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STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
JACKSON DISTRICT OFFICE



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July 21, 2008

VIA ELECTRONIC AND US MAIL

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Dear Sirs:

SUBJECT: Gelman Sciences, Inc. Remedial Action -
Unit E Aquifer, Well Identification Report dated November 28, 2006

The Department of Environmental Quality (DEQ) has reviewed the above referenced Well Identification Report (Report) that was submitted by Pall Life Sciences (PLS) and supplemented by a table provided with an e-mail note from Mr. Fotouhi on February 23, 2007. This letter and the enclosed Table 1 provides the DEQ's response to the Report, and as discussed in more detail below, includes requirements for additional information gathering, and additional actions to ensure that the public health, safety, and welfare are protected for the duration of the remedy, of which the Prohibition Zone (PZ) is an integral part. An electronic version of Table 1 will also be provided. Additional details about Table 1 are included near the end of this letter.

It should be noted that prior to responding to the Report, the DEQ sought clarification and information from Pall Life Sciences (PLS) regarding specific issues. This included meeting with Mr. Fotouhi and Ms. Laurel Beyer on August 15, 2007, to discuss questions the DEQ had about the information provided to date; sending a follow-up e-mail note to Mr. Fotouhi on August 31, 2007, with a draft version of a table containing information on water supply wells within the PZ available to the DEQ at that time, and requesting that PLS provide any updates or clarification of information in the table. Finally, during a telephone call on November 26, 2007, Mr. Fotouhi indicated that PLS had no additional information to provide and that the DEQ should respond to the Report based on currently available information.

To prevent any unacceptable exposure to 1,4-dioxane from the Unit E plume, the Washtenaw County Circuit Court (Court) in its May 17, 2005 Order Prohibiting Groundwater Use (PZ Order) required PLS to "submit to MDEQ for review and approval a work plan for identifying, or verifying the absence of, any private wells within the Prohibition Zone, for abandonment of any such private wells and for replacement of private drinking water wells with connection to the municipal water supply." PLS's Work Plan for Identification, Abandonment, and Replacement of Certain Private Water Supply Wells (Work Plan), dated June 17, 2005, did not adequately address the intent of the PZ Order. The DEQ's August 12, 2005 conditional approval of the Work Plan informed PLS that, among other things, the Work Plan should identify and plug any water supply wells within the PZ. After numerous written and verbal communications, some of the DEQ's comments on the Work Plan and subsequent reports have been addressed and some of the requested information has been gathered and submitted by PLS. However, PLS has not complied with all of the items required in the Work Plan, as conditionally approved by

the DEQ. For example, PLS has indicated it does not intend to take additional actions at several properties where the status of wells formerly used for drinking water has not been established. This and other unresolved issues are discussed in more detail below.

The DEQ's experience with other institutional controls¹ throughout the state indicates that it is not uncommon for residents and property owners to knowingly and unknowingly use groundwater for drinking water where that use has been restricted. This has been done by diverting groundwater from an unplugged well for household use. In addition, it is common for a well to be used for irrigation and other non-potable purposes after a home is connected to a municipal water supply. These uses are not permitted by the PZ Order, unless specifically approved by the DEQ under one of the exceptions in the PZ Order. Such wells remain subject to being diverted for drinking water use and must be plugged to prevent such use if an exception is not approved.

The process of identifying water supply wells within the PZ, as required by the PZ Order, has been time consuming for both parties, and has taken much longer than anticipated. The DEQ's conditional approval of the Work Plan was based on an understanding that all steps would be completed once a well was identified. Neither PLS, nor the DEQ, contemplated the possibility of not being able to find wells that were known to exist or the inability to verify the presence or absence of a well at specific locations. In the past, PLS has been reluctant to take additional steps to address this problem, as requested by the DEQ, asserting that the requests were beyond the scope of the PZ Order or the conditionally approved Work Plan, although it is clear from the PZ Order that the Court wants any possible exposure pathway extinguished unless certain exceptions are applied. The DEQ continues to believe that additional steps are required to meet the requirements of the PZ Order, as discussed in more detail below.

Since the DEQ's conditional approval of the Work Plan, additional sources of information have come to light that can be used by PLS to increase the reliability of the PZ. This information includes the City of Ann Arbor's (City) water utility database and Washtenaw County's *MapWashtenaw* geographical information system that now includes all City parcels, with links to detailed building information. The DEQ's August 12, 2005 conditional approval of the Work Plan did anticipate that changes to the Work Plan might be needed over time (page 3): "If any vulnerable properties or wells are identified after PLS submits its final report on this work plan, PLS will be required to implement the tasks in this work plan, as modified by this letter, or according to subsequent revisions approved by the DEQ." The DEQ will require that these sources of information be utilized in the completion of the Work Plan.

Due to the long-term nature of the PZ and the potential threat to public health if PLS's approach to implementing the Work Plan is accepted, the DEQ will require PLS to address the concerns that have arisen since the DEQ's conditional approval of the Work Plan. Although PLS has expended substantial effort to implement the Work Plan, there are four general areas that have not been adequately addressed, as discussed in more detail below:

1. Private water supply well investigation.
2. Private water supply well identification and plugging.
3. Notices where unused private water supply wells cannot be located.
4. Final report.

¹ The PZ Order is considered to be an institutional control for restriction of the use of groundwater, as discussed in more detail on page 4.

Private Water Supply Well Investigation

The private water supply well investigation has not been thorough enough to verify the absence of private wells in some locations. Additional effort is required to identify private water supply wells in the PZ that have not been plugged to ensure that any remaining wells cannot be used for drinking water. PLS indicates in the Report (page 3) that no further action will be taken at locations where surveys have been completed and no further information is available. This position ignores all available sources of information and, as discussed below, some survey results conflict with other available information, which indicate that some properties were once served by wells. As of February 23, 2007, at least 11 attempted surveys had not been returned. It is likely that current owners may not be aware of information about the existence of water supply wells at older homes, or may be unwilling to provide information about wells that are in use. In some cases, the DEQ will require that City records be reviewed to confirm survey results.

For example, there are ten addresses listed in Table 1 currently served by municipal water where wells sampled in the past have not been located. PLS has not proposed any additional actions at these properties. Three of those addresses (3432 Ferry, 3395 Jackson, and 211 Westover) were listed in a letter from Gelman Sciences, Inc. (PLS's predecessor), dated May 24, 1994, to the Department of Public Health, requesting that wells at several addresses be kept open for groundwater monitoring. Gelman Sciences, Inc. also indicated in that letter that another well now within the PZ would be plugged in the near future (3404 Porter); however, the DEQ has no record that this was ever done. PLS was responsible for permanent abandonment of these wells at the time they were no longer used as monitoring locations, and is also required to plug them as required by the PZ Order and the conditionally approved Work Plan. None of these wells are included in PLS's current monitoring plan.

Other conflicting information regarding the existence of water supply wells includes the responses PLS received from the City regarding its Freedom of Information Act (FOIA) requests. PLS initially interpreted the term "tap date" to mean the date the building was connected to municipal water. Subsequent follow-up with the City by the DEQ staff found that this is the date that a service lead with a shut-off valve was installed at the property line, not necessarily the date water was provided to the building. The City used the term "date meter set" to indicate when municipal water was actually provided to a building. The DEQ provided this information to PLS in April 2007. PLS still questions the City's explanation, and indicated it would do additional research. The DEQ will consider any new information PLS can provide on this matter.

It is clear that additional information available from the City, and possibly other sources, can assist in the effort to determine if properties now served by municipal water were once served by wells. The DEQ has generally agreed that PLS need not investigate the existence of private water supply wells in subdivisions where it can be demonstrated that these areas were provided with municipal water at the time of construction. PLS has based this on the requirements of City ordinances at the time of construction. However, PLS has not sufficiently investigated all of the developed areas that were not part of subdivisions. In addition, as discussed below, some homes already existed in areas that were later platted as subdivisions, and may have originally been served by wells.

The DEQ will require additional investigation to identify properties where wells may have served buildings prior to connection to municipal water, particularly in areas outside of subdivisions. Where that investigation cannot verify the absence of wells, a FOIA to the City, survey, and/or inspection of the properties, as appropriate, must be conducted in an effort to determine if wells exist. An example of the basis for this request is the DEQ staff review that identified several

homes that PLS did not initially consider and where information indicates unplugged wells may exist. These homes are either outside of subdivisions or were built before Assessor's Plats No. 4 and No. 12 were platted (Arborview, Jackson, Newport, Penncraft, and Pine Ridge). The DEQ has added these addresses to Table 1, where they are identified in the "PLS Comments" field as "not included". The table included with Mr. Fotouhi's February 23, 2007 e-mail note included several addresses on Newport that we did not find reference to in previous reports. Additional information is needed before the DEQ can determine if the absence of wells at these properties can be verified. A thorough review of areas within the PZ and outside of subdivisions is needed to identify other properties that may have once been served by wells.

Private Water Supply Well Identification and Plugging

Any private water supply wells identified within the PZ must be properly plugged, to ensure the integrity of the selected remedy, regardless of whether they are still in use, unless the DEQ approves an exception as allowed for in the PZ Order. PLS indicates in the Report that it does not believe the PZ Order requires PLS to plug wells that are not currently in use; however, no such exception is provided in the PZ Order. Despite this assertion, PLS has plugged some of these wells. There are several additional locations where available information indicates that the properties were served by wells in the past, where PLS believes it has completed the steps in the Work Plan and does not need to take any additional actions. The DEQ's conditional approval of the Work Plan indicated that all wells found within the PZ must be properly plugged, whether or not they are still in use.

Notices Where Unused Wells Cannot be Located

As discussed above, neither the DEQ nor PLS contemplated that unused wells would not be found, or what steps would be required in such cases. Based on the inconclusive information at some locations regarding the existence of wells, the DEQ will require PLS to provide notification to specific property owners within the PZ where wells were known to exist, but cannot be found and plugged, or where the absence of wells cannot be verified. The DEQ initially requested such notice in its letter dated October 30, 2006. PLS's response in the Report indicated that the well identification process, the existence of the PZ, and the restriction on installation of wells in the PZ provided adequate protection. Therefore, PLS has declined to provide any notices. The DEQ disagrees with this assertion and believes that Part 201 of the NREPA² is instructive in this situation.

Section 20120b(5) of NREPA provides for an institutional control to be used to restrict the use of groundwater in cases where restrictive covenants are considered to be impractical³. A local ordinance is the primary mechanism for establishing an institutional control in such cases, where large numbers of parcels are impacted. In the absence of restrictive covenants or a local ordinance, the Court entered the PZ Order because it was believed to be as protective as other institutional controls. However, it is only protective if adequate notice is provided to ensure that the intent of the restrictions are known, and can, therefore, be observed. For the reasons stated above, the PZ Order cannot reliably restrict the use of groundwater if specific property owners are not informed that the use of any wells that remain is prohibited.

² Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended, and the Part 201 Administrative Rules.

³ A restrictive covenant is the preferred method for restricting the use of groundwater because it is established with the agreement of the current owner, and becomes part of the property title record that is routinely provided to subsequent property owners, thereby increasing the long-term reliability of the remedy.

It is DEQ's standard practice when local ordinances serve as institutional controls to require that all owners of parcels of land included in the use restriction area be notified of the proposed groundwater use restriction by the party proposing the restriction. Enclosed for your reference is the DEQ's current guidance dated June 8, 2006. The guidance was established to ensure the reliability of a remedy that requires that use of groundwater be restricted to protect public health, and it is referred to here to demonstrate that this obligation is consistent with the DEQ requirements of other parties that choose to rely on institutional controls to reliably restrict exposure to unacceptable concentrations of hazardous substances. Therefore, the DEQ will require these additional notices. Based on the circumstances in this case, the DEQ will require notices for only a small sub-set of the approximately 4,500 parcels that are impacted by the groundwater use restriction.

Upon completion of the tasks outlined above, it is expected that there will be several parcels where known wells cannot be located or it is not possible to verify the presence or absence of a well where available information indicates the property may have once been served by a well. In those cases, PLS must provide the following notice to the property owners by certified mail: 1) a general description of the groundwater use restrictions and the well identification process, including the possibility that an unplugged well may exist on their property; 2) PLS's continuing obligation to plug any wells that are identified; 3) that the property owner must provide any information about the existence of wells to PLS or the DEQ; 4) the property owner's obligation to disclose the restrictions to prospective property owners pursuant to Section 20116(3) of the NREPA and 5) a copy of the PZ Order. PLS must then provide the DEQ with documentation of its efforts to determine the existence of wells on those properties and a copy of a mail return receipt or similar certification documenting that each property owner has received the notice described above.

Final Report

In response to PLS's first well identification report, dated February 28, 2006, the DEQ requested, by a letter dated April 18, 2006, that PLS "plot the subdivisions, with names, over the PZ map" (page 2). Figure 2 of the subsequent well identification report, dated May 19, 2006, is a PLS base map on which highlighters of various colors had been used to roughly identify the boundaries of subdivisions. The DEQ's July 17, 2006 response to that report indicated that figure is not detailed enough and made the following request: "This figure should be revised using the PZ map that shows individual parcels with an overlay of the subdivision plats." That letter also pointed out three areas that were not shown as being part of subdivisions, which PLS has subsequently investigated and where several homes were served, or likely to have been served, by wells prior to provision of municipal water. In spite of this initial omission, PLS's response to the DEQ's request, dated September 15, 2006, indicates that the DEQ's request ". . . goes beyond the scope of this project." The DEQ's October 30, 2006 response to that letter reiterated the need for PLS to prepare such a detailed map. PLS did not indicate in the November 28, 2006 Report whether or not it would comply with this request.

Because the PZ will be in effect for many years and more than 4,500 properties are affected, it is important that there be a convenient and accurate means by which the DEQ, PLS, local units of government, and individual property owners can easily determine the results of the well identification process regarding individual properties within the PZ.

The final report must include 1) a summary of the work performed and the rationale for not considering areas not reviewed in detail (e.g. subdivisions); 2) a detailed parcel map showing the names and boundaries of subdivisions where municipal water was required at the time of construction; and 3) an electronic spreadsheet that can be searched to determine which addresses have been reviewed and the outcome of that review. The map should also clearly

identify the City limits as of the date PLS relied on to determine that all developed properties within the city limits would have been provided with municipal water.

Table 1 Information

The brief explanation of the DEQ Comment Codes at the end of Table 1 is provided below, along with more detail on additional actions required by PLS.

Code	Brief Description	Additional DEQ Comments
a1	no further action; no evidence of a well	None
a2	no further action; well plugged	None
b	DEQ approved monitoring well	PLS indicates these wells are inaccessible for other uses; PLS will plug and submit well abandonment logs when no longer used for monitoring
c	DEQ will consider exception	if DEQ does not approve exception, must be plugged and well abandonment log submitted
d1	well known to exist; hooked up to city water	PLS must confirm each well is plugged and submit well abandonment log or other documentation; if well not found, document inspection and provide notice to the owner
d2	well used for drinking water	PLS is required to provide municipal water, plug wells and submit well abandonment logs (see details below for only two wells currently known to be in use for drinking water)
e	potential existence of water supply well not eliminated	PLS must use available resources to determine if wells exist; follow Code d1 if there is evidence of a well, or if the absence of wells cannot be verified (additional explanation provided below)

As discussed above, PLS questions the City's interpretation that the date a water meter was installed indicates that was when connection to the municipal water supply was first provided. The DEQ agrees that more research on this issue is warranted. The DEQ reviewed the date a house was built relative to the tap date to determine if water may have originally been supplied by a well. In cases where the tap date is more than one year after the house was built, it is likely the house was originally served by a well. However, in cases where the tap date is within a year of the date a house was built, it is possible the house was not occupied until after the tap date. We recognize that these records may not be precise, however, if PLS is not able to verify the absence of wells, notice must be provided, as discussed on page 4.

In regards to the water supply wells in use at 685 and 697 South Wagner Road, in these cases the DEQ will not require immediate provision of municipal water. The DEQ is using enforcement discretion at this time because 1,4-dioxane has not been detected in these wells for over 20 years, and the owners do not want to be annexed into the City, as would be required if they were connected. PLS must monitor these wells annually and send the results to the property owners with an offer to provide connection to municipal water and to plug the wells if the owner makes that request. The DEQ may revise this position if 1,4-dioxane is detected in either well, or based upon other circumstances. If the well at either of these two houses fails, PLS will be required to provide municipal water.

PLS's research indicates all subdivisions reviewed were supplied with municipal water when developed. City ordinances also required connection to the municipal water supply starting in 1945, unless municipal water was not available. Homes built outside of subdivisions before 1945 would not have been required to connect to municipal water. Homes built outside of

subdivisions in 1945 or after may have originally had wells, if municipal water was not available. In addition, many of these homes may have been outside of the City limits when built, so City ordinances would not have applied. PLS did not propose to survey several addresses where homes were built outside of subdivisions, before or after 1945, nor was any information provided about whether these homes were within the City limits when built, or if municipal water was available when they were built. These addresses are included in Table 1 with a DEQ Comment Code of "e", along with several others outside of subdivisions that the DEQ staff identified that were not included in any PLS reports.

Conclusion

PLS's obligations under the PZ Order are clear, it must take steps to protect the public from unacceptable exposures to 1,4-dioxane, and this obligation will continue for the duration of the remedy, of which the PZ is an integral part. The DEQ believes that PLS must complete the following tasks and submit a final report to ensure the PZ is protective of the public health, safety, and welfare:

1. Produce a detailed map as discussed above, and identify any developed parcels outside of the identified subdivisions for further investigation.
2. Survey property owners and/or review City records to identify or verify the absence of wells at addresses identified with a "DEQ Comment Code" of "e", and any additional properties identified in #1, above.
3. Inspect all properties that were once served by water supply wells in an effort to locate those wells and provide documentation of those efforts to the DEQ.
4. Locate, sample, analyze for 1,4-dioxane, and plug any wells found or request exceptions if applicable. Provide municipal water as needed.
5. Provide written notice of the restrictions and other relevant information where former wells cannot be found and also where the absence of wells cannot be verified.
6. Provide documentation to the DEQ that the required notice has been provided to the property owner.
7. Provide a final report with a detailed map and a complete list of the addresses that were considered, including up to date information about the well investigation at each address, in a format similar to Table 1.
8. Follow-up reporting on any additional wells in subsequent Quarterly Reports.

Please provide PLS's written commitment to comply with these requirements by August 21, 2008, including a schedule. The DEQ believes these requirements are reasonable and necessary to carry out the goals of the PZ Order. If PLS does not commit to performing the required actions by August 21, 2008, the DEQ will coordinate with the office of the Department of Attorney General to take appropriate action to ensure their performance.

We are not responding to any information provided regarding possible expansion of the PZ at this time. Please contact me if you have any questions.

Sincerely,

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517-780-7937

Mr. Farsad Fotouhi
Mr. Alan D. Wasserman
Mr. Michael L. Caldwell

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July 21, 2008

Enclosures

SK/KJ

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Mr. Richard Fleece, Washtenaw County
Ms. Celeste Gill, Department of Attorney General
Ms. Lynelle Marolf, DEQ
Mr. Stephen Cunningham, DEQ
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