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51.1248 (Manville)

**EXECUTIVE SUMMARY
FOR THE
MANVILLE WATER SUPPLY
PROJECT, LEVEL II**

June 13, 1997



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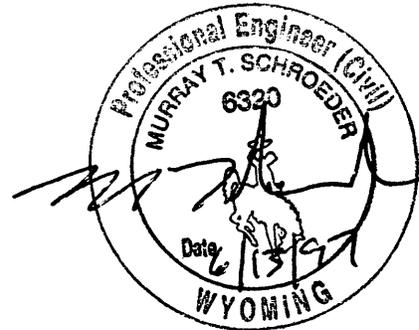
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**EXECUTIVE SUMMARY
FOR THE
MANVILLE WATER SUPPLY
PROJECT, LEVEL II**

June 13, 1997

Submitted To:

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1.0 INTRODUCTION

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1.1 Background

The Town of Manville, Wyoming, is located in Niobrara County near the headwater of the Niobrara River. Figure ES-1 is a project location map. The Town has a reported population of 100, and 60 water service connections to the Town's water distribution system. Most water use in the service area is for domestic purposes including domestic lawn irrigation.

The water system infrastructure includes two water supply wells, a 50,000 gallon elevated water storage tank, and water distribution piping. The wells were drilled in 1913, and the tank and original piping were installed in the 1910's.

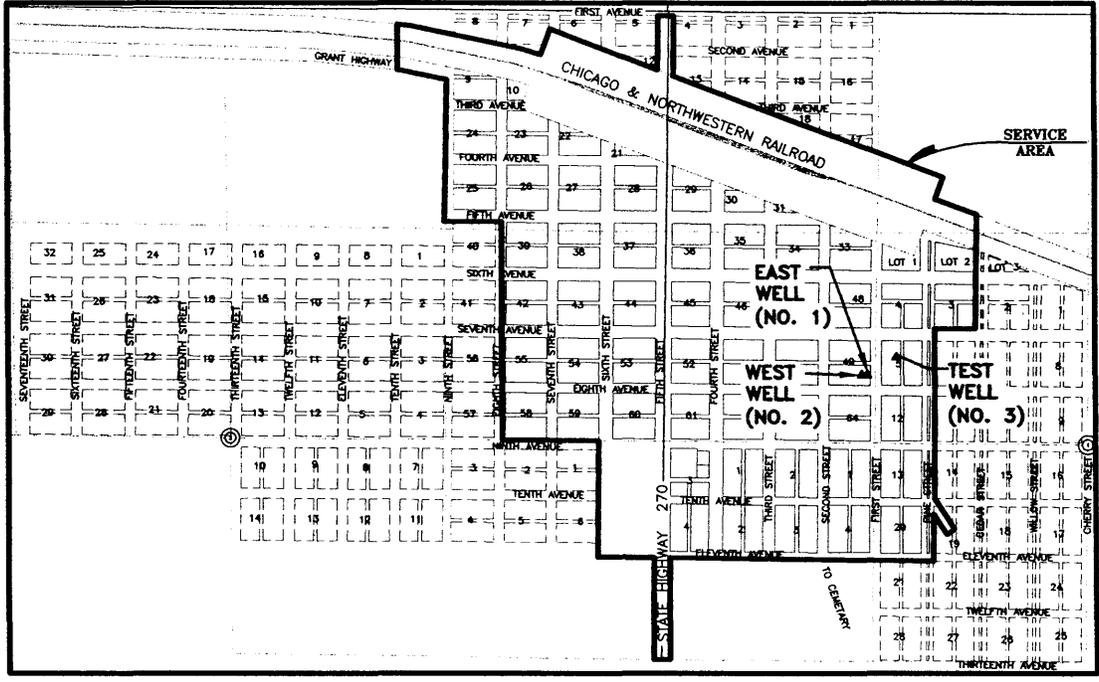
In 1995 the Town of Manville requested that a Level II project be funded by the Wyoming Water Development Commission (WWDC). At the time of this request, Town officials believed that the water storage and distribution system were in relatively good condition and of adequate size, but that the existing water wells were possibly at the end of their useful life.

In 1996, Western Water Consultant's, Inc. (WWC) contracted with the WWDC to perform an evaluation of the entire Manville water supply system, with an emphasis on water supply and water well evaluation.

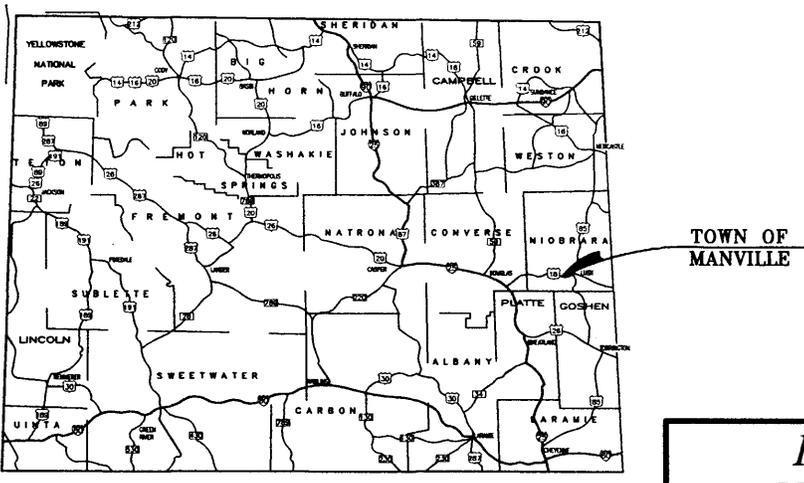
1.2 Objectives

The objectives of the Manville Water Supply Project, Level II were to:

1. Evaluate the ground-water supply from which Manville obtains water;
2. Evaluate the physical condition of the existing water supply wells;
3. Install a new municipal water supply well if the evaluations of water supply and water supply wells indicated that a new well would improve the reliability of supply and/or quality of water;



SERVICE AREA
 0 600 FT.
 SCALE



PROJECT LOCATION

FIGURE ES-1
PROJECT LOCATION MAP

TOWN OF MANVILLE, WYOMING
 WATER SUPPLY PROJECT, LEVEL II

Western Water Consultants, Inc. **Engineering**
 Engineering Environmental Mining Water Resources

4. Inventory and evaluate the condition of the water supply infrastructure, including the well pumps, the water storage tank, the transmission/distribution piping, and the water treatment system;
5. Prepare conceptual designs and perform financial evaluations for water supply infrastructure improvements that address system deficiencies identified during the project; and
6. Prepare a draft wellhead protection plan.

2.0 SUMMARY

2.0 SUMMARY

The following is a summary of important project findings and recommendations.

2.1 Ground-water Supply

The existing ground-water supply is the unconfined Arikaree aquifer. The Arikaree aquifer consists of massive fine grained brown and grey sandstone with occasional gravel layers. The aquifer is fractured at some locations.

Water quality from the Arikaree aquifer is excellent, as indicated by water quality data from the Town's water supply wells. At this time, the Town's water supply is in compliance with all enforceable EPA standards.

Ground-water nitrate (as N) concentrations are currently about 5 mg/L, which is one half of the EPA maximum allowable level of 10 mg/L. Concern for potential increases in nitrate concentration was one of the factors that contributed towards the Town's decision to drill a test well.

The Arikaree aquifer is the best potable water supply in the Manville area. The Arikaree aquifer has a large recharge area and can produce large quantities of excellent quality water. The Arikaree aquifer is vulnerable to contamination because it is a water table aquifer with a shallow depth to water, there is hydraulic connection/interaction with the Niobrara River, and the formation is locally fractured. Efforts to develop a wellhead (aquifer) protection plan and a local awareness of the ground- water resource are positive steps towards ensuring continued use of the Arikaree aquifer as a municipal water supply.

2.2 Water Demands

Design water demands were estimated for the purpose of evaluating the adequacy of both the existing water system infrastructure, and of any proposed modifications to the system. The design demands were based on actual demand field measurements, a system leakage allowance and a nominal demand increase allowance. Table ES-1 presents the design demands.

2.3 Existing Water Supply Wells

The East and West wells produce approximately 140 and 100 gpm, respectively, with drawdown during operation in the range of 3-7 feet. Both wells are capable of producing more water with higher capacity pumps.

The wells are open hole completion and in excellent condition despite their age. The wells were pump tested, and the results confirm that the two wells can supply the demand requirements of the Town with very little drawdown and interference. WWC recommends that these wells continue to be used because water quality and production is excellent and the wells are in good condition.

The existing pumping equipment is in reasonably good condition, but the pumps are not adequately sized (100 and 140 gpm) to meet current WDEQ requirements.

2.4 No. 3 Well (Test Well)

A new well completed in the Arikaree aquifer within the Town limits was deemed necessary by the Town Council to:

- a) reduce the risk of nitrate contamination, and
- b) provide supply capacity and redundancy if water quality or maintenance problems develop in the West and East wells. The Manville No. 3 well was located on the hill at the east edge of town, approximately 230 feet northeast of the East Well. The location was based on approved well siting criteria.

The Manville No. 3 well was drilled, installed, and developed during November 13-19, 1996. Eight-inch PVC casing was set and sealed with bentonite and cement from 0 to 100 feet. The well was then completed from 100 to 200 feet as 7 3/8 inch open hole.

Pump tests at the Manville No. 3 well were conducted during November 20-26, 1996. The well was pumped at a rate of 64 gpm for five days and can sustain a production of 60 gpm.

The general water chemistry at the Manville No. 3 well is identical to the East and West wells. However, the nitrate (as N) concentration in the No. 3 well appears to be slightly lower (1 mg/L) than at the East and West wells. This observation should be verified over a longer time period and with a larger number of comparative sampling events.

2.5 Water Storage Tank

Finished water storage for the Town includes a 50,000 gallon elevated steel tank. The tank was inspected, cleaned and repainted as part of a previous project in 1994. The tank is in excellent condition and does not require structural improvement.

WWC does not believe that treated water storage capacity should be increased. If Manville incorporates the No. 3 well into the supply at 60 gpm, upgrades the existing West Well pump to 200 gpm, and maintains the existing East Well at 140 gpm, then the water supply pumping and storage tank system will be in compliance with current WDEQ requirements.

2.6 Water Treatment System

The existing water supply is chlorinated at the wellheads with a Clorox solution and metering pumps. The treatment facilities were installed in 1994 and provide trouble free service. WWC recommends that the system be used without modification.

2.7 Water Distribution System

The water distribution system is in good condition. The distribution network piping is adequately sized to meet the peak hour design demand, although the network is not adequately sized to meet typical fire flow requirements. The Town has no legislated fire flow requirements.

System water leakage is about 11 gallons per minute (fall of 1996) and appears confined to service connections.

The distribution system has six dead end lines. The Town periodically flushes hydrants near the end of these lines to promote better water quality. This practice should be continued. There is one dead end line in the system (Sixth Ave, Second St. to Third St.) that WWC recommends be eliminated.

2.8 Conceptual Design and Cost Estimates

WWC prepared a detailed conceptual design and cost estimate for a project that will address all of the water system deficiencies identified during the project. The conceptual design includes the following general elements:

- a) No. 3 Well Tie-in. This work includes setting a pump in the new No. 3 well; installing a small building to house the pump discharge appurtenances, pump controls and chlorination equipment; and installing approximately 250 feet of transmission waterline to a point near the existing wellhouse.
- b) West Well Production Upgrade. This work involves replacing the existing pump with a new 200 gpm pump, which will improve the system flexibility for meeting peak demands. Work would also

include installing larger pump discharge piping, a water meter, a by-pass piping arrangement, and modern pump controls. These items are not a part of the existing pumping system.

- c) Manifold piping. This work involves installing new piping and valves to interconnect the No. 3 well and the West Well and the East Well. This piping arrangement improves the system by allowing for production from any one of the three wells. This three well system allows the Town to maintain appropriate emergency and fire flow storage volumes in the 50,000 gallon tank, even during conditions of peak use and or pump/motor downtime. This three well arrangement will also bring the Manville system into compliance with current WDEQ requirements (Chapter XII, Sections 13, (a)(I)(D)).
- d) Sixth Avenue Pipeline. This work involves extending a 4” diameter pipeline between Second Street and Third Street to eliminate a dead-end distribution line.

A project cost estimate for the conceptual design is included in Table ES-2.

2.9 Economic Evaluations

Table ES-3 presents economic data for the existing water supply system. The data show that the Town should increase the flat rate assessment to about \$15/tap/month if they expect to entirely fund the operation and maintenance costs of the system with user fees.

Table ES-3 also presents project financing, assuming WWDC financing of the conceptual design improvements. The evaluation shows that the flat rate charge for water use would have to be about \$23/tap/month in order to fund WWDC debt service and operation and maintenance of the system.

2.10 Draft Wellhead Protection Plan

A Draft Wellhead Protection (WHP) Plan was prepared as part of this project. The WHP plan was prepared in accordance with Wyoming’s Wellhead Protection Program Guidance Document – Draft Final (Wyoming Department of Environmental Quality/Water Quality Division, Version 1.1, March 1997).

WWC prepared only two of the required five parts of a formal WHP plan. WWC prepared a wellhead protection area delineation and a source inventory. The source inventory identifies potential sources of ground-water contamination within the delineated wellhead protection area. The Town will have to complete

the three other required aspects of a WHP plan, which include forming a WHP management committee, developing a contaminant source management plan, and preparing a contingency plan for siting new wells should contamination of the existing wells occur.

**Table ES-1
Town of Manville Design Water Demands
Manville Water Supply Project, Level II**

Description	Design Demand*		
	Gpm	Gal/capita/day**	Gpd
Summer			
Average Daily Demand	71	820	102,300
Maximum Day Demand	103	1,190	148,300
Peak Hour Demand	191	--	--
Winter			
Average Daily Demand	21	240	30,300
Maximum Day Demand	24	280	34,600
Peak Hour Demand	33	--	--
ANNUAL AVERAGE DAILY DEMAND	47	540	67,700

* Design Demand = 1996 Demand Estimate + Base Leakage Allowance + Demand Increase Allowance.

** Assumes 125 residents

Table ES-2
Conceptual Design Cost Estimate
Manville Water Supply Project, Level II

ITEM	DESCRIPTION	COST
A	Mobilization Bonds & Insurance	\$7,800
B	Well No. 3 Surface Seal	800
C	Well No. 3 Pipeline	6,900
D	Manifold Piping	3,600
E	Sixth Avenue Pipeline	8,500
F	Well No. 3 Pump House	14,300
G	Well No. 3 Pump	4,700
H	Well No. 3 Pump House Piping & Valves	5,500
I	West Well Pump House	5,500
J	West Well Pump	6,400
K	West Well Pump House Piping & Valves	8,500
L	Pumping System Controls	5,800
1	Construction Cost Subtotal (Items A-L Above)	\$78,300
2	Engineering Costs (10% of No. 1)	7,830
3	Subtotal (No. 1 & No. 2)	86,130
4	Contingency (15% of No. 3)	<u>12,900</u>
5	CONSTRUCTION COST TOTAL (No. 3 & No. 4)	99,030
6	Prepare Final Designs and Specs (15% of No. 5)	14,900
7	Permitting and Mitigation	500
8	Legal Fees	500
9	Acquisition of Access and ROW	<u>0</u>
10	PROJECT COST TOTAL (5+6+7+8+9)	114,930
11	3% Inflation Allowance for 1998 Project	\$3,450
12	TOTAL PROJECT COST (10+11)	118,380
13	ROUNDED PROJECT COST	\$118,000

**Table ES-3
Water System Economics
Manville Water Supply Project, Level II**

Item	Description	Annual Value
1	Current Annual Average Water System Income 3-Year average of 60 Taps at \$8.00/tap/month As prepared by the Town	\$6,878.92
2	Estimated Annual Water System O&M Budget	\$10,700.00
3	Flat Fee Water Rate to Cover Estimated Budget Only Based on Estimated Water System Budget Assumes 60 Taps (Item #2/60/12)	\$14.86 per tap/month
4	Conceptual Design Project Economics	
	a Project Costs	
	Well No. 3 Construction Cost	\$32,658.60
	Well Tie-in Conceptual Design	<u>118,000.00</u>
		150,658.60
	b Assumed WWDC Grant Percentage	60%
	c WWDC Grant	90,395.16
	d WWDC Loan	60,263.44
	e Financial Factor for n = 25 year, I = 7.25%	0.088
	f Annual Debt Service	5,303.18
	g Annual Debt Service per tap per month Assuming 60 services	\$7.37
5	Suggested Flat fee Water Rate to cover Estimated Annual O&M Budget and Debt Retirement on WWDC Financing Equal to Item 3 + Item 4g above	\$22.23 per tap/month