

Form 9-1366
(Oct. 2005)

**U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement**

Customer #: SD009
Agreement #: 10C4SD864800030
Project #: 8648001,9ZR,
TIN #: 46-6000380
Fixed Cost Agreement Yes No

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**FOR
WATER RESOURCES INVESTIGATIONS**

THIS AGREEMENT is entered into as of the 1st day of January, 2010, by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the City of Rapid City, South Dakota, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation for operation and maintenance of selected gaging stations and for various hydrologic investigations including hydrogeologic data collection and analysis, applications of groundwater-flow modeling, storm-water monitoring, and continuation of paleoflood investigation, herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.
2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of \$0.00.

(a) \$134,450.00 by the party of the first part during the period
01/01/2010 to 12/31/2010

(b) \$138,000.00 by the party of the second part during the period
01/01/2010 to 12/31/2010

\$3,550.00 unmatched by USGS

- (c) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.
- (d) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.
3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.
4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.
5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.
6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.
7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.

Form 9-1366
continued

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- 8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
- 9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered **quarterly**. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983).

U.S. Geological Survey
United States
Department of the Interior

City of Rapid City, SD

USGS Point of Contact


Customer Point of Contact

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Signatures

Signatures

By  Date 2/17/10
Name: Daniel G. Driscoll
Title: Acting Director, SD Water Science Center

By _____ Date _____
Name: Alan Hanks
Title: Mayor, City of Rapid City, SD

By _____ Date _____
Name:
Title:

By _____ Date _____
Name:
Title:

By _____ Date _____
Name:
Title:

By _____ Date _____
Name:
Title:

Work plan for USGS activities during 2010
In cooperation with Rapid City, South Dakota

Prepared for

City of Rapid City

by

U.S. Geological Survey

South Dakota Water Science Center

1608 Mountain View Road

Rapid City, South Dakota 57702

January 22, 2010

Introduction

The U.S. Geological Survey (USGS) and the city of Rapid City have had a long-term cooperative relationship to conduct hydrologic investigations to better understand the complex systems that comprise water resources for Rapid City and the surrounding area. The 2010 Work Plan is designed to assist the City with hydrologic data and additional interpretive information that is relevant to (1) providing a sustainable, high-quality, regional water supply; (2) protecting ecological resources; and (3) addressing public safety. Funding will be provided through a 50/50 cost-share arrangement between USGS and Rapid City.

Work plan activities for 2010

Planned activities for 2010 are described in five categories below. Monitoring of Rapid Creek streamflow is described in section (1) *streamflow gaging*. Water-levels and well inventory in the Madison and Minnelusa aquifers and seepage tracing with stable isotopes are described (2) *hydrogeologic data collection and analysis*. Activities to further analyze the Madison and Minnelusa aquifers with the numerical groundwater flow model are described in section (3) *application of groundwater-flow model*. Continued evaluation of storm water runoff is described in section (4) *storm water monitoring*. Continued participation in a paleoflood investigation for the central Black Hills, including Rapid Creek is described in section (5) *continuation of paleoflood study*. The total proposed funding package for the complete program and an approximate distribution of funding between the five individual programmatic areas are discussed in the final section of this work plan.

(1) Streamflow Gaging

The proposed streamflow-gaging program (table 1) would essentially be identical to the 2009 program, with an inflationary increase of 2.9 percent in the annual operational cost of a gage. Total funding from Rapid City for the gaging program would consist of \$21,134 that would be matched by USGS with \$17,584 of Federal Matching Funds and \$3,550 from the National Stream Information Program (NSIP).

Table 1. Proposed streamflow gaging program for water year 2010 – City of Rapid City

Gaging Station and Cooperators	Unmatched Federal	Local & State Cooperators	USGS Match	Total
Rapid Creek at Rapid City				
US Army Corps of Engineers	\$7,100			\$7,100
USGS NSIP Funding			\$3,550	\$3,550
Rapid City		\$3,550		\$3,550
subtotals	\$7,100	\$3,550	\$3,550	\$14,200
Rapid Creek below Sewage Plant				
Rapid City		\$7,100	\$7,100	\$14,200
subtotals		\$7,100	\$7,100	\$14,200
Rapid Creek near Farmingdale				
DENR		\$3,550	\$3,550	\$7,100
Rapid City		\$3,550	\$3,550	\$7,100
subtotals		\$7,100	\$7,100	\$14,200
Rapid Creek at Jackson Boulevard (telemetry and stage record)				
Rapid City		\$2,340	\$2,340	\$4,680
subtotals		\$2,340	\$2,340	\$4,680
Rapid Creek below Pactola Dam and below Deerfield Dam (2 gages)				
USBR	\$6,124			\$6,124
Rapid City		\$4,594	\$4,594	\$9,188
SDGF&P		\$2,297	\$2,297	\$4,594
RVWCD		\$2,297	\$2,297	\$4,594
subtotals	\$6,124	\$9,188	\$9,188	\$24,500
Summary of funding for all gages				
	Rapid City	Others	USGS	Total
Rapid Creek below Sewage Plant	\$7,100		\$7,100	\$14,200
Rapid Creek near Farmingdale	\$3,550	\$3,550	\$7,100	\$14,200
Rapid Creek at Jackson Boulevard	\$2,340		\$2,340	\$4,680
Rapid Creek below Pactola and Deerfield	\$4,594	\$10,718	\$9,188	\$24,500
Rapid Creek at Rapid City	\$3,550	\$7,100	\$3,550	\$14,200
Total Funding	\$21,134	\$21,368	\$29,278	\$71,780

(2) Hydrogeologic Data Collection and Analysis

Water-level monitoring will be continued during 2010 for nine observation wells that are completed in the Madison and Minnelusa aquifers. Inventory of new wells completed in the Madison and Minnelusa aquifers will be continued in 2010 and relevant information will be entered into the USGS ground-water data base. Selected sites will be visited to determine accurate locations of wells and land-surface and water-level altitudes. Stable isotope samples will be collected and analyzed for selected seepage sites to be compared with results for stable isotope samples of municipal water from the City's water distribution system near the seepage area. The different isotope signature between municipal water and local springs could provide insight on the source of water at seepage sites.

(3) Applications of Groundwater Flow Model

Applications for the recently-published groundwater flow model will include updating transient simulations with current data and hypothetical simulations of selected drought stresses and pumping scenarios. Updated transient data sets developed will include recharge to the Madison and Minnelusa aquifers from streamflow and infiltration of precipitation on the outcrop, estimates of spring discharge, compilation of pumping withdrawals from the aquifer, and tabulation of observed water levels. The water levels and spring discharge simulated by the model will be compared to observed and estimated values. These comparisons will test the ability of the model to simulate stresses and provide a basis for the evaluation of selected hypothetical stresses. The funding increment identified for 2010 would be used for preliminary development of the model data sets. It is anticipated that a larger funding increment will be available in 2011 because of the conclusion of the Paleoflood study described in item 5. Anticipated funding in 2011 would be used for documentation and publication of a USGS Scientific Investigations Report that describes the transient simulations and selected hypothetical simulations of stresses.

(4) Storm Water Monitoring

Rapid City has implemented programs to improve storm water quality in response to the 'Phase II Final Rule' storm water guidelines issued by the U.S. Environmental Protection Agency. In 2008, the City requested that USGS provide assistance in developing strategies for a storm-water monitoring plan and USGS responded by planning and implementing a preliminary monitoring program for the Arrowhead Basin. Data collected in 2008 and 2009 indicate concentrations of fecal coliform bacteria and total suspended solids that exceed EPA target goals for Rapid Creek. Data from samples collected in an October 2009 event indicate that a high percentage of bacteria, possibly approaching 100 percent, were E.coli.

Preliminary plans for 2010 are (1) continued monitoring within the Arrowhead Basin at the two sites that were used during 2009; (2) monitoring the efficiency of constructed ponds in reducing concentration of suspended sediment delivered by tributary streams; and (3) evaluating possible sources of fecal coliform. The constructed ponds near the intersection of E. St. Louis and Herman Streets provide an ideal setting to determine the efficiency of such structures in removal of suspended sediments, and the effects on fecal coliform counts. A methodology has recently been developed to determine if fecal coliform is from human versus non-human sources and may have applicability for the Rapid City circumstances. Testing of this method will be considered for the constructed ponds and for the Arrowhead basin. Detailed planning for 2010 activities will be accomplished through discussions of priorities with staff from the Stormwater Program of the Public Works Department. Planning for additional monitoring for suspended sediment and fecal coliform in locations beyond the Arrowhead Basin also may be considered, depending on priorities that are established through consultation with City staff.

(5) Continuation of Paleoflood Study

USGS currently is cooperating with several agencies (including Rapid City) on paleoflood investigations for several major drainages in the central Black Hills area, including Rapid Creek. Stratigraphic analyses and age dating of "flood slackwater deposits" have been the primary tools for the investigations, and contingent on availability of appropriate deposits, this tool can yield detailed chronologies for large previous floods. Preliminary results indicate that there is a very rich history of numerous large floods for the reach of Rapid Creek downstream from Pactola Reservoir. Flood evidence is much sparser in the reach above Pactola Reservoir, however, and tends to support a hypothesis of reduced peak-flow potential, relative to the downstream reach.

Results of investigations along Rapid Creek will be included in a USGS publication addressing the central Black Hills area that will be completed as part of the larger-scale project involving multiple cooperators. All field data collection has been completed and analytical activities are well underway. Current efforts are beginning to focus on producing a draft of the final publication, which is scheduled for completion during 2010.

Planned 2010 funding by task

Approximate funding allocations among planned program activities for 2010 are listed in Table 2. Planned work efforts and associated funding are to be on a calendar year basis for 2010, with the exception of Item 1 (*streamflow gaging*), which will be for water year 2010 (Oct. 1, 2009 through Sept. 30, 2010). A 50/50 cost share between Rapid City and USGS will be accomplished for all program components. The proposed distribution of program funding is subject to modification during 2010, depending on possible changes in priorities established through discussions with Rapid City staff.

Table 2. Planned allocation of funding for 2010 work activities

Item number	Proposed activity	Rapid City share	USGS share	Total
1	Streamflow gaging ¹	\$21,134	¹ \$17,584	\$38,718
2	Hydrogeologic data collection and analysis	\$20,000	\$20,000	\$40,000
3	Applications of groundwater-flow model	\$20,000	\$20,000	\$40,000
4	Storm water monitoring	\$44,000	\$44,000	\$88,000
7	Continuation of paleoflood study	\$32,866	\$32,866	\$65,732
Totals to be shown on Joint Funding Agreement		\$138,000	¹\$134,450	\$272,450

¹ Additional funding of \$3,550 for the streamflow gaging program will be provided by USGS through the National Streamflow Information Program, to accomplish an effective 50/50 match.