UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CROW BUTTE RESOURCES, INC.	)	Docket No. 40-8943
	)	ASLBP No. 08-867-02-OLA-BD01
(License Renewal for the	)	
In Situ leach Facility, Crawford, Nebraska)	)	

STATEMENT OF CHARMAINE WHITE FACE (AKA Zumila Wobaga)

I, Charmaine White Face, also known as Zumila Wobaga, do swear that the following statement is true and correct to the best of my knowledge.

I. Basis for statement

Defenders of the Black Hills (DOBH) was established in August, 2002, as an all volunteer, environmental organization, without racial or tribal boundaries, whose mission is to protect, preserve, and restore the environment of the 1868 Fort Laramie Treaty Territory. As the Coordinator for DOBH, my responsibilities include many different projects such as sacred sites protection, logging in the Black Hills forests, grasslands protection, and coal and other kinds of mining among others. With my scientific background, a Bachelor of Science degree with a double major in Physical Science and Biology, and enough hours for minors in Chemistry and Microbiology, my personal expertise and interest was in the ramifications of radioactive pollution in the Northern Great Plains Region. Furthermore, the fact that no dose of radioactivity is safe also pushed our concerns for the health of all the people, and the environment. (Exhibit 1. No Dose is

Safe) The Indigenous population of the Northern Great Plains Region also has the highest cancer rate in the nation. (Exhibit 2. **Cancer Mortality Among American Indians and Alaska Natives: Regional Differences, 1999–2003,** Donald Haverkamp, MPH* David Espey, MD* Roberta Paisano, MHSA, February, 2008, P. 46)

For the past twelve years, DOBH has been looking at issues regarding Uranium mining, both past and present. Although this initially included the Crow Butte Resources in Crawford, NB, another organization was asked to monitor that mine as we were engaged in monitoring the impacts of a planned new In Situ Recovery mine, Powetech, in the southwestern Black Hills. Our other major project relating to Uranium mining is the clean-up of all the abandoned Uranium mines in the Region.

As an all volunteer organization of Native Americans and non-Indians with varying levels of expertise, we are a 'watchdog' so to speak, for the environment of the Region. Therefore, we have also had volunteer mentors and researchers on this issue of radioactive pollution including a Ph.D. in Nuclear Physics, and a J.D.D. in Environmental Law providing expert information for any questions that arise.

In order to understand the implications of past Uranium mining in the Region, we have completed a baseline field study of Uranium in most of the surface water in western South Dakota. We have collected other types of research, when possible, from state or federal sources on both surface water and aquifers. Our primary study has been of the impacts from the 3,272 Abandoned Uranium mines in the Region according to the EPA, and their impacts on both surface and ground water, primarily in the Madison Aquifer.

II. Study of Deep Wells on the Pine Ridge Indian Reservation

Due to requests from residents of the Pine Ridge Reservation, we began collecting

drinking water samples a number of years ago and learned that the main aquifer being used on the Pine Ridge Reservation was the Arikaree, which is separate from the Madison. (Exhibit 3. Hydrogeology of the Pine Ridge Indian Reservation, South Dakota, USGS, M.J. Ellis and D.G. Adolphson, 1971) This alleviated our concerns of radioactive pollution coming from the thousands of bore holes and abandoned uranium mines that have already contaminated the Madison aquifer from a study completed by the Tennessee Valley Authority in 1980.

Working with Energy Laboratories in Rapid City, SD, water samples of domestic water were obtained by me, stabilized with nitric acid, everything recorded on chain of custody forms supplied by the laboratory, and given to the laboratory within 72 hours for their analysis. DOBH obtained the funding through donations or small grants to pay for the laboratory analyses. The Oglala Sioux Rural Water Supply System (OSRWSS) would be consulted on the source of the domestic water for that specific resident. Finally, our reports with the water sample results were given to the resident for their use, with a cover letter and copy of the results to the Oglala Sioux Tribal government and OSRWSS.

In 2014, we learned from the OSRWSS that most of the drinking water on the Pine Ridge Reservation is drawn from five (5) deep wells drilled into the Arikaree aquifer. The most eastern portion of the Reservation gets their water through the Mni Wiconi pipeline which transports water from the Missouri River.

Crow Butte Resources pumps dissolving lixiviant into the Arikaree aquifer at their In Situ Uranium Recovery mines at Crawford, NB, near the Pine Ridge Reservation. The USGS potentiometric map of the direction of flow in the Arikaree aquifer shows that the water flows to the north and east of Crawford, NB, into the Pine Ridge Reservation. (Exhibit 4. USGS, Generalized Potentiometric Surface of the Arikaree Aquifer, Pine Ridge

Indian Reservation and Bennett County, South Dakota, Janet M. Carter and Allen J. Heakin, 2007)

Further in Expert testimony given by Dr. Hannon LaGarry, Ph. D., he states:

> "Confining layers above and below uranium-bearing strata limit the unwanted spread of contaminants from an ISL site. However, horizontal flows within the uranium-bearing strata and along intersecting faults and joints are also of concern. Such flow can rapidly redirect lixiviant or mine waste away from the mine site and into unexpected breaches in the confining layers. In my 2008 opinion I cited research on the transmission of water along secondary porosity (faults and joints) in the Brule formation of up to 1500 feet/day. I also provide detailed, plausible conditions under which this contamination could spread to adjacent aquifers. Crow butte acknowledges such secondary porosity in the Brule formation (but not the faults that create it) in their FINAL ENVIRONMENTAL ASSESSMENT FOR THE LICNESE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSIN LICENSE NO. SUA-1534. This acknowledged secondary porosity, if breached by unconfined lixiviant, would transmit contaminants to the major, mapped faults north of the Pine Ridge in Nebraska in only a few years, and from there into adjacent regions."

In addition, the pumping action of five (5) deep wells to meet the domestic water needs of nearly 30,000 people on the Pine Ridge Reservation would also add pressure to the Arikaree aquifer for the lixiviant with dissolved radionuclides to travel more rapidly under the Pine Ridge Reservation.

These three conditions: the potentiometer surface of the Arikaree aquifer flowing from the South and West to the North and East,(CBR is southwest of the Pine Ridge Reservation), the secondary porosity, and the physical pull of five large well systems would lead one to hypothesize that the domestic drinking water on the Pine Ridge Reservation coming from the Arikaree aquifer could contain radionuclides above natural limits.

Findings

In a natural state, Uranium (U-238) is the average dominant element constituting 99.27 % of a sample, while the isotope U-234 is only 0.0053%, with the remainder being

the other isotope U-235. (Exhibit 5. Radioactive Decay Chain of Uranium 238)

According to information from the International Atomic Energy Agency:

IAEA-CN-184/256 The range of variation of uranium isotope ratios in natural uranium samples and potential application to nuclear safeguards

S. Buerger, S. F. Boulyga, J. A. Cunningham, A. Koepf, J. Poths; International Atomic Energy Agency, Safeguards Analytical Services, Austria

"In this work, the ranges of atomic abundances were determined to be about 0.0053 % to 0.0057 %, 0.7199 % to 0.7207 %, and 99.2737 % to 99.2749 % for U-234, U-235, and U-238, respectively. Based upon high accuracy data (using double-spike MC-TIMS) derived from a comparably small set of samples, Richter et al. [22] proposes a slightly narrower range of 0.0051 % to 0.0054 %, 0.7201 % to 0.7207 %, and 99.2739 % to 99.2748 % for U-234, U-235, and U-238, respectively. The present ranges for NU stated by IUPAC are 0.0050 % to 0.0059 %, 0.7198 % to 0.7202 %, and 99.2739 % to 99.2752 % for U-234, U-235, and U-238, respectively."

However, when naturally occurring Uranium is disturbed, the ratio of U-238 to U-234 will change. Our results consistently show that there is always more U-234 than U-238 in the samples from three deep wells used for the Reservations domestic needs located at Kyle, Pine Ridge, and Oglala. (Exhibit 6. Energy Laboratories Report, Dated 12/31/14, Project: WCDCC; Exhibit 7. Energy Laboratories Report, Dated 09/30/14, Project: ABWC-EPR; Exhibit 8. Energy Laboratories Report, Dated 07/02/14, Project: JTB-RSV) This is due to the disturbance of the earth by lixiviant which is dissolving and carrying these radionuclides to the Pine Ridge Reservation as previously stated.

Oglala Community Well

The community on the Pine Ridge Reservation closest to CBR is Oglala. The results in Exhibit 6. are from the White Clay District College Center which gets its drinking water from the deep well at Oglala. Uranium 234 is at 8.0 pCi/L while Uranium 238 is at 4.5 pCi/L. The ratio of U-234 to U-238 is almost 2 to 1, when in nature it would be U-234 at 0.005 to U-238 at 99.27. This indicates mining and the dissolving of Uranium 238 as well as

all the other decay products of U-238 by the ISR process.

Another interesting and disturbing fact from the water test results from the Oglala well is the amount of Thorium 234 at a Minimum detectable concentration of 90.0 pCi/L. Thorium 234 is the first decay step from Uranium 234, is a Beta and Gamma emitter, and has a half-life of only 24 days.

Although Thorium 234 is the first decay product of naturally occurring Uranium, U-238, the OSRWSS does not check for Thorium, nor does any other water department following the regulations of EPA. This naturally occurring Thorium has been unnaturally displaced so that it is in the drinking water at Oglala. It is not Thorium that has been generated by man-made activities from a nuclear power plant, through military intervention, or an industrial plant. Therefore, as a natural element, it is not monitored or regulated by the U.S. Environmental Protection Agency. (Exhibit 9. EPA, Radionuclides in Drinking Water, P. 16, Bottom of page) The OSRWSS is doing its job properly according to the EPA but the people of the Pine Ridge Reservation are drinking radioactively contaminated water containing not just Uranium but also Thorium.

Pine Ridge Community Well

The second nearest community where a deep well is located and used for domestic purposes is Pine Ridge Village. Exhibit 7. Energy Laboratories Report, Dated 09/30/14, Project: ABWC-EPR, shows the results from a resident who states they receive their domestic water from the OSRWSS, not a private well. Their residence is East of Pine Ridge Village proper.

The results show U-234 at 7.8 pCi/L and U-238 at 4.1 pCi/L. Again, this is almost a 2 to 1 ratio, indicating a disturbance of the natural state. Thorium 234 is also present at a Minimum detectable concentration of 123 pCi/l, a little higher by 33 pCi/L than the Oglala

well.

Kyle Community Well

Although Red Shirt village is located on the northwestern corner of the Pine Ridge Reservation, it is served by the deep well at Kyle with many other small communities and households also getting their water from the same source. The results in Exhibit 8. are from a residence in Red Shirt Village, and show U-234 at 7.0 pCi/L with U-238 at 3.4 pCi/L, again a 2 to 1 ratio indicating a disturbance of naturally occurring Uranium. Also the Minimum detectable concentration of Thorium 234 is 179 pCi/L.

The well at Kyle is the farthest distance from CBR and the one furthest North and East, yet these results signify a major disturbance in the Arikaree aquifer. Where could this be coming from other than CBR's disturbance of the aquifer?

North of Sharps Corner

In 2009, we were asked to test the water at a residence where a number of family members had died from cancer. It appeared a cancer cluster was there as the resident also told us of his neighbors who also died from cancer. A test was completed on their private well which was drilled into the Arikaree aquifer. The residence is approximately 3 miles north of Sharps Corner in the middle of the Pine Ridge Reservation. Another laboratory, ALS Paragon, Fort Collins, CO, was used as a quality control check as a previous test had been conducted at this same residence using Energy Labs. Again, the results from ALS show the ratio of U-234 to U-238 is 2 to 1. (Exhibit10. ALS Paragon Report, Dated 03/23/09, Project: PR-2.) As we had not specifically asked for all radionuclides, the amount of Thorium was not reported

Conclusion

The results from the tests of domestic water from the deep wells into the Arikaree

aquifer combined with the direction of flow within the Arikaree aquifer, and the number of excursions from the Crow Butte Resources operation, the secondary porosity, and the physical pull from the wells lead to the conclusion that Crow Butte Resources is polluting the Arikaree aquifer with radioactive contaminants.

Recommendations

The entire Arikaree aquifer needs to be tested for radioactive contamination, not just exploring for more Uranium deposits. No license, or extension of a license should be given to CBR until they can prove that their activities have not contaminated the Arikaree aquifer and polluted the drinking water on the Pine Ridge Indian Reservation. Furthermore, without any proof that CBR is not the cause of radioactive pollution in the Arikaree aquifer, CBR must be held responsible and accountable for all the health problems incurred by the people of the Oglala Sioux Tribe.

CERTIFICATION

Pursuant to 10 C.F.R. Sections 22.304(d) and 28 U.S.C. Section 1746, I declare, under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Dated this 5th day of May, 2015.

Charmaine White Face - Zumila Wobaga

Charmaine White Face (Zumila Wobaga)

LIST OF EXHIBITS

1. "No such thing as a safe dose of radiation", NUCLEAR INFORMATION AND RESOURCE SERVICE, www.nirs.org (2 pages)

2. **Cancer Mortality Among American Indians and Alaska Natives: Regional Differences, 1999–2003,** Donald Haverkamp, MPH* David Espey, MD* Roberta Paisano, MHSA, February, 2008, P. 46 (2pages)

3. USGS, Hydrogeology of the Pine Ridge Indian Reservation, South Dakota, M.J. Ellis and D.G. Adolphson, 1971

4. USGS, Generalized Potentiometric Surface of the Arikaree Aquifer, Pine Ridge Indian Reservation and Bennett County, South Dakota, Janet M. Carter and Allen J. Heakin, 2007

5. Radioactive Decay Chain of Uranium 238

6. Energy Laboratories Report, Dated 12/31/14, Project: WCDCC

7. Energy Laboratories Report, Dated 09/30/14, Project: ABWC-EPR

8. Energy Laboratories Report, Dated 07/02/14, Project: JTB-RSV

9. EPA - Radionuclides in Drinking Water (3 pages)

10. ALS Paragon Report, Dated 03/23/09, Project: PR-2

Exhibit 1.
(2 pages)

NUCLEAR INFORMATION AND RESOURCE SERVICE

6930 Carroll Avenue, Suite 340, Takoma Park, MD 20912
301-270-NIRS (301-270-6477); Fax: 301-270-4291
nirsnet@nirs.org; www.nirs.org

NO SUCH THING AS A SAFE DOSE OF RADIATION

There are many reputable scientists who believe, based on their research, that there is no threshold for radiation damage to humans- no dose which is harmless. These are just a few of their words:

"There is no safe level of exposure and there is no dose of radiation so low that the risk of a malignancy is zero"--Dr. Karl Z. Morgan, dubbed the father of Health Physics.[1]

"...there is no safe level of exposure to ionising radiation, and the search for quantifying such a safe level is in vain."—Rosalie Bertell, PhD.[2]

In 1940, several members of the US Committee on X-Ray and Radium Protection "proposed that the [radiation exposure] standard be lowered by a factor of five in response to the accumulating evidence that ANY amount of radiation, no matter how small, can cause genetic damage, injuring future generations." Gioacchino Failla argued against the lowering of the standards saying that "if genetic damage were to be a consideration for standard-setters, then logically no radiation exposure should be allowed."[3]

"...the human epidemiological evidence establishes—by any reasonable standard of proof—that there is no safe dose or dose-rate...the safe-dose hypothesis is not merely implausible—it is disproven." Dr. John.W. Gofman [4]

"One thing we should take from this (1991 study of Oak Ridge weapons workers by Steve Wing, et al.) is that there isn't any safe level of radiation exposure..." Dr. Carl Shy [5].

"The reanalysis (of Hanford worker data) provides no support for the idea that...there is reduced cancer effectiveness of radiation at low dose levels..." Drs. G.W. Kneale and A. Stewart [6].

"There is evidence that single tracks of all types of ionizing radiation can induce a variety of damage including DNA double-strand breaks which are believed to be critical lesions in radiation exposure. There is also a body of experimental evidence that argues against an error-free DNA repair system operating at low doses of ionizing radiation that might result in a dose threshold for the induction of gene and chromosomal mutations." MP Little and CR Muirhead.[7]

"An important feature of alpha irradiation is that, no matter how low the total dose to the whole body, a substantial dose of radiation (approx. .5 Gy) is delivered to an individual cell if it is traversed by a single alpha particle." E Wright [8].

The U.S. Committee on the Biological Effects of Ionizing Radiation concludes that, despite some evidence of a partial repair mechanism, recent low-dose radiation data "do not contradict the hypothesis, at least with respect to cancer induction and hereditary genetic effects, that the frequency of such effects increases with low-level radiation as a linear, non-threshold function of the dose." (National Research Council BEIR V 1990)

Works Cited:

1..."Cancer and low level ionizing radiation" *The Bulletin of the Atomic Scientists*. September 1978.

2.....*No Immediate Danger? Prognosis for a Radioactive Earth.* Women's Educational Press, Toronto, Ontario. 1985: 45. isbn 0-88961-092-4

3 Caufield, Catherine. *Multiple Exposures: Chronicles of the Radiation Age.* Harper and Row, New York. 1989: 48. isbn 0-06-015900-6.

4...*Radiation-Induced Cancer from Low-Dose Exposure: An Independent Analysis.* Committee for Nuclear Responsibility, Inc. 1990:18-16, 18-18. Isbn 0-932682-89-8.

5 Garloch, Karen. "Repeated low radiation doses hike leukemia risk, UNC study finds." *The Charlotte Observer*. Wednesday, March 20, 1991.

6 ..."Reanalysis of Hanford Data: 1944-1986 Deaths." *American Journal of Industrial Medicine*. 23:371-389 (1993).

7..."Curvilinearity in the Dose-Response Curve for Cancer in Japanese Atomic Bomb Survivors." *Environmental Health Perspectives*. 105 (6): 1505. (1997)

8..."Chromosomal instability in the descendants of unirradiated surviving cells after alpha particle irradiation." *Proc. Natl. Acad. Sci. USA.95*: 5730 (1998).

The following are additional studies are not quoted above:

Epidemiology:

Stewart, A.M., et al. "Radiation Exposures of Hanford Workers Dying from Cancer and Other Causes." *Health Physics*. Nov (1977).

Stewart, A.M, et al. "Delayed Effects of A-bomb radiation: a review of recent mortality rates and risk estimates for five-year survivors." *Journal Epidemiology and Community Health.* 36(2):80-6 (1982).

Morgenstern, H., et al. "Epidemiologic Study to Determine Possible Adverse Effects to Rocketdyne/Atomic International Workers from Exposure to Ionizing Radiation" Report by the UCLA School of Public Health. September, 1997.

Wing S., et al. "Mortality Among Workers at Oak Ridge National Laboratory." *JAMA*, 26 (11):1397 (1991)

.Cell studies:

Lorimore S. A., et. al. "Chromosomal Instability in the descendants of unirradiated surviving cells after alpha particle irradiation." *Proc. Natl. Acad. Sci. USA.* 95: 5730-5733 (1998). (Eric Wright is co-author)

Kadhim M. A., et al. "Transmission of chromosomal instability after plutonium alpha particle irradiation." *Nature*. 355:738 (1992). (Eric Wright is co-author)

Many more published studies (especially cell studies) and entire books show scientific evidence for the tightening of radiation standards in order to adequately protect human health. Those listed above are in no way wholly representative, but merely provided as reference.

Exhibit 2.
(2 pages)

Cancer Mortality Among American Indians and Alaska Natives: Regional Differences, 1999–2003

Donald Haverkamp, MPH*
David Espey, MD*
Roberta Paisano, MHSA†
Nathaniel Cobb, MD†

February, 2008

* Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, assigned to the Indian Health Service, Division of Epidemiology and Disease Prevention.

† Division of Epidemiology and Disease Prevention, Office of Public Health Support, Indian Health Service.

Table 16. Five leading causes of cancer mortality by average annual age-adjusted rates,* 1999–2003, by IHS geographic region and sex, compared with U.S. All races population.

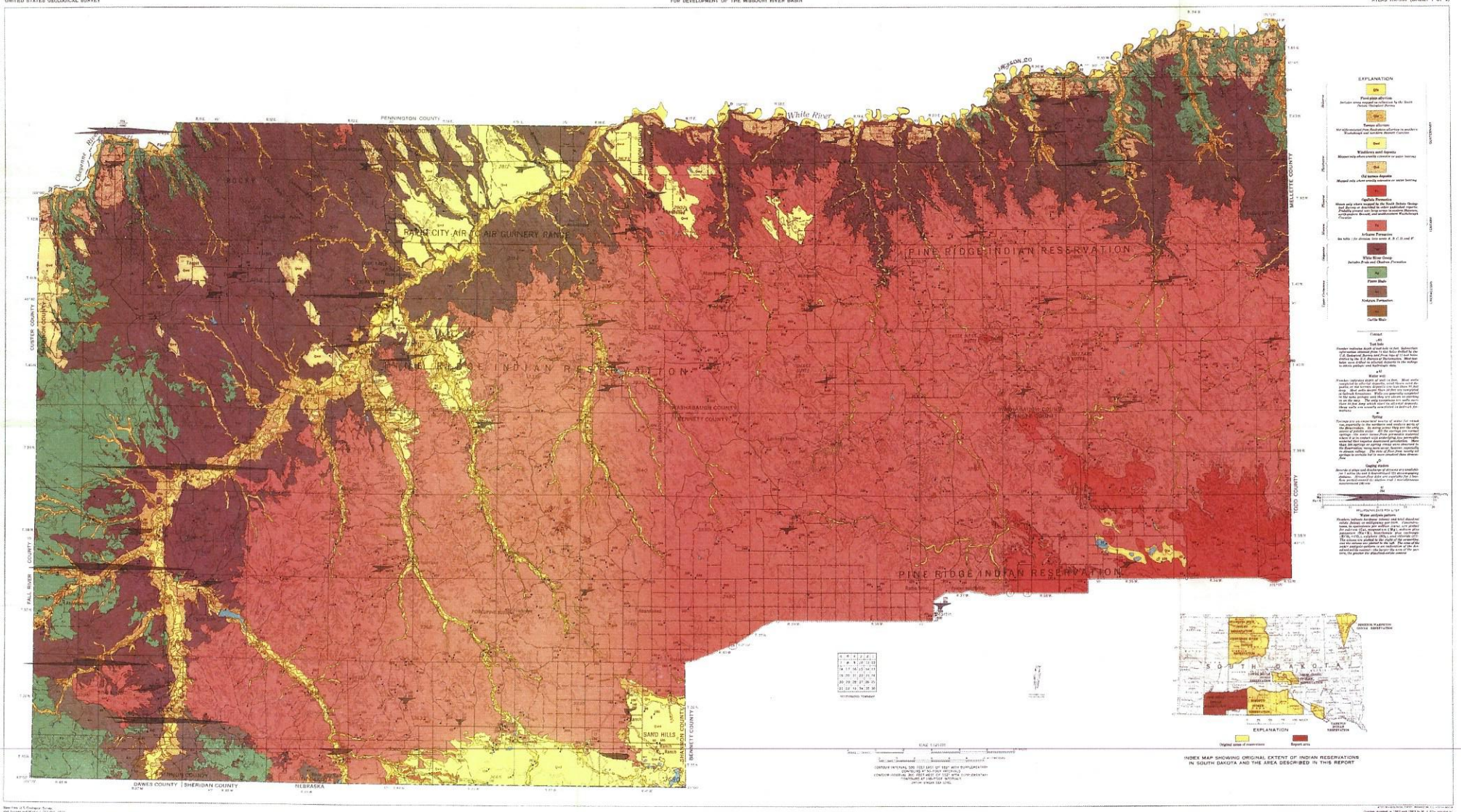
Region	Both sexes		Males		Females	
U.S. All races	Lung	55.1	Lung	74.8	Lung	41.0
	Colon/rectum	20.0	Prostate	29.1	Breast	26.0
	Miscellaneous	15.4	Colon/rectum	24.3	Colon/rectum	17.0
	Breast	14.8	Miscellaneous	19.4	Miscellaneous	12.6
	Prostate	10.9	Pancreas	12.2	Pancreas	9.2
All IHS regions	Lung	40.0	Lung	50.0	Lung	32.8
	Colon/rectum	17.3	Prostate	21.5	Breast	15.9
	Miscellaneous	15.6	Colon/rectum	20.9	Colon/rectum	14.8
	Breast	9.0	Miscellaneous	18.1	Miscellaneous	13.6
	Prostate	8.3	Stomach	10.3	Pancreas	7.4
Alaska	Lung	63.8	Lung	82.0	Lung	49.2
	Colon/rectum	35.5	Colon/rectum	45.4	Colon/rectum	30.5
	Miscellaneous	30.1	Miscellaneous	38.0	Miscellaneous	23.6
	Stomach	15.7	Prostate	23.5	Breast	21.2
	Pancreas	12.4	Pancreas	20.0	Stomach	14.0
East	Lung	42.2	Lung	51.6	Lung	35.5
	Colon/rectum	16.6	Prostate	16.1	Colon/rectum	17.9
	Miscellaneous	10.0	Colon/rectum	13.8	Breast	16.5
	Breast	9.5	Miscellaneous	8.2	Miscellaneous	11.3
	Pancreas	6.4	Leukemia	7.7	Pancreas	6.1
Northern Plains	Lung	84.2	Lung	100.3	Lung	73.2
	Colon/rectum	28.6	Prostate	41.6	Colon/rectum	24.4
	Miscellaneous	22.8	Colon/rectum	37.1	Breast	20.3
	Prostate	15.3	Miscellaneous	27.0	Miscellaneous	19.6
	Breast	11.6	Liver	13.6	Pancreas	8.5
Pacific Coast	Lung	40.3	Lung	47.1	Lung	35.5
	Colon/rectum	16.4	Colon/rectum	21.1	Colon/rectum	13.0
	Miscellaneous	10.7	Prostate	15.3	Breast	13.0
	Breast	7.3	Miscellaneous	12.4	Miscellaneous	9.3
	Pancreas	7.0	Leukemia	7.4	Pancreas	8.4
Southern Plains	Lung	43.0	Lung	56.2	Lung	33.6
	Colon/rectum	17.8	Prostate	21.7	Breast	18.0
	Miscellaneous	14.4	Colon/rectum	21.5	Colon/rectum	15.1
	Breast	10.4	Miscellaneous	19.1	Miscellaneous	11.3
	Prostate	7.9	Kidney	10.8	Pancreas	5.9
Southwest	Miscellaneous	15.2	Prostate	19.2	Miscellaneous	14.3
	Lung	12.4	Lung	17.9	Breast	13.2
	Stomach	11.0	Miscellaneous	16.0	Ovary	8.7
	Colon/rectum	9.4	Stomach	15.3	Lung	8.4
	Liver	9.4	Liver	13.4	Stomach	8.0

*All rates are per 100,000 population/year, adjusted to the 2000 U.S. standard population.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED AS PART OF THE PROGRAM OF THE
DEPARTMENT OF THE INTERIOR
FOR DEVELOPMENT OF THE MISSOURI RIVER BASIN

HYDROLOGIC INVESTIGATIONS
ATLAS HA-367 (SHEET 1 OF 2)



Geologic map showing water-analysis diagrams and locations of wells, springs, and test holes

HYDROGEOLOGY OF THE PINE RIDGE INDIAN RESERVATION, SOUTH DAKOTA

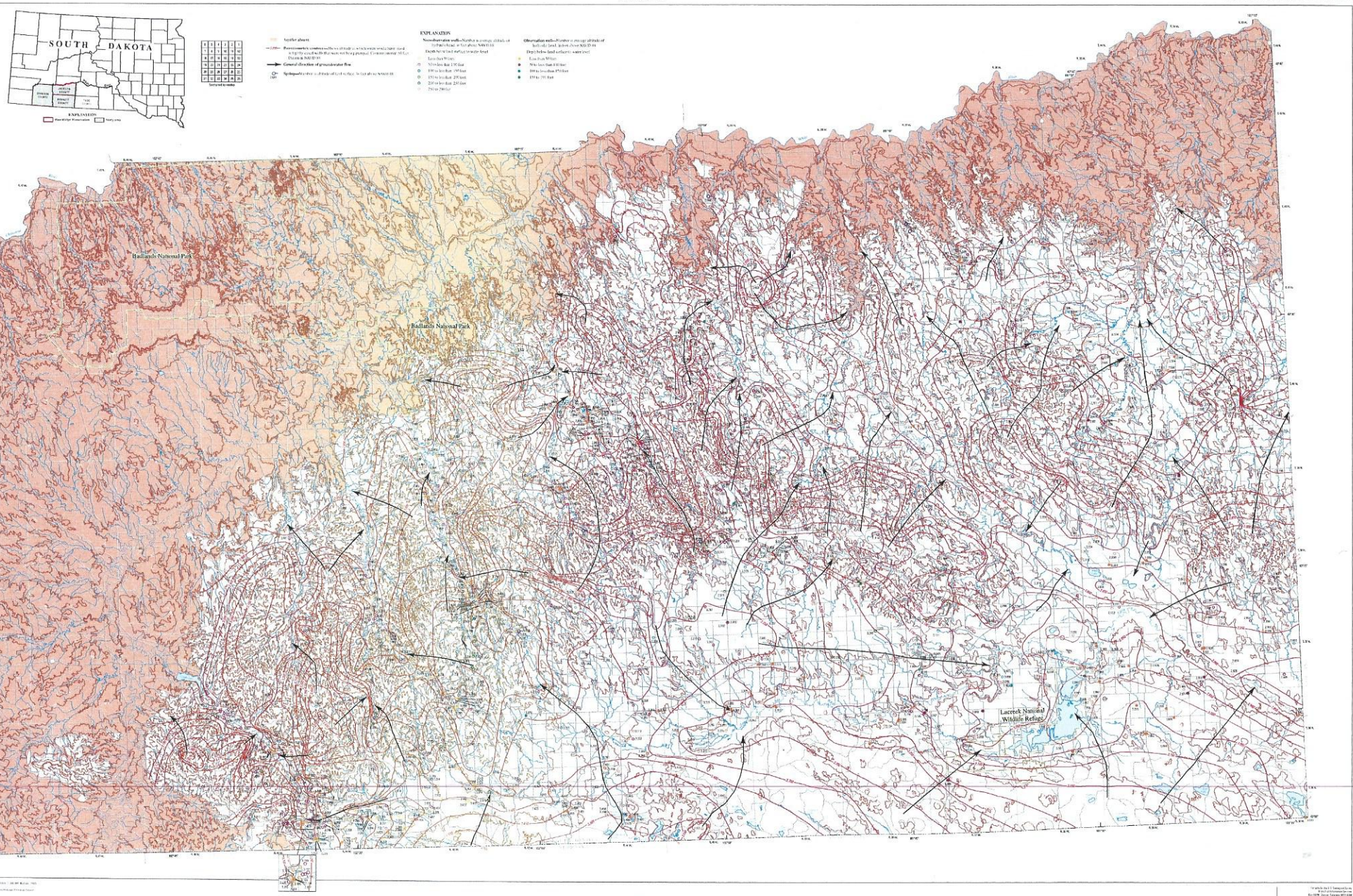
By
M. J. Ellis and D. G. Adolphson

1971

Exhibit 3.

USGS U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Scientific Investigations Map 2993

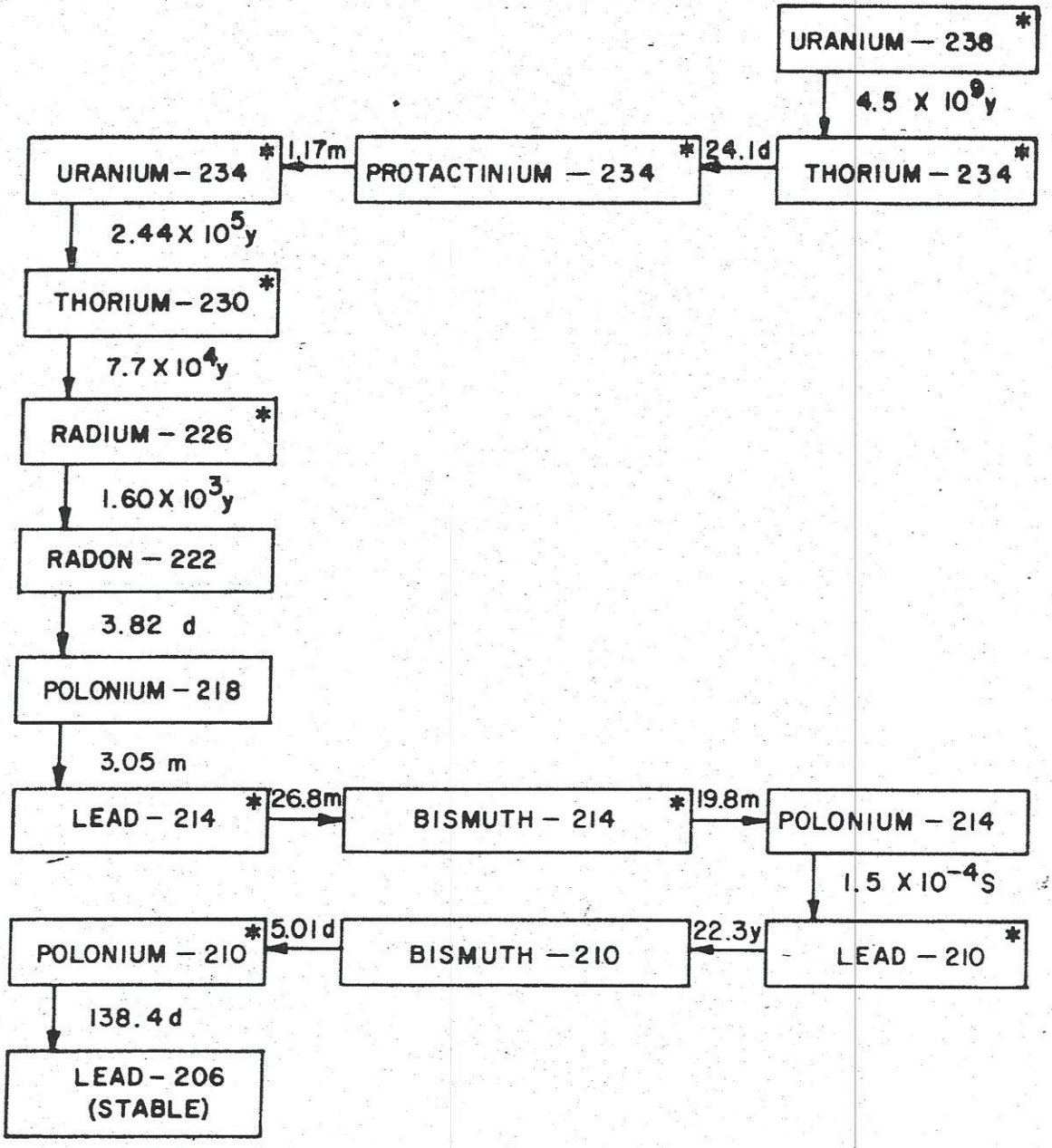


Generalized Potentiometric Surface of the Arikaree Aquifer, Pine Ridge Indian Reservation and Bennett County, South Dakota

By
James M. Carter and Allen J. Hoskin

2007

Exhibit 4.



NOTE:

VERTICAL DIRECTION REPRESENTS ALPHA DECAY, HORIZONTAL DIRECTION INDICATES BETA DECAY. TIMES SHOWN ARE HALF LIVES. ONLY THE DOMINANT DECAY MODE IS SHOWN.

* ALSO GAMMA EMITTERS

FIGURE 3-1. RADIOACTIVE DECAY CHAIN OF URANIUM 238

211-00

Exhibit 6.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Defenders of the Black Hills
Project: WCDCC
Lab ID: R14120067-001
Client Sample ID: WCDCC-Sink

White Clay District
Oglala Well

Report Date: 12/31/14
Collection Date: 12/03/14 14:30
Date Received: 12/03/14
Matrix: DRINKING WATER

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
METALS								
Uranium	15	ug/L		1	30	1	E200.8	12/11/14 21:35/eli-ca
Uranium, Activity	10.0	pCi/L		0.7	20	1	E200.8	12/11/14 21:35/eli-ca
RADIONUCLIDES - TOTAL								
Gross Alpha	12.5	pCi/L			15	1	E900.0	12/19/14 22:45/eli-ca
Gross Alpha precision (±)	2.1	pCi/L				1	E900.0	12/19/14 22:45/eli-ca
Gross Alpha MDC	1.7	pCi/L				1	E900.0	12/19/14 22:45/eli-ca
Gross Beta	14.3	pCi/L			50	1	E900.0	12/19/14 22:45/eli-ca
Gross Beta precision (±)	2.0	pCi/L				1	E900.0	12/19/14 22:45/eli-ca
Gross Beta MDC	1.8	pCi/L				1	E900.0	12/19/14 22:45/eli-ca
Radium 226	0.1	pCi/L			5	1	E903.0	12/17/14 07:41/eli-ca
Radium 226 precision (±)	0.09	pCi/L				1	E903.0	12/17/14 07:41/eli-ca
Radium 226 MDC	0.09	pCi/L				1	E903.0	12/17/14 07:41/eli-ca
Radium 228	0.5	pCi/L	U		5	1	RA-05	12/17/14 12:29/eli-ca
Radium 228 precision (±)	0.7	pCi/L				1	RA-05	12/17/14 12:29/eli-ca
Radium 228 MDC	0.7	pCi/L				1	RA-05	12/17/14 12:29/eli-ca
Uranium 234	8.0	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 234 precision (±)	0.9	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 234 MDC	0.1	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 235	0.2	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 235 precision (±)	0.1	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 235 MDC	0.1	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 238	4.5	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 238 precision (±)	0.6	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
Uranium 238 MDC	0.1	pCi/L				1	A7500-U C	12/10/14 16:29/eli-ca
RADIONUCLIDES - GAMMA								
Thorium 234	312	pCi/L	B			1	E901.1	12/10/14 08:14/eli-ca
Thorium 234 precision (±)	75.6	pCi/L				1	E901.1	12/10/14 08:14/eli-ca
Thorium 234 MDC	90.0	pCi/L				1	E901.1	12/10/14 08:14/eli-ca
Gross Gamma	724	pCi/L				1	E901.1	12/10/14 08:14/eli-ca
Gross Gamma precision (±)	327	pCi/L				1	E901.1	12/10/14 08:14/eli-ca
Gross Gamma MDC	462	pCi/L				1	E901.1	12/10/14 08:14/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
B - The analyte was detected in the method blank.

Exhibit 7.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Client: Defenders of the Black Hills
Project: ABWC-EPR
Lab ID: R14090027-001
Client Sample ID: ABWC-EPR

Pine Ridge Well
East Pine Ridge

Report Date: 09/30/14
Collection Date: 09/02/14 11:40
Date Received: 09/02/14
Matrix: DRINKING WATER

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
METALS								
Uranium	14	ug/L		1	30	1	E200.8	09/17/14 00:12/eli-cε
Uranium, Activity	9.1	pCi/L		0.7	20	1	E200.8	09/17/14 00:12/eli-cε
RADIONUCLIDES - TOTAL								
Gross Alpha	11.9	pCi/L			15	1	E900.0	09/19/14 03:47/eli-cε
Gross Alpha precision (±)	2.3	pCi/L				1	E900.0	09/19/14 03:47/eli-cε
Gross Alpha MDC	1.3	pCi/L				1	E900.0	09/19/14 03:47/eli-cε
Gross Beta	12.3	pCi/L			50	1	E900.0	09/19/14 03:47/eli-cε
Gross Beta precision (±)	2.2	pCi/L				1	E900.0	09/19/14 03:47/eli-cε
Gross Beta MDC	2.0	pCi/L				1	E900.0	09/19/14 03:47/eli-cε
Radium 226	0.2	pCi/L			5	1	E903.0	09/22/14 07:55/eli-cε
Radium 226 precision (±)	0.1	pCi/L				1	E903.0	09/22/14 07:55/eli-cε
Radium 226 MDC	0.1	pCi/L				1	E903.0	09/22/14 07:55/eli-cε
Radium 228	1.3	pCi/L			5	1	RA-05	09/17/14 11:57/eli-cε
Radium 228 precision (±)	0.7	pCi/L				1	RA-05	09/17/14 11:57/eli-cε
Radium 228 MDC	0.7	pCi/L				1	RA-05	09/17/14 11:57/eli-cε
Uranium 234	7.8	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 234 precision (±)	0.8	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 234 MDC	0.1	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 235	0.3	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 235 precision (±)	0.2	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 235 MDC	0.1	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 238	4.1	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 238 precision (±)	0.5	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
Uranium 238 MDC	0.1	pCi/L				1	A7500-U C	09/24/14 10:43/eli-cε
RADIONUCLIDES - GAMMA								
Thorium 234	252	pCi/L	B	50.0		1	E901.1	09/08/14 08:00/eli-cε
Thorium 234 precision (±)	99.7	pCi/L				1	E901.1	09/08/14 08:00/eli-cε
Thorium 234 MDC	123	pCi/L				1	E901.1	09/08/14 08:00/eli-cε
Gross Gamma	359	pCi/L				1	E901.1	09/08/14 08:00/eli-cε
Gross Gamma precision (±)	197	pCi/L				1	E901.1	09/08/14 08:00/eli-cε
Gross Gamma MDC	618	pCi/L				1	E901.1	09/08/14 08:00/eli-cε

- See Case Narrative regarding Gross Gamma analysis.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
B - The analyte was detected in the method blank.

Exhibit 8.

LABORATORY ANALYTICAL REPORT

Prepared by Rapid City, SD Branch

Kyle Hall
Red Shirt Village
Jerry Two Bulls

Client: Defenders of the Black Hills
Project: JTB-RSV
Lab ID: R14050425-001
Client Sample ID: JTB-RSV

Report Date: 07/02/14
Collection Date: 05/30/14 13:55
Date Received: 05/30/14
Matrix: DRINKING WATER

Analyses	Result	Units	Qual	RL	MCL/ QCL	DF	Method	Analysis Date / By
METALS								
Uranium	11.8	ug/L		0.3	30	1	E200.8	06/19/14 19:46/eli-ca
Uranium, Activity	7.9	pCi/L		0.2	20	1	E200.8	06/19/14 19:46/eli-ca
RADIONUCLIDES - TOTAL								
Gross Alpha	10.1	pCi/L			15	1	E900.0	06/19/14 21:36/eli-ca
Gross Alpha precision (±)	2.3	pCi/L				1	E900.0	06/19/14 21:36/eli-ca
Gross Alpha MDC	1.5	pCi/L				1	E900.0	06/19/14 21:36/eli-ca
Gross Beta	15.7	pCi/L			50	1	E900.0	06/19/14 21:36/eli-ca
Gross Beta precision (±)	2.3	pCi/L				1	E900.0	06/19/14 21:36/eli-ca
Gross Beta MDC	1.9	pCi/L				1	E900.0	06/19/14 21:36/eli-ca
Radium 228	0.6	pCi/L			5	1	RA-05	06/19/14 14:25/eli-ca
Radium 228 precision (±)	0.6	pCi/L				1	RA-05	06/19/14 14:25/eli-ca
Radium 228 MDC	0.6	pCi/L				1	RA-05	06/19/14 14:25/eli-ca
Uranium 234	7.0	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 234 precision (±)	0.7	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 234 MDC	0.07	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 235	0.2	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 235 precision (±)	0.09	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 235 MDC	0.07	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 238	3.4	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 238 precision (±)	0.4	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
Uranium 238 MDC	0.07	pCi/L				1	A7500-U C	06/19/14 10:32/eli-ca
RADIONUCLIDES - GAMMA								
Thorium 234	205	pCi/L				1	E901.1	06/11/14 12:00/eli-ca
Thorium 234 precision (±)	111	pCi/L				1	E901.1	06/11/14 12:00/eli-ca
Thorium 234 MDC	179	pCi/L				1	E901.1	06/11/14 12:00/eli-ca
Gross Gamma	205	pCi/L				1	E901.1	06/11/14 12:00/eli-ca
Gross Gamma precision (±)	111	pCi/L				1	E901.1	06/11/14 12:00/eli-ca
Gross Gamma MDC	179	pCi/L				1	E901.1	06/11/14 12:00/eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

EPA
United States
Environmental Protection
Agency

Radionuclides in Drinking Water: A Small Entity Compliance Guide

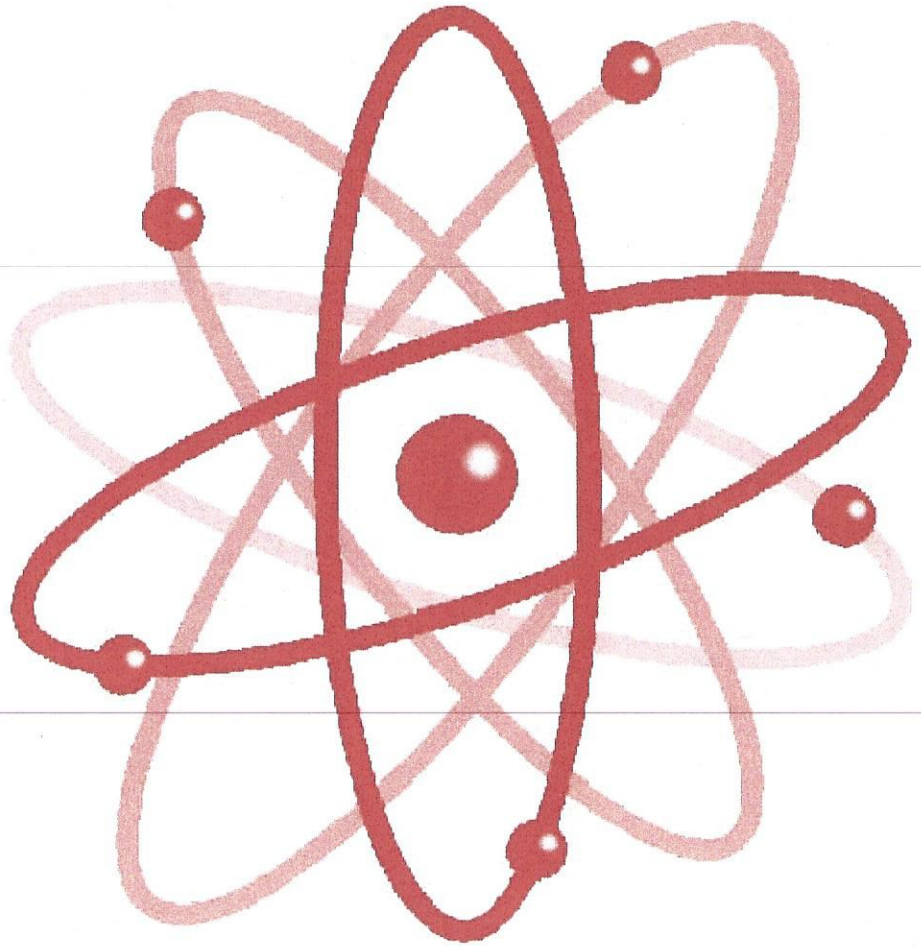


Exhibit 9.
(3 pages)

Office of Ground Water and Drinking Water

(4606M)

EPA 815-R-02-001

www.epa.gov/safewater

February 2002

Contaminant	Source	Health Effects
Alpha Emitters	Erosion of natural deposits	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined radium-226 and radium-228	Erosion of natural deposits	Some people who drink water containing radium-226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium	Erosion of natural deposits	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
Beta and Photon Emitters*	Erosion of natural deposits*	Certain minerals are radioactive any may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta particle and photon radioactivity in excess of the MCL over many years may have an increased risk of getting cancer.*

*EPA recognizes that there is an error in the Rule's language as relates to the beta and photon emitters CCR language, which appears verbatim in the table above. The beta and photon emitters that EPA regulates are all man made, and the sources of these regulated contaminants are their improper use, storage, discharge, and disposal from commercial, industrial, and military activities. The health effects language refers to minerals that are radioactive. The Rule, however, applies only to man-made substances that do not occur in mineral form.

ALS Paragon

Date: *23-Mar-09*

Exhibit 10.

Client: Defenders of the Black Hills
Project: Project Site (PR-2)
Sample ID: Tap Water
Collection Date: 1/6/2009 17:30

Pourier Ranch 2b.

Work Order: 0901023
Lab ID: 0901023-1
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ISOTOPIC URANIUM BY ALPHA SPECTROSCOPY			**PAI 714**		Prep Date: **2/2/2009**	Analyst: **CMS**
U-234	7.2 (+/- 1.3)		0.1	pCi/l	NA	2/5/2009 09:14
U-235	0.23 (+/- 0.12)		0.07	pCi/l	NA	2/5/2009 09:14
U-238	3.42 (+/- 0.68)		0.03	pCi/l	NA	2/5/2009 09:14
Tracer: U-232	*88.4*		*30-110*	*%REC*	NA	2/5/2009 09:14
RA-226 BY RADON EMANATION - METHOD 903.1			**PAI 783**		Prep Date: **2/10/2009**	Analyst: **DBC**
Ra-226	ND		0.97	pCi/l	NA	2/20/2009 16:25
Carr: BARIUM	*99.8*		*40-110*	*%REC*	NA	2/20/2009 16:25
RADIUM-228 ANALYSIS BY GFPC			**PAI 724**		Prep Date: **2/3/2009**	Analyst: **MOC**
Ra-228	ND	U,M IV	1.04	pCi/l	NA	2/10/2009 11:40
Carr: BARIUM	*91.7*		*40-110*	*%REC*	NA	2/10/2009 11:40
Carr: YTTRIUM	*71*		*40-110*	*%REC*	NA	2/10/2009 11:40