

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Sybil Kolon, Pall Life Science (PLS) Project Manager  
Remediation and Redevelopment Division  
Jackson District Office

FROM: Jim Coger, Geologist  
Remediation and Redevelopment Division  
Jackson District Office

DATE: April 26, 2006

SUBJECT: Review of the PLS, January 25, 2006 Interim Response Work Plan  
Western System (Work Plan)

I have reviewed the subject Work Plan. My comments address the Hydrogeological Characterization, Groundwater Quality Characterization, Site-Specific Conditions, Source Control, Interim Response Activities, Monitored Natural Attenuation, and Groundwater Extraction (Batch Purging) sections of the Work Plan.

**Hydrogeological Characterization:**

The September 2005 Potentiometric Surface Contour Map, included in the Work Plan (Figure 7), appears to be consistent with historical flow direction surveys. PLS describes the groundwater flow direction as being generally to the northwest, for the area proximal to the Ann Arbor Cleaning Supply Well (A<sup>2</sup>CSW) and MW-53 nest.

The aquifer performance test conducted in June 1993 established hydraulic conductivity, transmissivity, and storativity values that are consistent with glacial outwash - sand and gravel depositional environments. Groundwater flow velocities were calculated to be approximately 233 feet per year.

PLS states that groundwater in the Western System interacts with the Honey Creek Tributary (HCT). "Previous investigations have interpreted the HCT to generally be a gaining stream. In the localized area around Little Lake, the tributary has the potential to be under losing Conditions". A monitoring well/piezometer network, capable of evaluating how the HCT hydraulically interacts with groundwater in the Western System has not been installed. Potentiometric maps submitted by PLS do not distinguish "gaining and losing" sections of the HCT.

**Groundwater Quality Characterization:**

As referenced by PLS, 1,4-Dioxane was detected in several residential wells located on Park, Jackson, and Burton Roads, and the Huron Valley (Ann Arbor) Swim Club in 1987. Levels of 1,4-Dioxane in the 100 ug/l range were detected at the swim club property, 4503 Park, and 4401 Park Road locations in 1987. A water supply well at 231 Little Lake Drive detected 1,4-Dioxane at .007 ug/l during the 1987 sampling event. The 231 Little Lake Drive address is located approximately 1,200 – 1,500 feet upgradient (five to seven years travel time) from the Park Road residential wells.

PLS states that the Ann Arbor Cleaning Supply Well (A<sup>2</sup>CSW) currently is the well with the highest levels of 1,4-Dioxane contamination in the Western System. The 125 ug/l was detected

during the March 2006 sampling event. The A<sup>2</sup>CSW is located approximately 600 feet north/northwest (downgradient) from Little Lake and the HCT. Based on the 1993 aquifer test results, it should take groundwater approximately 2.5 years to travel from Little Lake to the A<sup>2</sup>CSW area. It's not plausible from a fate and transport perspective that Little Lake is the only source area contributing to the contamination at the A<sup>2</sup>CSW. Boring BHMW-92 installed in 2004, and the 1987 sampling data from the 231 Little Lake Drive supply well, reflects that contaminant levels have historically been very low between Little Lake and the A<sup>2</sup>CSW area. PLS does not explain how impacted surface water from the HCT and/or Little Lake is the suspected source of groundwater contamination in the intermediate screened interval (100 - 110 feet below ground surface) of monitor well MW-53i.

**Site-Specific Conditions:**

I do not agree that sufficient groundwater quality data has been collected, southwest, west, and northwest of the A<sup>2</sup>CSW area to perform an exposure pathway evaluation. The vertical and horizontal extent of 1,4-Dioxane contamination, exceeding 85 ug/l has not been defined. Exposure pathway assumptions based on residential well monitoring data is unreliable. Vertical profiling data is required to determine vertical extent, and establish maximum contaminant levels within the saturated interval(s). I do not agree that the residential well monitoring data for the Park Road, Myrtle, Burton, and Luella Streets areas represents that 1,4-Dioxane contamination is not a concern at shallower or deeper zones within the complex heterogeneous aquifers underlying this portion of Scio Township.

Vertical profiling data from borings/monitor wells recently installed along Wagner Road noted abrupt changes in 1,4-Dioxane levels within ten-foot intervals. Monitor well MW-95 detected 1,4-Dioxane at 16 ug/l at a depth interval of 119 - 120.5 feet below ground surface (bgs). The 1,4-Dioxane level increases to 626 ug/l ten feet below this interval (129 - 130.5 bgs). Boring PLS-05-04 did not detect any 1,4-Dioxane at 99 - 100.5 feet bgs; the sample from the next interval (109 - 110.5 feet bgs.) detected 1,4-Dioxane at 4,330 ug/l.

The significant vertical variability of contaminant distribution, as noted in the profiling data, clearly demonstrates that exposure pathway assumptions cannot be extrapolated from residential drinking water wells.

**Source Control:**

As referenced above, established groundwater flow velocities, and historical sampling data from the area upgradient of the A<sup>2</sup>CSW indicates that a source area other than Little Lake is contributing to the contamination currently present at the MW-53 nest, and A<sup>2</sup>CSW location.

A second area of concern includes the 5005 Jackson Road address. The water quality trend analysis for 5005 Jackson Road does not appear to correlate with historical trends for wells immediately upgradient. The summary of "Time vs. Concentration" water quality analysis for 5005 Jackson Road, provided in Table 1 of the Work Plan, depicts a general increase in 1,4-Dioxane levels between the years 2000 and 2005. The trend analysis for 4742 Park Road located approximately 900 feet upgradient (3.8 years) from 5005 Jackson Road, depicts low to non-detect 1,4-Dioxane levels between October 1998 and October 1999. Based on established flow velocities, a drop in contaminant levels should have been observed for the period between the years 2002 and 2004, at the 5005 Jackson Road address.

The 1,4-Dioxane impact at 5005 Jackson Road reflects that there may be other source areas other than those associated with "losing" sections of the HCT, west and/or downstream from Little Lake.

**Interim Response Activities, Monitored Natural Attenuation, Groundwater Extraction:**

As referenced above, there are no monitor wells located southwest, west, or northwest of the axis formed by the MW-53 nest, and MW-31. Exposure assumptions based on residential well monitoring data may or may not be relevant.

I do not concur with PLS's statement that 1,4-Dioxane concentrations have generally decreased at most Western System Wells. Monitor wells MW-31, MW-41s/d and the Artesian's have contaminant trends that have remained steady or slightly increased over the past ten to fifteen years. Monitoring data indicates that batch purging has reduced contaminant levels only in the immediate area of the A<sup>2</sup>CSW.

**Recommendations:**

Additional monitor wells are needed to characterize the extent of contamination southwest, west and northwest of the A<sup>2</sup>CSW area.

One well should be installed southwest of the A<sup>2</sup>CSW, proximal to the HCT. This location should determine if the HCT was historically, and/or is currently, a source of contamination in the Western System. The extent of contamination needs to be defined to 85 ug/l southwest of the A<sup>2</sup>CSW.

A second well is needed on the west side of the co-op woods/east side of the swim club property. Contingent on access, this well should be installed south of the MW-61 nest, and east of the Swim Club supply wells. This well is needed to establish where the 85 ug/l line is west/northwest of the A<sup>2</sup>CSW.

Based on the data trend analysis and location, I consider the 5005 Jackson Road residential well to be a "threatened well". As referenced above, this well appears to be located west of the A<sup>2</sup>CSW, plume. Contaminant levels have increased since November 2001, and may be originating from an unknown source related to the confluence of the HCT's. I'm not familiar with potential drilling locations for this area. An optimal location would be upgradient from the 5005 address, north of 4800 Park Road and west of the Artesian's. The need for a third monitor well at this location will be determined after review of the data from the swim club and southwest monitor well.

All wells should be vertically profiled to bedrock.

If you have any questions or comments please let me know.

JC/KJ

cc: Mitchell Adelman, RRD  
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