

## Johnson, Bill H (DNR)

---

**From:** Al Trippel <[REDACTED]>  
**Sent:** Friday, August 05, 2011 8:00 AM  
**To:** David Blaha  
**Cc:** Deb McGovern; Johnson, Bill H (DNR); Fred Marinelli  
**Subject:** RE: Fred Marinelli review of North Met Workplan

Dave

Yes, I agree with adding Fred's comments to the spreadsheet - - along with other ERM team comments

These should strengthen the final work plan and the usefulness of model outputs

Fred - - thanks much and safe travels !

Al

---

**From:** David Blaha  
**Sent:** Friday, August 05, 2011 6:50 AM  
**To:** Fred Marinelli  
**Cc:** Al Trippel; Deb McGovern; [REDACTED]  
**Subject:** RE: Fred Marinelli review of North Met Workplan

Fred

Many thanks for your input – good insights!!!

Al/bill – I am inclined to attach Fred's email to any other comments we receive on the work plan

Sound like a reasonable approach?

---

**From:** Fred Marinelli [[mailto:\[REDACTED\]](mailto:[REDACTED])]  
**Sent:** Tuesday, August 02, 2011 6:39 PM  
**To:** David Blaha  
**Cc:** [REDACTED] Fred Marinelli  
**Subject:** Fred Marinelli review of North Met Workplan

David,

I am at a remote location with good email, but no cell phone service. With a little notice, I can call your land line or cell via Skype.

I have completed an overview of the North Met workplan compiled by Barr. In my opinion, there are no fatal flaws with Barr's approach and the document is consistent with the presentation they made during our meeting in St. Paul. GOLDSIM is capable of performing the probabilistic calculations, but the programming will be complicated and difficult to check by third parties such as us. If not done so already, I would encourage Barr to include algorithms that perform local and global mass balance checks to insure that water and/or chemical mass is not artificially lost or created by the calculations.

Since groundwater is my technical area, I am in complete agreement with Barr that the only groundwater parameter that should be treated as an uncertain input is hydraulic conductivity. At some point, Barr will need to provide justification for the probability distributions used to define the various hydraulic conductivities in the model. This will likely come from a combination of field testing and generic values for similar geologic materials. This is no easy task when there is little hard data to draw upon.

Geochemistry is not my subject area, but I do have a concern with the number of chemical parameters that are treated as uncertain inputs. Assuredly, many or most of these are insensitive parameters and could be treated as deterministic without affecting the probabilistic nature model results. With so many uncertain parameters, it will be difficult to interpret the model output. During the initial runs of GOLDSIM, Barr can generate “tornado” diagrams to identify insensitive inputs to the model. I would then encourage Barr and the Agencies to consider making many of these deterministic for future GOLDSIM runs. Reducing the number of uncertain inputs will reduce the number of realizations required to generate reasonable and reproducible cumulative probability plots of the model results. My overall advice is to continually push to reduce the number of uncertain variables (with justification) rather than increase them.

Note that for triangular distributions, the document should indicate if the distribution is symmetric or non-symmetric. If it is the latter, the definition needs to include the probability associated with the mode value.

For this approach, the “devil’s in the details”. Once the sensitive uncertain inputs are identified, each will need to be assessed by a technical person who knows the subject area (e.g., geochemistry) to evaluate if the associated probability distribution is reasonable given hard data and generic information. This review could be quite tedious if there are a large number of uncertain inputs in the model.

Regards,

Fred Marinelli

---

This message contains information which may be confidential, proprietary, privileged, or otherwise protected by law from disclosure or use by a third party. If you have received this message in error, please contact us immediately and take the steps necessary to delete the message completely from your computer system. Thank you.

Please visit ERM's web site: <http://www.erm.com>