A newsletter from
the Black Mountain
Irrigation District

water matters

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BMID invites input on proposed treatment system

Black Mountain Irrigation District trustees will soon decide whether or not to approve the $2-million gravity-fed treatment system recommended by Reid Crowther & Partners Ltd. for construction on Mission Creek upstream of Stevens Reservoir. To ensure their decision reflects the wants and needs of BMID's residential customers, trustees encourage your questions and comments about the proposed project. You're invited to contact staff or attend an open house Tuesday, December 8th from 8 AM to 8 PM at BMID's office, 285 Gray Road.

Understanding the Proposed System

Responding to poor water quality caused by 1997's excessive spring run-off, BMID embarked on a six-week pilot project in April to test the effectiveness and cost-efficiency of a treatment system recommended by engineers from Reid Crowther. The proposed treatment system involves 'coagulation/flocculation/sedimentation', during which a chemical — in this case alum — is added at the front end of the collection process. The chemical binds with suspended particles (coagulation), which then form clusters (flocculation), and settle out (sedimentation). Results of the pilot study show that this process will effectively reduce turbidity, particle count (size and number of particles in the water), colour, and total organic carbon (TOC) levels.

Turbidity

Turbidity (cloudiness) is caused by suspended particles of clay, silt, organic and inorganic matter, plankton, and other microscopic organisms that water picks up as it travels through watercourses. Turbidity levels often spike, sometimes dramatically, during freshet (spring run-off) or after heavy rains. As outlined in the *Canadian Drinking Water Quality Guidelines*, turbidity is a health consideration because bacteria, viruses, parasites, and heavy metals can attach themselves to the suspended particles, which then interfere with disinfection by shielding contaminants from the disinfectant (generally chlorine).

BMID's treatment goal for turbidity corresponds with federal and provincial objectives of 1 NTU for health and 5 NTU for aesthetics. (An NTU is an optical measurement of water's ability to scatter and absorb light rather than transmit it in straight lines.) Because pilot tests showed that treated water was dramatically less turbid — particularly during peak run-off — Reid Crowther concludes the proposed treatment system will help BMID meet its quality objectives.

Particle Counts

Particle counting is an increasingly-used indicator of water quality. Typically, particle counters determine the number of particles in a given size range in a specified volume of water. (Waterborne pathogens such as Cryptosporidium and Giardia, for example, measure between three and five microns and seven and twelve microns respectively.) Particle counting enables a system operator to learn what processes result in the best reduction of particles in these critical size ranges.

Particle counts were conducted on raw and treated water samples during the pilot study. Overall, analyses showed a 50 to 90 percent drop in the numbers of particles in treated water. Of the five

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You're Invited!

Black Mountain Irrigation wants to know what you think about its proposed treatment project to improve drinking water quality, particularly during spring run-off. Project details will be presented during an open house Tuesday, December 8th from 8 AM to 8 PM at BMID's office (285 Gray Road). BMID staff and technical consultants will be available to answer your questions about the treatment process and project costs.

The proposed treatment system

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coagulants tested, alum provided a higher reduction of particles in the measured sizes.

Colour

Described as human perception of visible light, colour is measured in true colour units (TCUs). While turbidity reduction is the primary goal of the proposed treatment system, colour removal is another welcome outcome. As pilot tests indicate, coagulation with alum effectively removes colour from Mission Creek water. TCUs were reduced from 35 to 5; BMID's objective being 15.

Total Organic Compounds

Total organic carbons (TOCs) are the plant and animal materials found in raw water. By settling out most TOCs through coagulation/flocculation/sedimentation, BMID can reduce the amount of chlorine it injects before distribution. This, in turn, reduces the levels of disinfection byproducts such as trihalomethanes (THMs) produced when TOCs mix with chlorine.

The reduction of carcinogenic THMs is a primary objective of the proposed project. THM levels observed during the pilot study (which was conducted during spring run-off) were found to be higher than federal and provincial objectives. In keeping with BMID's treatment goals, settling reduced THMs to well below recommended levels.

The Recommended Coagulant

Of the five coagulants tested, alum (aluminum sulfate) proved the most effective and cost-efficient. Raw water levels of dissolved aluminum (that which can be absorbed) averaged 0.1 milligrams per litre, compared to 0.105 milligrams per litre in water treated with alum. Most of the added aluminum settled out as 'floc' or was present as total aluminum, which is not bioavailable (easily absorbed).

For several years, the Federal-Provincial Subcommittee on Drinking Water has worked to establish a guideline for aluminum in drinking water. Based on its research, the subcommittee has determined the public health benefits of using aluminum-based coagulants to remove harmful micro-organisms and organic matter (thus reducing chlorine demand and THM production) exceed the slight risk associated with residual aluminum.

BMID's test levels of residual aluminum averaged 0.105 milligrams per litre, well within the subcommittee's preliminary guidelines of 0.1 to 0.2.

Sludge Disposal

Assuming a 90-day freshet, the annual sludge volume from a full-scale operation would be about 200 cubic metres, when dried. Disposal options — which will be explored with the public and various regulatory bodies — must be cost effective and flexible enough to handle volume variations throughout the year. Sanitary landfills are the most common receiver of 'dewatered' water-treatment-plant sludge in B.C. In BMID's case, the Glenmore Landfill is the most probable site.

Estimated Costs

The capital cost estimate in 1998 dollars — including the pilot study, facility design, engineering, and construction — is about $2 million. Yearly operating costs — including chemicals, operator salary and benefits, and sludge disposal — is estimated at $148,000 for use during the three months of freshet, and $283,000 if used year-round.

The additional cost per connection to operate this process for three months a year (during freshet), based on 6,000 connections, is estimated at $2.05 per month per single-family residential unit.

Aluminum and Human Health

Aluminum is the third most abundant element in the earth's crust, and is present in soil, air, and water. Humans are constantly exposed to aluminum in food, drugs (e.g. antacids), cosmetics, (e.g. deodorant), consumer products (e.g. cooking utensils), the air we breathe (e.g. dry soil, smoke, and sprays), and water (e.g. coagulants used in treatment). Most adults ingest between 9 and 14 milligrams of aluminum daily from all sources; about 90 percent coming from their diets. In general, exposure to aluminum from drinking water is very low (below three percent) compared with that from foods and drugs.

Canadian Drinking Water Quality Guidelines are being revised to include a guideline for aluminum in drinking water. BMID levels of residual aluminum following treatment with alum averaged 0.105 milligrams per litre, well within preliminary guidelines of 0.1 to 0.2.

Peak Consumption!

The summer of '98 stands out as a record-breaking year for water consumption. BMID's residential and agricultural customers used nearly one billion gallons in July, and 954 million gallons in August. The peak-use day was July 26th, during which almost 43 million U.S. gallons were consumed. That's a per-minute flow of 36,000 gallons!

To help you put this peak consumption in perspective — one billion gallons of water would cover 3,000 acres to a depth of one foot, or one acre to a depth of 3000 feet!