. Matson, US Fish & Wildlife Service, Madison Wetland Management District, P.O. Box 48, Madison, SD 57042 (Ph # (605) 256-2974).

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

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

Sincerely,


Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

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

No. 6077-3

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

Date _____

We are in receipt of your letter of May 15, 1998, enclosing Notice of Hearing to Appropriate Water by Application No. 6077-3 which was first published in our issue of _____. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

Name

Newspaper

Instruction to Newspaper - Publish first Notice on May 21, 1998, with the second publication 7 days later. The U.S. Fish and Wildlife Service is responsible for payment.

NOTICE OF APPLICATION NO. 6077-3 to Appropriate Water

Notice is given that Bill Cooper, PO Box 243, Salem SD 57058 has filed an application for a water permit to impound 31 acre-feet of water from runoff by constructing a dam located in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 8 with water impounded in the SW $\frac{1}{4}$ Section 8; all in T101N-R54W. This application requests impoundment of water sufficient to maintain water at an outlet elevation of approximately 1450 feet mean sea level and is to be used to provide habitat for fish and wildlife production and livestock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 6077-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the chief engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the chief engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and chief engineer. The applicant must file a petition if contesting the chief engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by June 8, 1998.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Nettie H. Myers, Secretary, Department of Environment and Natural Resources.

Affidavit of Publication

STATE OF SOUTH DAKOTA)

:SS

COUNTY OF MCCOOK)

The undersigned, being first duly sworn, on his oath says: THE CANISTOTA CLIPPER is a weekly newspaper of general circulation, printed and published in the City of Canistota, McCook County, South Dakota, by MATTHEW ANDERSON, and has been such newspaper during the times hereinafter mentioned; that it has bona fide circulation of more than 200 copies weekly; that it has been published within said County of McCook in the English language and admitted to the United States mail under the second class mailing privilege for more than one year next prior to the publication of the notice hereinafter mentioned, and has been printed during such period and at the present time in part in an office maintained at the said place of publication; that I, the undersigned, am either "the publisher" or "an employee of the said publisher" or said newspaper, and have personal knowledge of all the facts stated in this affidavit; that the advertisement

headed

Notice of Application

a printed copy of which is hereto attached, was printed and published in said newspaper for *two* successive weeks; that said notice was published in the issues of said paper on the dates as follows, to-wit:

The first publication being made on *5-21-98*

the second publication on *5-28-98*

the third publication on

the fourth publication on

the fifth publication on

the sixth publication on

the seventh publication on

the eighth publication on

the ninth publication on

that being the full amount of the fee for publication of the annexed notice, insures solely to the benefit of the publisher of the said newspaper; that no agreement or understanding for the division thereof have been made with any other person and that no part thereof has been agreed to be paid to any person whomsoever, and that said newspaper is a legal newspaper under the laws of the State of South Dakota.

Matt O. Anderson

Subscribed and sworn to before me this *21*

1998

Notary Public, South Dakota



Notice of Application

No. 6077-3 to

Appropriate Water

OK

Notice is given that Bill Cooper, PO Box 243, Salem, SD 57058 has filed an application for a water permit to impound 31 acre-feet of water from runoff by constructing a dam located in the SW1/4 SW1/4 Section 8 with water impounded in the SW 1/4 Section 8; all in T101N-R54W. This application requests impoundment of water sufficient to maintain water at an outlet elevation of approximately 1450 feet mean sea level and is to be used to provide habitat for fish and wildlife production and livestock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No 6077-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the chief engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the chief engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and chief engineer. The applicant must file a petition if contesting the chief engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E. Capitol, Pierre, SD 57501 (605 773-3352)" and the applicant's address is given above. A petition filed by either an interested person or the applicant must be filed by June 8, 1998.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Nettie H. Myers, Secretary of Environment and Natural Resources.

5-21-2tc





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

JUN 12 1998

Bill Cooper
P.O. Box 243
Salem, SD 57058

Dear Mr. Cooper:

Enclosed is Water Permit No. 6077-3 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Also enclosed is Form 10, Notice of Completion of Works and Application of Water to Beneficial Use, which you are to complete and submit to the Chief Engineer when you have completed the system and/or have put the water to beneficial use. An inspection can then be scheduled so that the Water License may be issued, thus completing your acquisition of a Water Right.

Very truly yours,

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

enclosures

c: Noel N. Matson, USFWS, Madison Wetland Management District, P.O. Box 48, Madison, SD 57042.

PLEASE NOTE: Certain changes may be made to your water permit usually without affecting the priority date. The location of a point of diversion may be changed or additional points of diversion may be approved if the water source remains unchanged; no additional water is appropriated; and, if irrigating, no additional land is irrigated. The change may be allowed without application or publication, if the Water Rights Program is contacted and the chief engineer makes a finding that the change does not increase the potential for interference with existing diversions.

A new water permit application is required to change water sources, increase the permitted diversion rate, or increase the irrigated acreage. If the application is approved, the water permit will receive a new priority date.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

July 29, 2002

6077-3

Bill Cooper
PO Box 243
Salem SD 57058-0243

Dear Mr. Cooper:

On May 29, 2002, the investigation of your water use system, including the extent of application of water to beneficial use, as developed under Water Permit No. 6077-3, was completed by Tim Schaal, a staff engineer with our program. Your final water right document, the water license, can now be issued.

State law requires that we charge a \$50.00 fee for the investigation and issuance of the water license. Upon receipt of the \$50.00 fee from you, we will complete processing your water license. The check or money order for the fee should be made payable to the "Water Rights Program".

Your licensed water right will be similar to a property right that can not be lost as long as the water use continues and you abide by the permit requirements.

If you have any questions regarding the water permit, investigation of your water use system or payment of the fee, please contact Genny McMath with our program at (605) 773-3352.

Sincerely,

Genny McMath
Environmental Scientist
Water Rights Program
(605) 773-3352



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

March 24, 2003

REMINDER NOTICE

6077-3

Bill Cooper
PO Box 243
Salem SD 57058-0243

Dear Mr. Cooper:

On July 29, 2002, we advised you that a \$50.00 fee was due for the completed investigation of your Water Permit No. 6077-3. The fee also covers issuance of your water license which is the final document in obtaining and perfecting a water permit.

To date, we have not received the fee and therefore can not issue the water license. Your licensed water right will be similar to a property right that can not be lost as long as the water use continues and you abide by any permit requirements.

If you have any questions regarding the water permit, investigation of your water use system or payment of the fee, please contact Genny McMath with our program at (605) 773-3352. The check or money order for the fee should be made payable to the "Water Rights Program".

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program

File No. 6077-3

WATER RIGHTS PROGRAM -- FILE DOCUMENTATION

NAME & ADDRESS: Noel Matson, USFWS, Madison, SD

DATE: June 11, 2003

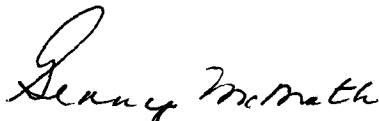
TELEPHONE: 605 256-2974

RE: Water Permit No. 6077-3 -- license fee

COMMENTS:

Two letters have been sent to Bill Cooper for payment of the licensing fee and no response has been received from him. USFWS sent in the fee for the permit application back in 1998. Prior to sending out the final notice with the billing statement, I called and spoke with Mr. Matson concerning who should pay the licensing fee for No. 6077-3.

He indicated Mr. Cooper -- the land owner should be responsible and we should keep trying to get in touch with Mr. Cooper.


Genny McMath
Environmental Scientist



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

June 11, 2003

FINAL NOTICE
Permit No. 6077-3

Bill Cooper
PO Box 243
Salem SD 57058-0243

Dear Mr. Cooper:

On July 29, 2002 and March 24, 2003, we advised you that a \$50.00 fee was due for the completed investigation of Water Permit No. 6077-3. The fee also covers issuance of the water license which is the final document in obtaining and perfecting a water right. To date, the fee has not been received.

A billing statement is enclosed. If the fee is not paid within 30 days from the date of this letter, the water license will not be issued and the bill will be turned over to a collection agency. Please remit the required fee to the Department of Environment and Natural Resources, Water Rights Program, 523 E. Capitol, Pierre, SD 57501-3181. The check or money order for the fee should be made payable to the "Water Rights Program".

If you have any questions or believe our records are in error, please contact Genny McMath at (605) 773-3352.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program

enclosure

**DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES
WATER RIGHTS PROGRAM BILLING STATEMENT**

Name: Bill Cooper
Mailing Address: PO Box 243
City, State, Zip: Salem, SD 57058-0243

Fee due by: July 11, 2003

Any account over 30 days old will be charged interest by the department plus any and all costs. A \$20.00 administration fee for the State Collections' cost shall be charged in addition to the interest and department costs.

Type of Fee	Amount Due	Permit Number
License	\$50.00	6077-3

Cut on line below - Keep the top portion for your records

↓-----↓-----↓-----↓-----↓-----↓-----

Please make payments payable to the "Water Rights Program". Return this portion with payment to the Water Rights Program, Department of Environment & Natural Resources, 523 East Capitol, Pierre, SD 57501-3181

Please make any changes to the name & mailing address that are not correct.

Name: Bill Cooper
Mailing Address: PO Box 243
City, State, Zip: Salem SD 57058-0243

Type of Fee	Amount Due	Permit Number
License	\$50.00	6077-3

Signature _____ Date _____

Should you have any questions regarding the above fees, please contact Genny McMath (605) 773-3352
Water Rights Program, Department of Environment & Natural Resources

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date July 18, 2003

RECEIVED OF Cooper Mining, PO Box 243, Siler SD 57058

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

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use		
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>0077-3</u>	50	00
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	50.00

No. 000000

By

Darlene Erbe
Chief Engineer

Permit No. 6077-3
Vermillion River - Water District

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

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre, SD 57501

I have this day, May 29, 2002, made a thorough examination of the water use system constructed by Bill Cooper of PO Box 243, Salem, SD 57058 holder of Permit No. 6077-3, bearing the priority of May 12, 1998 authorizing the storage of 31 acre-feet of the waters of runoff for fish & wildlife production purposes, in McCook County.

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

A. Works used to divert the water:

A 20.5 foot high dam with an 18 inch diameter CPE pipe as the primary spillway and a 70 foot wide earthcut secondary spillway that stores 31 acre-feet of water.

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

N/A

C. Works used to apply water to beneficial use:

A 20.5 foot high dam with an 18 inch diameter CPE pipe as the primary spillway and a 70 foot wide earthcut secondary spillway that stores 31 acre-feet of water.

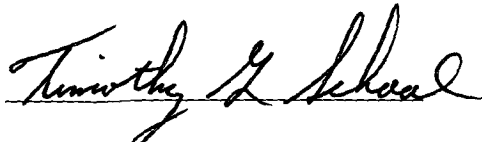
The system is in the following condition good. The point of diversion is located 1000 ft. north & 800 ft. east of the SW corner of Sec. 8-T101N-R54W (SW 1/4 SW 1/4). The works are capable of storing 31 acre-feet of water which is to be used for fish & wildlife production. Water has been put to beneficial use to the maximum extent as follows:

A 20.5 foot high dam with an 18 inch diameter CPE pipe as the primary spillway and a 70 foot wide earthcut secondary spillway that stores 31 acre-feet of water.

and the license should be issued for 31 acre-feet of storage.

Applicable permit qualifications have been complied with: Yes X

Exceptions to compliance are: none Date Report Completed: July 25, 2002



Timothy G. Schaal, P.E.
Natural Resources Engineer Specialist
DENR, Water Rights Program

REPORT ON INSPECTION OF PERMIT NO. 6077-3

Other permit(s) associated with the project: XXXX

DATE OF INSPECTION: May 29, 2002

NAME & ADDRESS OF INSPECTION CONTACT/ Bill Cooper

RELATIONSHIP TO PERMIT HOLDER, IF APPLICABLE: owner

NAME & ADDRESS OF PERMIT HOLDER: Bill Cooper, PO Box 243, Salem, SD 57058

DIVERSION POINT LEGAL LOCATION: 1000 ft. north & 800 ft. east of the SW corner of Sec. 8-T101N-R54W (SW 1/4 SW 1/4).

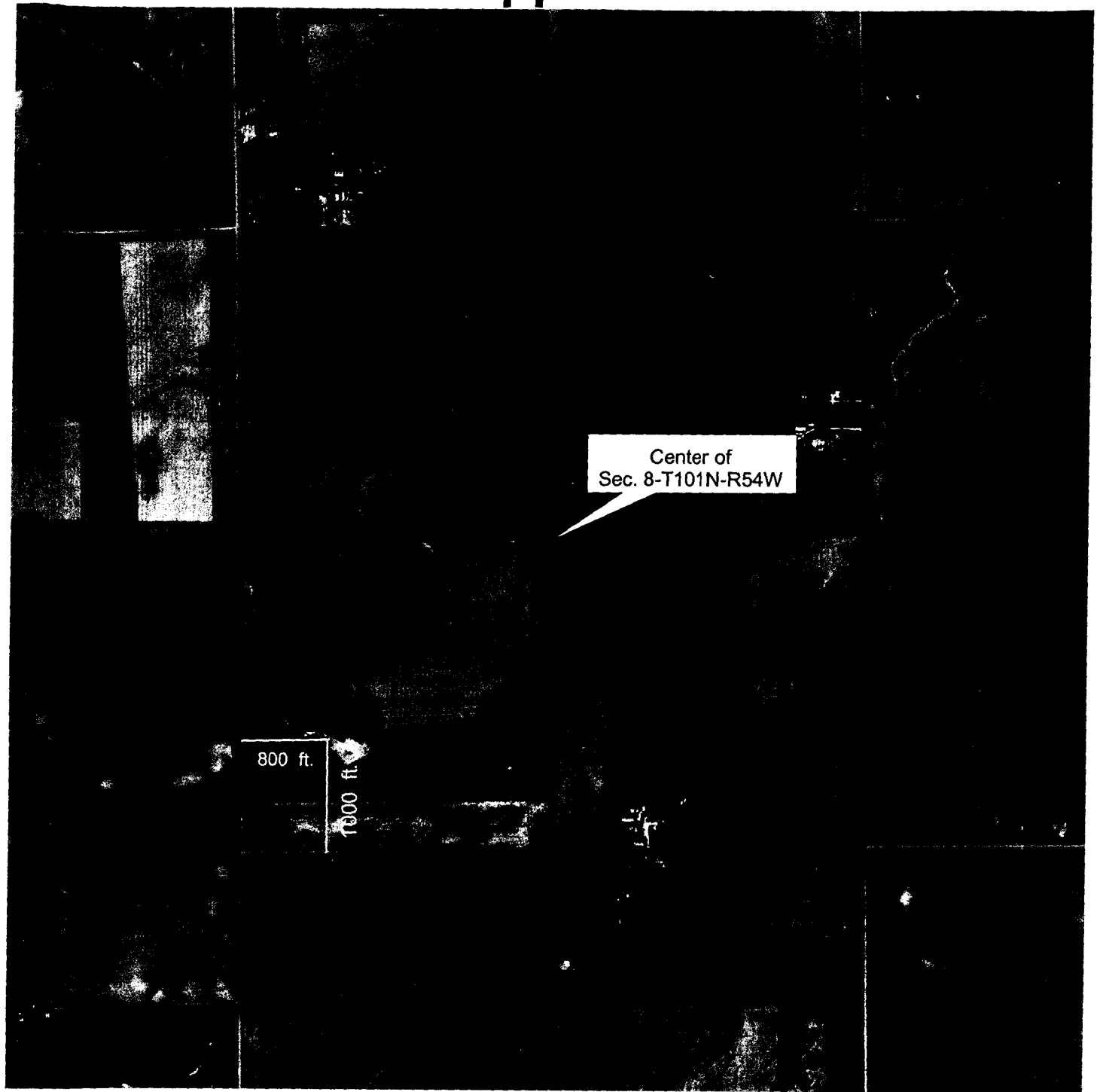
DAM INFORMATION:

- 1) Height to crest 20.5 feet
- 2) Height to primary spillway 14.5 feet
- 3) Height to secondary spillway 17.5 feet
- 4) Crest width 10 feet
- 5) Crest length 240 feet
- 6) Spillway length XXX feet
- 7) Spillway width 70 feet
- 8) Approx. storage (Normal) 31 acre-feet
- 9) Approx. storage (Maximum) 60 acre-feet
- 10) Date constructed: 1997

PERMIT QUALIFICATIONS AND REGULATIONS:

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

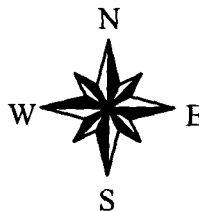
Water Permit Application No. 6077-3



South Dakota Department of
Environment and Natural Resources



Protecting South Dakota's Tomorrow ... Today



Timothy G. Schaal
Timothy G. Schaal, P.E. 7/25/02
Natural Resources Engineer Specialist
Water Rights Program

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 6077-3

(1) Bill Cooper, PO Box 243, Salem SD 57058-0243 made Application No. 6077-3, May 12, 1998 for a water permit to impound 31 acre feet of water from runoff, McCook County, South Dakota for fish and wildlife propagation and livestock watering purposes. Permit No. 6077-3, with a priority date of May 12, 1998 was approved June 8, 1998 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before June 8, 2003 and for the application to beneficial use of water on or before June 8, 2007.

(2) The water supply system has been completed and water applied to beneficial use in accordance with South Dakota State Law. Pursuant to South Dakota Codified Law 46-5-30.1, the holder and/or owner of Water Right No. 6077-3 is issued a license, bearing a priority date of May 12, 1998 to impound 31 acre feet of water.

The location of the storage dam (spillway) is 1000 feet north and 800 feet east of the southwest corner of Section 8-T101N-R54W (SW 1/4 SW 1/4).

(3) This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Permit No. 6077-3 including the following now applicable qualifications:

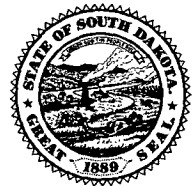
- Water Permit No. 6077-3 authorizes a dam with storage capacity of 31 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
- Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.



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

AUG 13 2003

date





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

AUG 13 2003

6077-3

Bill Cooper
PO Box 243
Salem SD 57058-0243

Dear Mr. Cooper:

Enclosed is Water License No. 6077-3. This is the final water right document completing your process of obtaining a Water Right. Enclosed is Receipt No. 000846 in the amount of \$50.00 which you paid for the investigation and issuance of the Water License.

As long as you use the water beneficially, as stated in the Water License, State Water Laws provide that you have a continuing right to use the water.

Sincerely,

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

enclosures

CERTIFICATION

I hereby certify that on March 25, 2003 , I have personally deposited with the United States mail at Pierre, South Dakota, first class postage, prepaid envelopes containing a Notice dated March 24, 2003 regarding Reminder Notice #6077-3, 4558-3, 5728-3, 5906-3 addressed as stated below:

5906-3
Virgil Mollet Jr
47991 334th St
Jefferson SD 57038

5728-3
Charlies Resort
% Charles Guy
43880 Hwy 10
Lake City SD 57247

4558-3
Mike & Brad Chicoine
32849 483rd Ave
Jefferson SD 57038

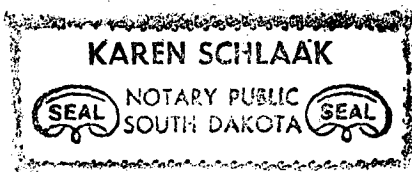
6077-3
Bill Cooper
PO Box 243
Salem SD 57058-0243


Eric Gronlund
Natural Resource Engineer
Water Rights

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

Sworn to, before me, this 26th day of March , 2003.


Karen Schlaak
Notary Public
My Commission expires April 1, 2007

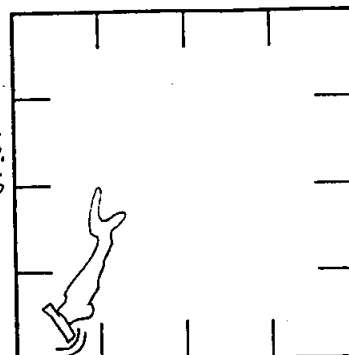




SD ENG-17
7/74

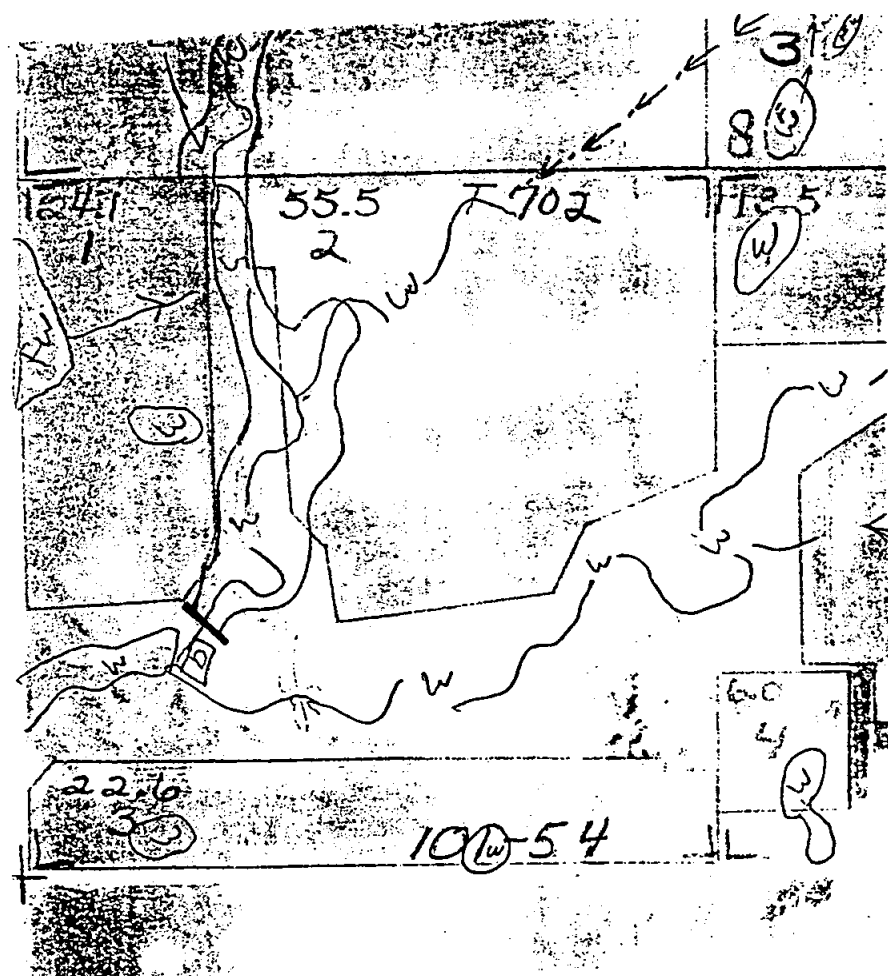
STRUCTURE DATA

DRAINAGE AREA	ANNUAL YIELD	PEAK RUNOFF	EMERG. SPLWY. CAPACITY	WATER DEPTH	SURFACE AREA	SEDIMENT STORAGE	TOTAL STORAGE
ACRES	AC. FT.	25-YR.	C.F.S.	FEET	ACRES	AC. FT.	AC. FT.
570	10.0 (50%)	404.0	321.8	14.8	4.42	10.5	44.06
7.1 (6%)							31.02 P.S.



Sec. 8 T. 101 R. 54
McCook County

LOCATION



SKETCH PLAN OF DAM AND RESERVOIR AREA

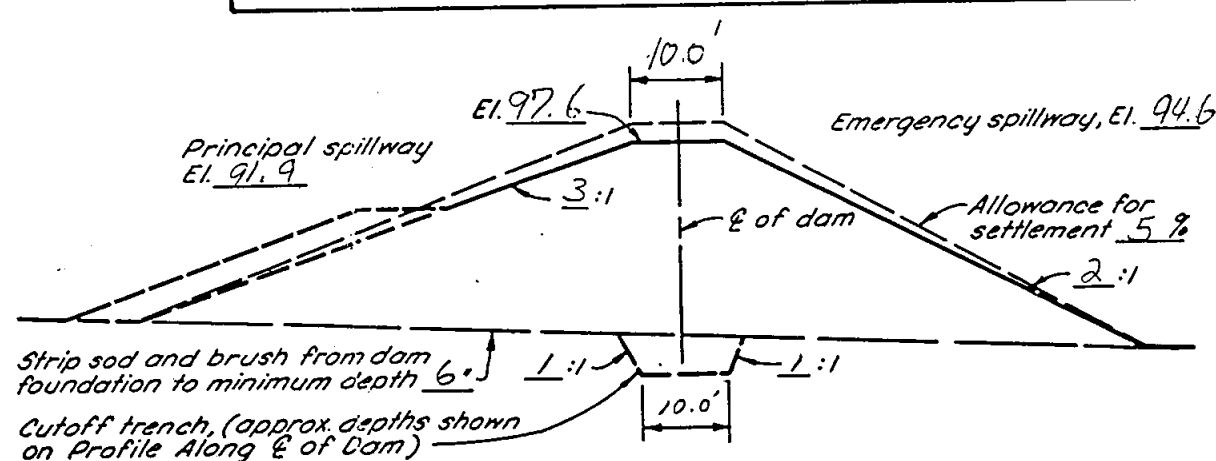
Approximate scale 1" = 660'

REFERENCE: GUIDE PLAN NO. 1.0

TABLE OF QUANTITIES

ITEM	UNIT	Pay QUANTITY
Compacted Earth Fill		
Lam. including 5% settlement stripping	CU. YD.	6,360
Cutoff trench		
Excavations		
Emergency Spillway (963 CU. YD.)		
Cutoff Trench (361.9 CU. YD.)		
Pipe, Smooth Plastic inside	LF	60
Corrugated out side 18" O.T.A.		
Metal Pipe 24" Corrugated	LF	28
(Hood Tallet Support @ 8' long)		
(@ 20' outlet Support, with 11 degree elbow)		
Hooded Tallet & Baffle	Each	1
Pipe Support	Each	1
Sand on - sec. collar	Each	1
O-Ring / Butyl Rubber	Each	2

60' Plastic ✓
24 Corrugated ✓
20' 11° elbow ✓



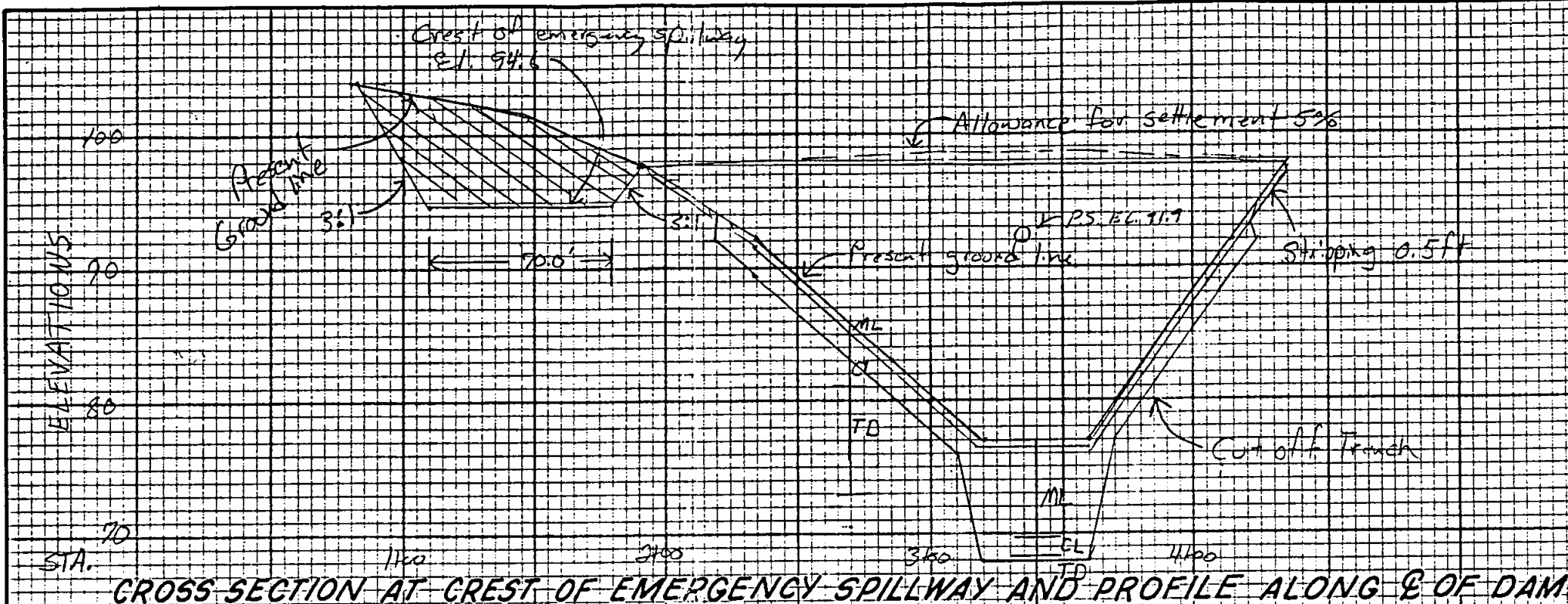
TYPICAL CROSS SECTION OF DAM

S.D. CONSTRUCTION AND MATERIAL SPECIFICATIONS:

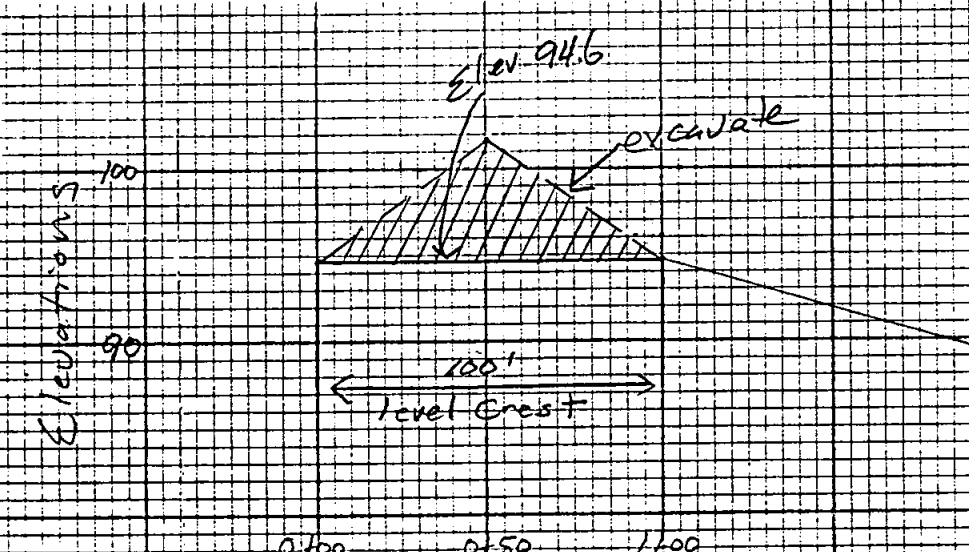
- SD-10 Top soil
- SD-4 Stripping
- SD-5 Excavation
- SD-7S Earth Fill - Class 5
- SD-15 Corrugated Metal Pipe
- SD-20B Corrugated Polyethylene / smooth inside
- SD-17 Metal Fab.
- SD-28 Seeding
- SD-50 Zinc-Coated Iron or steel corrugated pipe

EARTH DAM

OPERATOR:	Bill Cooper
CONSERVATION DISTRICT:	McCook
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed	Danny Merchen 7/12/96
Drawn	Danny Merchen 7/12/96
Traced	
Checked	
Date	7/12/96
Approved by	SEA
Title	Eng. 2
Sheet	1
Drawing No.	
No.	1
of	5



See SD ENG #42

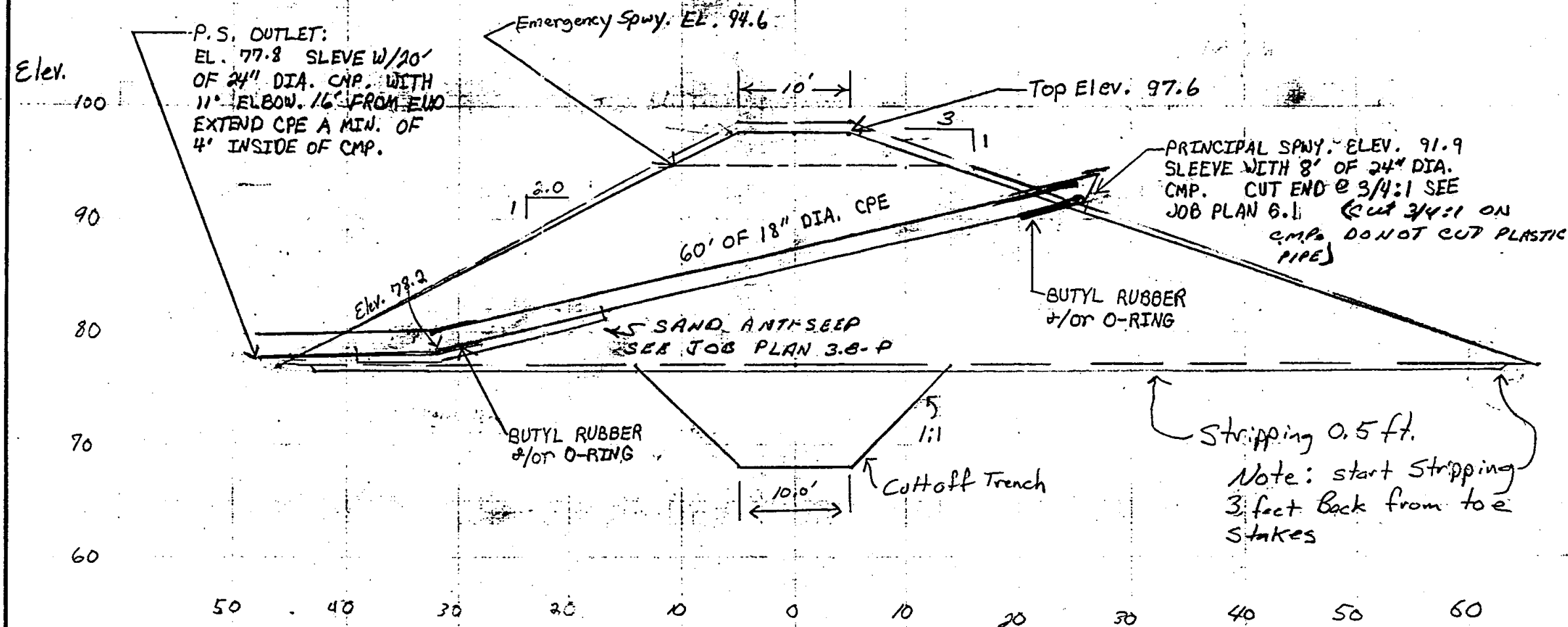


MAXIMUM CROSS SECTION OF DAM

SEDIMENT YIELD					
ERODIBILITY AREA ACRES	GROSS RATE A.F./AC./YR.	DRAINAGE AREA ACRES	DELIVERY RATE %	DESIGN PERIOD YEARS	REQ'D. SEDIMENT VOLUME AC.FT.
H	.0028	570	28%	25	10.5

Sta. 3+45

PROFILE OF PRINCIPAL SPILLWAY



Bill Cooper Fish Pond
McCook Co. 8-101-54
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed <u>Danny Menden</u> 7-12-96	Date <u>7-12-96</u>	Approved by _____
Drawn <u>Danny Menden</u> 7-12-96	Title _____	_____
Traced _____	Sheet <u>No 2</u>	Drawing No. _____
Checked _____	of <u>5</u>	

CONSTRUCTION NOTE:

- 1.) Ground where earth fill is to be placed shall be stripped and then scarified to a depth of 6 inches. Salvage and spread topsoil.
- 2.) Seed above HWL., the top and backslope of dam, the E. S., all dikes, and all disturbed areas designated by the engineer. Seeding is to be performed by owner.
- 3.) According to NEM. 210-520.21 this is a class "A" hazard structure located in a rural agriculture area. This structure is to be maintained in accordance with Operation and Maintenance Guidelines.
- 4.) 18" diameter CPE pipe shall conform to AASHTO M-294 Type S and the material compound shall conform to ASTM D-3350. The CPE pipe shall have annular corrugations. The CPE pipe shall be smooth on the inside and corrugated on the outside and have an "n" value of 0.010. CPE pipe shall be Hancor "Sure-Lok" 10.8 or equal.
- 5.) *ASK ENGINEER (MAY NOT APPLY)*
Concrete cradle is optional but recommended as this keeps the pipe from crushing. The cradle may be installed along the entire length from the sand antiseep collar to the inlet and thus the difficult compaction under the pipe is eliminated. The posts at the inlet are highly recommended as this keeps the Principal Spillway stable. There is tremendous power in the water when the pipe is flowing full. The pipe may vibrate and destroy itself.
- 6.) CPE pipe joints shall be watertight. Pipe Joint couplers shall be Hi-Q Sure-Lok 10.8 or equal.
- 7.) The two joints between the CPE and CMP (US @ inlet & DS @ outlet) shall be essentially watertight. Essential watertightness may be obtained by using O-ring's supplied by the manufacturer. Make an eight inch cut on the top of the CMP pipe and clamp the CMP securely to the O-rings on the CPE using a 0.5" dia. rod and lug. File the edges of the cut smooth and seal the cut with butly-rubber. An alternate method is to wrap the joint with an industrial grade tape and then wrap with butyl-rubber. Overlap the butyl-rubber at least 1/2 of the pipe circumference, and extend the butyl-rubber 8" to 12" on each pipe. Securely attach the butyl-rubber to the pipe to obtain essential watertightness and exclude soil particles.
- 8.) The critical compaction of earth fill around the pipe occurs from the midpoint of the pipe to the bottom of the pipe. Care is to be taken to assure proper compaction in this zone. There shall be full time inspection when the P. S. is installed.

BILL COOPER

SHEET #3 OF 5

P (Bottom)

24.5 2.8
52.7 5

(4.9+23.8) 374 = 1,831.1

(23.8+24.3) 46 = 2,213.8

(54.3+24.5) 47 = 3,250.7

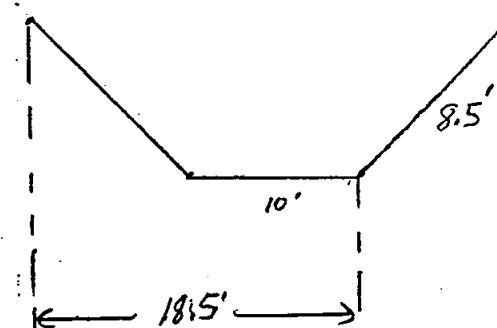
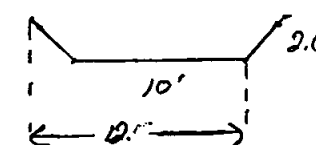
= 16,080 = 804.0

Cut off Trench

55' x 2.0' x 12.0 = 1320
90' x 2.0' x 12.0 = 2160

40' x 8.5' x 18.5 = 6290

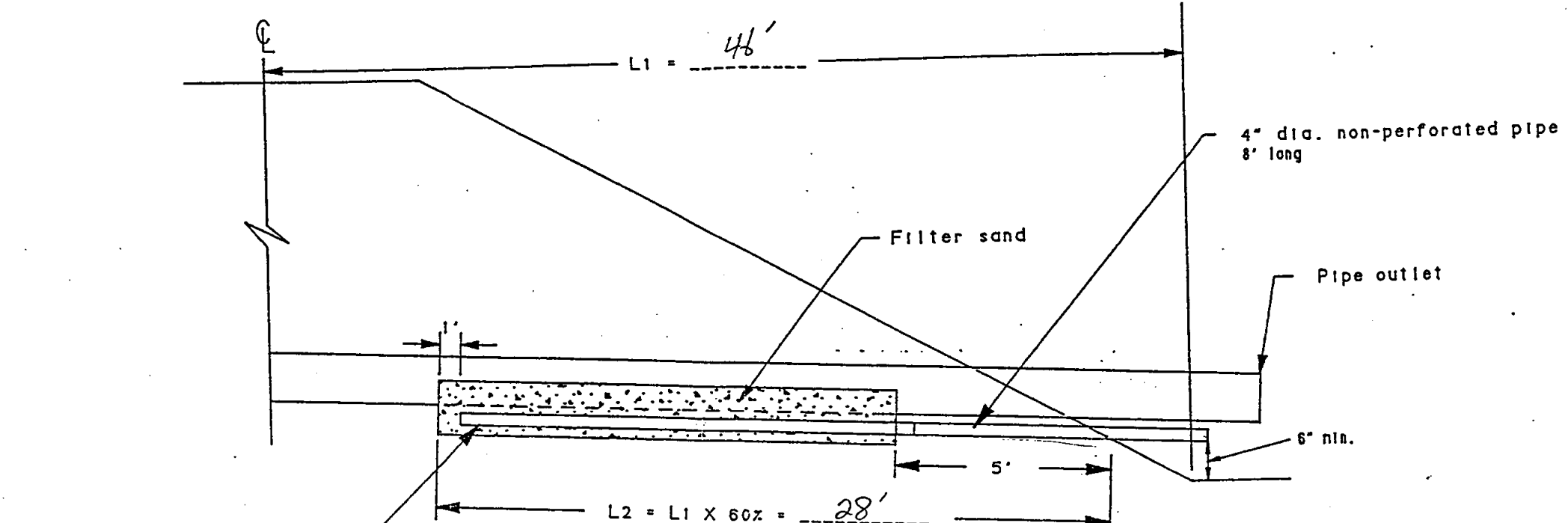
$\frac{9770 \text{ ft}^3}{27} = 361.9 \text{ yd}^3$ *82A*



Bill Cooper Fish Pond
101-54-8 SW 1/4

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed *E. Murch* Date *7-3-82* Approved by _____
Drawn _____ Title _____
Traced _____ Sheet _____ Drawing No. _____
Checked _____ of _____



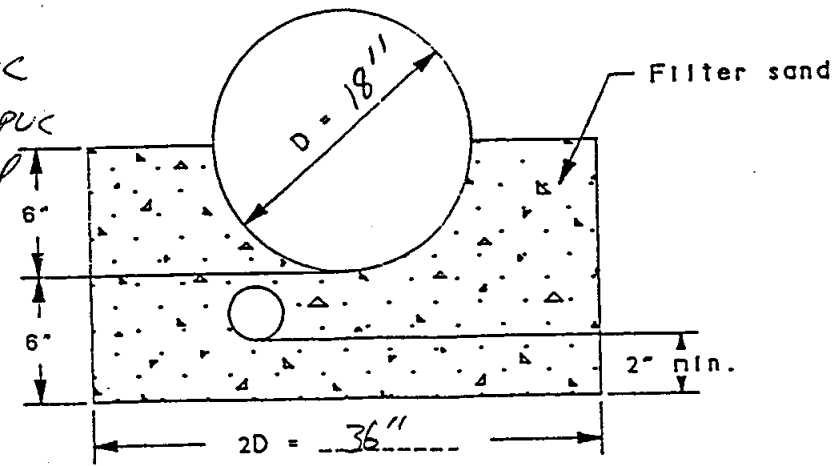
FILTER GRADATION

SIEVE SIZE	PERCENT PASSING
3/8"	100
4	85-100
8	80-100
16	50-85
30	25-60
50	10-30
100	2-10

SIDE VIEW

TABLE OF QUANTITIES

20' 4" dia. perforated PVC
 8' 4" dia. non-perforated PVC
 2.6 cu. yd. filter material



UPSTREAM VIEW

- NOTE:**
1. THE 4" DIA. PIPE SHALL BE SDR 35 PVC, OR STRONGER
 2. PROVIDE AN ANIMAL GUARD ON DRAIN OUTLET PIPE. DRILL 2, 1/2" DIA. HOLES, ON 6" FROM END OF PIPE AND PLACE A 3/8" DIA., 5 1/2" LONG GALVANIZED STEEL BOLT THRU THEM AND SECURE WITH A NUT (PLACE BOLT HORIZONTAL).
 3. FILTER SAND WILL BE CLEAN PEA AGGREGATE OR CONCRETE SAND.

SAND ANTISEEP DRAIN

OPERATOR Bill Cooper

CONSERVATION DISTRICT McCook

U.S. DEPARTMENT OF AGRICULTURE
 NATURAL RESOURCES CONSERVATION SERVICE

Designed Merchen Date 7-31-96 Approved by _____
 Drawn _____ Title _____
 Traced _____ Title _____
 Checked PSA BDH Sheet 4 Dwg. No. _____
 of 5

Rev. 3/96
 JOB PLAN NO. 3.8-P

