Sybil
EC

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Ann Arbor, MI 48103-9019 USA

734.665.0651 phone

June 29, 2007

Ms. Sybil Kolon
Department of Environmental Quality
Jackson State Office Building
301 E. Louis Glick Highway
Jackson, Michigan 49201

Re: Evergreen System

Dear Ms. Kolon:

Pall Life Sciences submits the enclosed Evergreen System Work Plan for Well Installation and Capture Zone Monitoring Background.

Should you have any questions regarding this Work Plan, please contact me at (734) 913-6130.

Sincerely,

Farsad Fotouhi

Farsad Fotouhi
Vice President
Corporate Environmental Engineering

cc: Celeste Gill, MDAG
Alan Wasserman, Esq.
Michael Caldwell, Esq.
Matthew Naud, City of Ann Arbor

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JUL - 5 2007
MDEQ-REMEDIATION & REDEVELOPMENT DIV.

Evergreen System

Work Plan for Well Installation and Capture Zone Monitoring Background

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Pall Life Sciences (PLS) currently operates three extraction wells in the Evergreen Subdivision: LB-1, LB-3 and AE-3. In May 2006, PLS prepared a document titled, *Evergreen System Review*. In this document, PLS proposed to reduce the flow rate of LB-1 and LB-3. The justification for reducing the flow was provided in the report. In summary, PLS' interpretations of available data strongly suggest that operation of the LB-1 and LB-3 wells at their current flow rates is:

1. Creating a capture zone that is larger than necessary to capture the Unit D2 plume, and

2. "Pulling" the Unit E plume from the south toward the wells.

This is causing other undesirable circumstances, including distortion of the Unit E plume, which may potentially pull the plume beyond the northern boundary of the Prohibition Zone.

The goal is to determine the optimal flow rate necessary to maintain capture of the Evergreen plume and to minimize contribution of 1,4-dioxane from the Unit E plume. PLS has demonstrated capture of the Unit D2 plume with flow rates as low as 75 gallons per minute (gpm) from LB-1. Currently, PLS is operating LB-1 and LB-3 at a combined flow rate of approximately 170 gpm. It is not anticipated that AE-3 will be operated in the future because its operation is not needed to capture the D2 plume. Current data support the conclusion that the low concentrations of 1,4-dioxane being withdrawn by AE-3 (concentrations have averaged 78 ppb since 2004) originate primarily if not entirely from the Unit E, not the D2 plume. Continued operation of AE-3 is not necessary to capture the D2 plume and will only further contribute to the distortion of the Unit E plume.

PLS is proposing to systematically monitor the capture zone of LB-1 and LB-3 as flow rates are changed (reduced). This will primarily be done by the collection and analysis of water level data. PLS proposes to reduce flows in increments of 25%. That is, the initial flow reduction will be a 25% reduction of the current flow rates. Once it is established that such a reduction can maintain capture, the flow will be reduced another 25% and so forth.

MONITORING WELL INSTALLATION

PLS and the Michigan Department of Environmental Quality (MDEQ) have agreed there is a need for additional monitoring on the northern boundary of the Evergreen plume. Beginning in the Fall of 2002, 1,4-dioxane trends at an existing monitoring well, MW-KD1d, began an upward trend. 1,4-Dioxane concentrations at this well have been over 85 micrograms per liter since January 2005. To determine the northern extent of the plume and assist in understanding the extent of capture north of the LB extraction wells, PLS is proposing the installation of a monitoring well applying similar methods used for other PLS wells at the location shown on Figure 1. The following procedures will be used:

WELL BORING/WELL INSTALLATION METHODS

Using a hollow-stem auger drilling method, the proposed test borings will be drilled to a depth sufficient to encounter bedrock. The proposed sampling methods are split spoon and Simulprobe for collection of soil and soil/groundwater, respectively.

Soil samples will be collected as split-spoon samples at 10-foot intervals, beginning at ground surface and ending at the bedrock surface. Starting at a depth approximately 10 feet below the uppermost water-bearing zone, soil/groundwater samples will be collected using Simulprobe techniques and continue through water-bearing deposits capable of providing adequate sample. In water-bearing units, Simulprobe sampling will be performed at a maximum frequency of every 10 feet. Split-spoon sampling will not be collected at the Simulprobe intervals, as the Simulprobe will account for the soil sampling. During the drilling of each boring, all soil samples will be described/classified based on their physical characteristics by an onsite geologist.

Groundwater samples will be collected using a Simulprobe and analyzed for 1,4-dioxane by PLS.

Upon reaching the total depth of the boring, as determined by the onsite geologist, the borehole will be geophysically logged using a natural gamma tool. This data will supplement the formation samples and provide additional information regarding site geological conditions.

Wells will be installed for the primary purpose of obtaining representative water quality and level data. This may involve installing nested wells or one strategically positioned well. Such decisions will be at the discretion of PLS. PLS will discuss all well installation plans with the MDEQ. Water quality data will also be considered in the selection of a representative screen zone.

Wells will be constructed of galvanized steel casing and equipped with a 5-foot stainless-steel well screen. The well will be gravel packed and grouted. The wells will likely be completed as flush mounts, equipped with locking caps and locks.

Soil cuttings derived from the drilling and development water will be transported back to PLS for appropriate management.

Water Level Data Collection

Water level data will be used to assess the groundwater flow around the extraction wells and determine the area contributing to the wells (capture zone). Using measured water level data is the most accurate way to determine the capture zone for LB-1 and LB-3.

Wells to be used for water level data collection are listed in the attached Table 1 and shown on Figure 1. PLS proposes to collect water level data on a monthly frequency after a significant adjustment is made to the flow rates. At the end of three monthly rounds of data collection, PLS will prepare an analysis of the data, including a capture zone analysis, for submittal to the MDEQ. PLS anticipates an iterative process by which water level data are collected, analyzed, and decisions are made. This process will continue until the flow rates are optimized.

Capture Zone Analysis Methods

The capture zone will be determined through a process of contouring data and the application of particle tracking methods. The popular computer program Log-Linear Kriger (KDTD_L, S.S. Papadopulos & Associates, Inc.) is one option for this analysis. This program uses Kriging with a linear-log drift to take into account large local departures from the linear drift, such as areas of pumping wells (Tolkin and Larson 2002). PLS may also use the existing MODFLOW model to assist in the capture zone analysis.

Water Quality Data Collection

PLS is not proposing any changes to its routine monitoring schedule for the Evergreen area.

Decision Process

At the end of three months of data collection, PLS will prepare a written report for MDEQ review. At that point, PLS will choose to:

1. Propose no change in flow rate for the wells, or

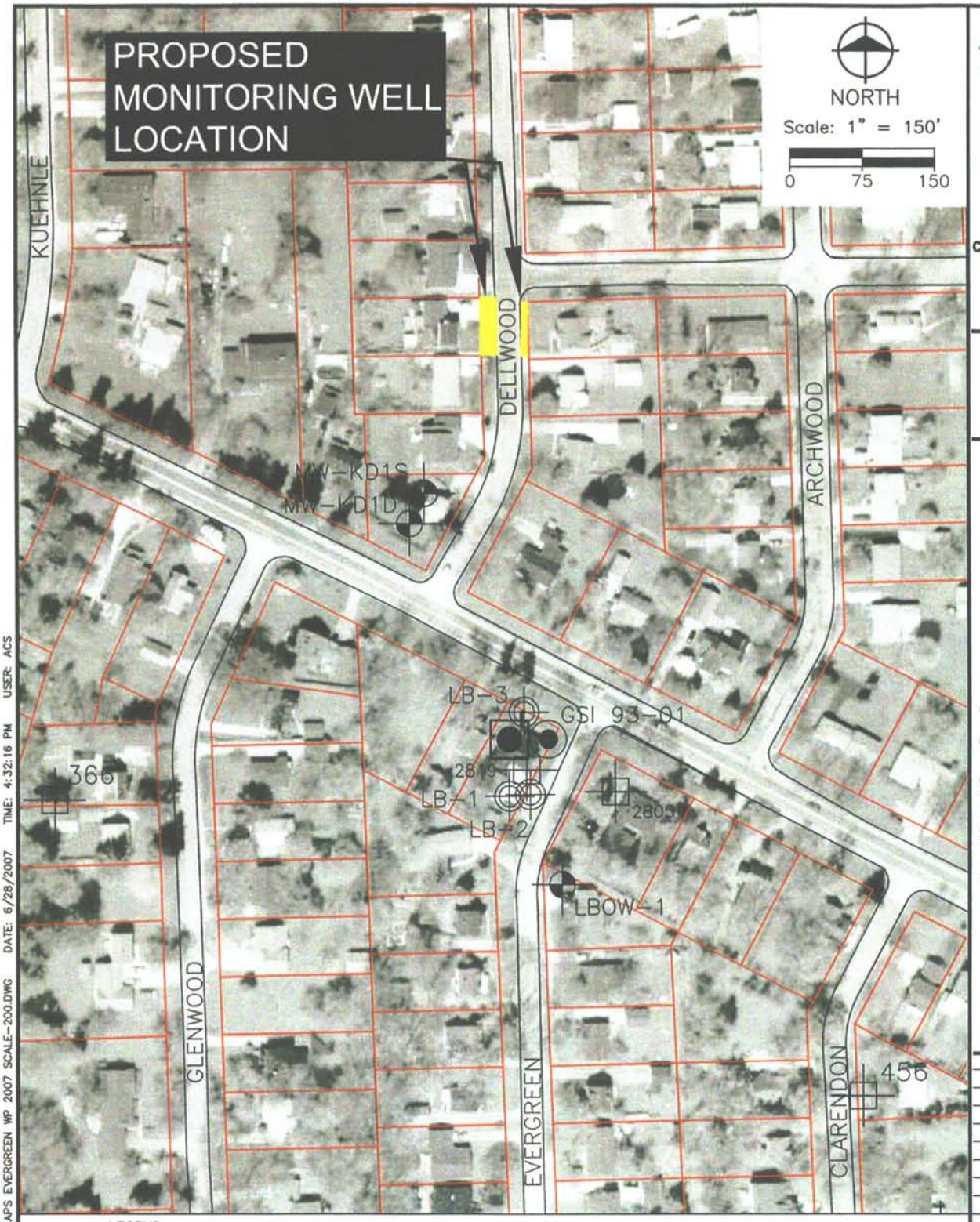
2. Propose a change in flow rate for the wells (increase or decrease), or

3. Propose additional data collection in order to evaluate the capture zone.

Upon MDEQ approval of the PLS capture zone interpretation, PLS will make the next adjustment in flow, continuing this process until an optimal flow rate is determined.

Reference

Tonkin, Matthew J, Larson, Steven P, Kriging Water Levels with a Regional-Liner and Point-Logarithmic Drift, Ground Water Vol. 40 No. 2, March 2002



LEGEND

- MONITOR WELL
- RESIDENTIAL WELL
- PURGE WELL
- HYDROGEOLOGIC TEST BORING
- UV/OX. TREATMENT SYSTEM
- TEMPORARY PURGE WELL
- SURFACE WATER ELEVATION POINT

— PARCEL BOUNDARY

PROPOSED MONITORING WELL LOCATION

fr&h

engineers
scientists
architects
constructors

fishbeck, thompson, carr & huber, inc.

Hard copy is intended to be 8.5"x11" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Pall Life Sciences
Scio Twp., Washtenaw County, Michigan
Work Plan for Well Installation and Capture Zone Monitoring Unit D2 Plume

PROJECT NO.
F96502B

FIGURE NO.
1

PLOT INFO: F:\WORK\96502\DWG\CONTOUR MAPS EVERGREEN WP 2007 SCALE-200.DWG DATE: 6/28/2007 TIME: 4:32:16 PM USER: ACS
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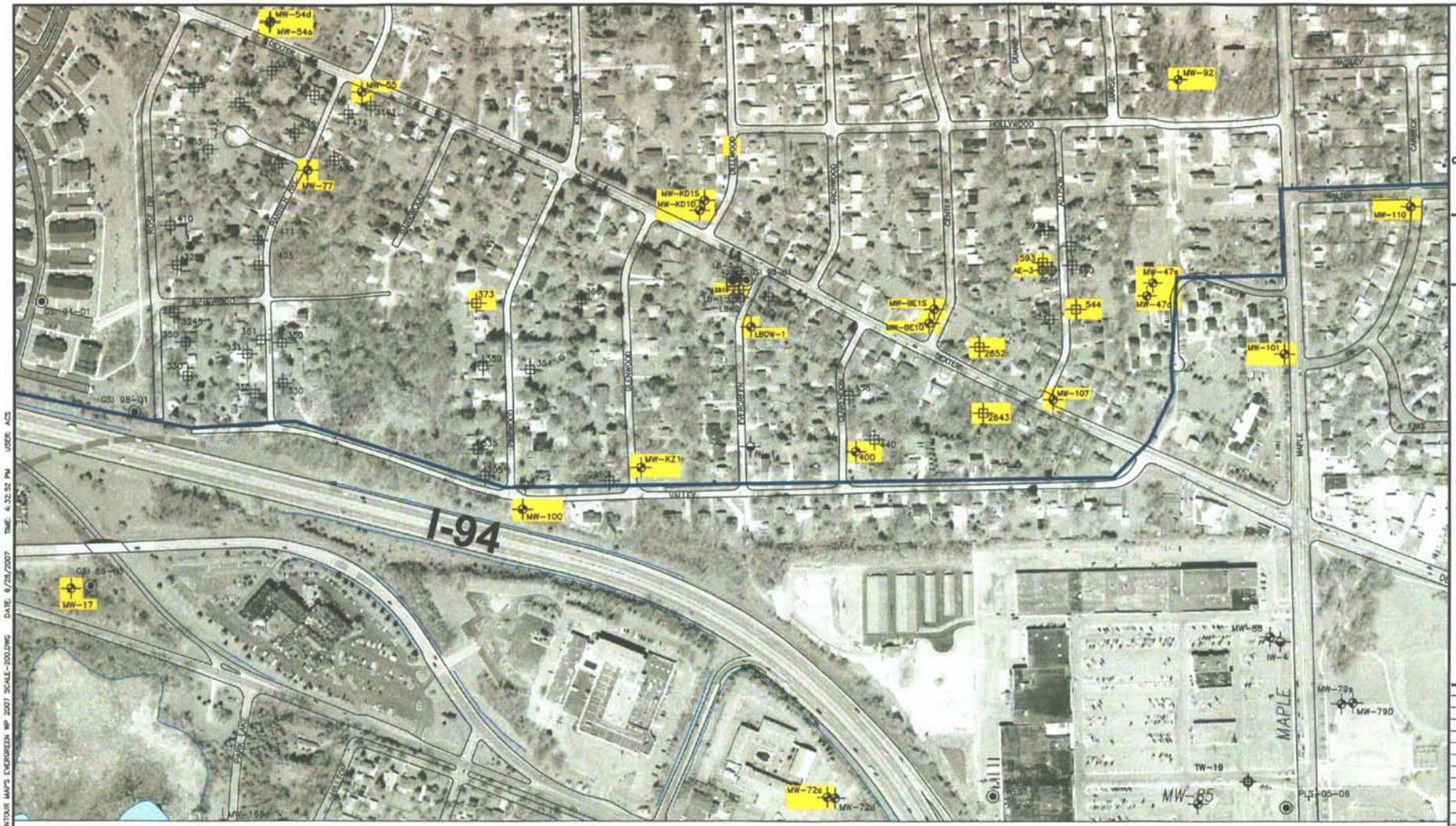

LEGEND

- MONITOR WELL
- RESIDENTIAL WELL
- PURGE WELL
- HYDROGEOLOGIC TEST BORING
- UV/OX. TREATMENT SYSTEM
- TEMPORARY PURGE WELL
- SURFACE WATER ELEVATION POINT
- PROHIBITION ZONE BOUNDARY

NORTH

Scale: 1" = 300'

0 150 300

MAP SHOWING WELLS USED FOR MONITORING

fr&h
engineers
scientists
architects
constructors

Fishbeck, Thompson, Carr & Huber, Inc.

Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Pall Life Sciences
Scio Twp., Washtenaw County, Michigan
Work Plan for Well Installation and Capture Zone Monitoring Unit D2 Plume

PROJECT NO.
F96502B

FIGURE NO.
2

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PLOT INFO: F:\WORK\96502\DWG\CONTOUR MAPS ENDGREEN WP 2007 SCALE-200.DWG DATE: 6/28/2007 TIME: 4:32:52 PM USER: ACS
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