



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

In the Matter of
CROW BUTTE RESOURCES, INC.
(Marsland Expansion Area)

Docket No. 40-8943-MLA-2
ASLBP No. 13-926-01-MLA-BD01

Hearing Exhibit

Exhibit Number: OST015

Exhibit Title: Mike Wireman Rebuttal Testimony

September 7, 2018

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REBUTTAL TESTIMONY OF MICKEL WIREMAN

I, Mickel Wireman, do hereby swear that the following written testimony is true to the best of my knowledge:

1. Crow Butte Resources, Inc. (“CBR”) and NRC Staff indicate that an adequate conceptual model of site hydrology has been developed for the Marsland Expansion Area (“MEA”) [CBR001and NRC001]. The NRC Staff testimony (NRC001 at 22-23) states that a groundwater hydrology conceptual model includes an assessment of preferential flow paths, aquifer recharge/discharge and aquifer water quality

Neither the CBR Technical Report (“TR”) nor the NRC Staff’s Environmental Assessment (“EA”) contain sufficient data and information to develop an adequate conceptual model of site hydrology. This is especially the case regarding the groundwater flow system in the Basal Chadron aquifer. The TR contains no data based information on the areas where recharge occurs, sources of recharge or the primary pathways which deliver recharge to the deep, confined aquifer. CBR testimony [CBR001 at 33-34] indicates that the only information related to recharge to the Basal Chadron aquifer is that *“the recharge zone must be above 3715 amsl and that the recharge zone most likely is located west or southwest of the MEA.”* CBR testimony states that groundwater flow in the basal Chadron aquifer is towards the northwest [CBR001 at 33]. Figure 3-8 in the EA [NRC006 at 69] indicates that groundwater flow in the Basal Chadron is from the north, from the northwest, from the west from the southwest and from the south. This is very qualitative information, somewhat inconsistent and not supported by actual data. In the TR, CBR reports that the potentiometric surface fluctuates about 7 ft annually [CBR006 at 137]. How does this relate to recharge? The TR should discuss the relationship between annual

recharge to the Basal Chadron aquifer and the annual consumptive used estimated by CBR for MEA operations (maximum of about 500 acre-feet per year).

There is significant uncertainty about groundwater flow in the Basal Chadron downgradient of the MEA. Section 3.3.2.1 of the EA [NRC006 at 67] states that groundwater flow in the Basal Chadron aquifer is not affected by the Pine Ridge escarpment -even though this escarpment functions as a groundwater divide in the Arikaree and Brule aquifers. There is no discussion to support this statement. Figure 3-8 in the EA [NRC006 at 69] and the TR at page 2-88 [CBR006 at 137] seems to indicate that all discharge from the Basal Chadron aquifer occurs at a point east of Crawford where the unit is exposed. This is highly unlikely. CBR should conduct hydrogeologic mapping to locate and characterize the suggested discharge areas.

Neither the EA nor the TR include any information on the geologic formations / aquifers into which CBR proposes to inject waste fluids. These include the lower Dakota, Morrison and /or Sundance. Are any of these formations an underground source of drinking water (USDW) as defined in the Federal Safe Drinking Water Act? If so CBR will need to demonstrate that there are no USDWs below the proposed injection zone and / or request an aquifer exemption. Appropriate hydrogeologic / water quality data will be necessary to address either of these requirements and should be included as a part of the conceptual model of site hydrology that CBR and NRC Staff claim is adequate in their direct testimony [CBR001 at 40 & NRC001 at 15, 23-27].

2. CBR assumes, and NRC Staff accepts, that the hydrology of the Basal Chadron aquifer downgradient of the MEA has been adequately characterized.

CBR has not installed any Basal Chadron monitoring wells upgradient or downgradient of the license area. These wells are necessary to provide the data required to fully evaluate downgradient impacts to the Basal Chadron aquifer including perturbation of the potentiometric surface downgradient of the mine units, unwanted changes in discharge for the Basal Chadron aquifer and potential contamination of downgradient groundwater that may result from inadequate groundwater restoration operations. CBR and NRC Staff testimony discussions of groundwater flow in the Basal Chadron aquifer downgradient of the MEA are very general and non-quantitative [CBR001 at 35-36 & NRC001 at 16] as are the discussions they reference in the EA and the TR.

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- 3. CBR testimony indicates [CBR001 at 9] that the applicant has characterized surface-water bodies and drainages within the licensed area.

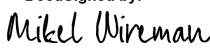
No quantitative data / information on surface water hydrology at MEA is included in the TR or the EA. Two southward flowing ephemeral streams traverse the MEA. A spring (Dooly spring) is located within the MEA. The baseline sampling conducted by CBR should include sampling the two streams when ephemeral flow is occurring and investigating the spring (is it flowing?' what geologic unit is discharging at the spring?). CBR obtained site specific meteorological data for one year: Aug 2010 -Aug 2011. However, 2011 was abnormal year and is not representative of average conditions. Ten of the 18 inches of annual precipitation total occurred in May. Another year of meteorological data should be collected.

- 4. CBR and NRC Staff testimony [CBR001 at 7, 14, 35-41 & NRC001 at 42-44] indicate that there are no unsubstantiated assumptions as to the isolation of the aquifers in the ore bearing zone.

The hydrologic assessments conducted by CBR assumed that groundwater flow could be characterized as Darcy flow or porous media flow and that no significant preferential flow occurs. The results of the 2011 CBR aquifer test, the spatial variability in hydraulic properties of the Basal Chadron aquifer and the fact that there has been significant structural disturbance of rock formations in the area all indicate that there may be significant preferential flow paths within the Basal Chadron aquifer and overlying rocks that are a result of structural and lithologic conditions.

Pursuant to 10 CFR 2.304(d) and 28 USC 1746, I declare under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Signed in Boulder, Colorado, on September 7, 2018.

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MICKEL WIREMAN