



# STATE OF NEVADA

Department of Conservation & Natural Resources

DIVISION OF ENVIRONMENTAL PROTECTION

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**January 29, 2008**

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Re. **BMI Plant Sites and Common Areas Projects, Henderson, Nevada**  
*Advisement Regarding Radionuclide Analyses*

Dear Sirs and Madam:

All of the companies listed above shall be referred to as “the Companies” for the purposes of this letter. NDEP has received responses to the NDEP’s December 7, 2007 letter from each of the Companies. NDEP has considered each of the responses and issues the following guidance:

1. Regarding new radionuclide data, the Companies must utilize radionuclide methods that are the same as the methods employed in the BRC/TIMET shallow soils background data set. This will insure comparability without unnecessary confusion or justifications. The Companies must insure that preparatory (prep) methods and analytical procedures produce comparable data. Failure to do so in future data sets will result in rejection of data. If a Company’s QAPP requires additional modification, please advise the NDEP **by February 29, 2008**.
2. Regarding new data, please note that the NDEP does not approve of the use of gamma spectroscopy (spec) for the analysis of Radium-228(Ra-228), or any other radionuclide.
3. Regarding existing data, it is noted that both ICP and ICP/MS methods have been used for the analyses of metals. It is noted that the ICP/MS data is more sensitive, however, the methods are comparable.
4. Regarding existing data, the NDEP generally concurs with the methodology outlined by BRC in their letter dated January 10, 2008 for uranium. This method will be described below with exceptions noted by the NDEP.
  - a. For historical data sets with compromised uranium data, background comparisons should first be made to uranium as a metal. If these background comparisons pass, nothing further is required.
  - b. If the metallic uranium background comparisons fail, isotope-specific correction factors must be developed and applied in order to quantitate risk. Please note that isotopic correction factors will need to be developed (or verified) separately for each data set (by sub-area, parcel, site, etc.) because of the potential for analytic and geologic differences between sub-areas or sites.

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- c. While the NDEP's original request was directed at uranium, it appears that some data sets may have other radionuclides that are not comparable to background because of analytical issues (e.g.: thorium and radium isotopes). Additional discussion is provided below.
- d. Please note that if it is not reasonable to assume secular equilibrium, then correction factors cannot be applied, and re-analysis might be required.
- e. For example, the thorium isotopic data for Phase A at TRONOX are much lower than background. The reasons need to be expeditiously investigated and identified.
- f. For example, the Thorium-230 (Th-230), Uranium-234 (U-234) and Uranium-238 (U-238) data at BMI Parcel 4B are much lower than background. Again, the reasons need to be expeditiously investigated and identified.
- g. It is noted that correction factors could be developed for thorium based on an assumption of secular equilibrium with uranium (since uranium is also analyzed as a metal).
- h. Ra-226 and Ra-228 have been analyzed by gamma spec at some sites. It has not been demonstrated that these data are comparable with the background radium data that involved alpha-spec (Ra-226) and beta emission (Ra-228) analysis. The correlation needs to be demonstrated prior to use of historic gamma spec data for radium isotopes.
- i. In particular, TIMET has noted that some data sets contain Ra-228 data by gamma spectroscopy. TIMET has proposed to compare these data to gamma spectroscopy data collected for the background data set to attempt to develop a correlation factor. To date, TIMET has not been able to develop a statistical relationship upon which a correlation factor can be developed. Hence, it is not evident that this will be possible. This issue requires further discussion among the Companies. This issue could be addressed in several ways.
  - i. Back quantitation of Ra-228 from a parent radionuclide (if the parent radionuclide data are comparable with background).
  - ii. Use of a correlation factor if developable.
  - iii. The NDEP is amenable to other suggestions by the Companies.
- j. In addition, TIMET has noted that there may be differences between the site data set for lead-210 (Pb-210) and the background data set. These differences need to be expeditiously investigated and identified. It is expected that TIMET will respond to this issue **by February 29, 2008**.
- k. The remaining Companies with radionuclide data should affirm that their data sets do not have any comparability issues with regards to Pb-210 (or any other compound). This affirmation is required **by February 29, 2008**.

Whereas NDEP recognizes that assumptions of relative abundance and secular equilibrium can be used to recalculate the activity of various radionuclides, this approach needs to be defended in each case. This is cumbersome, potentially unreliable, and requires longer review time. It is preferable that this situation is avoided and that data are collected that are directly comparable to the background data set.

Please contact me with any questions (tel: 702-486-2850 x247; e-mail: [brakvica@ndep.nv.gov](mailto:brakvica@ndep.nv.gov)).

Sincerely,

Brian A Rakvica, P.E.  
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BAR:s

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