CENTER for SCIENCE in PUBLIC PARTICIPATION
224 North Church Avenue, Bozeman, MT 59715
Phone (406) 585-9854 / Fax (406) 585-2260 / web: www.csp2.org / e-mail: csp2@csp2.org
"Technical Support for Grassroots Public Interest Groups"

March 2, 2012

Re: Testimony on the feasibility of reclamation for the proposed Chuitna coal mine, before the Alaska Senate Judiciary Committee on March 2, 2012

Fm: David M. Chambers, Ph.D., P. Geop.

Reclamation of a minesite is not restoration to its former function, but involves returning a minesite to a functional use after mining has been completed. The functional uses are typically things like wildlife habitat, grazing, and/or industrial use. The goals for reclamation functional use are, or have, always been aimed primarily at a surface use.

Recreating the subsurface hydrological regime that existed before mining would be extremely difficult, likely impossible, very expensive, and to my knowledge has never been the primary goal of any reclamation effort. Recreating the pre-mining hydrologic regime would be technically challenging at best, but more likely is not a viable option. At a minimum it would require a very detailed pre-mining data collection effort in order to understand the physical layout and function of the existing hydrologic (groundwater) regime. Where water moves and how fast it moves are functions that would have to be well understood before the groundwater strata are disturbed by mining. Some of the reclamation at Chuitna would involve attempting to restore up to 200 feet in thickness of potentially water-bearing strata.

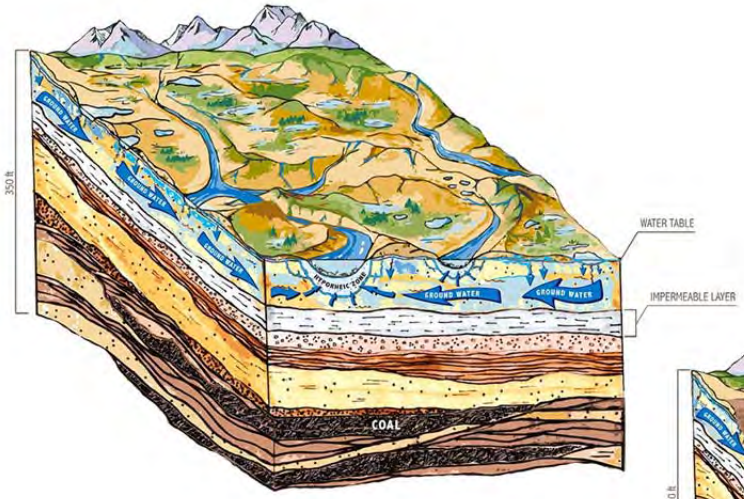
Complicating the restoration would be the Chuit and South Pit faults, and several anticlines (structural features) that have warped the underlying strata since its deposition. Faults can either be zones of high permeability that promote preferential flow of groundwater, or zones of low permeability that act as barriers to the transmission of groundwater. Mining through fault zones means that the groundwater hydrology must be thoroughly understood in order to have any chance of restoring groundwater flow patterns during reclamation. Similarly, anticlines and similar geomorphic structures will influence groundwater flow, and must be carefully mapped in order that restoration of pre-mining hydrologic effects might be attempted. It is not evident from the information presented in the pre-mining work[1] that these important hydrologic factors have been adequately examined.

If the original hydrology were to be adequately mapped in three dimensions, the flow patterns, temperature and water quality variations documented, getting similar materials back into these configurations would be very difficult. When waste material is mined, stockpiled, and then moved back into the mined out pit, there is a tendency for homogenization of the backfill material. From a hydrologic perspective the original strata will consist of zones that conduct water (aquifers), and zones that do not conduct water (aquitards). The aquitards are as important as the aquifers because they control the flow of groundwater. A normal pit backfill would tend to create a relatively uniform aquifer, with hydraulic conductivity that could be greater than or less than that of the original strata. Backfill could also negatively impact groundwater, and potentially surface water, quality.

In order to recreate the original hydrologic regime, backfill material would need to be sorted, stored separately, and selectively replaced into the mined out areas. This sorting, with perhaps screening, and separate storage would be more expensive than traditional pit backfill methodology. Quality control of the backfill segregation and placement would also be a significant management issue. If backfilled material is not sorted, stored, and replaced to meet locational and hydrologic parameters, then the restored hydrologic system would function differently than the original.

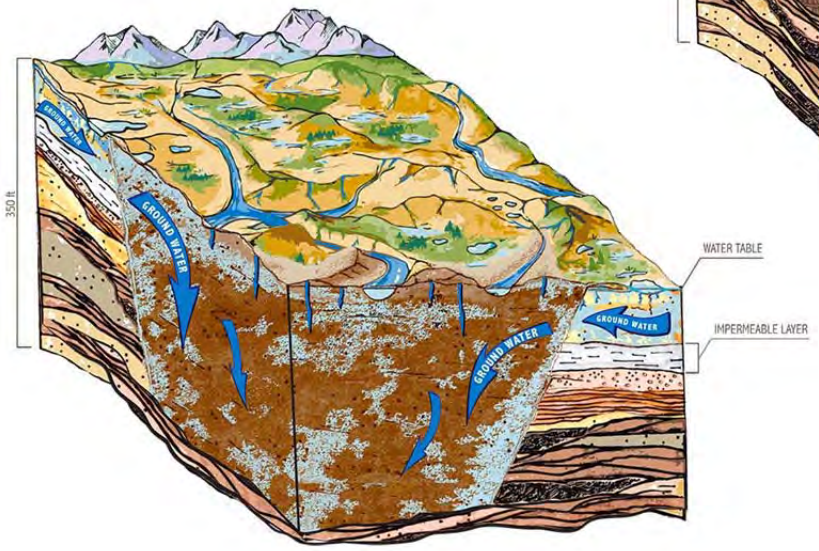
[1] Chuitna Coal Project Geology Baseline Information, PacRim Coal, L.P., August, 2006

It is highly unlikely that the original hydrologic system could be restored. This is due to the disruption of the original strata due to mining that would cause a change in the physical character of the rock. There would be changes in rock size (therefore hydraulic conductivity), and changes in rock volume. The volume would increase on a unit basis due to breaking up the rock, but there might be a decrease in total volume due to the removal of the coal – coal layers that cannot be replaced physically or hydrologically.



Strip Mining - Before

Strip Mining - During



Strip Mining - After

Because of all of these complications – of adequately defining the existing hydrology; of sorting and storing the mined waste; and, of putting it back in the same hydrologic configuration as the original material – it is likely that the restored hydrologic regime would only be a rough approximation of the original. The significant increase in cost to provide only a rough approximation of what was there before explains why restoration of the original hydrologic regime at a minesite is not typically attempted.

#####