URGEISCEmails

From: David Cory Frankel [davidcoryfrankel@gmail.com]
Sent: Friday, November 07, 2008 9:24 PM
To: NRCREP Resource
Cc: Shannon Anderson
Subject: Re: GEIS - Comments - Crow Butte Resources - Abitz Opinion Part 2 of 3
Attachments: Abitz Opinion - CBR summary-28july2008 part 2 of 3.pdf

Abitz Opinion Part 2 of 3 -

on 11/7/08 4:14 PM, David Cory Frankel at davidcoryfrankel@gmail.com wrote:

> Dear Sir,
>
> As an example of the need for site specific data, please see the
> attached from Dr. Hannan LaGarry " EXPERT OPINION REGARDING ISL MINING
> IN DAWES COUNTY, NEBRASKA" which explains the faults and fractures
> between the mined aquifer and drinking water aquifers near the Crow Butte mine at Crawford, NE.
>
> Also, see the attached documents from the current licensing
> proceedings In Re Crow Butte - including the opinion of Dr. Richard
> Abitz (sent under separate cover due to file size limits) concerning
> inadequacies in the licensing application for renewal by Crow Butte Resources, Inc.
>
> I am also attaching the opinion of Mr. Paul Robinson concerning Crow
> Butte Resources.
>
> Many thanks.
>
> David Frankel
> POB 3014
> Pine Ridge, SD 57770

Federal Register Notice: 73FR43795
Comment Number: 1306

Mail Envelope Properties (C53A1C07.29970%davidcoryfrankel)

Subject: Re: GEIS - Comments - Crow Butte Resources - Abitz Opinion Part 2 of 3
Sent Date: 11/7/2008 9:23:33 PM
Received Date: 11/7/2008 9:32:33 PM
From: David Cory Frankel

Created By: davidcoryfrankel@gmail.com

Recipients:
"Shannon Anderson" <sanderson@powderriverbasin.org>
Tracking Status: None
"NRCREP Resource" <NRCREP.Resource@nrc.gov>
Tracking Status: None

Post Office: gmail.com

Files	**Size**	**Date & Time**
MESSAGE	914	11/7/2008 9:32:33 PM
Abitz Opinion - CBR summary-28july2008 part 2 of 3.pdf	5071244	

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Return Notification: No
Reply Requested: No
Sensitivity: Normal
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Recipients Received:

follow a normal or log normal distribution, the mean and standard deviation cannot be used and non-parametric methods must be employed to develop the upper control limit for the excursion parameters.

Uranium is a key indicator of lixiviant excursion because its concentration in baseline wells is generally two or three orders of magnitude lower than the lixiviant and it is highly mobile as a carbonate complex in the lixiviant. Comparing Table 2.7-15 with Table 3.1-3 shows that the lixiviant/baseline concentration ratio is 27 for chloride, 11 for conductivity, 13 for alkalinity and 1300 for uranium (the higher the lixiviant/baseline ratio, the greater the probability that an excursion will be detected at a monitoring well). As the uranium ratio is approximately 100 times greater than the other parameters, it will perform about 100 times better in the detection of an excursion. Therefore, there is no rationale basis to exclude the best excursion indicator from the list of excursion parameters.

EPA (1992) discusses the proper statistical calculation of tolerance limits (a.k.a. upper control limits) using parametric (normal or log normal) and non-parametric techniques. In general, 3 or 4 samples are not sufficient to establish a normal or log normal distribution, and EPA recommends that a non-parametric tolerance limit be set at the maximum observed value (not the maximum value plus 20 percent). As more data are collected at the monitoring well, the distribution of the data is rechecked and if a normal or lognormal distribution is indicated, a tolerance limit can be calculated using the equations provided by EPA (1992). There is no basis or justification for calculating an upper control limit by adding 15 mg/L to the average value. Additionally, using 5 standard deviations added to the average applies only if the data follow a normal or log normal distribution and a Shewhart control chart is constructed.

EPA (1992) addresses the use of 4.5 standard deviations added to the mean via the construction of a Shewhart-cumulative sum control chart. The use of this approach is recommended provided that the data follow a normal or log normal distribution. Assuming a sufficient number of samples have been collected at a monitoring well to demonstrate that the measured values follow a normal distribution, two statistical parameters are calculated to evaluate contaminate migration at the well. First, the standardized mean is calculated from the mean and standard deviation (EPA 1992) and compared to the Shewhart control limit (SCL; set at 4.5 standard deviations above the mean) to evaluate a rapid increase in concentration at the monitor well. Second, the cumulative sum (CUSUM; set at 5 standard deviations above the mean) of the standardized means is calculated for each sampling period (EPA 1992) to determine if it has crossed the 'decision internal value' (h). If h is exceeded, it can indicate a rapid or

slow rise in concentration at the monitoring well. A gradual increase is indicated when the CUSUM exceeds h and the standardized mean does not exceed the SCL.

Figure 4 illustrates the importance of using the SCL and CUSUM for monitoring lixiviant excursion. The SCL (Z) and CUSUM (C) are plotted for an excursion parameter, a gradual increase in contamination exceeds the CUSUM limit in February of 2002, while the SCL limit is not exceeded until January of 2003. The SCL limit is similar to the CBR's use of 5 standard deviations above the mean for any one sampling event, although EPA recommends 4.5 standard deviations for any one sampling event. Using only the SCL limit allows contamination to migrate beyond the monitoring well for nearly a year before an excursion is declared. Therefore, if the CUSUM is not used with the SCL limit a gradual increase in contamination will not be detected and migration of diluted lixiviant will pass the montoring well without corrective action.

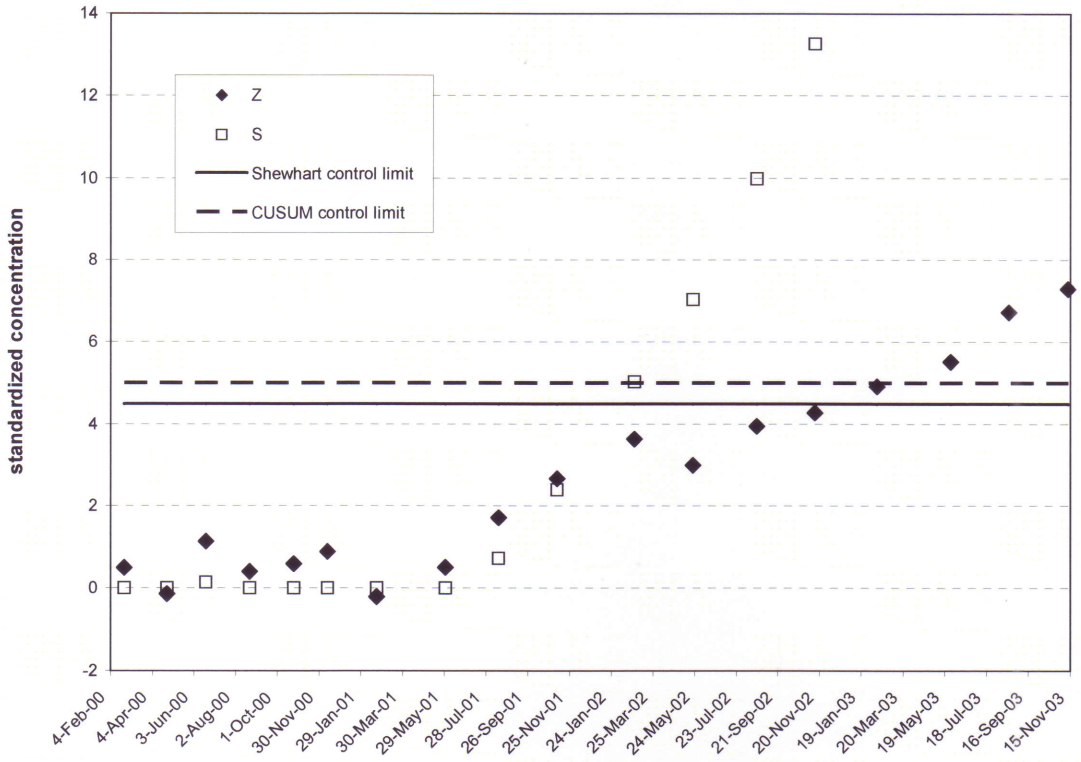

Figure 4. Proper use of a control chart to determine lixiviant excursions.

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Although there was insufficient time to develop a detailed analysis of all the concerns and omissions in the application, I note 46 additional issues that warrant a more detailed evaluation.

1) Section 1.8.1 notes that the only radioactive airborne effluent is radon-222 gas. This is not correct in the strict sense, as the radioactive daughters of radon-222 (Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210) form in the radon-22 gas cloud emitted from the facility. The radioactive daughters fallout as the plume drifts downwind, and particulate monitoring downwind should be performed to determine the fallout dose.

2) Section 1.11 notes that a yearly review is done to ensure that proper funds have been set aside for restoration. A key factor in calculating the amount of financial surety is the number of pore volumes of groundwater that must be processed to restore the aquifer to per-mining levels. As pre-mining levels are often biased improperly to high values, the number of pore volumes needed to restore the aquifer is underestimated and insufficient surety is posted.

3) There are no data to support the water quality results in Table 2.2-9. All data must be provided to allow an independent reviewer to derive values presented in the table. Use of the mean implies that the proper statistical test was performed to demonstrate that the data follow a normal or log normal distribution. There is no discussion of the use of statistical distribution tests.

4) Table 2.5-13 summarizes particulate data for the Black Hills and Rapid City, and is used to conclude that there is no problem with particulate matter less than 10 micorns (PM_{10}). This is unacceptable. Site specific data must be collected to demonstrate that the CBR site does not emit PM_{10} that exceeds 150 ug/m^3 (24-hour average) or 50 150 ug/m^3 (annual average).

5) Section 2.6.1.5 notes that the Chadron Sandstone formed as part of a vigorous braided stream system in the early Oligocene. Braided stream systems form a complex assemblage of sediments that consist of channel sands and gravels isolated by sand, silt and clay bank deposits. The primary flow for groundwater is through the channel sands and gravels, and the width of these channels are generally much narrower than the 400-foot spacing of wells in the monitoring ring. Therefore, it is possible that a paleochannel could exist between two monitoring wells and allow pregnant lixiviant to flow past the montoring wells without being detected. There is no discussion on this type of aquifer heterogeneity in Section 2.7.2.3.

6) Figures 2.6-4 through 2.6-11 show the thickness of the Chadron to be 40 to 80-feet thick through most of the mine area. Therefore, it is inappropriate to use a screened interval of 20 feet to sample the groundwater from the ore zone (Table 2.9-3). The entire thickness of the aquifer must be sampled to obtain a representative sample.

7) Tables 2.7-6 through 2.7-16 are not supported by the analytical results used to derive the reported values. See comment 4.

8) Section 2.9 notes that a preoperational monitoring was conducted for nonradiological parameters. This is unacceptable. Uranium and radium must also be considered because exploration holes placed in the ore zone disturb the ore and create a path for oxygen. The disturbance of the ore will expose new uranium mineral surfaces to the groundwater, which will release additional uranium, radium and their progeny. Addition of oxygen to the disturbed region will increase the dissolution of uranium ore minerals.

9) No justification is provided for the location of water-quality wells within the monitoring ring on Figure 2.9-2. Valid statistical methods must be used to locate the systematic or random samples on a grid than covers the entire area enclosed by the monitoring wells.

10) There are no data to support the water quality results in Table 2.9-4. See comment 4. Additionally, if preoperational monitoring was only for nonradiological parameters (see comment 9), when where the samples collected for uranium and radium results that appear in the table?

11) Section 2.9.4 is on surface water quality, but there are no data in the report stream water quality. Surface and buried pipelines that fail catastrophically or slowly leak pregnant lixiviant could contaminate surface water. Pipelines transferring pregnant lixiviant from the well fields to the processing facility are monitored for sudden drop in pressure, which indicates a massive failure and spill. However, small leaks in the buried pipelines, along joints and valves, would not be indicated on the monitor. Therefore, large volumes of pregnant lixiviant could be released to the environment from small leaks over the period of years. Surface waters should be monitored and sampled on a quarterly basis.

12) The end of Section 2.9.4 notes that suspended sediment samples have not been collected since 1982 and there is no plan to collect further samples. This is unacceptable, for reasons noted in comment 11.

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13) Soil results in Tables 2.9-10 and 2.9-11 have no results for molybdenum. Molybdenum is known to be concentrated by certain plants and cause problems when livestock ingest the plants containing Mo.

14) On page 3-21 the assumption is made that the aquifer is homogenous and isotropic. This is a poor assumption for fluvial deposits, as there is considerable lateral variability in the grain size (gravel, sand, silt, clay) and preferred flow paths will follow paleochannels.

15) Page 3-32 notes that a risk assessment was performed for the chemical storage facility. There are no assumptions or exposure scenarios discussed to determine if the conclusions are valid.

16) Section 3.3 discusses instrumentation used to monitor the flow out of and into the well fields. There is no detail provided on the pressure drop needed to denote a leak in the piping system transporting pregnant lixiviant. Is a leak of one liter a minute detectable? If so, what pressure drop is associated with such a leak and what is the sensitivity of the system to detect such a drop? If this cannot be detected, there is a potential for a significant amount of contamination to be released over the lifetime of the well field. A one liter per minute leak would result in 1440 liters per day released to the environment.

17) The pond inspection program discussed on page 4-5 does not address air monitoring around the ponds. Radon, mist, and particulate may be mobilized by the wind from the pond and dried margins. Why is air monitoring omitted? What data support such a decision?

18) Page 4-6 notes that if a pond liner leaks, the pond contents will be transferred to another pond. This creates a potential exposure scenario where the contaminated sediments dry out and become airborne by the wind. Air monitoring for particulate and radon is needed around the ponds.

19) Page 4-7 notes that flow-monitoring alarms are activated for a significant piping failure. This implies that a slow leak will not be detected. As noted in comment 16, a slow leak can result in significant contamination of the environment.

20) Page 4-8 (Piping) notes that large leaks would be detected quickly. Again, a small leak could go undetected for years because the piping is buried. This is unacceptable.

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