Septic shock: Poor soils stalling development near Butte

By Roberta Forsell Stauffer of The Montana Standard - 09/17/2006

It's looking like the richest hill on earth may come up poor when it comes to handling waste from septic systems.

New subdivisions are stalled southeast of Butte because of high nitrate readings in wells, and some scientists blame the unique geology of the Boulder Batholith.

Septic systems rely on micro-organisms in soil to break down waste, and in some parts of the Summit Valley, there's little soil to be found — only solid granite bedrock.

Even areas filled in with decomposed granite are hardly ideal for waste processing, according to hydrogeologist John LaFave. Since the sediment is coarse, water can move quickly through and back down into the groundwater, whereas in richer soils with more organic carbon, it seeps through more slowly, allowing time for the microscopic bugs to do their jobs.

Hydrogeologist John LaFave of the Montana Bureau of Mines and Geology explains how groundwater moves through the bedrock and decomposed granite common to the Summit Valley. This cut in the rock is just off Highway 2 near the Nine Mile, and it shows what the subsurface looks like in places around the valley.

Walter Hinick / The Montana Standard

"For the most part, it works," LaFave said of the septic and drainfield process. "But something's different about our valley where it's probably not working the way it should." Through their work with the Montana Bureau of Mines and Geology's groundwater assessment program, LaFave and other scientists have studied groundwater throughout the state, and only around Butte have they seen such concentrations of high nitrate readings in wells.

Even around high-growth areas such as Bozeman and the Bitterroot Valley, where many more subdivisions rely on wells and septic systems, the problem is relatively rare.

"We don't see the high concentrations of nitrate in those places," LaFave said. "I think the most reasonable explanation is the difference in the geology and the resultant soils. Clearly, it's got implications for how we develop." By the numbers Since 1993, the Bureau has taken 1,800 samples from wells across the state, and fewer than 5 percent of them have come back above the federal nitrate drinking water standard of 10 parts per million, with only 15 percent of samples higher than 3 ppm.

In contrast, samples from 43 wells in the valley around Butte came back with 15 percent above the health standard and 63 percent above 3 ppm.

"The geology makes the groundwater inherently susceptible to surface contamination or nitrate contamination," LaFave said. "That's what we think is going on down there." In part due to the bureau's research, the Montana Department of Environmental Quality decided in mid-August to hold off on approving any more septic systems in the southeast part of the valley until more is known about the situation.

That came as an especially disturbing surprise to developers of the 58-lot Homestake Meadows Phase Two planned for land north of Blacktail Canyon Road and the proposed 75-lot Buffalo Estates, a little closer to town along Continental Drive. Late-August construction couldn't even start on a single house in the Warne Heights subdivision since the builder could not obtain a septic permit.

Just months ago, the state OK'd septic systems for two five-lot minor subdivisions in that general area, and a few years ago, the 25-lot first phase of Homestake Meadows was approved and has since sold out.

DEQ hydrogeologist Eric Regensburger said new well data submitted in late July by Homestake Meadows' consultants — plus his newfound familiarity with the Bureau's research — brought on the sudden change in position.

Now he's not sure the standard computer model used routinely across the state to guide septic system placements will work in Butte's particular bedrock aquifer.

Regensburger said it's been common knowledge for years that nitrate levels are high in some wells in Warne Heights, a relatively dense subdivision north of the Kiwanis Sunshine Camp, dating back to the 1970s.

But when well results came back high from a few newer homes further north on much bigger lots and with newer

septic systems, that's when he really started to wonder.

Regensburger said there are a lot of areas around Montana with fractured bedrock, but not the quartz monzonite type common around Butte.

"Other bedrocks when they decompose and form soil are likely forming better soil than is forming out in this area," he said.

And hauling in more carbon-rich soil is not an option for new wastewater systems, he said. In fact, it's against the law.

"Natural soil has unique characteristics that you can't recreate just by trucking in soil and dumping it someplace," he said.

Where from here?

Regensburger said he is still "keeping an open mind" on this.

"I'm going to just wait for the data to come in," he said.

If the Homestake Meadows' consultant can prove through isotopic analysis that septic systems are not the cause of the high readings, he could reconsider his decision about using the model, and Russ Reed of HKM Engineering said the work is already under way to find out the exact nature of these nitrates.

"Hopefully we can show that it's not septics and then hopefully we can use these tools that are used throughout the state," Reed said.

Other possible nitrate sources include fertilizers, explosives, and decaying plant materials.

Reed said one high-nitrate well is off by itself, with nobody above to pollute it, which makes him believe another naturally occurring source is possible. But since water travels under the surface through weathered fractures in the solid bedrock, Regensburger and LaFave think it may even migrate up-grade in some places.

Results should be available in about three and a half months, but Reed said they might not be conclusive if tests come back showing overlapping sources.

The bureau also conducted this type of analysis on wells in different settings around the valley, and LaFave said all results pointed to human or animal waste as the source of the nitrate.

"I would be surprised if it comes out isotopically different from our source," LaFave said, adding that the typical background for naturally occurring nitrates is only 2 or 3 ppm.

Reed stressed that the facts will drive the outcome of this situation.

"We want to let the science tell us what's going on out there before we make any decisions on things," he said.

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