

**Minutes of the
Metro Groundwater Model Update Meeting
Metropolitan Council – M94 Office Park
November 30, 2006
1:30 PM**

Chris Elvrum moderated the meeting, beginning with a review of the agenda. Introductions were made; an attendance list is attached.

Doug Hansen, PCA, gave a brief history of the Metro Model and its current status. No updates to the Metro Model PCA web page have been made since 2004. The model was calibrated with CWI data that had been put through a geostatistical analysis, and he suggests that these data should be updated. MGS created the geologic datasets, which may need updating as well. Doug noted that, although the Metro Model is no longer updated, the website recorded 300 site visits during this past October. This makes it one of the most visited of the PCA websites.

Geoff Delin asked for more detail about the pumping data used in the model. Per Doug, SWUDS data from the late 90's or 2000 was used. Pumping wells were only included in some of the models Layer 4-5 and one of the province models, not the others. The model was calibrated to CWI data that had undergone a geostatistical analysis and some time of travel data.

Chris asked Steve Robertson about recent MDH modeling activities, particularly MODFLOW-based projects. The MDH based their modeling work on the Metro Model datasets. MDH has used both analytic element and finite difference models to construct sub-regional models in Scott, Dakota, Anoka and Ramsey counties.

Stu Grubb and Mark Janovec have used the Metro Model for wellhead protection planning, but do not find it useful for water supply planning as it does not allow for transient simulations.

Bill Olsen reported that MLEAM does not currently have transient capabilities, although this problem is being addressed. Otto Strack is currently focusing his energy, however, on developing leakage capability for MLEAM.

Stu commented that, while MLEAM is a solid modeling program, it 'feels' like old technology. There is a general preference for new programs with the ability to produce impressive graphics and three-dimensional visualizations.

Bill noted that MLEAM is best as a background model for far-field boundary conditions. Some Arc-interfaces to the MLEAM engine are in development.

Steve discussed the need for the MLEAM to allow open-source code in order to stimulate new development.

Chris asked the group to discuss how to focus modeling available resources: on updating models or on updating datasets. For example, current models need transient capabilities, but the MDH has already done steady-state models for much of the metro area. Could these models be easily adapted to transient scenarios?

Steve noted existing MDH models are 5-6 years old and don't address fine-scale changes in geologic maps. Also, for wellhead protection and water supply planning, some model

differentiation between the Prairie du Chien and Jordan aquifers would be useful. Mark Janovec noted that the FIG would benefit from being subdivided as well.

Stu commented that the recent work by the MGS and technological advances in three-dimensional viewing capabilities enhances the construction of model frameworks and highlights aquifer heterogeneity.

Tim Cowdery noted that, while there have been advances in geologic mapping and software development, we are no better than we were for calibration datasets. The last synoptic water level measurement was done in ~1990.

Chris introduced a discussion of about conducting another synoptic water level measurement, which is a project currently being explored at Met Council. Updates on this project will be shared with this group.

Geoff would like to start collecting water level data targeting transient calibrations through a network of ob wells in different aquifers. This will take money and cooperation.

Bill brought up the issue of SCADA data, which is not required to be calibrated. He proposed requiring municipalities to calibrate regularly. SCADA data is also biased toward certain productive aquifers. A good ob well network would need a wider selection of aquifers.

Stu discussed the value of monthly data from the existing DNR ob well networks. Bob Tipping wondered about the use of abandoned test wells; these wells are often converted to DNR ob wells. The current DNR permit process now requires monitoring wells; Lakeville has recently instrumented their monitoring wells.

Even Drivas noted that the DNR currently has the opportunity, with a new permit process for emergency and conservation plans, to require more water level monitoring.

Chris concluded that a summary of all water level data will help quantify the current network. This will point out areas that are missing data and wells that would benefit most by loggers.

Doug noted that the lower aquifer model development for the Metro Model was challenging due to the small number of ob wells in these aquifers. Time of travel studies were used to augment well data in the deep aquifers.

Geoff and Tim brought up the fact that synoptic water level data can also be used for transient calibrations for deep aquifers, where multi-decadal data can be used.

Mack Janovec commented on the need for 2 synoptic measurements to address high and low stress scenarios. Tim commented that, if only one measurement is possible, winter is the best time to document water levels under low stress conditions (least pumping). This single water level measurement could be augmented by continuously logger certain wells. The PCA and USGS collected the 1990 synoptic water level data, and the 1990 project can serve as the guide for future work. Jim offered to coordinate permission and access to wells during the synoptic measurement.

Stu commented that at least monthly data are needed for ground-surface interaction modeling. Bill reminded the group that there is a lot of well data at the PCA. This data set is supposed to be online soon, although Doug responded that the online groundwater data is delayed. PCA is

currently managing a database of shallow wells in developing areas that are being sampled for water quality.

Bob commented that the metro area bedrock mapping has not yet progressed to the point where it justifies creating a new Metro Model geologic framework. The existing 1:100,000 map is still the best data to use. There are smaller scale maps (1:24,000) in certain areas, however, which can be used for local modeling efforts.

Mark Wallis wondered what the purpose of a new Metro Model should be. His impression is that stakeholders want efficient use of their money – they don't want to spend money building a model if their neighbors already have. Jim expects the Metro Model to be used for regional water supply planning.

Tim commented that the model should be used to quantify fluxes through different stratigraphic units, to rivers, etc. This will allow users to calculate a total volume of water available and allocate resources accordingly. Geoff noted that we don't know what the flux to rivers is, which is critical for low flow planning.

Chris summarized by saying that the regional model would not be expected to replace local modeling, but that it would provide a consistent set of data and regional boundary conditions. Met Council and other groups may also construct local models to explore interference issues, for example.

Mark Wallis asked how regional planners intend to evaluate water supply adequacy. Tim stressed the nested capabilities in MODFLOW make it relatively easy to run a local model within a regional model.

Doug wondered if the primary focus should be the development of datasets that are platform independent.

Tim commented that ArcGIS is the interchange software to be used and that datasets are going to be the most important part of the model update process.

Geoff noted that it would be great to have a central database that everyone modeling could tap into. Tim added that a centralized database will also reduce the chance for modelers to overlook relevant data. Steve commented that a central database would reduce overall model construction time.

Bill noted that he'd started talking to Steve Kloiber about collecting chemistry data in a centralized way. They have an idea about a web-based search engine. This type of project would be appropriate for LCMR grant funding.

Doug noted that the PCA's EDA (environmental data access) project is the same idea.

Chris summarized primary goals: 1) Evaluate the state of the data, 2) Evaluate how best to compile one complete dataset for modeling, 3) Consider changes to the model (steady-state vs. transient, new hydrostratigraphic units).

Jim noted the difficulty of using SWUDS to determine the amount of water being pumped from each aquifer by multi-aquifer wells. Including additional hydrostratigraphic units in a new model

would not be particularly useful until data is available regarding the volume being pumped from these units.

Bob cautioned that redoing the entire Twin Cities' basin stratigraphy would take considerable time, although it should (and will) be done. He also noted that one of the problems with the current Metro Model is how it handles buried bedrock valleys.

Doug suggested getting a wish-list from all modelers. As they build and use models, what do they want to change, what information do they need but don't have, what questions were important but unanswered, etc.

Geoff wants to plan and fund projects now, because environmental events, like drought, don't occur in budget cycles.

Chris brought up the subject of recharge, specifically asking the group what they think of 'factor analysis' approaches.

Geoff commented that the USGS has some statewide recharge data that should be useful for regional modeling. This data will be published in February. Recharge data at the local level is still needed. We need a better understanding of controlling factors, spatial and temporal variability, inter-aquifer flow. Work is needed to study leakage through till, etc. The money is still missing for these types of projects, however.

Tim noted that recharge estimates are possible using hydrographs. This can be tied back to creating and maintaining a water level monitoring network.

Stu commented that he got a lot of good recharge data from geochemistry and age dating. Also, technological innovations may give us much more information that we currently have available. He cited his work with thermal photography to identify seeps and springs for estimates of seepage to rivers.

Bob noted that we should not shy away from rebuilding the Metro Model to handle transient, solute transport situations. That plan could be the framework to shape our data collection activities.

Chris concluded the meeting by stating that Met Council will compile data availability and coordinate the synoptic project.

Jim said he would compile a thorough list of the potential ob well network and requested information from the group regarding bedrock ob wells.

It was generally agreed that the group would continue to meet approximately quarterly.

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