The Water Line

Newsletter for the Lakes of Missouri Volunteer Program

Volume 2 Number 2 May 1998

WATCH FOR INFORMATION ABOUT THE 1998 GREAT AMERICAN SECCHI DIP-IN COMING

UPDATE ON WHAT WE'VE BEEN DOING

Fran and I have had a very busy spring so far. After getting the Data Report finished we began data review sessions. After the first meeting we decided to reduce the size of the Report to make it less intimidating to those who are not familiar with the program (the reduced size will also allow us to print more copies for distribution). The results are a Summary that is less than half the size of the original Data Report. This is what we plan to send out to anyone requesting a copy of our data. We would like to thank everyone who attended the data review sessions. The sessions are an important part of the program as they not only allow us to give you the results of your hard work but give us a chance to learn from your experiences on the lake. At the end of April, Fran and I attended the *11th Annual National Conference on Enhancing the States' Lake Management Programs* conference in Chicago. The conference provided us with new ideas about running the program, a better understanding of how our program is funded through the EPA, and a renewed spirit that we will hopefully be able to carry into this season and pass on to you. During May we began to train new volunteers to fill in for those who have left the program as well as volunteers on new lakes.

The busy spring will probably be followed by a busy summer as we plan to get out of the lab and do split sampling with some of the volunteers. We have already collected some split samples and will continue to do so throughout the sampling season. Stay tuned for more information. *****

Dan

ATTENTION!!!
June 28 thru July 4 is Official Lake Appreciation Week

THE CLEAN WATER ACTION PLAN OF 1998

Did you know that the Clean Water Act celebrated its 25th anniversary last October. While the act has helped us make great gains in terms of water quality in our country we are still falling short of the original goals. In response to these shortcomings President Clinton and Vice President Gore introduced the Clean Water Action Plan in February of this year. This Plan is designed to restore and protect America's waters through over 100 specific actions that federal agencies and others will follow. In addition, to support this initiative, the President's budget proposes $568 million in new resources in Fiscal Year 1999 - a 35 percent increase - and a total

increase of $2.3 billion over the next five years.

Some of the highlights of the Clean Water Action Plan include: a watershed approach to cleaning up our rivers, lakes and coastal waters, a unified approach to watershed assessment that will better prioritize those waters that are in the most need of restoration and protection, and increased funding through Section 319 Nonpoint Source Program (of the Clean Water Act) which is where many monitoring programs receive their funding.

If you would like to receive a copy of the Clean Water Action Plan please call the EPA's Water Resources Center at (202) 260-7786 or you may view it on the Internet at http://www.epa.gov/cleanwater.

We urge all of the volunteers to learn more about the Clean Water Action Plan and to call or write your Senators and Representatives about this important piece of legislation.

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LAKE FORMATIONS

7. Aeolian Lakes - These are lakes that are created by the erosive force of wind usually in an arid region or an area that was historically arid. Wind blown sand may dam a stream or the wind may create a depression which is filled with water during the rainy season. The Sand Hill Region of western Nebraska contains many small lakes created through this process.(*cont. pg 4)*

OOPS!!!

As might be expected with a document the size of the Data Report there were a few mistakes that made it past us in the first printing. Besides missing spaces between words the only other errors we have found occur on pages 60 and 61. The descriptive statistics for Secchi transparency for site 3 (Table 18) should be as follows; average = 126, median = 117, minimum = 84, and maximum = 240. Descriptive statistics for Secchi transparency for site

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CRYPTOSPORIDIUM ANOTHER DRINKING WATER CONCERN

by Angela Sell

The most significant impact that Cryptosporidium has had on the United States was in 1993 when an outbreak hit Milwaukee, WI and infected 403,000 people. Cryptosporidium emerged as a significant cause of severe diarrheal disease in the 1980's, and now it is one of the most common causes of diarrheal illness. Cryptosporidium are microscopic in size ranging between 2-6 micrometers in diameter (individual algae cells range in size between 2-100 micrometers). It is a protozoan, which means that it is a single cell and has membrane-bound intracellular structures. It parasitizes many species of mammals, birds, reptiles, and fishes. The species that affects human is known as Cryptosporidium parvum. Since the 1980's, Cryptosporidium parvum has been a significant contaminant found in drinking water because it has been the causal agent of a number of outbreaks of waterborne disease. It has a worldwide distribution, and it has no host specificity. Consequently, cryptosporidiosis is highly transmissible between humans and animals. It is transmitted via fecal/oral contamination. For example, sewage containing Cryptosporidium oocysts (resistant environmental stage) enters a body of water. There, the oocysts freely distribute themselves throughout the water column. If there is a deficiency or a malfunction in the treatment of the water, the oocysts can get into the water supply. When the oocysts are swallowed, they leave their resistant environmental stage in the intestine and invade the lining of either the intestine or the respiratory system. Post-infection of Cryptosporidium parvum, there is a 5-28 day incubation period before its symptoms arise. These symptoms include severe diarrhea, abdominal pain, fever, fatigue, and nausea. The pathological result to the host is a damaged gut lining and diarrhea leading to the loss of 2.5-4 gallons of water per day. In response to this, however, the host does develop an antibody response for future infections.

Those who are most susceptible to Cryptosporidium infections are the young, the elderly, the malnourished, the disease impaired (diabetics), and especially the immunocompromised individuals (transplant recipients, AIDS patients, and those receiving chemotherapy). Cryptosporidium has the most severe effect on the immunocompromised population because they are not able to produce antibodies to respond to infections. In addition, there is no drug treatment available. Subsequently, the over-abundant loss of electrolytes due to diarrhea leads to a high rate of mortality (50%) in the immunocompromised. This makes Cryptosporidium a major public health concern because water supplies can be contaminated by human and animal fecal wastes (calves may excrete up to 10 million oocysts in one day). This is especially important where there are large livestock operations in close proximity to drinking water sources.

Cryptosporidium has caused eleven waterborne outbreaks in drinking water from various sources in North America since it was first

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documented in 1985. Four of these outbreaks were due to well contamination. Two of these wells were shallow wells and were contaminated by surface water. One well was contaminated by sewage, and one well was contaminated by irrigation water. Three other outbreaks occurred because of a deficiency in the treatment of lake water. River water was the source for two other Cryptosporidium outbreaks. Both were due to a deficiency in the water treatment. Another outbreak occurred where the water source was a combination of springs and a river. This was due to poor filtration and high turbidities. The last outbreak was due to contamination at the tap.

Cryptosporidium parvum has become a significant contaminant found in drinking water and is associated with a high risk of waterborne disease.

Cryptosporidium has caused six waterborne outbreaks related to recreational use of water. One outbreak occurred from swimming in contaminated lake water. The other five cases involved swimming pools. In four of these cases, fecal contamination was the probable cause. An important note is that chlorine does not inactivate or kill Cryptosporidium oocysts.

Cryptosporidium parvum has become a significant contaminant found in drinking water and is associated with a high risk of waterborne disease. It is a parasitic protozoan that is found worldwide and is environmentally resistant. Specific attention should be called to this parasite because of its dramatic and mortal effect on the immunocompromised population. Thus, special attention needs to be focused on what goes in to water sources and how effective water treatments are at ridding of Cryptosporidium oocysts in the water.

(cont. from Pg 2- Lake Formations)

8. Fluviatile (river) Lake - This type of lake can be created when one river enters another. As the first river enters the second it dumps its load of suspended solids which form a partial dam across the second river. This leads to a decrease in the flow of the river as well as a widening. Lake Pepin in Wisconsin is an example of this type of lake and occurs where the Chippewa River enters the Mississippi River.
9. Oxbow Lakes - This type of lake is created when a tight bend of a river is cut-off by flood waters. The results are a crescent shaped water body that occupies what was once the river channel. There are many examples of oxbow lakes along the Missouri and Mississippi Rivers. Creve Coeur Lake which is sampled by LMVP is also an example of this type of lake.
10. Lakes Impounded by Organisms - These lakes are created when a stream or river is dammed up by usually one of two organisms; humans or beavers. These lakes generally differ from other types of lakes because the amount of water that passes through them is relatively high.
11. Lakes formed by Extraterrestrial Objects - Basins created when meteorites collided with the earth are thought to be the origin of at least 71 lakes in the world. The New Quebec Crater Lake located in the upper Ungava Peninsula is an example of this lake type.

We welcome your ideas and suggestions for making the Lakes of Missouri Volunteer Program

Table 1. *Cryptosporidium* Outbreaks in North America

Date	Location	# of cases	Water Source	Water treatment/ possible deficiency
1984	Braun Station San Antonio, TX	2,000	Well	Chlorinated/sewage contamination
1987	Carrollton, GA	13,000	River	Conventional(1)/mixers down, improper flocculation, filters brought on-line without backwashing(2,3)
1992	Jackson County, OR	3,000	Springs and river	Chlorination only and package filtration plant/ poor filtration and high turbidities(2)
1992	Picnic area, PA	551	Well	Chlorination/influenced by surface water
1993	Milwaukee, WI	403,000	Lake	Conventional/loss of coagulation process increase turbidity,r recycling backwash(2,3)
1993	Waterloo. Canada	1,000	River	Conventional with preozonation/recycling backwash waters(2)
1993	Private Home	7	Well	Untreated/shallow well(4)
1993	MN	27	Lake	Filtered and Chlorinated
1993	Las Vegas, NV	78	Lake	Conventional/recycling backwash(2,4)
1993	College Place, WA	104	Well	Chlorinated/ contamination with irrigation water(3)
1995	Gainesville. FL	77	Well	Single tap implicated/ contamination at tap(3)

(1) Conventional treatment consists of coagulation, flocculation,sedimentation, filtration and chlorination.
(2) No coliforms detected in these outbreaks
(3) Oocysts detected; source of the oocyst contamination was not identified.
(4) Oocysts detected in source; backwash and treated water after outbreak during more intensive monitoring.

Table taken from Annu. Rev. Public Health, Environmental Ecology of Cryptosporidium and Public Health Implications, 18:135-61, J.B. Rose, 1997.