

ANALYTICAL SERVICES, INC.

Microbiological Testing, Research and Consulting

Client: Missouri DNR
Address: 2155 N. Westwood Blvd.
Poplar Bluff, MO 63901
Client Sample ID: 0802665 *St Mary*

Sampling Date: April 22, 2008
Date Received: April 24, 2008
Analyst: cjf
ASI Sample No.: 31199-01

Section I.

Microscopic Particulate Analysis

This sample was analyzed using the Environmental Protection Agency's Consensus Method for Determining Ground Waters Under the Direct Influence (GWUDI) of Surface Water Using Microscopic Particulate Analysis (MPA). MPA is one parameter used to determine if a ground water source is under the direct influence of surface water. As indicated in the Guidance Manual for compliance with the Surface Water Treatment Rule, other factors, including a sanitary survey, well construction logs, hydrological criteria, distance from nearest surface water source and water quality are considered when making a GWUDI determination. Recent data indicate that factors effecting particulate movement in soil need to be taken into account in GWUDI determinations. These include the degree of hydraulic communication (timing and amount of surface water mixed with ground water), time of travel in the ground, and natural filtration.

An MPA filter is processed by first cutting the fibers from the filter core then washing them repeatedly with a stomacher. The resulting sediment is centrifuged into a pellet. Then, depending on the volume of the pellet recovered from a filter, the sediment is either purified by a gradient flotation procedure using Percoll sucrose as the levitant, or is analyzed directly. A portion of the pellet is examined for surface water "bioindicators", such as plant debris, algae, diatoms, insects, protozoa, rotifers, and other particulates that are characteristic of surface waters. The number and type of bioindicators are tabulated and used to calculate a risk rating score, which indicates the risk of surface water contamination. The MPA risk-rating table can be found in Section IV of this report.

We also analyzed a portion of the MPA sample concentrate for *Giardia* and *Cryptosporidium* using the purification, staining and microscopy procedures in Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/IFA (EPA-821-R-01-025). No *Cryptosporidium* oocysts or *Giardia* cysts were detected in the sample aliquot. The data from this analysis are presented in Section III of the Analytical Results.

There was a minimal amount of sediment recovered from the filter (0.2 mL in 1200 gallons), and a minimal amount remained after the flotation procedure. Biological particulates that contribute to the EPA Risk Rating score were detected in this sample. Data from the MPA are included in Section II of the Analytical Results.

An extremely high concentration of algae (2.9×10^4 in 100 gallons) was detected in this sample. Algae are indicators of surface water, and the source of these organisms should be determined. Algae identifications are included in Section II of the Analytical Results.

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Section II.

Analytical Results

I. SAMPLE DATA	
Sample Site:	Well #2
Water Type:	raw/well
Turbidity, NTU's:	S: 0.20 E: 0
pH:	S: 4.47 E: 7.62
Treatment:	chlorine, mixed-media filtration
Distance From Surface Water:	no data
Volume Filtered:	1200 gallons
Filter:	Commercial Honeycomb 1 µm
Filter Color:	dark cream
Sediment Volume:	0.2 mL
Volume Floated:	0.1 mL
Pellet Volume After Float:	0.05 mL
Levitant - type:	Percoll sucrose
specific gravity:	1.15

S = Start of Sampling;
 E = End of Sampling

II. MPA	
Numbers reported are per 100 gallons	
Amorphous Debris:	Uniformly distributed
Vegetative Debris -	
with chlorophyll:	<1.0
without chlorophyll:	<1.0
Diatoms -	
with chlorophyll:	<8.3 x 10 ²
without chlorophyll:	<8.3 x 10 ²
Other Algae*:	2.9 x 10 ⁴
Rotifers:	<1.0
Rotifer Eggs:	<1.0
Spores:	<1.0
Pollen:	4.0
Iron Bacteria**:	ND
Crustaceans:	<1.0
Crustacean Parts:	<1.0
Crustacean Eggs:	<1.0
Water Mites:	<1.0
Gastrotrichs:	<1.0
Tardigrades:	<1.0
Nematodes:	<1.0
Nematode Eggs:	<1.0
Invertebrate Eggs:	<1.0
Annelids:	<1.0
Amoebae:	<1.0
Protozoa:	<8.3 x 10 ²
Insects/Larvae:	<1.0

ND = None Detected

*Algae Identifications:	Unicellular Cyanophyta and Chlorophyta
**Iron Bacteria:	ND
Comments:	NA

NA = Not Applicable

ND = None Detected