

# Chat

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experiment, a project aiming to become the world's most sensitive detector for dark matter, which is thought to comprise 80 percent of all the matter in the universe. Dark matter currently remains undetected.

"Physicists at the lab are trying to figure out what the universe is made of," said Bill Harlan, the communications director for the Sanford Underground Research Facility and the event's moderator.

Harlan said it is necessary for the lab to be underground so that the experiments are shielded from cosmic rays.

"We don't notice them on the surface as they mostly pass right through us ... But if you have a very sensitive detector, such as a dark matter detector, those two or three particles per second would wreck your data," he said. "If you go down to the 4,850-foot level, you're protected by a mile of rock."

The LUX dark matter detector will focus on the leading candidate particle for dark matter, known as a weakly interacting massive particle (WIMP).

Ott said that if a WIMP is present, it will react with the Xenon in the detector, causing a flash of light. Electrons given off by the reaction also will cause a secondary flash. The light and pattern of movement by the particles can then be measured to confirm the presence of dark matter.

"This is all a little theoretical because no one's ever seen it, but this is what we expect," he said.

Ott said that there are two possible outcomes of the experiment.

"If we measure a WIMP signal, we obviously will

have succeeded, and certain people with our experiment will be getting a Nobel Prize," he said.

In order to make such a statement, the physicists will need to detect three or four WIMPs during the next two to three years, Ott said. In a best-case scenario, 20 or 30 will be measured.

"The other (possible outcome) is we don't see dark matter, but we are able to make a statement about how we didn't see dark matter," he said. "We can make a statement about how thin the dark matter is, how rare it is and how hard it is to see."

Should the scientists succeed, Ott said it is too early to know what practical applications the detection of dark matter will have.

"Pure science is a funny business in that sense," he said. "You don't know what the implications are going to be. It doesn't always have a direct practical application, and it's almost never in the short-term."

Ott said the same could be said for past discoveries and inventions, such as electricity and the Internet.

"I'm talking over a device partially because people doing particle physics wanted to exchange data," he said. "There's a lot of things that have long-term implications that you can't see right now. What we're doing is fundamental research."

The Sanford Underground Research Facility plans to hold more video chats at other sites in the future to continue to promote its research, Harlan said. It will also host "Neutrino Day," a free science festival July 13 in Lead, to provide more education about the facility. For more information, call 605-722-8650.

"It's some of the most exciting, fundamental physics research going on in the world today, and it's happening right here in South Dakota," Harlan said.

You can follow Derek Bartos on Twitter at [twitter.com/d\\_bartos](#)

# City

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Environmental Services Director Kyle Goodman said. "The savings we're going to have (by purchasing water from B-Y) is on our chemicals, which is about 26 cents per 1,000 gallons. When we compare apples to apples, that \$1.50 is quite a bit higher than what it appears."

Additionally, it is believed that an investment of as much as \$150,000 would be needed in order to treat B-Y's water to make it compatible with the City of Yankton's current water.

City Finance Officer Al Viereck pointed out that if the city borrows \$26 million of the approximately \$29 million needed for the water system improvements currently proposed, the annual debt service would be approximately \$1.735 million.

"We're going to keep all of our plant, all of our overhead — the only thing we'd save on is our chemicals (if we buy water from B-Y). We're paying our debt service to B-Y, and we're still going to have another increase in debt service for the collector well and any improvements to our treatment plant," Viereck said. "In essence, we don't have the \$1.6 million (for B-Y). That's not a savings if we buy it from B-Y. That's an increase. We're going to have to increase rates to pay that amount, plus we'll have to increase rates to pay for any capital improvements that we still need."

Because B-Y would not be able to commit the water elsewhere, it is also asking for a take or pay contract, meaning that Yankton would be required to make a minimum payment to B-Y whether any water is used or not.

Other issues city staff asked the commission to consider were:

- economic development opportunities. They believe there is a value to being able to guarantee water capacity;

- control over rates;
- investment in existing infrastructure. Staff believe it is critical that the money of Yankton residents be used toward infrastructure the city owns and operates; and
- a collector well and improvements to the treatment plant would still be necessary with the purchase of B-Y water.

Because Mitchell receives its water from B-Y, Commissioner David Knoff asked whether it has a seat on the board. He was told that it does not.

As the 30-minute discussion drew to a close, Hacecky told the commission that B-Y has a debt of approximately \$24 million split among 40,000-50,000 customers.

"You are taking on a debt of \$30 million with about 14,000 people," he said. "I think that's kind of scary. The state sets a speed limit. They also set a debt limit. I think you're kind of going around it, and I think it is very unsafe."

Under state law, the total amount of debt the city can take on is 5 percent of the previous year's assessed value. That puts the current cap for Yankton at approximately \$38-\$39 million. Of that total, the city has approximately \$19.7 million in legal debt capacity available.

If the city uses a surcharge, as is being discussed, to fund part of the water system upgrades, that would not count against the legal debt capacity.

Ultimately, the commission took no action on the B-Y proposal and did not indicate whether it would discuss it any further.

Also Monday, the commission:

- approved a new sign ordinance on a 5-4 vote; and
- gave staff direction on how to structure water rates to pay for infrastructure improvements.

You can follow Nathan Johnson on Twitter at [Twitter.com/AnInlandVoyage](#)



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