KANSAS GEOLOGICAL SURVEY

1930 Constant Ave., Campus West
The University of Kansas
Lawrence, Kansas 66047-3726
phone 785-864-3965
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May 13, 2003

Proposed Project for Application to the Kansas Department of Health and Environment for the Kansas Public Water Supply Loan Fund.

Applicant: Cloud County Rural Water District No. 1
P.O. Box 8
Aurora, KS 67417

Contact Person: Ann Adams, 785-464-3391

Sent to the Kansas Geological Survey for environmental review.

Agency Review Comments:

The project includes a recommendation to drill two new wells into the alluvial aquifer of the West Branch of Oak Creek about 3 miles southeast of Concordia and abandon the existing well, apparently because the radium concentration sometimes exceeds the MCL for public supply use. The depth of alluvium in such a small stream as West Branch Oak Creek would not usually be expected to be much greater than a couple tens of feet. Although the well log for the existing RWD well completed 1981 and screened at a depth of 90-110 feet in the Dakota sandstone aquifer indicates "gravel" at 51-64 ft and at 66-79 ft, this could be some cemented portion of the Dakota Formation that acted like gravel to the driller. If the "gravel" units are indeed true gravel, then why did the driller not screen the gravel units in the well because they were protected from the surface by 51 ft of clay? An alluvial aquifer of 79 ft deep in such a small valley would be most unusual for this part of Kansas.

Before proceeding with the final recommendations, a much better examination of the aquifer potential of the location should be obtained. Alternatively, this step could be made a part of the application. A test well should be placed into the supposed gravel zones down to a depth of about 80 ft to determine the water yielding character of the zones marked gravel on the log of the existing RWD well. The test well should be carefully logged to determine whether the "gravel" units found before at the existing well location are true alluvial aquifer material or part of the shallow Dakota aquifer at that location. The chemical quality of the water from the test hole should also be checked. I recommend that the RWD No. 1 obtain a company with someone who is familiar with the hydrogeology of Kansas in terms of locating and designing public supply wells for small communities.

I do not recommend abandoning the existing well because there is a possibility that the alluvial aquifer may not yield sufficient quantities of water for wells, especially considering that the alluvium appears to be clay at the location. If the "gravel" zones indicated in the logs of the

existing well are actually part of the upper Dakota aquifer at the site, and the "gravel" units yield sufficient water for wells, then the water could possibly hold smaller amounts of radium because from a different zone in the Dakota. If the "gravel" zone has a lower radium content, then water from a well constructed in that zone could be mixed with water from the existing well to make sure that the radium concentration is always below the MCL. The information on the radium in the existing well is that it "sometimes" exceeds the MCL. Thus, the radium concentration must be close to the MCL and mixing with water with below the MCL should produce a mixture that meets the drinking water regulations.

Any additions or changes to the water right held by the RWD should be submitted to the Division of Water Resources, Kansas Department of Agriculture.

Any short-term adverse impacts during construction of the wells, chlorination building, and associated activities should be offset by the long-term benefits of the improvements to the public water supply system.

Recommended Action:

___ Clearance of project should be granted

___ Clearance of project should not be granted

___ Clearance of project should be delayed until the issues or questions have been clarified

__X__ Clearance of project should not be delayed, but the applicant (in the application) should address or clarify the questions or concerns indicated above

If you have any questions concerning this review, you may call me at 785-864-2182.

Donald O. Whittemore	Geohydrology Section, Kansas Geological Survey	5/13/03
Reviewer's Name	Division/Agency	Date

Donald O. Whittemore

Reviewer's Signature

Kansas Geological Survey | Hydrology | Water Well Database Query

Specific Water Well Detail

Well T6S, R3W, Sec. 23, NESENW, Action: Constructed

Location Info		
	County: Cloud	**Location:** T6S, R3W, Sec. 23, NESENW
	Owner:	**Status**: Constructed
	Directions:	
	Longitude: -97.62076	**Latitude**: 39.52007
General Info		
	Well Depth: 110 ft.	**Elevation:** ft.
	Static Water Level: 18 ft.	**Well Use:** Public Water Supply
	Est. Yield: 500 gpm.	
Driller Info		
	Driller: Arnie Beswick, Cox-Beswick Irrigation Service, Inc.	**License #:** 361
	Comp. Date: 10-Sep-1981	**DWR Applic. #:**
	Chemical Sample Submitted?: N	
Casing Info		
	Casing Type:	
	Diam: 0 in. to 0 ft.	
	Diam: 0 in. to 0 ft.	
	Diam: 0 in. to 0 ft.	
Grout Info		
	Grout used: other	
	From: 0 to 0 ft.	
	From: 0 to 0 ft.	
	From: 0 to 0 ft.	
Contamination Info		
	Contamination type: none	
	Direction:	**Distance:** 0
Screen and Perforation Info		

Screen Type: OTHER	**Screen Openings:** OTHER
From: 90 ft. to 110 ft.	**From:** 0 ft. to 0 ft.
From: 0 ft. to 0 ft.	**From:** 0 ft. to 0 ft.

Lithologic Log

From: 0 ft. **to** 51 ft.	**Type:** CLAY
From: 51 ft. **to** 64 ft.	**Type:** GRAVEL
From: 64 ft. **to** 66 ft.	**Type:** CLAY & GRAVEL
From: 66 ft. **to** 79 ft.	**Type:** GRAVEL
From: 79 ft. **to** 80 ft.	**Type:** CLAY
From: 80 ft. **to** 82 ft.	**Type:** SANDSTONE
From: 82 ft. **to** 83 ft.	**Type:** CLAY
From: 83 ft. **to** 109 ft.	**Type:** SANDSTONE
From: 109 ft. **to** 110 ft.	**Type:** CLAY

Kansas Geological Survey
Comments to webadmin@kgs.ku.edu
URL=http://www.kgs.ku.edu/Magellan/WaterWell/index.html
Display Programs Updated June 17, 2002
Data added continuously.

Cloud County Rural Water District No. 1

P.O. Box 8
Aurora Kansas 67417

Phone 785-464-3391
Fax 785-464-3391

April 22, 2003

Kansas Geological Survey
University of Kansas
1930 Constant Ave., Campus West
Lawrence, Ks 66047

RE: Cloud County Rural Water District No. 1
Kansas Public Water Supply Loan Fund
Project No. 2327

The Cloud County Rural Water District No. 1 is preparing a application to the Kansas Department of Health & Environment for a loan from the Kansas Public Water Supply Loan Fund for the referenced project. Project consisting of the drilling and equipment of two new water wells, install telemetry controls, construct a chlorination building and refinish two standpipes.

We would appreciate your review of the project description and location, and any comments you may have, within 30 days. A project review form is enclosed for your use.

Please contact Ann Adams at 785-464-3391 if you have any questions. I am generally at this number in the evenings. I do have an email address which is aadams@ctiks.com.

Thank you.

Cloud County Rural Water District No. 1

P.O. Box 8
Aurora Kansas 67417

Phone 785-464-3391
Fax 785-464-3391

April 22, 2003

Please note that the deadline for application submittal is May 31, 2003. Your immediate attention to our request is appreciated.

We appreciate your assistance in the review process.

CCRWD#1
Board Members

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Schwab-Eaton, P.A.

CIVIL ENGINEERS • LAND SURVEYORS • LANDSCAPE ARCHITECTS

April 21, 2003

Board of Directors
Rural Water District No. 1
2268 Wagon Road
Clyde, KS 66938

Re: Water Supply Improvements
Rural Water District No. 1
Cloud County, Kansas

Dear Board Members:

Please accept this letter as our preliminary report of our investigation concerning water storage facilities on Systems A and D and water supply improvements for System D. Systems B and C are served from a direct connection to the City of Concordia and thus do not have storage facilities and water supplies to those system does not appear to be a problem.

System Concerns: The standpipes which serve as storage facilities on Systems A and D are in need of repainting. Before refinishing the standpipes, thought should be given to replacing the standpipes with elevated storage tanks which would provide considerably more beneficial storage. The beneficial storage capacity of a standpipe is somewhat limited to the upper one third of the unit, whereas the entire content of an elevated tank is considered available storage throughout the system.

The current water supply for System D is a single well and a backup booster pump station that pumps water from the City of Concordia. The well water quality is very good except for radium which sometimes exceeds the KDHE maximum contaminant level (MCL) of 5 picocures per liter. The backup booster pump does not have the capacity to serve all of System D, therefore the well water supply is critical to the system.

Water Demand: In 2001 the District experienced a period of high usage. System A had an average pumpage per active meter of 6,690 gallons per month. The peak day was 34,000 gallons which occurred on 2 August resulting in a peak to average day ratio of 2.2:1. In System D the average pumpage per active meter was 8,830 gallons per month. A peak day was noted on 8 August of 54,000 gallons, which results in a peak to average day ratio in excess of 1.5:1.

When projecting future demands, a 20-year planning period is typically used. A modest growth (1½% per year) is anticipated as well as a continued increase in water use (1% per year) throughout the planning period. Using a combined growth and water use projection of 2½% per year results in a 20-year compounded multiplier of 1.64.

Present Demand		
A System:	Avg. Monthly Pumpage	6,690 gal./meter
	Active Meters	69
	Average Day	15,200 gal.
	Peak to Average Day	2.24:1
	Peak Day Demand	34,000 gal. (23.6 gpm)
D System:	Avg. Monthly Pumpage	8,830 gal./meter
	Active Meters	122
	Average Day	35,400 gal.
	Peak to Average Day	1.52:1
	Peak Day Demand	54,000 gal. (37.5 gpm)
Future Demand		
A System:	Avg. Monthly Pumpage	8,160 gal./meter
	Active Meters	94
	Average Day	25,600 gal.
	Peak to Average Day	2.24:1
	Peak Day Demand	57,300 gal. (40.0 gpm)
D System:	Avg. Monthly Pumpage	10,770 gal./meter
	Active Meters	165
	Average Day	58,400
	Peak to Average Day	1.6:1 (rounded up)
	Peak Day Demand	93,500 gal. (65.0 gpm)

Water Storage: The total and beneficial storage capacities of the existing standpipes are:

System A:	Size	6' dia. x 100'
	Total Capacity	21,100 gal.
	Beneficial Storage	7,050 gal.
System D:	Size	6' dai. X 120'
	Total Capacity	25,400 gal.
	Beneficial Storage	8,450 gal.

As a general rule it is good to have two average days use or one peak days use in storage. Thus the future recommended beneficial storage capacities in Systems A and D are 57,300 gallons and 116,800 gallons respectively. Probably the nearest "standard" capacity elevated tanks would be 50,000 gallon and 100,000 gallon units.

Cost was the reason standpipes were installed in lieu of elevated tanks when the District was first constructed. Cost is still a prime consideration, especially since no problems have been reported to date due to a lack of water storage. Considering the fact that the combined cost of installing two elevated tanks would be around $400,000 it may be prudent to invest $50,000 to maintain

the existing storage facilities for several more years, or until such time that storage becomes a problem.

System D Water Supply: The Concordia backup booster pump is rated at approximately 30 gpm. This alone cannot meet even the current peak day demand. The entire Concordia delivery system would need to be reconstructed to provide the future 65 gpm flow requirements. This would require a new booster pump station and five miles of pipeline. The cost of water from Concordia at $2.40 per 1,000 gallons is also a factor in the desire to maintain a well water supply.

The present well currently pumps at a rate of 57 gpm which could sustain the system for many years. It is just unfortunate that the well has a high level of radium. A test well was recently drilled approximately 50 feet west of the present well. The test well was drilled into an alluvial formation but did not penetrate the lower Dakota. It is believed that the Dakota formation yields the higher radium amounts whereas the alluvial water had a radium content of only 2.0 picocures per liter. Other inorganic parameters were similar to the present well.

To provide a dependable groundwater supply, two new wells should be drilled into the upper alluvial deposits and each equipped with pumps capable of meeting the future peak day needs. In this manner, should one pump fail, the other is capable of serving the total needs.

A problem also exists with the present well control system which consists of a pressure switch at the well and an altitude valve at the standpipe. This type of system exerts excessive pressure on the pipeline and must be monitored at all times to insure a consistent control of the water level in the standpipe. Since beneficial storage is at a premium, new controls will maximize the limited capacity.

Recommendations: It is recommended that the two existing standpipes be refinished and to delay the high cost of constructing elevated storage tanks. Also, two new wells should be installed on System D and the existing well abandoned. In addition, a new chlorination building is needed for the new wells along with radio telemetry controls. Attached herewith is a project cost for a total of $278,000 representing the recommended improvements.

Should you have any questions regarding the contents of this report or wish to discuss the report in detail, please let us know.

Sincerely,

SCHWAB-EATON, P.A.

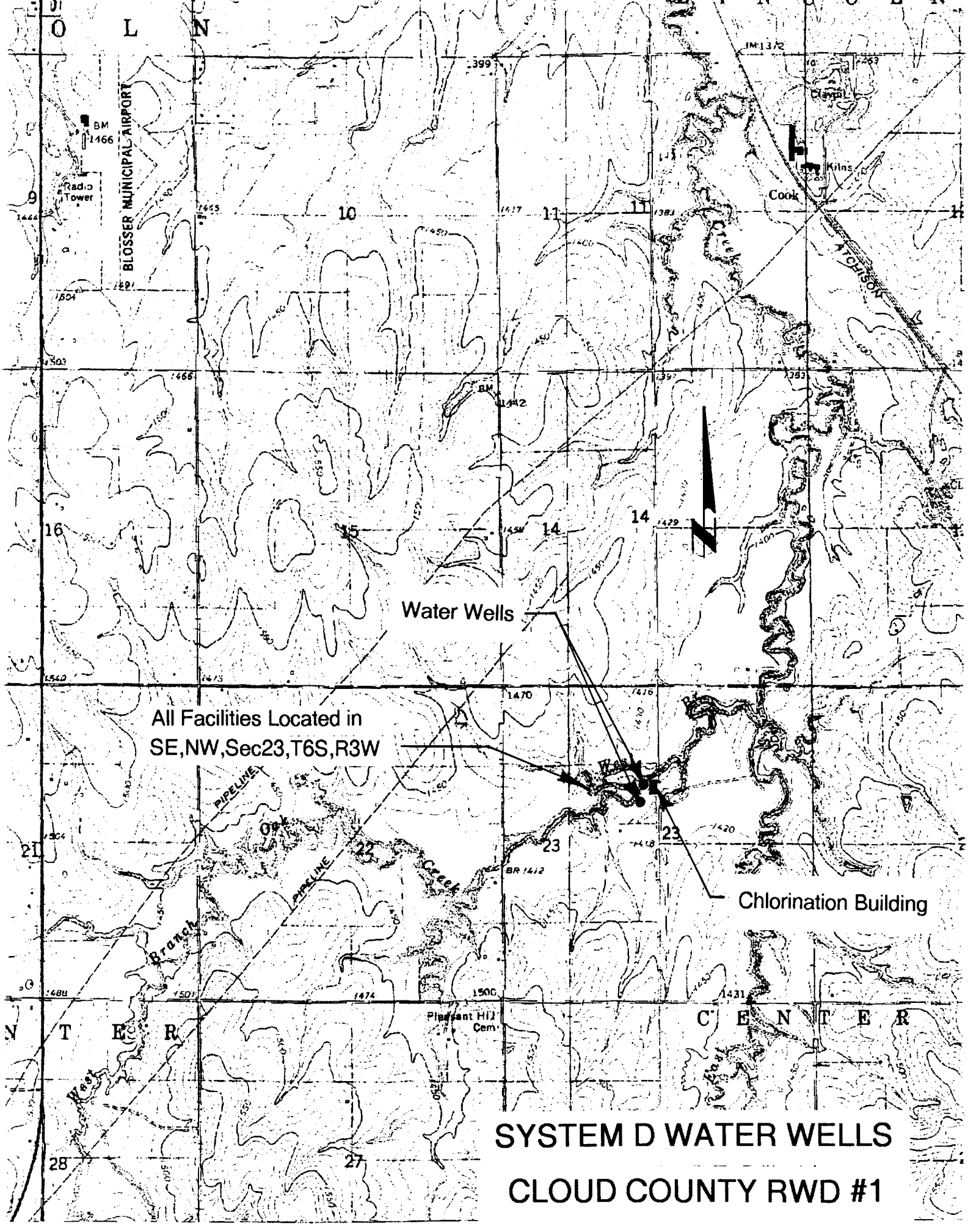
Mike Butler, P.E.

mb/ie

SYSTEM D WATER WELLS
RURAL WATER DISTRICT NO. 1
CLOUD COUNTY, KANSAS
April 2003

Project Cost Estimate

A.	Construction Cost			
	1. Water Wells Complete	2 Ea. @ $36,000	=	$72,000
	2. 4" PVC, Class 250 Pipe	600 L.F. @ $8.00	=	4,800
	3. Chlorination Building & Equipment	Lump Sum	=	70,000
	4. Radio Telemetry Controls	Lump Sum	=	16,000
	5. Plug Existing Well	Lump Sum	=	1,000
	6. Refinish 6' x 120' Standpipe	Lump Sum	=	25,000
	7. Refinish 6' x 100' Standpipe	Lump Sum	=	22,000
	Construction Cost Sub-Total			$210,800
B.	Overhead Costs			
	1. Engineering			$20,800
	2. Inspection			10,500
	3. Legal			2,000
	4. Sites (2 ea. @ $2,000)			4,000
	5. Test Drilling			8,000
	6. Contingencies (10%)			21,900
	Overhead Cost Sub-Total			$67,200
C.	Project Cost			
	1. Construction			$210,800
	2. Overhead			67,200
	TOTAL PROJECT COST ESTIMATE			**$278,000**


Water Wells
All Facilities Located in
SE,NW,Sec23,T6S,R3W
Chlorination Building
SYSTEM D WATER WELLS
CLOUD COUNTY RWD #1
BLOSSER MUNICIPAL AIRPORT
Radio Tower
Cook
Kilns
ATCHISON
Pleasant Hill Cem
PIPELINE
PIPELINE
Creek
Branch
West
BM 1466
BM 1442
BR 1412