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②

**DRAFT**

CITY ENGINEER

T. Rock

**FILE COPY**

In put on  
H<sub>2</sub>O quality

Firesteel Creek/Lake Mitchell

# 319 WORKPLAN

Just  
Jan 9  
4-4  
1:30

~~4/6/85~~  
3977 Jan  
996-7761 semi  
at office

Agenda for  
finance mtg  
Uddera

1985

Just 16 7/85

PREPARED BY  
SOUTH DAKOTA  
DEPARTMENT OF WATER AND NATURAL RESOURCES  
DIVISION OF WATER RESOURCES MANAGEMENT

local  
6/1/85

4/4/85

Rich Hanson -

DWNR

**DRAFT**

D75  
not aware that  
this is his penny  
I'm here? feed in  
85 study - haven't seen

Cost to city — \$ is in-kind

minor study?

1989

Organized presentation's plan w/ recommendation

Lake Dev / Dub Works

**DRAFT**

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Comprehensive Plan  
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## I. INTRODUCTION

The Firesteel Creek/Lake Mitchell Nonpoint Source Control Project is a comprehensive effort designed to control nonpoint sources of pollution in the Firesteel Creek drainage area (Hydrologic Unit) that delivers water to Lake Mitchell and empties into the James River. Lake Mitchell is the major source of domestic water for the City of Mitchell and is a multi-use recreational lake in South Central South Dakota.

Previous studies of the Firesteel Creek/Lake Mitchell area have shown Lake Mitchell to be eutrophic due to excessive nutrient and sediment loadings from the Firesteel Creek hydrologic unit. The lake is vulnerable to the potential pollution problems associated with a rural/urban growing community. An awareness and concern has arisen over hazardous spills, urban runoff, feedlots, soil erosion and other activities occurring on or adjacent to the lake and within the Firesteel Creek area. As the Lake Mitchell being a major domestic water source for the City of Mitchell, this concern is justified and the current situation is such that the South Dakota Nonpoint Source Task Force has designated Lake Mitchell (and its Firesteel Creek drainage area) as a priority waterbody.

The major objective of the Firesteel Creek/Lake Mitchell Nonpoint Source Control Project is to assure that the water quality of Firesteel Creek/Lake Mitchell is adequate to maintain its assigned beneficial uses. Various approved activities will be implemented to accomplish the major objective and including preservation, restoration, control, and educational/information programs in addition to comprehensive Water Quality planning and monitoring program designed to assess water quality project effectiveness.

## II. PROJECT AREA DESCRIPTION

### General Description

The Firesteel Creek/Lake Mitchell project area is about 58 miles long and averages about 10 miles wide encompassing some 366,000 acres primarily in Jerauld, Aurora, and Davison Counties (Figure 1). A small portion of the project area extends into Sanborn County. Major population centers within the study area include the municipalities of Mitchell and Wessington Springs.

Lake Mitchell is an artificial impoundment located on the lower portion of Firesteel Creek about 3 miles above its confluence with the James River. The Lake Mitchell reservoir has a surface area of 800 acres, a maximum depth of 29 feet and a mean depth of about 16 feet. Shoreline length is approximately 11 miles. The bottom varies from accumulated silt and muck in the reservoir basin to sand and gravel in near shoreline areas. Less than 5% of the shoreline is covered with cattails and bullrushes. Emergent and submerged aquatic vegetation is common but not particularly abundant. A lake quality survey conducted by the South Dakota Department of Water and Natural Resources (DWRN) in 1979 and a report in 1985 noted reduced water clarity and high algal densities in the Lake Mitchell reservoir which is suggestive of eutrophic conditions. Common fish species in Lake Mitchell are walleye, northern pike, crappie, and bullhead. No documented fish kills have been recorded to date.

## Beneficial Uses and Impairments

Lake Mitchell is a popular recreation lake providing swimming, fishing, picknicking, waterskiing, and boating. It helps to serve the recreational needs of a population estimated at 242,807 within a 65-mile radius of the Lake Mitchell reservoir. Lake Mitchell is the major source of domestic water for the nearby City of Mitchell.

According to the South Dakota Board of Water and Natural Resources Regulations, Chapter 74:03:02, "Surface Water Quality Standards", Lake Mitchell is classified as having the beneficial use designations of domestic water supply, warm water permanent fish life propagation, immersion recreation, limited contact recreation, wildlife propagation and stockwatering. Domestic water supply has been given the highest priority.

All streams in South Dakota are assigned the beneficial uses of irrigation, wildlife propagation, and livestock watering. Certain sections of Firesteel Creek also have the following beneficial use classifications: 1) Firesteel Creek from the James River to its confluence with the west fork of the Firesteel Creek (warm water permanent fish life propagation and limited contact recreation); 2) Firesteel Creek from its confluence with the west fork of Firesteel Creek to South Dakota Highway 34 (warm water semipermanent fish life propagation and limited contact recreation); and 3) the west fork of Firesteel Creek from Firesteel Creek to Wilmarth Lake (warm water marginal fish life propagation and limited contact recreation).

Although some upstream segments of Firesteel Creek have less stringent water quality criteria, they must not cause the more stringent criteria of downstream waters to be exceeded.

Impairments to Lake Mitchell reservoir water quality include nutrient and sediment loading from the Firesteel Creek drainage as well as sediments and nutrients derived from streambank and lakeshore erosion. Secondary sources of nutrients and primary sources of fecal coliform contamination may be overgrazing on streamside land, runoff from livestock operations, and seepage from individual septic tank systems around the Lake Mitchell reservoir periphery and in the project area.

#### Land Use

Land use in the project area is predominantly agricultural. Approximately 41% is estimated to be cropland and 59% rangeland or pasture. SCS estimated that about 58% of the project area had been adequately treated in 1981.

Over one-half of the Lake Mitchell reservoir shoreline has been developed.

Included are lakeside residences, beaches, and public access areas.

#### Climate

The climate of South Central South Dakota is continental with cold, dry winters, and relatively short springs marked by appreciable rainfall and rapid weather changes. About 70% of recorded yearly precipitation falls during the growing season (April-August) with highest precipitation occurring in June.

Average minimum and maximum temperatures are 62 and 91 F in July; 6 and 28 F in January. Mean annual temperature is 47 F. Average annual precipitation and lake evaporation amount to 22 inches and 37 inches, respectively.

#### Geology

Most of the soils in the Firesteel Creek watershed formed in glacial material (drift) that was derived from preglacial formations of granite, gneiss, limestone, sandstone, and shale. The glacier ground up and mixed these

reports of measure treatments will be made to the W.Q. Comprehensive Plan (CWQP) Committee by the Comprehensive Water Quality Plan (CWQP) Team as needed and on a biannual basis.

B. Grassland Management - Inventory of grassland

1st Quarter of 1990  
through the 3rd  
Quarter of 1993

BMP's are to be made by the Project Director and the CWQP team with approval of the CWQP Committee. Requests for technical assistance, and establishment of grassland BMP's are to be made to the appropriate agency(s) by the Project Director and the CWQP Team. Progress and completion reports of treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

C. Animal Watering Systems - Landowners in CWQP area

1st Quarter of 1990  
through 3rd Quarter of  
1992

are to be contacted by the Project Director and inventory of need be made a priority of twelve (12) facilities (dugouts, dams, and fencing) will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and construction are made to the appropriate agency(s) by the Project Director and CWQP Team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

materials as it transported them. It then redeposited them as it melted. Some deposits are unsorted material or glacial till; others are sorted either by water during deposition (outwash) or by wind after deposition (loess).

#### Major Soils

According to soil surveys conducted by the Soil Conservation Service (SCS) in the project area, the following major soil associations are found in the Firesteel Creek drainage area:

Houdeck-Prosper: Nearly level to gently undulating, well drained, and moderately well drained soils.

Houdeck-Stickney: Nearly level, well and moderately well drained, loamy soils formed in glacial till; on uplands.

Beadle-Stickney-Dudley: Nearly level, deep, loamy, well drained, and moderately well drained silty soils with claypan subsoils that formed in glacial till; on uplands.



MILESTONE SCHEDULE:

(Non-point source control measures and milestone chart)

The milestone schedules have been separated into parts to simplify the presentation of specific tasks which will be completed by the Water Quality Comprehensive Plan Team (Figure \_\_). The purpose of this outline is to state the major goals of the Big Stone Lake Firesteel Creek/Lake Mitchell NPS Water Quality Control Project for the next four years.

The following recommended implementation schedule refers to the installation of NPS control measures and will be coordinated on the local level by a Project Director with assistance from the assigned S.D. Co. Director, a project clerical Secretary, and approval of the Comprehensive Plan Water Quality Committee. The four year goal of the Firesteel Creek/Lake Mitchell NPS Water Quality Control Project is the construction and implementation of portions of the project shown on charts \_\_\_\_\_. The implementation of other BMP's and the Information and Education Program will be continuous activities for the W.Q. Comprehensive Plan Team. Therefore, these individual activities have not been specified in the outline of the milestone schedule.

IIIc. NPS Control Measures Implementation Schedule

<u>Activity and Measure Treatment to be Completed</u>	<u>Estimate Time Period</u>
A. Agricultural (Ag) Feedlots - Feedlot owners are to be contacted by the Project Director and evaluation be made to meet NPS pollution standards. A priority of sixteen (16) feedlots will be made and approved by the Comprehensive Water Quality Plan Committee (CWQP). Requests for preliminary surveys, design/cost estimate, and construction are made to the appropriate agency(s) by the Project Director and Comprehensive Water Quality Plan (CWQP) Team. Progress and completion	1st Quarter of 1990 through 3rd Quarter of 1992 <i>What if now?</i>

D. Streambank Erosion Protection - Landowners in CWQP area are to be contacted by the Project Director and inventory of need be made a priority of thirty (30) streambank erosion protection facilities structures (jetties, fencing, rock riprapping, seeding, and mulching) will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and construction are made to the appropriate agency(s) by the Project Director and CWQP Team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

1st Quarter of 1990 through 4th Quarter of 1993

E. City Storm Sewers - Cities and towns within the CWQP area are to be contacted by the Project Director and evaluation be made to meet NPS pollution standards. A priority of four (4) storm sewers improvements (debris basin, control facilities, etc.) will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and construction are made to the appropriate agency(s) by the Project Director and CWQP team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP team as needed and on a biannual basis.

1st Quarter of 1990 through 3rd Quarter of 1992

F. Hazardous Material Management - An inventory of hazardous material locations and potential sites

1st Quarter of 1990 through 3rd Quarter of 1992

*County Camp*

will be made by the Project Director and the CWQP team with approval of the CWQP committee.

Requests for technical assistance and certification training (3 programs and necessary needed equipment) will be made to the appropriate agency(s) by the Project Director and the CWQP team. Progress and completion reports of treatments will be made to the CWQP committee by the CWQP team as needed and on a biannual basis.

G. Sediment Control Structure; (Firesteel Creek Sediment Control and Water Supply Damsite and Reservoir, Rev. 11/78) - Proposed sediment control structure be evaluated by the Project Director and the CWQP team with approval of the CWQP committee. Requests if needed for additional surveys, design/cost estimates, and construction, are made to the appropriate agency(s) by the Project Director and CWQP team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

1st Quarter of 1990 until completed action has been made

H. Lake Shoreline Protection (Public/Private) - Landowners, cities, and towns in CWQP area are to be contacted by the Project Director and inventory of need be made. A priority of fourteen (14) lake shoreline protection facilities will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and

1st Quarter of 1990 through 4th Quarter of 1993

public and/or private

construction are made to the appropriate agency(s) by the Project Director and CWQP team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

I. Urban Drains - An inventory and evaluation will be made of the urban and agriculture drains (open and tile drains) in the CWQP area by the Project Director. A priority of three (3) water quality facilities (water and sediment intercept control basins) will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and construction are made to the appropriate agency(s) by the Project Director and CWQP team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

1st Quarter of 1990  
through 3rd Quarter  
of 1992

J. Gully Sheet Erosion - An inventory of gully and sheet erosion producing areas (acres) are to be made by the Project Director and the CWQP Team. A priority of 12,000 acres per year will be made and approved by the CWQP Committee. Requests for technical assistance and establishment of erosion control BMP's are to be made to the appropriate agency(s) by the Project Director and the CWQP Team. Progress and completion reports of

1st Quarter of 1990  
through 4th Quarter  
of 1993

treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

K. Fertilizer and Pesticide Chemical Utilization - An inventory of the fertilizers, pesticides, and chemicals used with land use operations will be made by the Project Director and the CWQP Team with approval of the CWQP Committee. Requests for technical assistance for proper use of fertilizers, pesticides, chemigation, groundwater protection (4 programs of information, education and certification training including necessary needed equipment) will be made to the appropriate agency(s) by the Project Director and the CWQP Team. Progress and completion reports of accomplishments will be made to the CWQP committee by the CWQP Team as needed and on a biannual basis.

1st Quarter of 1990 through 2nd Quarter of 1993

L. Septic Tank Control - Landowners within the CWQP area are to be contacted by the Project Director to inventory and evaluate septic tank systems to meet the NPS pollution standards. A priority of six (6) septic tank systems will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and construction are made to the appropriate agency(s) by the Project Director and CWQP Team. Progress and completion reports of measure treatments will

1st Quarter of 1990 through 4th Quarter of 1992

*enough?*

be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

M. Outboard Motorboat Control - An inventory of property owners who have motorboats, outboard motorboats, and marine storage facilities and equipment within the CWQP area are to be contracted to meet the NPS pollution standards by the Project Director and the CWQP Team with approval of the CWQP Committee. Requests for three (3) technical assistance programs and establishment of needed regulations will be made to the appropriate agency(s) by the Project Director and the CWQP Team. Progress and completion reports of accomplishments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

1st Quarter of 1990  
through 2nd Quarter  
of 1992

N. Solid Waste Control - An inventory of landfills, dumps, etc. within the CWQP area will be made by the Project Director and the CWQP Team. A priority of eight (8) areas not meeting the NPS pollution standards will be made and approved by the CWQP Committee. Requests for preliminary surveys, design/cost estimates, and installation are made to the appropriate agency(s) by the Project Director and CWQP Team. Progress and completion reports of measure treatments will be made to the CWQP Committee by the CWQP Team as needed and on a biannual basis.

1st Quarter of 1990  
through the 4th Quarter  
of 1992

0. Lake and Land Use Development for Residential, Industrial, Commercial, Recreational - An inventory of water and land use within the CWQP area will be made by the Project Director and the CWQP Team. Upon evaluation of the inventory and receiving technical assistance information, a priority of four (4) regulations be written for (residential, industrial, commercial, recreation) land use to meet NPS pollution standards and approved by the CWQP Committee. Requests for the enactment of the above regulations (ordinances) to protect the waters within the CWQP area are to be made to the appropriate units of government (City, County, and State) by the Project Director, CWQP Team and Committee.

1st Quarter of 1990 through the 4th Quarter of 1992

*Study done  
do any good  
controls are  
follow up  
and O75  
is already  
in process  
right?*







Public Involvement

The Firesteel Creek/Lake Mitchell Comprehensive Water Quality Project was started because of the public concern over declining water quality and the shortage of quantity water that affects the health and economic condition of the citizens living in the area. There are a number of groups working in the Firesteel Creek/Lake Mitchell Water Quality Project area including units of government that are trying to correct the various problems that affect water quality and quantity. This points out the much greater need to work together and the need for Firesteel Creek/Lake Mitchell Comprehensive Water Quality Plan and its implementation. Some of these agencies and organizations, but not limited to, are as follows:

- DWNR --- South Dakota Dept. of Water and Natural Resources
- D of Ag --- South Dakota Dept. of Agriculture
- GF&P --- South Dakota Dept. of Game, Fish and Parks
- USDA-SCS --- United States Dept. of Agriculture - Soil Conservation Service
- USDA-ASCS --- United States Dept. of Agriculture - Agriculture Stabilization and Conservation Service
- E.S. --- South Dakota Cooperative Extension Service
- JRWDD --- James River Water Development District
- DHUD --- United States Dept. of Housing and Urban Development
- EPA --- United States Dept. of Environmental Protection Agency
- FEMA --- United States Federal Emergency Management Agency
- City --- City of Mitchell, Wessington Springs
- County --- Davison, Aurora, Sanborn, Jerauld Counties
- Con. Dist. --- Davison, Aurora, Sanborn, Jerauld Conservation Districts
- EDS --- South Dakota Emergency Disaster Service

*↓  
But DWNR  
DAS doesn't  
know*

CE --- United States Army Corps of Engineers

RC&D --- Lower James Resource Conservation and Development Area

GPCP --- USDA-SCS - Great Plains Conservation Program

ACP --- USDA-ASCS - Agriculture Conservation Program

REA --- USDA - Rural Electrification Administration

DCSC --- Davison County Sportsmans Club

LMWD --- Lake Mitchell Water Development Committee

This list of agencies and organizations is far from a complete list. The goal of the CWQP Committee is to receive and obtain assistance from all groups who can provide a positive input into the improvement of the water quality in the Firesteel Creek/Lake Mitchell Comprehensive Water Quality Plan area.

APPENDIX

ITEM	YEAR1	YEAR2	YEAR3	YEAR4	TOTAL	ACP	OTHER FED
ANIMAL WASTE	100000	100000	100000	100000	400000	56000	0
GRASSLAND MGT	25000	25000	25000	25000	100000	50000	0
ANIMAL WATER	12000	12000	12000	0	36000	18000	0
STRMBK STAB	120000	240000	240000	0	600000	300000	0
STORM SEWER	30000	30000	0	0	120000	0	0
HAZARD WASTE	4000	4000	4000	0	12000	0	0
SEDIMENT CTL	0	0	0	0	0	0	0
LAKESHORE STAB	35000	35000	35000	35000	140000	0	0
URBAN DRAINS	3000	6000	3000	0	12000	0	0
BMPs	18000	18000	18000	18000	72000	36000	0
FERT PEST	3000	3000	3000	3000	12000	0	0
SEPTIC TANKS	3000	12000	3000	0	18000	0	0
OUTBOARDS	1500	1500	1500	1500	6000	0	0
SOLID WASTE	20000	20000	40000	0	80000	0	0
ORDINANCES	3000	3000	6000	0	12000	0	0
WQ MONITOR	15000	15000	15000	15000	60000	0	0
PERSONNEL	43000	45150	47407.5	49777.875	185335.375	0	0
INDIRECT	5977	6275.85	6589.6425	6919.124625	25761.617125	0	0
TECH ASST	124000	172000	172000	71200	539200	0	0
OFFICE	3000	3150	3307.5	3472.875	12930.375	0	0
TRAVEL	3500	3675	3858.75	4051.6875	15085.4375	0	0
EQUIPMENT	6000	0	0	0	6000	0	0
I&E	4000	2000	2000	2000	10000	0	0
ADMINISTRATION	23690.736444	23690.736444	23690.736444	23690.736444	94762.945778	0	0
TOTALS	605667.73644	840441.58644	764354.12894	358612.29857	2569075.7504	460000	0

MITCH2

ITEM	YEAR1	YEAR2	YEAR3	YEAR4	TOTAL	ACP	OTHER FED	BALANCE	319.00	STATE	LOCAL
STORM SEWER	3000.00	3000.00	3000.00	3000.00	12000.00	0.00	6000.00	6000.00	0.00	0.00	6000.00
HAZARD WASTE	4000.00	4000.00	4000.00	4000.00	16000.00	0.00	0.00	15000.00	9600.00	3200.00	2200.00
URBAN DRAINS	3000.00	6000.00	3000.00	3000.00	15000.00	0.00	0.00	15000.00	0.00	0.00	15000.00
BMPs	18000.00	18000.00	18000.00	18000.00	72000.00	36000.00	0.00	36000.00	0.00	0.00	36000.00
FERT PEST	3000.00	3000.00	3000.00	3000.00	12000.00	0.00	6000.00	6000.00	3600.00	1200.00	1200.00
SEPTIC TANKS	3000.00	12000.00	3000.00	0.00	18000.00	0.00	0.00	18000.00	0.00	0.00	18000.00
ORDINANCES	3000.00	3000.00	6000.00	0.00	12000.00	0.00	0.00	12000.00	7200.00	2400.00	2400.00
WQ MONITOR	5000.00	5000.00	5000.00	5000.00	20000.00	0.00	0.00	20000.00	12000.00	4000.00	4000.00
PERSONNEL	27000.00	28350.00	23767.50	31255.88	116373.38	0.00	0.00	116373.38	34912.01	34912.01	46549.35
INDIRECT	3753.00	3940.65	4137.68	4344.57	16175.90	0.00	0.00	16175.90	4852.77	4852.77	6470.36
TECH ASST	7200.00	7200.00	7200.00	7200.00	28800.00	0.00	28800.00	0.00	0.00	0.00	0.00
OFFICE	3000.00	3150.00	3307.50	3472.88	12930.38	0.00	0.00	12930.38	7758.23	2595.08	2595.08
TRAVEL	500.00	525.00	551.25	578.81	2155.06	0.00	0.00	2155.06	1293.04	431.01	431.01
SUPPLIES	2000.00	0.00	0.00	0.00	2000.00	0.00	0.00	2000.00	1200.00	400.00	400.00
I&E	500.00	500.00	500.00	500.00	2000.00	0.00	0.00	2000.00	1200.00	400.00	400.00
ADMIN.	2090.40	2090.40	2090.40	2090.40	8361.60	0.00	0.00	8361.60	8361.60	0.00	0.00
TOTALS	115043.40	126756.05	119554.33	112442.53	473796.32	36000.00	94200.00	342996.32	91977.65	54381.87	156636.30



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