Square Butte Water Company
Source Water Delineation and Assessment Report

Public Water Supply: **Square Butte Water Company (PWSID #MT0000333)**
Report Date: **September 23, 2004**
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Introduction

This delineation and assessment report is intended to meet the technical requirements of the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). Joe Meek with the Montana Department of Environmental Quality (DEQ) prepared the final report with assistance from intern Bethany Haines. Information on land use and potential contaminant sources comes from a variety of sources including a preliminary land cover data layer produced by the United States Geological Survey (USGS), DEQ Public Water Supply files (including sanitary surveys), and other public sources of information. A web-based GIS application was also used to query and generate maps to support writing this report. This application is called the Source Water Protection Program Query System and is available at the following web address or URL: http://nris.state.mt.us/wis/swap/swapquery.asp. The application was developed by the DEQ Source Water Protection Program (SWPP) and provides access to data from the U.S. EPA, DEQ, Montana Bureau of Mines and Geology (MBMG) and other sources.

Purpose

The purpose of this delineation and assessment report is to assess threats to the Square Butte Water Company public water supply using information obtained from personnel managing the site, the most recent sanitary survey, which was completed in December 1999 by William Engle (available from DEQ upon request), and from published reports. Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water are identified on a map. These areas are referred to as source water protection areas. Assessment involves identifying locations or regions in source water protection areas where contaminants may be generated, stored, or transported and then determining the potential for contamination of drinking water by these sources.

Public Water Supply Information

Square Butte Water Company supplies water from developed springs on the flank of Square Butte in Choteau County (Figure 1) to the community also bearing the Square Butte name. Square Butte is a flat-topped mass of intrusive metamorphic rock (also called a

laccolith) on the east side of the Highwood Mountains in central Montana. The source of water to the springs is infiltration of precipitation and snowmelt into the bedrock of the butte where moves downward due to gravity and is discharged as spring water where water-bearing structure is exposed at the surface or near the surface. Springs are probably found around Square Butte where the contact (water bearing structure) between different rock types occurs such as the interface of a dense (nonfractured) igneous layer and a sedimentary layer or a fractured igneous layer. The actual discharge point for springs from the bedrock may be overlain and obscured by unconsolidated material eroded from the higher elevations. The sensitivity of the spring to surface contaminants is dependent on the thickness and make-up of the overlying material, and whether the collection system captures water directly from the bedrock or the overlying sediments.

The public water supply system serves a transient population of 25 people per day, and a resident population of 20 people per day through 11 active connections. Because the water supply does not regularly serve the same 25 persons for at least six months a year, it is classified as a transient, non-community public water supply. Water demand is approximately 27,250 gallons per day assuming water use is 10 gallons per day per transient person and 100 gallons a day per residential person (EPA, 1991).

The water collection system consists of two springs located on a ranch 3 miles away from the community of Square Butte. The West Spring (Spring #1) is composed of two separate springs combining together in concrete collection box. There is a tablet erosion type chlorinator in the collection box for the West Spring. The East Spring (Spring #2) consists of a single concrete manhole spring box that is about 10 feet deep. The water from the springs supplies 10 houses and 1 bar. Since the system consists of springs and exact details of the collection system is unknown, aquifer sensitivity is assumed to be high, in accordance with the Source Water Protection Guideline document (MT DEQ, 1999).

The springs both have a polyethylene pipe that is lying on the surface of the ground that leads from the springs towards town. Along the way the pipes join and the combined flow goes into a 3-compartment 18,000-gallon concrete storage tank. The storage tank is built of concrete and is buried underground. The compartments are not connected in series with each other. The first compartment fills and then overflows to the livestock watering station. The only way to fill compartments 2 and 3 is to restrict the flow to the livestock watering station which causes the water to back up into compartments 2 and 3, then it is supplied to the town and finally to the entry point and the distribution system.

The sanitary survey for Square Butte Water Company listed several recommendations that may be helpful in the future. First, disinfect the whenever maintenance or repair work on the system is done. Secondly, the valve that is split should be removed for the line and the pipe repaired. Finally, it was recommended to keep animals out of the spring collection boxes and the storage compartments' areas.

Square Butte Water Company routinely tests for microbiological contaminants and nitrate. The system must complete monthly bacteriological samples, as well as an annual nitrate sample. In the past five years there has been one coliform detection in November 1999,

where DEQ issued a health advisory. The health advisory was removed following subsequent sampling when coliform was not detected and public notice. The highest recorded nitrate level in the past five years was 0.13 mg/L in 2002, which is below the maximum concentration level (MCL) of 10 mg/L set by the U.S. Environmental Protection Agency (EPA).

Delineation

Source water protection zones around each spring are delineated for the Square Butte Water Company. They include a 100-foot radius control zone and a modified one-mile radius inventory region (Figure 1). Groundwater flow direction in this area is interpreted generally from south to north following the topography the butte; therefore the eastern, northern, and western boundaries follow the formation of the surrounding terrain.

The control zone is the most critical area from which direct introduction of contaminants into the well or immediate area can occur. The inventory region encompasses the area from which water or contaminants can flow into the company's water supply over a period of months to years.

Inventory

The Montana Source Water Protection Program (Montana DEQ, 1999) requires that land uses and potential sources of nitrate and microbial pathogens within the control zone and inventory region be identified. The control zone has a radius of 100 feet from the well where spills, leaks, or discharges could migrate quickly to the wellhead.

The sanitary survey for the Square Butte Water Company provides little information about the control zone. A concern was grazing cattle are present in the vicinity of the springs. Improper management of animal wastes may impact drinking water supply especially if the animals have access to the control zone. No other potential sources of contamination were identified within the control zone.

Analysis of the inventory region reveals that the predominant land covers includes grassland/shrubland (90%), and forest (10%). These land uses are not considered threats to the water supply unless there is excessive grazing in grassland/shrubland. See Figure 2 for a summarization of this data.

Septic density in the inventory region is low and poses no potential threat to water supply.

Susceptibility Assessment

Susceptibility to potential contaminant sources is assessed for a public water supply well. It is assumed that the aquifer is unconfined with a high sensitivity to potential contaminant sources located in the area (Montana DEQ, 2000, Table 2). If additional completion details become available for Square Butte Water Company, it may be necessary to amend the aquifer sensitivity rating and the susceptibility ratings presented in Table 1 below. When constructed properly, shallow ground water that is more vulnerable to contaminant sources at the land surface is prevented from entering the spring collection system.

Square Butte Water Company's water supply system has no significant potential contaminant sources and is not generally susceptible to nitrate and bacterial contamination from any significant potential contaminant sources.

Management Options

The sanitary survey for Square Butte Water Company listed management recommendations that may be helpful to ensure the continued delivery of high quality drinking water to Square Butte. First, disinfect the whenever maintenance or repair work on the system is done. Secondly, the valve that is split should be removed for the line and the pipe repaired. Finally, it was recommended to keep animals out of the spring collection boxes and the storage compartments' areas.

References:

DEQ Permitting and Compliance Division, 2001. Sanitary Survey for Square Butte Water Company, PWS- PWS ID: #MT0000333.

Montana DEQ, 1999. Montana Source Water Protection Program, Approved by EPA in November 1999.

Montana DEQ, 2000. Montana Source Water Protection Program, Template for Non-Community Transient Public Water Supplies, Revised 2002.

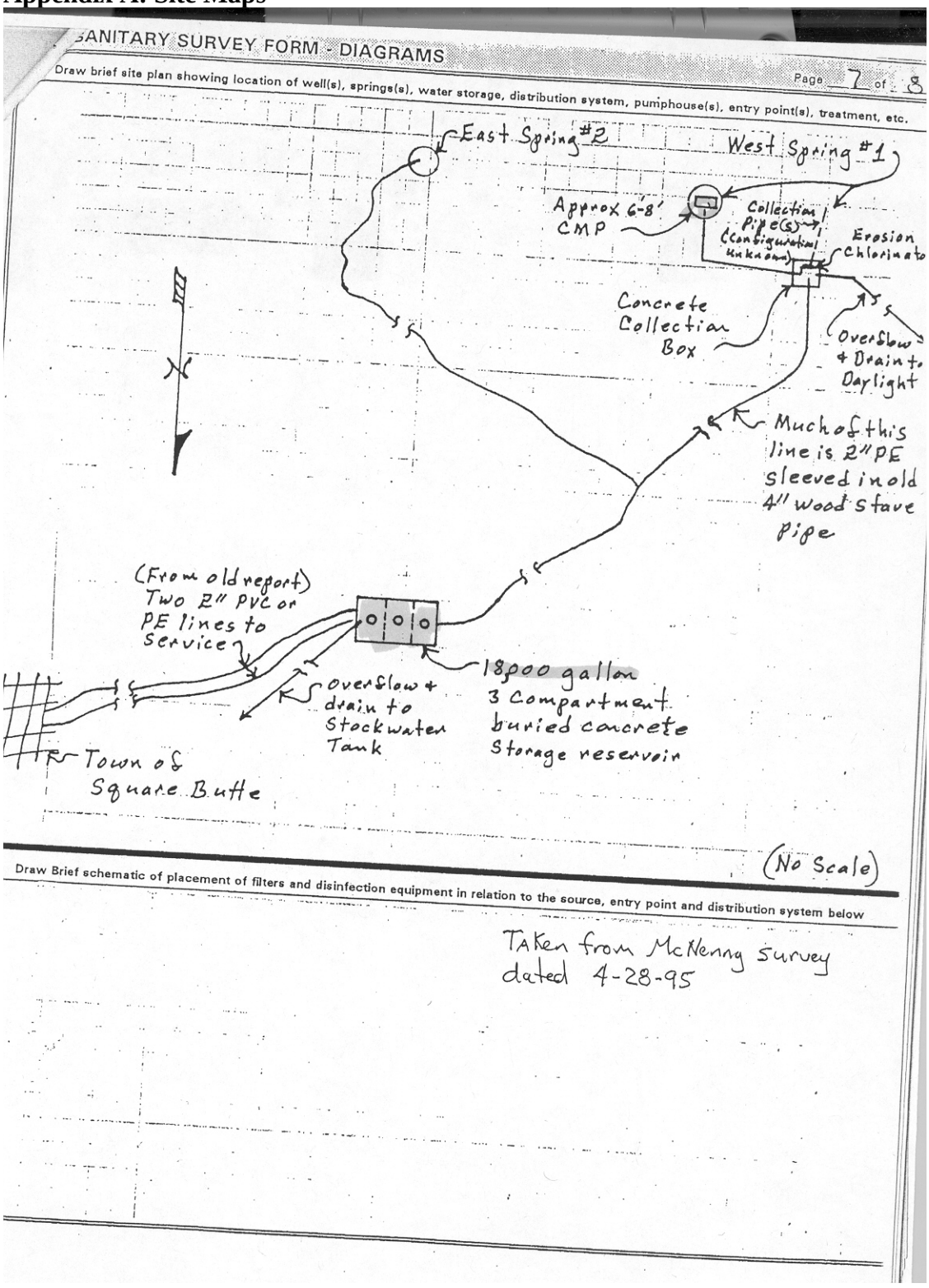
Montana State Library - Natural Resources Information System (NRIS) 2000 map base of the USGS Topographical coverage at 1:24,000 scale in MrSID format.

U.S. EPA, Office of Water, 1991. Manual of Small Public Water Supply Systems, EPA 570/9-91-003, 211 p.

U.S. Geological Survey, 2000. National Landcover Dataset, Montana. 30-meter electronic digital landcover/land use dataset interpreted from satellite imagery.

Alt, David A., and Donald W. Hyndman. Roadside Geology of Montana, 1986.

Appendix A: Site Maps



SANITARY SURVEY FORM - DIAGRAMS

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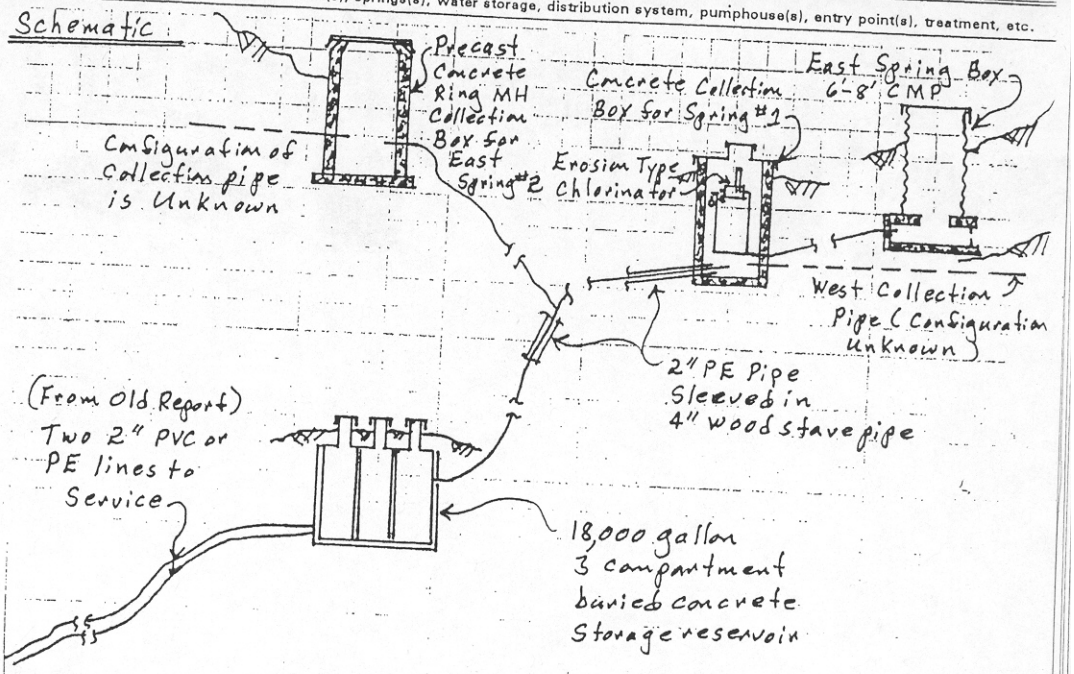
Draw brief ~~site plan~~ showing location of well(s), springs(s), water storage, distribution system, pumphouse(s), entry point(s), treatment, etc.



Draw Brief schematic of placement of filters and disinfection equipment in relation to the source, entry point and distribution system below

TAKen from McKenny survey dated 4-28-95