1 BEFORE THE DEPARTMENT OF ENVIRONMENTAL QUALITY
2 LAND QUALITY DIVISION
3

4
OVERVIEW PRESENTATION ON URANIUM MINING
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8 TRANSCRIPT OF HEARING PROCEEDINGS
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10 Transcript of Hearing Proceedings in the above-
11 entitled matter before the Department of Environmental
12 Quality, Land Quality Division, commencing on the 20th
13 day of August, 2012 at 10:00 a.m. at the Oil and Gas
14 Conservation Commission Hearing Room, 2211 King
15 Boulevard, Casper, Wyoming, Mr. Jim Gampetro presiding,
16 with Board Members Mr. Robert Green, Mr. Jim Skeen,
17 Mr. Jay Collins and Mr. Gene Smith in attendance.
18 Also in attendance were Ms. Nancy Nuttbrock,
19 Administrator of the LQD, Mr. Craig Hults of the LQD,
20 Mr. Mark Moxley of the LQD, Mr. Mark Rogaczewski of the
21 LQD and Mr. Luke Esch with the Attorney General's Office,
22 In attendance from the public were
23 Mr. Bill Kearney, Mr. Marion Loomis, Mr. Adam Voge,
24 Mr. Roger Cable, Mr. Zen Merritt, Mr. Josh Leftwich and
25 Mr. John Cash.

1 P R O C E E D I N G S

2 (Hearing proceedings commenced

3 10:00 a.m., August 20, 2012.)

4 CHAIRMAN GAMPETRO: If we could go around

5 the room and have everyone introduce themselves and just

6 indicate who they represent. Start back in the corner

7 back there.

8 MR. VOGE: My name is Adam Voge. I'm

9 energy reporter for the Star-Tribune.

10 MR. ESCH: My name's Luke Esch. I'm with

11 the Attorney General's Office. I represent DEQ.

12 MR. CABLE: Roger Cable, Oftedal

13 Construction.

14 MR. MERRITT: Zen Merritt. I'm just a

15 consultant. And I wanted to see what you all were doing.

16 MR. LOOMIS: Marion Loomis, Wyoming Mining

17 Association.

18 MR. KEARNEY: Bill Kearney with Uranium

19 One.

20 MR. LEFTWICH: Josh Leftwich with Cameco

21 Resources.

22 MR. ROGACZEWSKI: Mark Rogaczewski,

23 Wyoming DEQ, Sheridan.

24 MR. MOXLEY: Mark Moxley with Wyoming DEQ

25 in Lander.

MR. CASH: John Cash with Ur-Energy.

MR. HULTS: Craig Hults with Land Quality.

MS. NUTTBROCK: I'm Nancy Nuttbrock, Land Quality administrator.

MR. SMITH: Gene Smith, advisory board, representing public entities.

CHAIRMAN GAMPETRO: Jim Gampetro, advisory board, also a public representative.

MR. SKEEN: Jim Skeen, advisory board, public representative.

MR. COLLINS: Jay Collins, advisory board, and I'm the ag representative.

CHAIRMAN GAMPETRO: I'm going to turn it over to Nancy.

MS. NUTTBROCK: Well, Board, we had a plan today to use this third quarter 2012 advisory board meeting in a little different way. As you know, we won't always have a rule package, necessarily, to queue up and present to you and to discuss. So today we're utilizing our meeting to look a little closer and develop our understanding for one of the industries that's very important to Wyoming, and that's the in situ uranium industry.

So what we had planned for the day is to take from ten-ish until noon-ish to see a presentation that

1 was largely developed by the industry representatives of
2 Land Quality, slash, industry uranium work group that we
3 told you about. And we continue to work with that group
4 on a monthly basis. It's been a very productive group.
5 And I had asked them to be involved in today's meeting so
6 that they could be involved in this informative session,
7 essentially. Nobody knows their business better. So I
8 thought it was appropriate that we get them involved.
9 Bill Kearney took the lead on generating a PowerPoint
10 presentation. And there's bits and pieces from a lot of
11 different companies that went into this presentation.
12 And then afterwards, we have a video from
13 Ur-Energy on the Lost Creek Project. And we also have a
14 video on the Ross Project from Strata that we'll show
15 you. They're really nicely done videos. Then we'll take
16 a quick lunch break and head out to Cameco's site and
17 spend a couple of hours. We thought -- Josh and I
18 thought maybe from one-ish until about 3:30 doing a tour
19 of their site.
20 So we had intended for today to be very open.
21 Please ask questions throughout the course of the
22 presentation and the videos. The intent is just to have
23 a better understanding of how we, the industry, extract
24 the uranium out of the ground and how it's processed. So
25 that's what we expect from today.

1 I do want to visit with you about upcoming
2 meetings. You may have received an e-mail from Becky
3 identifying four dates for calendar year 2013. And I
4 know it seems like a stretch to look at 2013 already.
5 We're only into August of '12. But it is helpful for us
6 to have our quarterly meetings set out well enough in
7 advance so that we can look at our rule packages and
8 where they might land relative to our advisory board
9 meetings and so we can look at a number of other ways
10 that we can utilize this scheduled meeting time with you
11 and our industry counterparts to do some other things.
12 So, just for the benefit of everybody in the
13 room here who might not know of these dates, I'll just
14 read them off quickly. March 25th, 2013, May 20th of
15 '13, August 18th and November 18th. So those are all
16 2013 dates. And I'd like to hear from the board as to
17 whether you concur or whether you have conflicts with
18 those dates before we actually nail them down. They'd be
19 starting at 10:00 here at this same room. Seems to work
20 pretty well for everybody. But again, I'd like to
21 explore some other ways, minus a rule package, that we
22 might utilize this time to do some other things, as well.
23 One of the things that we have going on right
24 now that's a huge endeavor and very important to the Land
25 Quality Division and our industries is the development of

1 the e-permitting system. That in itself is going to
2 require a lot of outreach and taking as many
3 opportunities as we can to work with various sectors of
4 the mining industry to gain their feedback on an e-
5 permitting system that's being developed. For example,
6 the next meeting is November 19th of this year. We had
7 originally thought that we might be ready to look at
8 Chapter 11, which is the in situ chapter. I don't
9 believe we'll be ready at that point. We would still
10 like to do some more work and some more exploring and
11 discussion with our uranium work group prior to making
12 the necessary or any changes to Chapter 11. So I'd like
13 to put that off so we have a chance to work with our
14 staff and our industry counterparts on that Chapter 11.
15 But it may be right for that time to invite the
16 Wyoming Contractors Association in to talk about the e-
17 permitting system as it relates to LMOs, as it relates to
18 pieces that affect the first component of this e-
19 permitting. Electronic permitting is going to be rolled
20 out in big phases. The first phase will be LMOs, will be
21 the smaller operations. The next phase will be regular
22 mines. The next phase will be uranium and coal and the
23 larger permits. So we're taking it in bite-size pieces.
24 But November, we may just be ready to start
25 engaging with the Wyoming Contractors Association and

1 hear from them what the system would need to look like in
2 order to make permitting easier from their perspective,
3 as well. So that's one idea.
4 Another idea for our upcoming November meeting
5 might be to engage the coal industry in talk about an
6 oversight topic that OSM has put in in our evaluation
7 year 2013 report. They want to have some more discussion
8 about cast blasting and NOx clouds. And in our oversight
9 report, we had agreed to do some outreach with interested
10 parties, industry parties. It could be industry
11 representatives. It could be interested parties,
12 residents who live near those operations. So we may
13 utilize our November 19th meeting to start working on
14 that outreach piece.
15 So we have a lot of things going on. And you
16 may be able to be involved in some discussions that
17 aren't particularly rule-package associated. But as soon
18 as we have a better idea of what's the best use of our
19 time, what's queued up in the proper order relative to
20 these meeting dates, we'll certainly be in touch with
21 you, Chairman Gampetro, and the rest of you to get an
22 idea from you as to whether or not you agree with how
23 we're going to proceed with those meeting dates.
24 So the first thing for you to do is to take a
25 look at your 2013 calendar and get back with Becky as to

1 whether or not those dates work for you, and we'll go
2 from there.
3 CHAIRMAN GAMPETRO: Do we have minutes
4 from the last meeting to have approved?
5 MR. HULTS: We should. I'm hoping Becky
6 forwarded them. If not, we may have to key it up for
7 next time.
8 MS. NUTTBROCK: Who would she forward them
9 to?
10 MR. HULTS: Electronically to the members.
11 CHAIRMAN GAMPETRO: I had them e-mailed to
12 me. I'm just wondering, do we have the sign-off paper
13 here?
14 MR. HULTS: Yeah. That should be in
15 the --
16 CHAIRMAN GAMPETRO: Has everybody received
17 their e-mail copy of the minutes that we can vote on
18 them?
19 MR. SMITH: Yes.
20 MR. COLLINS: Yes.
21 MR. SKEEN: Yes.
22 CHAIRMAN GAMPETRO: I would entertain a
23 motion.
24 MR. SMITH: Mr. Chairman, I'll move to
25 approve the minutes from the last meeting.

MR. SKEEN: I'll second that.

CHAIRMAN GAMPETRO: It's been moved and seconded. All those in favor.

(All members vote aye.)

CHAIRMAN GAMPETRO: Any opposed?

(No response.)

CHAIRMAN GAMPETRO: I will sign it. Okay, that's done. Is there any other official business before we get into the presentations?

MS. NUTTBROCK: Not from Land Quality's perspective.

CHAIRMAN GAMPETRO: Anything anyone would like to bring up on the board?

(No response.)

CHAIRMAN GAMPETRO: We're a go for it, then.

MS. NUTTBROCK: So the first -- as I mentioned before, the first couple of hours here, which is the official portion -- official and public portion of the meeting, we'd like it to be pretty open in terms of folks asking questions and a good dialogue.

I would suggest that, Bill, you're going to be leading us through a presentation, so it might be beneficial to have folks kind of scoot up to the table here. And you can all see that on your screen.

1 So, yeah, as I mentioned before, we've got our
2 uranium working group, which is composed of sort of an
3 equal amount of Land Quality folks and industry folks,
4 and we've been able to work through a number of issues, a
5 number of big issues, although we've still got a number
6 of big issues that we have on our agenda to tackle here
7 in the next year. But Bill has taken the lead to put
8 together a presentation.
9 And, Bill, I'll turn it over to you.
10 There's a few slides that have come from a lot
11 of different areas and some different companies. So
12 those of who you are in the room, if your slide gets up
13 there and if you want to add some more commentary, please
14 hop in.
15 MR. KEARNEY: Nancy wants to keep this
16 pretty informal. So I'd like to thank you folks for the
17 opportunity for the mining association and the member
18 companies to make this presentation. And if you have any
19 questions or whatever during the presentation, why don't
20 you go ahead and just ask. Because there's people
21 sitting out here that are much more experts on certain
22 things like geology and stuff, and it might be beneficial
23 to do it that way. And I think we have plenty of time.
24 And then this afternoon you're going to go out
25 in the field and see the stuff for real. So it's

intended to give you a good background on what in situ recovery is in Wyoming.

So, with that, I'll go ahead and get started, Craig.

MR. HULTS: Yeah.

MR. KEARNEY: So the history of uranium and ISR in the U.S., in the 1940s, that's when the big race for uranium was on, when the U.S. government was developing the atomic bomb and those good things. In the '50s, it continued. There was discovery of large higher-grade deposits in Wyoming. Most of the uranium in the United States was mined in Wyoming, Arizona, Utah and New Mexico. And at that time the mining was your typical conventional underground and surface mining, with mills and tailings, all the stuff. The Gas Hills, Converse County in Wyoming pretty much folded up right around 1979 or 1980.

In 1979, 4,600 people were directly employed by the uranium industry in Wyoming. And to me, that's a stunning number. It's a big number. In the 1960s, it was the birth of the in situ recovery. That means recovery of the uranium using a leach in place underground, leaching it underground. And then it was developed in the '70s, and it's carried on in Wyoming today. That's what we're going to talk about in a little

1 more detail. But a lot of it got going in Texas. There
2 were some pilot projects that were done in Wyoming in the
3 '70s, but a lot of the technique was developed down in
4 south Texas.
5 Here's a shot of Wyoming on where the uranium
6 deposits mostly are. And I'll just point out that here's
7 Casper. The Powder River Basin, Cameco's operations are
8 in this area here. Uranium One, the other operating
9 facility, is here. The Lost Creek operation is out in
10 the Great Divide Basin. And this is the Gas Hills area.
11 So these are the predominant areas uranium was mined
12 historically and will be in the future.
13 And just a look at mining back in the early
14 days. Here's doing some exploration, looking for uranium
15 on the surface with a Geiger counter, typical underground
16 mining. The uranium deposits in Wyoming are not -- for
17 underground mining, it's pretty dangerous because the
18 rock's not very competent. And just some pictures of the
19 old miners from years ago.
20 And that's the Highland Uranium Project north
21 of Douglas, kind of out where you're going to be going
22 today. And this was operated by Exxon. For ten years,
23 they dug this pit and recovered 20 million pounds of
24 uranium, two million pounds a year for ten years. And
25 over 650 people were directly employed there in the '70s.

1 A lot of them lived in Douglas and Glenrock and Casper.
2 So that's how it used to be. Here's in situ mining
3 today. That's what you'll see when you go out in the
4 field this afternoon. And we're going to talk about how
5 it's done. But it's just basically conventional water
6 wells put down into the water.
7 Here's a schematic of what you have. The
8 uranium is found in a roll-front deposit, which is
9 typically in an aquifer in Wyoming. And the uranium was
10 put in place there by the groundwater millions of years
11 ago. And we'll talk a little bit more about that. But
12 basically, the in situ process, as you put injection and
13 production wells into the zone, you circulate the native
14 groundwater. You add oxygen and carbon dioxide. It
15 dissolves the uranium. And you pump it out, run it
16 through the surface through an ion exchange process, just
17 like a home water softener that you would have.
18 So what makes an ISR deposit -- what makes it
19 so it's mineable? The good thing about Wyoming is most
20 of the uranium deposits, certainly the ones of interest
21 today are -- you can solution mine them. If it's hard
22 rock, places in Colorado, things like that, you can't
23 do -- you can't do this type of technology. And the
24 importance of that is in situ recovery is a lot cheaper
25 to do, and that's why companies are in business today.

1 But the deposit should be in a permeable
2 sandstone. You have to be able to push water through it
3 to contact the uranium ore. And the uranium ore is just
4 a very tiny coating of uranium that is on the sand
5 grains, just a very low-percent uranium, just a coating
6 on those sand grains. And we go in, and by adding oxygen
7 and CO2, we dissolve that uranium off the sand grains.
8 It should be below the water table or in the saturated
9 aquifer so you have water to work with. That's desirable
10 but not necessary. Also, it's handy to have it confined
11 above and below these zones in a confined-type aquifer.
12 And that's typically what you have.
13 And then, of course, the host formation's got
14 to be compatible with an alkaline mining solution. And
15 that's where you add oxygen and carbonate to the
16 groundwater. In other places in the world, especially in
17 Kazakhstan right now, that's become a huge producer of
18 uranium, with in situ, they use sulfuric acid. And there
19 the groundwater is very salty, and this alkaline leach
20 wouldn't work as well. So they use acid.
21 And then you're probably wondering how the
22 uranium got there in the first place. And that's always
23 open for interpretation. But for the most part, Wyoming,
24 with its sedimentary basins, most of Wyoming, the theory
25 I subscribe to is you had -- a lot of volcanic ash came

1 out of Yellowstone and stuff, and it overlaid most of
2 Wyoming at some point in time. And it had low levels of
3 uranium in it. And it rained, and the oxygenated
4 precipitation went through this volcanic ash, leached the
5 uranium out. It went down into the sandstone aquifers
6 and moved with the groundwater.
7 Similarly, sometimes the Granite Mountains, the
8 Laramie Mountains had -- they were way bigger mountain
9 ranges at one time. And they had uranium in them, too.
10 And as that stuff eroded and decomposed, some of the
11 uranium washed out of there and did the same type of
12 thing. So that's kind of the two theories on how the
13 uranium got where it is. And it moves with the
14 groundwater in an oxidized state until it hits the
15 reduced zone.
16 Yes?
17 CHAIRMAN GAMPETRO: How did you get to the
18 surface in the first place?
19 MR. KEARNEY: Well, it got -- how it got
20 to the surface?
21 CHAIRMAN GAMPETRO: Yeah. How did it get
22 to the surface to wash down into this in the first place?
23 MR. KEARNEY: Because the area -- a lot of
24 Wyoming's basins were covered with volcanic ash, and the
25 volcanic ash had the uranium in it, and it was leached

1 out through that, and then it went down in the sandstone.
2 In a lot of places, that volcanic ash may be gone now.
3 Same with the stuff that came out of the mountains.
4 So here's what a roll-front deposit looks like.
5 And this is typically an aquifer here, a sandstone that
6 water's moving through very slowly. And as the oxidized
7 groundwater moves with the uranium, it's moving along,
8 and then when it hits a reduced zone, it precipitates out
9 on the sand grain, on the rock. And that's where it is
10 today. And that roll front is moving very, very slowly
11 in geologic time. But where it is today is where we're
12 mining it. In the old days, they open pit mined this, or
13 they underground mined these roll fronts.
14 And here is a well-used photo from an open pit,
15 probably -- I think this might have been in the Gas
16 Hills. Anybody know? Gas Hills? And this is an actual
17 roll front. What it looks like, in the high wall of the
18 pit, it might have been from Lucky Mac in the '60s or
19 '70s, but here's the -- the groundwater is moving this
20 way. And you see the roll front. And this is the
21 uranium here, the black. When it's reduced, uranium is
22 black. And that's where it's coating the sand grains.
23 So, when we go in and in situ mine it, we put the wells
24 into that, injection well, production well, move the flow
25 with the oxygen across it, oxidize it, put it back in

solution. And when uranium is oxidized, it becomes yellow.

Here's just a schematic of the same thing, but here's the roll front, the production well in the middle. This is pretty generalized. Got an injection well on each side. You're moving the ground -- you're pumping this well. You're injecting here. And it's going across and basically washing or dissolving this very low-level uranium off the sand.

And the good thing is, in conventional mining, surface or underground mining, you would dig a big pit here. You would take all this matrix out, the sandstone with the uranium. It would go to a big mill where it's crushed and it's acid leached. And then 99.97 percent of this rock would go out to a tailings pond. And you've probably heard of tailings ponds. That's what tailing is. It's all the rock you took out to get that relatively low level of uranium out of it.

And in the ISR industry, basically you just use conventional oil and conventional water well drill rigs. And here's one here at the Christensen Ranch Project. If you had a ranch or you were going to drill a well at your house, that's the type of rig you would use. The type of wells that are put in on PVC or fiberglass casing, basically the same thing. So this is not -- there's no

1 frac'ing. There's no high pressure. It's just basic
2 water well installation.
3 So this is kind of an interesting slide here,
4 because you can imagine if the sandstone -- it's in an
5 aquifer. It's got uranium in it.
6 I should have shut my phone off. Funny story
7 on that. I was down hunting chuckars in the Big Horn
8 Basin. And I had it in my pocket, and I didn't know it
9 was in there in my coat. It went off like that. And I
10 was looking around for this coyote. No, you idiot. It's
11 your phone. The kids changed it to that.
12 Anyway, because the formation's had this
13 uranium in it, the groundwater associated with the
14 uranium is naturally contaminated with radionuclide.
15 It's got uranium in it. It's got radium in it. It's got
16 radon gas in it. And it's really unsuitable for any use.
17 And because it's unsuitable, whether we go in there and
18 mine it or not, it's always going to be unsuitable. And
19 EPA, we're going to talk a little bit here and there
20 about some of their regulatory stuff. But EPA, the
21 Environmental Protection Agency, exempts that zone as an
22 underground source of drinking water under the Clean
23 Water Act. And that's what allows us to inject and
24 recover uranium in that zone.
25 The other thing is the uranium industry has

1 extensive exploration drilling programs. Because to find
2 these roll fronts, they're relatively limited in size.
3 And I don't know what the count is, but there's been
4 millions of drill holes since the '50s drilled in Wyoming
5 looking for uranium. And for the most part, everybody
6 knows where the uranium is these days. But all those
7 areas, even if nobody ever mined them, people have to be
8 concerned with the water quality in these zones. Because
9 if you put a well in there, you're potentially going to
10 have a bunch of radionuclides in your water.
11 MR. SKEEN: How close are these wells?
12 MR. KEARNEY: The wells that we use for
13 injection and production wells are typically 50 to 70
14 feet apart.
15 MR. SKEEN: And the water is pumped down
16 and then out and then reused?
17 MR. KEARNEY: Yep. And we'll talk about
18 that a little more. But basically, I've always liked to
19 use the point, this isn't hardly even really mining. To
20 me, it's a big plumbing project, is what it is. That's
21 how I like to look at it. It's just a big plumbing
22 project with a bunch of wells and a bunch of pumps and a
23 bunch of pipe, an IEX pump just like you have in your
24 house. Your water softener takes calcium and magnesium
25 out, the cations. This process takes the uranium and an

1 anion negatively charged. It takes the anion out it. It
2 takes uranium. So, to me, it's just a big plumbing
3 project.
4 CHAIRMAN GAMPETRO: When we had the issue
5 with the thickness of the cement casings, we went from,
6 what, two to three inches -- does anybody remember? -- on
7 the casings around the pipes? We had a 20 percent
8 failure rate at that time. This is ten years ago or
9 something. Does anybody know what that is today, what
10 the -- what our failure rate is today? Because we're
11 still going through other water tables when we go down.
12 Right?
13 MR. KEARNEY: Typically, yes. Uh-huh.
14 CHAIRMAN GAMPETRO: So we want to keep the
15 radioactive nuclides out of those other tables?
16 MR. KEARNEY: Correct.
17 CHAIRMAN GAMPETRO: Does anybody know what
18 our monitoring wells are indicating now in terms of
19 failure rate?
20 MR. KEARNEY: I don't have any numbers,
21 but I know that the technology has changed. And the type
22 of materials that are used, the joints and stuff, which
23 is typically where the problem is, is a lot more robust.
24 So I think it's safe to say that it's a lot better now
25 than it was 10 or 15 years ago, because different

1 materials are used.

2 CHAIRMAN GAMPETRO: Does anybody from the

3 State know?

4 MS. NUTTBROCK: I don't think -- that's

5 not a number that we have or would track routinely. So

6 I'm not certain what that failure rate would be, now that

7 we have three inches, better pipe, better couplings. I

8 don't know what that would be.

9 MR. KEARNEY: Really, the casing itself is

10 more critical than the cement around it. The cement is

11 giving it support. But it all goes hand in hand in

12 making a more competent -- a more competent well. But I

13 think it's safe to say that the well completion

14 techniques used today compared to 10 to 20 years ago are

15 a lot better.

16 CHAIRMAN GAMPETRO: I'd be interested in

17 that number if anybody could come up with it.

18 MS. NUTTBROCK: I'll see if we have a

19 number that could give you a better idea.

20 CHAIRMAN GAMPETRO: Thank you.

21 MR. KEARNEY: The next step would be well

22 field operations and the mining solution we're talking

23 about circulating. You'll probably hear the term once in

24 a while "lixiviant." And all lixiviant is is the water

25 that we're injecting, the native groundwater, and we mix

1 oxygen with it, gaseous oxygen, gaseous carbon dioxide,
2 and sometimes sodium bicarbonate, baking soda, is added,
3 as well. And that's why it's called an alkaline leach,
4 because these things are on the basic side of the pH
5 scale. It can be done with acid, but it's typically not
6 in Wyoming for a variety of reasons. But other places in
7 the world, Australia, Kazakhstan, like I said, they use
8 an acid leach.
9 So well field control, obviously you want to be
10 able to control your fluids, because you don't want them
11 to go out of your monitoring well ring that we're going
12 to talk about. And you don't want to be adding more
13 chemicals than you have to, because they cost money. So
14 control of your well field's important. And you want to
15 balance your well field so that the fluids stay in there.
16 And you typically take a little bit more water out than
17 you put in, called a bleed, to keep the fluid within your
18 mine area.
19 And nowadays, this stuff is continuously
20 controlled with computers. And the automation stuff they
21 use now out in the field reports back to the control
22 building. And it's way advanced compared to even ten
23 years ago. And like I said, you want to keep that --
24 those fluids within the exempted aquifer. That's the
25 important part that you're going to hear more about.

1 And here's just typical what a well field looks
2 like. This is what you're going to see today. This
3 here, the stippling here, those are the individual
4 injection and production wells that are all down. And
5 the well screen is in that zone where the uranium is in
6 it. These are the monitor well ring that, in some
7 respect, delineates the exempted aquifer. And these
8 wells are completed in the same zone. So, if you over-
9 inject, something happens and your fluids go out and you
10 detect it at these wells, you change the gradient, you
11 pump more here, and you pump it back.
12 Now, if it comes out here and the levels go up
13 of the parameters, we have to measure -- they just go up
14 actually quite a little amount and they hit a certain
15 level that the DEQ calls an upper control limit, and you
16 go on excursion. That's a regulatory term. And you have
17 to do certain things if you go on excursion. But
18 sometimes you can see the parameters going up ahead of
19 time, and you can head it off. And those type of
20 excursions do not happen very often.
21 Then you also have wells that -- not in every
22 operation, but most. If you have overlying and
23 underlying aquifers below this zone, we have to monitor
24 those, too. So you have wells above and wells below, and
25 all these wells get sampled every two weeks. So, between

1 the operating facilities, in Wyoming it's safe to say
2 there's probably, I don't know, at least a thousand wells
3 that get sampled every two weeks.
4 Yes?
5 CHAIRMAN GAMPETRO: What's the technology
6 involved in determining the actual path of the water
7 underground? Is it just exploratory drilling, or is
8 there some other technology that helps you know where
9 that shape is?
10 MR. KEARNEY: Well, that -- the shape with
11 the ore and stuff, this here -- and that's one part I did
12 leave out, because we could cover the exploration and
13 stuff of the uranium ore body, but it takes -- ahead of
14 these wells, you do a tremendous amount of drilling. And
15 you drill a hole, and it's an open hole, and it just has
16 the drilling fluid in it. Then you geophysically log it.
17 And the geophysical log that goes down, it detects the
18 radiation given off by the uranium, actually one of the
19 uranium daughters. And from that, you do like indirect
20 measurement, and it tells you how much uranium is there.
21 And that's how you determine where to put these wells and
22 if it's economic to mine it. So a tremendous amount of
23 drilling goes into this before the wells are even put in.
24 John, you want to add anything on that?
25 MR. CASH: John Cash with Ur-Energy.

1 Typically, an exploration, once you're on the
2 ore body, you're going to drill it out 100-by-100 centers
3 or 50 or a 100 centers. And as Bill said, you use a
4 gamma instrument. You measure the intensity of the gamma
5 response. And from that, you can back-calculate how much
6 uranium is there. And then the geologists take the
7 compilation of all of that data, and they can map out
8 exactly where that ore body is running through the
9 underground.
10 In addition to the gamma signature, the
11 geologists will also look at the cuttings that come up
12 from drilling. And they can tell from the cuttings if
13 you're on the oxidized side of the ore body or the
14 reduced side. So they'll make a map that shows where
15 that line is where the ore body should be right at the
16 boundary of oxidation and reduction. So, between those
17 two things, that's really what we use in our exploration
18 efforts.
19 MR. KEARNEY: Two things related to that,
20 directly related to that, is, number one, obviously the
21 industry employs a lot of people for drilling. And it's
22 typically always contractors that we use. So each drill
23 rig has three guys that run the rig and the water truck.
24 And then the other thing is, the geologic
25 aspect of it and the geology, each company has quite a

few geologists. And the science of doing this is very advanced in Wyoming, and it's more of an art than a science, really, to be able to interpret this information he's talking about and make these maps. I've been around the industry for like 20 years, and I still don't know how they do it. But I see all this stuff that they do. And they make all these different colors. But it's quite an interpretation the way they do it.

Yes?

MR. SMITH: In that example that you had there, where would the injection wells be, versus the recovery wells?

MR. KEARNEY: I don't know if there's -- there may not be another slide in here. But this whole thing is injection or production wells. If you can think of it as a square, the production well that has a pump in it is pumping out in the middle, and the injection wells are on the corners. And it's causing the flow to go across the uranium, basically wash or dissolve off the uranium off the sand grains and pump it out. And when the water comes out of the production well, it's just nice and clean. You can't see the uranium. The concentration is so low, you can't see it. It's dissolved in the water, just like salt would be dissolved in the water.

1 MS. NUTTBROCK: So, Bill, every dot you
2 see there is representing a square?
3 MR. KEARNEY: Well, each dot is either a
4 production -- the scale of this is not very good, if you
5 can see this. This is an array of production and
6 injection wells. And a lot of times -- you know, for the
7 most part, typically, it looks more like this, where the
8 ore is narrower. And you may have just -- you know,
9 these would be production wells down the center and then
10 injection wells on the edge.
11 CHAIRMAN GAMPETRO: I've been told this
12 before, but I don't remember it, and it was an
13 interesting number, how many gallons typically of
14 ore-producing water you would have to filter to get a
15 pound of yellow cake.
16 MR. KEARNEY: That calculation, I never
17 ran, but it's a -- I wouldn't want to try to do it in my
18 head. But typically -- typically, when you first turn an
19 area on, obviously -- think of it as you're dissolving.
20 You just got a chunk of salt down there. And you're
21 going to get -- the uranium is going to go up real fast.
22 And it typically peaks somewhere between 100 and 500, 600
23 parts per million of uranium. So it will peak very
24 quick. And then it will start -- it's an acidotic thing.
25 But it will die off.

1 In an area like this, it typically takes about
2 two to two and a half years to recover the uranium out of
3 that.
4 MS. NUTTBROCK: Anybody else have some
5 discussion or thoughts on it?
6 CHAIRMAN GAMPETRO: It was a lot. It was
7 a lot of water that had to be processed to get a pound of
8 yellow cake, I remember.
9 MR. KEARNEY: Sure. Right. And our
10 facility at Willow Creek is set up to process 6,000
11 gallons a minute. And I don't know what Cameco's are
12 that you're going to see today. But they have several
13 facilities that probably do 4,000 gallons a minute each.
14 So you probably do what, 12,000 gallons a minute now?
15 MR. LEFTWICH: I think we're up to about
16 16,000 gallons a minute.
17 MR. KEARNEY: And the other thing that
18 ties into this is obviously the price of uranium. As the
19 price goes up, you can run wells longer at a lower grade,
20 because basically you're just paying for electricity.
21 But again, it's a giant plumbing project.
22 Good question.
23 CHAIRMAN GAMPETRO: I remember that
24 number. Back ten years ago or so, it was twelve bucks a
25 pound. What is it now, sixty?

1 MR. KEARNEY: Fifty is a good number right
2 now.
3 CHAIRMAN GAMPETRO: Fifty?
4 MR. KEARNEY: Fifty. And to put it in
5 perspective, I think it was 1979 that the price peaked in
6 the sixties, which, in today's dollars, would be like
7 $130 a pound. So fifty is certainly better than 12, but
8 it's not near what the historic high was when things were
9 going gangbusters in the '70s, when 4,600 people were
10 employed here.
11 So here, this is a great tie-in to what we were
12 talking about, all the drilling. Here's a shot where
13 this is potentially going to be a well field for the next
14 several months, and these are all sites where they
15 drilled holes to delineate where the uranium is. Like
16 John said, this is where you put the probe down into the
17 hole to determine how much uranium is there. And then
18 those sites may or may not be used as a well. It all
19 depends. Again, a lot of geology goes into this, a lot
20 of drilling.
21 And here's a site where the geologists have
22 determined that this is going to be a well field in this
23 particular location. And here's the drill rigs. Now
24 they're going in and completing a well.
25 And here's a well field. This just happens to

1 be out at Christensen Ranch, where I'm associated with.
2 And this well field, here's an area, when I took this, it
3 just had gone into production. So you can see -- you can
4 see the well boxes here over the individual wells.
5 And again, this is what it looks like when it
6 is in production. This well field here, this picture was
7 taken about six months after production started. And it
8 was just seeded here and in the process of the grass
9 starting to grow. And that was in May of this year.
10 So a little closer look. You're going to see
11 these things today. Again, seeing it in real life is way
12 better than seeing it here on this PowerPoint. But
13 injection, production wells, they basically look like
14 this, and they're covered with a box to protect them from
15 the elements. And this stuff's all sealed. And out at
16 the Christensen Ranch Project, we have leak detection in
17 each well. So this little float here, if something
18 leaks, it knocks the float off, and it's hoped that
19 fiber-optics back to the plant and the operator knows
20 something's wrong with this well. He radios. Somebody
21 goes out there to look at -- you know, to see what's
22 going on. So that's way advanced over like ten or
23 fifteen years ago. And you're going to see that this
24 afternoon.
25 So you have the wells and then -- so each --

1 all those wells and groups, they're piped to a header
2 house. They're just another part of the big plumbing
3 project. So all this stuff comes into a header house.
4 One side is the injection side, and one's the production
5 side. And those wells are all hooked together in there.
6 And the water is either recovered there and goes into a
7 big pipe back to the plant, or it comes from the
8 injection side and goes back out to the well. And you'll
9 see this in real life this afternoon. So you'll see
10 there will be a bunch of these buildings around, and
11 those are called header houses.
12 And from that, the header houses all go into a
13 bigger pipeline, and another -- the major pipeline called
14 the trunk line, it all goes back to the satellite plant
15 where the ion exchange columns are.
16 And here's a little schematic of the satellite.
17 We already talked about this, the injection, production
18 fluid in the ore. The production fluid comes out. It
19 goes through the ion exchange column. Here's a picture
20 of the satellite. Here's the ion exchange columns. A
21 lot bigger than in your house, but the same principle.
22 These things are filled with -- I don't have the picture
23 in here, but they're loaded with resin, and the resin
24 looks like little, tiny fish eggs, you know, about the
25 size of the head of a rounded-off pencil lead. They're

1 just real small. And that's an organic plastic-type
2 material that has an affinity for uranium. So the
3 uranium sticks to that. The stuff you have at your house
4 has an affinity for calcium and magnesium. Just a
5 different chemical structure. So that stuff's in here.
6 And then typically you have to bring it to a plant to get
7 the uranium off it. So it's pumped into a
8 tractor/trailer truck, and then that's transported to
9 central processing facility.
10 This is another view of a satellite inside.
11 This is a different type of ion exchange column setup
12 that's out at the Christensen Ranch facility by Pumpkin
13 Buttes. And it also has here the RO system that's used
14 to treat some of the wastewater.
15 So what happens at the central processing
16 plant? Well, that's where the uranium's precipitated,
17 filtered. So the resin comes in. It's pumped out of a
18 truck or a trailer into another ion exchange site column
19 where the uranium is diluted, typically with sodium
20 chloride. The sodium chloride high concentration hits
21 it, and the chloride knocks the uranium free from the
22 resin. So now you have this uranium dissolved in water.
23 And then through different chemical additions
24 and pH changes, you precipitate the uranium, and you make
25 it into a solid. And that's getting closer to how the

1 conventional operations used to work, where you
2 precipitated the uranium, and then it's pumped to a
3 filter press, where you wash the uranium and get the
4 chlorides out of it, and then you dewater it before you
5 dry it. And so, once it comes out of the filter press,
6 it's kind of a very thick slurry, kind of about like
7 toothpaste. And then you either send that to a dryer or
8 you store it for drying later.
9 And then the stored uranium, it's either
10 dewatered by drying in a low-temperature vacuum dryer or
11 a higher-temperature dryer, which historically has been
12 called a calciner. In the old days, Lucky Mac, Shirley
13 Basin, Exxon, they all had high-temperature dryers
14 because they were precipitating the uranium using
15 kerosine, ion exchange that way. So they had very high-
16 temperature dryers that dried the uranium at over a
17 thousand degrees to get the kerosene and the organics out
18 of it.
19 Most of the places today use a low-temperature
20 dryer, which you'll see today, probably. And those
21 dryers are nothing special. They're just what the food
22 processing industry uses to dry beans or flour, other
23 things like that. They're basically off-the-shelf units.
24 And they dry the uranium at a lower temperature of about
25 400 degrees.

1 And the final product which you've heard,
2 yellow cake, have a picture of it coming up so you'll
3 know what it looks like. But the final thing is called
4 yellow cake because it's yellow when it's oxidized. And
5 then those things are just shipped in typical over-the-
6 road tractor/trailers to the processing facility. And
7 it's called exclusive use. And what that means is, when
8 a carrier is shipping our uranium in drums, they can't
9 put anything else in that truck. It can only be that.
10 They don't stop in Colorado and pick up a load of peaches
11 and mix it in with the uranium. It's exclusive use.
12 That's all that can be in that truck.
13 And here's pictures that are a little better
14 than what I just described. But here's a filter press,
15 where the water is squeezed out of the uranium slurry,
16 and then it goes down through a dryer, which would be
17 upstairs here, and then it fills up a 55-gallon drum.
18 And there's what it looks like in the drum. And the
19 drums of yellow cake -- uranium's heavy stuff, heavier
20 than lead. So what's in here, yellow cake, is uranium
21 oxide. It's not just U. It's uranium oxide. But it's
22 still heavy. A drum from a vacuum dryer weighs about 600
23 to 700 pounds. But if you go through the old
24 conventional calciner, where they're drying at a way
25 higher temperature, the drums typically weigh about a

thousand pounds. And those are just loaded with a forklift on a truck. And then you have to follow DOT regulations to ship it.

So, getting into some of the regulatory stuff, groundwater restoration requirements, like Nancy said, the Land Quality Division administers Chapter 11 of the Land Quality rules and regulations. And that is in situ mining. And those regulations have a goal of returning the groundwater impacted to the pre-mining or background quality use. In the event that you can't achieve that through all the parameters, the standard's to restore the groundwater to the pre-mining class of use the water was suitable for prior to mining. And like I said in the previous slides, this water is already naturally contaminated. So that's taken into consideration.

But no matter what you do in your restoration, you got to protect the groundwater that's outside your area, typically the direction that the water is moving down-gradient side. Because the water is typically better quality once you get away from the uranium ore bodies.

So what's it look like when you're done doing groundwater restoration? Well, typically it contains bicarb. The uranium -- there's some residual uranium left and elevated total dissolved solids, which is

1 nothing more -- that's another term for salt. So you've
2 increased the chloride concentration, for the most part,
3 and bicarb in the water, neither of which have primary
4 drinking water standards. Bicarbonate, soda ash,
5 carbonated water, that is not a hazardous substance.
6 But how do you reduce these things closer to
7 background? You basically use three techniques. You
8 pump a bunch of the groundwater out. You run it through
9 your columns. You remove the uranium. You use reverse
10 osmosis as the primary thing. Again, standard
11 technology, you might have one in your house if you have
12 kind of bad water quality. It might be under the sink.
13 And it's this big (indicating). ISR facilities, they're
14 half the size of this room. Some of them can do 500,000
15 gallons a minute. And what that does is filter the water
16 to a very, very clean state.
17 And then you also, at the end, typically add
18 some type of chemical reductant to help bring the
19 formation back to its natural condition that put the
20 uranium there in the first place. It's reduced -- when
21 the uranium is in a reduced condition, it's not mobile.
22 It sticks to the rock, as well as other metals that may
23 become mobilized. So that's an important step to
24 immobilize that stuff.
25 This is a picture of what an RO unit looks

1 like. And what they do is, it's got a semipermeable
2 membrane in there. And you pump the water at very, very
3 high pressure, and only the H2O goes through, for the
4 most part. And the dissolved chloride, bicarb, uranium,
5 radium, that stuff doesn't make it through this very,
6 very tight filter.
7 So some misconceptions that ISR contaminates
8 drinking water supplies, the facts are that groundwater
9 moves very slowly. Most of the areas in Wyoming, the
10 groundwater is moving about four to ten feet a year
11 naturally, is all that it's moving. So those geochemical
12 conditions that were there that made the uranium
13 precipitate out in that area, the reduce conditions,
14 those conditions are still there, just outside of where
15 we mined it. So those things are going to play a major
16 role in keeping any fluids from moving down-gradient. As
17 we already said, the restored formation, even if we
18 didn't mine it, it doesn't have any consumptive uses.
19 You shouldn't use the water for anything, whether we mine
20 it or not.
21 And then the main thing, again, is the uranium,
22 the radium and the radon gas. And what's often
23 overlooked, one of the main concerns is, if you put a
24 well into these zones naturally, you can get a ton of
25 radon gas in your house. If you turn on the shower or

1 the faucet, this radon is looking to come out. So it's
2 not just the uranium and the radium, but it's the radon
3 gas.
4 Another misconception here, that restoration
5 cannot be achieved. Well, there's many examples of
6 successful restoration in Texas, Nebraska, Wyoming. And
7 more than 50 well fields have been restored to regulatory
8 standards and released in Texas alone. About 15 well
9 fields have been restored in Wyoming and more in
10 progress. As a matter of fact, just got a call this
11 morning that the NRC's getting ready to deal on some of
12 our well fields, the release of them.
13 Misconception Number 3, ISR operations are not
14 safe places to work. And this is one that I always like
15 to give. Because if you've been to the old surface or
16 underground mines, they had a lot of hazards. And so one
17 of the biggest things why they're so safe is there's no
18 workers underground or in pits. And that had an
19 important implication about ten years ago, because at one
20 time our industry, from an industrial safety standpoint,
21 was regulated by MSHA, the Mine Safety and Health
22 Administration. And then there was an issue and a
23 finding that they didn't have jurisdiction because miners
24 were not underground. Nobody was underground.
25 So that's when OSHA took over. So we're

1 regulated from a safety standpoint by OSHA because
2 nobody's underground, whether you're in a pit underground
3 or underground mine. There's no large earth-moving
4 equipment, obviously a lot less labor-intensive. The
5 plants, unlike the conventional mines, there's no
6 grinding, crushing, so there's few moving parts, limited
7 quantities of chemicals and not very hazardous chemicals.
8 It's a clean environment. It's surveyed for uranium dust
9 and stuff on a regular basis. For the most part, there's
10 no loud or noisy equipment. There's no blasting.
11 Underground mining, surface mining, that's pretty
12 hazardous. You don't have to do any of that.
13 And then a misconception, it's not
14 environmentally sound. Here, again, is some of the
15 advantages over conventional surface mining. Besides
16 having no large earth-moving equipment and that hazard,
17 you don't have the diesel emissions from those, either.
18 Earlier I talked about no mill tailings. The rock is
19 staying in the ground. You're not taking it up and
20 bringing it to the surface. So you don't have
21 radioactive mill tailings.
22 Considerably less surface disturbance and
23 infrastructure, seen that in some of the slides.
24 Obviously you'll get a way good feel for that this
25 afternoon.

1 Although the well field areas are fenced to
2 keep the livestock out -- and you'll see that today --
3 the areas are quickly revegetated. And it actually
4 becomes like a little wildlife haven. Because
5 essentially you've excluded the livestock, the deer, the
6 antelope and the sage grouse gravitate to these places.
7 And you'll probably see some of that today. They like it
8 in there. And they jump the fence or go under the fence
9 and live in there quite a bit.
10 And then after reclamation is done, we have to
11 go in and plug the wells two to three feet underground,
12 rip out all the pipe, seed it. You can't even really --
13 you can't tell that there was an operation there, for the
14 most part.
15 And I'm about ready to wrap this up. But
16 obviously it's compatible with other land uses. And this
17 is a shot I took back in May at the Christensen Ranch
18 facility by Pumpkin Buttes. And this is some of our
19 drill rigs in the back here developing Mine Unit 8. And
20 this piece of land also has conventional oil wells on it
21 and coal bed methane. So, on this one piece of land, you
22 have coal bed methane, you have oil wells, and you have
23 uranium recovery all going on at the same place. If the
24 wind blew more out there, you'd have a windmill or two,
25 too, but the wind doesn't blow as much.

And here's a shot out at the Highland Uranium Project, and this is showing the wildlife like the well field, and another shot with sage grouse. Again, there's a lot of cover in the well fields, typically, because it's not being grazed.

So just to wrap up, what are the regulatory authorities that regulate us? Obviously Nancy and her group does. That's why we're here. But we're also regulated by the U.S. Nuclear Regulatory Commission out of D.C. And the reason they regulate us is because we're producing a radioactive material which they call source material. So we're regulated by the NRC, the same people that regulate nuclear power plants. And what do they regulate? The radiation protection to the worker, as well as the public and the environment. They also regulate the uranium recovery and processing aspect and then the radioactive waste disposal, which is also the transportation under DOT.

The DEQ, Land Quality Division specifically, regulates the uranium mining and the reclamation aspect. And the Water Quality Division also regulates various waste disposal aspects, mostly on the deep disposal wells. Most operations utilize a deep disposal well, or several of them, to get rid of the high salt wastewater.

The EPA is also involved, as they approve the

1 DEQ Water Quality Division's reclassification that allows
2 the aquifer to be mined and injected into. And then the
3 Bureau of Land Management, if you happen to be on BLM
4 land, they get involved, in that they have to approve a
5 plan of operations which covers mining and reclamation.
6 So you can see we're -- we have at least,
7 depending on where you're located, three groups that are
8 regulating the mining and reclamation aspect. And then I
9 already talked about that we're basically regulated from
10 a safety standpoint by the State of Wyoming, OSHA
11 program.
12 So just to wrap it up, we thought it was
13 beneficial to give you the whole picture of the industry
14 on how important some of this has become economically to
15 places in Wyoming. And Uranium One is headquartered in
16 Casper. They moved the corporate office from Denver last
17 year to Casper. That's who I work for. And there's
18 currently 95 employees and 70 contractors. And our
19 facility that's operating up by Pumpkin Buttes, about
20 half the work force lives in Buffalo and about half in
21 Casper and a few people in Midwest, but quite a draw out
22 of Buffalo and Johnson County.
23 In 2011 the payroll and benefits was almost $9
24 million, taxes and royalties, 1.1, payments to Wyoming
25 vendors, all the cement we use, the drilling supplies,

1 the well casing, all the pumps, over $20 million, and
2 total expenditures were over $30 million.
3 So the idea was we let the companies go ahead?
4 MR. CASH: Go ahead.
5 MR. KEARNEY: John represents Ur-Energy,
6 so if you have any specific questions. You've probably
7 seen recently Ur-Energy has the interest in the Lost
8 Creek Project in Sweetwater County. It's in the final
9 stages of permitting with the BLM. As a matter of fact,
10 I read in the paper yesterday that they approved the EIS.
11 Is that right?
12 MR. CASH: Right.
13 MR. KEARNEY: So they had to go through
14 the EIS with the BLM. And initial production is
15 scheduled for the spring of 2013. And I think I read in
16 the news release they're hoping to break ground in
17 October. Correct?
18 MR. CASH: Right.
19 MR. KEARNEY: So that's good. The company
20 currently has 25 employees in Wyoming, plans to hire
21 another 50 direct employees, 35 long-term contractors in
22 the very near future now, obviously. And a lot of those
23 contractors are drillers and the drill rigs.
24 The 2011 payroll with benefits was 2.6 million.
25 Over the life of the project, they plan to gross 550

1 million, a net of 290 million and state and local taxes
2 of over 34 million, so quite an economic impact. I'm
3 assuming a lot of the work force will come out of
4 Rawlins, maybe, Rawlins and Casper. But the technical
5 people, Casper has really become the hub, obviously, for
6 the technical capabilities in the uranium industry.
7 Pretty much the bigger companies all have a major
8 presence in Casper.
9 Uranerz. Don't see anybody from Uranerz here.
10 But anyway, Uranerz has been in the paper lately. It's
11 headquartered in Casper. They currently have 41 Wyoming
12 employees from three counties. Again, their facility is
13 located up by Pumpkin Buttes, as well, the Hank Nichols
14 Project. And it started construction about a year ago.
15 And they're not producing yet, but they're constructing.
16 And they have four drilling contractors. It
17 says right there, August of 2011 operations, the second
18 half of 2012 production operations, and from July of last
19 year to June of this year, they spent approximately $11
20 million just on that one project with Wyoming contractors
21 and suppliers. Over 122 businesses in Wyoming, they
22 spent this money on.
23 Cameco, where you're going to be going today,
24 picked just where you'll be heading out on the Smith
25 Ranch/Highland. That's the largest uranium operation in

1 Wyoming. It's the largest uranium operation in the
2 United States. There's not many of them, but it is the
3 largest. And they're headquartered in Cheyenne, and they
4 have -- what do you call the office here, Josh, your
5 regional or --
6 MR. LEFTWICH: Exploration development
7 office.
8 MR. KEARNEY: And Smith Ranch/Highland is
9 going to celebrate its 25th year of in situ mining next
10 year. A lot of people don't realize it's been going on
11 that long in Wyoming. Currently has 220 Wyoming
12 employees and 50 contractors, $59 million a year in
13 payroll, purchases, taxes, royalty. And they have big
14 expansion plans on other projects. Again, up by Pumpkin
15 Butte, there's projects. The Gas Hills, they have
16 projects that are going forward.
17 And how many people do you think you employ in
18 Casper?
19 MR. LEFTWICH: We have about 45 people
20 here at the Casper office.
21 MR. KEARNEY: So, again, a lot of the
22 geologist type staff. Engineering is here in Casper.
23 It's a pretty big deal.
24 Now we're really ready to wrap up. But Wyoming
25 uranium, if you didn't know it, nuclear power supply is

1 about 16 percent of the world's electricity, about 20
2 percent of the electricity in the United States. And
3 right now, right this minute, there's 104 nuclear power
4 plants running in the United States. Most people don't
5 realize there's that many of them. You heard it before,
6 nuclear power, there's no air pollution or greenhouse
7 gases. And one pound of uranium provides about the same
8 energy as 20,000 pounds or ten tons of coal. And there's
9 all the other comparisons with gas and this and that.
10 And I think that's it.
11 CHAIRMAN GAMPETRO: Thank you. That is an
12 excellent presentation.
13 MS. NUTTBROCK: Certainly is. Thank you,
14 Mr. Kearney, for taking the lead and putting that
15 together. Thanks for that.
16 I'm wondering, Chairman Gampetro, if we could
17 take just a few minutes to queue up the two videos that
18 we have. Could we take just a real short break?
19 CHAIRMAN GAMPETRO: Sure.
20 MS. NUTTBROCK: And we'll get those queued
21 up and come back and put those on the screen for you.
22 CHAIRMAN GAMPETRO: Let's come back at
23 11:30. Is that too long?
24 MS. NUTTBROCK: Ten minutes, that should
25 be fine.

CHAIRMAN GAMPETRO: At 11:25 we shall reconvene.

(Hearing proceedings recessed 11:17 a.m. to 11:32 a.m.)

CHAIRMAN GAMPETRO: We're ready whenever you guys want to reconvene the presentation.

MS. NUTTBROCK: For the record, I'll just introduce the videos. This is a video from Ur-Energy on the Lost Creek Project. And at the end of the video, John Cash is here to entertain questions and discussion about the video.

(Video playing.)

MS. NUTTBROCK: Okay. Any questions for Mr. Cash?

CHAIRMAN GAMPETRO: Somebody asked what's the average depth of the in situ wells?

MR. KEARNEY: 400 to 1,000 feet.

CHAIRMAN GAMPETRO: There you go. I forget who asked. I was off a little. I said about 1,000, 1,500.

MR. KEARNEY: Once you get deeper than that, over 1,000 feet, you have to potentially change some of the well completion materials and stuff. But our facility out at Willow Creek is right at about 400 feet. That's pretty shallow. It's typically not as shallow as

400 feet.

What's yours, John?

MR. CASH: At Lost Creek, we're about 450 feet.

CHAIRMAN GAMPETRO: The coal seams -- are there are coal seams out by Pumpkin Butte?

MR. KEARNEY: Yeah. That's where the coal bed methane is. That's at 1,500.

CHAIRMAN GAMPETRO: Those are like at 1,500?

MR. KEARNEY: Yeah, 1,500.

CHAIRMAN GAMPETRO: So this stuff is typically above the coal seams?

MR. KEARNEY: Yep.

MS. NUTTBROCK: We've got one more video. And again, for the record, this is a video made by Strata Energy for the Ross ISR Project. We don't have a Strata representative here with us today, so we'll just watch the video.

MR. HULTS: As far as I know, there is no audio on this one.

(Video playing.)

MR. CABLE: Is there any voice to this?

MR. HULTS: As far as I know, there isn't.

MR. CABLE: A company representative is

supposed to talk about it.

CHAIRMAN GAMPETRO: If anybody wants to tell us what we're looking at --

MR. CASH: I can talk a little bit about it. What they've done is each of these vertical spikes, those are drill holes. And what they're trying to do is present a three-dimensional model of what the mineralization looks like. And it takes a pretty stout set of computers to run modeling like this. You're not going to run this on a regular PC. And then from that 3D model, then they can calculate ore resources and develop mine plans.

CHAIRMAN GAMPETRO: So, if this stuff came with the volcanic ash, there's probably some bentonite around it, too. Right?

MR. CASH: There could be, yeah. A lot of that ash washed away millions of years ago.

MR. ROGACZEWSKI: With the Strata Ross Project -- Mark Rogaczewski with District 3, LQD -- this is up near Oshoto up in Crook County. And there are some bentonite deposits that had been mined within just a few miles of it.

CHAIRMAN GAMPETRO: Oh, I know. I just wondered if it was actually in these seams, if you run into bentonite when you're drilling in there.

1 MR. KEARNEY: The bentonite would have
2 been miles away where the sandstone outcrops.
3 CHAIRMAN GAMPETRO: Okay.
4 MR. KEARNEY: And that's how the water got
5 into that at the edge of it. Went through the ash and
6 got into the sand and may have moved 50 miles, something
7 like that.
8 MS. NUTTBROCK: So, as Mr. Rogaczewski
9 stated, this project, the Ross Project, is currently, as
10 of a week and a half ago, maybe even two, a week and a
11 half ago, is just out for public comment. So we're done
12 with our review process. Ready for any public comment.
13 If public comment is received, then we proceed with an
14 Environmental Quality Council hearing. If no comment is
15 received, then we issue the permits.
16 When is the public comment over?
17 MR. ROGACZEWSKI: The last date of public
18 notice will be August 30th, that Thursday. And then 30
19 more days will be this comment period. And it will end
20 September 29th. So we're roughly 45 days out.
21 MR. CASH: The various colors here
22 represent grade. And I don't have a scale.
23 MR. KEARNEY: John, what's the typical
24 grade? Uranium is very, very low. It's on the order of
25 a tenth of a percent by weight.

MR. CASH: Yeah, or even less. .04 percent, all the way up to maybe three-tenths of a percent for in situ.

CHAIRMAN GAMPETRO: What's the closest town?

MR. CASH: Moorcroft if you don't count Oshoto.

CHAIRMAN GAMPETRO: What's the deep disposal well issue?

MR. CASH: I don't know.

MR. ROGACZEWSKI: Mark Rogaczewski with LQD. This is depicting their application for the deep disposal well, that UIC permit, and where they plan on going and depicting just how deep this well will be and away from the human consumption water source. And the Madison limestone has been used as a water source for human consumption at various parts of the Powder River Basin. Water quality changes in it. But they're showing you they're going to basically go down 9,000 feet to dispose of their water, which is extremely expensive.

CHAIRMAN GAMPETRO: Between the Powder River and the mountains, I think it's 15,000.

MR. ROGACZEWSKI: Yeah. So they're on the upslope. It goes down to the Powder River Basin and comes up near the Big Horns.

1 MS. NUTTBROCK: So, relative to the
2 process -- the generalized process that we looked at this
3 morning, where in the process does the -- is the water
4 generated that's ultimately injected here? Is it after
5 the drying and after the extraction?
6 MR. CASH: No. The vast majority of the
7 wastewater that is generated through in situ mines comes
8 from what Bill talked about, the bleed, where you always
9 have water flowing into the mine unit. So you always
10 produce a little bit more water out than you put back in.
11 So that creates a negative pressure in the aquifer. And
12 that's where the vast majority of that wastewater comes
13 from.
14 Typically, you'll keep out about half a
15 percent, maybe one percent, of the water that you
16 produce. And that gives you that negative flow or bleed.
17 So, if you're flowing 6,000 GPM, your bleed of one
18 percent would be 60 gallons per minute. And that's where
19 most of that water comes from. And also, in groundwater
20 restoration, with reverse osmosis, there's a generation
21 of waste stream there, too.
22 CHAIRMAN GAMPETRO: But just in terms of
23 relativity, some of the deep gas wells they were drilling
24 back in the '70s, the late '70s, when we had the last oil
25 crisis, those things were 15,000 feet deep. So we're

1 dealing, even with your disposal well -- I assume it's
2 just one of those. Right?
3 MR. ROGACZEWSKI: Mark Rogaczewski. It
4 depends on the size of the operation and the projected
5 amount of bleed that's going to occur in mountain
6 wastewater. They may need more than one. It also
7 depends upon the amount of water that that geologic
8 formation can actually accept. Some of these geologic
9 formations are tighter and won't accept as much water at
10 one time, and others have more porosity. So there's a
11 lot of factors that come into play.
12 CHAIRMAN GAMPETRO: I've been told that --
13 just whoever the geologist, best geologist here is --
14 that all of these strata that you see between the top and
15 the bottom there, the Precambrian basin washed down off
16 the mountains over about 70 million years. The original
17 rock that was here is that Precambrian. And all the rest
18 of that is sediment that washed off. Is that accurate?
19 MR. KEARNEY: Yeah.
20 MR. LOOMIS: Or from oceans, seashores.
21 You would have sediments from mountains, seashores,
22 deltas.
23 CHAIRMAN GAMPETRO: Of course, those
24 mountains were about ten or fifteen thousand feet higher
25 back then, too.

1 MR. KEARNEY: And the reason the coal is
2 in the basin is because of the tremendous jumbles here
3 and everything that make a coal seam 150 feet thick. So
4 certainly things were different a billion years ago or a
5 couple hundred million years ago.
6 CHAIRMAN GAMPETRO: That's where the coal
7 came from.
8 MS. NUTTBROCK: Okay. Any other
9 discussion points before we talk about this afternoon's
10 tour?
11 (No response.)
12 MS. NUTTBROCK: Just a few things. We
13 will be traveling out to Cameco's site. We have a map
14 here for you. We'll be traveling out there in your own
15 vehicles. Grab some lunch on the way out there. We'd
16 like to talk -- how long does it take to get out to the
17 site?
18 MR. LEFTWICH: 45 minutes.
19 MS. NUTTBROCK: So we would like to start
20 the tour around 1:00. So, if you could grab some lunch
21 on the way out there, we've got maps to get you there.
22 Once we get there, we'll be hopping in a passenger van
23 that Cameco has. They do a lot of these tours. And
24 we'll be going from there, touring the site for a couple
25 of hours, until, Josh, 3:30-ish?

1 MR. LEFTWICH: Yeah.

2 MS. NUTTBROCK: So that's the plan for the

3 afternoon. Let's see. Safety gear. We've all dressed

4 appropriately. You've got hard hats and safety glasses?

5 MR. LEFTWICH: Yep.

6 MS. NUTTBROCK: Let's see. Any other

7 questions on this afternoon's adventure?

8 CHAIRMAN GAMPETRO: No questions? Are we

9 ready to adjourn?

10 MS. NUTTBROCK: Yes, sir.

11 MR. COLLINS: I so move.

12 MR. SKEEN: I'll second.

13 CHAIRMAN GAMPETRO: Been moved and

14 seconded. All those in favor.

15 (All members vote aye.)

16 CHAIRMAN GAMPETRO: Adjourned. Thank you

17 very much.

18 (Hearing proceedings concluded

19 11:50 a.m., August 20, 2012.)

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1 C E R T I F I C A T E

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3 I, RANDY A. HATLESTAD, a Registered Merit

4 Reporter, do hereby certify that I reported by machine

5 shorthand the proceedings contained herein constituting a

6 full, true and correct transcript.

7

8 Dated this 29th day of August, 2012.

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RANDY A. HATLESTAD

15 Registered Merit Reporter

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