Castelin, Paul

From: Castelin, Paul
Sent: Thursday, May 16, 2002 2:05 PM
To: Mike Rasmussen (E-mail)
Subject: Return flow gaging permission request

Mike,
I understand from Rodger Jensen that you and your canal company board wanted some information regarding the Eastern Snake Plain model project that's underway. Inlcuded below is a summary of the project which also gives the reasons for needing the information that we are trying to gather on the water budget:

"EASTERN SNAKE RIVER PLAIN AQUIFER MODEL
PROJECT DESCRIPTION
October 2000

The Eastern Snake River Plain Aquifer Model (ESRPAM) is being jointly developed by agencies and institutions represented by the Eastern Snake Hydrologic Modeling Committee (ESHMC). The model is being developed for the purpose of assisting in aquifer management, with an emphasis on conjunctive management of the aquifer and the Snake River. This effort will build upon the existing model, employing new data and technologies to improve model credibility and reliability. *Any numerical model represents a simplification of a complex physical system. It should be noted that even after model modifications, there will still exist model deficiencies in the ESRPAM model and uncertainties in model predictions.* Funding for the effort is being requested from the State of Idaho through the Idaho Department of Water Resources, the U.S. Bureau of Reclamation, the U.S. Geological Survey and private sector water interests such as Idaho Power.

This document identifies the intended uses and some of the limitations of the proposed model. The model is being designed and constructed with the following objectives:

1) Assist in conjunctive resource planning,
2) Estimate changes in aquifer conditions resulting from variations in water and land use,
3) Project average aquifer conditions and Snake River gains and losses resulting from current development levels,
4) Provide an expanded data base of hydrologic information on the eastern Snake River Plain,
5) Create a model which is widely accepted and defensible in litigation,
6) Develop a model that may serve as the basis for a future contaminant transport model of the eastern Snake River Plain aquifer,
7) Make data, model applications, and results easily accessible to and usable by outside parties, and
8) Determine and document model uncertainty to the extent possible.

The model will not directly simulate impacts of tributary basin development. The scale of the model and the lack of understanding of the hydrologic connection between the tributary basins and the eastern Snake River Plain aquifer preclude a meaningful representation of tributary basins in the model.

The project will be accomplished by a joint effort of staff of the Idaho Department of Water Resources, U.S. Bureau of Reclamation, U.S. Geological Survey, and the University of Idaho - Idaho Water Resources Research Institute. These entities will collaborate on tasks under the guidance of a management team from IDWR/UofI and technical review of the Eastern Snake Hydrologic Modeling Committee. The following tasks have been identified in a strategy document and a request prepared by the IDWR for state funding.

TASK A1 - *Model recalibration using data representing the 1980-2001 period.* This task includes collection of additional aquifer water level data and irrigation and recharge data. Assembly and analysis of aquifer recharge and discharge data comprise the dominant portion of the effort with the final product being

a model calibrated to a 22 year time period using 6-month timesteps.

TASK A2 - *Uncertainty analysis.* New parameter estimation tools provide the capability to at least partially quantify the uncertainty of model parameters and predictions. These tools will be applied after model recalibration to describe, to the extent possible, the uncertainty in the model.

TASK A3 - *Preparation of a data set to represent extrapolation of current levels of development.* Many management evaluations compare aquifer or river conditions to those that would exist if the status quo is maintained. This task develops a data set that represents average conditions over the past 22 years and allows projection of those conditions into the future.

TASK A4 - *Generation of river response functions.* Model recalibration will result in at least minor changes in the representation of the aquifer and river. Response functions generated from the earlier model version will become outdated and will have to be regenerated from the revised model. These response functions will then become available as a management tool.

TASK B1 - *Development of a GIS-based data processing tool.* Evaluation of aquifer recharge and discharge for each model cell (likely more than 2000 active cells in the model) becomes a substantial accounting problem. Irrigation, precipitation, evaporation, canal seepage, and other recharge components must be determined and summed for each cell and timestep. This task will develop the tool to streamline this process and provide the necessary assurances that the analysis is valid.

TASK B2 - *Development of improved ET estimation procedures.* Evapotranspiration (ET) from the approximately 2 million acres of irrigated land and nearly 11,000 square miles of non-irrigated land is a dominant component of the basin water budget. Model calibration relies upon accurate evaluation of water budget components, including ET. The processing of satellite images is becoming sufficiently robust that this method can either be used to estimate ET on the Snake River Plain, or be used to verify existing methods of estimation. This task will further the development and application of these techniques to the Snake River Plain. This task will require supplemental funding from outside sources.

TASK C1 - *Refining understanding of the interaction of the Snake River with the aquifer.* The Eastern Snake River Plain Aquifer Model represents our understanding of the aquifer and the river-aquifer interaction. This task is directed toward improving our understanding, so that the model representing that understanding may be a more realistic representation of the real system. This task includes field observation of relationships between aquifer water levels and spring discharge and may include additional river gaging.

TASK C2 - *Improved determination of canal seepage and return flows.* A knowledge of canal seepage is important to correctly represent the areal distribution of recharge to the aquifer. Return flow information is necessary to separate surface from ground water when evaluating river gains and losses. Field surveys of these conditions will be conducted.

TASK C3 - *Investigation of time lag between water application and aquifer recharge.* Canal seepage, precipitation, and irrigation all result in aquifer recharge. The recharge from these activities or events, however, must migrate through as much as 800 feet of unsaturated soil and basalt. The previous model assumed that the aquifer was impacted at the same time as the surface event occurred. The validity of this assumption will be evaluated from examination of existing data and reports.

TASK C4 - *Delineation of surface and ground water irrigated areas.* Irrigated acreage estimates from satellite imagery and adjudication data base records would be verified with field surveys when necessary. Field surveys would assist with distinguishing between areas irrigated with surface water as opposed to ground water. This data is essential to the preparation of model calibration data sets and those used to project the effects of current conditions.

Some of these activities have already begun with funding contributions from the involved agencies. The more significant portions of the effort will be implemented after legislative approval of the state funds. The Eastern Snake Hydrologic Modeling Committee believes that collaborative model development by the assembled consortium of experts from the multiple agencies and institutions in the basin is the ideal process to create an effective and unbiased model to assist in water management in the Eastern Snake River Plain.

More detailed information can be found on the Idaho Water Resources Research Institute web site (lsjflskjfsfs) or by contacting the following:

Paul Castelin, IDWR, (208) 327-7894

Donna Cosgrove, University of Idaho, (208) 282-7914"

Mike, Task C2 above specifies why we need permission from a large number of the major canal companies in order to get more accurate values for return flows. Of the 44 canal companies contacted for permission to install a gage, 42 have become cooperators, and in fact would like to see this effort continue beyond the two years that it is scheduled for.

You also asked about who is paying for the study: the State of Idaho is paying the lion's share of the project, about $1 million over three years, with contributions from Idaho Power ($375,000), US Bureau of Reclamation ($300,000), US Geological Survey cooperative funds amounting to almost $200,000, and NASA grant funds amounting to about $300,000.

Another question about access to the data: since the project is publicly funded, the data will be available to those who need it.

As for your last question: How it might effect your operations in the future; I guess that I have no crystal ball, but certainly having better data on water use within canal company and irrigation districts, you'll be able to refine your operations to be more water-efficient, to establish baseline information for possible TMDL requirements, and demonstrate to your shareholders that you are running an efficient operation.

I would be happy to discuss any further questions that you might have. I ask that you provide this information to your board and ask them to grant permission for our contractors to establish a gage on your system and periodic access for manual measurements and equipment maintenance.

Thank you!

Paul

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