

## Johnson, Bill H (DNR)

---

**From:** Peter J. Hinck <[REDACTED]>  
**Sent:** Monday, March 11, 2013 11:22 AM  
**To:** Johnson, Bill H (DNR); Tina Pint; [REDACTED]  
**Cc:** Cory D. Anderson; Fay, Lisa (DNR)  
**Subject:** RE: PolyMet GoldSim Model Review Period Check-ins 3-13-13 Discussion/Presentation Topic

Bill,

Please see the brief response to James' question below. We are happy to discuss this modeling process in more detail at Wednesday's phone conference. Please let us know if there are any additional issues that you're aware of as we prepare for the meeting.

Thanks,  
Peter

---

The use of PolyMet-collected groundwater quality data to develop distributions for the uncertainty in the average background groundwater concentrations is described in **Section 5.2.3.8 of the Water Modeling Data Package Volume 1 – Mine Site (Version 12)**. The resulting distributions are plotted relative to the population of observed values in **Attachment D**.

In short, the distribution parameters ( $\alpha$ ,  $\alpha_{\text{stddev}}$  and  $\beta$ ) are inferred from the observed dataset and referenced as inputs to the GoldSim model. Within the model, background groundwater quality is simulated by randomly sampling the log-transformed mean (normally distributed with mean  $\alpha$  and standard deviation  $\alpha_{\text{stddev}}$ ) and then using the distribution variance parameter  $\beta$  to convert the log-transformed mean to a real value, in units of  $\mu\text{g/L}$ . This same process is used to simulate the surficial aquifer and bedrock groundwater concentrations at the Mine Site and the surficial aquifer groundwater concentrations at the Plant Site.

The use of PolyMet-collected surface water quality data to develop distributions for the uncertainty in the average background surface runoff is described in **Section 5.2.4.7 of the Water Modeling Data Package Volume 1 – Mine Site (Version 12)**. The resulting distributions are plotted relative to the population of observed values in **Attachment E**. The calibration process described in the document was used to develop a lognormal distribution of the average runoff concentration for each constituent with a mean and standard deviation referenced as inputs to the GoldSim model. Within the model, background runoff water quality is simulated by randomly sampling the lognormal distribution for each constituent.

A similar process was used for the Plant Site model to develop model input distributions. This process is summarized in **Sections 5.2.1.3.5 (groundwater) and 5.2.1.4.5 (surface runoff) of the Water Modeling Data Package Volume 2 – Plant Site (Version 9)**, and is described in greater detail in **Attachment C** of that document.

Peter J. Hinck, PE

Water Resources Engineer

Minneapolis office: [REDACTED]

cell: [REDACTED]

[REDACTED]



---

**From:** Johnson, Bill H (DNR) [mailto: [REDACTED]]  
**Sent:** Wednesday, March 06, 2013 11:56 AM  
**To:** Tina Pint; [REDACTED]  
**Cc:** Cory D. Anderson; Peter J. Hinck; Fay, Lisa (DNR)  
**Subject:** FW: PolyMet GoldSim Model Review Period Check-ins 3-13-13 Discussion/Presentation Topic

Tina and all, we have a request for NEXT week's placeholder meeting for the Cooperating Agencies' model/results review. See below.

In looking at it, I'm wondering if the answer is in a data package...and that a reference could be easily provided. If yes, I think there's value in providing that reference AND having the discussion.

See what you think and let's discuss. Bill.

Bill Johnson, Mining Section Lead  
Environmental Policy & Review Unit  
MDNR Division of Ecological & Water Resources

---

**From:** Grimes, James [mailto: [REDACTED]]  
**Sent:** Wednesday, March 06, 2013 11:28 AM  
**To:** Johnson, Bill H (DNR)  
**Cc:** Westlake, Kenneth; Sedlacek, Michael  
**Subject:** PolyMet GoldSim Model Review Period Check-ins 3-13-13 Discussion/Presentation Topic

Bill –

Below is a suggested topic for next week's (3/13/13) check-in.

Please explain how the individual sample analyses are turned into the data files in GoldSim and how the values that are used in the calculations created.

Bedrock Groundwater Lab Analysis → GW\_Conc → Gw\_Bed\_Random → Gw\_Conc\_Bed\_alpha → Gw\_Conc\_Bed\_rand

Surficial Groundwater Lab Analysis → GW\_Conc → Gw\_Surf\_Random → Gw\_Conc\_Surf\_alpha → Gw\_Conc\_Surf\_rand

Surface Water Lab Analysis → SW\_conc → SW\_RO\_Random → SW\_Conc\_RO\_rand

*James G. Grimes*

Assisting the Environmental Protection Agency under a Cooperative Agreement with the National Asian Pacific Center on Aging

