HYDROGEOLOGIC ASSESSMENT OF THE LIONS PARK SPRING, FORSYTH, MONTANA FOR GROUND WATER UNDER THE DIRECT INFLUENCE OF SURFACE WATER

LIONS PARK SPRING PUBLIC WATER SUPPLY
PWSID #03742
FORSYTH, MT

Montana Bureau of Mines and Geology
Open-file Report 401W

Prepared for
Montana Department of Environmental Quality
Public Drinking Water Section

by
Ted Duaime
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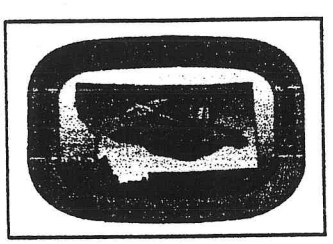
Catherine McDonald
Montana Bureau of Mines and Geology

JANUARY 2002



INTRODUCTION

This report summarizes the results of a hydrogeologic assessment of the Lions Park Spring public water supply (PWSID #03742). The Montana Bureau of Mines and Geology (MBMG) is under contract with the Montana Department of Environmental Quality (DEQ) to conduct preliminary assessments and hydrogeologic assessments for selected community water supplies. The project was funded under DEQ Contract Number 400022, Task Order number 10.

The purpose of conducting the hydrogeologic assessment is to determine if the Lions Park Spring is under the direct influence of surface water as defined in 40 CFR part 141. MBMG visited the site on May 9, 2001. The results of the hydrogeologic assessment indicate that the spring is most likely not under the direct influence of surface water as defined in 40 CFR part 141. This report summarizes data obtained during the field inspection that were used to make the above determination. Information on system location, construction, geology, hydrology, and water quality is summarized. Conclusions and recommendations are presented at the end of the report. Additional information, including the completed PA form, is provided in appendices to the report.

BACKGROUND

The Surface Water Treatment Rule (SWTR) of the Federal Safe Drinking Water Act of 1986 requires each state to examine public water supplies that use ground water to determine if there is a direct surface-water influence. In Montana, the Water Quality Division of DEQ is evaluating public water supplies for the SWTR. This project is known as the **Ground Water Under the Direct Influence of Surface Water (GWUDISW) program**. The SWTR defines ground water under the direct influence of surface water as any water beneath the surface with:

i) significant occurrence of insects or other macroorganisums, algae, or large diameter pathogens such as *Giardia lamblia*, or *Cryptosporidium*; or

ii) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface-water conditions.

PRELIMINARY ASSESSMENT

Evaluation of public water supplies for the GWUDISW program begins with completion of a preliminary assessment (PA). If the PA indicates that the ground-water supply may be under the direct influence of surface water, further study is required. Further study may include conducting a hydrogeologic assessment (HA), a water-quality assessment, and/or conducting microscopic particulate analysis (MPA) sampling. A preliminary assessment and a hydrogeologic assessment for Lions Park Spring was completed by MBMG during the May 9, 2001 site visit. The completed PA form for the spring is included as attachment 1. The spring was assigned a preliminary assessment score of 55 indicating the need for further assessment. A score of 40 or higher requires further evaluation. There has been one acute violation, and three non-acute violations in 2000 of the Total Coliform Rule.

SYSTEM DESCRIPTION

The Lions Park spring is classified as a transient non-community water supply by the DEQ. The spring serves visitors stopping at a roadside park along Highway 12. The spring box is buried under the gravel road that serves as a loop pull off from the highway. There is no access to the spring box and its exact location and condition is not know. Water from spring-box is piped underground to a concrete pad and stairs leading to a turn out along Highway 12. A PVC discharge pipe is mounted approximately 2 feet off the ground with the spring discharge flowing into a lined ditch. See Figure 2. Spring seepage appears at the surface between the spring box and the discharge pipe. This may be overflow from the spring box or possible signs of leakage which could allow surface water entry into the system (figures 3 and 4).

Location

The Lions Park spring is approximately 2 miles west of Forsyth, MT along Highway 12 (figure 1). The legal description for the spring is T. 6 N., R.40 E., section 21, tract CBDC. The coordinates of the site are latitude 46° 15' 22" and longitude 106° 43' 58". Access to the spring is via a gravel road that exits from Highway 12, or by stopping at the turnout and walking down a set of stairs to the spring.

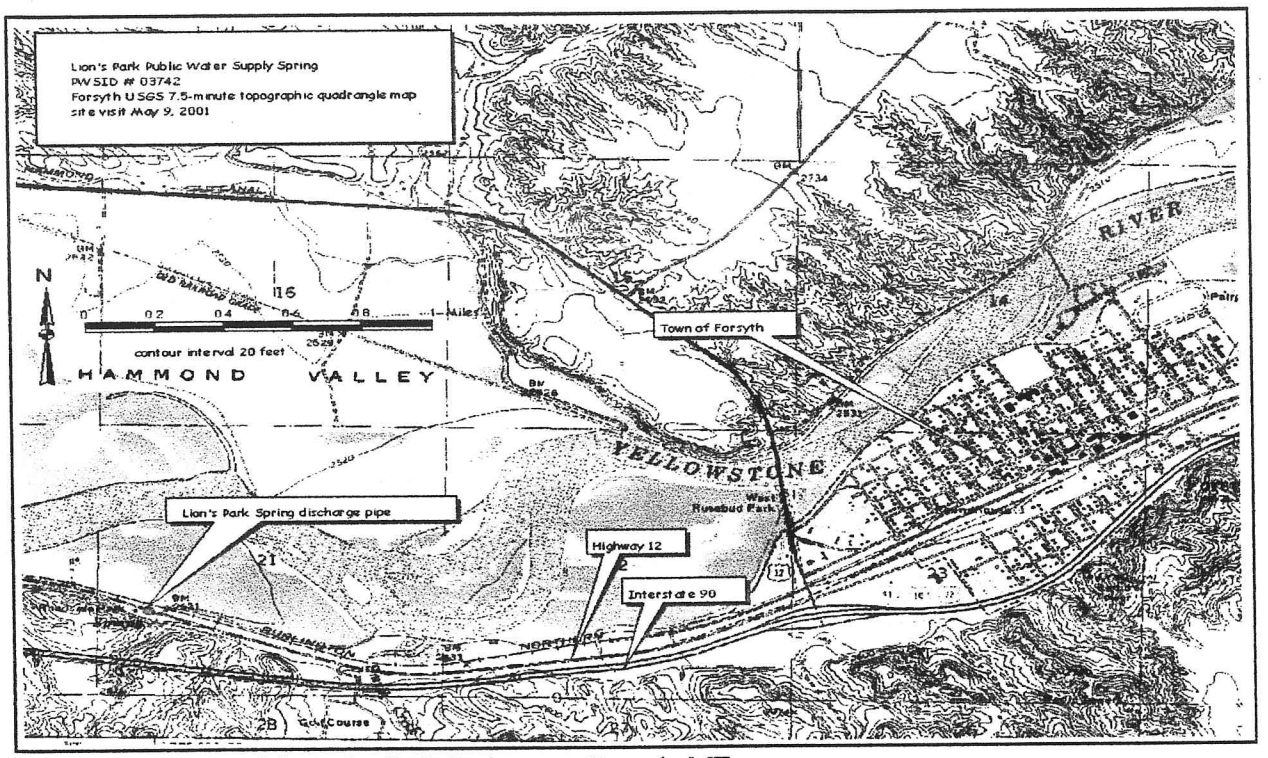


Figure 1. Location of the Loins Park Spring near Forsyth, MT.

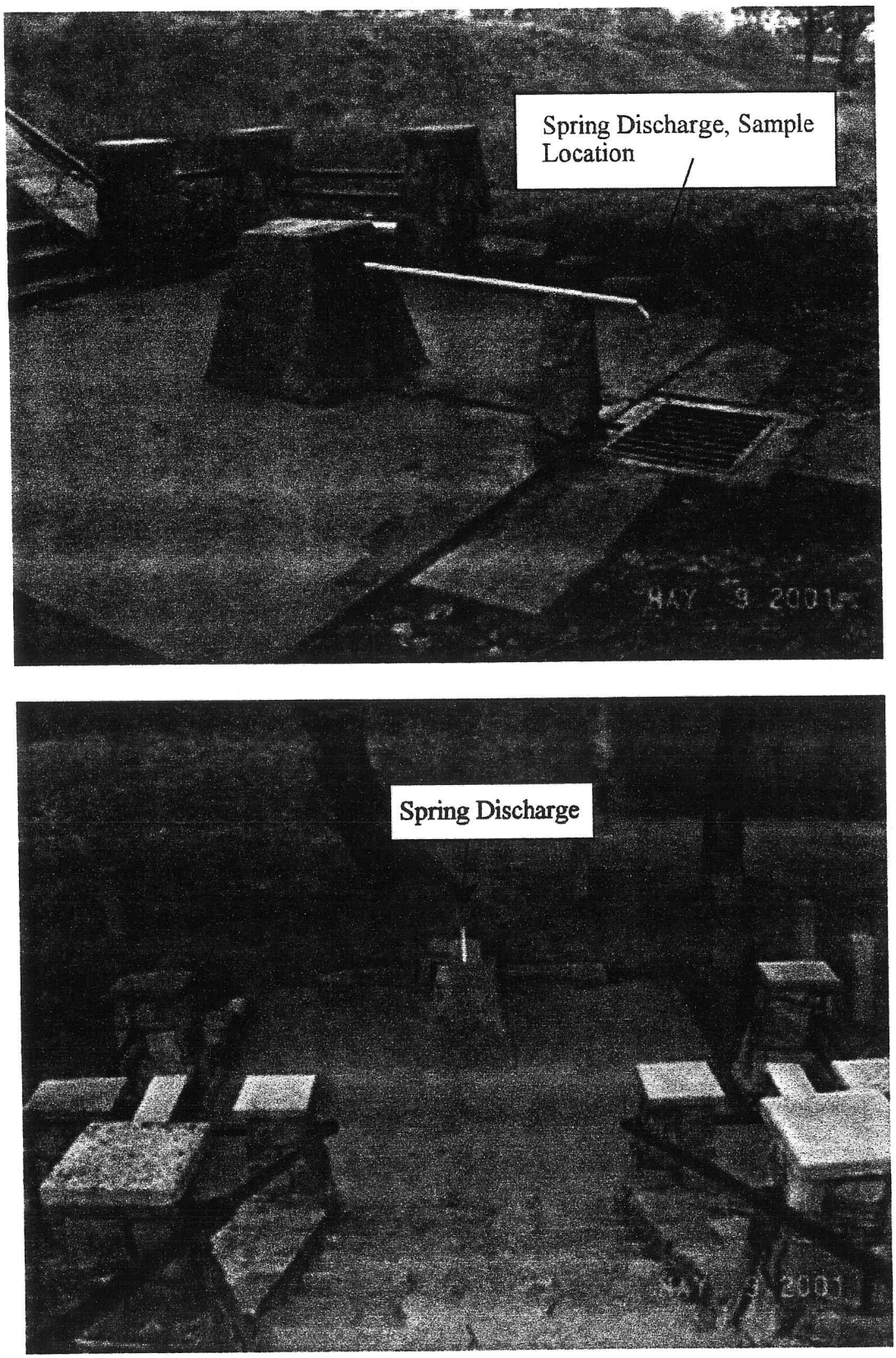


Figure 2. Photographs showing the springs discharge location and sample point.

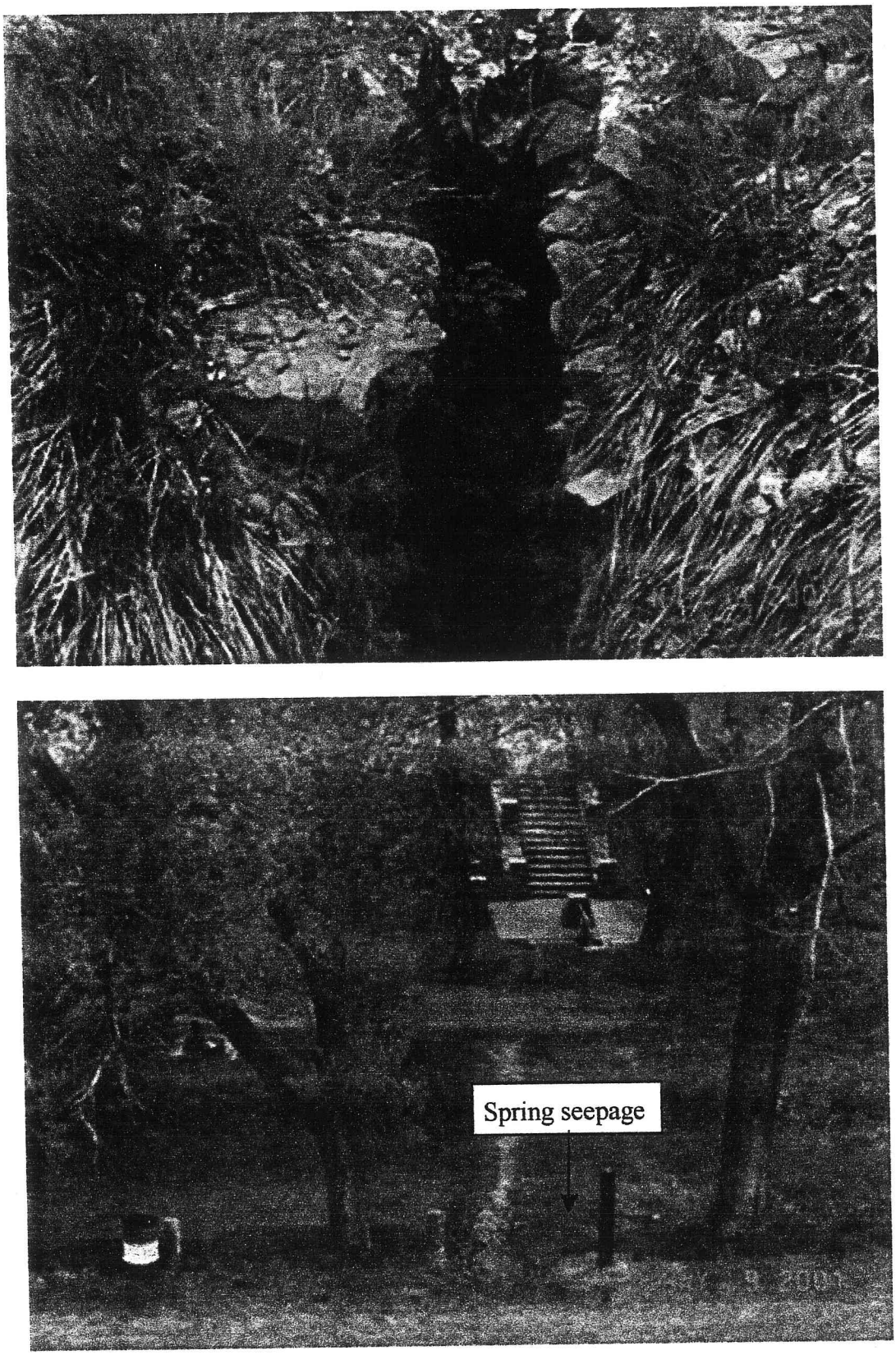


Figure 3. Photos of spring seepage between spring box and discharge pipe, possible overflow or leakage.

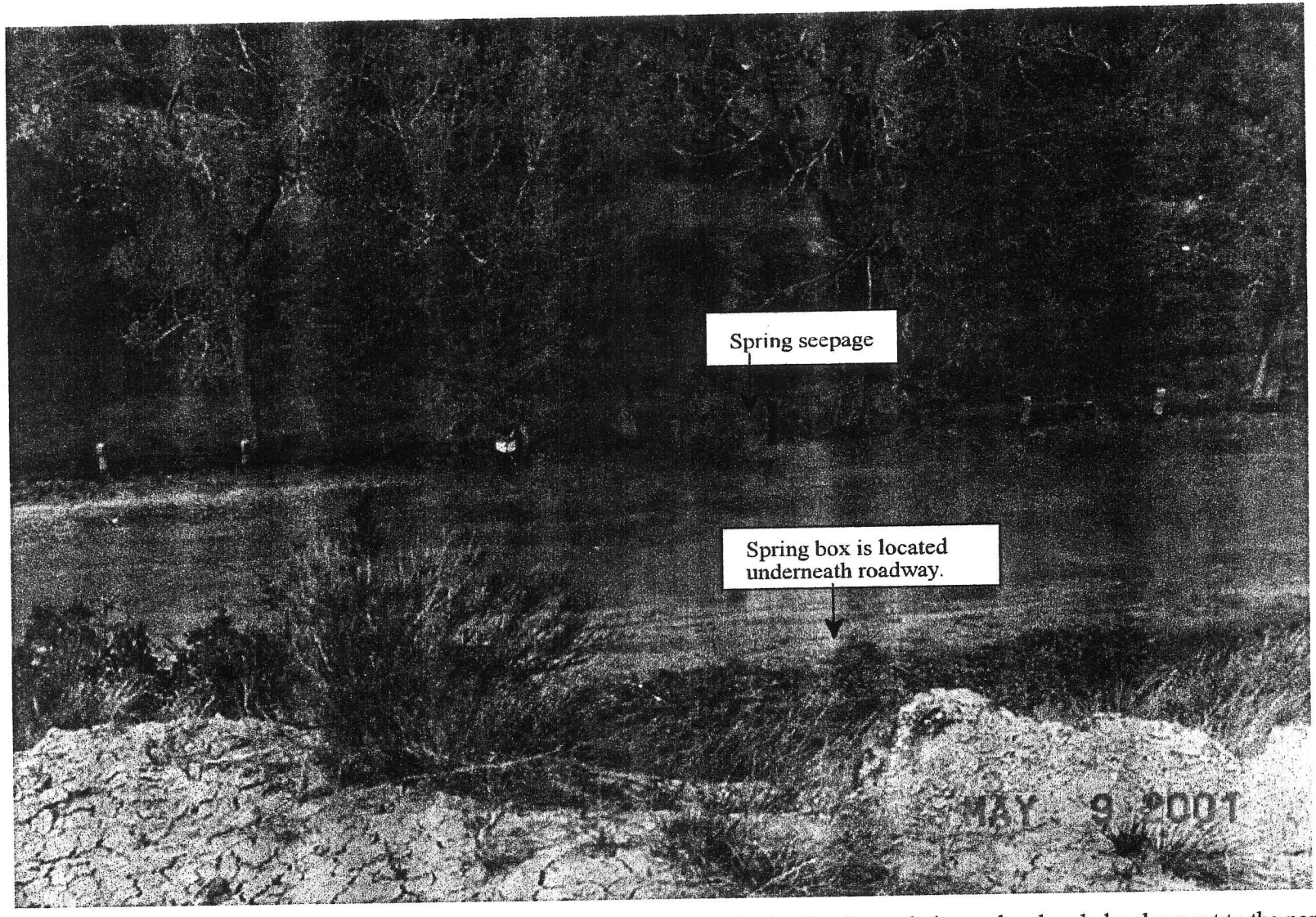


Figure 4. Spring development and spring box are hidden beneath roadway. Water is piped underneath the road and park development to the north side of park where it discharges from PVC pipe.

GEOLOGY

Regional Geology

The geology of the Forsyth area is characterized by flat-lying to gently dipping sedimentary bedrock overlain in many places by unconsolidated alluvial and colluvial deposits (Colton and others, 1984). Bedrock in the area is mostly sandstone and shale of the Upper Cretaceous Hell Creek Formation. A second bedrock unit, the Upper Cretaceous Fox Hills Formation, forms isolated exposures and consists mostly of shale and micacous sandstone. The Hell Creek Formation forms the primary aquifer in the study area and is up to 675 feet thick (Renick, 1929). The important unconsolidated deposits are Quaternary alluvium adjacent to the Yellowstone River, colluvium along the bases of nearby slopes, and alluvial terrace deposits that cap the bluffs. The deposits consist of clay, silt, sand, and gravel up to 50 feet thick.

Local Geology

The geology around the Lions Park spring consists of shallow alluvium and colluvium of Holocene age overlying sedimentary bedrock of the Upper Cretaceous Hell Creek Formation (figure 5). The spring is located in the unconsolidated alluvium and colluvium although it probably originates from a sandstone layer in the lower Hell Creek Formation.

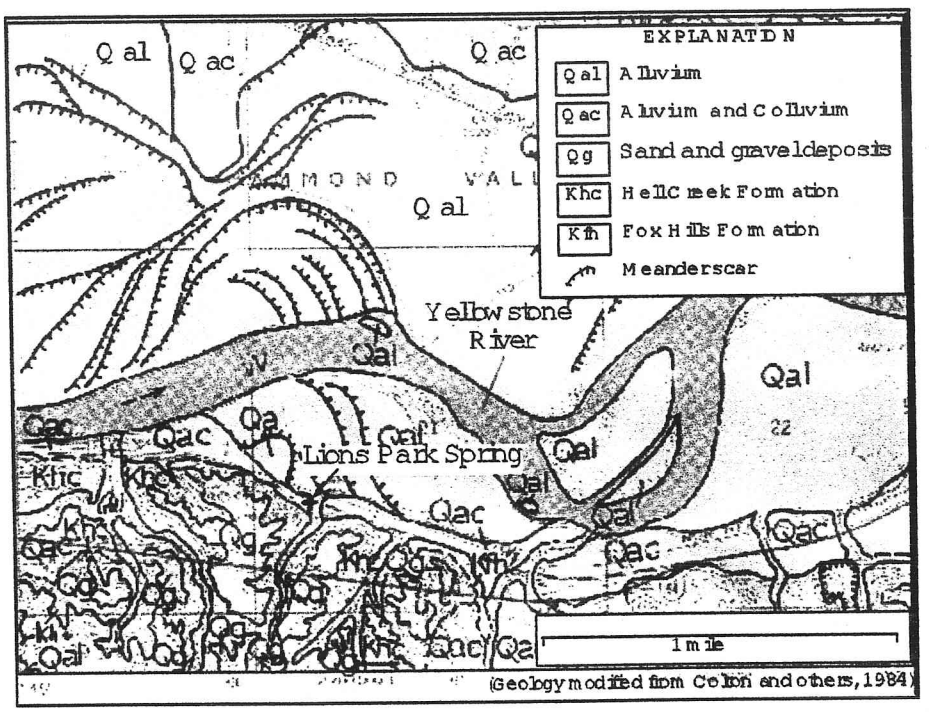


Figure 5. Geologic map of the area around Lions Springs Park.

HYDROLOGY

Surface-Water Resources

The Yellowstone River is the principal surface-water resource near the spring. The south edge of the river is more than 250 feet from the spring. Although the spring is on the southern edge of the flood plain, it is unlikely that flooding of the spring is a concern because of the distance from the river and because the spring is 10 feet higher or more in elevation than the rivers south bank. A series of railroad tracks and Highway 12 also separate the spring area from the Yellowstone River.

Ground-Water Resources

Two principal aquifers are present in the area. First is the shallow, unconsolidated valley-fill aquifer of the Yellowstone River, which consists of silt, sand, gravel, and boulders. The coarse gravel yields considerable water, but the finer material is either not water bearing or only yields small amounts of water. The second principal aquifer is the deeper, bedrock aquifer, which consist of sandstone units of the Hell Creek Formation. This is considered to be the primary aquifer in the area (Renick, 1929) The Lions Park Spring is believed to originate from the Hell Creek Formation. The spring emanates along the Yellowstone River near the base of bluffs of the Hell Creek Formation. Renick, who investigated ground-water resources in the area in 1923, also concluded that the springs source was the Hell Creek Formation. A water sample was collected by Renick and the results are included along with the more recent analytical results of this report in the water quality section below.

A potentiometic map for the aquifers was not available, however, ground water probably follows topography and flows toward the Yellowstone River. Aquifer recharge to the deeper aquifer is primarily from infiltration of precipitation and snowmelt. Recharge to the shallower aquifer is possibly from the Yellowstone River, precipitation and snowmelt, and subsurface inflow from underlying bedrock.

Water Quality

Water-quality samples for dissolved inorganic constituents, coliform, and tritium analysis were collected during the May 2001 field visit. The samples were collected from the springs PVC pipe discharge. The laboratory results for the major ions are listed in Table 1, the complete results are included as an attachment. The analytical results of a sample collected by Renick (1929) from this spring and a surface-water sample collected from the Yellowstone River by the USGS (1999) are included for comparison.

Table 1. Major ion concentrations for the water samples from the Lions Park Spring and the Yellowstone River.

Sample Site	Sample Date	Cations (mg/L)				Anions (mg/L)				Metals (μg/L)
		Ca	Mg	Na	K	HCO_3	Cl	SO_4	NO_3	As
Spring	May 9, 2001	11.10	2.49	249	1.88	515.8	6.90	169	<.5	1.05
Spring	Sept. 27, 1923	11.0	3.7	260		508.0	8.00	16.0	0.29	
River	Sept. 23, 1999	45.09	17.01	42.29	2.99	124.0	6.32	132.4		5.54

The major-ion chemistry shows that the spring water is a sodium-bicarbonate type with a relatively high concentration of dissolved solids (703.43 mg/L). The water is soft (37.97 mg/L hardness as CaCO3) and generally has low concentrations of metals, nitrate, and chloride. Renick (1929) states that water from deep aquifers or wells are soft water and water from shallow aquifers (that might be under the influence of

surface waters) are hard. The test results indicate that the Lions Park spring water meets current drinking water standards for the constituents analyzed, but sodium concentration for the spring was 249 mg/L. The current drinking water standard for sodium is 250 mg/L. This is a secondary drinking water standard and is base on aesthetic water quality, that is odor, color , taste, ect., and is not a human health standard. However, people on a low sodium diet should limit intake of this water, or be advised of its high sodium level.

A water sample was collected from the Yellowstone River in September 1999 at the USGS stream gaging station (06295000) located in Forysth approximately 2 miles downstream from the Lions Park spring. The water was a mixed-water type (calcium-sodium-sulfate) with an arsenic concentration of 5.2μg/L.

To understand the timing of ground-water recharge, ground-water age was estimated using tritium data for water collected during the May 2001 site visit. The tritium sample had a concentration of <0.8 +/- 0.5 tritium units (TU). In general, the data indicate that recharge to the aquifer probably occurred 40 to 45 years ago (Hendry, 1988).

Microbiological Water Quality

A review of the coliform bacteria sample results submitted to the DEQ indicate there has been one acute violation of the Total Coliform Rule in 2000, and three non-acute violations. A sample was collected by MBMG on May 9, 2001 for bacteria and the results were negative for coliform and fecal. Two more samples were collected by MGMB on May 10, 2001 and sent to separate laboratories for analysis. Both came back negative showing the water to be bacterially suitable for drinking.

Microscopic Particulate Analysis (MPA)

A microscopic particulate analysis was conducted May 7, 2001 on Lions Park spring. The MPA scores for the 2001 analyses was 0, indicating a ***low*** GWUDISW risk factor, but the 2001 MPA did show 3,275/100 gal. of ciliates, 98/100 gal. crustaceans, 59/100 gal. other arthropods, and 49/100gal. nematodes. A copy of the MPA analysis is attached.

CONCLUSIONS

Based on the results of the hydrogeologic assessment, it appears that the Lions Park spring is not under the direct influence of surface water, although there does appear there are problems with the construction of the spring box and outlet pipe. This determination is based on the following evidence:

1. The spring emerges at the base of sandstone bluffs of the Hell Creek Formation adjacent to the Yellowstone River.

2. The tritium results suggest the water has not been in contact with the atmosphere since the early 1950's, or earlier.

3. The 2001 MPA analyses conducted during spring runoff in the nearby Yellowstone River, indicates the spring is at low risk for GWUDISW. However, there was a high count of ciliates, and past bacteria sampling in 2000 has came back positive three times for coliform and once for coliform and fecal.

4. Water chemistry shows the spring is a sodium-bicarbonate type water and the Yellowstone River is a calcium-sodium-sulfate mixed water type.

RECOMMENDATIONS

1. The spring should be disinfected with a concentrated chlorine solution on a regular basis to control coliform populations. It is unclear whether the bacteria found in past sampling was from the spring box or whether it was on the PVC discharge tube. A gated fence around the spring discharge would keep wild life and other animals from drinking from the spring and possible contaminating the spring with bacteria.

2. Reconstructing the spring box would allow access for cleaning and inspections.

REFERENCES

Hendry, M.J., 1988, Do Isotopes have a place in groundwater studies?: Ground Water, v. 20, no. 4, p.410-415.

Dolton, R. B., J. L. Klockenbrink, Grout, M.A., Heffern, E.L., 1984, Photogeologic and reconnaissance geologic map of the Forsyth Quadrangle, Rosebud County, U. S. Geological Survey Miscellaneous Field Studies Map MF-1725, scale 1:24,000.

Renick, B.C., 1929, Geology and ground-water resources of Central and Southern Rosebud County, Montana: U.S. Geological Survey Water-Supply Paper 600, 140 p.

ATTACHMENTS

LIONS PARK SPRING PUBLIC WATER SUPPLY
PWS #03742

Preliminary Assessment Form
Field Inventory Form
Water Quality Analytical Results
Bacteriological Sample Results
Microscopic Particulate Analysis

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Metcalf Building
1520 E. 6th St.
Helena, MT 59620-0901

Preliminary Assessment of Groundwater Sources that may be under the Direct Influence of Surface water

SYSTEM NAME Lions Park PWS ID # 03742
SOURCE NAME Spring COUNTY Rosebud
DATE 5/9/01 [TNC] NTNC C POPULATION _____

	Index Points
A. TYPE OF STRUCTURE (Circle One)	
Well	GO TO SECTION B
Spring	[40]
Infiltration Gallery/Horizontal Well	40
B. HISTORICAL PATHOGENIC ORGANISM CONTAMINATION	
History or suspected outbreak of *Giardia*, or other pathogenic organisms associated with surface water with current system configuration	40
No history or suspected outbreak of *Giardia* .	[0]
C. HISTORICAL MICROBIOLOGICAL CONTAMINATION (Circle all that apply)	
Record of acute MCL violations of the Total Coliform Rule over the last 3 years (circle the one that applies)	
No violations	0
One violation	[5]
Two violations	10
Three violations	15
Record of non-acute MCL violations of the Total Coliform Rule over the last 3 years (circle the one that applies)	
One violation or less	0
Two violations	5
Three violations	[10]
DHES-verified complaints about turbidity . . .	5
D. HYDROLOGICAL FEATURES	
Horizontal distance between a surface water and the source	
greater than 250 feet	[0]
175 - 250 feet	5
100 - 175 feet	10
less than 100 feet	15
unknown	15
E. WELL CONSTRUCTION	

Poorly constructed well (uncased, or casing not sealed to depth of at least 18 feet below land surface), or casing construction is unknown . . . 15

In wells tapping unconfined or semiconfined aquifers, depth below land surface to top of perforated intervals or screen

greater than 100 feet	0
50 - 100 feet	5
25 - 50 feet	10
0 - 25 feet	15
unknown	15

F. WELL INTAKE CONSTRUCTION

In wells tapping unconfined or semiconfined aquifers, depth to static water level below land surface

greater than 100 feet	0
50 - 100 feet	5
0 - 50 feet	10
unknown	10

Poor sanitary seal, seal without acceptable material, or unknown sanitary seal type . . . 15

TOTAL SCORE 55

PRELIMINARY ASSESSMENT DETERMINATION (Circle the one that applies)

i) PASS: Well is classified as groundwater.
ii) FAIL:. Well must undergo further GWUDISW determination.
iii) FAIL: Spring or Infiltration Gallery; must undergo further GWUDISW determination.
iv) FAIL: Well will PASS if well construction deficiencies (section E or F) are repaired.
v) FAIL: Well may PASS if well construction details (section E or F) become available.

ANALYST Ted Duaime ANALYST AFFILIATION MBMG

COMMENTS: Spring is located at Lions Park, 2 miles west of Forsyth. While sampling 8-10 different people came by to fill up water jugs (1-5 gal.) For use in their homes.

SAMPLE [illegible] [X]

Date [illegible] **SITE INVENTORY SHEET** Project No. [illegible]

M NUMBER: 1525 [illegible]3742 **Aquifer** _____

Owner

Name Linus Price Forsyth

Address 2 mi. W. Forsyth

Forsyth MT

Phone _____

User/Resident (if different)

Name Jim Harvey / Joe Sanders

Address DOT

Miles City MT

Phone (406) 232-1093 / (406) 233-3607

LOCATION: T 06 (N)(S) R 40 (E)(W) S 21 Tract C / B / D / C Sequence 01 Irreg. Sect? Y__ N X

Latitude _____ Longitude _____ Datum _____ Geomethod GPS

County Rosebud USGSMap7'½' Forsyth Altitude 2530

SITE NOTES: Spring is located 2 mi. west of Forsyth on Frontage Rd. / Secondary Highway.

WELL DETAILS

Water Use Public Casing I.D. _____(in) Total Depth From Ground _____

Measuring Point (M.P.) _____ft(+ above, - below land surface) M.P. Elev._____

STATIC WATER LEVEL (E-Line ___ /Steel Tape ___ /Pressure Gauge ___)

Time	Depth Below M.P.	PSI	Head	Water level altitude	Remarks

PURGING PARAMETERS S.C. Range

Time	S.C. (meter)	Redox(MV	Temp C°	pH	Other	Vol/Time 3 gal ~~5 gal~~	Yield
1415	945	280	96	8.28		45.6 sec	3.95
						45.9	3.92
						45.2	3.98
AVG							3.95 gpm

PUMPING WATER LEVEL

Time	Depth Below M.P.	Water level altitude	Remarks

[illegible] Vers 4.0 12/99

Montana Bureau of Mines and Geology
1300 West Park Street, Butte MT 59701 (406) 496-4167

Analytical Laboratory Report
Analysis Id: **2001Q1546**

State: MT
Latitude - Longitude: 46d15m22s N 106d43m58s W Datum1927
Topographic Map: FORSYTH
Geologic Source: ALLUVIUM (QUATERNARY)
Drainage Basin: YELLOWSTONE RIVER BTWN POWDER RIV
Agency + Sampler: MBMG * TED
Field Number: LP-FORS
Date + Time: 09-MAY-01 14:15:00
Lab + Analyst: MBMG * JMC
Date Complete: 5-Jun-01
Release Flag: YES
Sample Handling: 3120
Method Sampled: GRAB
Procedure Type: DISSOLVED
Water Use: PUBLIC WATER SUPPLY

County: ROSEBUD
Site Location: 06N 40E 21 CBDC 1
Site Id: 1525
Project: PWSINV *WSP-600
Station Id:
Sample Source: SPRING
Land Surface Altitude: 2590.00
Sample Media: WATER

Site Name: LIONS PARK SPRING

	mg/L	meq/L
Calcium (Ca):	11.1	0.55
Magnesium (Mg):	2.49	0.20
Sodium (Na):	249	10.83
Potassium (K):	1.88	0.05
Iron (Fe):	.009	0.00
Manganese (Mn):	.005	0.00
Silica (SiO2):	8.94	
Total Cations:		11.65

	mg/L	meq/L
Bicarbonate (HCO3):	515.8	8.45
Carbonate (CO3):	0.0	0.00
Chloride (Cl):	6.90	0.19
Sulfate (SO4):	169	3.52
Nitrate (as N):	<.5	0.00
Fluoride (F):	<.5	0.00
OrthoPhosphate (as P):	<.5	0.00
Total Anions:		12.17

Field Chemistry and Other Analytical Results (units as specified).

Calculated Dissolved Solids:	703.43	Total Hardness as CaCO3:	37.97
Sum of Diss. Constituents:	965.14	Field Hardness as CaCO3:	
Field Conductivity (Micromhos):	945	Total Alkalinity as CaCO3:	423.04
Lab Conductivity (Micromhos):	1083.00	Field Alkalinity as CaCO3:	
Field pH:	8.28	Ryznar Stability Index:	7.70
Laboratory pH:	7.96	Langlier Saturation Index:	0.13
Water Temp. (C):	9.60	Sodium Adsorption Ratio:	17.59
Air Temp. (C):		Field Redox (mV):	280.00
Nitrite (mg/L as N):	<.5	Field Dissolved O2 (mg/L):	
Field Nitrate as N (mg/L):		Phosphate, TD, (mg/L as P):	<.05
Ammonia (mg/L NH4):	Not Rptd	Field Chloride (mg/L):	
Bromide (ug/L Br):	<500	Hydroxide Alkalinity as OH-:	Not Rptd
PCP (ug/L):	Not Rptd	T.P. Hydrocarbons (ug/L):	Not Rptd

DISSOLVED Trace Element results (ug/L)

Aluminum (Al):	<30	Cadmium (Cd):	<2	Mercury (Hg):	Not Rptd	Tin (Sn):	Not Rptd
Antimony (Sb):	<2	Chromium (Cr):	3.05	Molybdenum (Mo):	<10	Titanium (Ti):	<1
Arsenic (As):	1.05	Cobalt (Co):	<2	Nickel (Ni):	<2	Thallium (Tl):	<5
Barium (Ba):	8.20	Copper (Cu):	5.65	Silver (Ag):	<1	Vanadium (V):	<5
Beryllium (Be):	<2	Lead (Pb):	<2	Selenium (Se):	<1	Zinc (Zn):	12.2
Boron (B):	273	Lithium (Li):	29.2	Strontium (Sr):	186	Zirconium (Zr):	<2

Explanation: mg/L = milligrams per Liter, ug/L = micrograms per Liter, meq/L = milliequivalents per Liter, ft = feet, mg/Kg = milligrams per Kilogram, pC/L = picoCuries per Liter
Qualifiers: A = Hydride atomic absorption, E = Estimated due to interference, H = Exceeded holding time, N = Spiked sample recovery not within control limits, P = Preserved sample, S = Method of standard additions, * = Duplicate analysis not within control limits.

Sample Condition: CLEAR NO SEDIMENT ON FILTER

Field Remarks: SAMPLE COLLECTED FROM PVC DISCHARGE PIPE. TRITIUM & BACTI SAMPLES ALSO COLL

Lab Remarks:

Note: In correspondence, please refer to Lab Number: 2001Q1546

Print Date: 14-Jun-2001

LABORATORIES
P.O. Box 30916 2120 South 27th Street Billings, MT 59107-0916
800-735-4489 406-252-6325 406-252-6069 fax e-mail@energylab.com

LABORATORY ANALYSIS REPORT

MT Bureau of Mines & Geology	**Project ID:**			
Ted Duaime	**Sample ID:**	Spring		
1300 W Park	**Laboratory ID:**	B01050027-001A		
Butte, MT 59701-8997	**Sample Matrix:**	Water		
	Sample Date:	10-May-01 1250		
	Received at lab:	10-May-01	**Reported:**	15-May-01

	Results	Units	Qual	Reporting Limit	Regulatory Limit	Method	Analyzed	
Bacteria, Total Coliform	Absent	/100 ml				SM 9223	10-May-01 1630	DLR
E-Coli	Absent	/100 ml				SM 9223	10-May-01 1630	DLR

This total coliform bacteria analysis shows this water to be bacterially suitable for drinking.

HKM Laboratories

HKM LABORATORY SERVICES

106 So. Parkmont P.O. Box 3588 Butte, Montana 59702-3588

Certified by the MDHES according to the Federal Drinking Water Standards

PLEASE FILL IN — PRESS FIRMLY

ADDRESS WHERE SAMPLE WAS COLLECTED FROM:

L P - [illegible]
(street address, house #, legal description, property name, etc.)

City: Forsyth County: Rosebud

Date Collected: 5/7/01 Time: 1415

Collector of Sample: Ted Duaime Phone No.: (406) 496-4157

Optional

Type of Supply (Circle One) Well (Depth of Well _____) (Spring) Cistern,

Lake or other Surface Supply:

PERSON TO RECEIVE REPORT *(Please Fill In)*

Name: Ted Duaime, MBMG

Street: 1300 W. Park

City: Butte State: MT Zip: 59701

MON THRU FRI
(Sample after 9 a.m. if possible)

LAB USE ONLY

Lab No. 8666 M C MB PC

RECEIVED AT LAB: 5-11-01 1230

ANALYZED: 5-11-01 1230

ANALYZED BY: [illegible]

BACTERIOLOGICAL RESULTS

MEMBRANE FILTER METHOD:

- [X] 1. Bacteriologically Suitable for Drinking, <1 coliform bacteria organism/100 ml.*
- [ ] 2. Contaminated with ____ coliform bacteria organisms/100 ml.**
- [ ] 3. Contaminated with coliform bacteria — sample unsatisfactory.
- [ ] 4. Fecal coliform: Present/ Absent

MULTIPLE TUBE METHOD — MPN METHOD

- [ ] 1. Bacteriologically Suitable for Drinking, -10/10 tubes.*
- [ ] 2. Contaminated with + ____ /10 tubes.**

* If suitable for drinking, no animal or human fecal pollution.

** If contaminated, the water supply should be disinfected and retested before used as drinking water or household purposes. Consult your county sanitarian for disinfection procedures.

PAYMENT MUST ACCOMPANY SAMPLE
(Price subject to change without notice)

HKM Laboratories

HKM LABORATORY SERVICES

106 So. Parkmont P.O. Box 3588 Butte, Montana 59702-3588

Certified by the MDHES according to the Federal Drinking Water Standards

PLEASE FILL IN — PRESS FIRMLY

ADDRESS WHERE SAMPLE WAS COLLECTED FROM:

Lions Park Spring
(street address, house #, legal description, property name, etc.)

City: Forsyth County: Rosebud

Date Collected: 5/10/01 Time: 1250

Collector of Sample: Ted Duaime Phone No.: (406) 496-4157

Optional

Type of Supply (Circle One) Well (Depth of Well _____) (Spring) Cistern,

Lake or other Surface Supply:

PERSON TO RECEIVE REPORT *(Please Fill In)*

Name: Ted Duaime MBMG

Street: 1300 W. Park

City: Butte State: MT Zip: 59701

LAB USE ONLY

Lab No. 8665 M C MB PC

RECEIVED AT LAB: 5-11-01 123

ANALYZED: 5-11-01 123

ANALYZED BY: [illegible]

BACTERIOLOGICAL RESULTS

MEMBRANE FILTER METHOD:

- [X] 1. Bacteriologically Suitable for Drinking, <1 coliform bacteria organism/100 ml.*
- [ ] 2. Contaminated with ____ coliform bacteria organisms/100 ml.**
- [ ] 3. Contaminated with coliform bacteria — sample unsatisfactory.
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* If suitable for drinking, no animal or human fecal pollution.

** If contaminated, the water supply should be disinfected and retested before used as drinking water or household purposes. Consult your county sanitarian for disinfection procedures.

PAYMENT MUST ACCOMPANY SAMPLE

COPY

ANALYSIS FOR WATERBORNE PARTICULATES

Invoice 20010246

CH Diagnostic and Consulting Service, Inc.
214 SE 19th Street, Loveland, CO 80537
Keith W. Hancock, President
(970) 667-9789

Customer 20011280
Montana Dept of Transportation (Miles City)
PO Box 460
Miles City, MT 59301
PWSID# MT0003742

Laboratory Information
Postal Express; 5/8/01; 1020 Hrs; Excellent; Wound
Results submitted by: Tricia Klonicki

03742

Sample Identification: Lions Spring, Spring/pipe outlet

Sample Information: SOURCE: Spring; 1/4 to 1/2 mile from surface water; pH 8.3; 0.10 NTU —» 0.13 NTU

Sample Date & Time: 5/7/01 07:35 AM —» 5/7/01 03:38 PM **Sampler:** Matt Usuriello

Amount: 1930.35 L (510 gal) **Filter Color:** Off white **Filter Type:** Polypropylene wound cartridge

Date/Time Eluted/Centrifuged: 5/8/01 11:42 AM **Centrifugate:** 0.00259 mL/100 L

Amount of sample assayed: 39 L

Amorphous Debris	clay (1-2 µm), silt (2-50 µm), sand (50-2000 µm), inorganic precipitate, aggregates
Algae	ND
Diatoms	ND
Plant debris	ND
Rotifers	ND
Nematodes	49/100 Gal
Pollen (pine)	ND
Ameba	ND
Ciliates	3,275/100 Gal
Colorless Flagellates	ND
Crustaceans	98/100 Gal, some Copepod including Copepod nauplii
Other Arthropods	59/100 Gal including Arthropod pieces
Other	ND

Giardia and Coccidia are none detected (ND) by MPA unless reported under "Other".
This sample was analyzed for particulates following the Environmental Protection Agency Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA). 1992. USEPA, Port Orchard, WA, EPA 910/9-92-029. All limitations stated in the methods apply. If capsule was received, method was modified by filtering sample through a Gelman Envirochek® capsule at the sample site. If *Giardia* and *Cryptosporidium* Analysis was also performed, particulate extraction was modified.

Floated Pellet: 0.001 mL/100 L

Amount of sample assayed: 190 L

		Total IFA Count	Empty	Amorphous Structure	1 Internal Structure	>=2 Internal Structure	Internal Structure
Giardia	detected	0	0	0	0	0	
	#/100 L	<0.52	<0.52	<0.52	<0.52	<0.52	
Cryptosporidium	detected	0	0	0			0
	#/100 L	<0.52	<0.52	<0.52			<0.52

This sample was analyzed for *Giardia* and *Cryptosporidium* by the method outlined in: ICR Laboratory Manual. 1996. USEPA, Washington, D.C., EPA/600/R-95/178. All limitations stated in the method apply. If capsule was received, method was modified by filtering sample through a Gelman Envirochek® capsule at the sample site. If Microscopic Particulate Analysis was also performed, then particulate extraction was modified.

COMMENTS: Score: 0 - Low Risk per EPA Consensus Method referenced above.