Western
1/8/08

Plan for Modification of Purging Frequency

Western System

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JACKSON DISTRICT OFFICE

PALL Life Sciences

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BACKGROUND

Pall Life Sciences (PLS) has been batch purging groundwater from a well in the Western System for the purpose of reducing 1,4-dioxane levels in this well to levels below the Michigan Department of Environmental Quality (MDEQ) Drinking Water Protection Criteria of 85 micrograms per liter (µg/L). Purge operations began in February 2003 and involve batch purging approximately 36,000 gallons of water, in a one-day period every month, from one well (the Ann Arbor Cleaning Supply Well), into a tanker truck for treatment at the PLS treatment facility on Wagner Road. To date, approximately 2.3 million gallons of water have been extracted from the well.

The Western Plume resides in a sand and gravel aquifer that is approximately 125 feet thick in the plume area. Available monitoring and boring data indicate the plume is limited horizontally and vertically. The only well detecting 1,4-dioxane levels above 85 µg/L is the purge well. 1,4-Dioxane concentrations are below 85 µg/L at the neighboring MW-53i. The plume is limited vertically, as supported by data from MW-53s, MW-53i, and MW-53d, and the downgradient well/boring, MW-92. Upgradient, the plume is also limited, as indicated from data from MW-51 and BMW-92.

It is estimated that the Western Plume mass is less than five pounds. With the given distribution of monitoring wells in the Western System area, and the lack of a well immediately downgradient on the neighboring property (Sunward Cohousing), there is some level of uncertainty in this estimate.

PLS believes a localized plume is not justification for installation of infrastructure to manage (transfer) water to the PLS treatment system. PLS, therefore, proposes continuation of the current batch purging to manage the limited plume remaining in the Western System.

Since batch purging began in February 2003, 1,4-dioxane at MW-53i has consistently declined. 1,4-Dioxane levels in the Ann Arbor Cleaning Supply well fluctuated up and down until April 2005, then have generally declined. There is not a clear relationship between batch purging and the 1,4-dioxane trends observed in the two wells. The 1,4-dioxane trends in these two wells are believed to be controlled in part by water level changes (as water levels increase, so do 1,4-dioxane levels, and vice versa). A graph showing 1,4-dioxane trends and a hydrograph of water level data from MW-53i is attached.

The water level changes observed at MW-53i are reflective of more regional groundwater trends and not localized trends around the well and/or the batch purging. Water levels have been declining regionally since at least 2000. Hydrographs of two wells outside the plume area, MW-40d and a distant U.S. Geological Survey observation well (421322083441301) located near the Airport, are attached. These hydrographs support the theory that water level changes are not localized to the Western Plume area.

Purging from the Ann Arbor Cleaning Supply Well has the potential to reduce 1,4-dioxane concentrations through mass reduction and dispersion. As mass is reduced, concentrations are lowered. Secondly, if cleaner water is drawn toward the purge well (vertically or horizontally), concentrations in the well area are reduced. Alternatively, concentrations may increase as a

result of purging, if water of higher 1,4-dioxane concentrations were to be pulled toward the extraction well. Not knowing the precise area of the remaining plume, it becomes somewhat difficult to predict or model the effect of the batch purging. The best predictive method is extrapolation of trend data from monitoring. Because this trend has changed over time, our estimates for when 1,4-dioxane levels would be below 85 µg/L have changed. Current predictions suggest 1,4-dioxane concentrations will be below 85 µg/L by 2010 (see attached graph). However, as discussed, there appears to be a relationship between the water level changes. As such, it is difficult to predict future 1,4-dioxane concentrations, since future water levels cannot be predicted and, therefore, be accounted in the trend predictions.

WORK PLAN

Overview

PLS initially selected a monthly batch purging frequency of monthly. This frequency was selected by PLS based on the estimated plume extent and was considered to be minimally disruptive to the area/neighbors. It is unknown whether alternative frequencies or volumes in batch purging will change the trend of 1,4-dioxane concentrations. Such changes could impact the current trends, both positively (result in a decreased trend) or negatively (result in an increased trend). PLS desires to examine the response in 1,4-dioxane concentrations to alternative ("test") purge frequencies and volumes. Ultimately, PLS desires to understand whether alternative purge frequencies or volumes will have a similar, negative or positive impact to observed trends in 1,4-dioxane.

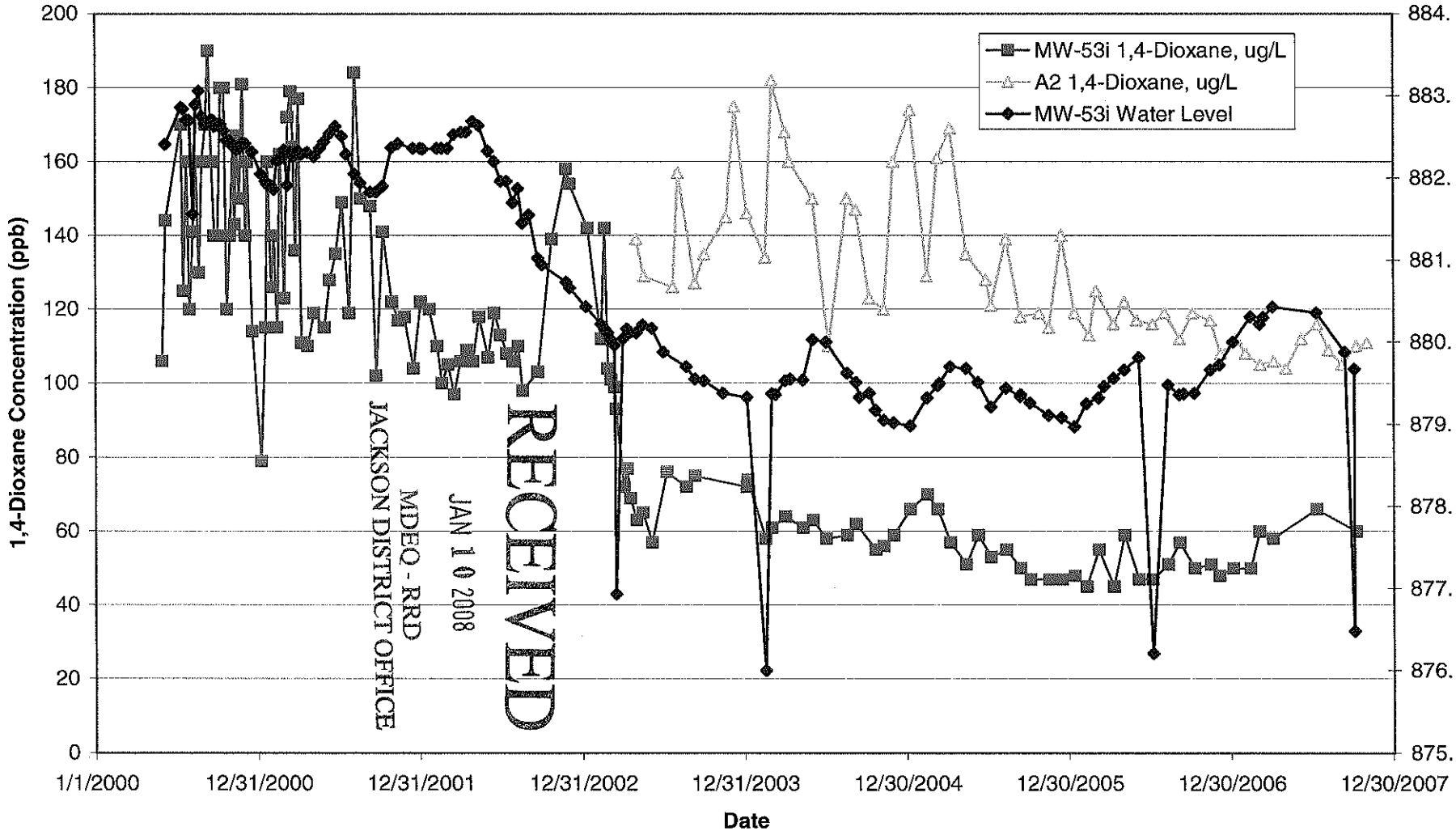
Implementation Plan

First Test - PLS proposes to reduce purging from monthly to every other month (bi-monthly) for 8 months. For consistency, the same volume of water (approximately 36,000 gallons) that is currently being purged will be purged each event. 1,4-Dioxane trends will be monitored in the purge well and MW-53i on a bi-monthly frequency. PLS believes at least six months of data will be necessary to confirm any trend changes due to the change in purge frequency.

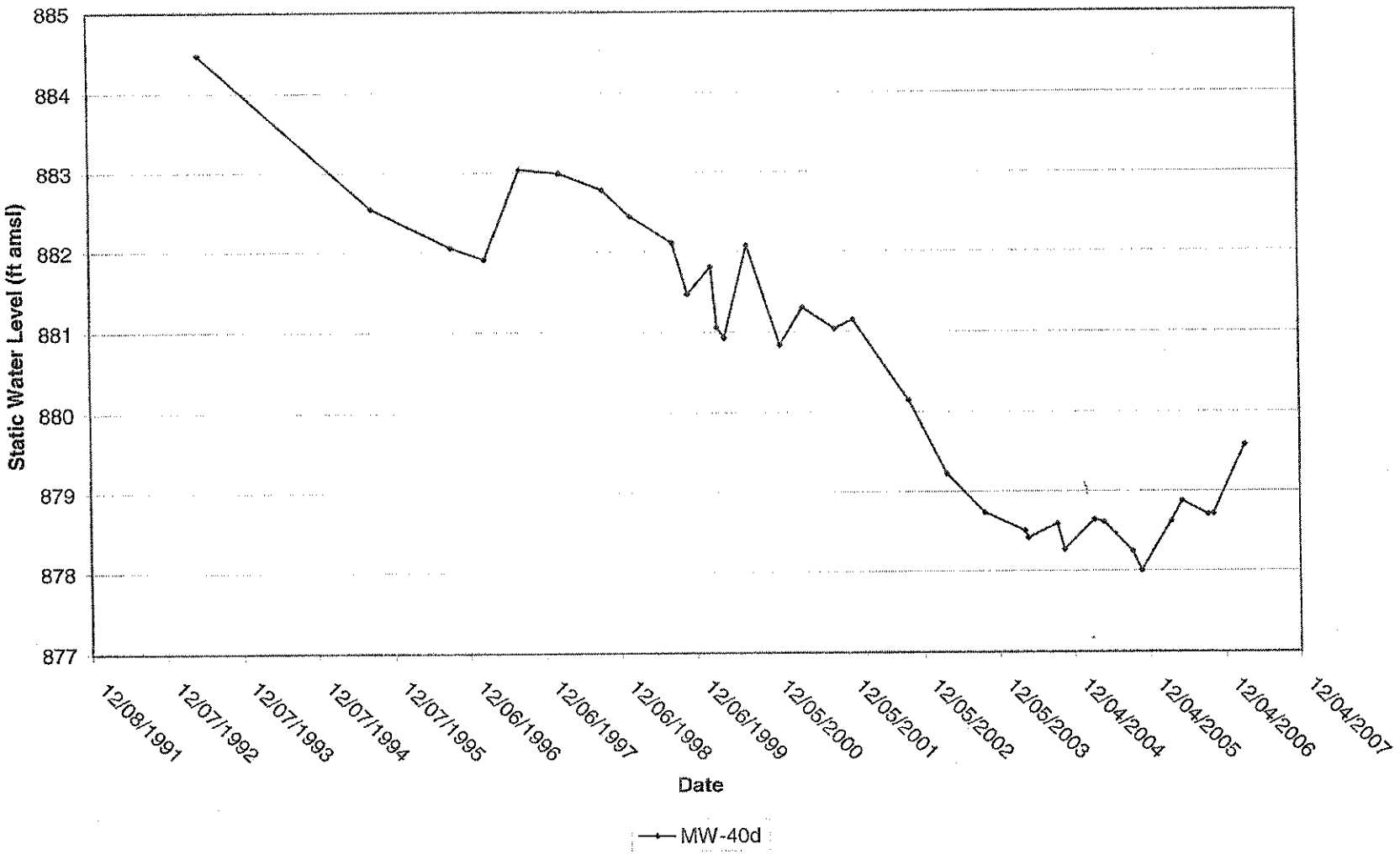
Second Test – Immediately following the first test for a period of 4 months, PLS proposes to batch purge approximately 250 gallons, two times per month. 1,4-Dioxane trends will be monitored in the purge well and MW-53i on the same frequency.

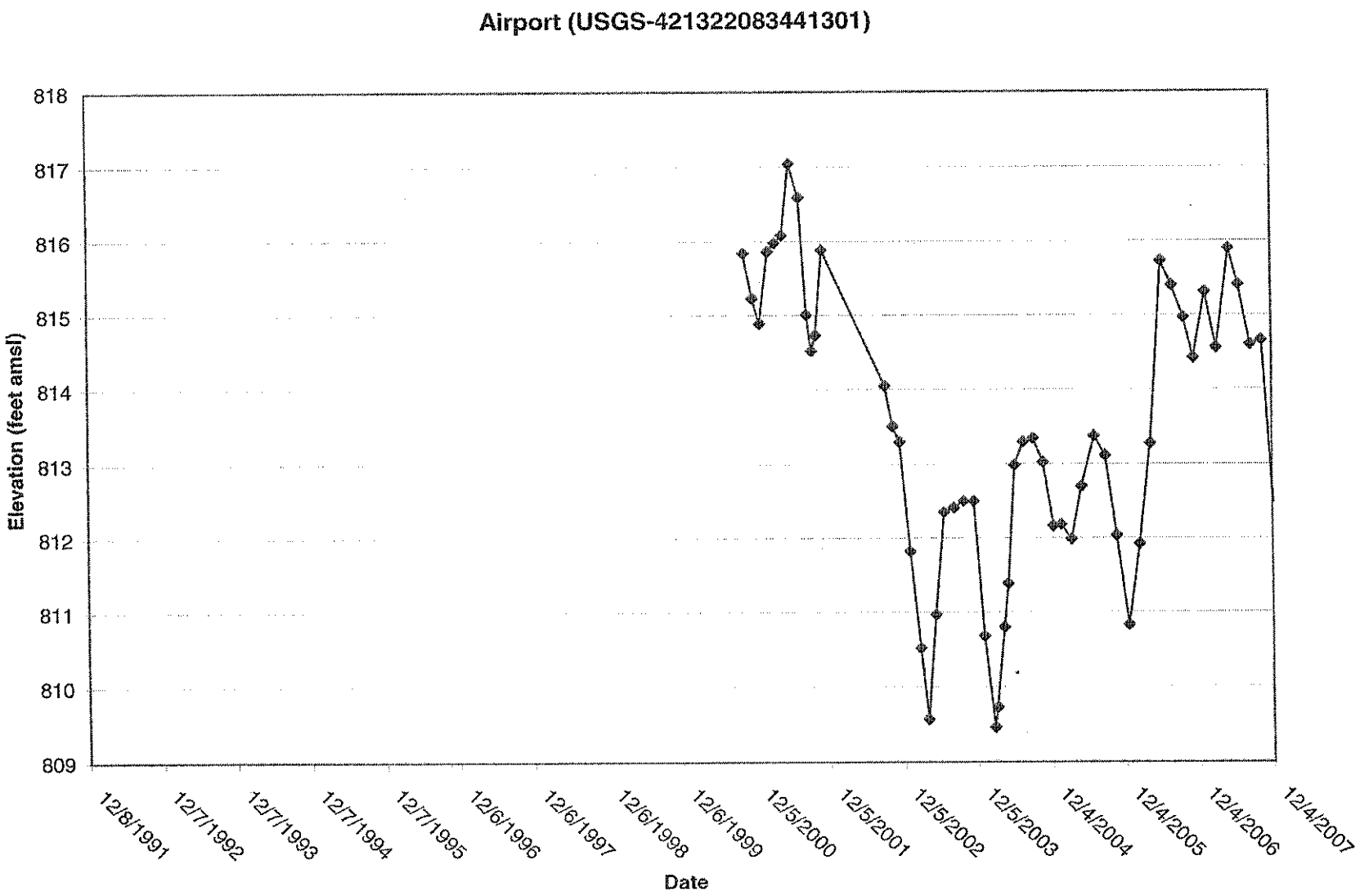
At the end of one year, PLS proposes to report its findings to the MDEQ. If the testing shows that there is not a negative result from the reduced frequency and/or volume in batch purging, PLS will implement one of these changes. If it is shown that there is a negative result from the purge frequency/volume, PLS will continue the current monthly batch purge frequency. A negative result would be considered a demonstratable relationship between the changes in batch purging and an increasing trend in 1,4-dioxane levels at either the purge well or MW-53i.

MW-53i & A2 Cleaning



MW-40d Hydrograph




Airport (USGS-421322083441301)
Elevation (feet amsl)
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