Nez Perce

ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT

P.O. BOX 365 • LAPWAI, IDAHO 83540-0365 • (208) 843-7375 / FAX: 843-7378

October 4, 1999

R.D. Hildebrand
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington, 99352

Re: *Recommendations for Selection of a Site-Wide Groundwater Model at the Hanford Site, August 1999.*

51701

Dear Mr. Hildebrand:

The Nez Perce Tribe's Environmental Restoration and Waste Management Program (ERWM) has reviewed the *Recommendations for Selection of a Site-Wide Groundwater Model at the Hanford Site, August 1999.* This letter contains, for your consideration, ERWM's comments and suggestions on this document.

Since 1855, reserved treaty rights of the Nez Perce Tribe in the Mid-Columbia have been recognized and affirmed through a series of Federal and State actions. These actions protect Nez Perce rights to utilize their usual and accustomed resources and resource areas in the Hanford Reach of the Columbia River and elsewhere. DOE's American Indian Policy states that "*The Department will consult with Tribal governments to assure that Tribal rights and concerns are considered prior to DOE taking actions, making decisions or implementing programs that may affect Tribes*". Accordingly, ERWM has support from the U.S. Department of Energy (DOE) to participate in and monitor relevant DOE activities.

Developing a site-wide groundwater model for the Hanford Site is an extremely complex problem. ERWM believes that such a model should provide some general knowledge about environmental conditions in the aquifer system. However, when it used for solving specific problems in specific areas, it should be used carefully, considering the model's assumptions and technical limitations.

We understand that there are computational limitations that require serious simplifications in the program. Our comments focus on issues, that might be easily included or modified in the code, or should be considered as limitations of the model when solving large-scale problems on the Site.

1. Geologic structures in the area, including the Umtanum Ridge-Gable Mtn., the May Junction, and the Cold Creek Faults, should be more carefully considered and evaluated as locations where the unconfined aquifer can be in potential communications with deeper, confined aquifers.

2. We suggest some modifications in the color scheme of the maps. The current key does not provide clear distinction between the surface water and the basalt units above the water table.

3. Hanford site maps (e.g. Figures 6, 11 and 15) are inconsistent with maps containing boundary conditions and results of simulations; In the simulation maps Gable Mountain is interrupted to the east (e.g. Figures 29-32), whereas the mountain is continuous on the site maps.

4. Since the model does not incorporate the vadose zone, it would be more appropriate if using the output of vadose zone flow and transport models as upper boundary conditions would be more clearly emphasized in the chapters about boundary conditions. Currently, the use of vadose zone models is only mentioned in chapter 5.3.1.10.

5. The use of linear adsorption coefficients in the model might be adequate only for a small range of contaminants, not only because of "volatilization or by the occurrence of non-aqueous phase liquids" (p.68, paragraph 1), but also, and more importantly because of the nature of the adsorption process. Adsorption is generally linear for most chemicals for a short concentration range. As the concentration range increases several orders of magnitudes, which is very probably the case in a contaminant plume, adsorption might not be linear anymore. Using distribution coefficient (Kd) instead of a non-linear adsorption model can miscalculate the amount of sorbed contaminants, therefore, the movement of the plume. The pH of the system also has to be considered in relation to the adsorption process.

6. The calibration of the transport model (Figures 31 and 32) did not produce as convincing results as the water flow model did. The model should be calibrated for several different contaminants in order to evaluate its validity.

7. The uniform vertical grid that is proposed for the entire aquifer excludes the possibility to model spatial variations in the thickness of the different lithologic units throughout the aquifer.

8. A figure showing the locations of the boreholes that were used in developing the geologic framework should be included in the text. Eventually, the geologic framework should incorporate all available and useable borehole information.

9. Several of the lithologies, shown at well locations on Figure 7, Poeter and Gaylord (1990) do not appear to agree with the lithologies shown on identical wells shown on Figures 7 and 10 of this document. Well 699-24-1P, Figure 10 of the groundwater model document, shows 20+ meters (m) of Ringold gravel while Figure 7 (Poeter and Gaylord, 1990), cross-section C-C' shows 20+ m of silt & mud. Well 699-39-E2, Figure 7 of the groundwater model document, shows about 16 m of Ringold lower mud 6 versus 30+ m of Ringold sand and gravel shown on Figure 7 (Poeter and Gaylord, 1990), cross-section A-A'.

10. The statement that "*There may be some evidence for a fault to exist in the basalt in this region north of Gable Butte and Gable Mountain, but there is no evidence of a fault in this region in the unconsolidated sediments*", p. 133, and similar wording on page B.6, is not consistent with field observations reported in Reidel and others (1994). Reidel and others (1994, Table 4, p. 172) report ~ 6 cm of movement in late Pleistocene? sediments in sec. 19, T13N,R27E associated with the Central Gable Mountain Fault.

The Nez Perce Tribe ERWM appreciates the opportunity to provide comments on *Recommendations for Selection of a Site-Wide Groundwater Model at the Hanford Site, Augusi 1999.* If you wish to discuss Nez Perce ERWM's comments further, please contact Judit German-Heins at (208) 843-2367, (208) 843-7378 (fax), or jheins@nezperce.org (email)

Sincerely,

Patrick Sobotta
Interim ERWM Director

cc: Kevin Clarke, DOE-RL, Indian Programs Manager
J.R. Wilkinson, CTUIR, SSRP Manager
Rich Holten, DOE-RL
Dib Goswami, Ecology
Larry Gabois, EPA
Wade Riggsbee, YIN
Mike Graham, BHI
Peter Wierenga, U. of Arizona

References:

Poeter, E. and D. R. Gaylord, 1990, *Influence of aquifer heterogeneity on contaminant transport at the Hanford Site,* Ground Water, Vol. 28, No. 6, pp. 900-909.

Reidel, S.P., N.P. Campbell, K.R. Fecht, and K.A. Lindsey, 1994, *Late Cenozoic Structure and Stratigraphy of South-Central Washington*, Washington Division of Geology and Earth Resources, Bulletin 80, p. 159-180.