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DEPARTMENT OF ENVIRONMENTAL QUALITY
JACKSON DISTRICT OFFICE

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VIA ELECTRONIC and US MAIL

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Dear Sirs:

SUBJECT: Gelman Sciences, Inc. Remedial Action
Comprehensive Proposal to Modify Cleanup Program, dated May 4, 2009
Evergreen Plan for Verifying Protectiveness of Proposed Remedial Modifications, dated June 3, 2009
Amended Comprehensive Monitoring Plan, dated June 3, 2009

In 1992, a Consent Judgment was entered between the State of Michigan and Gelman Sciences, Inc., to address the area wide 1,4-dioxane contamination related to the former Gelman Sciences facility located at 600 S. Wagner Road in Scio Township, Michigan. After continuing investigations determined that the extent of the 1,4-dioxane contamination was more widespread than originally understood, the Washtenaw County Circuit Court (Court) supplemented the remedial objectives of the Consent Judgment through a series of orders with varying remedial objectives. Last year, the Department of Environmental Quality (DEQ) and Pall Life Sciences, Inc. (PLS) began discussing the possibility of modifying the remedial objectives of the existing Consent Judgment, based on the improved understanding of the area wide 1,4-dioxane contamination and with the hope of providing a more cohesive remedial approach that is protective of public health, safety, welfare and the environment.

On May 4, 2009, PLS submitted its Comprehensive Proposal to Modify Cleanup Program (PLS Proposal), dated May 4, 2009, which was supplemented by the Evergreen Plan for Verifying Protectiveness of Proposed Remedial Modifications (Evergreen Plan), dated June 3, 2009, and the Amended Comprehensive Groundwater Monitoring Plan (Amended CGMP), dated June 2, 2009. The Amended CGMP replaced an earlier version of the CGMP submitted with the PLS Proposal. As mandated by the Court's schedule, the DEQ is providing the following response to those submittals today and has attempted to provide as detailed a response as possible, including the basis for all of our comments. However, the DEQ wishes to reserve the right to supplement its response, due to the limited amount of time allowed for this crucial review. This response is focused on Section V of the PLS Proposal, Proposed Modifications to Remedial Program.

Because the PLS Proposal, as supplemented, came about because of discussions to possibly modify the existing Consent Judgment, the DEQ notes that Section XXIV of the Consent Judgment provides that it can be modified upon mutual consent of the parties and the approval of the Court. We further note that, pursuant to Section 20102a of Part 201, Environmental

Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA

451, as amended (NREPA), PLS, as a person implementing response activity pursuant to a legally enforceable agreement, can request, and the department shall approve, changes in a plan for response activity as long as those changes are consistent with Sections 20118 and 20120a of the NREPA, MCL 324.20118 and MCL 324.20120a. Therefore, the DEQ reviewed the PLS Proposal for consistency with the applicable sections of Part 201 and the Part 201 Administrative Rules (Part 201 Rules). Based upon our analysis, which is detailed below, we find that the proposed modifications as requested by PLS are not consistent with Sections 20118, 20120a of the NREPA, and the Part 201 Rules, and thus we must deny the request for proposed modifications.

Some of the deficiencies are significant and rise to the level of being "fatal flaws." These include the fact that there is an inadequate definition of the current extent of groundwater contamination to support a decision that the proposed remedy is protective; the proposed groundwater monitoring plan is wholly inadequate to satisfy the overall objective of protecting the public health, safety and welfare, and the environment; and no rationale is provided to demonstrate that the proposed modification west of Wagner Road is feasible.

Throughout the rest of this letter, references to "groundwater contamination" mean 1,4-dioxane in groundwater above the current generic residential cleanup criterion (GRCC), which is 85 parts per billion (ppb). The GRCC for 1,4-dioxane in groundwater is also considered to be the drinking water criterion (DWC) for 1,4-dioxane.

The DEQ has organized its response to correspond to the outline used in the PLS Proposal. For consistency, this letter uses PLS's terminology, which describes the numbered items as "elements." For ease of review, the DEQ's comments on specific provisions of the PLS Proposal follow the DEQ's summary of each element. Additional concluding comments are provided for each of the areas (Western and Eastern).

A. WESTERN AREA

A1. PLS - Mass Reduction: PLS proposes to operate nine extraction wells at a total of 612 gallons per minute (gpm) for mass reduction.

DEQ Comments, A.1:

While the DEQ agrees that this element of the PLS Proposal would result in mass reduction, the DEQ cannot formulate a judgment about whether the proposed mass reduction would be as effective at achieving remedial objectives than the current extraction program because PLS did not provide a comparison of the proposed mass removal to the current program.

A2. PLS - Clear and Enforceable Cleanup Objectives:
A5. PLS - Termination Criteria:

DEQ Comments, A2 and A5:

Because these two elements include similar sub-paragraphs and due to the inter-relationship of the sub-paragraphs, the DEQ is combining its response to all of these elements, below.

2.a. PLS - Containment: PLS proposes to contain areas impacted by 1,4-dioxane of 85 ppb or greater, except migration above 85 ppb east of Wagner Road, into the Prohibition Zone (PZ).

5.a. PLS - DWC Containment Objective: PLS proposes to continue operating the "...Western Area extraction wells deemed necessary to prevent the areas impacted by contaminant concentrations of above DWC from expanding in directions that do not lead to the Prohibition Zone until PLS can establish that groundwater extraction is no longer necessary to prevent such expansion." This would be followed by long-term monitoring.

2.b. PLS - Mass Removal: PLS proposes to operate the mass reduction wells until they are no longer productive in terms of removing mass and lowering concentrations .

5.b. PLS - Mass Removal Objective: PLS proposes to continue operating "...individual extraction wells for mass removal purposes until contaminant concentrations in the well fall below 500 ppb. Once the concentration of an extraction well falls below 500 ppb, PLS will evaluate whether the well can be operated effectively (i.e., with concentrations above 500 ppb) at a lower extraction rate."

DEQ Comments, A.2 and A.5:
The DEQ does not believe containment as a termination criterion is a clear and enforceable objective as proposed by PLS. The DEQ does not believe the details of the mass removal objective described in the PLS Proposal provide a clear and enforceable termination criterion. Specifically:

- PLS has not provided any rationale for the selection of a termination criterion of 500 ppb for 1,4-dioxane.
- No information is provided about how PLS intends to evaluate the effectiveness of mass reduction from the selected wells. Based on previous mass balance estimates done by PLS, there are still areas of high concentration of 1,4-dioxane west of Wagner Road, despite the fact that PLS has removed more mass since 2000, than PLS estimated existed in 2000.
- For the following reasons, the DEQ does not believe that the termination criterion for 1,4-dioxane of 500 ppb for extraction wells is appropriate or reasonable: 1) 1,4-dioxane is totally soluble in groundwater and does not naturally attenuate in groundwater; 2) the current mass of 1,4-dioxane is unknown and PLS does not propose to quantify the mass of 1,4-dioxane that would be removed or would remain when extraction is proposed for termination; 3) groundwater contamination migrated to the west and northwest prior to any extraction and those migration pathways are expected to resume upon termination of extraction; 4) there is a very limited understanding of the sources of the remaining groundwater contamination (e.g. 24,754 ppb in MW-5d, April 2009); and 5) there is a very limited understanding of the number and location of connections between the various "units," particularly the shallower Unit C_3 and Unit D_2 plumes with the deeper Unit E plume. As indicated in the enclosed interoffice communication from Mr. James Coger, dated June 15, 2009, the DEQ is not satisfied that the current extent of contamination west of Wagner Road is adequately defined for the purpose of approving the PLS Proposal as it is currently formulated. Prior to being able to approve some revised version of the PLS Proposal for the Western Area, the DEQ would require additional investigation to define the horizontal and vertical extent of contamination west of Wagner Road, and quantification of the mass removal objective.
- PLS does not propose to analyze, investigate, quantify, remove or otherwise address the remaining sources of high concentrations of 1,4-dioxane that remain in soils and

groundwater. In order to be consistent with Section 20118(8) of the NREPA, an analysis of source control measures already implemented or proposed must be provided.

A3. PLS - Increased Wagner Road Extraction: PLS proposes to install an additional extraction well at Wagner Road to reduce the mass of contaminants migrating east of Wagner Road, and also proposes to eliminate the objective to prevent groundwater contamination in the Unit E aquifer from migrating east of Wagner Road. PLS indicates there would be no environmental benefit from meeting that objective.

DEQ Comments, A3:
The DEQ agrees that an extraction well should be installed at this location, where the concentration of 1,4-dioxane in MW-94s has exceeded 2,500 ppb, except on a few occasions, since it was installed in January 2005. In fact, the DEQ suggested that PLS consider an extraction well at this location in a letter dated March 7. 2006. The DEQ believes there is a compelling case for containing all 1,4-dioxane above the GRCC for groundwater from migrating east of Wagner Road, particularly in the vicinity of MW-94s, where groundwater contamination is understood to be migrating toward the Evergreen Subdivision area. The uncertainty about the fate of contamination migrating east and northeast of Wagner Road, and the limited ability to extract, treat, and discharge any contamination that may migrate beyond the current or proposed PZ boundary, places more importance on the need to control the contamination at its source. When evaluating this aspect of the PLS Proposal against the criteria in Rule 603(1)(b), the DEQ considers the uncertainty associated with the fate of groundwater contamination that would migrate east and northeast of Wagner Road to be unacceptable.

The risks and uncertainties associated with allowing continued migration of contamination east of Wagner Road make it appropriate to maintain an objective for intercepting the Unit E plume, and extending that objective to all plumes at Wagner Road. Such action would provide significant benefit to the public health, safety, and welfare, and the environment. However, particularly for the area south of the capture zone of TW-18, the DEQ would consider an objective of containing 1,4-dioxane at a concentration greater than the GRCC, but less than 500 ppb, at Wagner Road. Such a decision would depend upon a more complete understanding of the fate of any groundwater contamination migrating into the PZ.

A4. PLS - Performance Monitoring: PLS proposes to reduce the number of sampling locations, and the frequency of sampling at many monitoring wells (MW), upon approval of the PLS Proposal, as detailed in its Comprehensive Groundwater Monitoring Plan (CGMP), received with the May 4, 2009, PLS Proposal. PLS submitted an Amended CGMP on June 3, 2009.

DEQ Comments, A4:
The DEQ has not been able to thoroughly review the Amended CGMP in the eight working days since it was received. However, even though there are some increases in monitoring frequencies compared to the May 4, 2009 version, the DEQ notes significant reductions in sampling locations and frequencies from the current schedule. Any significant reductions in monitoring cannot be considered until at least one year of data has been collected at the current locations and frequencies, to ensure that any unexpected responses to the reduced extraction are detected before unintended consequences occur. The DEQ does not believe a significant reduction in monitoring, concurrent with the implementation of the PLS Proposal, would be protective of the public health, safety, welfare, or the environment.

PLS does not propose to extract from TW-2, which is on the east side of Wagner Road and currently has a minimum extraction rate of 50 gpm. Although TW-2 is in the Eastern Area, there is no mention of it in that section of the PLS Proposal, and the DEQ believes it is appropriate to consider it as part of the Western Area, because of its ability reduce the migration of groundwater contamination further east into the PZ. The concentration of 1,4-dioxane in MW-15d (just downgradient of TW-2) has decreased significantly since extraction from TW-2 began (5,400 ppb in December 1993 to 1 ppb in July 2008). This concentration could increase if extraction from TW-2 is terminated, especially considering the concentration of 1,4-dioxane in MW-105s (1,781 ppb in April 2009), just upgradient of TW-2, and screened at an elevation similar to TW-2 and MW-15d. PLS proposes to maintain sampling of MW-15d annually and reduce the sampling frequency of MW-105s from quarterly to annually. As stated above, the DEQ's review of the Amended CGMP is not complete; however, if the DEQ agreed that extraction from TW-2 could be terminated as part of any revised proposal for the Western Area, a quarterly sampling frequency for MW-15d and MW-105s would be required.

To be consistent with Section 20118(10) of the NREPA, PLS must submit a groundwater monitoring plan that includes, among other things, information addressed by R 299.5540(2)(a) to (n)[1] of the Michigan administrative code, and identification of points of compliance for judging the effectiveness of the remedial action.

In order to monitor a revised remediation plan goal on the west side of Wagner Road, as stated (i.e. to prevent the areas impacted by contaminant concentrations of 85 ppb or greater from expanding in directions that do not lead to the PZ) it is first necessary to assure that the current extent of contamination at concentrations greater than 85 ppb throughout the saturated vertical thickness is understood, so that a sufficient monitoring network consistent with 20118(10) can be designed and employed to assure that the extent does not expand from the established baseline. Such an understanding is a minimum requirement in furtherance of the stated objective of establishing a clear and enforceable cleanup objective.

A6. PLS - Institutional Controls: PLS proposes to evaluate the extent of any areas where contaminant concentrations exceed 85 ppb prior to terminating active remediation. PLS would continue active remediation until restrictive covenants or other institutional controls are in place.

DEQ Comments, A6.:
PLS does not indicate that it intends to continue extraction from the Ann Arbor Cleaning Supply well in the Western System. Because results from this well continue to show 1,4-dioxane above the GRCC, restrictive covenants would be required on impacted properties, prior to termination of extraction, to prevent the use of groundwater, including an adequate buffer area. Otherwise, active remediation must continue until the GRCC is met in this area.

[1] The required contents of a monitoring plan are now contained in R 299.5540(2) which replaced R 299.5519(2) when R 299.5519(2) was rescinded in 2002.

The DEQ notes that there has been little change in PLS's interpretation of the extent of contamination in the Western Area since significant active remediation began in 1997[2]. Although concentrations within the plumes have decreased significantly since that time, the DEQ has no basis to believe, and PLS has not provided any technical basis to support its hypothesis, that the extent of contamination would decrease significantly over time with the proposed reduced extraction, based on the total solubility of 1,4-dioxane in water and the historical extent of the groundwater contamination.

Section 20120a(16) of the NREPA requires that a remedial action plan provide response activity to meet the residential categorical criteria, or provide for acceptable land use or resource use restrictions pursuant to Section 20120b of the NREPA. Because PLS is proposing to revise the cleanup plan, relying in whole or in part on cleanup criteria approved pursuant to Section 20120a(1)(f) to (j) or (2), land use or resource use restrictions to assure the effectiveness and integrity of the remedy must be described in a restrictive covenant, pursuant to Section 20120b(5). PLS also needs to provide documentation that the affected property owners, including those who own property in a reasonable buffer area, would consent to having restrictive covenants placed on their properties prior to the DEQ approving the termination of extraction. A revised proposal must contain a schedule for placement of restrictive covenants in relation to the termination of extraction that affects various parcels.

<u>DEQ Concluding Comments on the Proposed Modifications for the Western Area</u>
The DEQ does agree that there are practical difficulties with the enforceability of the current objective of containment of 85 ppb in the Unit E plume at Wagner Road. These difficulties include the fact that it is not possible to distinguish between the Unit E and Unit D_2 plumes at all locations along Wagner Road, as well as the difficulty of monitoring the migration on the east side of Wagner Road due to wetland areas. However, due to the concerns expressed above about allowing significant concentrations to continue migrating east of Wagner Road, particularly in the area north of the capture zone of TW-18, the DEQ cannot agree to remove this objective entirely. Removing as much mass as possible prior to migration of contamination east of Wagner Road must be a primary objective of any proposed modifications to the cleanup objectives west of Wagner Road.

As outlined above, the DEQ does not believe the PLS Proposal provides enough detail for the DEQ to agree to the reduced extraction and revised cleanup objectives for the area west of Wagner Road. In conclusion, the DEQ is denying the proposed modifications to the cleanup objectives for the area west of Wagner Road based on the information currently available.

The DEQ believes it is critical to assure that any remedial plan for the site establishes clear and enforceable cleanup objectives. It then becomes critical to establish a performance monitoring plan capable of monitoring compliance with the stated objective, and establishing a contingency plan to address the possibility of unanticipated expansion.

Prior to the DEQ being able to approve PLS's proposed modifications west of Wagner Road, the DEQ has identified the items listed below as minimally necessary; however, the DEQ is willing to discuss other options that could address the DEQ's concerns. The DEQ will be able to

[2] It is true the PLS's depiction of the Western System has decreased significantly; however, this is due to PLS's revised interpretation of plume extent and dilution of the Western Plume (Unit D_0) as it migrated to the west and discharged into the Honey Creek Tributary, not to any significant extent due to extraction from wells west of Wagner Road.

provide additional detail regarding these items when staff has been able to fully assess the PLS Proposal, the Evergreen Plan, and the Amended CGMW. At a minimum, PLS needs to:

1. Any mass removal objective must include new mass estimates, to be updated annually, and annual mass removal benchmarks.

2. A termination criterion based on leaving a concentration of 1,4-dioxane in the environment greater than 85 ppb must be based on plausible technical rationale that lead to the conclusion that there will not be an expansion of the extent of groundwater contamination greater than 85 ppb in order for the termination criterion to be clear and enforceable.

3. At least one additional extraction well must be installed near Wagner Road, in the vicinity of MW-94s. Any revised version of the PLS Proposal for the Western Area must include installation of this extraction well as one of the first scheduled actions.

4. A robust performance monitoring plan with explicit points of compliance predicated on anticipated plume behavior, capable of assessing the groundwater conditions in this complex hydrogeological environment, must be designed and implemented. A realistic, feasible and implementable contingency plan must also be provided to address any detected expansion of groundwater contamination.

5. A6 - Continue extraction from the Ann Arbor Cleaning Supply well or obtain restrictive covenants on impacted properties to prevent the use of groundwater, including an adequate buffer area.

6. Provide a schedule for placement of restrictive covenants in relation to the termination of extraction that affects various parcels.

B. EASTERN AREA

B1. PLS - Elimination of Drinking Water Pathway by Expansion of Prohibition Zone: PLS proposes to apply measures currently in place for the existing PZ to the expanded area, as depicted in Figure 4 of the PLS Proposal.

DEQ Comments, B1:
PLS does not provide an explanation of its proposed boundary for the area of the proposed expansion. An obvious inadequacy in the proposed expansion is the failure to include the triangle of land north of Dexter Road and southeast of M-14. This area is within 700 feet of 465 Dupont Circle, where concentrations of 1,4-dioxane have been increasing and were at 1,284 ppb in May 2009. The existence of the newly installed MW-121s and MW-121d, where results from 2009 have been non-detect, is not sufficient to ensure the long-term protection of this property from migrating contamination. It is the DEQ's understanding that the property north of Dexter Road and southeast of M-14 does not currently have access to municipal water and any water supply well on that property would be threatened with contamination. When evaluating this aspect of the PLS Proposal against the criteria in Rule 603(1)(b), the DEQ considers this uncertainty to be unacceptable.

In the PLS Proposal, PLS states that it will approach the well identification process consistent with the Court's May 17, 2005 Order Prohibiting Groundwater Use (PZ Order). The DEQ notes that PLS has not yet completed the well identification process for the existing PZ, forcing the State to file a Motion to Enforce the PZ Order on June 5, 2009. The DEQ will not approve the proposed PZ expansion until this issue is resolved. PLS's failure to complete the requirements imposed four years ago for the initial PZ demonstrates that an expanded PZ cannot be considered a reliable risk management measure until this issue is resolved.

B2. PLS - Unified 2,800 ppb Containment Cleanup Objective: PLS proposes to eliminate the cleanup objective for the Evergreen System to capture the leading edge of groundwater contamination. PLS states that the groundwater contamination in the Evergreen Subdivision would migrate east, staying within the proposed expansion of the PZ and the existing PZ.

DEQ Comments, B2:
The DEQ does not believe the investigation of groundwater flow northeast of the LB extraction wells has been adequate to conclude that there will be no migration of contamination greater than 85 ppb outside of the proposed PZ expansion with the proposed reduction in extraction rates. The DEQ's analysis of the potentiometric surface map and data provided to the DEQ by PLS on June 2 and June 3, 2009 (supplementing PLS's March 2009 submittal of *Report on Water Level Testing Under Reduced Flow Conditions)*, is provided in the enclosed interoffice communication from Mr. Richard Mandle, dated June 15, 2009. As discussed in Mr. Mandle's analysis of the information obtained from the recent installation of MW-123s and MW-123d, the information produced by PLS's recent work is insufficient and, as a result, the DEQ is still unable to conclude that a decrease of extraction from the Evergreen area extraction wells (LB-1, LB-3 and AE-3) will not result in migration of groundwater contamination outside of the proposed PZ expansion. The DEQ provided its response to PLS's March 2009 submittal on April 27, 2009.

PLS's most recent capture zone analysis for the Evergreen area extraction wells, dated April 29, 2008, indicates that the leading edge of contamination is captured with LB-1 operating at 95 gpm, LB-3 at 90 gpm, and AE-3 at 15 gpm. The DEQ's review of that submittal, provided to PLS in an interoffice communication from Mr. Mandle dated June 19, 2008, indicated that the DEQ does not believe the existing extraction wells (LB-1, LB-3, and AE-3) are capturing all of the groundwater contamination migrating toward them. However, the DEQ has not yet asserted that PLS is not meeting the current objective of capturing the leading edge of groundwater contamination in the Evergreen Subdivision area, in part because the entire vertical and horizontal extent of groundwater contamination that must be captured is not defined. Although PLS has discounted the DEQ's concerns, PLS does acknowledge that a reduction in extraction will allow some of the groundwater contamination to escape capture.

The DEQ will require, among other things, additional investigation, as described by Mr. Coger in the enclosed interoffice communication, dated June 15, 2009, before it can consider changing the current objective for the Evergreen System. Comments regarding inadequacies of the monitoring are included below.

Upon review of Rule 603(1)(b), the DEQ considers the uncertainty that results from inadequate plume definition and lack of well defined and reliable predictions of the fate of groundwater contamination in the Evergreen Subdivision area to be unacceptable.

B3. PLS - Continued Evergreen Groundwater Extraction: PLS proposes to initially reduce the extraction rates at LB-1 from 100 to 75 gpm, at AE-3 from 15 to 0 gpm, and to maintain LB-3 at 75 gpm. PLS does not indicate how any future changes in extraction rates would be determined. PLS states that these extraction rates will prevent groundwater contamination from migrating outside of the proposed PZ expansion.

DEQ Comments, B3:
The DEQ restates its concern about the potential for groundwater contamination to migrate outside of the proposed PZ expansion with the proposed reduction in extraction. PLS does not address any further reduction in these extraction rates; however, other portions of the PLS Proposal indicate further reductions are probable, which increase the DEQ's concern about the potential for groundwater contamination to migrate outside of the proposed PZ expansion. Upon review of Rule 603(1)(b), the DEQ considers the uncertainty about whether groundwater contamination will be contained in the proposed expanded PZ to be unacceptable.

B4. PLS Potential Installation of an Additional Extraction Well: PLS indicates that it will consider installation of a new extraction well near Rose and Valley at some undetermined time in the future, after the reduction in extraction discussed above. PLS indicates that if this well is installed, it could be connected to the existing pipelines. PLS also states that it "...believes that this area – where there does not appear to be a geologic barrier between the D_2 and the deeper Unit E aquifers – is near the source of the higher contaminant concentrations that have migrated toward the Dupont Circle area, where concentrations have risen over time. This area is also upgradient of the LB wells. It may prove advantageous to extract groundwater from this location to lower downgradient concentrations and to help control any potential expansion of the plume in the Dupont Circle area that might otherwise occur with the reduction of the LB extraction well purge rates."

DEQ Comments, B4:
The DEQ expects that PLS would further decrease the extraction from LB-1 and LB-3 if the proposed extraction well were installed, due to the limited capacity in the pipeline, as discussed under the DEQ's comments in the next sections.

The DEQ believes it is more accurate to refer to the potential high concentrations of 1.4-dioxane in the area of Rose and Valley as part of the migrating contamination, rather than as the source of contamination at 465 Dupont Circle. The DEQ agrees that the higher contamination migrating to the Dupont Circle area could be in the area of Rose and Valley; however, this has not been determined. An investigation of this migration pathway should begin as soon as possible, and must precede any reduction in extraction from the LB extraction wells. In addition to controlling contamination at or near the source on the PLS property, it may also be necessary to intercept it at or near the Dupont Circle area, to prevent its expansion outside of the capture zone of the LB extraction wells, or the proposed expansion of the PZ, if the PLS Proposal is implemented.

B5. PLS - Installation of Pipeline to Connect the Maple Road and Evergreen Systems: PLS proposes this pipeline to allow the transfer of contaminated groundwater extracted from the Maple Village Shopping Center (MVSC) to the pipeline in the Evergreen subdivision area for transfer back to the PLS property for treatment. This would allow PLS to terminate use of the reinjection wells in the MVSC that have had recurring problems accepting treated groundwater.

DEQ Comments, B5:
Before the DEQ can approve the use of the proposed pipeline, its concerns with other elements of the proposed modifications to the cleanup objectives east of Wagner Road must be addressed, especially if the proposed changes are intended to lead to a cohesive approach to the remediation of the groundwater contamination. This includes the requirement for a contingency to address the potential need for additional pipeline capacity to transport both treated and untreated groundwater.

B6. PLS - Maple Road Extraction Well: PLS proposes to continue using extraction well TW-19 in the MVSC at the current volume of about 50 gpm, "...to ensure that contaminant concentrations above 2,800 ppb do not migrate past Maple Road, and to remove mass, as appropriate."

DEQ Comments, B.6:
PLS's statement presumes that TW-19 is adequate to contain the entire width of the plume exceeding 2,800 ppb and does not specifically address the possibility that the extraction rate may need to be increased to meet this objective. As previously discussed between the parties, the DEQ does not believe the extent of the plume exceeding 2,800 ppb upgradient of Maple Road has been adequately characterized.

PLS does not indicate how it would prioritize the use of the limited pipeline capacity of 200 gpm between the Evergreen Subdivision area and the MVSC if additional extraction were required to contain 2,800 ppb of 1,4-dioxane at Maple Road. The DEQ believes that it is inappropriate to view the capacity limitation of the existing pipeline as a definitive limitation on the amount of groundwater than is withdrawn as part of the remedy – this capacity limitation cannot drive the remedy. Instead, the remedy must be designed to reliably meet risk-based objectives and, if necessary, other means for disposing of contaminated groundwater must be implemented.

In addition, there is a pending dispute between PLS and the DEQ regarding the need for a third performance monitoring well nest in Veterans Park to determine compliance with the current and proposed continuation of the objective to contain 2,800 ppb of 1,4-dioxane at Maple Road. The DEQ believes it is appropriate to continue operating TW-19 at a minimum of 50 gpm; however, an implementable contingency plan would be required to address the need for increased extraction, and the associated need for additional treatment and discharge capacity.

The inadequate characterization of groundwater contamination upgradient of Maple Road, the inadequate performance monitoring network, and the lack of a contingency plan to address the potential need to extract, treat and discharge additional volumes of water increases the uncertainty associated with, and decreases the reliability of, the PLS Proposal. Upon review of Rule 603(1)(a) and (b), the DEQ considers this uncertainty to be unacceptable.

B7. PLS - Downgradient Monitoring: PLS proposes to continue monitoring the migration of the plume to ensure that it does not move outside of the PZ and refers to the CGMP, which was amended on June 2, 2009.

DEQ Comments, B7:
As stated in response to PLS's Performance Monitoring Section for the Western Area (B4.), the DEQ has not had sufficient time to fully review the Amended CGMP. The Amended CGMP does not appear to address the installation of any additional MWs other than the three proposed

in the Evergreen subdivision area. The DEQ anticipates that it will be necessary for PLS to install additional MWs to track the migration of the plume within the PZ and to ensure that any migration of the plume toward the PZ boundaries is detected in time to allow appropriate response actions to be taken before the plume reaches the PZ boundary.

To be consistent with Section 20118(10) of the NREPA, PLS must submit a groundwater monitoring plan that includes, among other things, information called for by R299.5540(2)(a) to (n) of the Michigan Administrative Code, and identification of points of compliance for judging the effectiveness of the remedial action.

B8 PLS - Termination Criteria:

a. The PLS Proposal States: "GSI Containment Objective. PLS will operate TW-19 as needed to meet this objective until all approved monitoring wells upgradient of Maple Road are below the GSI [groundwater/surface water interface] criterion *or* PLS can establish that additional purging is no longer necessary to satisfy the containment objective at this location. Long-term monitoring will be implemented as provided in the Consent Judgment."

DEQ Comments, B8.a:
PLS does not explain how it would establish that it is appropriate to terminate purging when concentrations of 1,4-dioxane greater than the GSI criterion (currently 2,800 ppb) remain in groundwater upgradient of Maple Road. Such information would be required prior to termination and be subject to DEQ approval. Additional MWs may be required upgradient of Maple Road to fully assess the extent of 1,4-dioxane in groundwater greater than the GSI criterion.

b. The PLS Proposal states: "Prohibition Zone Containment Objective. PLS will continue to monitor the plume above the DWC as it migrates to the Huron River until all approved monitoring wells upgradient of the Huron River are below the DWC, *or* PLS can establish that continued monitoring is not necessary to satisfy the Prohibition Zone containment objective."

DEQ Comments, B8.b:
The PLS Proposal provides no information as to how PLS would establish that groundwater monitoring is no longer needed when groundwater contamination remains within the PZ and upgradient of the Huron River. The DEQ's approval would be required prior to the termination of monitoring. The DEQ anticipates it will be many decades before monitoring could be completely terminated and that such determination would be based on a rigorous review of trends of groundwater contamination throughout the PZ. It is unlikely that the DEQ would approve termination of monitoring in areas where the concentration of 1,4-dioxane in groundwater significantly exceeds the GRCC or in areas where such contamination could migrate.

DEQ Concluding Comments on the Proposed Modifications for the Eastern Area
The PLS Proposal does not discuss the fact that PLS's current ability to extract and transfer groundwater back to the PLS property for treatment and discharge is limited to the capacity of the deep pipeline. This four-inch pipeline, which PLS indicates has a maximum capacity of 200 gpm, was installed inside of the former North Horizontal Well when the original six-inch transmission line failed in 2005. PLS has provided no information to the DEQ regarding the expected life of the existing pipeline. The DEQ does not accept PLS's apparent premise that the capacity limitation of the current pipeline serves as a limit to the volume of contaminated

groundwater that should and can be extracted, treated and discharged to comply with PLS's current or future remedial obligations.

The PLS Proposal for the area east of Wagner Road does not address the fact that the surface water human drinking water value (HDV) for 1,4-dioxane of 34 ppb would become the relevant criterion if conditions change such that 1,4-dioxane in groundwater is reasonably expected to vent to surface water in concentrations that exceed the generic GSI criteria. This criterion would apply at the groundwater/surface water interface in proximity to a water supply intake in inland surface waters. This criterion is established in Section 20118(2)(b) of the NREPA and Rule 299.5716 of the Part 201 Rules, and is relevant to the city of Ann Arbor's (City) water supply intake at the east end of Barton Pond. The potential impact on the City's water supply of such migration requires that this threat be addressed by any proposal to eliminate the objective to capture the leading edge of groundwater contamination in the Evergreen Subdivision area. This requirement is discussed below.

The DEQ does not believe any further expansion of the PZ beyond that contained in the PLS Proposal should be allowed for the following reasons:

- Much of the area north of highway M-14 relies on individual water supply wells for drinking water. Considerable expense and disruption of neighborhoods would result if groundwater contamination migrated toward or into these areas, due to either response actions or installation of a municipal water supply that would be required to ensure a safe drinking water supply.
- The HDV criterion discussed above is significantly more restrictive than the GRCC and the DEQ considers it critical to protect the City's water supply intake at Barton Pond.

The Evergreen Plan is specific to the proposed modifications for the Eastern Area in the PLS Proposal. The Evergreen Plan and the Amended CGMP propose the installation of three additional MW nests to address concerns about the potential migration of groundwater contamination to the northeast, outside of the proposed PZ expansion. PLS would agree to install these MWs after DEQ approval of the PLS Proposal. As indicated in response to element B2, additional investigation in this area is required, among other items, before the DEQ could consider approving the PLS Proposal. However, the DEQ agrees that the proposed MWs would assist in answering the DEQ's concerns.

The Evergreen Plan also provides for additional investigation if northern PZ boundary MWs are confirmed to contain 1,4-dioxane in excess of 20 ppb. The DEQ believes that this could serve as a starting point for the contingency plan to prevent further migration of groundwater contamination beyond the proposed expansion of the PZ, as discussed below. However, as discussed above, the DEQ does not believe it is appropriate to plan for additional expansion of the PZ boundary to the northeast, due to the threat to water supply wells and the City's water supply intake at Barton Pond.

As outlined above, the DEQ believes additional investigation and detail are needed prior to being able to consider approving the proposed modifications for the area east of Wagner Road. In conclusion, the DEQ is denying the proposed modifications to the cleanup objectives for the area east of Wagner Road based on the information currently available. The DEQ's concerns about continued migration of groundwater contamination west of Wagner, as discussed in the DEQ's comments on PLS's Proposal for the Western Area, would also have to be addressed as part of any revision to the Eastern Area to address the DEQ's comments.

Prior to the DEQ being able to approve PLS's proposed modifications east of Wagner Road, the DEQ has identified the items listed below as minimally necessary; however, the DEQ is willing to discuss other options that could address the DEQ's concerns. The DEQ will be able to provide additional detail regarding these items when staff has been able to fully assess the PLS Proposal, the Evergreen Plan, and the Amended CGMW. At a minimum, PLS needs to:

1. Provide a contingency plan to prevent any migration of groundwater contamination beyond the proposed expansion of the PZ, including the triangle of land discussed in the DEQ's comments in response to B.1.
2. Perform the well identification process in the expanded PZ in the same manner as required by the DEQ for the original PZ.
3. Perform additional investigation in the area of the proposed PZ expansion as described in Mr. Coger's June 15, 2009 Interoffice Communication.
4. Perform a remedial investigation to determine the migration pathway of groundwater contamination upgradient of the Dupont Circle area to address the DEQ's concerns as discussed in response to B4.
5. Provide an implementable contingency plan for additional treatment and discharge of contaminated groundwater to address the potential need for additional extraction that would be required to:
    a. contain 1,4-dioxane contamination greater than 2,800 ppb from migrating east of Maple Road;
    b. prevent the migration of groundwater contamination beyond the proposed expansion of the PZ, as modified by the DEQ's comments in response to B.1;
    c. prevent the discharge of 1,4-dioxane greater than 34 ppb in proximity to the water supply intake at the east end of Barton Pond.
6. Install the third performance monitoring well in Veterans Park, in the vicinity of the PLS-07-09 boring.
7. Provide an adequate performance monitoring network and plan to monitor any migration of groundwater contamination outside of the existing and proposed expansion of the PZ.
8. Provide for the implementation of an enhanced performance monitoring network and plan in the event that the DEQ determines there is any threat to the drinking water supply intake at the east end of Barton Pond, where the HDV for 1,4-dioxane of 34 ppb would apply at the groundwater/surface water interface.
9. Provide a contingency plan to prevent the migration of groundwater contaminated with 1,4-dioxane greater than 34 ppb in proximity to the water supply intake at the east end of Barton Pond.
10. Agree that PLS will not request any further expansion of the PZ to the north of the proposed expansion of the PZ

Potential contingent discharge options to address item 5, above, could include:

- Construction of a new, larger pipeline from the Evergreen Subdivision area to the PLS property.
- Use of the storm sewer when there is adequate capacity (when not needed due to precipitation and thawing), subject to the authority of the City.

Conclusion

Due to the significant modifications that would be required to the Consent Judgment and related court orders if some revised version of the PLS Proposal were to be implemented, the DEQ would require that a legally enforceable agreement (as is required by MCL 324.20120b(3) for implementation of restricted cleanups similar to the PLS Proposal) be included in any

amendment to the Consent Judgment. The provisions of such an agreement include, but are not limited to reimbursement of the DEQ's oversight costs and provision of a financial assurance mechanism. The major reasons for these requirements are that implementation of the PLS Proposal would: 1) increase the uncertainty about the fate of contamination; 2) increase the potential for additional response actions to be necessary in the future to address unintended consequences; and 3) increase the length of long-term monitoring required. All of these factors increase the potential for additional costs to both the DEQ and PLS. PLS should bear the burden if any of these events occur as a result of implementation of the PLS Proposal, not the DEQ or the taxpayers of the State of Michigan.

In summary, the DEQ finds that the PLS Proposal is not as protective as the current remedial program required by the Consent Judgment and subsequent Court orders and increases the uncertainty about the fate of the groundwater contamination; therefore, the DEQ is unable to approve the PLS Proposal in its current form. We have scheduled a meeting to discuss these matters on June 22, 2009, at the PLS office.

Sincerely,

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SK/KJ
Enclosures
cc: Ms. Celeste Gill, Department of Attorney General
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Mr. Philip Schrantz, DEQ
Mr. Richard Mandle, DEQ
Mr. Mitchell Adelman, DEQ/Gelman File
Mr. James Coger, DEQ