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**WATERSHED PLAN
and
ENVIRONMENTAL IMPACT
STATEMENT**



**PONY
CREEK
WATERSHED**

**BROWN & NEMAHA COUNTIES, KANSAS
RICHARDSON COUNTIES, NEBRASKA**

OCTOBER 1988

REVISED JUNE 1990

**United States
Department of
Agriculture**

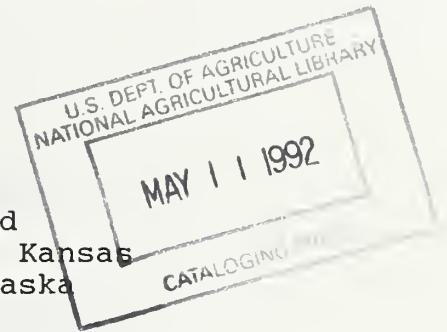


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ADDENDUM

Pony Creek Watershed
Brown and Nemaha Counties, Kansas
Richardson County, Nebraska



This addendum shows the change in federal and non-federal costs by removing Multipurpose Site No. 3 from the project. This multipurpose site will be constructed by the City of Sabetha with a grant and loan from the State of Kansas instead of using federal cost-share funds.

Project benefits have been updated to a 1989 price base and the current interest rate of 8 7/8 percent has been used to annualize costs and benefits over the life of the project. Project costs have not been updated but the 1989 costs would be 4 percent less than those shown in the plan according to the Kansas construction cost index.

The formulated project initially had federal costs of \$4,370,500 and local costs of \$1,339,000. The revised obligations are federal costs of \$3,291,500 and local costs of \$772,400.

Total cost of the project amounts to \$4,063,900. Annualized costs at 8 7/8 percent interest are \$297,400 compared to annualized project benefits of \$436,900. The benefit/cost ratio is 1.5:1.

June 1990

WATERSHED PLAN AND
ENVIRONMENTAL IMPACT STATEMENT

PONY CREEK WATERSHED

Brown and Nemaha Counties, Kansas
Richardson County, Nebraska

Abstract:

This document describes a plan consisting of land treatment measures, six floodwater retarding dams, and a multipurpose dam to reduce flood damages and erosion and to supply agricultural water in the Pony Creek Watershed. Alternatives considered during planning include: no project action, a national economic development plan, a nonstructural alternative, and a resource protection plan. Sponsors are responsible for 24 percent of the installation costs. Environmental impacts include: reduced upland erosion, reduced sedimentation, maintenance of the long-term productivity of soils, reduced flood damages, reduced flood plain scour, decreased terrestrial wildlife habitat, increased aquatic reservoir habitat, decreased stream aquatic habitat, and increased wildlife habitat quality. High maintenance costs of rural, county, and state roads will be reduced. Many acres of highly productive cropland will be protected and preserved for future generations.

This document is pursuant to authorization under Public Law 566 funding and to fulfill requirements of the National Environmental Policy Act.

This Plan/EIS has been prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq.).

Prepared by: Pony Creek Watershed Joint District No. 78, Kansas
City of Sabetha, Kansas
Brown County Conservation District, Kansas
Nemaha County Conservation District, Kansas
Nemaha Natural Resources District, Nebraska
Kansas State Conservation Commission
Kansas Department of Wildlife and Parks
U.S. Department of Agriculture,
Soil Conservation Service
U.S. Department of Agriculture,
Forest Service and Kansas State and Extension
Forestry

For additional information contact: James N. Habiger, State
Conservationist, Soil Conservation Service, 760 South Broadway,
Salina, Kansas 67401. Phone: (913) 823-4565.

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WATERSHED AGREEMENT

between the

Pony Creek Watershed Joint District No. 78, Kansas
Brown County Conservation District, Kansas
Nemaha County Conservation District, Kansas
Nemaha Natural Resources District, Nebraska

(referred to herein as sponsors)

and the

Soil Conservation Service
United States Department of Agriculture

(referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the sponsors for assistance in preparing a plan for works of improvement for the Pony Creek Watershed, State of Kansas, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to SCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and SCS a plan for works of improvement for the Pony Creek Watershed, State of Kansas, hereinafter referred to as the watershed plan-environmental impact statement, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. The sponsors will acquire, with other than Public Law 566 funds, such land rights as will be needed in connection with the works of improvement. (Estimated cost \$199,800)
2. The sponsors hereby agree that they will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as

implemented by 7 C.F.R. Part 21) when acquiring real property interests for this federally assisted project. If the sponsor is legally unable to comply with the real property acquisition requirements of the Act, it agrees that before any federal financial assistance is furnished, it will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the sponsor agrees that it will reimburse owners for necessary expenses as specified in 7 C.F.R. 21, 1006 (c) and 21.1007.

The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the sponsors and SCS as follows:

	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Relocation Payment Costs</u> (dollars)
Relocation Payments	19.0	81.0	0 <u>a/</u>

a/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost shared in accordance with the percentages shown.

3. The sponsors will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.

4. The sponsors will obtain all necessary federal, state, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

5. The percentages of construction costs to be paid by the sponsors and by SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Construction Costs</u> (dollars)
6 Floodwater Retarding Dams	0	100.0	\$1,118,800

6. Cost-sharing rates for the establishment of enduring land treatment practices are a varying percent of the average cost of installing the enduring practices in the selected plan for the evaluation unit. The cost-share rate to be paid by landowners or operators (Brown and Nemaha County Conservation Districts in Kansas and Nemaha Natural Resources District in Nebraska) and by SCS are as follows:

<u>Practice</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Construction Cost</u> (dollars)
Terraces - 283.7 miles	35	65	\$ 646,400
Underground outlets - 9.8 miles	35	65	216,800
Diversions - 5.0 miles	35	65	38,500
Water and sediment control basins - 66	35	65	53,700
Grade stabilization structures - 53 <u>a/</u>	30	70	461,100
Grassed waterways - 140 acres	35	65	119,000
Forestland improvement - 1,200 acres	100	0	41,000

a/ Small, on-farm structures installed as part of the planned land treatment

The estimated total P.L. 83-566 financial assistance cost for enduring practices is \$1,021,000.

7. The percentages of the engineering services costs to be borne by the sponsors and SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Engineering Costs</u> (dollars)
6 Floodwater Retarding Dams	0	100.0	\$ 391,700

8. The Soil Conservation Service will assist the sponsors in providing technical assistance to landowners or operators to plan and install land treatment practices shown in the plan. Percentages of technical assistance costs to be borne by sponsors and SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Technical Services Costs</u> (dollars)
Land treatment practices	0	100	\$ 613,800
Forestland improvement	20	80	15,000

9. The sponsors and SCS will each bear the costs of project administration that each incurs, estimated to be \$14,000 and \$134,300, respectively.

10. The Brown and Nemaha County Conservation Districts in Kansas and Nemaha Natural Resources District in Nebraska will obtain agreements from owners of not less than 50 percent of the land above each floodwater retarding dam. These agreements state that the owners will carry out conservation farm or ranch plans on their land and ensure that 50 percent of the land is adequately protected before construction of any dam.

11. The Brown and Nemaha County Conservation Districts in Kansas and Nemaha Natural Resources District in Nebraska will obtain applications from owners of not less than 75 percent of the land in the problem area, indicating that they will carry out the planned land treatment measures. Applications will be obtained before the first long-term land treatment contract is executed.

12. The Brown and Nemaha County Conservation Districts in Kansas and Nemaha Natural Resources District in Nebraska will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed plan.

13. The Brown and Nemaha County Conservation Districts in Kansas and Nemaha Resources District in Nebraska will obtain agreement with landowners or operators to operate and maintain the land treatment practices for the protection and improvement of the watershed.

14. The Pony Creek Watershed Joint District No. 78 will be responsible for the operation, maintenance, and replacement of the floodwater retarding dams by actually performing the work, or arranging for such work in accordance with agreements to be entered into before issuing invitations to bid for construction work.

15. The costs shown in this plan are preliminary estimates. Final costs, to be borne by the parties hereto, will be the actual costs incurred in the installation of works of improvement. Land treatment costs will be based on average costs for each practice installed.

16. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

17. A separate agreement will be entered into between SCS and sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

18. This plan may be amended or revised only by mutual agreement of the parties hereto, except that SCS may deauthorize or terminate funding at any time it determines that the sponsor has failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the sponsor in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsor or recoveries by SCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the sponsor(s) having specific responsibilities for the measure involved.

19. No member of or delegate to Congress shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

20. The program conducted will be in compliance with all requirements respecting nondiscrimination, as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15), which provide that no person in the United States shall, on the ground of race, color, national origin, sex, age, handicap, or religion, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity conducted or assisted by the Department of Agriculture.

PONY CREEK WATERSHED JOINT
DISTRICT NO. 78, KANSAS

By Harlan Bailey
Harlan Bailey

Rt. 3, Box 58
Sabetha, KS 66534
Address _____ Zip Code _____

Title President
Date 7/16/90

The signing of this plan was authorized by a resolution of the governing body of the PONY CREEK WATERSHED JOINT DISTRICT NO. 78, KS

adopted at a meeting held on 7/16/90

Craig A. Strahm
Craig Strahm, Secretary

Morrill Community Building
Morrill, KS 66515
Address _____ Zip Code _____

Date 7/16/90

NEMAHA NATURAL RESOURCES
DISTRICT, NEBRASKA

By Neal Frost
Neal Frost

125 Jackson, Tecumseh, NE 68450
Address _____ Zip Code _____

Title Chairman
Date 8/9/90

The signing of this plan was authorized by a resolution of the governing body of the NEMAHA NATURAL RESOURCES DISTRICT, NEBRASKA

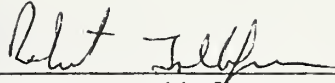
adopted at a meeting held on August 9, 1990

Dan Rand
Dan Rand, Secretary

125 Jackson, Tecumseh, NE 68450
Address _____ Zip Code _____

Date 8/9/90

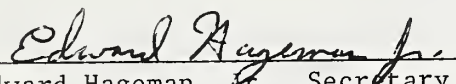
BROWN COUNTY CONSERVATION
DISTRICT, KANSAS

By 
Robert Tollefson

1310 Oregon
Hiawatha, KS 66434
Address _____ Zip Code _____

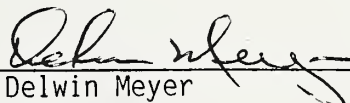
Title Chairman
Date July 3, 1990

The signing of this plan was authorized by a resolution of the governing body of the BROWN COUNTY CONSERVATION DISTRICT, KANSAS adopted at a meeting held on July 3, 1990


Edward Hageman, Jr., Secretary
Date July 3, 1990

Hiawatha, KS 66434
Address _____ Zip Code _____

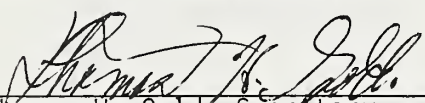
NEMAHA COUNTY CONSERVATION
DISTRICT, KANSAS

By 
Delwin Meyer

411 North Street
Seneca, KS 66538
Address _____ Zip Code _____

Title Chairman
Date July 18, 1990

The signing of this plan was authorized by a resolution of the governing body of the NEMAHA COUNTY CONSERVATION DISTRICT, KANSAS adopted at a meeting held on July 18, 1990

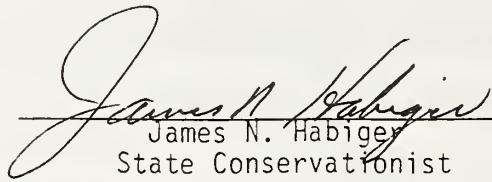

Thomas H. Gold, Secretary

411 North Street
Seneca, KS 66538
Address _____ Zip Code _____

Date July 18, 1990

Soil Conservation Service
United States Department of Agriculture

Approved by:


James N. Habiger
State Conservationist

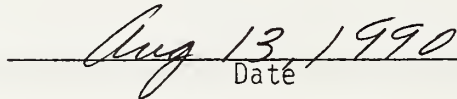

Date

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SUMMARY OF WATERSHED PLAN/ENVIRONMENTAL IMPACT STATEMENT

Project Name: Pony Creek Watershed

Counties: Brown and Nemaha Counties
Richardson County

State: Kansas
Nebraska

Sponsors: Pony Creek Watershed Joint District No. 78, Kansas
City of Sabetha, Kansas
Brown County Conservation District, Kansas
Nemaha County Conservation District, Kansas
Nemaha Natural Resources District, Nebraska

Description of NED Plan:

The NED plan includes 6 floodwater retarding dams, 1 multipurpose dam, land treatment structure systems at 53 gully erosion problem areas, and required land treatment on 6,150 acres. A total of 60 severe erosion problem areas will be treated with the project. About 1,200 acres of forestland will be treated and managed for long-term timber production.

The floodwater retarding dams include storage for floodwater and sediment. The dams will generally control drainage areas of 1,000 acres and greater. The land treatment structure systems consist of small on-farm-size structures with drainage areas generally less than 50 acres. These systems may include one or more grade stabilization structures, diversions, water and sediment control basins, or combinations of the three.

Resource Information:

Size of Watershed 39,490 acres

Land Ownership	Percent
Private	97.3
Federal and State Transportation System	0.3
Local Public Transportation System	1.7
Urban	0.7

Number of Farms - 90 Average Size - 440 acres

Important Farmland - 10,060 acres prime farmland

Highly Erodible Land - 29,000 acres

Wetlands - minor acres not affected by the project

Endangered and Threatened Species -

Federal - bald eagle, peregrine falcon, whooping crane,
Eskimo curlew, least tern, and piping plover
State - Eastern spotted skunk, snowy plover, and white-
faced ibis

Cultural Resources - no significant sites identified in work areas of project

<u>Present Land Use:</u>	<u>Total Watershed</u>		<u>100-Year Flood Plain</u>	
	Acres	Percent	Acres	Percent
Cropland	29,840	76	2,330	75
Grassland	5,650	14	160	5
Forestland	2,120	5	300	10
Other	1,880	5	310	10
Total	39,490	100	3,100	100

Problem Identification:

Problems identified in the watershed are flood damages, moderate to severe sheet and rill erosion, ephemeral gully erosion, grade stabilization, and soil moisture limitations.

Annual flood damages to 3,100 acres of flood plain are as follows: flood plain scour damage to 250 acres is estimated to be \$3,300 and damages to crop, pasture, other agriculture, road and bridge, and recreation are estimated to be \$171,600. Potential savings in bridge replacement costs are estimated to be \$53,200 on 13 major flood plain tributary bridges.

Sheet and rill erosion on 9,940 acres after treating 2,480 acres with the going program will cost farmers an estimated \$89,500 in average annual income.

Ephemeral gully erosion damages on 55 acres (voids) depreciates the production on an additional 550 acres of associated untreated cropland at an estimated cost of \$56,900. Damages caused by voiding 100 acres due to projected gully growth are estimated to be \$6,100.

Depreciated cropland productivity damages on 750 acres associated with gullies are estimated to be \$21,200.

The damages to 50 road crossings including severe maintenance and bridge/culvert replacement costs are estimated to be \$56,100. Road ditch sediment clean out costs are estimated to be \$1,500 per year.

Reduced farm income from soil moisture limitations is estimated to be \$100,400 per year.

Farmers spend an estimated \$156,300 each year attempting to hold back gully development in terraced fields. Bridge and culverts are undercut by advancing gullies; therefore, useful life may be only a few years instead of 25-30 years, as designed. Frequent flooding causes extensive flood plain damage.

The commercial value of the wooded areas is low due to low value species, poor quality trees, and livestock grazing. Improvements can

be made by practicing forestland improvement, such as culling and cutting non-desirable species, planting desirable species, and eliminating livestock grazing.

Candidate Plans Considered:

Alternatives considered include no-project action, floodwater retarding dams and/or land treatment measures that include grade stabilization structures, water and sediment basins, gradient terraces with underground pipe or grassed waterways as outlets, and diversions in conjunction with each severely eroding problem area.

Project Purposes: The project purposes include watershed protection, flood prevention, and agricultural water supply.

Principal Project Measures:

- 6 floodwater retarding dams
- 1 multipurpose dam
- Land treatment structure systems at 53 problem areas
- 6,150 acres required land treatment
- 1,200 acres forestland treatment

<u>Project Costs:</u>	<u>PL-566</u>	<u>Cost</u>	<u>Other Funds</u>		<u>Total</u>
	\$	%	\$	%	\$
Land Treatment Measures:					
Required	649,800	65	345,400	35	995,200
Structure Systems	371,100	69	169,200	31	540,300
Forestry	-0-	-0-	41,000	100	41,000
Technical Assistance	625,800	99.5	3,000	0.5	628,800
Structural Measures:					
Floodwater Retarding					
Dams	1,118,800	85	199,800	15	1,318,600
Multipurpose Structure	614,000	52	562,600	48	1,176,600
Technical Assistance	747,800	100	0		747,800
Project Administration	<u>243,200</u>	<u>93</u>	<u>18,000</u>	<u>7</u>	<u>261,200</u>
Total	4,370,500	76.5	1,339,000	23.5	5,709,500

<u>Project Benefits Dollars</u> ^{a/} :	<u>Value</u>	<u>Percent</u>
Agricultural:		
Upland	\$ 243,000	42.5
Flood plain	85,600	15.0
Forestry Land Treatment	65,600	11.4
Agricultural Water	102,300	17.9
Recreation	1,600	0.3
Road, Bridges, and Utilities	<u>73,900</u>	<u>12.9</u>
Total	\$ 572,000	100.0

a/ Price Base 1986

Acres Benefited: Total - 28,600, Land Treatment - 11,400,
Structural - 17,200

Impacts:

Land Use Changes - 6 Floodwater Retarding Dams and 1 Multipurpose Dam

Converted From (Ac.):		Converted To (Ac.):	
		<u>Grassland</u> ^{a/}	<u>Sediment Pools & Beneficial Use</u>
Cropland	116	12	104
Grassland	100	16	84
Forestland	127	13	114
Total	343	41	302

a/ Dam and spillway areas seeded to a native grass mixture and managed for wildlife.

Natural Resources Changed or Lost:

Wooded Flood Plain (ac) - none
Wetlands (ac) - none
Cultural Resources (name) - none

<u>Wildlife Habitat</u>	<u>Loss Before Compensation</u>	<u>Compensation</u>	<u>Net Change</u>
Forestland (HU)*	975	975	0
Herbaceous (HU)	634	412	- 222

Fisheries - Change of 3 miles of streams to reservoirs.

Prime Farmland (ac) - 710 acres increase

Major Conclusions: (Final statements - interagency comments)

Areas of Controversy: (Final statements - interagency comments)

Issues to be resolved: (Final statements - interagency comments)

*Habitat units equal the rated quality value (variable 1 to 10) multiplied by acres

INTRODUCTION

The watershed plan and environmental impact statement have been combined into a single document describing plan formulation, expected environmental impacts, and is the basis for authorizing federal assistance for implementation.

The USDA Soil Conservation Service (SCS) and Forest Service (FS), Kansas State Conservation Commission, and Kansas Department of Wildlife and Parks assisted the local sponsors in developing the plan. Other federal, state, and local agencies also assisted by providing information, reviewing data, and helping with assessments.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 566 (83d Cong., 68 Stat. 666), as amended (16 USC 1001-1008), and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, as amended (42 USC 4321 et seq.). The Soil Conservation Service is responsible for compliance with the National Environmental Policy Act.

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PROJECT SETTING

Pony Creek Watershed is comprised of 39,490 acres (61.7 square miles). Acres by county are Brown, 27,840 acres, and Nemaha, 5,050 acres, in northeastern Kansas, and Richardson County, 6,600 acres, in Nebraska. (See Project Map, Appendix D.) Pony Creek Watershed is located in the Missouri River Basin in Water Resources Council Area 1024.*

Population of Sabetha, the only incorporated city in the watershed, totals 2,290. Rural population is about 400 in the watershed. 1/ 2/ **

Economy of the area is based on agriculture. The 90 farms in the watershed average about 440 acres each. 3/ Principal crops are corn, grain sorghum, wheat, alfalfa, and soybeans. Beef production is the major livestock enterprise. Most farms are diversified.

Normal annual precipitation is about 36 inches. Approximately 85 percent of the area's floods occur between April and October during the 178-day average growing season. 14/ Approximately 8 percent of the watershed is included in the 100-year flood plain.

Land use in Pony Creek Watershed is 76 percent cropland, 14 percent grassland, 5 percent forestland, and 5 percent other land (including streams, ponds, gullies, roads and farmsteads).

Gentle sloping land of three percent or less occurs on about 18 percent of the watershed. The remaining watershed land is categorized into slope groups of 3-6 percent, 7-9 percent, and 10 percent plus. These make up about 48, 17, and 17 percent respectively of the soil groups.

The eroded soils in the watershed have low natural fertility and organic matter. Infiltration of water is impaired and they are more difficult to till.

The historical change in land use dramatically contributed to excessive erosion. The area was essentially grassland until the late 1800's when large increases in population, number of farms, and acres farmed occurred in northeast Kansas. The conversion of grassland to

* All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigations by the Soil Conservation Service and the Forest Service, U.S. Department of Agriculture.

** Numbers appearing in the text correspond to the numbers of the references.

cropland changed the runoff characteristics. Plowing followed by several tillage operations left the soil largely unprotected which in turn caused severe soil erosion.

In the 1940's terracing and waterway construction were introduced. These practices were readily accepted as a tool to reduce erosion. Land use the past 10 to 15 years has been relatively stable.

PROBLEM AND OPPORTUNITY IDENTIFICATION

Major problems in the Pony Creek Watershed are flooding, grade instability, erosion, and shortage of water for agricultural uses. The flood plain includes 2,330 acres of cropland that are subject to flood damages. Approximately 9,940 upland project acres have an erosion rate exceeding the tolerable limit called "T." The tolerable limit is a maximum level of erosion that allows sustained productive capacity. Of these acres, approximately 900 acres are eroding at a rate of 1 to 2 times "T", 6,590 acres are eroding at a rate of 2 to 3 times "T", and 2,450 acres are eroding at a rate exceeding 3 times "T."

Erosion at these rates is a significant source of damaging sediment. Gully erosion limits the use of 15,000 acres. The annual erosion and flood damages are estimated to be \$621,400 as shown in Table 5, page 74.

Flooding Problems

Agricultural income is reduced by flooding on approximately 3,100 acres, including about 2,330 acres of cropland. Flood plain land use includes 1,100 acres of corn, 670 acres of soybeans, 60 acres of grain sorghum, 480 acres of wheat, 20 acres of alfalfa, 160 acres of grassland, 300 acres of forestland, and 310 acres of miscellaneous land including river channel. Frequency of overbank flow ranges from three times in 2 years to once a year. Small localized flooding causes considerable damage and inconvenience to farmers in the watershed. Flood damages by reach, type, and amount are shown in Table A. The Project Map (Appendix D) shows reaches.

Table A - Average Annual Flood Damages By Reach
Dollars

Reach	100-Year Flood Plain Acres	Crop & Pasture	Other Agric.	Road	Scour	Bridge Constr.	Recre- ation	Total
1	610	34,000	4,700	100	300	14,000	--	53,100
2	490	16,800	6,000	600	1,200	6,800	--	31,400
3	650	27,300	4,600	--	700	10,900	--	43,500
4	360	29,400	7,100	900	200	11,900	--	49,500
5	90	1,300	1,000	--	100	500	--	2,900
6	370	10,800	2,300	1,300	400	4,300	--	19,100
7	360	10,700	5,300	1,800	300	4,300	3,200	25,600
9	170	1,200	1,100	100	100	500	--	3,000
Total	3,100	131,500	32,100	4,800	3,300	53,200	3,200	228,100

Floods damage growing crops and forage grasses which are knocked over and/or covered with sediment, washed away, or reduced in quality. Crop yields are also reduced due to delays in planting and/or harvesting. In addition, floods that occur before or shortly after planting cause extra tillage and reseeding. Damage is not substantially affected by the duration of flooding, which is usually less than 24 hours.

Flooding of other agricultural items causes damage to buildings, fences, livestock, and feed yards on 28 farms. Many miles of fences are destroyed or damaged by floods. Most farmsteads have been located out of the flood plain because of the frequency of flooding. Installations such as machine sheds, livestock pens, feed bunks, and water tanks are frequently damaged. Considerable expense is incurred for debris removal after each flood. Photos 1 and 2, page 11, show road damages and a field with flood plain scour.

The design, frequency of replacement, and maintenance of bridges are affected by flooding and erosion. Thirteen bridges and 5 miles of dirt, gravel, and asphalt roads are subject to flood damage. About 50 other bridges are affected by erosion. Floods wash away road surfacing, scour road shoulders, fill road ditches with mud, and damage bridges. Bridge abutments are often severely eroded or washed out. While bridges are under repair, traffic must be rerouted. This is inconvenient and costly. County and township budgets are not sufficient to make timely replacements and repairs after a flood, hence these facilities are commonly in poor condition.

Sycamore Springs, a private recreational facility, is located on the north bank of Pony Creek four miles north and two miles east of Sabetha. Flooding in the camping area forces campers to evacuate. Floodwater has been around but not in any of the buildings.

Flooding indirectly affects everyone in the area due to loss of utilities, transportation systems, and business to those serving the agricultural community.

Table B summarizes flood damages by major categories by frequency:



Photo 1 - Gravel washed off road and debris left on the road



Photo 2 - Gravel from road and flood plain scour

TABLE B - Flood Damages By Flood Frequency

Type	2-Year	10-Year	50-Year	100-Year
<u>Agricultural</u>				
<u>Crop and Pasture</u>				
Total Damages (\$)	\$ 90,900	\$ 282,900	\$ 374,400	\$ 396,600
Area Flooded (Ac.)	(920)	(2,170)	(2,330)	(2,490) ^{a/}
<u>Other (Farms, Fences, Etc.)</u>				
Total Damages (\$)	18,200	68,300	95,600	104,700
Subtotal Damages (\$)	109,100	351,200	470,000	501,300
<u>Roads, Bridges, and Utilities</u>				
Total Damages (\$)	3,300	20,200	24,800	31,100
TOTAL DAMAGES (\$)	\$112,400	\$ 371,400	\$ 494,800	\$ 532,400

a/ Total flood plain of 3,100 acres includes 300 acres forestland, 310 acres other land, and 2,490 acres cropland

Erosion and Sedimentation

Highly erodible land (HEL) makes up 29,000 acres or 74 percent of the watershed. Ninety percent of the untreated cropland or 8,200 acres are highly erodible land.

According to the Kansas 208 Water Quality Management Plan, Pony Creek Watershed is in one of the more highly erodible areas of the state. Approximately 320,300 tons of soil are displaced through erosion annually. This results in a present sediment yield to the Nemaha River of 126,200 tons annually.

Land treatment evaluation is based on evaluation units. By definition these units require similar practices, have similar treatment costs per acre, and respond to treatment in the same way. District Conservationists, Area Specialists, and Water Resources Planning Staff Specialists considered various evaluation units and agreed to use slope groups as the basic unit. Three slope groups namely 3, 7, and 10+ percent were selected. All soils evaluated in the watershed were assigned one of these groups. The soils in the 0 to 2 percent slope group were not evaluated. Problems and solutions are shown by these categories.

Sheet and rill erosion analysis shows that about 9,940 acres (25 percent of the watershed) are presently eroding at a rate which reduces the productive capacity and quality of the soil resource (exceeding 5 tons per acre per year). The existing erosion rates for this area range from 5.5 to 40 tons per acre with an average of 17.5 tons per acre per year (see footnote on Table C). Seventy-eight percent of the total watershed erosion is sheet and rill.

Most sediment is being flushed through stream channels and into the Nemaha River. Some in transit sediment is deposited temporarily in watershed streams. Other sediment deposition areas include farm ponds, flood plains, roads and borrow ditches. Dredging, land smoothing, road grading, and loading and hauling are common costs incurred in the watershed and off project to handle the sediment deposits.

Natural fertility is lost due to sheet and rill erosion. Commercial fertilizers, herbicides, and pesticides bonded to soil particles and organic material are eroded away. Soil intake rates decrease, tillage costs increase, and crop yields are reduced. The following table shows sheet and rill erosion rates by evaluation unit:

TABLE C - Untreated Cropland Sheet and Rill Erosion Rates - 1987

Evaluation Unit <u>a/</u>	Acres	Tons/Ac./Year <u>b/</u>	Total Tons/Yr.
1	5,180	10.6	55,000
2	1,770	17.4	30,100
3	2,110	40.0	84,200
4	880	5.5	4,800
Total	9,940	17.5	174,100

a/ Evaluation units 1, 2, 3, and 4 are percent slope groups - categories 3, 7, 10, and 0-2 percent respectively.

b/ Erosion rates are estimated to a fraction of a ton acre for relative comparison purposes only and do not imply that such accuracy is possible under current criteria.

Gross sheet and rill erosion was estimated for three land use categories. Grassland and forestland were combined because the rates are similar. The following table shows the 1987 sheet and rill erosion estimates. Photo 3, page 15, shows an example of this type erosion. At the present erosion rates, future without project sheet and rill erosion damages will total \$89,500 annually.

TABLE D - Gross Sheet and Rill Erosion - 1987

Evaluation Unit <u>a/</u>	Cropland		Grassland/Forestland		Miscellaneous		Total	
	Acres	Tons/Year	Acres	Tons/Year	Acres	Tons/Year	Acres	Tons/Year
1	14,110	66,000	3,530	6,400	470	1,900	18,110	74,300
2	4,460	34,500	1,250	3,100	170	900	5,880	38,500
3	5,030	110,400	1,250	6,200	170	1,500	6,450	118,100
4	3,910	9,800	1,290	900	170	700	5,370	11,400
Flood Plain	2,330	5,600	450	500	30	100	2,810	6,200
Total	29,840	226,300	7,770	17,100	1,010	5,100	38,620	248,500

a/ Evaluation units 1, 2, 3, and 4 are percent slope groups - categories 3, 7, 10, and 0 to 2 percent respectively

Ephemeral gully erosion usually occurs on cropland that is untreated. It is caused by concentrated flow from snow melt or rainfall in small, natural water courses. Some farmers try to fill in these little gullies before planting while others work around them. Some crop is left unharvested and harvest and tillage costs are increased. This type of erosion causes an estimated \$56,900 average annual damage to untreated cropland and is approximately 7 percent of the damages. Photo 4, page 15, shows the typical ephemeral erosion pattern. Photo 5, page 16, shows the end of an ephemeral drainageway as it empties into an advancing gully. Photo 6, page 16, shows sediment deposits from ephemeral gully erosion. The following table shows the 1987 ephemeral erosion rates by category:

TABLE E - Ephemeral Gully Erosion - 1987

Evaluation Unit <u>a/</u>	Void Acres	Tons/Acre	Tons/Year
1	26	330	8,600
2	9	440	4,000
3	10	520	5,200
4	10	340	3,400
Total	55		21,200

a/ Evaluation units 1, 2, 3, and 4 are percent slope groups categories 3, 7, 10, and 0 to 2 percent respectively.

Adjacent to the 55 acres of voids there are 550 acres eroding each year. An attempt to fill the voids are made with farming operations. The 550 acres are classified as depreciated acres. The erosion reduces the natural fertility and organic material on these acres at a higher rate than the remaining acres in the fields thus increasing tillage and harvesting costs as well as reducing yields.



Photo 3 - Typical sheet and rill erosion on untreated cropland



Photo 4 - Ephemeral gully erosion and on-site sedimentation
typical of untreated cropland



Photo 5 - Gully and ephemeral erosion typical of this watershed



Photo 6 - This photo shows sediment deposits from a ephemeral gully

Channel work on the Nemaha River and some local straightening along Pony Creek set in motion an erosion cycle that is causing instability in upstream reaches of the watershed. The channelization has lowered the stream channel grade, thus causing overfalls to move up field ditches or waterways. The overfalls cause instability in the waterway outlets and if left unchecked will cause stability problems in terrace outlets as they move upstream.

An unchecked overfall or a series of overfalls moving upstream will result in additional acres of gullies in the future. The 1987 gully acres in treated cropland were 20 acres; untreated cropland, 20 acres; and other land, 90 acres; for a total of 130 acres. Average annual damages associated with future gully growth are projected to be \$6,100.

Gullies account for approximately 11 percent of the total soil loss in the watershed. Approximately 1,200 gullies cause permanent damage to agricultural land and most are less than 50 feet in length. Gully erosion affects the use of about 15,000 acres of treated and untreated agricultural land. Some grassed waterways in the treated areas have been made ineffective by advancing gullies which may also cause some terrace systems and field crossings to fail. About 130 acres have been permanently damaged by gullies. The ongoing program will treat approximately 2,480 acres of the 15,000 acres.

Eroding gullies constantly threaten the public transportation system. Special and expensive design and construction methods are needed at stream crossings to counter the effects of gullies and erosion. Photos 7 and 8, page 19, show channel bank sloughing and severe channel erosion where bridge footings are exposed. Future bridge replacement costs will be much greater because of this erosion. Culverts are commonly installed with a drop of as much as 10 feet from one side of the road to the other. Concrete aprons and/or other structures are generally needed at the downstream ends to retard undercutting of culverts. Routinely, rock and earth fill have been hauled in to replace that which has washed away.

Road shoulders are often severely eroded by gullies advancing in roadside ditches at bridges and culverts. Gullies advancing in roadside ditches also threaten farmstead and field entrances and agricultural land adjacent to the roadside. Farmers and road maintenance crews spend considerable time and money repairing road shoulders and field edges. The life expectancy of road crossings may be 15 years or less under these conditions whereas the culvert could last 25 years or more. The added cost to maintain the transportation system above the severely eroding problem areas was estimated to be \$56,100. Cleaning sediment out of ditches from eroding cropland costs another \$1,500. Photo 9, page 20, shows a typical gully beside a paved road undercutting the road and extending into the adjacent field.

Erosion hazard is the main factor limiting more intensive use of upland cropland. Erosion also threatens prime farmland. Farm owners

and operators use alfalfa, red clover, wheat, and grass as means of controlling gully erosion. Potential income from more profitable crops is thus foregone. This trend is expected to continue.

Flood plain scour in Pony Creek Watershed accounts for approximately 2 percent of the total erosion. Scour damage presently occurs on about 280 acres. Scour damages are estimated to be \$3,300 annually. Photo 10, page 20, shows sediments from flood plain scour.

A tabulation of gross erosion from all categories is a dramatic expression of the watershed's total erosion problem. The following table shows gross erosion by land use.

TABLE F - Total Watershed Gross Erosion - 1987 a/

Type	Land Use			Total
	Cropland	Grassland/Forestland	Misc.	
	Average Tons/Year			
Sheet and rill	226,300	17,100	5,050	248,450
Ephemeral gully	21,200	--	--	21,200
Gully	25,400	9,400	--	34,800
Scour	6,950	--	--	6,950
Streambanks	--	--	8,900	8,900
Total	279,850	26,500	13,950	320,300

a/ Includes all the land in the 0 to 2 percent slopes that is not included in land treatment units 1, 2, and 3

Average annual erosion damages are shown in Table 5. The categories evaluated are sheet and rill, \$89,500; ephemeral, \$56,900; gully, \$6,100; depreciated, \$21,200; expense to repair outlets in treated land, \$156,300; road systems, \$56,100; and cleaning of sediment from road ditches, \$1,500.

Water Supply Problems

Ground water quality in Pony Creek Watershed is generally sufficient for domestic use except during periods of drought. The major source of ground water is the glacial outwash over most of the watershed. Yield from alluvial deposits is low.

The City of Sabetha's present water supply is Sabetha Lake built in 1936 and rebuilt by raising the top of the dam and the emergency spillway in 1951. The rebuild gave the lake approximately 1,950 acre feet of municipal water capacity. In 1984 the capacity had been depleted by approximately 740 acre feet due to sedimentation with an average depth of 6.2 feet over 118 acres and a maximum depth of 12 feet. The water quality is acceptable for domestic uses, but the samples taken have tested slightly high in ammonia, low in dissolved oxygen, and abnormally high in phosphorus. 15/



Photo 7 - Sloughing on channel banks



Photo 8 - Severe channel erosion has undercut concrete bridge abutment



Photo 9 - Typical gully erosion undercutting a blacktop road



Photo 10 - Sediments from flood plain scour

Fish and Wildlife Habitat Problems and Opportunities

The major factor influencing fish and wildlife habitat conditions in the watershed is land use. Conversion of 73 percent of the watershed to cropland has decreased habitat diversity. Future changes are expected to be minor. There is an opportunity to increase diversity by adding interspersed plantings of grassland and woodland in large cropland areas, and by maintenance and improvement of wooded riparian habitat.

There is an opportunity to improve fisheries in Pony Creek by reducing sediment in streams. Sediment can affect downstream fisheries diversity by filling pool segments and covering gravel and rock in the streambed. Fewer pools and longer runs that have resulted from sedimentation of Pony Creek have lowered the diversity of fish. 25/

Research 26/ indicates that suspended sediment lessens quality and quantity of food available to fish. This reduced food supply may affect fish survival by reduced growth and decreased resistance to disease and toxic substances.

Other Problems and Opportunities

The Pony Creek Watershed Forestry Woodland Resources Plan 5/ problems section states that even though the commercial quality forest contains marketable quantities of timber, there are large proportions of low value species and cull trees. Pasturing has reduced the commercial value of wooded areas in wooded pastures.

Forestry management can help correct the above problems by harvesting the sawlogs, culling low value species for fuelwood, managing hedgerows for posts and firewood, planting trees, excluding livestock grazing, and protecting the areas from fire.

Pony Creek is subject to Kansas Surface Water Quality Standards (KAR 28-16-28b through 28f) administered by the Kansas Department of Health and Environment (KDHE).

Kansas Department of Health and Environment maintains a water quality monitoring station on Pony Creek near Reserve (Station 291). Pony Creek water quality, as well as that from seven other reference monitoring sites, is summarized in Appendix C, Table III.

In comparing Pony Creek water quality to the clean water reference site (Cottonwood River near Plymouth - Station 275), Pony Creek water is of a poorer quality. Since there are no industrial or municipal point source discharges to Pony Creek, the detrimental effects to Pony Creek water quality are a result of agricultural non-point source pollution. Pony Creek water quality will continue to deteriorate due to an increase in nonpoint source pollutants unless corrective action is taken. Suspended solids, phosphorus, ammonia, and nitrate appear to be the most significant agricultural non-point

source pollutants. These pollutants also represent the greatest threat to aquatic life. 7/

KDHE also has tested the water for agricultural pesticide samples in Pony Creek. A summary of this sampling is included in Appendix C, Table II. Atrazine and metolachlor have been found occasionally at the Pony Creek site. The concentrations found do not represent immediate environmental contamination problems and the long term environmental consequences of these concentrations are uncertain. Because of this uncertainty, it is prudent to carefully examine and evaluate current pesticide use practices within the watersheds. At the minimum, pesticide users should be encouraged to use pesticides judiciously and special attention should be given to proper container and residue disposal.

INVENTORY AND FORECASTING

Scoping of Concerns

Relative impacts of alternatives, in Table G, on environmental, economic, and social factors were analyzed early in planning to determine the significance to decision making and to design the environmental evaluation. Scoping considerations involved an interdisciplinary team approach plus correspondence with state and federal agencies. Assessment findings showed that alternatives would have no significant impact on drainage, mineral resources, ground water, wetlands, air quality, visual resources, minority populations, or threatened or endangered species. Therefore, these factors will not be discussed in the impacts section although some basic data concerning these factors have been collected in order to determine the magnitude of impacts. Significant factors were used to scope the study, compare alternatives, and to present the impacts of the recommended plan.

Existing Resources

In 1982 fewer than 10 percent of Brown and Nemaha County farms had gross sales under \$10,000, and 22 percent of Brown and Nemaha County farmers worked 100 or more days off the farm. Approximately 15 percent of the farms in the watershed used 150 or more days of hired labor in 1982. ^{20/} Although many farmers have low gross farm sales and maintain off-farm jobs, 60 percent of the farms in the watershed gross over \$20,000 per year. In 1980 approximately 40 percent of the watershed population was included in the low income level. Per capita income ^{19/} for watershed counties is below state and national averages.

Transportation routes in Pony Creek Watershed are essential to the economy. Major routes through the watershed are U.S. Highway 75 from Sabetha north, U.S. Highways 73 and 159 at the lower end of the watershed on a north-south route, and a blacktop farm to market road from Morrill north through the watershed. The minor routes are gravel roads and other short sections of dry weather road.

An inventory of Food Security Act wetlands was made. No wetlands caused by frequent flooding exist. ^{4/}

Table G - Resources and Problems Significant to Decision Making

Natural Resources and Problems	Degree of Impact <u>a/</u>	Significance to Decision Making	Remarks
Flooding	Major	High	Damage to local residences, businesses, and reduces agricultural income
Streamflow	Moderate	Low	Impacts high flows most
Drainage	Minor	None	
Gullies	Major	High	
Erosion	Major	High	Reduce agricultural income
Sedimentation	Major	Medium	Affects diversity of aquatic species, water pollution, high road and ditch maintenance
Land use	Moderate	Medium	Threatened by erosion
Prime farmland	Moderate	Medium	
Mineral resources	Minor	None	
Water supply	Major	High	
Ground water	Low	Low	Insufficient for agric.
Wetlands	Minor	None	High bacterial and nutrient counts
Water quality (other than sediment)	Moderate	Medium	
Air quality	Minor	None	Lacks habitat diversity
Fish habitat	Minor	Low	
Wildlife habitat	Moderate	Medium	No critical habitat identified
Endangered, threatened plants and animals	None	None	
Visual resources	Minor	Minor	Rural setting, little change expected
Cultural resources of national significance	Minor	Low	None affected
Minority populations	Minor	Minor	A small local demand exists
Recreation	Minor	Low	
Human health and safety	Minor	Medium	Reduced by floods and erosion
Agricultural income	Major	High	
Relocations	None	Low	None expected
Wild fires	Minor	Low	County road maintenance budgets cannot keep up with current costs
Road and Bridge Maintenance	Major	High	

a/ Relative magnitude of impact of alternatives:

Major - significant

Moderate - readily apparent and somewhat significant

Minor - detectable but slight

None - at lower level of detection if at all

Twenty-five percent of the land is classified as prime farmland. Land use is shown in Table H. Gully acreages were subtracted from cropland, grassland, and forestland acres for evaluation purposes.

Table H - Present Land Use

<u>Land Use</u>	<u>Evaluated Flood Plain</u>		<u>Upland</u>		<u>Total</u>	
	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>
Cropland	75.2	2,330	75.6	27,510	75.5	29,840
Grassland	5.2	160	15.0	5,490	14.3	5,650
Forestland	9.6	300	5.0	1,820	5.4	2,120
Other Land	1.0	30	2.7	980	2.6	1,010
Stream Channel	9.0	280	.8	300	1.5	580
Ponds	-	-	.5	160	.4	160
Gullies	-	-	.4	130	.3	130
TOTAL	100.0	3,100	100.0	36,390	100.0	39,490

Most of Pony Creek Watershed consists of upland soils developed in loess or glacial till. Most of the area is classified in the Grundy, Shelby, and Pawnee series. The somewhat poorly drained Grundy soil has a clayey subsoil and is formed in loess. The moderately well-drained Pawnee and well-drained Shelby soils are formed in glacial till. Pawnee has a clayey subsoil and Shelby has a loamy subsoil. The valleys in the watershed are generally less than one-half mile wide. The major alluvial soil is Judson. Most of the soils are used for cultivated crops and are in Land Capability Classes II, III, or IV. 27/

Pony Creek Watershed contains several gravel pits and potential sources for commercial limestone aggregate. Sand and gravel come from high terrace and glacial drift deposits. Limestones are near the surface or are exposed hard ledge rocks along the upper 1/3 of Pony Creek. 9/ 10/

Ground water is the principal domestic source of water in Pony Creek Watershed. Ground water is available from three general sources, bedrock, alluvium, and glacial outwash. The most important source is glacial outwash. Relatively small quantities are available from the alluvial deposits. Much of the water is obtained from bedrock aquifers, especially in northwestern Brown County including Pony Creek. 8/

Springs occur along the walls of stream channels; issuing from jointed and fractured limestones. Sycamore Springs Resort is developed below one of the larger springs in northwest Brown County. Also a privately-owned trout raising facility is using one of the springs to provide water with a constant temperature, quality, and quantity.

Sabetha, located in the extreme upper end of the watershed, received its water from wells until the mid to late 1930's when

Sabetha City Lake was built. The lake is the city's present water supply.

Water from wells in the county is generally hard but is suitable for most uses.

There are 149 miles of ephemeral, 71 miles of intermittent, and 51 miles of perennial streams in Pony Creek Watershed.

The major factor influencing fish and wildlife habitat conditions in the watershed is land use. Past land use changes have decreased habitat diversity and available edge. There is an opportunity to increase diversity by interspersed plantings of grassland and woodland in large cropland areas and in maintenance of wooded riparian habitat.

Wildlife species commonly found where suitable habitat is available are: opossum, eastern cottontail, fox squirrel, gray squirrel, beaver, muskrat, coyote, raccoon, skunk, white-tailed deer, bobwhite quail, meadowlark, cardinal, red-tailed hawk, yellow-shafted flicker, ornate box turtle, red-sided garter snake, and western chorus frog. Nationally endangered or threatened species that do, or are likely to, occur in the watershed include the bald eagle, peregrine falcon, and whooping crane. 21/ Six state-listed threatened or endangered species, Eskimo curlew, least tern, piping plover, Eastern spotted skunk, snowy plover, and white faced ibis, are also likely to occur. The Eastern spotted skunk is the only permanent resident within the watershed. It prefers forest edges and grasslands where rock outcrops and shrub clumps are present. Woody fence rows, odd areas, and abandoned farm buildings are also important. 18/

The following species of fish were collected during the Triagency aquatic field evaluation in November 1987: 28/

<u>Common Name</u>	<u>Scientific Name</u>
Central stoneroller	<u>Campostoma anomalum</u>
Sand shiner	<u>Notropis stramineus</u>
Fathead minnow	<u>Pimephales promelas</u>
Creek chub	<u>Semotilus atromaculatus</u>
White sucker	<u>Catostomus commersoni</u>
Yellow bullhead	<u>Ictalurus natalis</u>
Green sunfish	<u>Lepomis cyanellus</u>
River shiner	<u>Notropis blennius</u>
Red shiner	<u>Notropis lutrensis</u>
Suckermouth minnow	<u>Phenacobius mirabilis</u>

None of these species are on the threatened or endangered list.

During two surveys sponsored by SCS, archeologists from the Kansas State Historical Society 12/ 13/ identified 44 cultural resource sites in the watershed. These included 18 prehistoric sites, 21 historic archeological sites, 4 sites with both prehistoric and historic artifacts, and 1 historic period structure. Prior to the

surveys only one archeological site from the watershed was represented in official inventory records, and no cultural resources were listed in or eligible for the National Register of Historic Places. 11/ 23/ The surveys focused on settings in small valleys where grade stabilization structures might be installed, and on adjacent slopes and uplands where various conservation practices may be implemented. Surveyed areas included those where shoreline erosion may occur, perhaps exposing archeological sites. Twenty-six structure sites and closely adjacent areas were investigated. The prehistoric sites were found in fairly consistent settings; prominent well-drained areas overlooking Pony Creek and its permanent tributaries. Most historic sites were located near section and subsection lines, probably occurring after the pattern of rural roads developed in this part of Kansas

Eight of the archeological sites were considered to be potentially significant. Five of these would not be affected by the project. The three remaining sites that may be affected by the project were evaluated to determine their significance. Based on the results of this work, it has been determined that the sites are not significant. 29/

There are no known cultural resources that will be affected by the project. Based on the work described above, it is expected that few additional archeological sites will occur in areas where conservation practices may be installed. It is possible, but unlikely, that additional archeological sites will occur in areas where structural measures will be installed. Provisions are included in the plan to take these resources into account during installation.

Forecasted Conditions

Future conditions are forecasted for a 50-year project life.

Flood Damages - Crop and pasture, other agricultural property, road and bridge, and flood plain scour damages are estimated to increase in the future without the project.

The area flooded is not expected to change without some type of group project. Installation of the going program practices on about 2,480 acres will reduce flood peaks approximately 3 percent. The effect of this flood damage reduction was not used to compute future without project damages.

Crop Yield - Potential crop yields have increased dramatically due to changes in technology. Flood plain yields reflect application of known technology. Present yields were used for all erosion evaluations such as sheet and rill, ephemeral, gully, and depreciated.

Sediment - The erosion cycle is at the point where more acres will be lost to gullies in the future without the project. This erosion will increase the amount of sediment moving through the system and into the Nemaha River. Road ditches, farm ponds, and reservoirs will continue to fill with sediment at accelerated rates.

Water Quality - There is no impairment of water in Pony Creek although there is a large sediment load. Most streams are intermittent or ephemeral and are not presently classified for a specific water use. Under Kansas Water Quality Standards, protected uses of Pony Creek include agricultural water supply, expected aquatic support, industrial water supply, and non-contact and consumptive recreation. KDHE concludes that the quality of water is a result of agriculture non-point sources and that the water will deteriorate unless corrective action is taken. ^{7/} Even though there is no water use impairment at this time, continued deterioration may result in one or more of the designated water uses not being met.

The continued deterioration of surface water in the watershed spells a corresponding negative implication for groundwater. Due to the natural recharge-discharge relationships and the hydraulic interactions, declining surface water quality implies declining groundwater quality.

Since this area of the state has a high recharge potential through percolation, the bedrock aquifers are susceptible to water quality problems. Since most water consumed in the area is groundwater, continued deterioration is a serious concern.

The City of Sabetha projects a demand of .60 MGD for the city and a potential demand of .33 MGD to surrounding communities and rural water districts. Sabetha and the surrounding communities each have populations of less than 2,500; therefore, the water use is classified as agricultural. The average daily pumpage of .37 MGD in 1986 fully utilized the current water source for the City of Sabetha. 16/

Recreational uses for Multipurpose Dam No. 3 were not pursued because the City of Sabetha lies within a 25-mile radius of the Upper Black Vermillion Site No. 50 and the water-based recreational needs for the Sabetha area are considered satisfied by that site.

Stream Ecosystems - Fishery habitat quantity and quality is expected to decline throughout the stream system. The present use of fertilizers and pesticides and the presence of soil erosion are expected to continue which will further deplete the quality of water in streams and the stream ecosystem. The entire food chain is disrupted and game fish (primarily predators) are the primary species affected. Toxic substances may also prove to be limiting factors to the aquatic producers and/or consumers. There is a demand for a small amount of stream fishing in Pony Creek.

Erosion - Land quality on 9,940 acres will continue to decline, eroding at a rate exceeding five tons/acre/year. Infiltration rates will decrease thereby reducing available water and potential crop yields. Conversion of some cropland to grassland and other attempts to protect cultivated fields may slow down the advancing gullies, but not stop them. Numerous gullies will develop in grassed waterways and other conservation system outlet works on about 8,000 acres of treated cropland.

Ephemeral Gully Erosion - Ephemeral gullies erode untreated cropland fields. Time of year, storm intensity, soil type, management practices, and slope affect width and depth of soil being eroded. Farmers plow these eroded areas and/or push them in with dozers and disk around them before starting their normal tillage operations. Topsoil is thereby mechanically moved into the water course only to be flushed out during the next storm. Over time many of these ephemerals will become permanent gullies (however, a nearly equal number of acres will become ephemeral drains as the erosion cycle and the water courses move upstream).

Gully Erosion - Pony Creek gully development is a result of channel instability caused by downstream channelization and aggravated by some farming operations. The increase in gully acres is a result of the system attempting to stabilize. All gullies follow essentially the same geomorphic development and eventually return to relative stability. Stability is reached when the headcut reaches the drainage divide or no longer has sufficient energy to erode. Gully erosion will cause the conversion of 100 acres of cropland to stream channels and/or miscellaneous land. Production costs will increase as gullies cause greater machine time and equipment breakage.

Depreciated Areas - Next to the advancing gully, some farmers leave a buffer strip in an attempt to hold back the advancing gully. In addition, selected odd areas are also left untilled. These areas revert to grass or brush. Some revision will occur in treated cropland, but most of the area is in untreated cropland. Approximately 300 acres of cropland adjacent to these gully areas will be converted from row crop to grassland.

Going Program - Watershed farmers will install few enduring practices (less than 50 acres per year) in the future without the project due to limited funds for such practices. Conservation tillage and no-till will be the primary conservation practices in the watershed without the project.

Conservation Reserve Program - The CRP is expected to convert 800 acres of cropland to permanent vegetation. Four hundred-fifty of these acres are expected to be highly erodible land (HEL) untreated cropland with an additional 350 acres of HEL cropland with terraces and waterways installed but still eroding over tolerable amounts. After ten years it is expected that the acres with land treatment structures would be recultivated and treated with conservation tillage and no-till. The HEL acres without structural systems would remain in permanent vegetation.

Highly Erodible Land - There are 8,200 acres of HEL untreated cropland acres now. By 1995, CRP will treat 450 acres and the ongoing land treatment will treat another 350 acres, leaving 7,400 acres HEL cropland eroding above tolerable amounts. An estimated forty-five landowners will be out of compliance and be in jeopardy of losing USDA program benefits.

Land Use - Compare Table I with Table H to see expected future land use changes without a project.

Table I - Future Land Use Without Project

<u>Land Use</u>	<u>100-Year Flood Plain</u>		<u>Upland</u>		<u>Total</u>	
	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>
Cropland	75.2	2,330	74.3	27,050	74.4	29,380
Grassland	5.2	160	16.0	5,840	15.2	6,000
Forestland	9.6	300	4.9	1,780	5.3	2,080
Other Land	1.0	30	2.8	1,010	2.6	1,040
Stream Channel	9.0	280	.9	300	1.5	580
Ponds	-	-	.4	180	.4	180
Gullies	-	-	.7	230	.6	230
TOTAL	100.0	3,100	100.0	36,390	100.0	39,490

Without-project forecasts show a reduction in cropland and an increase in grassland. Gullies are projected to increase significantly. Aquatic species diversity will also be reduced due to deterioration of stream habitat.

Wildlife - Habitat quality will decline for some species. Projected habitat changes in Table J refer to cropland, grassland, and forestland cover. Gullies and grass planted to slow gully growth are included under the cover type where they occur.

Table J - Projected Habitat Unit^{a/} Changes Without a Project

<u>Land Cover</u>	<u>Average Value</u>	<u>Present Habitat Units</u>	<u>Projected Habitat Units^{b/}</u>	<u>Change in Habitat Units</u>	<u>Percent Increase/Decrease</u>
Cropland	2.5	74,600	73,450	- 1,150	- 1.5
Grassland	3.0	16,940	18,000	+ 1,060	+ 6.2
Forestland <u>c/</u>	5.7	12,080	11,860	- 220	- 2.0

a/ Habitat units equal the rated quality value (variable 1 to 10) multiplied by acres.

b/ Assuming the quality factor (average value) remains constant.

c/ Includes riparian and upland woodland.

The quality (average value) of permanent wildlife habitat may also decrease in the future due to reduced interspersion (mixing of habitat types), brought about by increased row crops, improper

management of woodlands, and increased use of herbicides and pesticides. See Tables H and I for acres. See Table IV in Appendix C for a complete habitat evaluation.

Transportation System - The cost of maintaining and replacing bridges and culverts will increase in the future without the project as gully erosion adds considerable cost to road crossings above the flood plain. About 50 culverts and bridges are affected by gully erosion in the watershed. Gullies advancing upstream undercut embankment slopes, bridge aprons, wingwalls, and support columns. To repair the problems requires large capital outlays that most county maintenance departments do not have. Therefore, temporary measures of dumping fill material at the undercut areas or in some cases closing the less traveled roads occurs.

The bridge replacement costs on the flood plain can be reduced by more than \$800,000 over the 50-year project life. The discounted costs savings at 8 5/8 percent interest totals approximately \$600,000.

Sediment Deposition - This highly erodible watershed yields a large amount of sediment. Much of it enters the Nemaha River where it is distributed downstream, including the Missouri River. Dredging is needed to keep the waterway open for river transportation. There are approximately 150 farm ponds in the watershed, many of which receive excessive sediment deposition from untreated areas. This excessive deposition results in reducing the expected design life of the ponds. Approximately 28 ditch miles receive excessive amounts of sediment each year and will require periodic cleanout and removal. See the following table for projected off-site sediment deposition:

Table K - Projected Future Off-Site Sediment Deposition

Category	Tons Per Year	Acre Feet
Pony Creek and Tribs. <u>a/</u>	Negligible	
Ponds	16,800	12
Nemaha River <u>b/</u>	98,700	76
Road Ditches	8,000	6
<u>Total</u>	<u>123,500</u>	<u>94</u>

a/ Sediment is flushed through the system. Negligible deposition occurs in tributary channels.

b/ Nemaha River confluence with the Missouri River a few miles downstream

(blank)

FORMULATION OF ALTERNATIVES

Formulation Process

The Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implementation Studies contain the broad objective to contribute to national economic development consistent with protecting the nation's environment. The objective is to increase the value of the nation's output of economic goods and services or to improve economic efficiency. Protection of the nation's environment is to conserve and/or preserve the nonmonetary aspects of man's surroundings such as cultural resources, ecological systems, or natural resource qualities.

Early in the formulation process, sponsors listed the problems and opportunities in the watershed. Public input plus interdisciplinary and interagency planning produced the final list of problems and opportunities shown in the first column of Table L, page 35.

The main problems identified in the May 1975 Pony Creek Watershed General Plan are grade stabilization, floods, and erosion. There were 83 problem areas identified. The watershed district decided it would need outside assistance to solve 48 of the problem areas such as P.L. 566 floodwater retarding dams. The other 35 problem areas were to be solved using private, local, and state resources.

Detailed surveys and floodwater retarding dam cost estimates were made for 25 of the most severe problem areas. Flood prevention benefits were computed and allocated to each floodwater retarding dam. Land treatment structure system (grade stabilization structures and land treatment) needs were identified and costs estimated.

Current studies showed only two dams (Nos. 3 and 5) of the initial 48 floodwater retarding dams were feasible due to the small drainage areas controlled, changes in planning criteria, and increased construction costs. To provide the flood control that was anticipated in the initial system, some of the small drainage areas were combined into larger drainage areas for Dam Nos. 94, 95, and 96. Additional studies determined that Dam No. 96 on Pedee Creek had a very significant effect on flood reduction. By combining Dam No. 96 with Dam Nos. 3 and 5 and adding four more dams (18, 33, 42, and 94) incrementally, a viable flood control system was developed. The seven dams combined with land treatment structure systems will decrease flood damages, stabilize grades, reduce erosion, and provide the stability needed for equilibrium in agricultural income. Dam No. 3, a multipurpose reservoir, will supply water for the City of Sabetha. Sabetha projects a future demand from surrounding small communities and rural water districts.

Each floodwater retarding dam is designed to retard flooding and where needed control the channel grade. A hydrologic analysis was made on all proposed structures to measure their individual and

cumulative reductions on flood damage. Flood damage reduction benefits were identified for crop and pasture, other agricultural, road and bridge, land scour, sediment, and other direct damages. Benefits to each flood plain reach were thus allocated to each structure for the various alternatives studied.

Each land treatment grade stabilization structure will be designed to control gully growth where a floodwater retarding dam is not feasible. One or more grade stabilization structure may be needed to control the gullies that one floodwater dam could control.

Project scoping began with a list of those measures that would help achieve or could be expected to satisfy one or more of the problems and opportunities (Table L).

Analysis was made of the expected impact of each measure under consideration for each of the problems or opportunities. Table L summarizes the results of this effort and displays the basis for selection of combinations of measures to be included in alternative plans. It also indicates reasons some measures were not studied further. Formulation of the NED and other plans are discussed in more detail on the following pages.

The ability of the going program of land treatment to solve watershed problems and fulfill opportunities was assessed. About 7,460 acres of untreated cropland above gully problem areas were found to have special land treatment needs. Advancing gullies restrict treatment of these areas because acceptable stable outlets are not provided by waterways or underground outlet systems. Some gullies can be treated with land treatment funds available to individual farmers, but many require cooperative agreements between several landowners.

Opportunities to improve wildlife habitat and environmental quality could best be accomplished by land use changes and improved management practices. Opportunities to reduce sediment yield, from gullies and scour erosion and improve downstream aquatic habitat could best be met by sediment retention structures combined with land treatment and improved management practices.

Four alternatives were formulated by combining various measures to solve problems and realize opportunities. These alternatives are: (1) No Project - the going conservation program will treat 2,480 acres including limited use of area affected by gullies; (2) the NED plan - 6 floodwater retarding dams, 1 multipurpose dam, 53 grade stabilization structures, and the required land treatment on 6,150 acres; (3) primary nonstructural plan, and (4) the Resource Protection Plan - 7 floodwater retarding dams, 1 multipurpose dam, 53 grade stabilization structures, and the required land treatment on 6,150 acres.

The NED alternative was formulated using a step-by-step incremental analysis starting with the 48 previously identified problem areas. Twenty-five of the 48 erosion problem areas were

Table L - Measures^{a/} to Satisfy Problem and Opportunities

Problems and Opportunities	Floodwater Retarding Dams	Change Flood Plain Land Use and/or Management	Change Upland Land Use and/or Management	Multi-purpose Structure
<u>To increase agricultural income:</u>				
Reduce soil loss on 7,460 acres greater than "T"	+	N	-	N
Stabilize gullies that restrict use and treatment of 15,000 acres	+	N	-	N
Maintain erosion control practices on 7,800 acres	+	N	-	N
Reduce flooding on 3,100 acres	+	-	-	+
Reduce other flood damages on 28 farms	+	-	-	+
Reduce flood damages to roads and bridges	+	N	N	+
<u>To increase water supply:</u>				
Provide 0.86 mdg water supply	N	N	N	+
<u>To enhance environmental values:</u>				
Improve stream aquatic habitat	+	+	+	+
Improve wildlife habitat	-	+	+	-
Increase habitat diversity	-	+	+	+
Protect woody riparian habitat	-	+	N	-
Reduce sediment yield	+	+	+	+
Reduce scour on 270 acres of flood plain	+	+	+	+
Reduce erosion in forestland	N	N	+	N
Reduce soil loss on 7,460 acres	+	N	+	N
Stabilize gullies	+	N	N	N
Maintain erosion control practices on 7,800 acres	+	N	N	N

a/ See narrative for definition of each measures

(+) favorable impact

(N) no impact or negligible impact

(-) adverse impact

studied in detail and only two dams had benefits in excess of costs. The results were presented to the watershed district board for their approval. The two dams will not provide a significant amount of flood protection compared to the flood protection goal of the watershed district. With flood protection in mind, the board reaffirmed the need to control the frequent flooding on Pony Creek and requested a re-evaluation or eleven of the dams. The board collected additional data on flood damages on historical storms.

After the preliminary formulation meeting, hydrographs were plotted for selected storms to find where flood peaks originated. New dam sites were identified at key locations. The hydrographs indicated that two peaks move down the creek during most flood events.

A core system of dams was identified that would give a significant level of flood protection. Dams were tested incrementally and in series to measure their effect on peak flood reduction.

Incremental costs and benefits were calculated with each increment. The core system consisted of Dam Nos. 3, 5, 18, 33, 42, 94, and 96. Dam No. 3 was evaluated as a multipurpose dam. The least cost effective Dam No. 94 was tested to determine if incremental benefits exceeded incremental costs. It was assumed that if this dam was feasible as the last increment, then the other dams would also be feasible. This analysis showed that Dam No. 94 is feasible. Dam No. 95 was added to the core system but incremental costs were larger than incremental benefits. The NED alternative is the core system consisting of Dam Nos. 3, 5, 18, 33, 42, 94, and 96.

The following table shows the results of the incremental analysis:

Table M - Incremental Analysis of Structural Measures

<u>Alternatives</u>	<u>Total Costs</u> \$	<u>Incremental Cost</u> \$	<u>Total Benefits</u> \$	<u>Incremental Benefits</u> \$	<u>Net Benefits</u> \$
6 Dams	354,500	-	443,300	-	88,800
7 Dams	394,300	39,800	484,000	40,700	89,700
8 Dams	427,200	32,900	512,700	28,700	85,500

The land treatment incremental analysis was done for three evaluation units. Evaluation units consisted of soils in similar slope groups that required the same kind of treatment. The three slope groups (evaluation units) were three to six percent, seven to nine percent and 10 percent and greater. Following are descriptions and the incremental analysis tables for the evaluation units:

Evaluation Unit No. 1 (5,180 acres - 3 to 6 percent slope group)
Fields with average gross soil losses of 13.6 tons per acre per year

Evaluation Unit No. 2 (1,770 acres - 7 to 9 percent slope group)
Field with average gross soil loss of 22.7 tons per acre per year

Evaluation Unit No. 3 (2,110 acres - 10 percent and greater slope group)
Fields with average gross soil losses of 47.5 tons per acre per year

Table N - Incremental Analysis
of Land Treatment Structural Systems

Evaluation Unit No. 1 a/
3 - 6 Percent Slopes

Practice or System	Remaining Erosion <u>b/</u>	Erosion Reduction <u>b/</u>	Cost	Benefit	Benefit-Cost Ratio
	(Tons/Ac/Yr)	(Tons/Ac/Yr)	(\$/Ac)	(\$/Ac)	
Iteration No. 1	Average Beginning Gross Erosion = 13.6 tons/acre/year				
Conservation Tillage <u>c/</u>	11.4	2.2	--	11.33	--
Terraces, Contouring, and Interdependent Grade Stabilization Structures <u>d/</u>	3.7	9.9	30.33	61.14	2.06:1
Iteration No. 2	Tons of Erosion with Conservation Tillage Applied = 11.4 tons/acre/year				
Conservation Tillage, Terraces, Contouring, and Interdependent Grade Stabilization Structures	2.9	8.5	30.33	49.81	1.64:1

a/ Average weighted tolerable soil loss is 5.0 tons/acre/year

b/ Erosion includes sheet and rill, ephemeral, and gully

c/ Conservation tillage assumes a minimum residue cover of 30 percent after planting

d/ Interdependent structures include diversions and waterways

Table N, continued

Evaluation Unit No. 2 a/

7 - 9 Percent Slopes

Practice or System	Remaining Erosion <u>b/</u>	Erosion Reduction <u>b/</u>	Cost	Benefit	Benefit-Cost Ratio
	(Tons/Ac/Yr)	(Tons/Ac/Yr)	(\$/Ac)	(\$/Ac)	
Iteration No. 1 Average Beginning Gross Erosion = 22.7 tons/acre/year					
Conservation Tillage <u>c/</u>	15.2	7.5	--	12.34	--
Terraces, Contouring, and Interdependent Grade Stabilization Structures <u>d/</u>	4.5	18.2	54.22	65.16	1.20:1
Iteration No. 2 Tons of Erosion with Conservation Tillage Applied = 15.2 tons/acre/year					
Conservation Tillage, Terraces, Contouring, and Interdependent Grade Stabilization Structures	4.2	11.0	54.22	52.82	0.97:1

a/ Average weighted tolerable soil loss is 5.0 tons/acre/year

b/ Erosion includes sheet and rill, ephemeral, and gully

c/ Conservation tillage assumes a minimum residue cover of 30 percent after planting

d/ Interdependent structures include diversions and waterways

Table N, continued

Evaluation Unit No. 3 a/

10 Percent and Up Slopes

Practice or System	Remaining Erosion <u>b/</u>	Erosion Reduction <u>b/</u>	Cost	Benefit	Benefit-Cost Ratio
	(Tons/Ac/Yr)	(Tons/Ac/Yr)	(\$/Ac)	(\$/Ac)	
Iteration No. 1	Average Beginning Gross Erosion = 47.5 tons/acre/year				
Conservation Tillage <u>c/</u>	31.3	16.2	--	14.31	--
Terraces, Contouring, and Interdependent Grade Stabilization Structures <u>d/</u>	9.9	37.6	63.31	73.07	1.15:1
Iteration No. 2	Tons of Erosion with Conservation Tillage Applied = 31.3 tons/acre/year				
Conservation Tillage, Terraces, Contouring, and Interdependent Grade Stabilization Structures	8.6	22.7	63.31	58.76	0.93:1

a/ Average weighted tolerable soil loss is 5.0 tons/acre/year

b/ Erosion includes sheet and rill, ephemeral, and gully

c/ Conservation tillage assumes a minimum residue cover of 30 percent after planting

d/ Interdependent structures include diversions and waterways

The Resource Protection Plan was formulated with the main emphasis being watershed protection. All of the practices included in the NED Plan would become a part of the Resource Protection Plan. A comparison was made between the needed land protection and the treatment projected under the going program and the NED Plan. These two plans would treat about 95 percent of the present untreated cropland. It is unreasonable to project a 100 percent treatment; therefore, no additional treatment was projected for the remaining untreated cropland.

Consideration was given to increasing flood control. A search was made of the next best site to further reduce flood damages. Dam No. 95 was selected. This dam was situated on a drainage area that did not have any flood control dams on it. A dam at this location would make a sizable flood peak reduction. It would enhance the flood damage reduction effects of the NED dams. Alternative 4 shows the costs and benefits for this alternative.

One site near Sabetha was investigated to determine feasibility for recreational development. The Kansas Department of Wildlife and Parks and SCS assisted sponsors to determine the need for water-based recreational facilities using the comparable demand method. The analyses supposedly show the recreational demands will be met with the Centralia multipurpose reservoir.

Agricultural water supply development was investigated. A multipurpose reservoir on Pony Creek in S19, T2S, R14E was studied for feasibility to yield water for the City of Sabetha. The structure is capable of supplying 0.86 mgd with 98 percent certainty. It was evaluated based on a 0.90 mgd supply with a gross storage volume of 4,760 acre-feet. The city also considered increasing the number of wells or pumping water from the Missouri River. Pumping water from Upper Black Vermillion Site 50 (Centralia Lake) was also considered. The multipurpose reservoir was found to be the least costly solution.

Data were not available to measure agricultural water dollar benefits specifically. Therefore, a reasonable estimate of this value was made using alternative costs. Cost estimates were made to pump water to Sabetha from the Missouri River, Centralia Lake, and/or existing well fields. In addition, a cost estimate was made for a single purpose water supply dam at the Dam Site No. 3 location. This single purpose cost was the least costly alternative; therefore, it was assumed to be the value of the agricultural water benefits.

Evaluation of Alternatives

Alternatives considered during planning are described in this section. Costs and economic, environmental, and social impacts of greatest significance to decision making are compared in Table G, page 40; and in Appendix C. The watershed map in Appendix D shows the National Economic Development Plan and the location of Dam No. 95 in the Resource Protection Plan.

Alternative 1 (No Project) consists of continuing the present conservation program without project action for the next 50 years. Land treatment would be applied on 2,480 acres of cropland and 360 acres of pastureland in addition to areas presently treated. Conservation tillage would be practiced on 14,300 acres (including some of the above cropland area). Flooding will continue in the watershed.

Alternative 2 is the National Economic Development (NED) Plan. This plan includes the going program, 6 floodwater retarding dams, 1 multipurpose reservoir, land treatment structure systems at 53 erosion

problem areas, required land treatment, and forestry land treatment. Infrequent flooding will continue at Sycamore Springs.

Forest/Woodland Resource Plan measures include forestland improvement on 1,200 acres and fire control measures on 7,770 acres which also includes grassland. Forestland improvement consists of prescribed timber harvesting and tree plantings. Fire control measures are improved fire control equipment and training of volunteer rural firemen.

Costs: Total project costs - \$5,709,500; PL 83-566 share - \$4,370,500; other - \$1,339,000; average annual cost - \$416,400, operation, maintenance, and replacement cost - \$74,400.

Effects: This alternative would reduce sediment yield to the Nemaha River by 67,300 tons or 68 percent, scour by 3,260 tons on 130 acres, gully erosion by 21,900 tons and preserve 80 acres, depreciated area by 260 acres, ephemeral erosion by 11,760 tons on 6,150 acres, sheet and rill erosion by 68,900 tons; terrace 6,150 acres of cropland; and provide stable water outlets for 10,200 cropland acres of which 6,150 acres are to be terraced and 4,050 acres are presently terraced. The 100-year flood plain would be reduced about 550 acres. Overall flood damages would be reduced 68.6 percent. Average annual benefits of \$572,000 would accrue at an annual cost of \$416,400. The net annual benefit to this alternative would be \$155,600.

The Forestry Plan outlines steps for removing over mature trees to provide room for seedlings and sapling age classes. This will enhance and diversify the total overstory. Fire control measures will reduce the incidence of wild fires. Benefits for the plan are \$65,600.

Alternative 3 is primarily a nonstructural plan. There were no viable nonstructural measures found that would reduce flood damages and produce benefits in excess of costs. The evaluated measures consist planting grass on cropland that floods more frequently than once a year, relocating the main roads above the 100-year flood plain, and flood proofing Sycamore Springs.

Conversion of additional cropland to grassland is not economical. Expected net crop income under flooding conditions exceeds net income from grassland.

Relocating the main roads (FAS 64 and Highway 73/159) would not relieve the need to maintain many miles of the old road for farm needs; therefore, total road mileage would increase. In addition, a new road above the flood plain would have to be located on rolling hills, causing construction and maintenance to be more costly than maintenance of the old road.

Relocating buildings and elevating camper pads above the 100-year flood plain at Sycamore Springs is more costly than enduring infrequent flooding.

Table 0 - Summary and Comparison of Candidate Plans

Effects	Without Project	Alternative 2 NED Plan (Recommended Plan)	Alternative 4 Resource Protection Plan
Measures	Continue going land treatment program including CRP	Continue going program, 6 floodwater retarding dams, 1 multi-purpose dam, 53 erosion problem areas treated with land treatment structures, and 1,200 acres of forestland treatment	Continue going program 7 floodwater retarding dams, 1 multi-purpose dam, 53 erosion problem areas treated with land treatment structures, and 1,200 acres of forestland treatment
Problem Areas Treated	0	60	61
Project Investment	0	5,709,500	6,075,300
<u>National Economic Development Account</u>			
Adverse, Annualized	-	416,400	438,800
Beneficial, Annualized	-	572,000	592,700
Net Beneficial	-	155,600	153,900
<u>Environmental Quality Account</u>			
Beneficial			
Going Program Effects	Treat 2,480 acres of cropland and 360 acres of grassland	Treat 2,480 acres of cropland and 360 acres of grassland	Treat 2,480 acres of cropland and 360 acres of grassland
Tons Sheet and Rill Erosion	188,900	120,000	120,000
Ephemeral Gully Area			
Affected Acres	390	80	80
Voided Acres	40	8	8
Gully Acres	230	150	150
Depreciated Acres	750	480	480
100-Year Flood Plain Will Be Reduced - Acres	0	550	570
Scour Acres	250	120	115
Tons Sediment Yield	98,700	31,400	29,700
Percent Sediment Yield Reduction	20	68	70
Cropland Treated	2,480	6,150	6,150
Beneficial to Wildlife and Aquatic Life			
Convert Cropland to Water <u>a/</u>	0	123	143
Convert Grassland to Water <u>a/</u>	0	115	119
Convert Forestland to Water <u>a/</u>	0	119	120

Table 0 - Summary and Comparison of Candidate Plans, Continued

Effects	Without Project	Alternative 2 NED Plan (Recommended Plan)	Alternative 4 Resource Protection Plan
EQ Account, cont'd.			
Adverse to income			
Convert Cropland to Water <u>a/</u>	0	123	143
Convert Grassland to Water <u>a/</u>	0	115	119
Convert Forestland to Water <u>a/</u>	0	119	120
<u>Other Social Effects</u>			
Beneficial			
Going Program			
Cropland Treated	2,480	2,480	2,480
Grassland Treated	360	360	360
Project Action			
Cropland Treated	0	6,150	6,150
Forestland Treated	0	1,200	1,200
HEL Cropland Treated by 1995	350	4,370	4,370
Protection of Road Crossings (vehicles per day)	0	620	620
Wildlife Habitat Units			
<u>Regional Economic Development</u>			
Positive Effect			
Annualized	b/	572,000	592,700
Region	<u>b/</u>	572,000	592,700
Rest of Nation	<u>b/</u>	0	0
Negative Effect			
Annualized	b/	416,400	438,800
Region	<u>b/</u>	154,800	157,500
Rest of Nation	<u>b/</u>	261,600	281,300

a/ Acres converted to water for the 53 grade stabilization structures are included in Alternatives 2 and 4
b/ Not measured

As there are no feasible nonstructural means to increase agricultural income or to prevent the damages at Sycamore Springs through reduced flooding, this alternative was not considered further.

Alternative 4 is the Resource Protection Plan. This plan includes: the going program; 7 floodwater retarding dams, 1 multipurpose dam, and required land treatment; land treatment structure systems and required land treatment at 53 problem areas; and forestland land treatment. (See Alternative 2 for Forestry Plan)

Costs: Total project costs - \$6,075,300; PL 83-566 share - \$4,700,100; other - \$1,375,200; average annual cost - \$438,800; operation, maintenance, and replacement cost 74,900.

Effects: This alternative would reduce sediment yield to the Nemaha River by 69,000 tons or 70 percent, scour by 3,350 tons on 140 acres, gully erosion by 21,900 and preserve 80 acres, depreciated area by 260 acres, ephemeral erosion by 11,760 tons on 6,150 acres, sheet and rill erosion by 68,900 tons; terrace 6,150 acres of cropland; and provide stable water outlets for 10,200 cropland acres of which 6,150 acres are to be terraced and 4,050 acres are presently terraced. The 100-year flood plain would be reduced about 570 acres. Overall flood damages would be reduced 70.4 percent. Average annual benefits of \$592,700 would accrue at an annual cost of \$438,800. The net benefit to this alternative would be \$153,900.

Comparison of Candidate Plans

The National Economic Development Plan was selected by sponsors after consideration of preferences expressed by the public, their financial resources, and their assessment of the social impact of land rights acquisition. Maintenance and enhancement of the soil resource base and flood protection weighed heavily in the sponsors' decision.

The Formulation of Alternatives section provides more insight into deliberations about these objectives and related plan elements. Table P shows a comparison of impacts of the alternatives.

Because Alternative 1 would have virtually no impact on any of the planning objectives nor on any key environmental issues, the sponsors did not consider no-project-action as a viable alternative.

The NED Plan, Alternative 2, includes 6 floodwater retarding dams, 1 multipurpose dam, and 53 land treatment structure systems. It costs \$365,800 less than the Resource Protection Plan. The going program would continue. Average soil loss will be reduced by about 45 percent on cropland, but remain unchanged on grassland and forestland.

The Resource Protection Plan, Alternative 4, was formulated to protect each of the 61 erosion problem areas in the most efficient manner either by a floodwater retarding dam or land treatment structure system. All of these areas are protected to some degree.

The plan meets the maximum objectives of the sponsors of any available alternatives. Erosion will continue, but at a much slower rate than without the plan. This alternative will cost \$365,800 more than the NED Plan.

The Resource Protection Plan includes 7 floodwater retarding dams, 1 multipurpose water supply dam, and 53 land treatment structure systems. Flood damages will be reduced 70.4 percent. The weighted sheet and rill erosion rate on about 6,150 acres will be reduced from 23.0 to 4.5 tons per acre per year. The soil resource on 6,150 acres used for crops and 1,200 acres of forestland will be protected for long-term productivity. About 10,200 acres of terraced fields will have stable water outlets. Cost sharing and technical assistance is included to adequately protect 6,150 acres to be treated and about 10,200 acres currently treated.

Project Interaction

The Pony Creek Watershed District along with local landowners and the State Conservation Commission have been installing small flood-water retarding dams throughout the watershed.

Risk and Uncertainty

Benefits expected to accrue to the planned measures depend upon the installation of the complete plan. Due to the large number of landowners involved there is some uncertainty as to whether all measures will be installed. However, due to landowner acceptance of soil conservation measures and the record of their willingness to install conservation practices it is believed that the planned measures will be installed. Available cost-share funds have traditionally been readily used in the counties involved as is expected with funds to be made available through this project.

Planned measures and funds are tailored to maintain the highest level of long-term protection to the watershed resource base given the present fiscal limitations imposed by P.L. 566. The construction of structural and land treatment measures is scheduled to complement each system and provide greater benefit.

The analysis of the plan assumed no dramatic changes in technology, crop prices, government programs, or agriculture in general. But, as a result of the Food Security Act, landowners may plant untreated HEL acres to noncommodity crops or convert them to noncropland uses to avoid noncompliance. Funds for current federal and state land treatment programs may be increased in order to treat more acres prior to the 1995 FSA deadline. The effects of landowners using noncommodity crops or noncropland uses combined with the effects of other landowners being in noncompliance is uncertain. It may affect economic stability of some landowners, land rights acquisition, and local watershed district funding.

Rationale for Plan Selection

The primary objective of the sponsors is to protect and maintain as much of the resource base as possible from further impacts of flooding and erosion while keeping project benefits above project costs. The NED Plan has maximum net economic benefits as its primary objective.

The sponsors wish to reduce flooding; gully, sheet, and rill erosion; and ephemeral gully erosion as much as possible. They want to install as many stable land treatment system outlets as they can because stable outlets are critical to the installation and maintenance of land treatment practices. They have a limited tax base on which to operate. For this reason they are anxious to select a system that can reduce their future operating costs and also control erosion. The sponsors also want to reduce road and bridge maintenance cost.

The NED Plan includes 6 floodwater retarding dams and 1 multipurpose dam. The Resource Protection Plan includes 7 floodwater retarding dams and 1 multipurpose dam. The NED Plan and Resource Protection Plan treat the same 53 land treatment structure systems. The project costs for the Resource Protection Plan are \$365,800 higher than for the NED Plan. Net annual benefits for the NED Plan are \$1,700 more than for the Resource Protection Plan. Both plans will improve wildlife habitat and water quality.

The State of Kansas has an active interest in soil and water resource protection. The State Water Plan passed into law in 1985 calls for increased efforts by federal, state, and local programs to control soil erosion and to maintain and improve water quality and quantity. The State Water Plan fully embraces the small watershed concept of protecting the state's soil and water resources. The NED Plan takes the most positive and decisive steps in that direction for the Pony Creek Watershed and the State of Kansas.

RECOMMENDED PLAN (NED)

Purpose and Summary

The project is planned for the purposes of watershed protection, flood prevention, and agricultural water supply. Major components of the flood prevention purpose are grade stabilization, erosion control, and floodwater damage reduction. The Recommended Plan (NED) includes 6 floodwater retarding dams and 1 multipurpose dam with required land treatment, land treatment structure systems at 53 erosion problem areas with accelerated cropland treatment, and forestland treatment.

For additional details about the Recommended Plan (NED), see Tables 1, 2, 3, and 6 and the Project Map (Appendix D).

Plan Elements

Land Treatment Practices - The ongoing conservation program will provide adequate protection to 2,480 acres in the watershed with or without any project action. Required land treatment will be installed on 2,470 acres above floodwater retarding dams and the multipurpose dam to meet program requirements and to ensure the dams will function as planned. Accelerated land treatment will be installed on 3,550 acres above land treatment structure systems and in other areas not treated by the ongoing programs. Land user participation in each type of land treatment application is voluntary and the users will make the final decision on land use and practices to be installed.

Long-term contracts will be used to install project land treatment practices. Approximately 40 contracts averaging 160 acres each will be needed.

Land treatment structure systems will be installed at 53 erosion problem areas. These systems consist of small on-farm size structures with drainage areas generally 50 acres or less. These systems may include grade stabilization structures, diversions, water and sediment control basins, or combinations of the three.

The settings of structural practices in erosion problem areas have not been assessed for cultural resources, but will be considered further during installation to determine if they contain significant cultural resource sites. Where cultural resources may be present SCS will follow its established procedures for identifying and evaluating the resource.

Principal spillways for grade stabilization structures will be located to maintain specific water elevations to control gully grades and provide stable outlets for interdependent land treatment practices.

Land treatment practices to be installed in evaluation units 1, 2, and 3 include conservation tillage, contour farming, terraces,

grass waterways, underground outlets, water and sediment control basins, diversions, and grade stabilization structures. ^{17/} The project is formulated to protect the land resource base. Stable outlets are a basic unit and are an integral part of all land treatment. Each problem area to be treated by this project has a combination of terraced cropland and untreated cropland in two or more of the evaluation units 1, 2, and 3. Sometimes steep slopes (evaluation unit 3) are inclusions within a larger gentler slope group (evaluation unit 1). It will be practical to treat the whole area instead of just evaluation unit 1. This is done to achieve a system of practices for effective resource protection.

TABLE P - LAND TREATMENT - Required

<u>Type of Land Treatment</u>	<u>Location of Land Treatment</u>	PL-566 ^{a/} <u>Tech. Assist.</u>	PL-566 ^{a/} <u>Financ. Assist.</u>	<u>Acres</u>
Accelerated	Above floodwater retarding dams	Yes	Yes	2,470
	Above land treatment structure systems	Yes	Yes	3,550

a/ See Table 1 for assistance dollars

Plan elements are illustrated and described as follows:



Grade Stabilization Structure

Grade stabilization structures are constructed in drainageways that cannot be stabilized by terraces or other means. Structures stabilize grades and control erosion in channels, prevent formation or advance of gullies, enhance environmental quality and reduce water pollution hazards. Most structures will be earthfill dams with corrugated metal pipe spillways. Sediment pools will temporarily contain water until it is replaced by sediment.



Water and Sediment Control Basins

Water and sediment control basins are short earth embankments or ridges and channels generally constructed across the slope and minor watercourses to form a silt or sediment basin. They will all use underground outlets. They are used to reduce on-site erosion, reduce sediment content in water, intercept and conduct surface runoff through underground conduits to stable outlets, reduce peak rate or volume of flow, reduce flooding, prevent gully development, re-form the land surface, and improve farmability. Basins are installed in conjunction with the establishment of a workable terrace system.



Conservation Tillage System

Conservation tillage is a form of cultivation that does not turn under crop residue, but leaves large amounts of residue mulch on the soil surface throughout the year. Conservation tillage includes any tillage and planting system that maintains residue on at least 30 percent of the soil surface after planting to reduce water and wind erosion. Conservation tillage is applied to terraced land and other cropland areas.



Grassed Waterway or Outlet

A grassed waterway or outlet is a natural or constructed channel or outlet, shaped or graded, and established in suitable vegetation for the safe disposal of runoff water. The grassed waterway will dispose of excess surface water from terraces, diversions, or natural concentrations without causing erosion or flooding.



Diversion

A diversion is a channel with a supporting ridge on the lower side constructed across the slope. It is designed to divert excess water from areas to sites where it can be used or disposed of safely.



Terrace

A terrace is an earth embankment or a combination ridge and channel constructed across the slope to intercept and conduct surface runoff at a nonerosive velocity to a stable outlet. A graded terrace is designed with a slight downward slope across the field to the outlet. A grassed waterway or underground conduit is commonly used as the outlet.

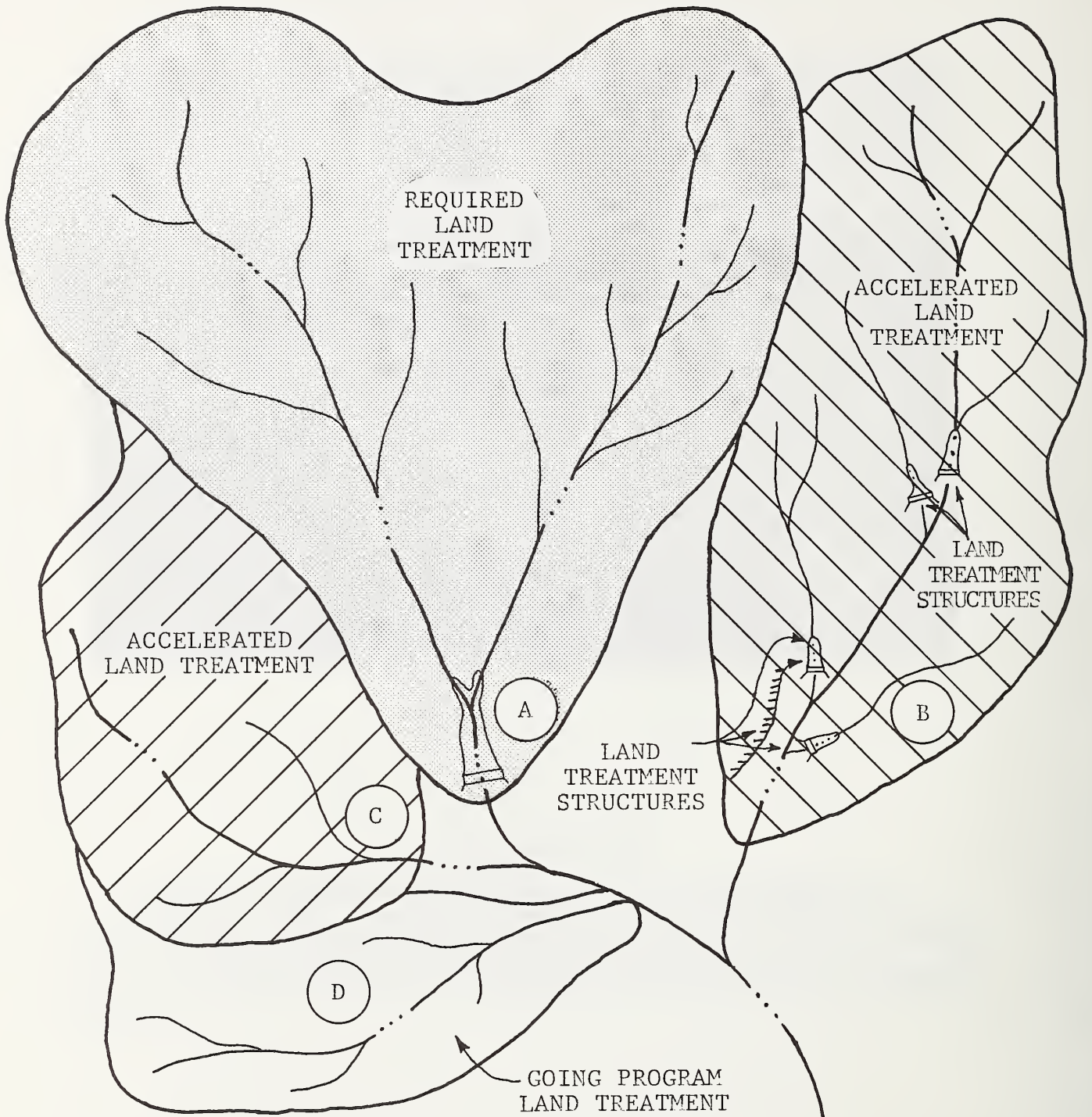


Underground Outlet

Underground outlet is a conduit installed beneath the surface of the ground to collect surface water and convey it to a suitable outlet. It is to dispose of excess water from terraces, diversions, subsurface drains, surface drains, or other concentrations without causing damage by erosion or flooding.

FIGURE 1

LAND TREATMENT TYPE EXAMPLE



- A. Problem area treated with floodwater retarding dam and required land treatment
- B. Problem area treated with land treatment structures and accelerated land treatment
- C. Area treated with accelerated land treatment
- D. Area treated with going program land treatment

A 95 percent participation rate is estimated for project land treatment practice implementation.

A Forest/Woodland Resource Plan 5/ was developed for Pony Creek Watershed by the Kansas State and Extension Forester, cooperating with the USDA Forest Service. Forestry technical assistance will be provided through the watershed project and the Cooperative Forest Management Program. Forestland improvement includes enduring practices of timber stand improvement and tree plantings and will permit an increased annual harvest of high quality trees.

The watershed is protected by rural fire districts. Equipment procurement, training in fire fighting and control, and fire prevention education will be continued. Technical assistance for fire control measures will be provided by the Kansas State and Extension Forester through the Cooperative Fire Control Program.

Structural Measures - Six (6) floodwater retarding dams and one (1) multipurpose dam will be installed as structural measures to reduce flooding and control gullies. All structural measures will be earth dams. See Project Map (Appendix D) for structure locations.

Each floodwater retarding dam will have a drop-inlet type principal spillway constructed to maintain water at a specific elevation to control a gully problem and to release floodwater from a detention pool. (A typical dam with a drop-inlet principal spillway is shown in Appendix B.)

The multipurpose dam will have a drop inlet type principal spillway constructed to a specific elevation to release floodwater from the detention pool, provide gully protection, and provide agricultural use water supply storage for the city of Sabetha and to some of the surrounding communities and rural water districts.

Principal spillways will be of reinforced concrete and each will have a single-stage uncontrolled inlet. Release rates will average about 20 cubic feet per second per square mile (csm) and will not exceed present downstream channel capacities. Stilling basins at spillway outlets will dissipate energy.

The dams will have vegetated or rock emergency spillways to discharge runoff safely when reservoir and principal spillway capacities are exceeded. In any one year the chance of operation of the emergency spillway at any site is 4 percent or less. Emergency spillways of some structures will require topsoiling to establish and maintain vegetation.

The 7 dams will provide detention storage varying from 2.67 to 5.56 inches of runoff from their respective drainage areas. Runoff from 22.79 square miles, 37 percent of the watershed, will be controlled. The combined volume of retarding storage will be 4,582 acre-feet (equivalent to 3.77 inches of runoff from the drainage area controlled) with a combined temporary surface area of 590 acres. Land

treatment structural systems will reduce runoff on an additional 9 percent of the watershed.

Where practical principal spillway crests are designed to maintain water at the elevation necessary to provide stable outlets for land treatment practices and storage for a 50-year accumulation of sediment. Sediment storage capacity varies from 0.84 to 1.62 inches. Combined sediment storage volume for all structures will total 1,332 acre-feet. Combined surface area of the sediment pools will total 173 acres.

Borrow areas will be confined to sediment pools and emergency spillway excavations, where practical. Borrow areas will be left rough and uneven to enhance fish production, where practical. Borrow material at most dam sites will be CL and CH (Unified Soil Classification System).

Existing trees and brush may be left in pool areas for fishery enhancement where it is requested by sponsors and when they will not interfere with structure operations. Maintenance costs may increase slightly by leaving trees and brush in sediment pool areas.

Most of the floodwater retarding dams will be on deep till foundations in narrow valleys. Depth of soils in most abutments exceeds 20 feet.

Rock excavation is expected in the emergency spillway for Multipurpose Dam No. 3. Rock may be found at other structure locations during construction.

The need for water and air pollution abatement during construction will be determined on a site-by-site basis. Abatement measures normally include dry stream crossings, temporary vegetative establishment, watering for dust control, and temporary sediment control basins.

Effects on Existing Physical Features

Project installation may affect some roads and bridges, farmsteads, wells, pipelines, and powerlines. At Dam No. 96 a township road will be closed. Dam No. 18 will affect the operation of a trout-raising system.

Mitigation Features

The floodwater retarding and multipurpose structure system without the mitigation would result in a loss of 976 habitat units of forestland and 634 habitat units of herbaceous habitat. Table VI, Appendix C, shows the acreages of land, by dam site and by land treatment type, that sponsors will provide for compensation of wildlife habitat losses. Compensation measures will be located in the general vicinity of the floodwater retarding dams and multipurpose dam; however, actual locations will be determined during land rights acquisition. Landowners who desire wildlife areas will be given first

consideration. Wildlife habitat compensation measures include establishment and management of native grasses and forbs on 41 acres, woody plantings on 192 acres, or woodland preservation and management on 222 acres (using an average value of 4.3 habitat units per acre). A combination of woody planting and preservation may be used.

The three miles of stream habitat being inundated by the seven structures are of relatively low fishing quality. Aquatic food supplied by these stream segments will be partially offset by food contributed from the pools created by the structures. It is not feasible, practical, or socially acceptable to mitigate the three miles of stream habitat that will be lost.

Land treatment systems will be installed so that wildlife and significant resources will not be adversely affected. Several features of the plan are included specifically to reduce project impacts on these resources.

In order to mitigate for these changes and potential habitat losses, the following compensation features will be installed on all land treatment plans:

1. All grade stabilization dams will be fenced and seeded. In cropland situations the seeding will be a native grass and forb mixture. In pasture situations the seeding will be the same species as the pasture.

2. Installation of a diversion will be made in accordance with the Field Office Technical Guide. When the area between the top of the diversion and the field boundary is less than a normal terrace interval, the area between the top of the diversion and the field boundary will be planted to a mixture of native grass and forbs. Shrubs may also be added to this area. Areas greater than a normal terrace interval can continue to be farmed or planted to grass based upon the landowner's preference.

Mitigation will be installed at the same cost-share rate as other associated practices.

Permits and Compliance

A permit to construct is required by the State of Kansas for some structures in the project. Sponsors will request 404 permits (Section 404 of P.L. 92-500) as required by federal regulations.

SCS cultural resource procedures will be completed during installation for practices that may affect such resources. SCS will consult with the State Historic Preservation Officer to develop means to mitigate or eliminate adverse effects that may occur to significant cultural resources.

Kansas Department of Wildlife and Parks has the responsibility for permits where there are critical habitats for threatened and

endangered species. At this time there are not any critical habitats for threatened and endangered species, but if any exist at construction time, the project sponsors are responsible for all required permits.

Dam Safety

In the event of failure, damage to the area downstream of a class "a" dam would be limited to farm buildings, agricultural land, or township and county roads. A greater hazard potential could be created if additional development occurs in the breach inundation area of any dam. The hazard classification would then become either class "b" or class "c". For class "b" dams, damage would be limited to isolated homes, main highways, minor railroads, or interruption of service of relatively important public utilities. For class "c" dams, loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, main highways, or railroads could occur.

Class "a" dams are planned to have the least amount of floodwater retarding storage, class "b" dams contain intermediate storage, and class "c" dams the greatest amount of storage. Having less storage, class "a" dams have the greatest potential to be overtopped by extreme floods. Class "c" dams are planned to safely pass the maximum probable flood without overtopping but could fail from other causes, and would pose greater danger in case of failure. Other things being equal, failure of a dam with greater storage can cause more damage than one with lesser storage.

Overtopping is just one type of failure; any dam can fail for other reasons unless properly designed, constructed, operated, and maintained. Examples of the most common failures listed in the order most likely to occur, based on historical records (Engineering News Record, May 8, 1980) are: leakage (piping), outlet works damage, slope instability, inadequate slope protection, overtopping, deterioration, and embankment deformation.

A breach analysis was made for each dam included in this plan to estimate the maximum area downstream that might be flooded if the dam should fail. Based on this, each dam has been assigned a hazard classification as shown in Table 3. SCS has classified 6 of the dams as class "a" dams and one dam as a class "c." Although some building symbols are shown in the flood plain, the elevations have been considered in breach inundation studies and are not affected. A site specific study should be made before developing or building anywhere in the flood plain (benefited area) shown in yellow on the Project Map (Appendix D). The hazard classification will be reviewed prior to construction of each dam and reclassified, if necessary.

Costs

Total project cost is \$5,709,500, of which \$1,339,000 will be borne by local funds and \$4,370,500 by P.L. 566 funds. The agreement

shows actual cost-sharing between P.L. 566 and other funds. The P.L. 566 funds include \$1,732,800 for dam construction and mitigation costs; \$747,800 for engineering services; \$243,200 for project administration; \$625,800 for land treatment technical services, and \$1,020,900 for land treatment construction. Local costs include \$358,900 for land rights, \$18,000 for project administration, \$403,500 construction cost for Multipurpose Dam No. 3, and \$555,600 for land treatment construction and \$3,000 for land treatment technical services. All costs reflect a 1986 price base. Estimated costs are shown in Table 1.

Land treatment costs include all funds provided for technical and financial assistance to install the planned measures. Landowners will pay the local share of the cost of land treatment measures.

Structural measure costs are also summarized in Table 1. These costs are shown by individual dam in Table 2.

Construction costs are direct costs for installation of structural measures. Construction includes such items as earth embankment, excavation, riprap, reinforced concrete, reinforced concrete pipe, wildlife habitat compensation measures, seeding, and fencing.

Engineering services costs for structural measures include all direct and related costs of surveys, geologic investigations, soil mechanics testing and analysis, designs, plans, and specifications.

Land rights costs are direct and related costs for the right to install, operate, and maintain works of improvement. These costs include land purchases, easements, agreements, permits, and modifications of properties and utilities. Land values were determined by the Pony Creek Watershed board with SCS concurrence. Land rights cost estimates are based on current land values that vary from \$350 per acre for woodland and miscellaneous land to \$1,200 per acre for flood plain cropland. Land rights cost estimates may exceed actual expenses because some land rights may be donated. Land rights for about 415 acres are needed for the floodwater retarding dams and 261 acres for the multipurpose structure.

Relocation costs include all payments and services provided according to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. The sponsors and SCS expect that no relocations will occur. However, the Agreement contains provisions for sharing relocation costs should they occur.

Project administration costs include contract administration, review of engineering plans prepared by others, construction inspection, and relocation assistance advisory services.

The watershed district and the City of Sabetha will pay for portions of Multipurpose Dam No. 3 to store water for agricultural uses. The city will pay a percentage (see Agreement) of the construction and engineering costs. The city and the watershed district will participate in the local cost of land rights for the multipurpose dam.

The SCS will enter into an agreement with the sponsors on the method of paying the cost prior to starting the work. The City of Sabetha plans to install some water-based recreational facilities at Multipurpose Site No. 3 with assistance from the State of Kansas.

Cost sharing between P.L. 566 and other sources is shown in the Agreement. Cost allocation and sharing is shown in Table 2A. The Multipurpose Dam No. 3 costs were allocated using the Separable Cost Remaining Benefit Method. This method begins by identifying specific costs for each purpose included in the dam and then adding to those costs part of the remaining joint costs. Joint costs are allocated to each purpose by the percentage of remaining benefits after subtracting from gross benefits for each purpose the amount equal to specific costs

Installation and Financing

Works of improvement will be installed in a 8-year period following authorization of federal assistance under P.L. 566. Table Q shows anticipated cost by fiscal year for land treatment and structural measures:

Table Q - Distribution of Project Costs by Fiscal Year
Land Treatment and Structural

<u>Fiscal Year</u>	<u>P. L. 566</u>	<u>Other</u>	<u>Total</u>
<u>Land Treatment</u>			
1	78,700	34,200	112,900
2	181,300	64,400	245,700
3	196,700	69,600	266,300
4	489,500	164,900	654,400
5	156,600	56,200	212,800
6	161,800	49,900	211,700
7	184,700	57,600	242,300
8	197,400	61,800	259,200
Subtotal	1,646,700	558,600	2,205,300
<u>Structural</u>			
1	37,100	34,700	71,800
2	248,600	33,000	281,600
3	350,700	76,200	426,900
4	604,500	163,100	767,600
5	878,100	417,700	1,295,800
6	203,500	31,600	235,100
7	227,800	24,100	251,900
8	173,500	0	173,500
Subtotal	2,723,800	780,400	3,504,200
Total Project	4,370,500	1,339,000	5,709,500

Pony Creek Watershed Joint District No. 78 and the City of Sabetha have the necessary authority to finance and install their

portion of the planned project. This includes the right to accept contributions, levy taxes, make assessments against benefited land, issue bonds, and exercise the right of eminent domain. They have agreed to use these powers as needed. They will be financially responsible for excess investigation and design costs resulting from their failure to exercise or delay in exercising their rights under Kansas Statute 24-1218.

Expenses of organizing the watershed district have been paid and current general expenses are being met by an annual ad valorem tax. Future expenses of the sponsors will be paid from funds on hand, funds to be collected through taxes, or through the issuance of general obligation bonds.

P.L. 566 funds for construction of structural measures will be provided to the watershed district and to the City of Sabetha through project agreements with the SCS. Funds transferred to the sponsors by these agreements are subject to the Office of Management Budget Circular A-102. The watershed is divided by the Nebraska-Kansas state line. Nebraska will provide funds for the land treatment in Nebraska and Kansas will provide funds for the floodwater retarding dams, the multipurpose dam, and the land treatment in Kansas. A project agreement will generally be prepared for each construction contract.

Prior to making agreements that obligate funds of the SCS, the watershed district must certify they have a financial management system for adequate control, accountability, and disclosure of P.L. 566 funds received, and for control and accountability for property and other assets purchased with P.L. 566 funds. The watershed district will be required to develop an acceptable code of conduct for its members. The watershed district will pay its own contract administration costs.

Federal technical assistance, engineering services, project administration, and funds for construction are contingent upon appropriations for these purposes.

The SCS, upon request, will provide technical assistance to the conservation districts for installation of land treatment. The conservation districts set priorities for SCS technical assistance. The sponsors will have a mutual agreement on responsibilities to contact individual landowners and operators to urge them to cooperate in establishing conservation practices on their farms. Participation in programs to plan and install land treatment is voluntary, and landowners and operators will make final decisions on land use and practices to be installed.

The ongoing program will be continued in the watershed as it would have been without project action. Table 1 shows the amount of P.L. 566 assistance for project land treatment. Actual amounts of technical and financial assistance provided by each program will vary from year to year depending upon availability of funds. The following criteria will also guide determination of program assistance:

1. The accelerated program will supplement the ongoing program.
2. Technical and financial assistance cannot be used to implement measures cost shared under the ongoing program.
3. Financial assistance is available for the following practices at the indicated maximum cost share:

<u>Practice</u>	<u>Federal Cost Share - %</u>
Terraces	65
Grassed waterways	65
Grade stabilization structures	70
Underground outlet	65
Diversions	65
Water and sediment control basins	65
Forestland improvement	0

Two types of agreements/contracts can be used for cost sharing land treatment: (1) between SCS and the conservation districts with a long-term contract between the conservation districts and the landowner or operator; or (2) long-term contract between SCS and the landowner or operator. Conservation plans will be made a part of each agreement. Long-term contracts will be for at least 3 years and not more than 10 years. All structural cost-shared land treatment will be completed prior to the last two years of the contract.

Procurement methods can include formal sealed bidding contracts, small purchase contract (less than \$10,000), force account, performance of work, and long-term land treatment contracts. Agreements and contracts made by sponsors or individuals with SCS will describe the procurement method, installation arrangements, method of payment, and operation and maintenance requirements. Non cost-shared management practices will be required as a condition for cost-sharing when they are necessary to achieve project objectives.

Installation costs of forestry land treatment will be borne by individual landowners, and other federal programs. The cost of accelerated technical forestry assistance will be borne by P.L. 566 through the Kansas State and Extension Forester cooperating with the U.S. Forest Service.

The SCS will provide technical assistance for application of wildlife habitat measures. The Kansas Department of Wildlife and Parks will also provide technical assistance as resources permit.

County Agricultural Stabilization and Conservation committees will cooperate with conservation districts to accelerate assistance for conservation practices. The Extension Service will assist with the educational phase of the land treatment program.

Administration will be shared by landowners, the watershed district, city, conservation districts, natural resources district,

and SCS. Additionally, any agency offering an assistance program for land treatment will administer its own program.

Land treatment measures will be applied according to a schedule developed jointly for each county by the conservation districts, natural resources district, and the watershed district. This schedule will meet the goals of the conservation districts, natural resources district, and the watershed district and correlate with the floodwater retarding dams installation schedule.

The problem areas selected for land treatment group planning will include logical physical units within the hydrologic area. Commitments will be obtained from the operators of not less than 75 percent of the land in that unit to carry out the planned land treatment measures before any agreements are executed for installation.

A group plan will be developed with landowners for installation of land treatment in the drainage area of each problem area with assistance from the District Conservationist, Conservation District, and Watershed District Representatives. This group meeting will be jointly conducted where appropriate by the conservation district and the watershed district.

The following items will be addressed by each district respectively:

Watershed District - Review purpose of the watershed program as it relates to the problem area. Explain the need for the floodwater retarding dam, etc.

- Review land rights needs
- Review wildlife compensation land rights
- Review operation and maintenance needs of floodwater retarding dam

Conservation District and Natural Resources District - Review land treatment needs and purpose of conservation plans (individuals and group)

- Schedule with individuals development of individual and/or update conservation plans
- Review wildlife planning needs for compensation
- Identify and/or plan joint conservation practices between two or more landowners
- Review operation and maintenance of conservation practices
- Review group agreement for the group plan

The length of diversions, number of water and sediment control basins, and number of grade stabilization structures to be installed at each erosion problem area will be determined through group planning and conservation planning with individual landowners. Technical installation assistance will be the responsibility of the local district conservationist. A field level environmental assessment will be made and recommendations identified to mitigate losses in each group plan.

Public Law 566 financial assistance will be provided for terraces, underground outlets, waterways, water and sediment control basins, diversions, and grade stabilization structures including seeding as appropriate for these measures. Cost-share rates are stated in the Watershed Agreement. All terraces, underground outlets, grade stabilization structures, and water and sediment control basins will be cost-shared according to average costs within the watershed. Average cost will be developed just prior to initial contracting and updated annually.

Landowners or operators will negotiate contracts for construction of terraces, grass waterways, diversions, water and sediment basins, underground outlets, and grade stabilization structures. The district conservationist will provide design and layout assistance and necessary inspection.

The watershed district will develop, and keep current throughout project installation, a schedule of dam installation. The schedule will identify when each dam is to be installed with particular detail on the current year and following two years. Other dams may be grouped for installation in following years. This schedule will be used to guide land treatment installation and land rights acquisition.

The watershed district will employ a Contracting Officer and contract for construction of floodwater retarding dams installed as structural measures. The City of Sabetha will employ a Contracting Officer and contract for construction of the multipurpose dam. Construction contracts will be awarded on the basis of competitive sealed bidding. Contracting will begin when land rights have been obtained, land treatment certifications are made, P.L. 566 funds and technical assistance are available, approved drawings and specifications have been developed, and the necessary construction permits obtained. The SCS will furnish engineering services for the floodwater retarding dams and upon request will also provide contracting assistance.

The watershed district will furnish legal services and obtain all land rights needed for installation of floodwater retarding dams. The City of Sabetha will furnish legal services and obtain all land rights needed for installation of the multipurpose dam. The sponsors will maintain a land rights schedule showing status of land rights for each planned dam in the watershed. The sponsors will also make arrangements to abandon, move, or modify roads and utilities where necessary.

Cultural Resources

Personnel involved in project installation will be alerted to watch for cultural resources (buildings, structures or artifact type materials that may contain information important to history or prehistory) during construction. If cultural resources are found, SCS procedures for their protection will be followed.

If such resources are unexpectedly found during construction, SCS procedures for their protection will be implemented. SCS construction

personnel will be trained in identifying cultural resources prior to issuing construction contracts.

Operation, Maintenance, and Replacement

Operation is the administration, management, and performance of any services needed to ensure proper functioning of the measure throughout its evaluated life. This includes such items as periodic inspections, reports, and/or other needed labor, etc.

Maintenance can be divided into either annual or periodic maintenance of project measures. Annual maintenance is the regular service required on the measure to prevent deterioration and ensure its effectiveness. It includes controlling growth of undesirable vegetation; management of grass cover such as mowing, controlled grazing, and fertilization; cleaning trash racks, etc.

Periodic maintenance is required on a recurring basis but less often than annually. Periodic maintenance includes spot revegetation, fence repair, and the more complex and costly work required to repair concrete, steel, or earthen parts of measures. Repair of damages to completed measures caused by normal deterioration, drought, flooding caused by rainfall in excess of design rainfall, or vandalism is considered maintenance regardless of whether it occurs immediately or several years after a measure is installed or established.

Replacement is required when a component has a shorter life span than the measure evaluation period and must be replaced with a new item to ensure continued effectiveness of the measure. Replacement could also be required when a major storm causes such severe damage the component can no longer function properly. Replacement includes significant erosion repair, repair of emergency spillways, replacement of principal spillway pipes, etc.

Land treatment structures will be maintained by owners or operators of farms on which the measures are installed. Agreements for cost sharing will spell out operation and maintenance requirements and responsibilities for each measure. Conservation district representatives will periodically inspect land treatment measures and will encourage landowners to perform needed maintenance, to replace obsolete measures, and to help plan and install new measures necessary to maintain adequate protection. Operation and maintenance cost will be paid by participating landowners or operators.

Technical assistance for operating and maintaining forestland improvement measures will be provided by the Kansas State and Extension Forester in cooperation with the Forest Service. The average annual operation and maintenance costs include the following: harvesting, manufacturing, and retailing forest products; fire protection; and training fire fighting personnel.

Operation and maintenance agreements will be made by SCS with the City of Sabetha for the multipurpose dam and with the Pony Creek

Watershed District for the floodwater retarding dams. The agreements will provide for the above local organizations to operate and maintain their respective structures and related wildlife habitat with other vegetation according to operation and maintenance plans to be developed with SCS technical assistance. The agreements will be signed before land rights, relocation, or project agreements are signed. They will be based on the SCS National Operations and Maintenance Manual. Emergency action plans will be included where appropriate.

Table 4 itemizes the estimated annual operation and maintenance cost for the floodwater retarding dams, multipurpose dam, land treatment measures, and forestland improvement.

Pony Creek Watershed Joint District No. 78 will be responsible for maintaining drawdown control valves and passing natural streamflow through all P.L. 566 floodwater retarding dams to meet downstream water rights as provided by the Kansas Water Appropriation Act. The watershed district will open drawdown control valves as necessary for pool drainage for operation and maintenance.

The City of Sabetha will acquire water rights to operate the multipurpose reservoir in accordance with Kansas Statutes, Chapter 82a, Article 7, Appropriation for Beneficial Use.

Each dam will be jointly inspected by SCS and the sponsors immediately after initial filling and annually thereafter by the sponsors. The inspection team is to: review hazard classification, assess O&M adequacy, identify unsafe conditions, and specify work needed. A qualified engineer will assist during or immediately following the occurrence of major events such as floods or earthquakes, and with annual inspections for the first three years. Formal inspections are to be conducted under the leadership of a qualified engineer at least once every five years for class (b) and (c) dams (see Table 3).

Items of inspection will be listed in the Plan of Operation and Maintenance and will include, but not be limited to, the principal spillway and its appurtenances, emergency spillway, dam, vegetation on the dam and emergency spillway, fences installed as part of the project, and wildlife habitat measures. Records of inspection will be kept by the sponsors. The sponsors will be responsible for access to conduct the inspections.

Access to the floodwater retarding dams will be controlled by landowners except as necessary for inspection, operation, and maintenance. The watershed district will notify landowners and the Kansas Department of Health and Environment of the need for sanitary facilities if significant recreational use occurs. If significant recreational use occurs, water quality monitoring may be required during the swimming season. The Kansas Department of Health and Environment will provide technical assistance to control disease-producing organisms.

TABLE 1 - ESTIMATED INSTALLATION COST

Pony Creek Watershed, Kansas and Nebraska

Installation Cost Item	Unit	Total	Estimated Cost (Dollars) a/						Total
			P.L. 566 Funds			Other Funds			
			SCS b/	FS b/	Total	SCS b/	FS b/	Total	
LAND TREATMENT									
STRUCTURE SYSTEMS - ACCELERATED									
Grade Stabilization Structures	No.	46	280,100		280,100	120,100		120,100	400,200
Water & Sediment Control Basins	No.	53	28,000		28,000	15,100		15,100	43,100
Diversions	Mi.	3.55	17,700		17,700	9,600		9,600	27,300
Grassed Waterways	Ac.	82	45,300		45,300	24,400		24,400	69,700
Technical Assistance			216,000		216,000				216,000
SUBTOTAL			587,100		587,100	169,200		169,200	756,300
ABOVE LAND TREATMENT STRUCTURE SYSTEMS - ACCELERATED									
Evaluation Unit 1 (Terraces)	Ac.	2,736	161,800		161,800	87,200		87,200	249,000
" 2 "	Ac.	458	89,600		89,600	48,300		48,300	137,900
" 3 "	Ac.	352	82,600		82,600	44,500		44,500	127,100
Technical Assistance			205,600		205,600				205,600
SUBTOTAL			539,600		539,600	180,000		180,000	719,600
ABOVE STRUCTURAL MEASURES - REQUIRED									
Evaluation Unit 1 (Terraces)	Ac.	1,922	113,700		113,700	61,200		61,200	174,900
" 2 "	Ac.	375	73,400		73,400	39,500		39,500	112,900
" 3 "	Ac.	170	39,900		39,900	21,500		21,500	61,400
Grade Stabilization Structures	No.	7	42,600		42,600	18,300		18,300	60,900
Water & Sediment Control Basins	No.	13	6,900		6,900	3,700		3,700	10,600
Diversions	Mi.	1.45	7,300		7,300	3,900		3,900	11,200
Grassed Waterways	Ac.	58	32,000		32,000	17,300		17,300	49,300
Technical Assistance			192,200		192,200				192,200
SUBTOTAL			508,000		508,000	165,400		165,400	673,400
Forestland Improvement	Ac.	1,200					41,000	41,000	41,000
Technical Assistance				12,000	12,000		3,000	3,000	15,000
SUBTOTAL				12,000	12,000		44,000	44,000	56,000
TOTAL LAND TREATMENT			1,634,700	12,000	1,646,700	514,600	44,000	558,600	2,205,300
STRUCTURAL MEASURES	No.	6	1,644,800		1,644,800	213,800		213,800	1,858,600
TOTAL PROJECT			3,279,500	12,000	3,291,500	728,400	44,000	772,400	4,063,900

a/ Price Base 1986

b/ Federal agency responsible for assistance in installation of works of improvement

TABLE 2 - ESTIMATED COST DISTRIBUTION

Pony Creek Watershed, Kansas and Nebraska

(Dollars) a/

Item	Installation Cost - P. L. 566 Funds				Installation Cost - Other Funds				Total Installation Cost	
	Construction	Engineering	Project Adm.	Total P. L. 566	Land Rights	Project Adm.	Construction	Engr.		Total Other
Multipurpose Site No. 3					(159,100) ^{b/}	(112,900)	(907,500)	(317,600)	(1,497,100)	(1,497,100)
M&I Water Supply Intake							(110,000)	(38,500)	(148,500)	(148,500)
Floodwater Retarding Dams										
5	140,500	49,200	16,900	206,600	22,100	2,000			24,100	230,700
18	134,800	47,200	16,200	198,200	12,200	2,000			14,200	212,400
33	157,600	55,200	18,900	231,700	29,600	2,000			31,600	263,300
42	157,600	55,200	18,900	231,700	32,700	2,000			34,700	266,400
94	227,100	79,500	27,300	333,900	31,000	2,000			33,000	366,900
96	301,200	105,400	36,100	442,700	72,200	4,000			76,200	518,900
TOTAL	1,118,800	391,700	134,300	1,644,800	199,800	14,000			213,800	1,858,600

a/ Price Base 1986

b/ () denotes non-project costs for Multipurpose Site No. 3

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TABLE 2A - ESTIMATED COST DISTRIBUTION
Structural Measures

Pony Creek Watershed, Kansas and Nebraska

ITEM	COST ALLOCATION				COST SHARING							
	PURPOSE				P.L. 566				OTHER			
	Flood Prevention	Agric. Water Supply	Total		Flood Prevention	Agric. Water Supply	Total		Flood Prevention	Agric. Water Supply	Total	
Floodwater Retarding Dams												
Construction	1,118,800		1,118,800		1,118,800		1,118,800					
Engineering	391,700		391,700		391,700		391,700					
Land Rights	199,800		199,800									
Project Adm.	148,300		148,300		134,300		134,300					
Subtotal	1,858,600		1,858,600		1,644,800		1,644,800					
Multipurpose Struc. No. 3												
Construction	210,300	807,200	1,017,500		210,300	403,700	614,000					
Engineering	73,600	282,500	356,100		73,600	282,500	356,100					
Land Rights	65,200	93,900	159,100						65,200	93,900	159,100	
Project Adm.	26,100	86,800	112,900		25,200	83,700	108,900		900	3,100	4,000	
Subtotal	375,200	1,270,400	1,645,600		309,100	769,900	1,079,000		66,100	500,500	566,600	
TOTAL	2,233,800	1,270,400	3,504,200		1,953,900	769,900	2,723,800		279,900	500,500	780,400	

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TABLE 3 - STRUCTURAL DATA

Pony Creek Watershed, Kansas and Nebraska

ITEM	UNIT	STRUCTURE NUMBER						TOTAL
		3	5	18	33	42	94	
Class of Structure								
Seismic Zone	Sq. Mi.	1	1	1	1	1	1	1
Total Drainage Area		6.51	1.53	1.55	1.70	2.43	2.40	6.67
Runoff Curve No. (1 day)(AMC II)		79	84	77	79	77	78	78
Time of Concentration (Tc)	Hrs.	2.43	0.81	0.78	0.90	1.00	1.15	3.25
Elevation Top of Dam	Ft.	1,173.5	1,247.2	1,079.9	1,008.0	987.6	1,116.0	1,037.3
Min. Easement Elev. 100-yr. 24 hr. storm	Ft.	1,164.5	1,243.5	1,076.6	1,004.3	984.3	1,114.1	1,034.3
Elevation Crest Emergency Spillway	Ft.	1,164.5	1,242.2	1,074.9	1,003.0	982.6	1,111.0	1,031.9
Elevation Crest High Stage Inlet	Ft.	1,155.0	1,232.4	1,062.9	995.1	971.2	1,099.2	1,017.8
Maximum Height of Dam	Ft.	66.5	39.6	40.4	37.2	40.1	39.6	45.0
Volume of Fill	Cu. Yds.	616,500	62,750	60,500	73,000	79,300	132,900	163,455
Total Capacity a/	Ac. Ft.	4,486	388	303	410	523	544	1,527
Sediment Submerged	Ac. Ft.	263	107	75	132	137	146	338
Sediment Aerated	Ac. Ft.	29	12	8	15	16	17	39
Beneficial Use (Agric.)	Ac. Ft.	2,265	--	--	--	--	--	--
Floodwater Retarding	Ac. Ft.	1,929	269	220	263	370	381	1,150
Surface Area	Acres	36	17	11	23	20	20	47
Sediment Pool	Acres	164	--	--	--	--	--	164
Beneficial Use (Agric.)	Acres	240	43	27	51	51	49	129
Floodwater Retarding Pool a/								
Principal Spillway Design								
Rainfall Volume (1-day)	Inches	7.30	5.85	5.85	5.85	5.85	5.85	6.20
Rainfall Volume (10-day)	Inches	12.00	9.70	9.70	9.70	9.70	9.65	10.30
Runoff Volume (10-day)	Inches	7.17	6.09	4.79	5.18	4.79	4.88	5.42
Capacity of High Stage (Max.)	c.f.s.	139.9	36.3	35.0	34.4	34.8	34.6	121.1
Dimensions of Conduit	In.	30	18	18	18	18	18	30
Emergency Spillway-Frequency Operation	% Chance	1	4	4	4	4	4	4
Emergency Spillway Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.
Emergency Spillway Bottom Width	Ft.	300	40	40	40	40	40	150
Emergency Spillway Exit Slope	%	6.0	11.0	9.4	5.3	6.0	4.0	4.0
Emergency Spillway Hydrograph								
Rainfall Volume	In.	11.10	5.50	5.50	5.50	5.50	5.50	6.80
Storm Duration	In.	8.44	3.73	3.05	3.24	3.05	3.14	4.29
Velocity of Flow (Ve)	Hrs.	6	6	6	6	6	6	6
Max. Reservoir Water Surface Elev.	Ft./Sec.	5.32	3.43	3.67	2.27	1.90	1.08	4.75
Freeboard Hydrograph	Ft.	1,167.3	1,242.6	1,075.5	1,003.3	982.7	1,111.1	1,033.5
Rainfall Volume	In.	27.00	8.10	8.10	8.10	8.10	8.10	10.95
Runoff Volume	In.	24.05	6.19	5.37	5.60	5.37	5.48	8.17
Storm Duration	Hrs.	6	6	6	6	6	6	6
Max. Reservoir Water Surface Elev.	Ft.	1,173.5	1,245.1	1,078.2	1,005.8	986.0	1,114.8	1,037.3
Outflow per Foot of Width (0e/b)	Ac.Ft./Ft.	20.6	4.3	4.5	4.4	6.4	6.1	10.1
Bulk Length	Ft.	800	350	300	500	300	450	600
Capacity Equivalents								
Sediment Volume	In.	0.84	1.46	1.01	1.62	1.18	1.27	1.06
Floodwater Retarding Volume	In.	5.56	3.30	2.67	2.90	2.85	2.98	3.23
Beneficial Volume (Agric.)	In.	6.52	--	--	--	--	--	--

a/ Crest of emergency spillway

TABLE 4 - ANNUALIZED ADVERSE RECOMMENDED PLAN EFFECTS

Pony Creek Watershed, Kansas and Nebraska

(Dollars) a/

Evaluation Unit	Project Outlays (\$)		Total
	Amortization of Installation Cost	Operation, Replacement, and Maintenance Cost	
Multipurpose Dam	113,000	9,600	122,600
Land Treatment Structural Systems and Required Land Treatment	87,900	27,000	114,900
Six Floodwater Retarding Dams and Required Land Treatment	137,300	9,400	146,700
Forestry Land Treatment	3,800	28,400	32,200
TOTAL	342,000	74,400	416,400

a/ Price base 1986 - All costs discounted to the beginning of the installation period and annualized at 8 5/8 percent interest rate for the period of analysis

b/ Cost estimate includes processing and marketing of wood products off project

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TABLE 5 - ESTIMATED AVERAGE ANNUAL
FLOOD DAMAGE REDUCTION BENEFITS

Pony Creek Watershed, Kansas and Nebraska

(Dollars) a/

Item	Estimated Annualized Damage		Damage Reduction Benefits <u>b/</u>
	Without Project	With Project	
Floodwater			
Crop and Pasture	131,500	34,700	96,800
Other Agricultural	32,100	9,500	22,600
Nonagricultural			
Road and Bridge	4,800	1,600	3,200
Recreation	3,200	800	2,400
Bridge Construction	53,200	--	53,200
Subtotal	224,800	46,600	178,200
Sediment			
Channel Deposition	5,800	2,300	3,500
Road Ditches	1,500	600	900
Subtotal	7,300	2,900	4,400
Erosion			
Flood Plain Scour	3,300	1,600	1,700
Streambank/Upstream and Crossings	56,100	5,300	50,800
Erosion and Gullies	330,000	62,500	267,500
Subtotal	389,400	69,400	320,000
TOTAL	621,500	118,900	502,600

a/ Price base 1986

b/ Includes effects of required land treatment measures

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TABLE 6 - COMPARISON OF RECOMMENDED PLAN BENEFITS AND COSTS

Pony Creek Watershed, Kansas and Nebraska

(Dollars) a/

Evaluation Unit	Damage Reduction Benefits	Erosion Reduction Benefits	Erosion Intensification Benefits	Timber Production Benefits	Agric. Water Supply Benefits	Total Benefits	Total Costs b/	Benefit: Cost Ratio
Multipurpose Dam	19,300	30,100	7,300	--	102,300	159,000	122,600	1.30:1
Land Treatment Structural Systems and Required Land Treatment	45,600	95,700	33,300	--	--	174,600	114,900	1.52:1
Six Floodwater Retarding Dams and Required Land Treatment	95,800	62,700	14,300	--	--	172,800	146,700	1.18:1
Forestry Land Treatment	--	--	--	65,600	--	65,600	32,200	2.04:1
TOTAL	160,700	188,500	54,900	65,600	102,300	572,000	416,400	1.37:1

a/ Price base 1986. All benefits discounted to the beginning of the installation period and annualized at 8 5/8 percent interest rate for the period of analysis.

b/ From Table 4

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EFFECTS OF RECOMMENDED PLAN

A review of Table G on page 24 shows that the Recommended Plan will have a major impact on flooding, grade stability (gullies), water supply, erosion, road and bridge maintenance, sedimentation, and agricultural income. It will have a moderate impact on streamflow, land use, prime farmland, water quality, and wildlife habitat. The recommended plan will also have minor impacts on mineral resources, drainage, fish habitat, visual resources, wet lands, air quality, wild fires, and recreation; however, these factors were of little significance to decision making. The project will have a negligible impact on ground water and no impact on cultural resources, endangered or threatened plants and animals, minority populations, or relocation of people or farm operations. Rationale for not discussing a factor in this section was given in the Significant to Decision Making section. Monetary values of benefits and costs are included in Tables 5 and 6, pages 74 and 75.

Grade Stabilization (Gully Control) and Related Impacts

Installation of the recommended floodwater retarding dams and required land treatment will reduce problems discussed on pages 35, 36, and 37 to the following extent:

Sheet and rill erosion will be reduced by 68,900 tons per year by treating 6,150 acres. About 5,190 acres of 3 percent slope land will have a projected soil loss of 2.9 tons per acre; the 7 percent slope group (1,770 acres) will have a projected soil loss of 4.2 tons per year; soils with slope greater than 10 percent (2,100 acres) will have a projected soil loss of 8.6 tons per year.

Ephemeral erosion on 6,150 acres of cropland will be essentially stopped by installation of a resource management system including such practices as terraces, contour farming, and conservation tillage. Erosion will be reduced from 14,930 to 3,170 tons per year, a net reduction of 11,760 tons per year.

The project will stop advancing gullies at 60 problem areas. This will result in a reduction of 80 acres of new gullies. About 6,050 acres of terraced cropland will be protected and 6,150 acres of untreated cropland will have stable water outlets so that terraces can be installed. This project action will reduce gully erosion from 27,500 to 5,700; a reduction of 21,800 tons per year.

Treatment of the projected gully area will allow 350 acres to remain as cropland that otherwise would revert to grass and trees.

Treatment of 60 grade instability problem areas will reduce road crossing maintenance at about 50 locations. As bridges are replaced, the floodwater control dams and land treatment grade stabilization structures will allow smaller bridges thus reducing construction costs.

Prime farmland will be increased by 760 acres. Scour damages will be reduced on 130 acres.

Due to land treatment structural systems and floodwater retarding dams, water quality will improve because these practices will retard erosion on cropland, gully erosion, and excessive sediment deposition.

The application of land treatment practices will protect lands from excessive sheet and rill, ephemeral, and gully erosion. This will help maintain yields, reduce production costs and improve farming operations.

Erosion and Sedimentation Related Impacts

Decreased sediment load, if the only parameter affected, would increase the potential to erode stream channels. However, peak discharges and average flow velocities will also be reduced. Channel stability examinations indicate degradation may occur below the floodwater retarding dams after construction because of the reduction in suspended sediment. This degradation will continue for a short time period until the channel slopes reach stable values for the new conditions. Redistribution of bedload supply, channel slope flattening, changed hydraulic parameters, and the presence of bedrock will prevent excessive channel degradation.

Flood damage reduction benefits from reduced sediment deposition are about 1 percent of the total benefits.

The trapping of sediments, other solids, and absorbed chemicals in the impoundments created by this project will reduce the amounts of these substances in downstream waters. The effect of storm-flow concentrations of nutrients, bacteria, sediment, and other suspended solids will be reduced. The application of land treatment measures on 6,150 acres will reduce erosion which will further reduce the transport of sediment, nutrients, and pesticides. Generally, there will be a decrease in BOD and bacteria levels. Stream temperatures will not change significantly.

The completed project will reduce sediment yield to 51 miles of perennial stream by 68 percent thereby improving water quality as the end result. Reduced sediment loads due to the project will improve fish habitat quality.

The project will reduce flood plain scour and improve the productive capability of 130 acres. Benefits from reduced flood plain scour damages amount to 1 percent of the total.

Flooding and Streamflow Related Impacts

Installation of the project will cause less variation in streamflow. The structures will reduce high-flow peaks while prolonging discharge after storms. Some water will evaporate from impoundments. Seepage and prolonged discharge from reservoirs will

contribute to stream base flows and the frequency of low flows will probably increase. Streams will be dry less often although changes of stream classification are not expected. 24/

The 6 floodwater retarding dams and 1 multipurpose reservoir with flood control will reduce frequency, discharge, depth, area, and velocity of flood flows. Table R shows reduction of peak discharges and frequency of flooding with and without the project.

Table R - Peak Reductions and Bank Full Frequencies

<u>Reach</u>	<u>Location</u>	<u>Percent a/ Peak Reduction</u>	<u>Bank full frequency</u>	
			<u>w/o Project Time(s)/ Year(s)</u>	<u>w/Project Time(s)/ Year(s)</u>
1	Watershed outlet	39	1/1	2/5
2	NW 1/4, Sec. 28-T2N-R16E	39	1/1	2/5
3	SW 1/4 Sec. 4-T2S-R16E at Kansas-Nebraska state line	40	1/2	1/4
4	SW 1/4, Sec. 8-T1S-R16E	42	3/2	1/2
5	S 1/2 Sec. 12-T2S-R15E	70	1/2	1/25
6	S 1/2 Sec. 12-T2S-R15E	39	1/1	1/2
7	NW 1/4 Sec. 22-T2S-R15E	37	1/1	1/2
9	SW 1/4 Sec. 17-T1S-R15E	80	3/4	1/100

a/ Average reductions for storms ranging from 4 inches to 10 inches of rainfall in 24 hours.

The NED plan will accomplish a 68.4 percent reduction in average annual flood damage on 3,100 acres. Flood plain benefited in each reach and the percentage of damage reduction by structural and land treatment measures is shown in Table S. Benefits from reduced crop and pasture flood damages are 18.4 percent of the total.

Table S - Flood Damage Reduction

<u>Evaluation Reach</u>	<u>Flood Plain a/ Benefited (acres)</u>	<u>Reduction in Average Annual Damages (percent)</u>
1	610	65.1
2	490	65.4
3	650	71.6
4	360	72.6
5	90	98.0
6	370	69.5
7	360	67.4
9	170	95.0
Total	3,100	Average 68.4

a/ 100-year flood plain, including channels

Installation of the project will allow farmers to plant higher income crops in areas that are now planted with flood-resistant crops. This shift in cropping pattern will also be accompanied by an increase in yield to acres that, with the project in place will be out of the flood plain. These flood-protected acres will be more intensively cultivated. More intensive use benefits are about 1 percent of the total.

Flood damage reduction will affect approximately 400 people in the watershed. All or parts of 28 farms are located in the flood plain and will be directly affected by the project.

Installation of the project will decrease flood damages to fences, livestock, feed yards, buildings, and other permanent facilities constructed on the flood plain. Cleanup of debris after each flood and increased harvesting costs associated with sediment damage will be reduced by the project. Dirt from floodwater in the harvested grain will also be reduced. Benefits from these reduced other agricultural damages will amount to 4 percent of the total flood damage.

Installation of the project will reduce bridge and culvert construction and maintenance costs through reduced flood flows and control of gullies. Pony Creek Watershed has 13 bridges downstream from dam sites that will be directly affected by the structures. Required bridge size will be reduced because of the control and protection offered by the floodwater retarding dams. The project benefits in reduced bridge construction costs amount to 10 percent of the total benefits.

Transporting, processing, and marketing of agricultural commodities will be more dependable and convenient. Crop losses will be reduced. Increased farm income will benefit local retailers. More goods and services will be used on the farm to get greater benefits from increased production potential.

Frequent closing, damage to, and loss of use of flood plain roads due to flooding will be reduced.

Road and bridge damage reduction benefits are 1 percent of the total.

Land Use and Prime Farmland Impacts

Land use with the project in place is shown in Table T. See Tables H and I for comparison of present and projected without project land use.

Table T - Future Land Use With Project

<u>Land Use</u>	<u>100-Year Flood Plain</u>		<u>Upland</u>		<u>Total</u>	
	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>
Cropland	75	2,330	73	26,550	73	28,880
Grassland	5	160	17	6,090	16	6,250
Forestland	10	300	5	1,760	5	2,060 a/
Other Land	1	30	3	1,020	3	1,050 b/
Stream Channel and Ponds	9	280	2	820	3	1,100
Gullies	-	-	1	150	1	150
TOTAL	100	3,100	100	36,390	100	39,490

a/ Does not include a possible 192 acres of forestland established for compensation (see page 61 for discussion of options).

b/ Includes 41 acres of dams and spillways seeded to native grass and managed for wildlife habitat compensation.

The 7 planned dams will directly change land use as shown in Table U. Table VI, Appendix C, shows acreage by dam site.

Table U - Land Use at Floodwater Retarding Dams (acres)

<u>Project Land Use</u>	<u>Present Land Use</u>			<u>Total</u>
	<u>Crop-land</u>	<u>Grass-land</u>	<u>Forest-land</u>	
Dams and Spillways	12	16	13	41
Sediment Pools and Beneficial Use	104	84	114	302
Detention Pools	92	98	98	288
Total	208	198	225	631

At maximum flood detention, a total of 600 acres will be inundated. Individual detention pools will be filled an average of once every 25 years or less frequently (see Table 3).

Reduced flooding on 3,100 acres will result in about 760 acres being classed as prime farmland. Structures will occupy 50 acres of existing prime farmland. A net increase of 710 acres of prime farmland will result. Additionally, 2,340 acres of existing prime farmland will benefit from reduced flooding and reduced erosion.

The P.L. 566 program will treat 6,000 HEL untreated acres in order to protect grade stabilization land treatment systems and floodwater retarding structures from sediment. Many of these acres may be treated by project measures before the 1995 FSA deadline. This

will allow an estimated 35 landowners to remain eligible for USDA programs.

Fish and Wildlife Impacts

Reservoirs will replace 300 acres of terrestrial habitat with aquatic habitat and dams will modify an additional 40 acres of terrestrial habitat. The creation of a permanent water source will be beneficial to some wildlife. Each dam and spillway will be seeded with a native grass mixture, fenced, and managed for wildlife.

Sponsors will compensate for all forestland wildlife habitat losses caused by dams. Wildlife habitat changes induced by the project are summarized in Table V. Habitat losses are shown for each proposed dam in Tables V, and VI, Appendix C. Table VI also shows alternative compensation methods and resulting areas needed to achieve compensation. Table IV summarizes total watershed habitat units with and without the project.

The installation of P.L. 566 dams will partially offset the demand for stream fishing. However, reservoir fishing and stream fishing are two different types of fishing opportunities. There will be more opportunity for reservoir fishing with the project dams installed and a slight reduction in opportunities for stream fishing. Fishing opportunities as a whole will increase in the watershed with the project.

Table V - Impact on Wildlife Habitat at 6 Floodwater Retarding Dams and 1 Multipurpose Dam

<u>Habitat Type</u>	<u>Habitat Value ^{a/}</u>		
	<u>Loss Before Compensation</u>	<u>Compensation</u>	<u>Net Change</u>
Total Riparian and Upland Forestland	976	976	0
Grassland <u>b/</u>	154	412	+ 258
Cropland	480	0	- 480
Total Herbaceous	634	412	- 222

a/ Value listed in habitat units. Habitat units equal rated quality (value 1 to 10) multiplied by acres. See Table VI, Appendix C. These calculations were made from data collected by the Triagency Team in 1987. 22/

b/ Category includes rangeland and pastureland.

Nationally endangered or threatened species that do, or are likely to, occur in the watershed include the bald eagle, peregrine falcon, whooping crane, Eskimo curlew, least tern, and piping plover. 21/ The three state-listed threatened or endangered species, Eastern

spotted skunk, snowy plover, and white-faced ibis are also likely to occur. The Eastern spotted skunk is the only permanent resident within the watershed. It prefers forest edges and grasslands where rock outcrops and shrub clumps are present. Woody fence rows, odd areas, and abandoned farm buildings are also important. 18/ No adverse impacts are expected on any of these threatened or endangered species.

Other Impacts

Water quality in Pony Creek will improve with the installation of dams and land treatment to a similar quality as is in the adjacent Walnut Creek Watershed, completed in 1969. 6/

Woodlands with vigorous, fully stocked stands of trees and undisturbed ground cover will slow runoff and improve soil water intake. Windbreaks and shelterbelts will break up wind and assist in reducing erosion and provide added wildlife habitat.

Installation of the project will provide 40 man-years of employment during the 8-year installation period. Operation and maintenance of the structures will provide 1 man-year of employment annually.

Project installation will result in closing one lightly traveled unsurfaced road. The location of the affected road is a north-south road between Sections 2 and 3, Township 1S, Range 15E. Alternate routes approximately equal in distance and quality are available.

No cultural resources listed in, eligible for, or being considered for the National Register of Historic Places will be affected by the project. Potential impacts of land treatment measures on cultural resources are not likely but will be determined during installation following SCS procedures. 11/ 12/ 13/ 23/

Off-Site Benefits

Off-site benefits are defined as those benefits that accrue off the farm from where treatment occurs. Water conservation, sheet and rill erosion, and gully erosion benefits are defined as on-site benefits. Off-site benefits include flood damage reduction benefits such as crop and pasture, other agricultural, roads, recreation, scour, and sedimentation. In addition, road ditch sedimentation, agricultural water, and forestry land treatment benefits to businesses are also off-site benefits. Reduced bridge construction and erosion damage reduction benefits at road crossings are off-site benefits.

The Pony Creek Watershed plan was formulated using all of the benefits that would accrue to the dams and land treatment measures applied. Approximately 60 percent of the project benefits are off-site benefits and approximately 40 percent of the project benefits are on-site benefits.

Relationship to Other Plans, Policies, and Controls

Pony Creek Watershed is an element of the Missouri River Basin Management Plan, which is a water and related land resources management plan prepared by the Missouri River Basin Commission. The plan serves as a definitive, flexible guide for the development, conservation, preservation, and management of water and related land resources in the Missouri River Basin. Pony Creek Watershed is in the Missouri River Basin Water Resources Council Area 1024.

Nearby projects of other agencies include the Missouri River Bank Stabilization and Navigation Project, a Corps of Engineers project for multipurpose development that includes navigation, bank stabilization, and recreation.

Pony Creek Watershed is located within the Northeast Kansas Erosion and Sedimentation Cooperative River Basin Study Area. The Pony Creek Watershed Plan is compatible with this river basin study which is being conducted by SCS.

Pony Creek Watershed is part of the high priority problem area in the State Water Quality Plan.

CONSULTATION AND PUBLIC PARTICIPATION

On January 19, 1967, after a public informational meeting, residents of the Pony Creek watershed area organized a steering committee to direct the organization of a watershed district. Formal incorporation was granted by the Kansas Secretary of State on January 8, 1968.

Pony Creek Watershed Joint District No. 78 submitted a P. L. 566 application to SCS in March 1968. This application was filed with the Governor's Watershed Review Committee on April 1, 1968. The Field Examination Team and other interested individuals toured the watershed, identified watershed problems, and recommended solutions. The Field Examination Team was composed of representatives from the State Conservation Commission; Kansas Water Resources Board; and Division of Water Resources (Kansas State Board of Agriculture). In conjunction with the tour, a public meeting was held May 9, 1968, at the Sabetha Country Club. In the review committee's written report field examination summary, a rating of 74 was assigned. The Watershed Review Committee approved the watershed application on May 23, 1968, and the Nebraska Soil and Water Commission approved the application on June 13, 1968.

Initial planning results were presented to sponsors in a Preliminary Watershed Investigation Report at a May 7, 1973, watershed district quarterly meeting. Another public meeting was held December 14, 1978, in Hiawatha to determine the desirability of pursuing a planning authorization and to contact the public and interested agencies for input into the planning process. A draft preauthorization report was reviewed at public meetings on February 23, 1983, and February 6, 1984. The Administrator of SCS approved planning assistance on March 26, 1984.

A preliminary forestry and wildlife habitat assessment report was completed February 1973 by representatives from the Department of Wildlife and Parks and the Extension Forestry Service. The Department of Wildlife and Parks (with SCS personnel) made a preliminary wildlife habitat analysis in August of 1979.

The SCS consulted with the U.S. Fish and Wildlife Service in regard to the possible occurrence of endangered species in the project area. In June 1984 the Fish and Wildlife Service concurred that no federally-listed endangered species should be affected.

In November 1987 an interagency team of biologists investigated proposed dam and reservoir areas in the watershed to evaluate wildlife habitat and estimate changes. An interdisciplinary team discussed the habitat changes and recommended to the State Conservationist full compensation for woody habitat losses. The SCS and the sponsors worked together to determine the maximum habitat replacement consistent with sponsor capabilities to provide land rights and operation and maintenance.

Archeological and historical reviews were initiated by the Kansas State Historical Society in January 1985. Phases I and II were completed in April 1985 and June 1986, respectively. A supplemental Phase II was completed in December, 1987.

A forestry plan was compiled for the watershed by the Extension Forestry Service and submitted in April 1986.

A water quality survey report was submitted by the Kansas Department of Health and Environment in March of 1987.

In 1977 the City of Sabetha notified the district of an interest in a water supply. In June 1986, during work plan formulation, the watershed board contacted Sabetha and confirmed their interest in a water supply. The City of Sabetha, State Conservation Commission, Kansas Water Office, Pony Creek Watershed Board, and Soil Conservation Service met to discuss development of a watershed supply reservoir.

Since formal incorporation of the Pony Creek Watershed Joint District No. 78 in 1968, the district board has carried out a continuing program to inform and involve the general public. Local people have maintained active interest and attendance at watershed meetings. Frequent person-to-person contacts have been on going to help explain the project and to ask for input into the planning needs and processes. An active public information program has kept local people advised of the status of Pony Creek Watershed. Quarterly or on-call meetings open to the public have been held. Annual meetings were advertised in advance in the principal county newspapers.

The watershed directors have reviewed the list of eligible practices for cost sharing and have developed priorities for practices which would best meet the needs of the watershed. They have also assisted in reviewing the contracting arrangements and rates of cost sharing. A public meeting was held on August 1, 1988, to review and discuss the draft plan and environmental impact statement.

List of agencies, conservation groups, and organizations to whom copies of this draft plan were sent for comment:

Federal:

- Department of Agriculture
 - Agricultural Stabilization and Conservation Service
 - Farmers Home Administration
 - Forest Service
 - Office of Equal Opportunity
- Department of Army
 - Chief of Engineers
 - District Engineer
- Department of Commerce
 - Ecology and Conservation Division
 - River Forecast Center
- Department of Housing and Urban Development

Department of the Interior
Bureau of Indian Affairs
Bureau of Mines
Bureau of Reclamation
Fish and Wildlife Service
Regional Director
Kansas State University
Geological Survey
National Parks Service
Office of Environmental Project Review
Secretary of the Interior
Environmental Protection Agency

State:

Biological Survey
Department of Health and Environment
Department of Transportation
Department of Wildlife and Parks
Division of Budget
Governor of Kansas
Kansas State University
Dean of Agriculture
Department of Agronomy
Kansas Water Office
State Board of Agriculture
Division of Water Resources
Secretary
State and Extension Forester
State Conservation Commission
State Historical Society
Geological Survey

Other:

Friends of the Earth
Kansas Chapter Wildlife Society
Kansas Ornithological Society
Kansas Wildlife Federation, Inc.
National Audubon Society
National Wildlife Federation
Natural Resources Defense Council
Sierra Club (national and state levels)

Local:

Conservation Districts (Kansas)
Natural Resources District (Nebraska)
Watershed District
City of Sabetha

LIST OF PREPARERS AND QUALIFICATIONS

PONY CREEK WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT

FORMAT:

NAME - Present Job Title (years); Degree(s) - Major; continuing education subjects; Former Job Titles (years of experience); other information.

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W. DUANE EVANS - SCS Agric. Economist (21); BS-Agric. Econ., MS-Agric. Econ.; statistics, linear programming, computer sci., environ. sem.

STEVEN C. HENNINGSSEN - Water Resources Planning Staff Soil Conservationist (1); Dist. Conservationist (12); BS-Wildlife Conservation; Soil Conservationist (3).

ROBERT J. HIGGINS - SCS State Biologist (1); BS-Biol.; environ. concepts sem.; recreation, environ., water quality testing, warm water fisheries; Conser. Tech. (1), Range Conserv. (5), Soil Conserv. (7); Biologist (13); Certified Wildlife Biologist T.W.S.

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ROBERT D. WOOD - Wildlife Ecologist (5); BS-Wildlife Mngmt.; KDWP Environmental Liaison Biologist (12); KFGC Game Biol. (10); Certified Wildlife Bio. T.W.S.

LAURENCE D. ZUCKERMAN - Kansas Department of Wildlife and Parks Aquatic Ecologist (1); BS-Marine Ecology; MS-Environmental and Forest Biology; PhD (candidate)-Fishery Biology; Fish Biologist (7); Environmental Law, Statistics, Community Ecologists; Certified for HEP U.S. Fish and Wildlife Service.

The preparers of this document include various consultants in addition to the members of the Interdisciplinary Team and the Triagency Team.

Reservoir topographic maps were provided by Bucher and Willis Engineers. Van Doren, Hazard, and Stallings Engineers made hydraulic studies and bench mark surveys. Van Doren, Hazard and Stallings Engineers did hydraulic studies and mapping.

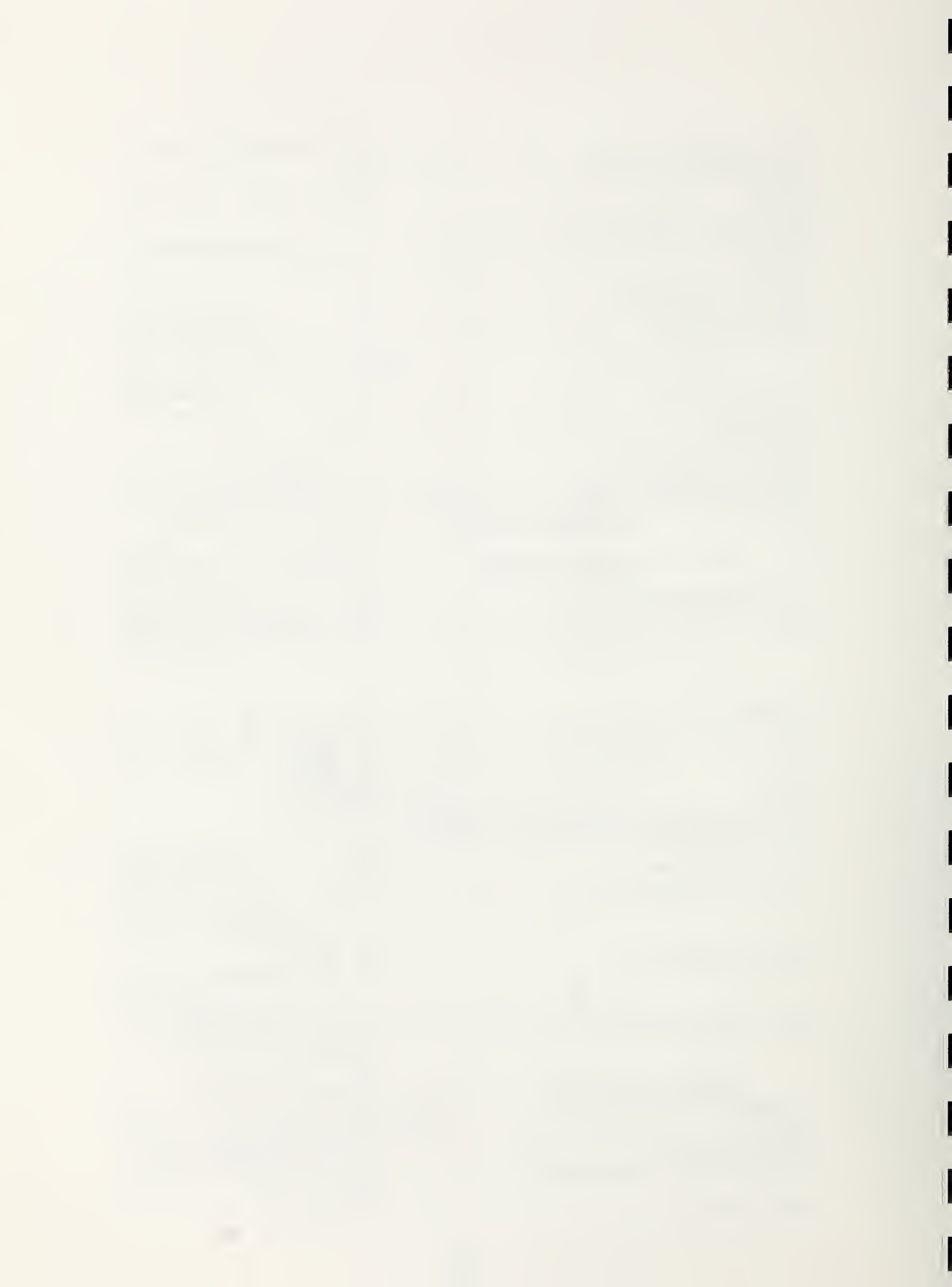
The draft watershed plan and environmental impact statement was reviewed by SCS staff at the field, state, and Midwest National Technical Center levels by specialists having responsibility for engineering, soils, agronomy, range conservation, biology, forestry, geology, hydrology, economics and recreation.

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LIST OF APPENDICES

Appendix A - Letters and Oral Comments on Draft Plan/EIS

Appendix B - Support Maps

Appendix C - Supporting Information

Appendix D - Project Map



A P P E N D I X A

Letters and Oral Comments on Draft Plan/EIS



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101



U.S. Department of Housing and Urban Development
Kansas City Regional Office, Region VII
Professional Building
1103 Grand Avenue
Kansas City, Missouri 64108-2496

August 17, 1988

Mr. James N. Habiger
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

RE: Pony Creek Watershed, Brown and Nemaha Counties, Kansas
and Richardson County, Nebraska

In accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, we have reviewed the draft Watershed Plan-Environmental Impact Statement for the project referenced above. The project and document are rated "LO" (Lack of Objections).

Thank you for the opportunity to comment.

Sincerely yours,

Michael J. Bionadei

for Lawrence M. Cavin
Chief, Environmental Review
and Coordination Section

No response necessary

July 7, 1988

Mr. James N. Habiger
State Conservationist
U.S. Department of Agriculture
760 South Broadway
Salina, KS 67401

Dear Mr. Habiger:

SUBJECT: Draft Environmental Impact Statement (EIS): Pony Creek
Watershed; Brown and Nemaha Counties, Kansas, and
Richardson County, Nebraska, (June 1988)

This office has reviewed the subject draft EIS for the Pony Creek Watershed in northern Kansas. The document was found to be satisfactory in meeting the spirit and intent of the National Environmental Policy Act (NEPA) of 1969 and no apparent adverse impacts have been noted relating to Department of Housing and Urban Development projects in this jurisdiction.

We appreciate the opportunity to comment on this matter.

Sincerely,

Lance L. Long

Lance L. Long
Environmental Officer
Office of Community Planning
and Development

No response necessary



DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
700 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896
August 23, 1988

REPLY TO
ATTENTION OF:
Environmental Resources
Branch
Planning Division

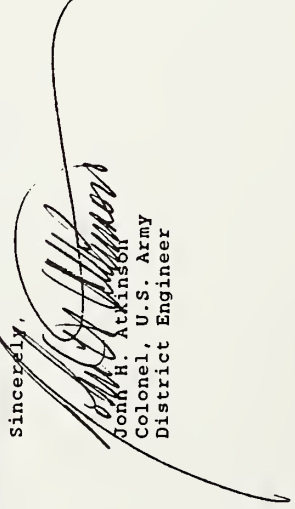
Mr. James N. Habiger
State Conservationist
United States Department
of Agriculture
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

Thank you for the opportunity to review and comment on the draft Watershed Plan/Environmental Impact Statement for Pony Creek Watershed, Brown and Nemaha Counties, Kansas, and Richardson County, Nebraska which you provided to the Kansas City District, Corps of Engineers (KCD) on June 23, 1988. My staff has reviewed the report and I have enclosed their comments for your use (encl).

If you have any questions or need any further assistance, please do not hesitate to contact Mr. Danny McClendon, of my Planning Division Staff at (816) 426-3358.

Sincerely,



John H. Atkinson
Colonel, U.S. Army
District Engineer

Enclosure

Kansas City District, Corps of Engineers
Comments on Draft Watershed Plan/Environmental Impact Statement
for
Pony Creek Watershed
Brown and Nemaha Counties, Kansas
and
Richardson County, Nebraska

1. Regulatory Jurisdiction. In accordance with current regulations and recent policy changes, it is the KCD's position at this time to not exert regulatory jurisdiction over Soil Conservation Services (SCS) ponds and farm ponds built by individuals. The Pony Creek Watershed Plan is considered to be covered by this policy action and remains exempt from further regulatory review by the Corps. Since this jurisdictional policy action is still under review and subject to possible change by higher authority, the SCS may later be informed of changes. Also, for record keeping purposes, I ask that you furnish KCD's Regulatory Branch the number of dams constructed under this regulatory exemption policy at the end of each fiscal year, but not later than October 10 of each year. If you have any questions concerning Department of the Army permits, feel free to write Mr. M. D. Jewett, Chief, Regulatory Branch or to call Mr. Lyle Keim, Chief, Permit Evaluation and Enforcement Section at (816) 426-3967.

2. Page 26. It would be useful if there was a short paragraph listing the fish species found in Pony Creek and the amount of recreational fishing, if known, that occurs. Are there any Federally-listed or State-listed endangered or threatened fish or invertebrate species found in Pony Creek?

3. Page 79, Table R: It is difficult to accept that Reach 1 will have an average peak reduction of 39 percent with project condition when only 36.9 percent of the basin is controlled by flood control structures. The Corps experience has been that peak reduction is a significantly smaller percentage than the percentage of the drainage area controlled. Other reaches upstream of Reach 1 may be similarly subject to the same concern. Additionally, at the 4 percent pool level some control of inflow begins to be lost through the uncontrolled spillway. Depending on the frequency of flood events averaged, those volumes exceeding an event with 4 percent annual chance of occurrence should result in a smaller average peak reduction.

4. Page 82, Third complete paragraph under Fish and Wildlife Impacts: Fishing opportunities will increase only if the landowners allow public fishing. Since access to the impoundments will be controlled by the landowners as stated on Page 68, how will public fishing in these ponds be administered, especially if the ponds are stocked using public funds?

5. Appendix B, Page B-2: Include a scale for this Breach Inundation map.

1

2

3

4

5

RESPONSE:

1 | Comment noted

2 | Paragraph describing the fish species in Pony Creek has been added as requested.

Peak discharges and related parameters are achieved through hydrologic modelling and analyzing several different alternatives with the computer. The watershed is subdivided into small hydrologic units and the significant physical characteristics of each unit are evaluated and utilized in the model. Factors evaluated include size, shape, and slope of the unit; sizes, lengths, and slopes of water courses; types of soils; geology; vegetative cover; and other physical features such as terraces, waterways, and other conservation practices, as applicable. The models are calibrated to generate peak discharges consistent with regional USGS stream gage data analysis and frequencies derived from historical storms.

The shape of Pony Creek Watershed is the primary cause of unusual relationships of peak discharges to drainage area for uniform storms over the watershed. The shape and hydraulic characteristics of the drainage area in the upstream reaches causes dual peak discharges to pass the confluence of reaches five and six to the outlet of the watershed. Thus the location of the dams in the fan shape of upper part of the watershed reduce the peaks at their respective locations so as to dissipate them as they move downstream. The narrower watershed shape in the lower reaches allows the peaks to move downstream and dissipate separately ahead of the headwaters held in detention by the dams.

It has been SCS experience in small watershed project analysis that percent peak reduction is proportional to and in most cases greater than the percent of watershed control.

The project will provide increased fishing opportunities through landowner controlled access to reservoirs. Increased incidental recreation (including fishing) use of watershed structures in Kansas has been documented through inventories of use from project sponsors. If the Kansas Department of Wildlife and Parks stock the reservoirs with fish, the landowners agree to allow fishing with their permission, but not for public access.

5 | Included as suggested.



United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
WASHINGTON, D.C. 20240



Mr. James N. Nabiger

ER 88/581

AUG 19 1988

Mr. James N. Nabiger
State Conservationist
Soil Conservation Service
760 South Broadway
Saline, Kansas 67401

Dear Mr. Nabiger:

We have reviewed the draft watershed plan/environmental impact statement for Pony Creek Watershed, Brown and Nemaha Counties, Kansas, and Richardson County, Nebraska. General and specific comments have been provided for your consideration.

General Comments

Pony Creek is classified as a Class II, high priority fishery resource in both Kansas and Nebraska. During the Nebraska Game and Parks Commission 1972 stream inventory, no species currently listed as threatened or endangered were sampled within the Nemaha Basin. The inventory report states that nearly all streams in the basin carry heavy sediment loads during period of peak run-off reducing fish production. As a result, the bulk of fish populations within the Nemaha Basin are made up of the more tolerant species, including carp and various suckers. The project should reduce the sediment load and increase the stream fishery potential.

On those structures where no public access would be provided, there would be no public benefit derived from retention of water in the sediment pool. Additionally, there could be downstream flow benefits and a reduction in adverse terrestrial habitat impacts by maintaining such action. Further terrestrial benefits could be gained by fencing all of the structures to allow implementation of a grazing control plan. Livestock could be provided access to water either below the dam or through fencing design.

Specific Comments

Indian water rights have not been considered and may become an issue at a later date. The Bureau of Indian Affairs is in the process of researching the history of land acquisition for Indian tribes in Kansas. Inventories of quantity and quality of water will be a factor in determining further action regarding claims to water rights for Indian tribes. We recommend that the final statement address the impact of this proposal on water rights.

4 According to the EIS (page 27), "additional archeological and historical sites are concluded to exist in areas that may be affected by proposed structural features or conservation practices." Further in the paragraph it is stated that "... there is a relatively low likelihood that additional resources will be identified." These two statements are somewhat contradictory and therefore an explanation should be provided.

5 From a planning standpoint it appears that additional cultural resources inventories by qualified archeologists should be conducted prior to construction since a potential exists for sites to be located in those areas. This would probably eliminate the potential for delay of construction because of discovery situations. Reference is also made that the SCS procedures will be followed should cultural resources be found during construction, however, there is no provision for what action will be taken, or who will be responsible for treatment, should cultural resources be exposed as a result of erosional wave action. Additional information should be provided in the final statement.

6 The analysis should address effects of the impoundments on groundwater quality, water levels and underflow.

Thank you for the opportunity to comment on this proposal.

Sincerely,

Bruce Blanchard, Director

RESPONSE:

1 | Comment noted.

2 | The project will provide increased fishing opportunities through landowner controlled access to reservoirs. Increased incidental recreation (including fishing) use of watershed structures in Kansas has been documented through inventories of use from project sponsors. If the Kansas Department of Wildlife and Parks stock the reservoirs with fish, the landowners agree to allow fishing with their permission, but not for public access.

3 | Landowners are encouraged to fence the pool areas but are not required to. The dam and emergency spillways are fenced and grazing control plans are recommended for the fenced and unfenced areas.

4 | Floodwater Retarding Dam No. 3, which includes water supply storage, will need an appropriation for storage from the Kansas State Board of Agriculture, Division of Water Resources. The other structures in the plan will only need a construction permit from the Division of Water Resources.

5 | Apparently no Indian reservation lands are contained within the Pony Creek Watershed. While a statewide adjudication of Indian water rights could have an effect in the watershed, such an adjudication has not taken place and the specific effects, if any, cannot be determined at this time.

6 | The referenced paragraph has been revised to reflect the different levels of likelihood of additional archeological sites occurring in settings of proposed structures as opposed to settings where conservation practices may be installed.

7 | This strategy appears on page 47 of the draft plan and is inherent in related language on pages 59 and 66. It has been retained in the final plan. The strategy applies mostly to the installation of conservation practices. Archeologists will examine the areas of conservation practices where there is a potential for archeological sites to occur. Identification of potential areas will be made by SCS personnel in conjunction with the State Historic Preservation Officer's staff.

8 | Wave action is not expected to be a cause of erosion in impoundments of the size proposed. Groundwater saturation, followed by fluctuation in the pool surface elevation and a wetting and drying cycle, often escalates the rate of bank erosion. Surveys to identify and evaluate archeological resources took this result, among others, into account. If None of the known sites would be affected in this way.

9 | sites were missed during the identification surveys, and it is possible in this and most other projects in alluvial settings that buried sites exist, and the presence of the resource became apparent during operations the disposition of the site would be up to the landowner.

10 | A statement has been added on page 26 of the plan to reflect consideration of the potential for future erosion of sites along the shoreline of the proposed impoundments.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 NATIONAL OCEAN SERVICE
 OFFICE OF CHARTING AND GEODETIC SERVICES
 ROCKVILLE, MARYLAND 20852

JUL 20 1988

MEMORANDUM FOR: David Cottingham
 Ecology and Environmental Conservation Office
 Office of the Chief Scientist

FROM: Rear Admiral Wesley V. Hull, NOAA
 Director, Charting and Geodetic Services

SUBJECT: DEIS 8807.02 - Pony Creek Watershed, Nebraska

The subject statement has been reviewed within the areas of Charting and Geodetic Services' (C&GS) responsibility and expertise and in terms of the impact of the proposed actions on C&GS activities and projects.

A preliminary review of C&GS records has indicated the presence of numerous geodetic control survey monuments in the proposed project area. Attached are four published geodetic control quadrangles of data for the proposed project area as identified below:

1. Quadrangle number 390954 (Horizontal & Vertical)
2. Quadrangle number 400953 (Horizontal & Vertical)

These quadrangles should be reviewed for identifying the location and designation of geodetic control monuments that may be affected by the proposed project. If there are any planned activities which will disturb or destroy these monuments, C&GS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation.

C&GS recommends that funding for this project include the cost of any relocation required for C&GS monuments. For further information about these monuments, please contact the National Geodetic Information Branch, N/CGI7, Rockwall Bldg., room 20, National Geodetic Survey, NOAA, Rockville, Maryland 20852, telephone 301-443-8631.

Attachments

CC:
 N/CG1x28 - Odum
 N/CG17 - Spencer



RESPONSE:

All geodetic control survey monuments lay outside of any construction areas of the six floodwater retarding dams and one multipurpose dam.



Mike Hayden, Governor

KANSAS WATER OFFICE
Joseph F. Harkins
Director

State 200
109 SW Ninth
Topeka, Kansas 66612
913-296-3185

August 18, 1988

Mr. James N. Habiger
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
760 South Broadway
Salina, KS 67401

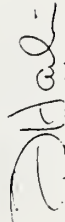
Dear Mr. Habiger:

I am writing concerning the draft watershed plan and environmental impact statement for the Pony Creek Watershed. As requested in your letter of June 23, 1988, this office has coordinated a review of the draft by state agencies.

Five agencies replied to my letter of July 5, 1988, soliciting comments on the draft. Copies of all replies are attached. Substantive comments were received from the Kansas Department of Wildlife and Parks. In his letter to me, dated August 15, 1988, W. Allan Wentz referred to the narrative on pages 59, 82 and 83 regarding necessary permits and fish and wildlife impacts of the plan. Wentz requests that these subsections be revised to state that while no Department of Wildlife and Parks permits may be needed at this time, construction of individual structures may be require such permits depending upon the threatened and endangered species lists in effect at the time.

Thank you for the opportunity to review this draft. Subject to the revisions mentioned, the State of Kansas recommends that the draft watershed plan and environmental impact statement for Pony Creek Watershed Joint District No. 78 be adopted.

Sincerely,


Joseph F. Harkins
Director

JFH:TWL:dk
Attachments

cc: The Honorable Mike Hayden, Governor of Kansas
W. Allen Wentz, Assistant Secretary, Kansas Department of
Wildlife and Parks
Glen E. Kirk, Kansas Water Office

See response to comments in the following letters

STATE OF KANSAS



Department of
Wildlife & Parks

Office of The Secretary
900 Jackson Street, Suite 502
Topeka, Kansas 66612-1220
913-296-2281

Mike Hayden, Governor

Robert L. Meinen, Secretary

W. Alan Wentz, Assistant Secretary

Operations Office
Route 2, Box 54 A
Topeka, Kansas 66612-9599
316-672-5911

August 15, 1988

Ref:ED1.0402

Pony Creek

Joseph F. Harkins
Kansas Water Office
109 SW 9th, Suite 200
Topeka, KS 66612-1215

Dear Mr. Harkins:

In response to your July 5, 1988, transmittals to this agency, Department of Wildlife and Parks (DWP) staff have reviewed the Interagency Review Draft Watershed Plan and Environmental Impact Statement. The only comment we have pertains to the Permits and Compliance narrative on Page 59 and to the last paragraph of the Fish and Wildlife Impacts narrative on Pages 82-83.

Kansas Administrative Regulation 23-17-2, authorized by the Kansas Nongame and Endangered Species Conservation Act of 1975 (K.S.A. 32-501 thru 510), requires a permit for any publicly funded, state or federally assisted, or state or federally permitted project that impacts critical habitat for any state-listed threatened or endangered species. Kansas Administrative Regulation 23-17-1 contains the current threatened and endangered species lists, but that regulation is subject to periodic revision. Although, to date, there have been no critical habitats for any of the current listed species, we have no way of knowing what animals or what critical habitat designations may be listed by the time any of the proposed Pony Creek structural measures are installed, which may be 10-15 years in the future. As a way of addressing the dynamic status of the state's threatened and endangered species lists, the DWP is utilizing the State Water Projects Environmental Coordination Act (K.S.A. 82a-325 thru 327) as a means to review individual flood control structures in light of species lists current at the time. Any structures that are found to be impacting threatened or endangered species, appropriate permits from DWP will be

EQUAL OPPORTUNITY EMPLOYER

Harkins

2

August 15, 1988

required. Appropriate wording should be inserted in the cited plan narratives to assure project sponsors are aware that just because there are no DWP permits needed at the time this document is being prepared, future reviews of individual structures may be subject to permitting depending upon the threatened and endangered species lists in effect at the time.

Thank you for the opportunity to comment. If there are any questions about our concerns, feel free to contact the Environmental Services Section at DWP Operations Office.

Sincerely,

W. Alan Wentz
W. Alan Wentz
Assistant Secretary
Operations Office

bd

xc:

USFWS, Manhattan
SCS, Salina
NERG, Topeka
KCC, McConnell
KDHE, Hess
Ext. Forestry, Naughton
St. Bio. Surv., Liechti
St. Cons. Comm., Kern
St. His. Soc., Timberlake
KDWP, Kivett

RESPONSE:

The third paragraph in the Permits and Compliance narrative on page 59 was added to concur with this request.

The comment to the Fish and Wildlife Impacts narrative on pages 82-83 has been addressed in the Permits and Compliance narrative on page 59.



State Conservation Commission

100 SW 9TH STREET, ROOM 300
TOPEKA, KANSAS 66604

KANSAS BIOLOGICAL SURVEY

The University of Kansas

13 July 1988

August 3, 1988

Mr. Joseph F. Harkins, Director
Kansas Water Office
109 SW Ninth, Suite 200
Topeka, Kansas 66612-1215

Joseph F. Harkins, Director
Kansas Water Office
109 S.W. Ninth, Suite 200
BUILDING MAIL

Dear Mr. Harkins,

Dear Mr. Harkins:

We have reviewed the draft Watershed Plan and Environmental Impact Statement for the Pony Creek Watershed Joint District No. 78. The Plan seems to adequately address the existing problems. Likewise, the various land treatment, land use and structural measures recommended to correct these problems appear to have been thoughtfully chosen. The habitat improvements that are to be instituted in conjunction with certain aspects of the Plan appear appropriate for the protection or enhancement of riparian habitat and the wildlife habitat additions viewed as mitigation measures, seem reasonable. In general, there is no objection to the draft Plan as written.

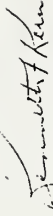
Thank you for the opportunity to review the Watershed Plan and Environmental Impact Statement for Pony Creek Watershed.

The Pony Creek Watershed Joint District No. 78 has constructed eleven dams utilizing state assistance from the State Watershed Construction Assistance Program administered by the Commission. The P.L.-566 structures will provide the necessary flood control and grade stabilization intended in the general plan.

The State Conservation Commission recommends the approval of the review draft.

Thank you for the opportunity to review the Watershed Plan. We look forward to reviewing the individual site and structure plans for those projects that will require review in conjunction with the Environmental Coordination process.

Sincerely,


Kenneth F. Kern
Executive Director

KFK:du

Sincerely,


Edward A. Martinko
Director

No response necessary

No response necessary

Cooperative Extension Service
Department of Forestry
State and Extension Forestry
2610 Clinton Road
Manhattan, Kansas 66502
913-532-5752

July 11, 1988

Joseph F. Harkins, Director
Kansas Water Office
Suite 250
109 SW Ninth
Topeka, KS 66612-1215

Dear Joe:

We have reviewed the draft Watershed Plan and Environmental Impact Statement for the Pony Creek W.S. Joint District No. 78.

Having spent considerable time in the formulation of the forestry section of this plan and having worked during the process with the Watershed Board and the Soil Conservation Service, we are pleased with the result of this effort and have no corrections, criticisms, or changes to offer.

We concur with the plan and EIS as drafted, and intend to be at the public meeting on August 1.

Sincerely,

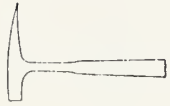
Lester R. Pinkerton

Lester R. Pinkerton
Acting State Forester
& Department Head

LRP/grh

cc: Gary Cargil, Regional Forester, Denver
Tom Wardle, Dept. State Forester, Nebraska

No response necessary



KANSAS GEOLOGICAL SURVEY

1930 Constance Ave., Campus West
The University of Kansas
Lawrence, Kansas 66046-2898
913-864-3065

July 21, 1988

Mr. Joseph F. Harkins
Kansas Water Office
109 SW Ninth, Suite 200
Topeka, Kansas 66612-1215

Dear Mr. Harkins,

I have reviewed the Watershed Plan and Environmental Impact Statement for Pony Creek Watershed Joint District No. 78 sent to Dr. Lee Gerhard with your cover letter of July 5, 1988. Based on the data presented the land treatment measures and various dams seem to be needed to reduce flooding and erosion. Otherwise we have no comment.

Sincerely,

Thomas McClain

Thomas McClain

cc: Lee Gerhard

TM:amc

No response necessary



DEPARTMENT OF HEALTH AND ENVIRONMENT

Penobscot Field
Topeka, Kansas 66620-0001
Phone (913) 296-1500

Mike Hawden, Governor

Stanley C. Gamb, Ph.D., Secretary
Gay K. Hulet, Ph.D., Under Secretary

August 29, 1988

Mr. Larry D. Miles
Water Resources Planning Staff Leader
USDA Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

RE: Pony Creek Watershed Joint District No. 78, Draft Watershed
Plan and Environmental Impact Statement

Dear Mr. Miles:

Thank you for requesting our comments on the subject document. We note with satisfaction that the draft plan addresses and includes our comments and recommendations made with our letter of March 1987. Since March 1987, we have completed the nonpoint source assessment required under Section 319 of the Clean Water Act and have developed additional refinements to the initial Pony Creek assessment. The significant points and suggestions we wish to call to your attention are:

1. We previously stated that Pony Creek was the only stream in the watershed that met the criteria for a "classified" stream. After further review we have found there are a total of 10 un-named tributaries to Pony Creek and Pedee Creek that are considered to be classified streams. The un-named tributaries are identified as *A through *J on the project map.
2. With completion of the Nonpoint Source Assessment, we have developed more definitive water quality problem identification criteria that show water quality in Pony Creek impairs aquatic life, domestic water supply and recreational uses. The aquatic life support use is impaired by suspended solids and nitrate-nitrogen concentrations which exceed the criteria for protection of these uses by over 3 fold. The recreational use is impaired by high fecal coliform bacteria counts.


We do not believe these comments significantly alter the recommendations of the plan. Water quality improvements through suspended solids and bacteria reduction would result from this

Mr. Larry D. Miles
August 29, 1988
Page 2

project in tributaries *B, *D, *G, *H, *J and Pedee Creek. It appears that the project will have no impact on un-named tributaries *A, *C, *E, *F, *I and a substantial area of direct drainage to Pony Creek. The plan is also not expected to significantly alter the nitrate quality of the water. We recommend that nonpoint source pollution control measures be considered for these areas and that fertilizer management practices be developed and implemented for the entire project. Pesticides have been occasionally found in water quality samples. At the present time we do not believe pesticides are causing a water use impairment, but we recommend that a pesticide management plan be developed to prevent the future occurrence of a pesticide water quality problem.

Again, thank you for the opportunity to comment on this plan. Please feel free to contact me (913-296-5567) if you have any questions.

Sincerely,


Donald D. Snethen, P.E., Chief
Water Quality Assessment Section
Bureau of Water Protection

lv

c: Project 8612000.2

RESPONSE:

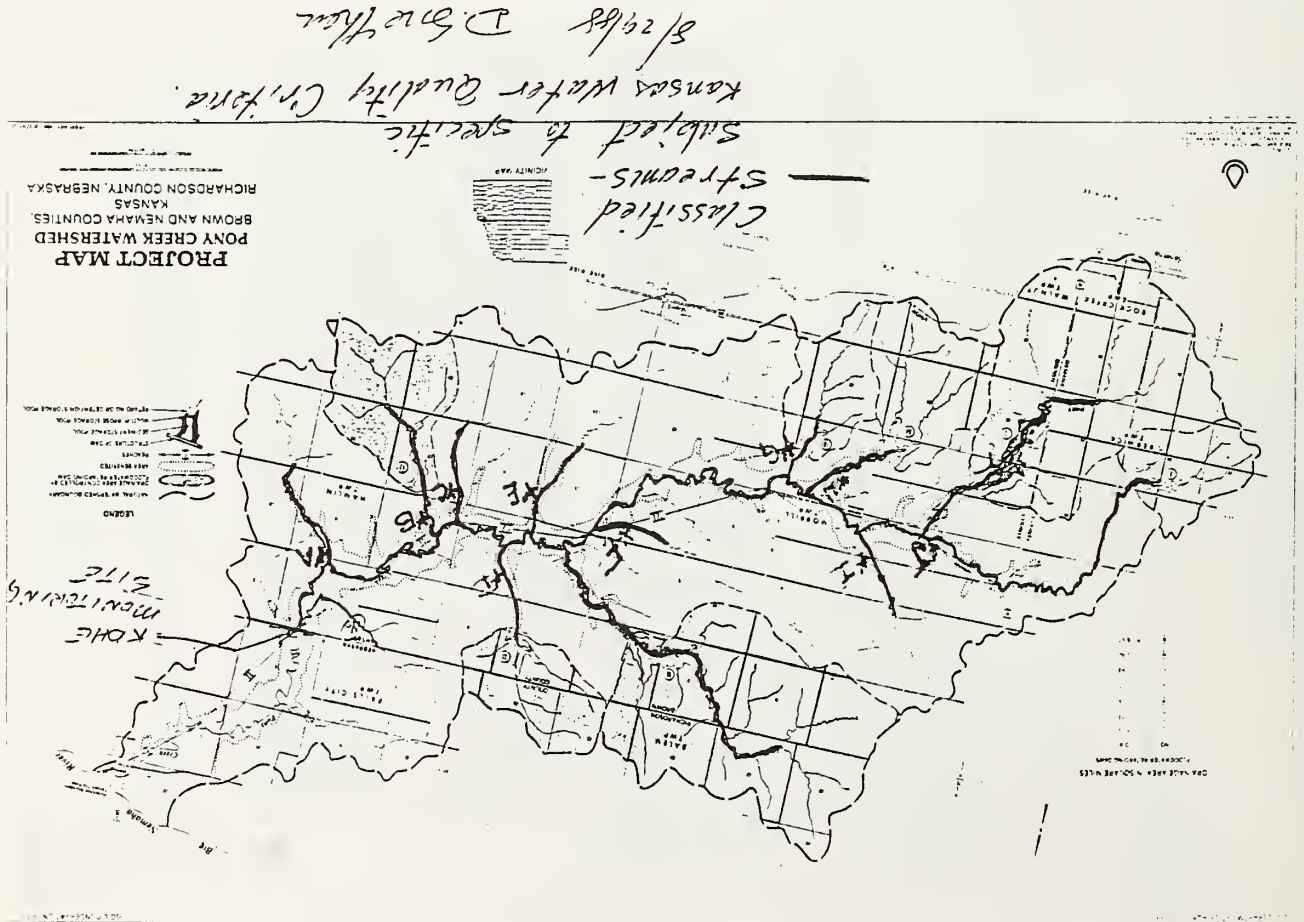
In an earlier letter from KDHE it was determined there were not any impairments to the water quality and the main channel was the only channel to be classified in the watershed. KDHE reported in their interagency review comments water quality impairments have been found with the completion of the Nonpoint Sources Assessment. The impairments are to aquatic life, domestic water supply, and recreational uses. The impairments do not significantly alter the recommendations of the plan and do not affect the uses of Multipurpose Dam No. 5. In addition to the Pony Creek mainstem being classified, ten unnamed tributaries and Pedee Creek met the criteria for a "classified stream."

Land treatment structural systems will provide control measures for nonpoint source pollution.

SCS will recommend the land user use available information on pesticides and fertilizers to properly manage chemicals on his land along with implementation of his conservation plan.

1

2





NATIONAL WILDLIFE FEDERATION

1412 Sixteenth Street, N.W., Washington, D.C. 20036-2266 (202) 797-6800

August 23, 1988

James N. Habiger, State Conservationist
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

We welcome the opportunity to submit these comments for the record on the Pony Creek draft watershed plan and environmental impact statement. We also thank Norman Lister of your office for extending the filing date for public comments until August 24. The National Wildlife Federation is the nation's largest environmental education organization, with over 5.1 million members and supporters. The Federation has an ongoing interest in the SCS Small Watershed Program.

SUMMARY

The draft watershed plan/environmental impact statement for Pony Creek, located in the Big Nemaha River basin in Brown and Nemaha Counties, Kansas, and Richardson County, Nebraska, proposes to reduce flood damage and erosion in the watershed. Six floodwater retarding dams, one multipurpose dam for floodwater retention and agricultural water supply, 35 land treatment structures, and nonstructural land treatment measures are the major components of the draft plan. The total cost would be \$5,709,500, with 76.5% funded by PL 83-566, and 23.5% paid by local sponsors.

The draft plan/EIS does not provide basic data about the hydrology and aquatic biology of Pony Creek. Quantitative descriptions of the proposed project's effects on water quality and quantity during low flow periods are also missing. As a result, the effects of a possible interbasin transfer are impossible to determine

with the information at hand. The draft plan also lacks data on the town of Sabetha's current water use, on its projected needs, and on the costs and benefits of alternative water supply. Important information on cost sharing and benefit analysis is not included. Finally, the draft plan's nonstructural alternative analysis is incomplete.

The draft plan does not include the basic information on basin characteristics needed to assess the project's impact on the watershed.

The draft plan/EIS lacks fundamental hydrologic information about the Pony Creek watershed. There are no data on peak or low flows, drought of record low flow, or annual basin discharge. Data are not included on how the project would affect these basin characteristics, including the expected evaporative losses from the impoundments. These are significant environmental considerations for a watershed plan, and the draft plan/EIS is incomplete without them.

The proposed project will inundate three miles of riparian habitat. No compensation is included in the draft plan/EIS, nor is there an inventory of aquatic species which will be affected. The draft plan should be revised to include a complete analysis of the effects of this habitat change and a list of the affected aquatic species in the watershed. The draft plan should include mitigation for the lost stream habitat.

The environmental and institutional implications of supplying water to Sabetha are not explored in the draft plan.

The draft plan should include information about where Sabetha would discharge its water supply. Sabetha straddles the watersheds of the Big Nemaha and the Kansas Rivers. An important environmental consideration is whether or not the water that Sabetha would withdraw from Pony Creek would be returned to the same watershed. If Sabetha discharges the water it receives from the Pony Creek facility into the Kansas River basin, then such use permanently reduces the discharge of the watershed and constitutes an interbasin transfer. The draft plan should identify the location of Sabetha's wastewater treatment and discharge facility. If the plan is

proposing the removal of water from the basin, then several additional factors must be addressed.

The draft plan should quantitatively project the combined effects of a diversion to Sabetha and evaporative losses from the project. The plan states that Sabetha's supply of .86 MGD could be guaranteed with 98% certainty. If this water would not be returned to the basin via Sabetha, then the draft plan must investigate this loss, combined with evaporative losses, in terms of the impact on both average annual low flow periods and drought of record low flows. Reduced stream flows during low flow periods may seriously affect water quality and aquatic habitat in the watershed and in the Big Nemaha River. Diversion of up to .86 MGD from the watershed may significantly increase chemical concentrations already present in the creek from agricultural runoff. The possibility of further degradation of a supply that already has quality problems must be explored. The draft plan only discusses the improvement expected from reduced sediment yield, but lacks a complete analysis of all water quality effects of the project.

Regulatory issues regarding Kansas and Nebraska state policies for inter-basin water transfer must be addressed in the draft plan. If Sabetha does not return the water to Pony Creek watershed, inclusion of water supply in the multipurpose dam may require additional approval from either or both of the states before construction begins.

The draft plan does not adequately explain Sabetha's current and future demand for additional water or possible alternative sources of supply.

The draft plan should include a thorough description of Sabetha's water supply options. The plan states that water supply would equal 20% of the total project benefits. Since water supply is a significant portion of the proposed project, the draft plan should include a more complete analysis of Sabetha's alternatives. Increasing the number of local wells, or pumping from either the Missouri River or Centralia Lake are the only alternatives mentioned and are not adequately discussed. The city may be able to increase its water supply by dredging Sabetha City Lake to allow for additional storage capacity at a lower incremental cost than the new construction for added supply. Consideration of alternative plans

should not be limited to those that would completely eliminate the projected gap between the city's supply and demand.

The draft plan does not clearly detail Sabetha's current water use requirements, or the rationale or time frame used for future demand projections. The current .37 MGD withdrawal for a population of 2500 with no mention of industrial water consumption would appear, on its face, to be more than adequate. The plan should present more information on consumptive use in Sabetha and ongoing or planned water conservation measures in the city. The projected increase in water use to .93 MGD for Sabetha and surrounding communities has no time reference, and includes no explanation for the projected increase in demand. An explanation of how these figures were calculated, and their validity in terms of population growth or industrial development should be included.

The draft plan should provide more information on how the agricultural water supply benefits were calculated, and how the Separable Costs and Remaining Benefits method was applied to determine the costs and benefits for the multipurpose structure.

The draft plan should clearly explain the terms of payment required of the sponsors. The plan explains how the sponsors' share will be allocated to project costs. However, there is no information about whether payments will be concurrent with project expenditures, or will only begin after project completion.

The draft plan does not adequately develop a nonstructural alternative to the NED proposal.

The only evaluated nonstructural measures in this alternative were converting flood-prone acres to grassland, relocating main roads, and floodproofing a recreation area. This does not constitute a comprehensive nonstructural watershed plan. The NED plan includes a large land treatment component. Possibilities such as the NED land treatment scheme, combined with ongoing conservation measures, should be developed as real alternatives, not dismissed without adequate analysis. A revised plan/EIS should include evaluation of a realistic nonstructural option.

CONCLUSION

The Pony Creek draft watershed plan/environmental impact statement is incomplete. The National Wildlife Federation opposes the project based upon the present level of documentation. We urge that a revised draft plan/EIS be produced to include information currently missing from the initial draft, with appropriate allowance for public review and comment.

Sincerely,

E. R. Osann
Edward R. Osann, Director
Water Resources Program

Jean Battle
Jean Battle
Water Resources Program

cc: J. Michael Jess, Director
Nebraska Department of Water Resources

Ross Manes, President
Kansas Wildlife Federation

Steve Rothenberger, President
Nebraska Wildlife Federation

RESPONSE:

In the Other Problems and Opportunities section reference is made to the Kansas Department of Health and Environment's (KDHE) letter dated March 12, 1987, and a letter in the comments section dated August 29, 1988, addressing the water quality at the Reserve (291) Station on Pony Creek. "The water quality will continue to deteriorate unless corrective action is taken to reduce suspended solids, phosphorus, ammonia, and nitrate as the most significant agricultural non-point sources of pollutants." The land treatment practices in the plan will reduce non-point agricultural runoff on 8,633 acres with 2,525 acres above the six floodwater control dams and the multipurpose dam, 3,628 acres on areas above grade stabilization structures, and 2,480 acres treated with the on-going program.

The land treatment practices and floodwater retarding dams will have a significant effect on the non-point agricultural runoff.

Pony Creek is an ungaged stream and records have not been kept on low and high flows. From U.S.G.S. Open File Report 80-734 "Multiyear Low Flow in Northeast Kansas," the mean annual discharge is 0.45 cubic foot per second per square mile of drainage area. The lowest mean discharge for 12 consecutive months at a recurrence interval of 2 years is 0.3 cubic foot per second per square mile of drainage. For a recurrence interval of 50 years, the discharge is 0.01 cubic foot per second per square mile.

The average annual evaporation is 43 inches per year with average annual precipitation of 36 inches giving a net lake evaporation of 7 inches per year. The normal annual evapotranspiration is 28 inches. Thus, project lakes would cause an additional 15 inches of evaporation than would occur under normal conditions over 302 acres. The 302 acres is .76 percent of the watershed area. The 4,530 acre inches of water lost to evaporation is equal to .11 inch of water over the total watershed. This is not a significant amount of evaporation in a 36-inch rainfall zone.

Terrestrial wildlife habitat is a part of the plan. A list of the aquatic species is included in the Inventory and Forecasting Section of the plan.

Aquatic stream habitat inundated by dams will not be mitigated. However, there will be more opportunities for reservoir fishing with the project. Fishing opportunities will increase as a whole with the project.

A paragraph has been added to the mitigation section discussing stream habitat loss.

The Kansas Water Transfers Act, K.S.A. 82a-1501 et seq., defines water transfers and establishes an application and review procedure to ensure that such transfers are in the public interest. Under this Act, a water transfer is defined as the "diversion and transportation of water in a quantity of 1,000 acre-feet or more per year beneficial use outside a ten-mile radius from the point of diversion of such water."

Following is an estimate of how the City of Sabetha will use the water from Multipurpose Dam No. 3. As the maximum yield of 0.86 mgd is equivalent to 960 acre feet per year, the city will use from the reservoir. The maximum not returned to the basin will be 660 acre feet as 250 acre feet will be used by rural water districts and 50 acre feet as lawn water and other uses in the area of Sabetha that is within the basin boundary. The point of transfer is three miles north and one mile east of Sabetha.

Since neither the amount of water diverted nor the distance of the diversion is great enough to constitute a water transfer as defined in K.S.A. 82a-1501 et seq., an application for approval by the State of Kansas for such diversion would not be necessary.

See last paragraph of Formulation Process in Formulation of Alternatives Section.

A cost analysis was conducted to determine the cost of dredging Lake Sabetha. Dredging the estimated 1,100 acre feet of silt would cost \$14,200,000 compared to the cost of \$1,645,600 to build Multipurpose Dam No. 3. The water quality in the existing lake will continue to be a problem due to the large percentage of cropland drainage area.

The following comments are from the Study of Water Demands Sabetha and ENVIRONS by Novak and Lay, Engineers (Reference 16).

The time frame used for future demand projections is 50 years to the year 2040 with a population of 3,000 people.

The current 0.37 mgd use includes industrial water consumption. The average per capita consumption is 149 gallons per day which includes the industrial use.

The city opened a new industrial park in 1985 with a projected water demand of .09 mgd.

A 104-bed nursing home with 48 apartments constructed plans to add another 200 housing units to their complex which will add an additional 300 residents that was not included in the normal population growth.

There are four rural water districts and five small communities that have indicated a desire to purchase extra water from Sabetha when available. The potential need is 0.33 mgd.

A paragraph has been added at the end of the Cost Section of the Recommended Plan (NED) Section explaining how the Separable Costs and Remaining Benefits Method was applied. There is also a breakdown of costs and benefits in Table 2A in the yellow sheets.

The payments will be concurrent with project expenditures.

A land treatment structural system alternative was considered in the early stages of planning. This alternative did not provide the degree of flood control necessary to effectively address the flood problems in the watershed. The land treatment component was subsequently added to the NED Plan to complement the flood control and erosion control objectives of the sponsors.

Comment noted. All data is on file and available for public review.

August 18, 1988

USDA Soil Conservation Service
760 S. Broadway
Salina, KS 67401

RE: PONY CREEK WATERSHED COMMENT

To Whom it May Concern:

COMES NOW Fred Fulton of Route 1, Box 200B, Weston, Missouri 64098, and makes the following comments concerning the proposed Draft of the Watershed Plan and Environmental Impact Statement for Pony Creek Watershed dated June 1978.

1. I am the owner of a 100% interest in the following described real estate:

The West Half of the Southeast Quarter and the South 41 acres of the East Half of the Southeast Quarter all in Section 19, Township 1, Range 15 East of the 6th P. M., Brown County, Kansas.

Also I am the owner of a 50% interest in the following described real estate:

- a. North Half of the North Half of the Southwest Quarter of Section 30, Township 1, Range 15, Brown County, Kansas,
- b. A portion of the Southeast Quarter of Section 30, Township 1, Range 15 commencing at the Northwest Corner of the Southeast Quarter of Section 30, Township 1, Range 15, Brown County, Kansas, thence running South 35 rods, thence East 23 rods, thence North 35 rods, thence West 23 rods to place of beginning, containing 5 acres, more or less,
- c. A portion of land in the Southwest Quarter of Section 30, Township 1, Range 15 commencing at the Southeast Corner of the North 40 acres of the Southwest Quarter of Section 30, Township 1, Range 15, Brown County, Kansas, thence South 24 rods, thence West 10 rods, thence North 24 rods, thence East 10 rods to place of beginning, containing 1 1/4 acres, more or less, and

d. A Tract of land in the North Half of the Northwest Quarter of the Southwest Quarter of Section 30, Township 1 South, Range 15 East, described as follows: Beginning at a point on the South line 116.1 feet East of the Southwest Corner of said North Half of the Northwest Quarter of the Southwest Quarter; thence Northerly 334 feet to a point 117.5 feet East of the West line of said tract; thence East 15 feet; thence Southerly 334 feet; thence West 15 feet to the place of beginning, in County of Brown, State of Kansas. The above contains .115 acres, more or less.

2. The Watershed project covering the lake and dam on my property will have an adverse environmental impact for the following reasons:

- a. Ever since homestead days my family and predecessors in title have chosen to keep excellent farm bottom land in native prairie and timber. Much of the area to be undated will be good bottom land which remains in its natural pristine state. The family sacrificed income to preserve the natural habitat.
- b. When I was a child my friends and I found Indian arrowheads and other evidences of an Indian campsite. There is a bend in the stream which made an excellent Indian campsite area.

- c. The former Sabatha City dump located in the NE 1/4 1-1-14 which allowed uncontrolled dumping until 1976 has a head water drainage into Pony Creek. We have all seen how waste disposal abusers have dumped toxic substances into uncontrolled dumping facilities. A thorough evaluation of a ground water and run off hazard potential should be made on the property now owned by Keim Transportation and formerly

1

2

3

used as a City dump. I noticed on my trip out west that many towns have been forced to remove all natural former small City dumps due to environmental pollution. La Habra and Whittier, California are examples.

3

d. The current facility provides excellent game habitat. It is home to nests of rare prairie chickens. Once I spotted what I thought was a whooping crane on its annual migration from Canada.

4

3. The proposed confiscation of my land will have an adverse financial impact on me and my family. I am married with three children. These farms provide a place for the children to enjoy the benefits of nature uninhibited by damage done by man. I can not replace the unique land with other land of such historical background and family history.

5

4. The confiscation of land will give the government and/or City of Sabetha the right to run a municipal water and recreation facility. See page 61 of the proposed draft. The City denies it will use the land for recreation purposes. This is an example of failure to get stories straight. The City will make money in its water fund from the lake water. Further it will make money for recreation purposes. It is not fair to me to be forced to leave my land so the City can make money.

5

Further the limestone on my property is planned to be used to line the outflows of other dams. This limestone

increases the value of my land.

5. In the past geologists have speculated that oil and minerals are under my land. There are currently producing oil wells within several miles of my properties. The City and Watershed would confiscate my future rights to oil.

5

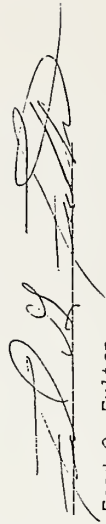
6. The report states the content of the water supply for the City of Sabetha will improve by a new dam. Farmers will dump the same agricultural chemicals around the old dam as well as around the new dam. The quality and quantity of pollutants probably are more toxic and more hazardous around the proposed dam because more property is farmed in the drainage basin.

6

7. Why should the City of Sabetha and others be able to sell water at a profit from a dam whose lake confiscates my property? It is not fair to me to have my properties taken to support this business activity.

5

8. Currently 22 acres of my farm is in the ten year farm program. I am paid \$65.00 per acre per year. This money must be returned if the land is sold or taken. This would put a burden on me.



Fred G. Fulton

RESPONSE:

The natural pristine state of the native prairie and timber is questionable since a resource inventory of the area shows timber harvesting occurred in the past and bottomland fields are currently planted to brome grass. Brome grass is not native grass; it is an introduced cool season grass that has been planted on areas that have been cropped.

Your knowledge of habitation of the area by past cultures is substantiated by the Kansas State Historical Society. Four archeological sites were located in the vicinity of the reservoir. One of the sites will be inundated at normal pool, two of the sites will be inundated at maximum pool, and the fourth site is above the maximum pool.

It has been determined that the reservoir will not adversely affect three sites and the remaining one site does not have archeological resources of significant value.

During construction if an archeological site is found, construction will be halted or moved from the affected area. The National Park Service and State Historic Preservation Officer will be contacted to evaluate the site and decide if it should be preserved or, if of no value, allow construction to resume.

Keim Transportation rehabilitated the dump site and uses it as a truck terminal. The runoff from the area flows through three ponds that have fish and wildlife activity. A field reconnaissance of the area downstream from the dump shows no evidence of harmful leaching to the surface water or groundwater.

A team of biologists from the U.S. Fish and Wildlife Service, Kansas Department of Wildlife and Parks, and the Soil Conservation Service walked the area to be inundated with water on your land. Wildlife habitat losses due to dam construction were determined from this assessment. A mitigation plan to compensate for the habitat losses was developed. That plan is included in Appendix C of the plan.

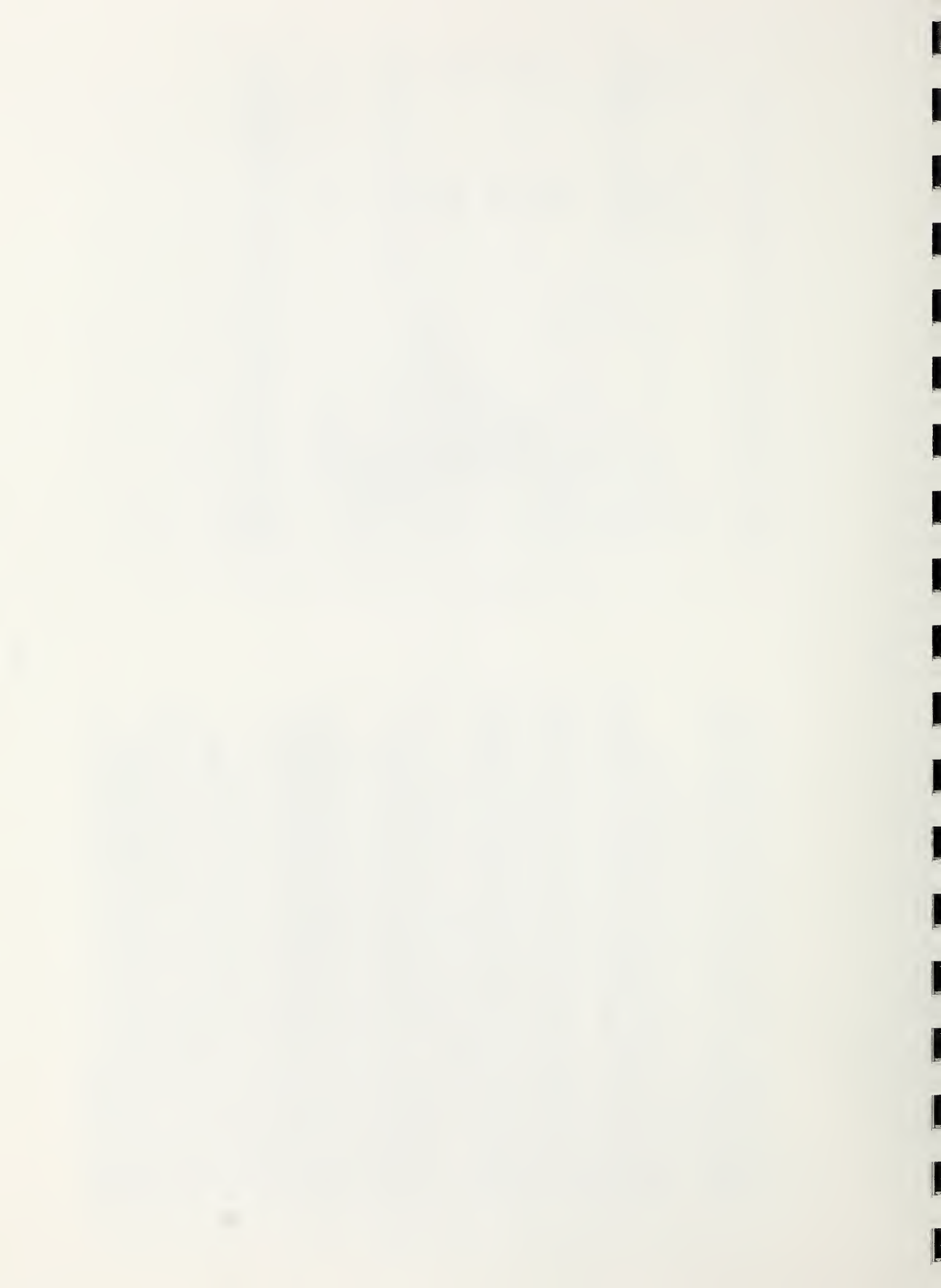
The provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 provide for compensation of land taken for public use.

The city and the watershed district as legal entities of government in the State of Kansas have the right of eminent domain as prescribed by the statutes of the State. The right allows such an entity to obtain property for the purpose of installing public utilities. Mineral rights and Conservation Reserve Program payments, if applicable, may be included in the agreement for land rights compensation.

Novak and Ley Engineers/Surveyors of Hiawatha, Kansas, made a survey of the existing Lake Sabetha and Multipurpose Dam No. 3. Their findings are as follows:

Parameter	Lake Sabetha	Site No. 3
1. Drainage Area	9.44 sq.mi.	6.51 sq.mi.
2. Surface Area - Water Supply	118 acres	158 acres
3. Maximum Depth	12 feet	55 feet
4. Average Depth	6.2 feet	17.9 feet
5. Water Supply Storage Volume	737 ac.ft.	2267 ac.ft.
6. Total Lake Volume	737 ac.ft.	4468 ac.ft.
7. Water Supply Capacity Equivalent in Inches or Runoff over Drainage Area	1.46 in.	6.53 in.
8. Contributing Flows from Springs	0 gpm	33 gpm
9. Drainage Area Use:		
a. Cropland	70%	43%
b. Grassland	26%	40%
c. Municipal	0%	7%
d. Woodland/Other	4%	10%
10. Livestock Operations		
a. Number of Lots	11	15
b. Number of Animals	3000	1900
c. Animals Per Square Mile	320	290
11. Area Under Soil Conservation Practices	100%	93%
12. Primary Soils Group of Watershed		
a. Small Lakes	0	2
b. Large Ponds	15	6
c. Small Ponds	0	18
13. Other Water Storage in the Watershed		
a. Small Lakes	0	2
b. Large Ponds	15	6
c. Small Ponds	0	18

The overall quality of the water in the new reservoir will be better because the drainage area above the new reservoir has 1,790 acres of cropland compared to the 4,230 acres of cropland above Lake Sabetha. The land treatment will be at a level of 95 percent before the new reservoir is built.

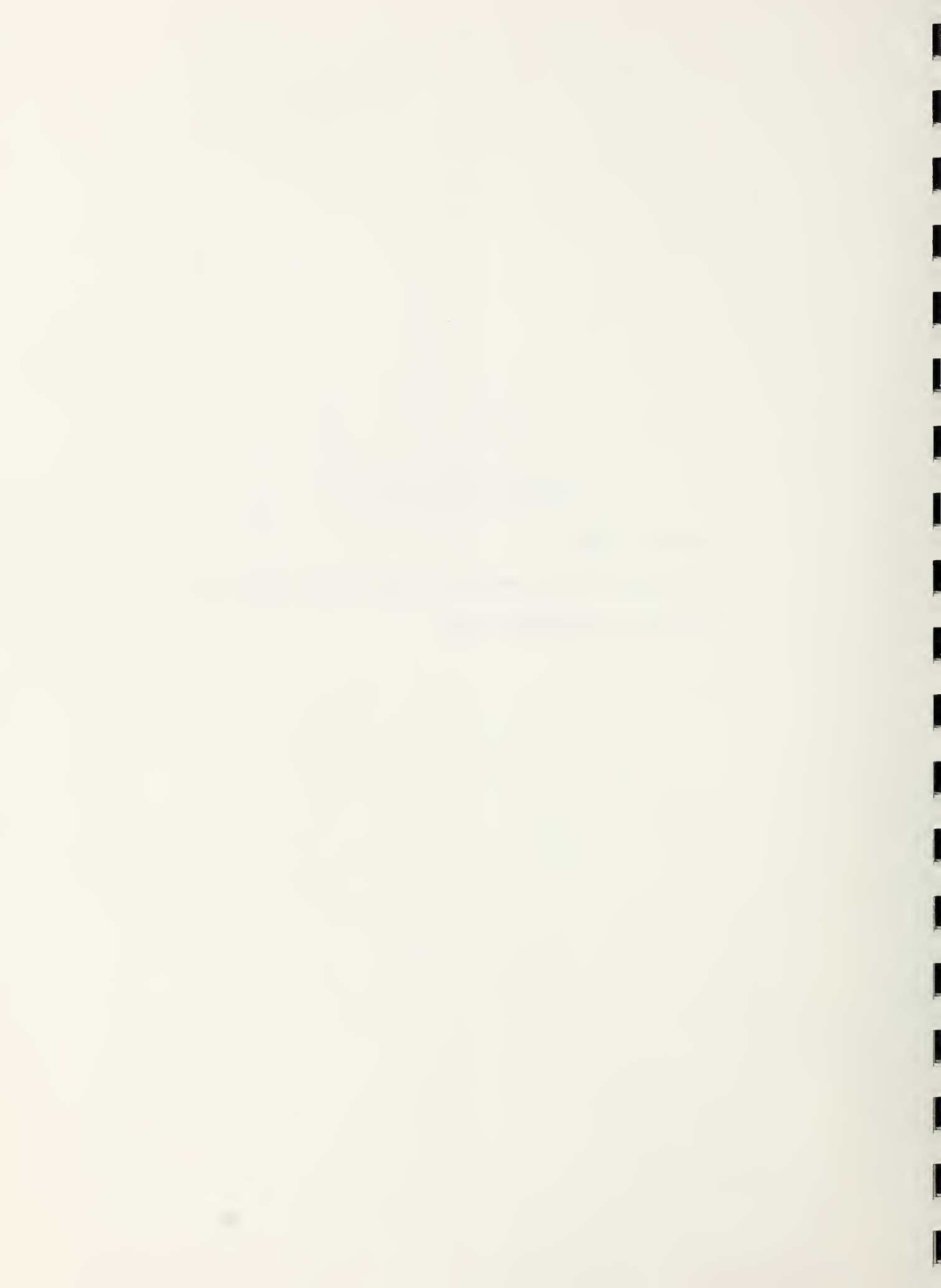


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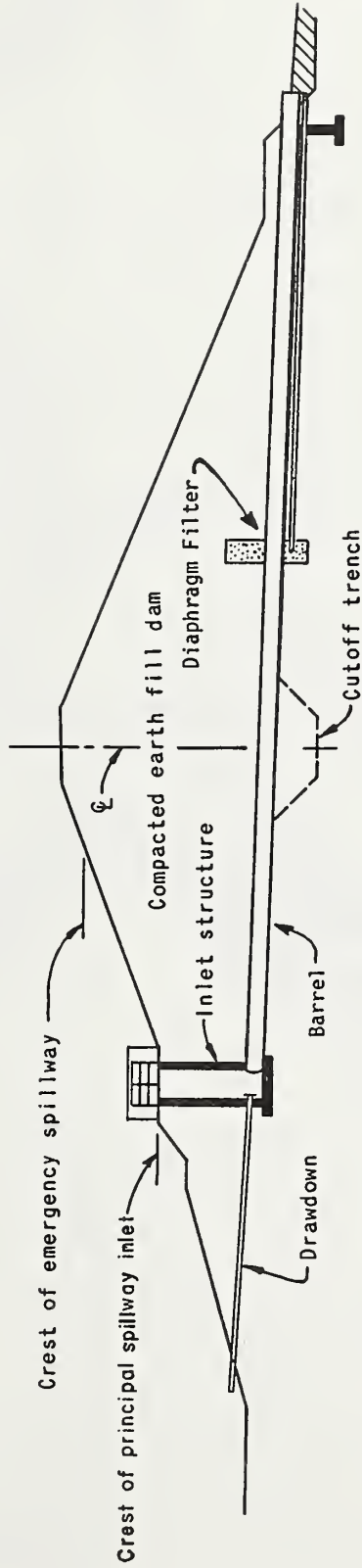
Support Maps

Typical Earth Dam with Drop Inlet Spillway

Breach Inundation Map



TYPICAL EARTH DAM WITH DROP INLET SPILLWAY

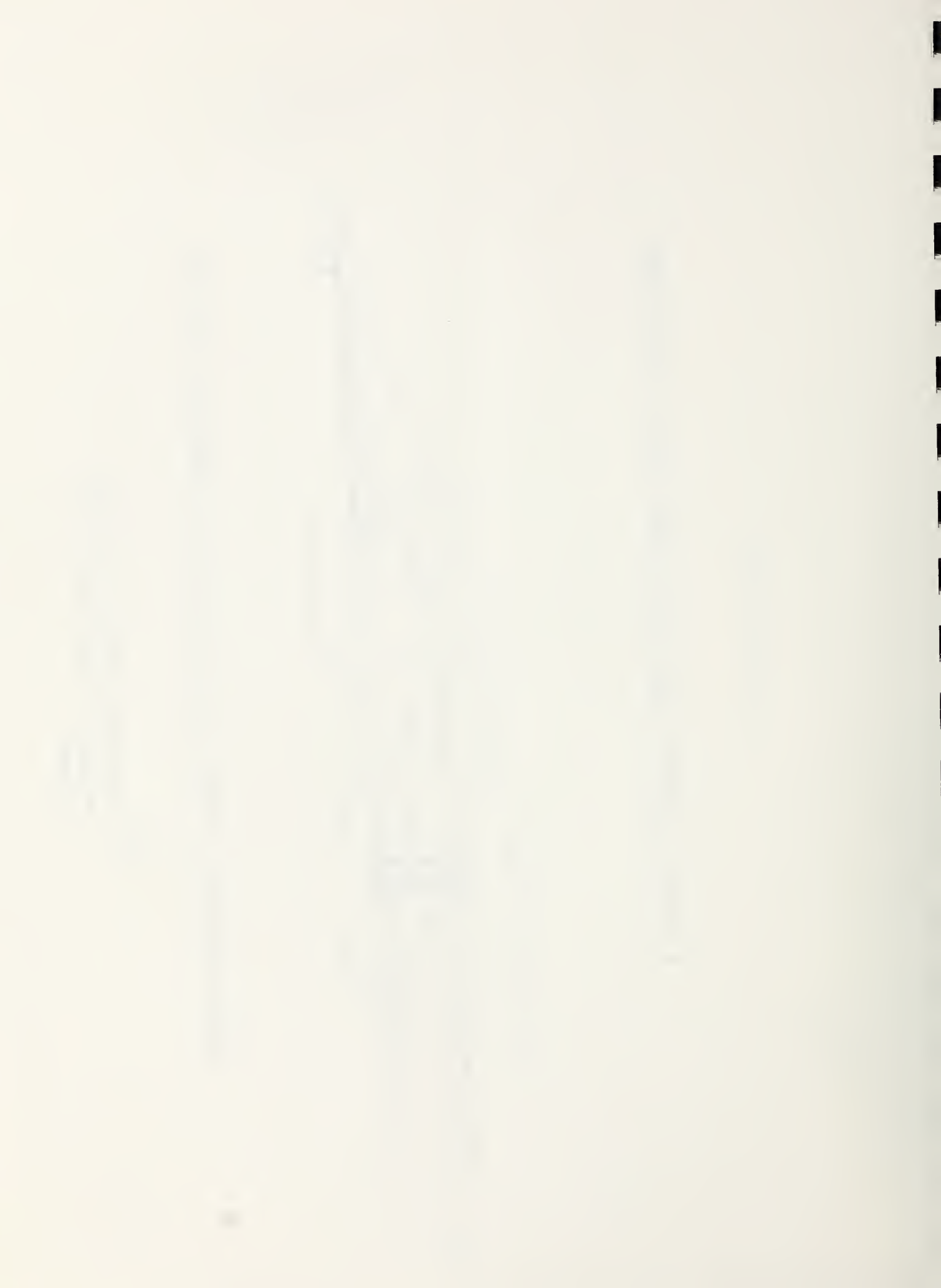


B-1

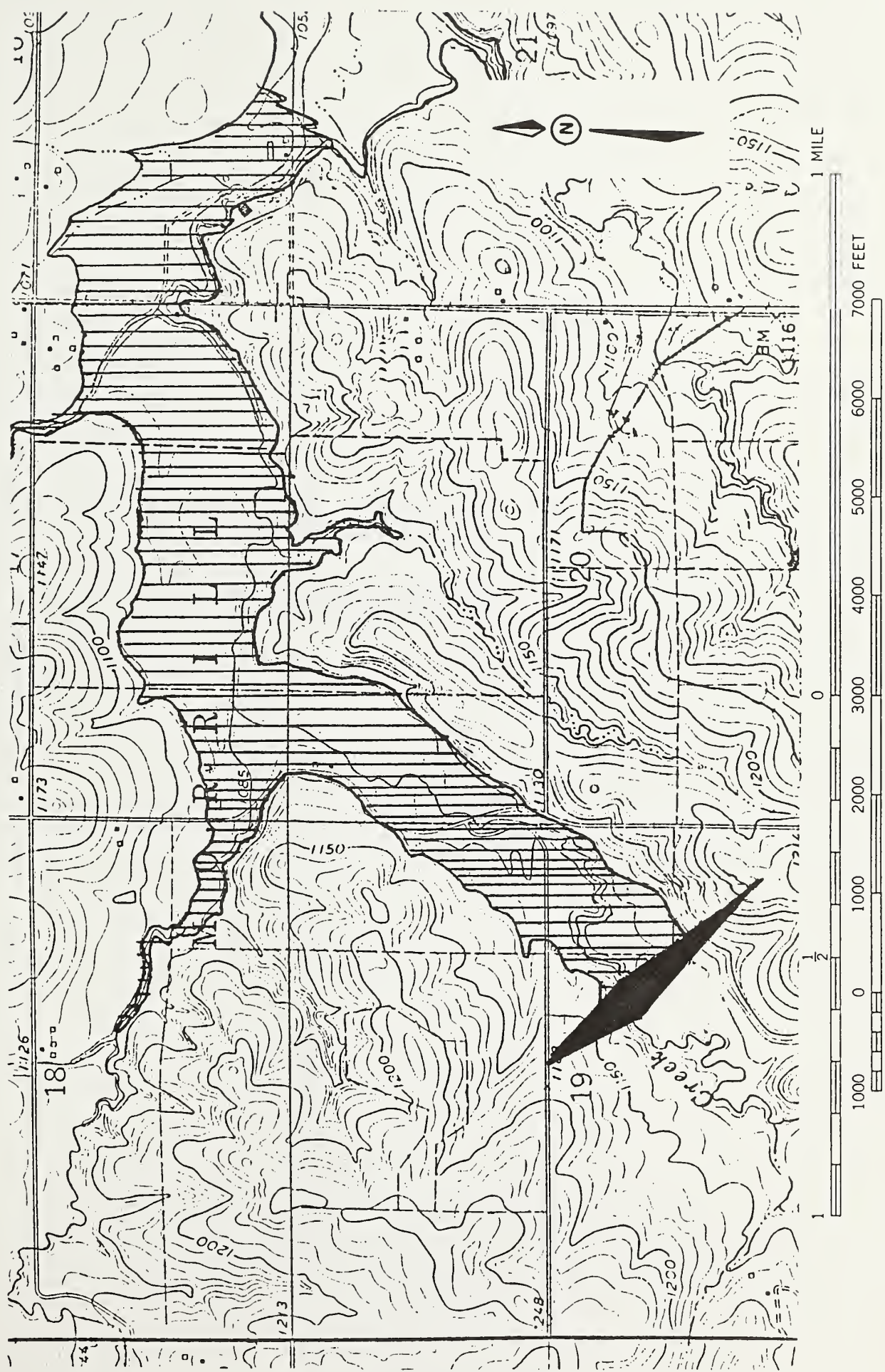
CROSS SECTION OF DAM ON CENTERLINE OF PRINCIPAL SPILLWAY

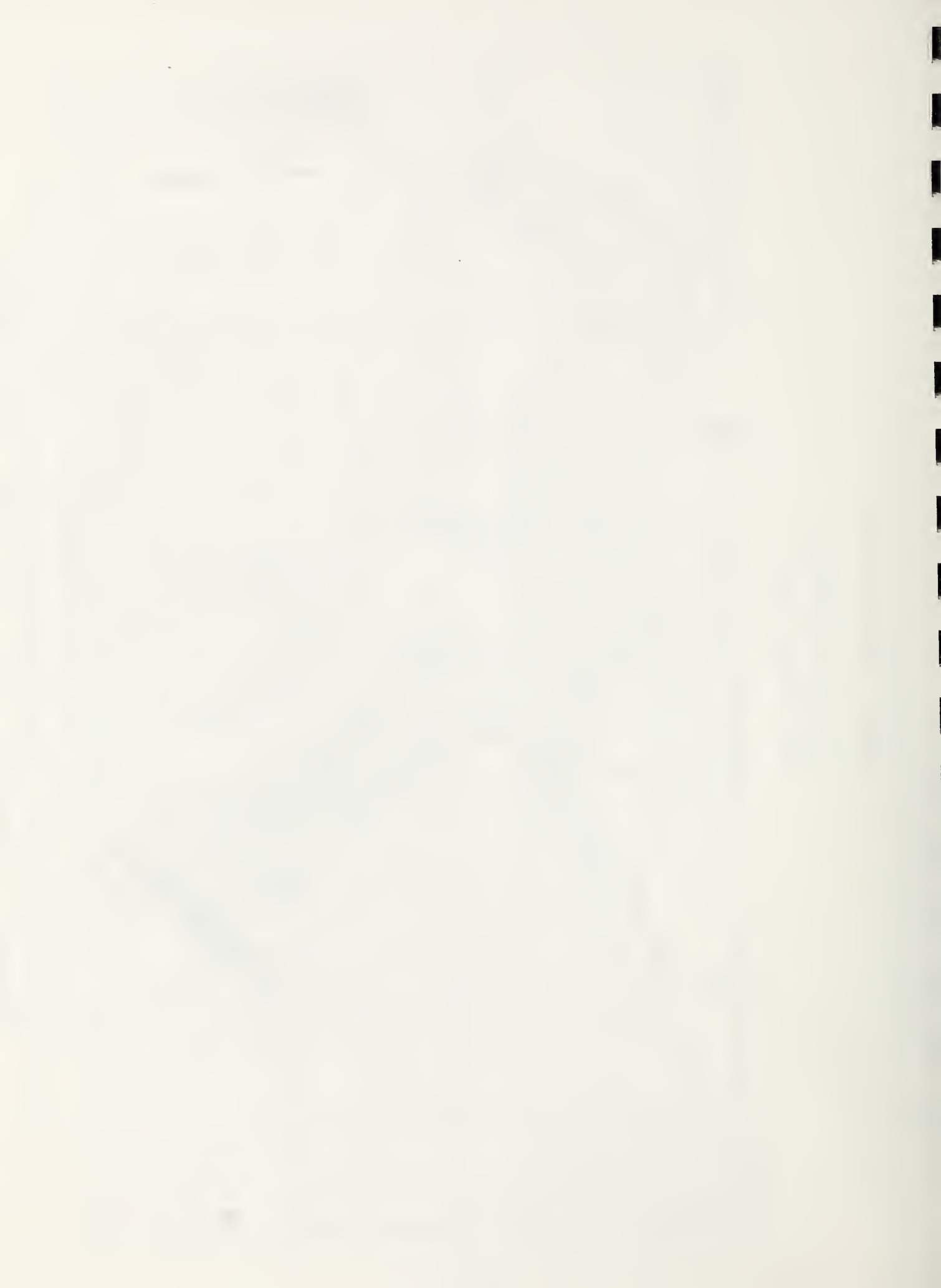
NOTES:

1. FOR INDIVIDUAL STRUCTURE DATA SEE TABLE 3.
2. EMBANKMENT AND FOUNDATION DESIGN FEATURES NOT SHOWN.



BREACH INUNDATION MAP
PONY CREEK WATERSHED
MULTIPURPOSE DAM NO. 3





A P P E N D I X C

Supporting Information

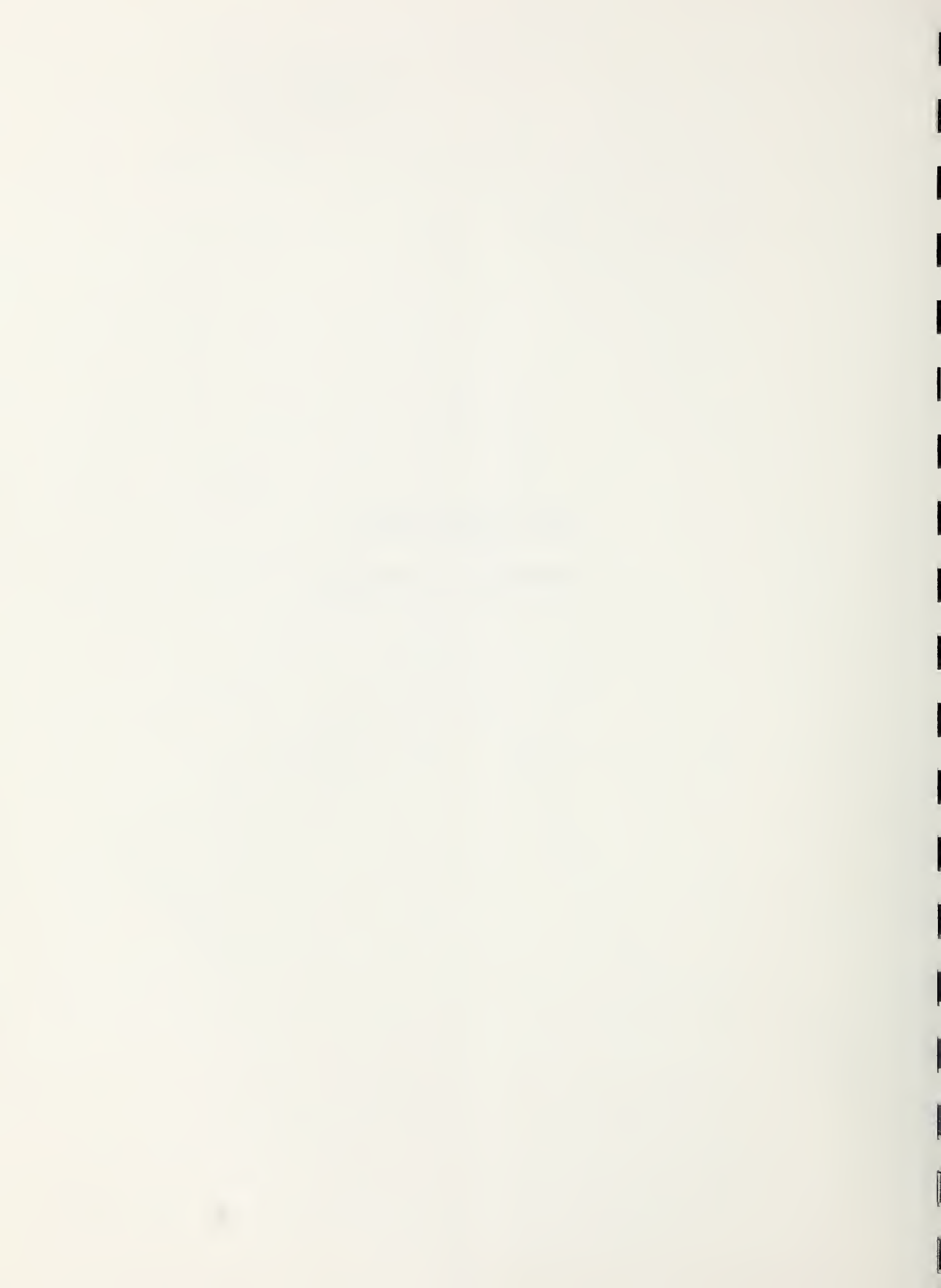


TABLE I
PUBLIC WATER SUPPLY^{a/}

City	Bendena	Denton	Denton	Denton	Everest	Hiawatha	Leona	Robinson
Well No.	2	2	3	3	5	1	1	7
Location	NE $\frac{1}{2}$ SE $\frac{1}{4}$ S33, T3S, R20E	NE $\frac{1}{4}$ S10, T4S, R19E	NE $\frac{1}{4}$ S10, T4S, R19E	SE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ S6, T5S, R18E	SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ S32, T1S, R17E	SE $\frac{1}{4}$ S18, T3S, R19E	NW $\frac{1}{4}$ NW $\frac{1}{4}$ S28, T2S, R18E	
Date Collected	5-11-73	3-28-78	9-28-67	2-21-61	7-17-62	6-21-76	12-1-77	
Total Alkalinity (as CaCO ₃)	132 mg/l	186 mg/l	188 mg/l		118 mg/l	210 mg/l	166 mg/l	
Alkalinity (NaHCO ₃)		0 mg/l						
Total Dissolved Solids	353 mg/l	353 mg/l	268 mg/l	346 mg/l	282 mg/l	210 mg/l	192 mg/l	
Total Hardness (as CaCO ₃)	256 mg/l	256 mg/l		244 mg/l	220 mg/l	124 mg/l		
Hardness - Carbonate	186 mg/l	186 mg/l		0 mg/l	18 mg/l	6 mg/l		
Hardness - Noncarbonate	70 mg/l	70 mg/l		7.8	7.4	7.4		
pH	6.7	8.0		620	490			7.7
Specific Conductance		600				290		
Turbidity (NTU)		0.2				0.9		
Bicarbonate (HCO ₃)		227 mg/l		325 mg/l	268 mg/l	144 mg/l		
Calcium (Ca)		83 mg/l		65 mg/l	74 mg/l	42 mg/l		54 mg/l
Carbonate (CO ₃)		<0.1 mg/l				0.1 mg/l		
Chloride (Cl)	31 mg/l	24 mg/l	24 mg/l	7 mg/l	7 mg/l	1 mg/l		10 mg/l
Magnesium (Mg)		12 mg/l		20 mg/l	13 mg/l	4.7 mg/l		14 mg/l
Nitrate (N)	45 mg/l	8.1 mg/l	66 mg/l (NO ₃)	22 mg/l (NO ₃)	15 mg/l (NO ₃)	19 mg/l (NO ₃)		6.2 mg/l
Potassium (K)		0.8 mg/l				0.9 mg/l		
Sodium (Na)		16 mg/l		31 mg/l	8.3 mg/l	15 mg/l		14 mg/l
Sulfate (SO ₄)		45 mg/l	50 mg/l	16 mg/l	13 mg/l	24 mg/l		18 mg/l
Iron (Fe)		0.01 mg/l	0.30 mg/l	0.02 mg/l	0.08 mg/l	0.10 mg/l		0.15 mg/l
Manganese (Mn)		<0.01 mg/l	<0.01 mg/l			<0.01 mg/l		0.05 mg/l
Total Phosphorus (P)		0.09 mg/l	23 mg/l (PO ₄)			0.15 mg/l (PO ₄)		
Silica (SiO ₂)		24 mg/l				26 mg/l		
Arsenic (AS)		<0.01 mg/l						
Barium (Ba)		0.1 mg/l						
Cadmium (Cd)		<0.001 mg/l						
Chromium (Cr)		<0.01 mg/l						
Copper (Cu)		<0.01 mg/l						
Fluoride (F)		0.25 mg/l	0.8 mg/l	0.3 mg/l	0.2 mg/l	1.0 mg/l		0.4 mg/l
Lead (Pb)		<0.01 mg/l						
Mercury (Hg)		0.002 mg/l						
Selenium (Se)		0.003 mg/l						
Silver (Ag)		<0.01 mg/l						
Zinc (Zn)		0.01 mg/l						

^{a/} Kansas Department of Health and Environment, communication by letter, 1979

Table II - Summary of Agricultural Pesticides Found at Selected Water Quality Monitoring Sites. a/

Location	Alachlor (Lasso)	Atrazine	Metolachlor (Dual)	Metribuzin (Sencor) (Lexon)	Propachlor (Ramrod)	2,4-D
Pony Creek stn 291	*	2/7 0.286	1/7 0.143	*	*	*
Wolf R. stn 201	4/9 0.444	3/9 0.333	2/5 0.40	2/7 0.286		4/8 0.50
S.F. Nemaha stn 234	2/7 0.286	3/8 0.375	2/5 0.4	2/7 0.286	1/7 0.143	1/6 0.167
Walnut Cr. stn 292	1/7 0.143	2/7 0.286	*	*	*	*
Delaware R. stn 103	*	1/5 0.2	*	*	*	1/5 0.2
Kansas R. stn 260	*	10/11 0.909	3/8 0.375	*	*	*
Kill Cr. stn 253	*	1/10 0.1	*	*	*	1/9 0.111
Cottonwood R. stn 275	*	*	*	*	*	*

Notes"

(Lasso) - Commercial Name

* - No pesticides have ever been found in concentrations which exceed detection level.

└─ Number of times pesticide found in concentration exceeding detection level.

2/7: Find Ratio

└─ Number of samples analyzed for pesticides 0.286 decimal equivalent of Find Ratio - representing the likelihood a given pesticide will be found at the sampling site.

a/ Letter from Donald D. Snethen, P.E., Chief, Water Quality Assessment Section, Kansas Department of Health and Environment, State of Kansas, dated March 12, 1987

TABLE III

COMPARISON OF WATER QUALITY PARAMETERS
FROM PONY CREEK AND OTHER LOCAL AND "CONTROL" AREAS^{a/}

All data are mean values for the period of record (1975 to June 1986)

LOCATION	TOTAL PHOS. (mg/l)	TOTAL AMMONIA NITROGEN (mg/l)	NITRITE/ NITRATE/ NITROGEN (mg/l)	TURB- IDITY (NTU)	BOD (mg/l)	FECAL COLI- FORM (#/100 ml)	FECAL STREP (#/100 ml)	MBI ^{b/}
<u>PLANNING AREA</u>								
Pony Cr. (near Reserve)	0.34	0.17	4.5	119	2.3	9,762	22,089	na
<u>LOCAL AREA</u>								
Walnut Cr. (at Reserve)	0.39	0.21	3.5	109	2.6	3,584	13,272	na
Wolf River (near Sparks)	0.52	0.20	4.0	187	2.5	12,307	26,014	4.81
South Fork Nemaha (at Bern)	0.52	0.21	1.6	161	2.8	15,857	23,709	5.02
Delaware River (at Muscotah)	0.34	0.08	1.6	106	2.2	4,892	15,259	4.51
<u>CONTROL AREAS</u>								
Kansas R. (at Wamego)	0.33	0.16	1.0	103	2.2	2,213	3,453	4.33
Cottonwood R. (at Plymouth)	0.17	0.11	0.7	55	2.6	1,676	4,153	4.29
Kill Cr. (at DeSoto)	0.22	0.23	1.0	47	2.9	3,556	8,904	na

a/ Letter from Donald D. Snethen, P.E., Chief, Water Quality Assessment Section, Kansas Department of Health and Environment, State of Kansas, dated March 12, 1987

b/ MBI Macroinvertebrate biotic index - a numerical index ranging from 1.5 to 11 that combines the organic pollution tolerance of benthic organisms which estimates community structure to determine the general relationship of these benthic communities to water quality. Lower index numbers indicate higher quality water.

TABLE IV

WILDLIFE HABITAT UNITS FOR WATERSHED LAND COVER

Pony Creek Watershed

Land Cover	Rated Habitat Unit Average Value	Total Habitat Units					
		Present Acres	Habitat	Future Without Project Acres	Habitat	Future With Project Acres	Habitat
HERBACEOUS							
Cropland	2.5	29,840	74,600	29,380	73,450	28,880	72,200
Grassland	3.0	5,645	16,940	6,000	18,000	6,250	18,750
Compensation	-	-	-	-	-	41	410
Total Herbaceous		35,485	91,540	35,380	91,450	35,171	91,360
Forestland	5.7	2,120	12,080	2,080	11,860	2,060	11,740
Compensation	-	-	-	-	-	-	960
Total Forestland		2,120	12,080	2,080	11,860	2,060	12,700
AQUATIC							
Streams	7.3	580	4,230	580	4,230	575	4,200
Flatwater (Pond Lake)	4.4	160	700	180	790	525	2,310

TABLE V

WILDLIFE HABITAT UNIT LOSS FOR FLOODWATER AND MULTIPURPOSE STRUCTURES
BEFORE COMPENSATION

Site No.	Planned Dam & Sed. Spwy. Pool	Acreage	Cropland		Pastureland		Rangeland		Riparian Forestland		Upland Forestland		Bank Zones		Water Zones		H.U. Potential in Dam & Spillway
			H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	H.U. Acres	
3	11.2	164	65.0	235.5	18.0	54.0	2.0	8.0	74.0	555.0	10.5	63.0	3.4	16.4	2.3	14.6	112
5	3.0	17	4.5	13.5	9.5	28.5	-	-	5.0	21.3	-	-	.8	1.9	.2	.7	30
18	3.0	11	5.0	9.2	3.0	9.0	-	-	5.0	29.7	-	-	.6	3.2	.3	1.9	30
33	3.0	23	7.0	24.1	17.7	20.7	-	-	-	-	-	-	.9	1.6	.4	1.7	30
42	3.0	20	14.5	31.4	-	-	-	-	7.1	50.4	-	-	1.0	5.5	.4	2.4	30
94	8.0	20	6.5	18.4	10.5	33.3	-	-	9.9	54.5	-	-	.8	1.4	.4	2.0	80
96	10.0	47	35.0	145.8	-	-	-	-	18.8	132.2	-	-	1.9	11.8	1.3	7.6	100
Total	41.2	302	137.5	477.9	58.7	145.5	2.0	8.0	119.8	843.1	10.5	63.0	9.4	41.8	5.3	30.9	412

June 1988

TABLE VI
WILDLIFE HABITAT COMPENSATION ALTERNATIVES

Site Number	Habitat Units Lost		Habitat Units to be Compensated		Alternative 1		Alternative 2 ^a		Net Change (Habitat Units)
	Forestland	Herbaceous	Forestland	Herbaceous	Acres to be Revegetated	Forestland	Herbaceous	Est. Acres to be Preserved	
3	649.0	297.5	649.0	112.0	129.8	11.2	150.9	4.3	- 185.5 H
5	23.9	42.0	23.9	30.0	4.8	3.0	5.6		- 12.0 H
18	34.8	18.2	34.8	30.0	7.0	3.0	8.1		+ 11.8 H
33	-	48.1	-	30.0	-	3.0	-		- 18.1 H
42	58.3	31.4	58.3	30.0	11.7	3.0	13.6		- 1.4 H
94	57.9	51.7	57.9	80.0	11.6	8.0	12.0		+ 28.3 H
96	151.6	145.8	151.6	100.0	30.3	10.0	35.3		- 45.8 H
Total	975.5	634.7	975.5	412.0	195.2	41.2	225.5		- 222.7

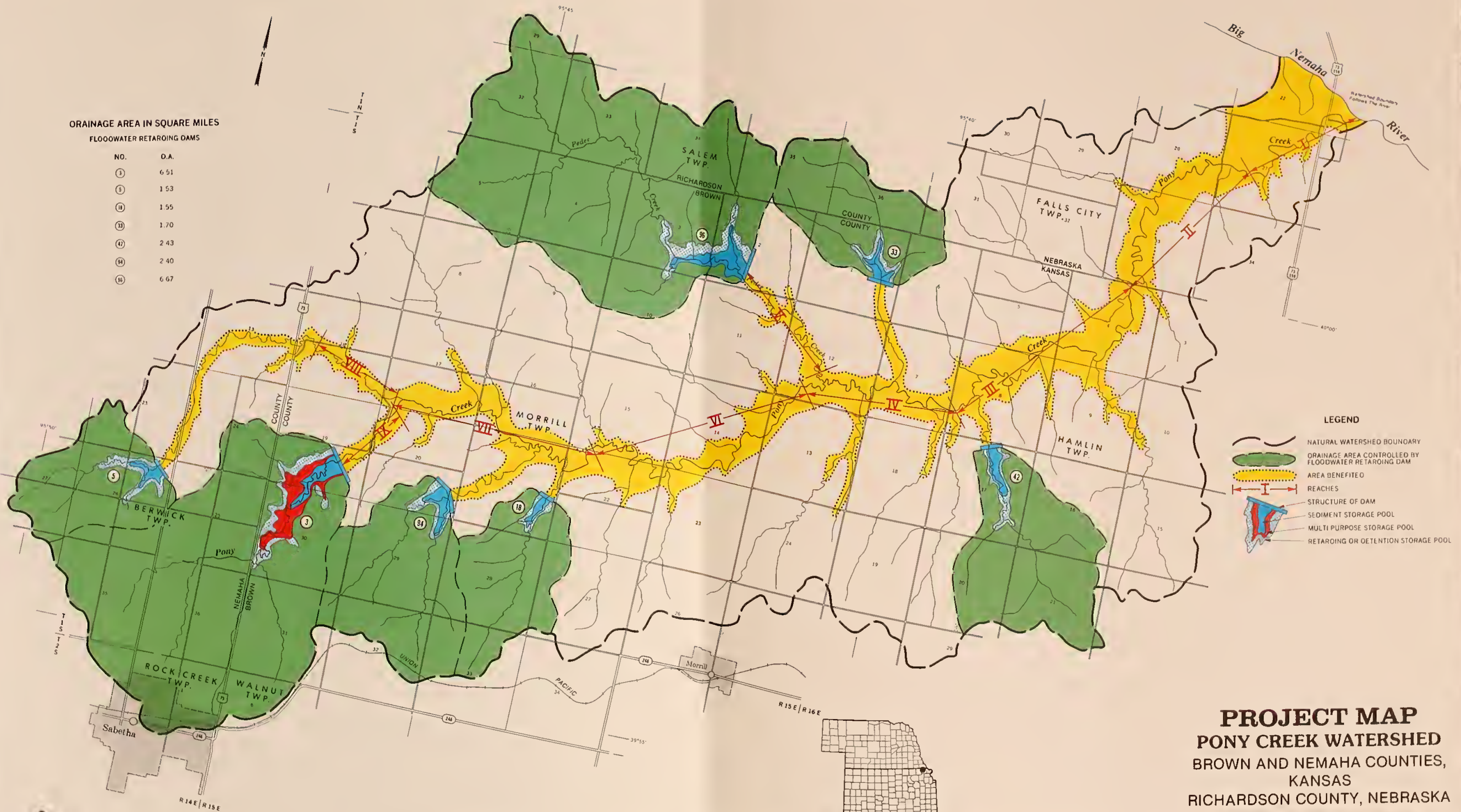
a/ Either Alternative 1 or Alternative 2 will compensate for all losses on the site. A combination of the two alternatives may be expected to compensate for all losses

A P P E N D I X D

Project Map

**ORAINAGE AREA IN SQUARE MILES
FLOODWATER RETAROING DAMS**

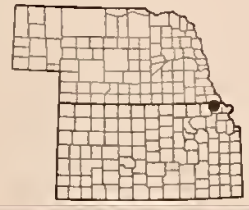
NO.	O.A.
①	6.51
⑤	1.53
⑩	1.55
⑬	1.70
⑭	2.43
⑯	2.40
⑳	6.67



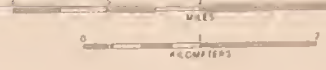
LEGEND

- NATURAL WATERSHED BOUNDARY
- DRAINAGE AREA CONTROLLED BY FLOODWATER RETAROING DAM
- AREA BENEFITED
- REACHES
- STRUCTURE OF DAM
- SEDIMENT STORAGE POOL
- MULTI PURPOSE STORAGE POOL
- RETAROING OR DETENTION STORAGE POOL

**PROJECT MAP
PONY CREEK WATERSHED
BROWN AND NEMAHA COUNTIES,
KANSAS
RICHARDSON COUNTY, NEBRASKA**



VICINITY MAP



SOURCE
BASE MAP COMPILED FROM 1:24,000 USGS
QUADRANGLES, COUNTY HIGHWAY MAPS AND
INFORMATION FROM SCS FIELD PERSONNEL
POLYCONIC PROJECTION

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