# ENVIRONMENTAL QUALITY INCENTIVES PROGRAM
# AGRICULTURE WATER ENHANCEMENT PROGRAM
# FISCAL YEAR 2009

RSI-2041

*Submitted to*

USDA Natural Resources Conservation Service
AWEP Proposals
Financial Assistance Programs Division, Room 5241-S
1400 Independence Avenue, SW
Washington, DC 20250

*Submitted by*

Belle Fourche River Watershed Partnership
1839 5th Avenue
Belle Fourche, South Dakota 57717

April 2009

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# 1.0 PARTNERSHIP CAPACITY

## 1.1 COMMITMENT BY THE PARTNER TO THE LONG-TERM CONSERVATION OF SURFACE AND GROUNDWATER OR WATER-QUALITY IMPROVEMENT

The Belle Fourche River Watershed Partnership (BFRWP) is cooperating with the Cheyenne River Watershed Partnership (CRWP) to submit this comprehensive soil- and water-quality Best Management Practices (BMP) implementation project proposal. Because of the extensive past experience of the BFRWP on the type of project being proposed, along with the fact that the CRWP was formed in response to a Total Maximum Daily Load (TMDL) assessment being completed in the South Dakota portion of the Cheyenne River, the BFRWP will act as the project lead. Both organizations are committed to the long-term health of the natural resources within their individual watersheds.

The BFRWP developed and implemented an assessment project to determine the TMDL for the Belle Fourche River. The project started in April 2001. The purpose of the assessment was to: (1) assess the current physical, chemical, and biological integrity of the Belle Fourche River and its tributaries; (2) determine the sources of total suspended solids (TSS) in the Belle Fourche River Watershed; and (3) define management prescriptions for identified nonpoint source critical areas in the watershed. The draft TMDL was completed in 2003 and approved by the U.S. Environmental Protection Agency (EPA) in 2005. The TMDL report includes two waterbodies, the Belle Fourche River and Horse Creek. The TMDL approved by EPA addresses a cluster of TMDLs.

The Belle Fourche River is identified in the 1998 and 2002 *South Dakota 303(d) Waterbody Lists* and the 2004 and 2006 *Integrated Report for Surface Water Quality Assessment* (IR) as impaired because of elevated TSS concentrations. According to the 2006 IR, the Belle Fourche River from the Wyoming border to the Cheyenne River, South Dakota, failed to support its assigned uses because of high TSS concentrations. In the report, agricultural activities were listed as a likely source of occasional impairment. This report also states that a natural source of TSS may be the erosion of exposed shale beds that lie along the river and its tributaries. The 2008 IR shows all segments of the Belle Fourche River, with the exception of one, were delisted after water-quality standards for TSS were met.

Horse Creek was listed in the 1998 impaired waterbody list for total dissolved solids (TDS) that was later determined to be a listing error. The Horse Creek listing was corrected to conductivity during 2002. During this assessment, approximately 10 percent of the samples collected from Horse Creek exceeded the water-quality standard for TSS. The 2008 IR lists Horse Creek as nonsupporting for conductivity and delisted for TSS. The TMDL report for Horse Creek includes both TSS and conductivity.

Implementation of the BMPs recommended in the Belle Fourche River TMDL began in 2004. The first year of implementation included funding from local ranchers and farmers, BFRWP, Lawrence County, Belle Fourche Irrigation District (BFID), Wyoming Department of Environmental Quality (WY DEQ), National Resources Conservation Service (NRCS), Corps of Engineers, Bureau of Reclamation, and the U.S. Geological Survey (USGS). Two products of the project were the *Ten-Year Belle Fourche River Watershed Strategic Implementation Plan* (10-Year Plan) and the *Belle Fourche Irrigation District Water Conservation Plan* (5-Year Plan). These two plans outline the work that will be completed in the watershed during the next several years to meet the TMDLs. In the reports, the associated TSS and nonused water savings are presented for each BMP planned.

The BFRWP is about to enter its fourth funding segment of implementation. Tables 1-1 and 1-2 outline the amount of BMPs implemented as of October 2008 and the number planned to be installed from the 10-Year Plan. Segment I and Segment II were completed on schedule and within budget. Segment III is on schedule for completion in June 2009 and within budget.

**Table 1-1. Best Management Practices Installed and Scheduled Above the Belle Fourche Reservoir**

| BMP | Amount Implemented October 08 | Amount Scheduled From 10-Year Plan |
|---|---|---|
| Flow Automation Units (Gates) | 2 | 2 |
| Upgraded Water Card and Water Order System | Phase III | Three Phases |
| Portable Stage/Flow Measuring Devices | 0 | 3 |
| Real-Time Stage Flow Measuring Devices | 1 | 3 |
| Alternative Keyhole Water Delivery Study | 0 | 1 |
| Alternative Keyhole Water Supply Method | 0 | 1 |
| Nonused Water Storage Pond | 0 | 1 |
| Inlet Canal Lining | 5,960 | 10,560 |
| Pipeline Projects Delivering Water to Fields | 6,532 | 500 |
| Irrigation Sprinkler Systems | 4 | 2 |
| Scheduling of Irrigation Water | 1 | 1 |
| Managed Riparian Grazing | 13,033 | 14,750 |
| Public Meetings | 24 | 40 |
| Project Tours | 6 | 8 |

**Table 1-2. Best Management Practices Installed and Scheduled Below the Belle Fourche Reservoir**

| BMP | Amount Implemented October 2008 | Amount Scheduled From 10-Year Plan |
|---|---|---|
| Flow Automation Units (Gates) | 25 | 40 |
| Upgraded Water Card and Water Order System | Phase III | Three Phases |
| Portable Stage/Flow Measuring Devices | 6 | 12 |
| Real-Time Stage Flow Measuring Devices | 8 | 12 |
| Line Open Canals and Laterals | 2,640 | 16,000 |
| Replace Open Canals and Laterals With Pipelines | 5,488 | 25,000 |
| Nonused Water Storage Pond | 0 | 2 |
| Pipeline Projects Delivering Water to Fields | 27,407 | 8,500 |
| Irrigation Sprinkler Systems | 14 | 34 |
| Scheduling of Irrigation Water | 1 | 1 |
| Managed Riparian Grazing | 7,412 | 19,250 |
| Public Meetings | 24 | 40 |
| Project Tours | 6 | 8 |

The BMPs installed to date have resulted in an estimated 45 milligrams per liter (mg/l) above the reservoir and 83.6 mg/l below the reservoir for a total of 128 mg/l reduction in TSS. The goal of the 10-Year Plan was to reduce TSS by 357 mg/l, including 249 mg/l above and 108 mg/l below the reservoir. A reduction of 128 mg/l translates to 36 percent achievement of the goal since the project was initiated.

## 1.2 ABILITY TO COORDINATE WATER-QUALITY AND QUANTITY EFFORTS AMONG AGRICULTURAL PRODUCERS

The Belle Fourche River Watershed Partnership has distributed over $773,000 to over 50 different producers to install rangeland and irrigation conservation practices within the watershed in 2007 and 2008. Table 1-3 describes the type and amount of conservation practice installed. These practices are merely the ones funded by EPA 319 funds through the South Dakota Department of Natural Resources (SD DENR) and do not include those installed by NRCS district offices through any of their programs, such as the Environmental Quality

Incentives Program (EQIP) or Wildlife Habitat Incentives Program (WHIP). BFRWP staff has worked hand-in-hand with area office NRCS staff to locate eligible cooperators in need of financial and technical assistance.

**Table 1-3. Conservation Practices Installed in the Belle Fourche River Watershed**

| Practice Installed | Amount |
|---|---|
| Pipeline (516) | 237,000 (LF) |
| Watering Facility (614) | 48 (No) |
| Water Well (642) | 8 (No) |
| Pumping Plant (533) | 9 (No) |
| Fence (382) | 25,0000 (LF) |
| Streambank Stabilization (580) | 8,000 (CY) |
| Irrigation System, Sprinkler (442) | 1,700 (Ac) |
| Gravity Pipeline to Center Pivot (430EE) | 34,000 (LF) |

## 1.3 AVAILABILITY OF NONFEDERAL MATCHING FUNDS OR OTHER RESOURCES BEING CONTRIBUTED

This Agriculture Water Enhancement Program (AWEP) grant will be matched by the producers that are being granted dollars to put conservation practices on the ground that will ultimately enhance soil and water quality in the Belle Fourche and Cheyenne River Watersheds. Cooperating producers within the Belle Fourche River Watershed alone have contributed over $1.2 million in match in 2007 and 2008. It is expected that this level of cooperating partner funding will continue throughout this project.

## 1.4 ABILITY TO MONITOR AND EVALUATE PROJECT EFFECTS ON NATURAL RESOURCES

The BFRWP has demonstrated its ability to manage a successful EPA 319 implementation project that began in 2004. The BFRWP is in the fifth year of implementation within its 10-Year Plan to reduce TSS in the Belle Fourche River. A requirement of this project is to track TSS reductions in the Belle Fourche River. Before this implementation project, **BASINS** and **HSPF** were used to model the Belle Fourche Watershed when the TMDL was developed. To develop the TMDL and to determine the necessary load reductions, several BMPs were modeled in these programs to reduce TSS concentrations in the streams within the Belle Fourche Watershed. The sources of TSS identified were range erosion, irrigation and on-farm waste,

free cattle access to streams, riparian degradation, natural geologic processes, hydraulic alteration by irrigation, and reduced stream miles. The following activities were completed to determine the progress made to achieving the goals of the TMDL plan:

1. Monitor Present Progress Against Plan in Midyear and Annual Reports (Load Reductions Reported Annually).

   Evaluation of project success in reaching the project objectives and goals will be accomplished by measuring:

   - Scheduled versus actual milestone completion dates.
   - Comparisons of flow rates and chemistry for irrigation water application, delivery, and riparian BMPs.
   - Measurement of reduction in nonused water from the BFID discharged into streams.
   - Development of a sustainable watershed implementation project measured in part by the participation and approval of additional grants money for BMP implementation.

   Project monitoring is being reviewed by the BFRWP in quarterly meetings to report progress toward the goals and objectives.

2. Monitor Water-Quality Improvement.

   Water-quality monitoring used a targeted approach. Water-quality data are being collected at sites used during the watershed assessment to formulate the TMDL. Flow impact on the macrowatershed is being analyzed using the following USGS stations:

   - USGS 06428500 (Belle Fourche River at South Dakota-Wyoming state line)
   - USGS 06436000 (Belle Fourche River Near Fruitdale, South Dakota)
   - USGS 06437000 (Belle Fourche River Near Sturgis, South Dakota)
   - USGS 06438000 (Belle Fourche River Near Elm Springs, South Dakota)
   - USGS 06436760 (Horse Creek Above Vale, South Dakota)
   - USGS 06433000 (Redwater River Above Belle Fourche, South Dakota).

   The stations are long-term flow measurement sites operated, funded, and maintained by USGS. The practices installed to reduce the amount of nonused water discharging to the waterways within the irrigation district should be detectable at the Belle Fourche River sites near Sturgis and near Elm Springs as well as at the Horse Creek site above Vale. The other sites recommended will allow a water mass balance to be calculated, adding to the precision of the analysis. Turbidity, specific conductance, temperature, and pH will be measured on a continuous basis at Horse Creek above Vale to provide baseline data to measure water-quality improvements as a result of the nonused water reduction and

range projects BMPs implemented within the Horse Creek Watershed. The SD DENR Surface Water Quality Program also has 21 monitoring stations within the watershed.

Statistical analysis is being used by project staff to estimate the changes in flow and water quality resulting from the implemented BMPs. An analysis of real-time discharge data at Horse Creek was collected by USGS from October 1980 to December 2006 for the final report to the EPA after Segment II was implemented. Implementation of BMPs in the BFID canals, replacing existing flood irrigated fields with sprinklers, and enhanced range health are expected to reduce return flows impacting Horse Creek. Figure 1-1 shows a boxplot of USGS average daily discharge data for two time periods, pre-BMP (1980–May 2005) and post-BMP (June 2005–November 2006). The boxplot shows 95 percent of the data (the highest and lowest 2.5 percent of values are considered outliers). Median value of the average daily flow is marked with a plus sign, the boxes delineate the inner quartile range (the range bounded by the 1st and 3rd quartiles), and the whiskers mark the extents of 95 percent of the data. Traditional boxplot whiskers extend to 1.5 times the inner-quartile range. In this case, the lower whiskers would extend into negative values; hence, the use of whiskers to mark 95 percent of data.

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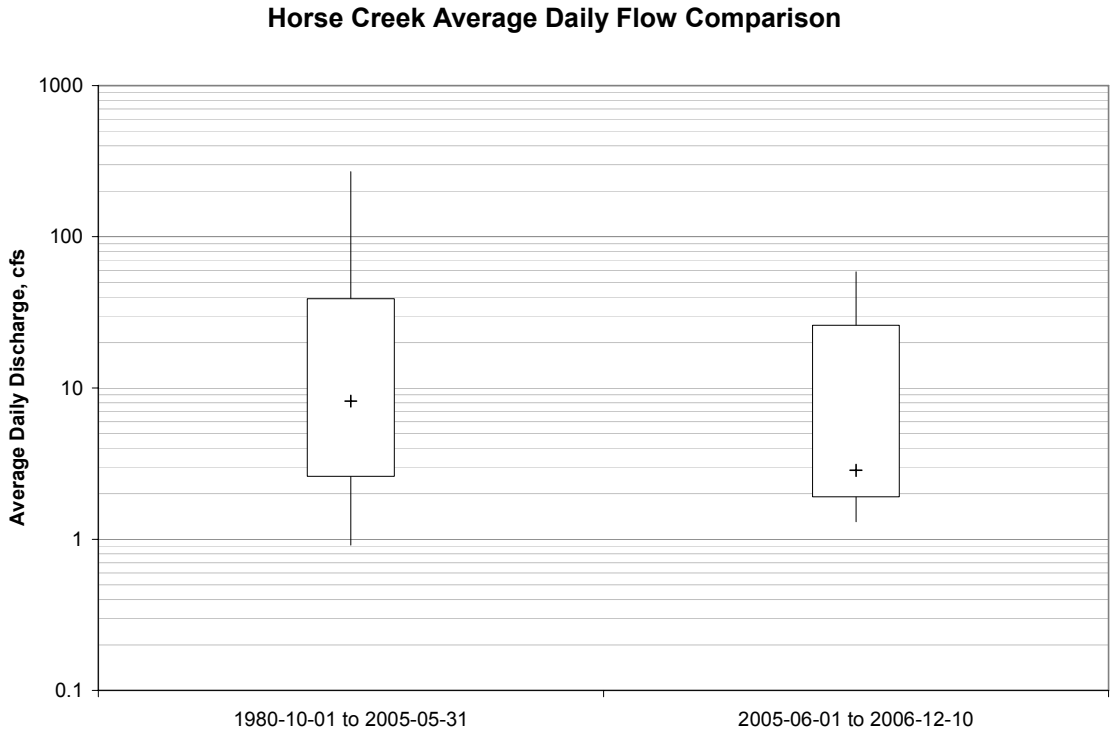


**Figure 1-1.** Boxplot of Pre- and Postbest Management Practices Average Daily Discharge Data at Horse Creek Station After Segment II Implementation Project.

Boxplots are effective and convenient tools for visualizing relationships between datasets that are too limited to analyze using other statistical methods. The boxplot in Figure 1-4 implies that flow reductions are occurring in Horse Creek. Values for medians and quartiles are less in post-BMP data than in pre-BMP data. Long-term data are expected to show reductions in flows in Horse Creek associated with irrigation return flows and consequential reductions in TSS/Suspended Sediment Concentration (SSC) in Horse Creek and the Belle Fourche River.

Currently, a TMDL is being conducted in the Cheyenne River Watershed. Similar protocol will be used to monitor water quality in the watershed using the following USGS stations:

- WQM WQ 460657 (Fall River Near confluence with Cheyenne River)
- USGS 6402500 (Beaver Creek Near Buffalo Gap, South Dakota)
- USGS 6402600 (Cheyenne River Near Buffalo Gap, South Dakota)
- USGS 6403700 (Cheyenne River at Redshirt, South Dakota)
- USGS 6406000 (Battle Creek at Hermosa, South Dakota)
- USGS 6406500 (Battle Creek Below Hermosa, South Dakota)
- USGS 6421500 (Rapid Creek Near Farmingdale, South Dakota)
- WQM WQ 460679 (Box Elder Creek Near New Underwood, South Dakota)
- USGS 6423500 (Cheyenne River Near Wasta, South Dakota)
- USGS 6425100 (Elk Creek Near Rapid City, South Dakota)
- USGS 6425500 (Elk Creek Near Elm Springs, South Dakota)
- USGS 6438000 (Lower Belle Fourche Near Elm Springs, South Dakota)
- USGS 6438500 (Cheyenne River Near Plainview, South Dakota)
- WQM WQ 460133 (Cheyenne River Near Eagle Butte, South Dakota).

## 1.5 CAPACITY TO DELIVER A FINAL PROJECT PERFORMANCE REPORT

The BFRWP has completed two final reports for Segments I and II of their 319 implementation project and are in the progress of completing the final report for Segment III. These reports have covered all the work completed during individual segments of implementation and estimated the effects of the BMPs implemented have had on the water quality in the Belle Fourche River. In addition to the final reports, Grant Reporting and Track System (GRTS) reports were completed as required by the SD DENR. Outside of 319 implementation final reports, the BFRWP completed final reports for U.S. Department of Agriculture- (USDA-) funded grants, including a Rapid Watershed Assessment (RWA) and

Cooperative Conservation Partnership Initiative (CCPI) grant, and is responsible for semiannual reports for a Conservation Innovation Grant (CIG) within the watershed. All final project reports and grant applications can be accessed at the project Web site (*www.bellefourchewatershed.org*).

## 1.6 NATURAL RESOURCES CONSERVATION SERVICE CRITERIA USED TO PRIORITIZE AND RANK AGRICULTURAL PRODUCERS' AGRICULTURE WATER ENHANCEMENT PROGRAM APPLICATIONS IN THE PROJECT AREA

The BFRWP has developed two cost-share applications—one for rangeland and one for irrigation implementation practices within the Belle Fourche River Watershed (Appendices A and B). These applications rank producer projects based on water-quality and soil-health parameters. The ranking sheets were developed with collaboration of NRCS District Conservationists within the watershed to prioritize EPA 319 water-quality funds on rangeland and irrigation improvement practices. The rangeland ranking is based on six major criteria, including location of the project in proximity of the Belle Fourche River or major tributaries, runoff reduction from rangeland and cropland, cropland residue management, cropland conversion, riparian area improvement, and establishment of wildlife habitat. An environmental cost index is calculated by dividing the cost per acre by the environmental points from the six categories. The irrigation ranking sheet is based on three major categories, including location of the project in proximity of the Belle Fourche River or major tributaries; runoff reduction from irrigated cropland, hayland or pastureland; and conversion from cropland or change in cropping system for improved sediment control and/or establishment of wildlife habitat. Total environmental points for irrigation applications are calculated from these three categories. These applications have proven to be an efficient method of distributing producer cost-share funds on rangeland and irrigation practices when water quality, specifically TSS and soil health, are priorities. In the past 2 years, the BFRWP has allocated $473,000 for rangeland implementation practices to 27 producers treating approximately 159,347 acres using this application and $300,000 for irrigation implementation practices to 21 producers treating approximately 2,700 acres. Similar criteria would be used to prioritize and rank agriculture producers applying for AWEP.

## 1.7 COLLABORATING PARTNERS AND THE ROLES, RESPONSIBILITIES, AND CAPABILITIES OF EACH PARTNER

Properly functioning riparian areas can significantly reduce nonpoint source pollution by intercepting surface runoff; settling, filtering, and storing sediment and associated pollutants; and stabilizing banks. Improving irrigation water delivery as well as application reduces the amount of nonused irrigation water discharged to the waterway in turn reducing TSS. AWEP would allow the BFRWP to continue working with local individuals and communities to

implement projects that improves soil health and water quality within the watershed. Projects would include riparian/upland cross fencing to reach proper grazing standards; well, pipeline, and tank to develop alternative water supply; land and stream bank stabilization practices, appropriate tree plantings; conversion of gravity irrigation to sprinkler; converting open ditches to pipeline; and other USDA-approved practices that would positively affect water quality in the watershed. The focus of these projects will be to improve rangeland and cropland, including the riparian corridor along the Belle Fourche River and Cheyenne River and their tributaries that will, in turn, reduce the TSS load in the Belle Fourche River and Cheyenne River. Practices that would be used to reach this goal would include fence (382); pipeline(516); pumping plant (533); stream and shoreline stabilization (580); water well (642); watering facility (614); windbreak/shelterbelt establishment (380); range planting (550); irrigation system, sprinkler (442); irrigation water conveyance, pipeline, high pressure plastic (430DD); and irrigation water conveyance, pipeline, low pressure plastic (430EE).

## 1.8 AGRICULTURAL WATER-ENHANCEMENT ACTIVITIES TO BE APPLIED WITHIN THE DESIGNATED 5-YEAR TIMEFRAME

AWEP would be used to assist approximately 40 producers annually within the watershed. $600,000 per year is being requested to install rangeland BMPs including: 156,000 feet of pipeline (516), 75 watering facilities (614), 70,000 feet of fence (382), two deep water wells (642), two pumping plants (533), 8,300 feet of stream and shoreline stabilization (580), 200,000 feet of windbreak/shelterbelt establishment (380), and 288 acres of range planting (550). An additional $200,000 per year is being requested to install irrigation related BMPs including 1,000 acres of gravity irrigation converted to sprinkler systems (442), and 15,555 feet of gravity pipeline to center pivot (430EE).

## 1.9 ANNUAL FUNDS NEEDED FOR PRODUCER CONTRACTS

The project sponsors are seeking $800,000 annually for producer contracts.

## 1.10 AMOUNT AND SOURCE OF NONFEDERAL FUNDS OR OTHER RESOURCES THAT ARE ANTICIPATED TO BE LEVERAGED BY AWEP

This AWEP grant will be matched by producers being granted dollars to put conservation practices on the ground in the Belle Fourche River and Cheyenne River Watersheds. It is anticipated that producers will contribute up to $1.07 million over the life of the project (25 percent match).

## 1.11 NATURAL RESOURCE CONSERVATION SERVICE PROJECT FUNDING REQUESTED THROUGH AWEP

The project sponsors are requesting $800,000 annually for 4 years, totaling $3.2 million. The money will be distributed throughout the entire Belle Fourche and Cheyenne River Watersheds in western South Dakota

## 1.12 PROJECT IMPLEMENTATION SCHEDULE

A project schedule is provided in Figure 1-2.

## 1.13 PROPOSED PROJECT AREA

Figure 1-3 shows a map of the proposed project area in South Dakota.

## 1.14 AGRICULTURAL WATER-QUALITY AND WATER CONSERVATION ISSUES ADDRESSED BY THE PARTNERSHIP AGREEMENT

Streams in both the Belle Fourche River and Cheyenne River Watersheds are historically and currently listed by the SD DENR as impaired due to excessive concentrations of sediment and fecal coliform. The rangeland and irrigation practices proposed to be implemented in this project will work toward the goal of both the BFRWP and CRWP to enhance the soil health and in-turn the water quality within their respective watersheds. The irrigation practices proposed will reduce losses on the lands impacted by up to 45 percent (conversion of surface to sprinkler irrigation).

## 1.15 AGRICULTURAL WATER ENHANCEMENT OBJECTIVES TO BE ACHIEVED THROUGH THE PARTNERSHIP

Water-quality objectives have been estimated using modeling performed during the Belle Fourche Watershed TMDL study. These values are assumed to also apply to practices installed in the Cheyenne River Watershed during this project. Estimated TSS reductions resulting from rangeland and irrigation improvement practices on approximately 100,000 total rangeland acres and 9,000 riparian acres annually is 18 mg/l. Irrigation improvements on approximately 1,000 cropland acres annually and installing eight center pivots and 15,555 linear feet of pipeline is 15 mg/l.

| ID | Task Name | 2010 | | | | | | | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 |
| 1 | **Fence (382)** | **280,000' Fence** | | | | | | | | | | | | | | | | | | |
| 2 | **Pipe (516)** | **624,000' Pipeline** | | | | | | | | | | | | | | | | | | |
| 3 | **Watering Facility (614)** | **300 Watering Facilities** | | | | | | | | | | | | | | | | | | |
| 4 | **Water Well (642)** | **8 Water Wells** | | | | | | | | | | | | | | | | | | |
| 5 | **Pumping Plant (533)** | **8 Pumping Plants** | | | | | | | | | | | | | | | | | | |
| 6 | **Stream and Shoreline Stabilization (580)** | **33,200 Cubic Yards Stream and Shorline Stabilization** | | | | | | | | | | | | | | | | | | |
| 7 | **Windbreak/Shelterbelt Establishment (380)** | **800,000' Windbreak/Shelterbelt Establishment** | | | | | | | | | | | | | | | | | | |
| 8 | **Range Planting (550)** | **1,152 Acres of Range Planting** | | | | | | | | | | | | | | | | | | |
| 9 | **Irrigation System, Sprinkler (442)** | **32 Sprinklers** | | | | | | | | | | | | | | | | | | |
| 10 | **Irrigation Water Conveyance, Pipeline, Low Pressure Plastic (430EE)** | **33,776' Pipeline** | | | | | | | | | | | | | | | | | | |
| 11 | **Irrigation Water Conveyance, Pipeline, High Pressure Plastic (430DD)** | **33,600' Pipeline** | | | | | | | | | | | | | | | | | | |

**Figure 1-2.** The Proposed Project Schedule.

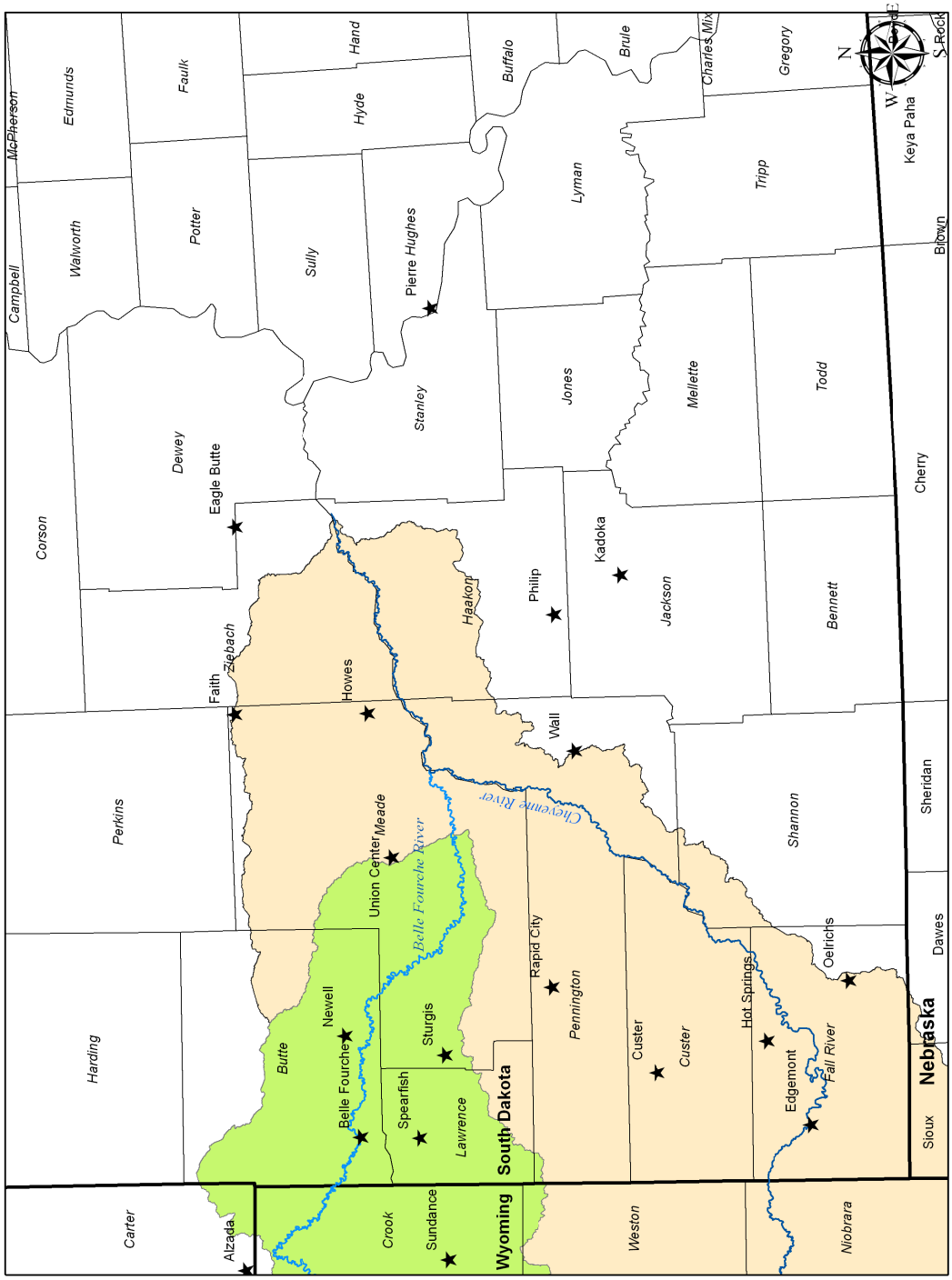


**Figure 1-3.** The Project Area.

## 1.16 TOTAL NUMBER OF ACRES NEEDING CONSERVATION TREATMENT

Conservation treatment is needed on approximately 100,000 rangeland acres annually. This includes approximately 9,000 riparian acres. Conservation treatment is needed on approximately 1,000 acres of cropland to improve irrigation application.

## 1.17 PROPOSED AGRICULTURAL WATER ENHANCEMENT ACTIVITIES TO BE IMPLEMENTED

AWEP would be used to assist approximately 40 producers annually within the watersheds. $600,000 per year is being requested to install rangeland BMPs including: 156,000 feet of pipeline (516), 75 watering facilities (614), 70,000 feet of fence (382), two deep water wells (642), two pumping plants (533), 8,300 Cubic Yards of stream and shoreline stabilization (580), 200,000 feet of windbreak/shelterbelt establishment (380), and 288 acres of range planting (550). An additional $200,000 per year is being requested to install irrigation-related BMPs including 1,000 acres of gravity irrigation converted to sprinkler systems (442), 8,400 feet of high-pressure plastic irrigation water conveyance pipeline for delivery of water to center pivots (430EE), and 8,444 feet of low-pressure pipeline irrigation water conveyance pipeline for delivery of water to gated pipe (430DD).

# 2.0 PRODUCER INFORMATION

## 2.1 THE NUMBER OF AGRICULTURAL PRODUCERS THAT ARE LIKELY TO PARTICIPATE IN THE PROJECT

Approximately 40 producers annually would participate in this project.

## 2.2 THE TOTAL NUMBER OF AGRICULTURAL PRODUCERS IN THE PROJECT AREA

There are approximately 860 agricultural producers in the South Dakota portion of the Belle Fourche River Watershed and approximately 2,050 agricultural producers in the South Dakota portion of the Cheyenne River Watershed.

# 3.0 LETTER OF REVIEW AND SUPPORT

A copy of the cover letter showing the proposal was sent to the South Dakota State Conservationist, Ms. Janet Oertly, is located in Appendix C. Other letters of support for this project are also located in Appendix C.

# 4.0 PROJECT ACTION PLAN

AWEP would be used to assist approximately 40 producers annually within the watershed. $600,000 per year is being requested to install rangeland BMPs, including: 156,000 feet of pipeline (516), 75 watering facilities (614), 70,000 feet of fence (382), two deep water wells (642), two pumping plants (533), 8,300 cubic yards of stream and shoreline stabilization (580), 200,000 feet of windbreak/shelterbelt establishment (380), and 288 acres of range planting (550). An additional $200,000 per year is being requested to install irrigation-related BMPs, including 1,000 acres of gravity irrigation converted to sprinkler systems (442); 8,400 feet of high-pressure plastic irrigation water conveyance pipeline for delivery of water to center pivots (430EE), and 8,444 feet of low-pressure pipeline irrigation water conveyance pipeline for delivery of water to gated pipe (430DD). A schedule of action plans is given in Figure 4-1.

Monitoring and evaluation will take place annually to quantify the results of the project for the final performance report. The BFRWP has demonstrated its ability to manage a successful EPA 319 implementation project that began in 2004. The BFRWP is in the fifth year of implementation within the 10-Year Plan to reduce TSS in the Belle Fourche River. A requirement of this project is to track TSS reductions in the Belle Fourche River. Before this implementation project, **BASINS** and **HSPF** were used to model the Belle Fourche River Watershed when the TMDL was developed. To develop the TMDL and determine the necessary load reductions, several BMPs were modeled in these programs to reduce TSS concentrations in the streams within the Belle Fourche Watershed. The sources of TSS identified were range erosion, irrigation and on-farm waste, free cattle access to streams, riparian degradation, natural geologic processes, hydraulic alteration by irrigation, and reduced stream miles. The following activities were completed to determine the progress made to achieving the goals of the TMDL plan:

1. Monitor Present Progress Against Plan in Midyear and Annual Reports (Load Reductions Reported Annually).

   Evaluation of project success in reaching the project objectives and goals will be accomplished by measuring:

   - Scheduled versus actual milestone completion dates.
   - Comparisons of flow rates and chemistry for irrigation water application, delivery, and riparian BMPs.
   - Measurement of reduction in nonused water from the BFID discharged into streams.
   - Development of a sustainable watershed implementation project measured in part by the participation and approval of additional grants money for BMP implementation.

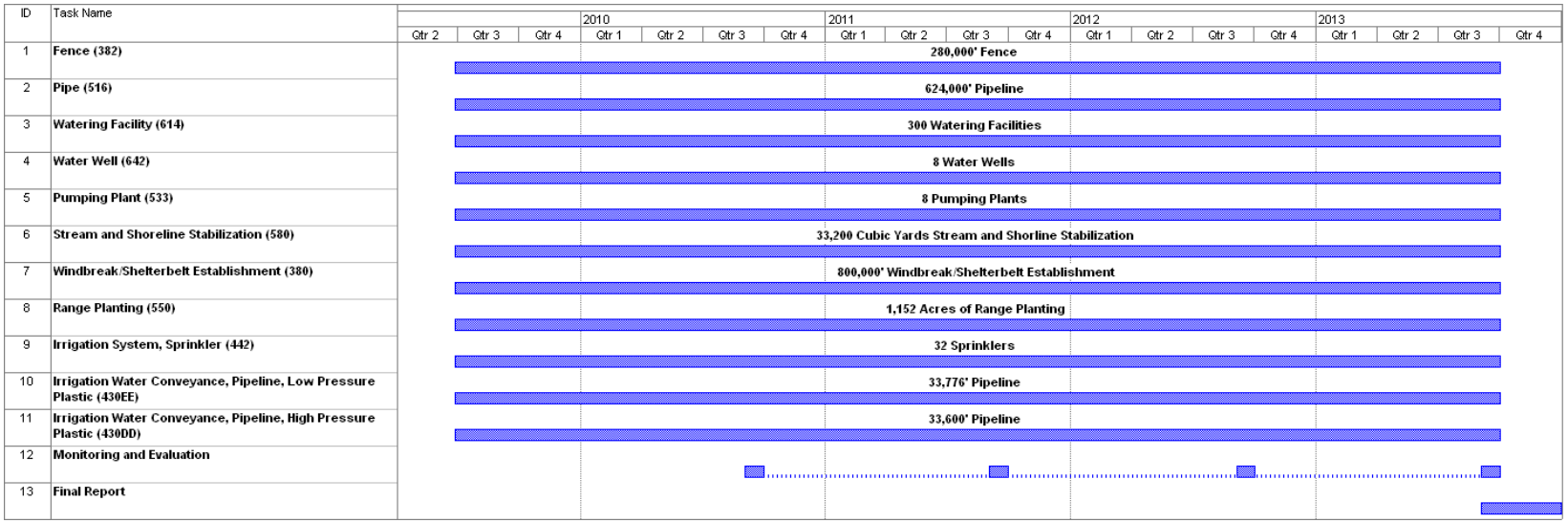


**Figure 4-1.** Schedule of Action Plans.

Project monitoring is being reviewed by the BFRWP in quarterly meetings to report progress toward the goals and objectives.

2. Monitor Water-Quality Improvement.

Water-quality monitoring used a targeted approach. Water-quality data is being collected at sites used during the watershed assessment to formulate the TMDL. Flow impact on the macrowatershed has been analyzed using the following USGS stations:

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- USGS 06433000 (Redwater River ABOVE Belle Fourche, South Dakota).

The stations are long-term flow measurement sites operated, funded, and maintained by USGS. The practices installed to reduce the amount of nonused water discharging to the waterways within the irrigation district should be detectable at the Belle Fourche River sites near Sturgis and near Elm Springs as well as at the Horse Creek site above Vale. The other sites recommended will allow a water mass balance to be calculated, adding to the precision of the analysis. Turbidity, specific conductance, temperature, and pH will be measured on a continuous basis at the Horse Creek site above Vale to provide baseline data to measure water-quality improvements as a result of the nonused water reduction and range projects BMPs implemented within the Horse Creek Watershed. The SD DENR Surface Water Quality Program also has 21 monitoring stations within the watershed.

Statistical analysis is being used by project staff to estimate the changes in flow and water quality resulting from the implemented BMPs. An analysis of real-time discharge data at Horse Creek was collected by USGS from October 1980 to December 2006 for the final report to the EPA after Segment II was implemented. Implementation of BMPs in the BFID canals, replacing existing flood irrigated fields with sprinklers, and enhanced range health are expected to reduce return flows impacting Horse Creek. Figure 1-1 showed a boxplot of USGS average daily discharge data for two time periods, pre-BMP (1980–May 2005) and post-BMP (June 2005–November 2006). The boxplot shows 95 percent of the data (the highest and lowest 2.5 percent of values are considered outliers). Median value of the average daily flow is marked with a plus sign, the boxes delineate the inner quartile range (the range bounded by the first and third quartiles), and the whiskers mark the extents of 95 percent of the data. Traditional boxplot

whiskers extend to 1.5 times the inner-quartile range. In this case the lower whiskers would extend into negative values; hence, the use of whiskers to mark 95 percent of data.

Boxplots are effective and convenient tools for visualizing relationships between datasets that are too limited to analyze using other statistical methods. The boxplot in Figure 1-1 implies that flow reductions are occurring in Horse Creek. Values for medians and quartiles are less in post-BMP data than in pre-BMP data. Long-term data are expected to show reductions in flows in Horse Creek associated with irrigation return flows, and consequential reductions in TSS/SSC in Horse Creek and the Belle Fourche River.

Currently, a TMDL is being conducted in the Cheyenne River Watershed. Similar protocol will be used to monitor water quality in the watershed using the following USGS stations:

- WQM WQ 460657 (Fall River Near confluence with Cheyenne River)
- USGS 6402500 (Beaver Creek Near Buffalo Gap, South Dakota)
- USGS 6402600 (Cheyenne River Near Buffalo Gap, South Dakota)
- USGS 6403700 (Cheyenne River at Redshirt, South Dakota)
- USGS 6406000 (Battle Creek at Hermosa, South Dakota)
- USGS 6406500 (Battle Creek Below Hermosa, South Dakota)
- USGS 6421500 (Rapid Creek Near Farmingdale, South Dakota)
- WQM WQ 460679 (Box Elder Creek Near New Underwood, South Dakota)
- USGS 6423500 (Cheyenne River Near Wasta, South Dakota)
- USGS 6425100 (Elk Creek Near Rapid City, South Dakota)
- USGS 6425500 (Elk Creek Near Elm Springs, South Dakota)
- USGS 6438000 (Lower Belle Fourche Near Elm Springs, South Dakota)
- USGS 6438500 (Cheyenne River Near Plainview, South Dakota)
- WQM WQ 460133 (Cheyenne River Near Eagle Butte, South Dakota).

A schedule of monitoring and evaluation is given in Figure 4-1.

A final comprehensive report will be submitted at the end of the project detailing the activities that have been complete and summarizing the monitoring and evaluation activities that have taken place. A schedule of the final report is given in Figure 4-1.

# APPENDIX A

# BELLE FOURCHE RIVER WATERSHED
# COST-SHARE APPLICATION UPLAND PRACTICES

# BELLE FOURCHE RIVER WATERSHED
# COST-SHARE APPLICATION UPLAND PRACTICES

Name: _____

Address: _____

_____

_____

Telephone Number: _____

Assistance Requested: _____

_____

_____

_____

Cost-Share Dollars Requested: _____

Is there a complete and current conservation plan in place on your farm or ranch that addresses current needs and resource concerns? _____

_____

_____

_____

If a current conservation plan is not in place on your farm or ranch, are you interested in having NRCS or the Belle Fourche Watershed staff work with you to develop a plan? _____

_____

_____

_____

Legal description or subwatershed in which your farm or ranch is located. _____

_____

_____

_____

# BELLE FOURCHE RIVER WATERSHED RANKING WORKSHEET

Name: _____ Fiscal Year: _____

## LOCATION/PLANNING

Location of Area Needing Treatment: (select one of the following)

Land greater than 5 miles from the Belle Fourche River or a perennial tributary or one of the following major intermittent tributaries (Bear Butte Creek, Spring Creek, Alkali Creek, 9 Mile Creek, 4 Mile Creek, Elm Creek, Owl Creek, Hay Creek, Horse Creek above Irrigation District, Willow Creek, Indian Creek).

(0 points) _____

Within 5 miles of Belle Fourche River or perennial tributary, including above named intermittent streams.

(10 points) _____

Land within ¼ mile of the Belle Fourche River or perennial tributary, including above-named intermittent streams

(20 points) _____

## RUNOFF REDUCTION FROM RANGELAND AND CROPLAND (INCLUDES HAYLAND AND PASTURELAND)

1. An annual Nutrient Management Plan or Pest Management Plan is or will be developed on fields/pastures containing soils that are highly vulnerable to nutrient leaching and/or runoff.

   (20 points) _____

2. Livestock watering facilities are located a minimum of 200 feet from streambanks, lakes, wetlands or riparian areas.

   (20 points) _____

3. Rangeland Grazing Management. Facilitate the implementation of prescribed grazing systems to increase the residual plant cover remaining on the rangeland or pastureland after grazing. Completion of this item will be documented by producer using the SD-CPA-16 form or equal.

(2 points/200 acres, maximum 40 points) _____

4. Cropland Residue Management:

   Implementation of No-Till Conservation Farming System
   (2 points/40 acres, maximum of 20 points) _____

   Establishment of Strip Cropping
   (2 points/40 acres, maximum of 10 points) _____

5. Conversion from Cropland to other land uses that provide permanent sediment control benefits:

   Cropland converted to trees or shrubs
   (5 points/acre, maximum 25 points) _____

   Cropland converted to native grasses
   (15 points/25–50 acres, 25 points/over 50 acres) _____

   Cropland converted to tame grasses and alfalfa
   (2 points/50 acres, maximum 10 points) _____

6. Improvement of Riparian Areas: (may use maximum of 2 of the next 4 items)

   Dormant season riparian grazing only
   (5 points/50 acres, maximum 35 points) _____

   Riparian Area Revegetation (trees/shrubs)
   (5 points/200 feet, maximum 30 points) _____

   Riparian area revegetation (native grasses)
   (5 points/300 feet, maximum 30 points) _____

   Implementation of prescribed grazing system which reduces use of riparian areas during growing season
   (20 points) _____

7. Establishment of Wildlife Habitat:

   Improve or establish wildlife habitat through one or a combination of the following conservation practices or management systems.

   Prescribed grazing system with a minimum of 12 months deferment of Rangeland or tame pastures
   (5 points) _____

Implementation of no-till cropping system

(5 points) _____

Establishment of eight or more rows shelterbelt

(5 points) _____

Construction of shallow water or multiple use ponds for enhancement of waterfowl habitat

(5 points) _____

Dedication of five acres or larger areas adjacent to cropland for upland wildlife habitat (Cover must be maintained until August 1)

(5 points) _____

Implementation of vegetative buffers adjacent to intermittent or perennial streams – grazing and/or harvest of vegetation allowed only one out of every 3 years

(5 points) _____

Implementation of pine thinning and/or hardwood enhancement in forest areas to improve plant diversity and enhance wildlife habitat

(5 points) _____

# PRIORITY RANKING SUMMARY

Location/Planning _____

Runoff Reduction from Rangeland and Cropland (Items 1–3) _____

Cropland Residue Management (Item 4) _____

Cropland Conversion (Item 5) _____

Riparian Area Improvement (Item 6) _____

Establishment of Wildlife Habitat (Item 7) _____

**TOTAL ENVIRONMENTAL POINTS** _____

1. Total Application Cost _____
2. Watershed Dollars Requested _____
3. Acres Benefited By This Plan _____

Contract Cost per Acre (Divide No. 2 by No. 3) _____

Environmental Cost Index
(Cost per Acre Divided by the Total Environmental Points × 100) _____

_____ _____
Applicant Signature Date

_____ _____
Belle Fourche River Watershed Partnership Signature Date

_____ _____
Designated Conservationist Signature Date

# APPENDIX B

# BELLE FOURCHE RIVER WATERSHED
# COST-SHARE APPLICATION IRRIGATION PRACTICES

# BELLE FOURCHE RIVER WATERSHED
# COST-SHARE APPLICATION IRRIGATION PRACTICES

Name: _____

Address: _____

_____

_____

Telephone Number: _____

Assistance Requested: _____

_____

_____

_____

Cost-Share Dollars Requested: _____

Is there a complete and current conservation plan in place on your farm or ranch that addresses current needs and resource concerns? _____

_____

_____

_____

If a current conservation plan is not in place on your farm or ranch, are you interested in having NRCS or the Belle Fourche Watershed staff work with you to develop a conservation plan? _____

_____

_____

_____

Legal description or subwatershed in which your farm or ranch is located. _____

_____

_____

_____

# BELLE FOURCHE RIVER WATERSHED RANKING WORKSHEET (IRRIGATION)

Name: _____ Fiscal Year: _____

## LOCATION/PLANNING

Location of Area Needing Treatment: (select one of the following)

Land is within 5 miles of the Belle Fourche River or a perennial tributary or one of the following major intermittent tributaries (Bear Butte Creek, Spring Creek, Alkali Creek, 9 Mile Creek, 4 Mile Creek, Elm Creek, Owl Creek, Hay Creek, Horse Creek, Willow Creek, and Indian Creek)

(5 points) _____

Land within ¼ mile of the Belle Fourche River or perennial tributary or one of the above-named intermittent streams

(10 points) _____

## RUNOFF REDUCTION FROM IRRIGATED CROPLAND, RANGELAND OR PASTURELAND

1. An annual Nutrient Management Plan or Pest Management Plan is or will be developed on fields/pastures containing soils that are highly vulnerable to nutrient leaching and/or runoff

   (20 points) _____

2. Low pressure sprinkler irrigation systems are implemented to replace flood irrigation systems to reduce runoff, improve water quality and conserve irrigation water resources

   (30 points) _____

3. Conserve irrigation water resources through tailwater recovery system and/or documented on-farm irrigation efficiency increases (documentation will be completed through the use of an irrigation water management plan, completed by NRCS staff)

   (20 points) _____

4. On-farm irrigation ditches are replaced with underground pipelines to improve irrigation efficiency and eliminate water seepage and evaporation

(20 points) _____

5. Implementation of a No-Till conservation farming system to save energy and improve soil quality (minimum of 40 acres).

(20 points) _____

## CONVERSION FROM CROPLAND OR CHANGE IN CROPPING SYSTEM FOR IMPROVED SEDIMENT CONTROL AND/OR ESTABLISHMENT OF WILDLIFE HABITAT

1. Implementation of no-till cropping system.

(5 points) _____

2. Establishment of eight or more rows shelterbelt.

(5 points) _____

3. Dedication of five acres or larger areas adjacent to cropland for wildlife upland habitat management (grass and/or legume stands that are comprised of native grasses, forbs and legumes or Intermediate Wheatgrass and alfalfa/clover).

(5 points) _____

4. Implementation of vegetative buffers adjacent to intermittent or perennial streams or riparian areas (grazing and/or harvest of vegetation allowed only one out of every 3 years).

(5 points) _____

# PRIORITY RANKING SUMMARY

Location/Planning _____

Runoff Reduction _____

Improvements for Wildlife Habitat _____

**TOTAL ENVIRONMENTAL POINTS** _____

_____ _____

Applicant Signature Date

_____ _____

Belle Fourche River Watershed Partnership Signature Date

_____ _____

Designated Conservationist Signature Date

# APPENDIX C

# COVER LETTER TO THE SOUTH DAKOTA STATE CONSERVATIONIST AND PROJECT LETTERS OF SUPPORT

**BELLE FOURCHE RIVER WATERSHED PARTNERSHIP**

Belle Fourche Office
1837 5th Avenue, South
Belle Fourche, SD 57717-2086
(605) 892-3368 Ext. 3

RSI(RCO)-1870/3-09/21

March 31, 2009

Ms. Janet Oertly
U.S. Department of Agriculture
Federal Building Room 203
200 Fourth Street SW
Huron, SD 57350

Dear Ms. Oertly:

The Belle Fourche River Watershed Partnership (BFRWP) is pleased to submit the attached proposal for the Agriculture Water Enhancement Program (AWEP) for your review. The proposed project area includes the Belle Fourche River and Cheyenne River Watersheds in South Dakota. Currently, the BFRWP is working on an implementation project with the goal of bringing the Belle Fourche River and Horse Creek into compliance for total suspended solids within 10 years.

Thank you for giving the BFRWP the opportunity to apply for AWEP funding. If you have any questions please feel free to contact us.

Sincerely,

Tim Reich
President

CSF:llf

cc: Chief, Natural Resources Conservation Service
Project Central File 1870 — Category K

**DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES**

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

February 27, 2009

Tim Reich, President
Belle Fourche River Watershed Partnership
1837 5th Avenue, South
Belle Fourche, SD 57717-2086

Dear Mr. Reich,

The South Dakota Department of Environment and Natural Resources (DENR) supports your Environmental Quality Incentives Program (EQIP), Agricultural Water Enhancement Program (AWEP) application to the USDA Natural Resources Conservation Service (NRCS) for the installation of rangeland Best Management Practices (BMP) and the conversion of gravity irrigation to sprinkler systems.

DENR has provided financial and technical assistance to the Belle Fourche River Watershed Partnership to assist in restoring the beneficial uses of the Belle Fourche River. This assistance has included the installation of BMP's to improve efficiencies of the irrigation systems to reduce runoff and sediment entering the river. Your project application will continue to address the reduction of sediment which is needed to restore the water quality of the river.

Please advise us if we can be of further support or assistance.

Sincerely,

David Templeton

David Templeton, Director
Division of Financial and Technical Assistance

Cc: RESPEC

February 25, 2009

Chief of the USDA-NRCS
Natural Resources Conservation Service
USDA (AWEP) Proposals)
P.O. Box 2890
Washington, DC 20013

Dear Chief,

The Cheyenne River Watershed Partnership supports the objectives of Agriculture Water Enhancement Program (AWEP) sponsored by the Belle Fourche River Watershed Partnership. The long-term goal of the project is to bring the Belle Fourche River and Horse Creek into compliance for total suspended solids (TSS) within 10 years. The Belle Fourche River Watershed encompasses over 4.6 million acres. Future work will incorporate the soon-to-be-submitted Total Maximum Daily Load (TMDL) report for the Lower Cheyenne River. Collectively, the Cheyenne River and Belle Fourche River Watersheds cover approximately 20 million acres.

The Cheyenne River Watershed Partnership is providing support to the project by acting as a liaison to local agriculture producers by providing time, input, and expertise to the Belle Fourche River Watershed Partnership. The result of this effort is expected to reduce the amount of TSS concentration in the Belle Fourche and Cheyenne Rivers and to improve soil health in the watershed.

We fully support efforts such as this watershed project to help conserve our water resources and soil health in South Dakota and to provide producers with viable economic, environmental, and socially-accepted resource solutions.

Sincerely, Lynn Denke

Lynn Denke
Chairman, Cheyenne River Watershed Partnership

LD:llf

cc: Project Central File 1870 — Category A