WEST DAKOTA WATER Development District

MEETING LOCATION:
WEST RIVER ELECTRIC
3250 SD HWY 44
Rapid City, SD 57703

AGENDA
Tuesday, May 9, 2017
6 p.m.

1. **Pledge of Allegiance (Chair)**

2. **Invocation (You are welcome to participate, but not required) (Deurloo)**

3. **Roll Call of Members (Secretary)**

4. **Approval of Agenda (Chair)** *The board cannot take official action on any item(s) not on the agenda.*

5. **Approval of Previous Meetings Minutes (Chair)**

6. **Treasurers Report**
    a. Expense for Shredding Check Blanks ($6.39)
    b. Software for Recording ($34.99)
    c. Membership Dues - Black Hills Multiple Use Coalition ($100)

7. **Tax Levy Request (Treasurer/Admin)**

8. **2016 Annual Report (Treasurer/Admin)**

9. **H2E Administration Contract**

10. **USGS Canyon Lake/Rapid Creek Study Request for Funds:** Galen Hoogestraat (2nd vote) (Mueller)
    a. Quarterly payments
    b. Routine expenditure one signature

11. **USGS Streamflow Gaging Stations Continuation Project:** Joyce Williamson (Akers)

12. **2018 Hydrology Conference Key Note Speaker Funding Request ($2,000):** Joanne Noyes (Steinken)

New Items/Business

13. **Conservation of Water Through the Use of Compost - Project Funding Request**: Jerome Wright (Bjerke)

14. **Chairman's Comments**

15. **Items from Directors**

16. **Items from Admin**

17. **Items from Public**

18. **Adjournment**

Draft Minutes for **March 14, 2017**

An audio recording was not available for this meeting.

CALL TO ORDER

The West Dakota Water Development District convened for its regular board meeting at West River Electric, 3250 SD Hwy. 44 Rapid City, SD. Chairperson Mueller called the meeting to order at 6:02 pm by leading the Pledge of Allegiance. Director Deurloo gave an opening prayer. Directors present: Kenn Moss (District 1), Dan Bjerke (District 2), Mike Mueller (District 3), Nathan Gjovik (District 4), Robert Akers (District 5), Robert Williams (District 6), Ken Steinken (District 7), James Bialota (District 8), Jeanette Deurloo (District 9).

Director(s) absent: none. A quorum was declared.

Employees present: Emily Martinez (Administrative Manager), Leon Ewert (Parliamentarian).

Others in attendance: Galen Hoogestraat (US Geological Survey), Glenda Williams (Citizen), Joyce Williamson (USGS), Joanne Noyes (SD Geological Survey), Barry Muxen (Clean Water Alliance) and Bill Eldridge (Citizen).

APPROVAL OF AGENDA

Chairman Mike Mueller asked to change Item 10 from States Attorney, to Attorney General's office. Moved with change by Moss and seconded by Deurloo to approve the agenda. Motion passed unanimously.

APPROVAL OF PREVIOUS MEETING MINUTES

Moved by Deurloo and seconded by Gjovik to approve minutes from the January 10, 2017 meeting with corrections as provided by the secretary with removal of word "legal." Motion passed unanimously. Final corrected version of the minutes is available at westdakotawater.com

Moved by Steinken and seconded by Akers to approve the correction of the minutes for the December 13, 2016 meeting concerning the submission of director vacancy petitions as provided by Ewert after listening to the recording of the meeting. Motion passed 5-0. Bjerke, Williams, Biolata, Gjovik abstained. Final corrected version of the minutes is available at westdakotawater.com

AMENDED 2017 MEETING SCHEDULE

Moved by Deurloo and seconded by Moss to accept amended 2017 meeting schedule. Motion passed unanimously.

TREASURERS REPORT
Akers and Ewert presented the Treasurer's Report. Ewert reported that WDWDD received an unexpected distribution of $2,133.26 from the state bank franchise tax.

Moved by Bjerke and seconded by Deurloo to continue discussion of Black Hills Multiple Use Coalition 2017 membership dues payment until May meeting.

HILL CITY PROJECTS
Moved by Moss and seconded by Deurloo to defund Hill City Drainage ($30,000) and Hill City Dump Station ($20,000) projects from the 2017 Budget. Motion passed unanimously.

PROJECT FUNDING SCORESHEET
Gjovik presented for consideration a scoring sheet to be used to assist in the process of determining whether or not to fund proposals received by WDWDD. Discussion followed on how to use the tool.

Moved by Deurloo and seconded by Steinken to use an amended form of the scoresheet (Change Criteria 1 – replace "involvement" with "mission." Eliminate Criteria 6 – "Director determination of need") as an individual director's tool on trial basis for four meetings. Motion passed 8-1. Akers opposed.

ATTORNEY GENERAL RECOMMENDATION
Mueller reported that Matt Naasz with the Attorney General's Office would not offer a legal opinion on the appointment of Area 6 and 8 Directors at the January meeting. He recommended contacting a private attorney. Mueller decided to not proceed without getting board approval to spend funds to engage WDWDD's counsel Sarah Frankenstein for an opinion. Mueller reported that the individual who sent an angry email after the January meeting did not contact him after he provided his cell phone number to discuss his concerns. No action taken.

NEW BUSINESS

USGS CANYON LAKE/RAPID CREEK STUDY PROPOSAL
USGS hydrologist Galen Hoogestraat presented "Water Quality Monitoring of Canyon Lake, 2017-2018" proposal.

- Proposal in March 14, 2017 Board Packet at http://www.westdakotawater.com/pdf/2017/20170314%20Board%20Packet.pdf.
- Video presentation of proposal from meeting available at http://www.westdakotawater.com/pdf/2017/Canyon%20Lake%20Presentation.pdf.

USGS requests WDWDD provide $20,000 annually for two years to be matched with $10,000 annually from USGS for a two-year project total of $60,000.

The proposed project has two objectives. First, document any changes to Canyon Lake water quality that may occur during dredging. Second, assess the amount of sediment, nutrient, and bacteria loading that occur within Canyon Lake. This project will help gauge success of an individual dredging event at achieving improved water quality. The study will also provide data

that may help develop management strategies for the beneficial uses of Canyon Lake which include domestic water supply, coldwater permanent fish propagation, immersion and limited contact recreation. Additionally, it may help determine if waterfowl management strategies are warranted for Canyon Lake.

Moved by Bjerke and seconded by Williams to approve the request for funding of $40,000 to the USGS over a two-year period to be paid in quarterly installments. Motion passed 8-1. Gjovik opposed. Second vote of approval for funding will be held at May meeting.

ITEMS FROM ADMINSTRATION

Ewert reported that the SD DENR Water Rights program approved WDWDD Future Use Water Permit No.1443-2 for 10,000 acre-feet of water annually from the Missouri River at the hearing on March 1. The permit is for seven years. Ewert will send the check for the permit fee of $895.00.

Ewert reported that WDWDD Policy 14 requires two signatures for checks over $2,500, but that banks no longer check both signatures. Several directors commented that requiring two signatures on larger checks serves as a useful internal precautionary measure. No action taken.

Moved by Deurloo and seconded by Bjerke to approve $300 for another microphone and additional cables as requested by Ewert to facilitate quality recording of WDWDD board meetings to achieve the goal of making the meeting recordings available to the public. Motion passed unanimously.

ITEMS FROM THE PUBLIC

The floor was opened to the public. Joyce Williamson commented on upcoming Hydrology conference.

Meeting adjourned at 8:37 pm.

Respectfully Submitted,

Ken Steinken, Secretary

2017 Tax Levy Request
Due by: 09/01/2028

West Dakota Water District
Mike Mueller
PO Box 6365
Rapid City SD 57709

Daytime Phone #: (605) 390-6253

District Email: wdwdd2@outlook.com

Check box or boxes below to levy maximums allowable:

☐ Estimated max tax dollars available: $227,771

☐ Opt Out Dollars available: $0

Opt Out Expires in:

OR

Write in specific dollar amounts below if different than above:

General Fund: $ _____

Other Fund: $ _____

Opt Out Tax $'s: $ _____

New Opt Out: $ _____ Approved Date: _____

Total: $ _____

_____ _____

Signature Date

West Dakota Water District - D

Exhibit I

WEST DAKOTA WATER DEVELOPMENT DISTRICT
BALANCE SHEET
GENERAL FUND
December 31, 2016

	GENERAL FUND
ASSETS AND DEFERRED OUTFLOWS OF RESOURCES:	
Assets:	
Cash and Cash Equivalenets	$ 513,028.68
Accounts Receivable	
Due from Other Governments	
Taxes Receivable - Current	
Taxes Receivable - Delinquent	
Prepaid Insurance	
South Dakota Public Assurance Alliance Deposit	
Total Assets	$ 513,028.68
Deferred Outflows of Resources:	
Other Deferred Outflows of Resources	
Total Deferred Outflows of Resources	$ -
TOTAL ASSETS AND DEFERRED OUTFLOWS OF RESOURCES	$513,028.68
LIABILITES, DEFERRED INFLOWS OF RESOURCES AND FUND BALANCES:	
Liabilities:	
Accounts Payable	
Accrued Payroll Taxes	
Deferred Revenue	
Total Liabilities	$ -
Deferred Inflows of Resources:	
Unavailable Revenue--Property Taxes	
Other Deferred Inflows of Resources	
Total Deferred Inflows of Resources	-
Fund Balances:	
Nonspendable	
Restricted	
Committed	
Assigned for Subsequent Year's Budget	150,000.00
Assigned for Other Purposes	
Unassigned	363,028.68
Total Fund Balances	$ 513,028.68
TOTAL LIABILTIES, DEFERRED INFLOWS OF RESOURCES AND FUND BALANCES	$513,028.68

Exhibit II

WEST DAKOTA WATER DEVELOPMENT DISTRICT
STATEMENT OF REVENUES, EXPENDITURES AND
CHANGES IN FUND BALANCES
GENERAL FUND
For the Year Ended December 31, 2016

	GENERAL FUND
Revenues:	
Property Taxes	$ 216,874.90
Grants: (List)	-
Investment Earnings	256.95
Other	
Total Revenues	$ 217,131.85
Expenditures:	
Governing Board	$ 5,924.14
Administrative	15,950.34
Legal and Consulting	74,312.57
Technical Assistance	
Capital Outlay	
Debt Service	
Project Assistance; (list)	
USGS Stream Flow 0029	$ 16,300.00
USGS Flow Model Aquifers 0034	$ 10,000.00
SDSM&T Crystal Aquifer 14-09	$ 34,189.75
H2E Incorporated DNA Sampling Rapid Creek	$ 40,086.11
Grants; (list)	
Hisega Community Water System	$ 40,000.00
Total Expenditures	$ 236,762.91
Net Change in Fund Balance	(19,631.06)
Fund Balance - Beginning	532,659.74
FUND BALANCE - ENDING	$ 513,028.68

Exhibit III

WEST DAKOTA WATER DEVELOPMENT DISTRICT
SCHEDULE OF CHANGES IN CAPITAL ASSETS
For the Year Ended December 31, 2016

	BEGINNING BALANCE	INCREASES	(DECREASES)	ENDING BALANCE
Land	$ -			$ -
Buildings	-			-
Improvements Other than Buildings	-			-
Furniture, Equipment and Vehicles	-			-
(Less Accumulated Depreciation)	-			-
INVESTMENT IN CAPITAL ASSETS	$ -	$ -	$ -	$ -

Exhibit IV

WEST DAKOTA WATER DEVELOPMENT DISTRICT
SCHEDULE OF CHANGES IN LONG-TERM DEBT
For the Year Ended December 31, 2016

	Debt	**Debt**
Debt Payable, January 1, 2016		
Add New Debt Issued		
Less Debt Retired		
DEBT PAYABLE, DECEMBER 31, 2016	$ -	$ -

Note: Amounts reported do not include interest.

May 2, 2017

West Dakota Water Development District Directors
PO Box 6365
Rapid City, SD 57709-6365
(605)394-2685

RE: West Dakota Water Development District Program Management

Dear Directors,

Over the past two years, H2E Incorporated has managed and administrated the West Dakota Water Development District programs. H2E has furnished all of the Services set forth in their Proposal dated June 26, 2015. These Services included:

- Manage Meetings
  - Choose locations,
  - Prepare agendas,
  - Notify and prepare documents for the public,
  - Assist in conducting the meetings as needed,
  - Assist the secretary with meetings minutes and submit to the board for review and approval.
- Office Space
  - Staffed consistent office hours for a minimum of 8 hours per week.
    - Tuesdays 12:00-4:00
    - Thursdays 8:00-12:00
- Administration
  - Manage the filing system,
  - Manage and update the website as necessary,
  - Provide petition and instructions for election applications.
- Financial
  - Prepare budgets for board approval,
  - Provide the board with budget updates,
  - Manage the financial data and reports as necessary,
  - Pay accounts payable as needed.
- Representative of the Board
  - Establish and maintain relationships with other Districts, local, state and federal government officials, and other resource organizations.

In addition to fulfilling the Services set forth in the Proposal, H2E has provided many other services and benefits to the WDWDD. The following list shows additional tasks or services completed by H2E this last year:

- Reviewed and amended all WDWDD Policy and By Laws.

- Provided a Parliamentarian for Board Meetings.
- Donated time to develop a DNA Testing Plan for Rapid Creek.
- Found and corrected accounting errors made in 2014.
- Created detailed district area maps for use by the Directors and citizens for elections.

H2E is available to provide the same services as previous years, for a reduced lump sum of $63,400.00 (Original contract amount = $73,580.00). If the West Dakota Water Development District Directors would like to amend the services requested in their proposal dated June 26, 2015, H2E would be available to adjust this bid accordingly.

If selected to continue managing and administrating WDWDD projects, H2E will work diligently to satisfy the needs of the District and to support its mission. We will continue to strengthen and expand the network of cooperation that has been developed as to better serve the District and its taxpayers.

Sincerely,

Chris Ewert
President
H2E, Incorporated

Water-quality monitoring of Canyon Lake, 2017-2018

Proposal by the U.S. Geological Survey, Dakota Water Science Center

Background

Canyon Lake, an impoundment on Rapid Creek near the west boundary of Rapid City, provides residents with areas for fishing, boating, and other recreation. Canyon Lake (fig. 1) acts as a nutrient and sediment sink that allows for widespread aquatic plant growth within the lake, and the water also attracts a large waterfowl population. The beneficial uses for Canyon Lake are domestic water supply and coldwater permanent fish propagation (SD DENR, 2010); the coinciding water-quality criteria for these uses include numerical goals for nutrients, dissolved and suspended solids, certain major ions, and temperature. Canyon Lake also carries beneficial uses of immersion and limited-contact recreation; the coinciding water-quality criteria for these additional uses include fecal indicator bacteria (E. coli). Rapid Creek downstream from Canyon Lake also carries these same beneficial use criteria.

In order to better assess the sources of fecal indicator bacteria in Rapid Creek, more data is needed regarding the bacteria loading that occurs at Canyon Lake primarily due to waterfowl congregation. Very limited data for fecal indicator bacteria is available for Canyon Lake or Rapid Creek immediately below the dam. Currently, there is not a routine monitoring program that would be able to detect water-quality issues that may arise at Canyon Lake. SD DENR operates a water quality monitoring (WQM) site at Dark Canyon (upstream from Canyon Lake), but the next downstream WQM site on Rapid Creek is located in eastern Rapid City at the Saint Patrick Street bridge. Isolated studies have been conducted on Canyon Lake in the early 1990's and 2007 (Delzer, 1993; Hoogestraat and others, 2008). SD DENR's statewide lakes assessment program contains sample data (mostly field parameters and nutrients) from 1991-92, 2000, 2008, and 2011. In this dataset, there are only two samples for fecal indicator bacteria since 1988 (2008 and 2011).

A memorandum of understanding among five local entities (SDGFP, City of RC, WDWDD, BH Fly Fishers, and SD DENR) was signed in 2016 to purchase and operate a dredging system intended to help clean out Canyon Lake sediment and nutrients. Dredging is expected to begin in the year 2017. Dredging is expected to benefit Canyon Lake by 1) improving aquatic habitat, 2) maintaining storage capacity, and 3) maintaining the water quality of Rapid Creek (Gesick, 2016). There are no current plans for comparing water quality during pre- and post-dredging time periods.

Objectives and approach

The proposed project would contain two separate objectives, but a single approach. The first objective is to document any changes to Canyon Lake water quality that may occur during dredging. The second objective is to assess the amount of sediment, nutrient, and bacteria loading that occur within Canyon Lake.

These objectives will be accomplished by compiling recent water-quality data from Canyon Lake and collecting data prior to dredging; this would be accompanied by post-dredging samples collected at the same locations. Sample locations will include Rapid Creek sites above and below Canyon Lake to assess the amount of bacteria loading that occurs within Canyon Lake, and as many as three sites on Canyon Lake (fig. 1). Water-quality information collected will include field parameters (pH, dissolved oxygen, temperature, specific conductance, and turbidity), sediment, nutrients (nitrogen and phosphorus), and fecal indicator bacteria (E. coli). Water-quality data will be collected 16 times during a 2-year period to capture seasonal variations. At least one sample will be collected during the active dredging period. Continuous streamflow information (for estimation of loads) is available from an existing USGS gaging station on Rapid Creek above Canyon Lake (site 06412500). Streamflow information below Canyon Lake will be obtained from discharge measurements during sample collection. A more detailed listing of the proposed sites and number of samples will be determined through further discussions with interested cooperators. Pre-dredging information will be compiled from all available sources, specifically including SD DENR databases. This will allow for a longer time period of pre-dredging observations.

Sediment fingerprinting may evolve as a useful aspect for a future phase of this monitoring program. Sediment fingerprinting involves collecting samples of stream sediment and lake bed soils and characterizing them by physical and chemical properties, such as mineral composition, soil type, nitrogen content, and phosphorus content. These properties collected from upstream tributaries (such as the Red Rock drainage basin) could be compared to the sediment properties of the lake bed. This would allow for an assessment of the amount of accumulated sediment that can be attributed to in-lake waterfowl loading (organics), and that portion that can be attributed to inflow from upstream tributaries. This task will not be included in this initial proposal.

Relevance and benefits

This project will help gauge success of an individual dredging event at achieving improved (or similar) water quality, and provide information to assist with future dredging operations. This will also provide the managers of Canyon Lake quantitative information regarding the potential effects of the waterfowl population on downstream water quality. This information can be used to help determine if waterfowl management strategies are warranted for Canyon Lake. In these ways, a monitoring program will aid in the management of Canyon Lake for decades to come.

Products

Data collected from this project will be provided to the public on the National Water Information System (NWIS) website. Quarterly progress reports will be provided to the cooperator(s) that summarize information collected and preliminary explanations or implications. A final presentation will be made at the conclusion of the project. A peer-reviewed publication is not planned with this proposal, but could be included with a future phase if desired.

Budget and timeline

This project budget would require $20,000 annually from West Dakota Water Development District (cooperator) to be matched with $10,000 annually from USGS cooperative funding for a total of $60,000 during a 2-year period. The anticipated project start date is April 2017 and ending in December 2018.

Table 1. Proposed budget for 2-year Canyon Lake monitoring project.

Category	Cooperator	USGS	Total
Staff labor	$ 28,200	$ 14,000	$ 42,200
Lab analyses	$ 9,400	$ 4,800	$ 14,200
Equipment / travel	$ 2,400	$ 1,200	$ 3,600
Total	$ 40,000	$ 20,000	$ 60,000

Figure 1. Canyon Lake photo from September 2015, showing areas of excessive aquatic vegetation in the southwest corner and around island. Approximate sampling locations for proposed project are depicted with red triangles.

References Cited

Delzer, G.C., 1993, Water-quality and nutrient survey for Rapid Creek from below Pactola Reservoir to Canyon Lake in Rapid City, South Dakota: Rapid City, South Dakota School of Mines and Technology M.S. Thesis, 150 p.

Gesick, J.N., 2016, Canyon Lake dredging will increase depth and clarity of water, Rapid City Journal, December 5, 2016: accessed December 6, 2016, at http://rapidcityjournal.com/news/canyon-lake-dredging-will-increase-depth-and-clarity-of-water/article_791f4887-5b39-5106-9c37-fcb610cdeb19.html.

Hoogestraat, G.K., Putnam, L.D., and Graham, J.L., 2008, Algal and water-quality data for Rapid Creek and Canyon Lake near Rapid City, South Dakota, 2007: U.S. Geological Survey Data Series 354, 16 p.

South Dakota Department of Environment and Natural Resources, 2010, Surface water quality standards: accessed June 22, 2010, at http://denr.sd.gov/des/sw/swqstandards.aspx.

United States Department of the Interior
U.S. GEOLOGICAL SURVEY
Dakota Water Science Center

ND Programs Office
821 E. Interstate Avenue
Bismarck, ND 58503

SD Programs Office
1608 Mountain View Road
Rapid City, SD 57702

April 28, 2017

Ms. Emily Martinez
Administrator
West Dakota Water Development District
P.O. Box 6365
Rapid City, South Dakota 57709

Dear Ms. Martinez:

Enclosed are two signed originals of our standard joint-funding agreement (18EMSD0001) for the Dakota Water Science Center Water Resources Investigations project of operation and maintenance of two streamflow gages – Castle Creek above Deerfield Reservoir (seasonal, non-ice period) and Rhoads Fork near Rochford, during the period October 1, 2017 through September 30, 2018 in the amount of $14,785 cash from your agency. U.S. Geological Survey contributions for this agreement are $11,725 for a combined total of $26,510. Please sign and return one fully-executed original to Jennifer Bednar at the address above.

Federal law requires that we have a signed agreement before we start or continue work. Please return the signed agreement by **October 1, 2017**. If, for any reason, the agreement cannot be signed and returned by the date shown above, please contact Joyce Williamson by phone number (605) 394-3219 or email jewillia@usgs.gov to make alternative arrangements.

This is a fixed cost agreement to be billed annually via Down Payment Request (automated Form DI-1040). Please allow 30-days from the end of the billing period for issuance of the bill. If you experience any problems with your invoice(s), please contact Jennifer Bednar at phone number (605) 394-3218 or email at jbednar@usgs.gov.

The results of all work performed under this agreement will be available for publication by the U.S. Geological Survey. We look forward to continuing this and future cooperative efforts in these mutually beneficial water resources studies.

Sincerely,

Joyce E. Williamson
Director

Enc.: 18EMSD0001(2)

Form 9-1366
(April 2015)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations

Agreement#: 18EMSD0001
Customer#: 6000000742
Project #: NT009R0 00100
TIN #: 46-0385532
USGS DUNS #: 126301386

Fixed Cost Agreement YES[X] NO[ ]

THIS AGREEMENT is entered into as of the October 1, 2017, by the U.S. GEOLOGICAL SURVEY, Dakota Water Science Center, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the West Dakota Water Development District party of the second part.

1. The parties hereto agree that subject to the availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation for Water Resource Investigations for operation and maintenance of two streamflow gages – Castle Creek above Deerfield Reservoir (seasonal, non-ice period) and Rhoads Fork near Rochford, 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) include In-Kind-Services in the amount of $0.00

(a) $11,725 by the party of the first part during the period October 1, 2017 to September 30, 2018

(b) $14,785 by the party of the second part during the period October 1, 2017 to September 30, 2018

$3,060 unmatched

(c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of :

Description of the USGS regional/national program:

(d) 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

(e) 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.

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 cost, 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 annually. 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.).

Form 9-1366
(April 2015)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations

Agreement#: 18EMSD0001
Customer#: 6000000742
Project #: NT009R0 00100
TIN #: 46-0385532
USGS DUNS #: 126301386

USGS Technical Point of Contact

Name:	Joyce Williamson Supervisory Hydrologist
Address:	1608 Mountain View Road Rapid City, SD 57702
Telephone:	(605) 394-3219
Fax:	(605) 355-4523
Email:	jewillia@usgs.gov

Customer Technical Point of Contact

Name:	Emily Martinez Administrator
Address:	P.O. Box 6365 Rapid City, South Dakota 57709
Telephone:	(605) 394-2685
Fax:	
Email:	EMartinez@h2eincorporated.com

USGS Billing Point of Contact

Name:	Jennifer Bednar Administrative Officer
Address:	1608 Mountain View Road Rapid City, SD 57702
Telephone:	(605) 394-3218
Fax:	(605) 355-4523
Email:	jbednar@usgs.gov

Customer Billing Point of Contact

Name:	Emily Martinez Administrator
Address:	P.O. Box 6365 Rapid City, South Dakota 57709
Telephone:	(605) 394-2685
Fax:	
Email:	EMartinez@h2eincorporated.com

U.S. Geological Survey
United States
Department of Interior

Signature

By _____ **Date: Apr 28, 2017**
Name: Joyce E. Williamson
Title: Director

West Dakota Water Development District

Signatures

By_____ **Date:** _____
Name:
Title:

By_____ **Date:** _____
Name:
Title:

By_____ **Date:** _____
Name:
Title:

Form 9-1366
(April 2015)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations

Agreement#: 18EMSD0001
Customer#: 6000000742
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Fixed Cost Agreement YES[X] NO[ ]

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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) include In-Kind-Services in the amount of $0.00

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(b) $14,785 by the party of the second part during the period October 1, 2017 to September 30, 2018

$3,060 unmatched

(c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of :

Description of the USGS regional/national program:

(d) 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

(e) 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.

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 cost, 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 annually. 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.).

Form 9-1366
(April 2015)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations

Agreement#: 18EMSD0001
Customer#: 6000000742
Project #: NT009R0 00100
TIN #: 46-0385532
USGS DUNS #: 126301386

USGS Technical Point of Contact

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U.S. Geological Survey
United States
Department of Interior

Signature

By _____ **Date: Apr 28, 2017**
Name: Joyce E. Williamson
Title: Director

West Dakota Water Development District

Signatures

By_____ **Date:** _____
Name:
Title:

By_____ **Date:** _____
Name:
Title:

By_____ **Date:** _____
Name:
Title:

Draft research proposal April 3, 2017 by Jerome Wright

"The conservation of irrigation water through the use of compost as a soil amendment."

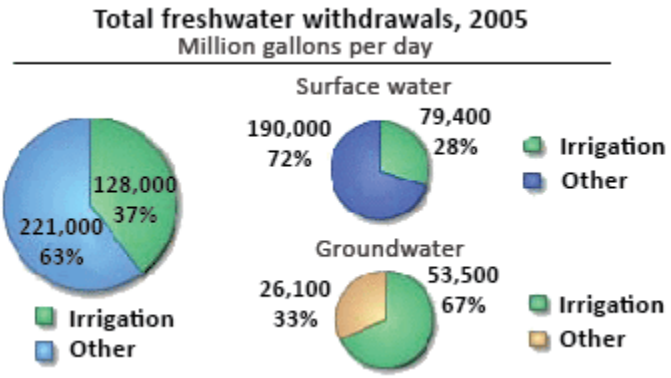
This proposal is prepared in the hopes of acquiring academic, financial, scientific, and operational resources to determine if compost would be a significant factor in irrigation water conservation.

Statement of the Problem

"Agriculture is a major user of ground and surface water in the United States, accounting for approximately 80 percent of the Nation's consumptive water use and over 90 percent in many Western States. Efficient irrigation systems and water management practices can help maintain farm profitability in an era of increasingly limited and more costly water supplies." Usda.gov/topics/farm practices-management/irrigation-water-use.aspx

From the USGS Water Science School, May 2, 2016, http://water.usgs.gov/edu/wuir.htm

Irrigation water withdrawals for the Nation, 2005



For 2005, total irrigation withdrawals were about 128,000 million gallons per day (Mgal/d), or 144,000 thousand acre-feet per year. (All 2010 water use information is from the report Estimated use of water in the United States in 2010.) Irrigation withdrawals were 37 percent of total freshwater withdrawals and 62 percent of total freshwater withdrawals for all categories, when excluding thermoelectric power. Surface water accounted for 58 percent of the total irrigation withdrawals. About 61.1 million acres were irrigated in 2005.

About 26.6 million acres were irrigated with surface (flood) systems, 4.05 million acres with microirrigation systems, and 30.5 million acres with sprinkler systems. The national average application rate was 2.35 acre-feet per acre.

Irrigation freshwater withdrawals for the United States in 2005					
Withdrawals Million gallons per day (1,000 acre-feet per year)			Irrigated land (1,000 acres)		
Groundwater	Surface water	Total	Sprinkler	Micro-irrigation	Surface
53,500 (60,000)	74,900 (84,000)	128,000 (144,000)	30,500	4,050	26,600

In addition to the use of water for irrigation, another growth issue is solid waste and the proper use and or disposal of the same. In the publication EPA-530-7-14-001, February 2014, www.epa.gov.wastes solid waste generation peaked at 4.38 pounds per day per person. As a nation, in 2012 we generated approximately 250.9 million tons of municipal solid waste. The composition of that waste is as follows:

13.5% yard waste	8.9% metals	3.4% other
14.5% food waste	12.7% plastics	
27.4% paper and paperboard	8.7%ntextiles, leather, rubber	
4.6% glass	6.3% wood	

Yard waste and food comprise 28% of our municipal solid waste which is easily composted through several methods. Paper products are compostable but there is also the option of sale to post consumer buyers. If paper products are included over 50% of the waste stream is compostable. If the compostable portion, along with the highly marketable value of metals and plastics are included, our waste stream being landfilled can be reduced significantly, and within the 50% range.

Would the diversion of organic wastes currently being landfilled to the production of compost be a beneficial solid waste disposal option? Would the utilization of compost into our soils, especially in the western areas of the United States, improve the soil structure enough to significantly conserve irrigation water and other soil related issues in agricultural production.

Recent records on the production of compost products by the City of Rapid City, Landfill and Material and Recovery Facility are as follows:

2011	6,666 ton	2014	10,099 ton
2012	6,339 ton	2015	5,508 ton
2013	5,611 ton	2016	6,226 ton

The two most important elements on earth for our growth and survival are provided by the air we breathe and the water we drink. It is proposed by this project to study the conservation of water through the use of compost in our agricultural soils and the potential for conservation of valuable water through such efforts.

A community's ability to survive and grow is directly based upon the availability of usable water. If there is a shortage of water or no water to support development, a community will only be able to maintain the status quo. If there is a need to provide food supplies for a growing population, economic growth to sustain a growing population, then available water is an absolute necessity. Additional water, unless imported, because of the transpiration process, is simply not available. Water conservation and protection of existing water resources is paramount. Reasonable and cost effective conservation methods must be implemented as soon as possible.

The population and commerce of any urban area, in addition to requiring water, produces approximately one ton per year of solid waste. 80% of the waste is municipal solid waste, with the above mentioned components. The City of Rapid City, with its current yard waste and municipal solid waste composting, utilizing bio solids, is in an excellent position, along with irrigated properties in the immediate area, to support a field applied analysis of the question, "Does increasing the organic matter of agricultural soil, by the incorporation of compost into the soils, conserve significant amounts of irrigation water?"

If water is significantly conserved by the use of compost in amending soils, would the finding assist in better water usage, higher potential for quality growth, economic development, and agricultural production. In the evaluation of findings, what would be the savings in water, infrastructure, landfill storage, and bio solid utilization.

Literature Review

Literature searches have shown significant information on water availability through compost utilization, but very little if any, on the conservation of water in irrigation projects where the soils were amended with compost.

The City of Rapid City, through its yard waste and solid waste composting program, along with the bio solids composting program, has in excess of 10 years of data on the quality and environmental compliance of their compost products. This includes compost quality and environmental compliance required by EPA.

Conceptual Framework

Utilizing the compost products produced by the City of Rapid City and local irrigation fields, comparative data will be produced showing the findings of any differences in soil absorption and availability of water**.** Areas will be set aside and equitably divided so that comparisons with the least if any variables available being used. It appears in observation and literature discussion, that soils with higher porosity, less density, will absorb water quicker than tight soils having minimal or restrictive mechanisms water infiltration. By incorporating compost into the soil the organic fraction of the soil structure would be

increased and therefore should improve the soils ability to absorb water. If infiltration is delayed by the condition of the soil, more of the applied water is at risk of evaporation or runoff. Prevention of this risk exposure would occur if the soil is able to absorb, infiltrate, the water quicker. Therefore, water would potentially be conserved.

Hypotheses or Research Questions.

Will the incorporation of compost into soils being irrigated significantly reduce the amount of applied water needed to bring the soil to adequate water content?

Will the cost of incorporating the compost into the soils of an irrigation project be in a positive cost benefit analysis?

Will the incorporation of compost into the soils of an irrigation project produce any other positive or negative results?

Methodology

It is anticipated that agricultural land near the Water Reclamation Facility will be the beta site, with additional sites at the Belle Fourche Irrigation District and the Angostura Project may be incorporated.

Radial plots, will be used, so that pivotal type sprinkler systems can be used. The plot center line will be orientated with the prevailing wind, with one half being modified with compost and the other not. Otherwise, all other conditions will be the same. If compost is incorporated by tilling, plowing or other method, the non- composted area will receive the same treatment.

Through the use of water supplied by the Water Reclamation Facility, utilizing their water supply line and operational pumping system, along with appropriate monitoring devices or methods, for water applied, rain/snow fall, winds, temperature, and similar environmental and application records will be kept. Appropriate testing for infiltration, water content, soil moisture, and soil characteristics will be taken and recorded. Other appropriate testing for other items of concern can be included.

The quality of the compost will be stated by the testing done by the City for their compliance and customer information needs. Test results for over ten years are readily available and samples of two such samples are at Appendix A.

The water content of each soil segment will be compared for any difference in water content and or related quantities or measures of moisture as appropriate for this study. If significant savings in water applied is proven by the comparison of composted and non-composted soils, economic and savings evaluation will be discussed.

1. Equal parcels of cropland will be used.
2. The parcels will be in circular form, with the division line oriented to the prevailing winds.
3. With the exception of compost application, at rates to be determined, all other conditions will be the same.

4. Climatic and application rates and volumes of moisture will be recorded.
5. If results show a significant savings in water applied through the use of compost treated soils, an analysis of the potential impact in savings will be made.
6. Value of any conserved water will be discussed in relation to current uses by irrigation operations.

Task Structure

1. Research team will be selected, this will include the primary researcher, appropriate academic advisory members, and data collection assistants,
2. Data to be collected will be listed
3. Data analysis protocol will be selected including laboratory facilities.
4. Site(s) will be selected
5. Site preparation, including soil and or compost amendment shall occur. Irrigation system and any installed instrumentation, including possible weather station, will be installed.
6. Data will be collected on a regular basis, and initial analysis, as appropriate will be done
7. Upon completion of a reasonable monitoring time and results is complete, the final analysis will occur.
8. Preparation of the final report will be concluded, along with appropriate peer review.
9. Presentation of findings will be made to the appropriate recipients.
10. Additional research, if warranted, will be noted and recommended.

Management Plan

The primary manager of the research in the impact of compost in potential savings of water will be the PhD candidate conducting the basic research, as outlined above.

The Chairman, Civil and Environmental Engineering Department head, South Dakota School of Mines, will be the primary academic control for the water conservation findings and direction.

The appropriate professor, Plant Science Department, South Dakota State University, will be the primary academic control and advisor for the agricultural findings and direction.

Laboratory services will be used as available and appropriately. The use of the private laboratory for compost quality assurance will continue. Other testing may be done by the City of Rapid City through its own resources, and the same will hold for SDSU.

The initial selection and construction of the test site(s) will occur in May through June of 2017.

Data management and collection will begin as soon as possible, and occur as needed.

Analysis of findings will begin as appropriate with initial findings being possible by the end of fall 2017.

Final data collection, with draft reports being completed by December of 2018 or sooner.

Completion of project by April of 2019.

Staff and Institutional Qualifications

Jerome T. Wright, primary researcher, PhD candidate SDSM&T, PE retired, BSCE 1971, MSCE 1974, manager and contributing designer for Rapid City Recycling and Composting Program.

Dr. Scott Kenner, Department Chair, Civil and Environmental Engineering, South Dakota School of Mines

Dr. Sandeep Kumar, Professor, Plant Science Department, South Dakota State University

Dave Van Cleave, BS Biology, Division Manager, Water Reclamation Facility, City of Rapid City

The South Dakota School of Mines is a distinguished learning and research center in the fields of environmental engineering and water quality and conservation. South Dakota State University is a nationally recognized leader in agricultural research and applied science.

Budget 4/3/2017	**Annual**	**Total**
PhD candidate tuition and fees	$6,000	$12,000
PhD subsistence	$ 0	$ 0
SDSU, Academic Support	$ 0	$ 0
MSCE candidate tuition and fees	$ 0	$ 0
MSCE Subsistence	$15,000	$15,000
Laboratory fees	$ 0	$ 7,500
Materials	$	$18,000
Report publication		$ 2,000
Contingency at 10%		$ 5,000
Subtotal		$59,500
SDSM&T, University Overhead – 39%		$23,205
Total Cost		**$82,705**
Anticipated Funding		
PhD candidate GI Bill		$13,000
City cash contribution		$25,000
City materials, incorporation, etc.		$20,000
SDDENR		$ 0
West Dakota Water Development District		$25,000
Economic Development Fund		$ 0
USDA, NRCS		$ 0
Total Funding		**$ 83,000**