Dear Rafael

Members of Mahomet Aquifer Consortium asked me to send you the comments concerning the Clinton Landfill application that I prepared for them. I serve as a technical advisor to the consortium. There are some critical inconsistencies in the water table elevation data used by USEPA to state that the PCB landfill will meet the necessary regulations. If the correct data is used, the permit would not be acceptable according to the regulations as stated in the permit.

All underlined items are directly from the USEPA draft permit approving the landfill.

The technical requirements for any landfill accepting PCBs include the following:

> 3. HYDROLOGICAL CONDITIONS: The proposed CWU meets the requirements set out at 40 CFR § 761.75(b)(3):
> A) The bottom of the proposed CWU will be above the historical high water table.
> B) The proposed CWU is not in a flood plain, shore land or groundwater recharge area.
> C) There is no hydraulic connection between the Site and standing or flowing surface water.
> D) The Site will have monitoring wells and leachate collection.
> E) The bottom of the landfill liner system will be at least fifty feet from the historical high water table.

The purpose for keeping the landfill above the water table is not explicitly stated in 40 CFR § 761.75(b)(3); two possible reasons include reducing the potential for contamination of the surrounding groundwater and to prevent the landfill from filling up with groundwater inflow.

USEPA gives the following two definitions for the water table in the permit which are clear and consistent with textbooks on groundwater:

> WATER TABLE: The elevation of a free-water surface at which the pressure is equal to and responsive to atmospheric pressure.
>
> GROUNDWATER TABLE: For saturated soil under unconfined conditions, i.e., "water table" conditions, the elevation of the free water surface; for saturated soil under confined conditions i.e., "artesian conditions", the potential elevation of the free water surface.

A major inconsistency with these definitions is USEPA's definition of the historical high water table used to satisfy requirements 3a and 3e above:

> HISTORICAL HIGH WATER TABLE: The elevation for top-of-sand for the Mahomet Aquifer, top-of-sand elevations in the vicinity of Clinton Landfill #3 are between 483 and 490 feet MSL.

This definition is for the historical high water table is incorrect because the "top-of-sand for the Mahomet Aquifer" is a geologic contact, not a "free-water water surface" or the "potential elevation of the free water surface" as in the USEPA definition of a water table. The potential

elevation of the free water surface, or potentiometric surface, of the Mahomet Aquifer is around 605 msl as measured by Anliker and Sanderson (1995 - *this report was not made part of the administrative record [AR] even though it referred to many times by USEPA and the applicant used as the basis for flow direction – see AR 207*) and also shown in Wilson et al (1998; AR 171). More recent 2010 measurements made within three miles of the Clinton Landfill by the US Geological Survey show higher water levels of 613 and 617 msl (This *data is also not part of the AR*) (http://groundwaterwatch.usgs.gov/countymaps/IL_039.html).

Why is this important? The bottom of the proposed CWU is at an elevation of 662 msl and the bottom of the 3-foot compact clay layer is at 559 msl, leaving and elevation difference with the water level in the Mahomet Aquifer of as little at 42 feet. This 42-foot difference is less than the required 50 feet of separation required by CFR § 761.75(b)(3e).

In the bigger picture of the hydrology at the site, USEPA's definition is for the historical high water table is also incorrect because it ignores all of the shallower tables in the shallower units. The best evidence for this oversight in the permit is in section 6 on page 12 which describes the monitoring systems:

> A) Background groundwater sampling for water bearing units and drinking water aquifers closest to the proposed CWU has been conducted and PCBs were not detected. Quarterly data for the following units was taken for 2 years and submitted with the Application:
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> i) Roxana Silt (Sangamonian interglacial unit, part of Mason Group),
> ii) lower Radnor Till Sand (upper Glasford Formation),
> iii) Organic soil (correlative with Roby Silt Member of Glasford Formation),
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> B) The lower Radnor Till Sand and three adjacent water-saturated but unproductive permeable zones of the upper Glasford Formation and Mason Group are heavily monitored as part of the conditions of the RCRA Subtitle D permit and will be monitored as part of this Approval. Groundwater flow in the lower Radnor Till Sand is southward toward Salt Creek Valley where potentiometry suggests it dissipates into valley-fill sediments of Salt Creek.
>
> C) The monitoring plan proposed in the Application is designed to test the closest and best connected drinking water bearing sands, the upper Glasford Formation units. The plan does so. It is a best-possible early warning system based on worst-case and most stringent assumptions.

This section describes the results of water sampling done in the shallow units close to the surface and above the Mahomet Aquifer. Because the applicant has sampled these "drinking water bearing sands", these units must be below the water table. The Roxana Silt has an elevation of approximately 670 msl. Groundwater flow (ie below the water table) is also discussed in the definition of the lower Radnor sand:

> *LOWER RADNOR TILL SAND: (M) A 1-2 foot thick water-sand sub-unit of the upper*

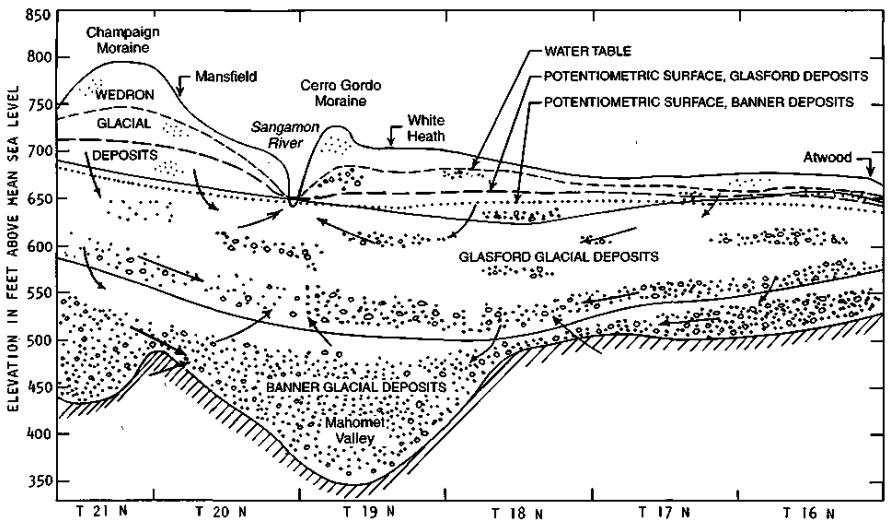
Glasford Formation at the base of the Radnor Till, host to 25-30 drinking water wells within a 5 mile radius of the CWU. The unit is located approximately 18 feet below the base of the CWU's lowest liner and hosts groundwater that is monitored before it disperses into recent valley fill of Salt Creek Valley.

The monitoring plan in section 33 GROUNDWATER MONITORING calls for monitoring wells only in the shallowest units with the deepest of these wells completed at an elevation of approximately 630 msl. If the HISTORICAL HIGH WATER TABLE is truly at 483 and 490 feet MSL, then all of the monitoring wells will be dry and completely ineffective in detecting leakage. It would also be inconsistent in the monitoring plan not to have monitoring wells in the Mahomet Aquifer below the stated high water table.

The permit also completely ignores the 10-foot thick Glasford sand which occurs at an elevation of 580 to 590 in the geologic cross-sections submitted with the permit. This unit is mappable across the county, is a significant source of water to many wells, and has a water level of approximately 660 to 670 msl according to measurements by Anliker and Sanderson (1995). This omission should be addressed be addressed in the permit.

The true water table (the elevation of a free-water surface at which the pressure is equal to and responsive to atmospheric pressure) in across most of Illinois where there are glacial deposits is generally less than 10 feet from the surface. This is why there are extensive networks of drainage tiles in the farm fields and why our cemeteries are on hillsides or in sandy deposits. Information on water table elevations and fluctuations can be found on the ISWS WARM network webpage. (http://www.isws.illinois.edu/warm/sgwdata/wells.aspx).

The requirement that the bottom of a landfill accepting PCB wastes be 50 feet above the historic water table probably eliminates more than 90% of the land in Illinois from having one of these landfills. A representation of the water table typical of Piatt and DeWitt Counties is show in on Figure 9 in Anliker and Sanderson (1995):



In a separate issue, the Permit states on page 17 "Wells in the EPA 3 mile radius database are all topographically above, side-gradient or up-gradient of the proposed CWU." This statement contradicts the report by Greenslate (1996) that shows the capture zone of the City of Clinton wellfield would extend under the landfill area. The Permit should be changed to reflect the fact if the landfill leaked into the Mahomet Aquifer, it could contaminate the Clinton water supply. This would also be another reason to require monitoring wells in the Glasford and Mahomet aquifers.

Similarly, any contamination in the groundwater flow of lower Radnor sand "disperses into recent valley fill of Salt Creek Valley". This statement needs to be explained. The "dispersed" contamination would have to end up in Salt Creek, not only contaminating it, but potentially the downstream water supplies at Mt Pulaski and Lincoln.