

RESPONSIVENESS SUMMARY

Pall Life Sciences, Inc. NPDES Permit No. MI0048453

A Public Meeting and Public Hearing with the Michigan Department of Environmental Quality (DEQ) were held on September 13, 2005, at the Scio Township Hall in Ann Arbor to discuss and hear comments and objections regarding the draft National Pollutant Discharge Elimination System (NPDES) permit proposed for reissuance to Pall Life Sciences, Inc. (Pall), located at 600 South Wagner Road, Ann Arbor.

The public meeting began at 7:00 P.M., while the public hearing portion of the proceedings began at approximately 8:15 P.M. and ended at approximately 9:30 P.M. The public meeting/hearing was attended by twenty-three (23) people. Nine people provided statements during the hearing. Among the speakers was a representative of the City of Ann Arbor, a representative from the Washtenaw County Department of Planning and Environment, and several local citizens including some from the group called Scio Residents for Safe Water (SRSW). The hearing's primary issue was that of the new technology being used by Pall in their remediation activities, the ozone/hydrogen peroxide-based technology. All people providing statements maintained that the DEQ should require Pall to employ the previously utilized ultraviolet light/hydrogen peroxide-based technology in their groundwater remediation activities. In addition, most expressed concern regarding the effluent bromate concentrations created by the ozone/hydrogen peroxide-based technology.

As part of the public comment period, which lasted from August 12, 2005, through September 16, 2005, dozens of written statements were received, including statements from the City of Ann Arbor, the Washtenaw County Department of Environmental Health Regulation, the Ecology Center, and from local citizens.

A summary of the significant, relevant issues identified during the public hearing and in the written statements is contained herein. In preparing this summary, actual comment language may have been abbreviated, paraphrased, and/or edited for clarity. With respect to some issues, similar comments were combined into one comment.

1. Comments/Objections: **The increased concentrations and loading of bromate from Pall's discharge outfall that result from the change in the treatment technology utilized by Pall and authorized by the permit will negatively impact the City of Ann Arbor's drinking water intake, which is located downstream of Pall's outfall on Barton Pond.**

Response: In accordance with the procedures established in the State of Michigan's promulgated rules (i.e., Rule 57 of the Part 4 Rules, the Michigan Water Quality Standards), the DEQ has for the compound bromate derived a human cancer value for drinking water sources at the point of intake. This value is 0.5 micrograms per liter ($\mu\text{g/L}$) or 0.5 parts per billion (ppb). In accordance with the rule, this value is established based upon a risk associated dose at a level corresponding to an incremental cancer risk of 1 in 100,000 and the conservative exposure assumption that two (2) liters of the affected water source would be consumed per day.

The DEQ has performed a conservative analysis using the maximum permitted bromate concentration, the facility's maximum authorized effluent flow rate of 1.872 million gallons per day, and the appropriate design flows of the downstream water bodies to verify that the concentration of

bromate in Barton Pond at the point of water intake is less than 0.5 µg/L. Regarding appropriate design flows, Rule 90 of the Michigan Water Quality Standards states that “for human health values, the design flow is equal to the harmonic mean flow”, which in the case of the Huron River and Barton Pond is 220 cubic feet per second (cfs). Using these values in the determination of the bromate concentration at the point of intake at Barton Pond yields a concentration value of 0.13 µg/L, which is well within a level compliant with Water Quality Standards (approximately 25% of the standard of 0.5 µg/L).

2. **Comments/Objections: In some reaches of Honey Creek and its unnamed tributary, these water bodies are “losing streams” (i.e., stream flow vents from the stream channel bed to the groundwater). As a result, the increased concentrations and loading of bromate from Pall’s discharge outfall that result from the change in the treatment technology utilized by Pall and authorized by the permit will negatively impact the groundwater and exacerbate the potential for contamination of residential wells located in the vicinity of Honey Creek and its unnamed tributary.**

Response: Although there has been no confirmation that Honey Creek and its unnamed tributary are indeed losing streams, the DEQ has considered this possibility in determining the appropriate effluent limitations for bromate for inclusion in the reissued permit. The Remediation and Redevelopment Division of the Michigan Department of Environmental Quality is currently in the process of establishing Part 213 Tier 1 risk-based screening levels and Part 201 generic cleanup criteria for bromate. The drinking water criteria are being established as levels applicable to residential and commercial drinking water uses and are consistent with the State of Michigan’s drinking water standard for bromate in potable water sources. The bromate drinking water standard of 10 µg/l is contained in R 325.10610 of the administrative rules promulgated under the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, and became effective on January 29, 2003.

The effluent limitation for bromate contained in the reissued permit is 10 µg/L, which is equivalent to the drinking water standard’s MCL and the draft cleanup criteria. Following a discharge from Outfall 001 to the unnamed tributary of Honey Creek, Pall’s effluent mixes with any available flows in Honey Creek and the unnamed tributary. Should any subsequent loss from the stream beds to the groundwater occur, the effluent bromate concentrations are further diluted through mixing with the ambient groundwater. Therefore, any discharge of bromate in Pall’s effluent will not cause exceedances of standards in the groundwater, if a discharge to the groundwater does occur. In addition, water supply wells are required to be at least 25 feet deep. In the event that low concentrations of 1,4-dioxane or bromate infiltrate into the shallow groundwater, it is unlikely that any nearby wells would be impacted due to the depths of the wells.

3. Comments/Objections: **The DEQ should require Pall to utilize the best available treatment technology, the ultraviolet light (UV)/hydrogen peroxide-based technology, instead of the “new” ozone/hydrogen peroxide-based technology, because the performance of the UV/hydrogen peroxide-based technology is superior in that it provides lower average 1,4-dioxane concentrations without the creation of the increased concentrations of bromate.**

Response: The control through which the effluent quality resulting from this purge and treat remediation activity is established is through compliance with the applicable treatment technology-based effluent limitations and water quality-based effluent limitations. Regarding treatment technology-based effluent limitations, the applicable effluent limitations for 1,4-dioxane are established consistent with best available technology economically achievable (BAT) as defined in 40CFR, section 125.3. This federal definition of BAT does not specify use of a particular technology in achieving BAT-based effluent limitations. Rather, it is compliance with these effluent limitations that dictates what treatment technology the discharger may use.

There is no statutory or regulatory requirement that a specific treatment technology be used in achieving compliance with this permit's BAT-based effluent limitations for 1,4-dioxane. Further, it is important to note that these BAT-based effluent limitations for 1,4-dioxane are substantially more restrictive than water quality-based limitations for 1,4-dioxane.

Regarding the increased concentration of bromate resulting from use of the ozone/hydrogen peroxide-based technology, Rule 98 of the Michigan Water Quality Standards (i.e., R 323.1098) states with respect to any action or activity “that is anticipated to result in a new or increased loading of pollutants by any source to surface waters of the state” that “ except for outstanding state resource waters, or as the department may determine on a case-by-case basis that the application of the procedures in this rule are required to adequately protect water quality, the following do not constitute a lowering of water quality.....(c) response actions undertaken to alleviate a release into the environment of pollutants that may pose an imminent and substantial danger to the public health or welfare under any of the following:(iii) Part 201 of Act No. 451 of the Public Acts of 1994 as amended ...”. Pall's remediation activities are being conducted under Part 201, and the company has submitted a statement of exemption consistent with the requirements of the rule. Further, the permit will be reissued with the applicable water quality-based effluent limitations for bromate that are protective of all designated uses.

Regarding the performance of the two technologies with respect to the mineralization/oxidation of 1,4-dioxane and the resulting average 1,4-dioxane concentrations, the average concentration provided by the ozone/hydrogen peroxide-based technology from the period of start-up on March 22, 2005, through August 31, 2005, is 4.6 ppb. In contrast, although the UV/hydrogen peroxide-based technology had been utilized from the inception of the discharge on June 13, 1997, this technology did not provide average effluent concentrations less than 5 ppb until after approximately 4½ years of operation when in calendar year 2002 the average effluent concentration was approximately 4.2 ppb.

The long term performance of the ozone/hydrogen peroxide-based technology has not to date been established, and it cannot be determined in the 5 to 6 months of discharge, since March 22, 2005. Pall has maintained that the system must be calibrated over a period of time before an optimal level of treatment can be achieved, including the determination of the optimal level of treatment parameters such as hydrogen peroxide feed rates, ozone dosage rates, system

contact times, and pH adjustment. In any event, the DEQ will continue to monitor the performance of the ozone/hydrogen peroxide-based technology particularly with respect to compliance with the applied BAT-based effluent limitations.

With respect to the ozone/hydrogen peroxide-based technology, the DEQ expects some environmental benefits from the use of the ozone/hydrogen peroxide-based technology. The previous UV/hydrogen peroxide-based technology required a higher hydrogen peroxide feed rate to achieve the desired level of 1,4-dioxane mineralization, which in turn required a greater quantity of chemical reagent (sodium bisulfite, etc.) to be applied to the treated groundwater in order to meet the NPDES permit's aquatic toxicity-based effluent limitation for hydrogen peroxide.

During application of sodium bisulfite, care must be taken to assure that application rates are not so high as to result in excess dissolved solids (i.e., "salts") being discharged with the effluent, because these dissolved solids can have negative impacts with respect to aquatic biota in the receiving water. Conversely, with the the ozone/hydrogen peroxide-based technology, a much lower hydrogen peroxide feed rate is necessary to facilitate the mineralization reaction, such that a much lower sodium bisulfite chemical feed is necessary to achieve compliance with Michigan's Water Quality Standards (specifically, the effluent limitation for hydrogen peroxide). As a result, with less applied sodium bisulfite, there is less of a chance for dissolved solids to impact the receiving water. Therefore, the DEQ does anticipate an environmental benefit from the use of the new technology.

4. Comments/Objections: The data set used by DEQ in establishing the revised BAT-based effluent limitations is not appropriate. Use of an alternate data set in the statistical analysis would result in more restrictive effluent limitations that should be applied in the permit as the facility can comply with more restrictive limitations.

Response: In order to apply appropriate effluent limitations for 1,4-dioxane in the reissued Pall permit, the DEQ determined the BAT-based effluent limitations through calculation of 99th upper percentile value based upon a delta-lognormal distribution of the pollutant data using a data set that included all daily effluent concentration data points from January 1, 2001, through December 31, 2004. This method was used for determination of both the daily maximum effluent limitation and the monthly average effluent limitation.

The data set used in these calculations is appropriate as the treatment system had definitely reached steady-state conditions after approximately 3½ years of operation, the system was performing at a high level with respect to 1,4-dioxane mineralization, and a large data set and time period is considered (i.e., in this case four full calendar years). It is not appropriate to utilize a smaller data set of twelve to twenty-four months in the calculations as this may reflect an optimal level of treatment that is achieved for short periods, and use of a smaller data set may subject the discharger to permit noncompliance.

Before consideration of factors such as significant figures, calculation of the daily maximum and monthly average effluent limitations resulted in values of 21.95 ppb and 5.48 ppb, respectively. Based upon various factors, including the significant figures involved in the BAT-based effluent limitations calculation, the quantification levels for this pollutant, and the sensitivity of the effluent sample analyses, integer values in parts per billion (ppb) are utilized for the resulting effluent

limitations. Since the intent of the analysis is not to subject the discharger to potential permit noncompliance, these values must always be rounded up.

In addition, a subsequent review of the reported monthly average effluent 1,4-dioxane concentrations revealed that, during the period utilized for the analysis (i.e., January 1, 2001, through December 31, 2004), Pall would have been in noncompliance during some months. As stated above, the objective of the BAT-based effluent limitations calculation is not to subject the discharger to potential permit noncompliance. Therefore, the permit will be reissued with daily maximum and the monthly average effluent limitations of 22 µg/L (ppb) and 7 µg/L (ppb), respectively.

5. **Comments/Objections: The DEQ should not allow Pall to bypass and abandon use of “the Green Pond” as part of the required treatment system. Elimination of use of the Green Pond could allow a release of thousands of gallons of untreated water to the unnamed tributary of Honey Creek.**

Response: Effluent from the treatment technology-based processes is directed to the Green Pond prior to discharge at Outfall 001. Historically, the primary functions of the Green Pond are to attenuate the variable concentrations of 1,4-dioxane in the effluent prior to compliance sampling and discharge and to provide a safety mechanism for capture of the effluent in the event of a treatment system upset. These two functions are primarily considered to be a protection for Pall from permit noncompliance. However, regarding capture of the effluent in the event of a treatment system upset, the Green Pond provides minimal retention time (less than one hour at average effluent flow rates), and the Green Pond does not provide any actual treatment.

Based upon the existing “plumbing” which remains in place at the site, flow can be directed to the Green Pond in the event of a treatment system upset. Further, regarding a potential treatment system upset, the system can be completely shut down as there is no requirement that Pall purge and treat groundwater at all times. Regarding large gallons of untreated water being discharged without treatment, it is important to note that Part II.C.9. of the current and reissued permit contain prohibitions for bypass and diversion of the treatment facilities used for the groundwater remediation.

Pall has requested DEQ approval to allow the bypassing of the Green Pond based upon the lack of a perceived need for this component of the system. Compliance staff of the Jackson District Office of the DEQ, Water Bureau, have granted approval to bypass the Green Pond on a trial basis for a period of six months in order to determine any potential unforeseen impacts from deletion of this component of the system.

With respect to effluent 1,4-dioxane concentrations, the reissued permit will contain requirements for 24-hour composite sampling, which is flow proportioned composite sampling consisting of hourly or more frequent portions that are taken over a 24-hour period. As a result, the information regarding effluent 1,4-dioxane concentrations will be improved, and the need for attenuation of effluent 1,4-dioxane concentrations in the Green Pond will not be necessary. With respect to upset conditions, a short-duration increase in effluent 1,4-dioxane concentrations and a short-duration exceedance of the BAT-based effluent limitations should not cause a water quality impact in the receiving water as the applied BAT-based effluent limitations are significantly more restrictive than the applicable water quality-based effluent limitations for 1,4-dioxane.

It should be noted that NPDES permits do not typically specify each component of a treatment system utilized by a facility and the mandatory use of these components. Often, modifications to treatment facilities are handled through correspondence with district compliance staff.

As stated above, the bypassing of the Green Pond has been allowed on a trial basis, and the DEQ will continue to monitor this matter to determine whether the bypassing will be approvable on an indefinite basis.

6. Comments/Objections: **It is unclear how effective the new ozone/hydrogen peroxide-based technology is with respect to complete mineralization of 1,4-dioxane. Therefore, the permit requirement for characterization of the effluent for the presence of intermediate breakdown compounds resulting from the incomplete mineralization of 1,4-dioxane should be restored in the reissued permit.**

Response: In accordance with Rule 57 of the Part 4 Rules, Michigan Water Quality Standards, DEQ has established water quality values for some of the potential breakdown compounds, including oxalic acid, formic acid, acetic acid, formaldehyde, and acetaldehyde. Regarding oxalic acid, the permit already requires monitoring of the effluent for this compound (see Part I.A.1, page 2 of the reissued permit) primarily based upon the intent of verifying that the final chronic value for aquatic toxicity of 250 ppb is not exceeded.

For some of these compounds the water quality values are relatively “high” with respect to what levels would be expected to be in the effluent. For example, regarding formic acid, there are two established water quality values, and these are a human non-cancer value and a human non-cancer value for a drinking water source at the point of water intake, and these values are 3,100,000 ppb and 38,000 ppb, respectively. It is doubtful that concentrations of formic acid could approach these levels in the effluent. However, a waste characterization study for some of the intermediate breakdown compounds has been added to the permit, including requirements for monitoring of the effluent for formic acid, acetic acid, formaldehyde, and acetaldehyde. With respect to the compound methoxyacetic acid, this compound is not required for analysis, because, based upon information previously gained through this process, this compound is too unstable to exist in the environment.

7. Comments/Objections: **Although the compliance sampling for 1,4-dioxane has been changed to twenty-four (24) hour composite sampling for 1,4-dioxane, Pall should be required to report any grab samples taken for 1,4-dioxane concentrations in the effluent.**

Response: Part II.C.4. of the permit states that “If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report”.

In addition, Part I.A.1. of the permit has been modified to require that any grab samples taken of the effluent for 1,4-dioxane concentrations shall be reported.

8. Comments/Objections: **The MDEQ should require that Pall provide immediate notification to the City of Ann Arbor Water Plant for any exceedance of the final permit conditions.**

Response: Although the effluent limitations for 1,4-dioxane and bromate are more restrictive than the water quality-based effluent limitations that would be applied to ensure protection of the drinking water intake on Barton Pond, the permit has retained the permit requirements for notification to the City of Ann Arbor Water Plant in the event of a treatment system process upset or an unanticipated treatment system bypass as soon as possible but no later than 24 hours from the time the permittee becomes aware of such occurrences. Based upon past treatment system performance, only treatment system upsets or bypasses will result in the level of exceedance that could possibly impact the drinking water intake. In addition, based upon time of travel in the receiving streams from Outfall 001 to Barton Pond, the required time frame is considered to be adequate.

It should be noted that, although it is a violation of the permit, a temporary exceedance of the 1,4-dioxane limitations does not necessarily constitute a violation of water quality standards, because the permit's effluent limitations for 1,4-dioxane are treatment-based, as opposed to water quality-based.

9. Comments/Objections: **The effluent flow rate authorized by the permit is exacerbating the existing flooding problems in and around Honey Creek and its unnamed tributary, including the constant flooding of Little Lake and Sunward Co-Housing's two in-stream retention ponds. In addition, the effluent flow rate is causing stream bank erosion on Honey Creek and the unnamed tributary.**

Response: The NPDES permit is a water quality control document that is not intended or designed to address all issues relative to a discharge. The permit's authorized maximum effluent flow rate is an existing authorization (there is no increase in the flow rate subject to comment at this time). Further, during processing of the increased use modification in 2002, the DEQ performed field work to consider these flow quantity issues and determined that Pall's discharge would not measurably increase flood elevations or aggravate existing flooding conditions in or around Honey Creek or the unnamed tributary. Regarding stream bank erosion, Pall's maximum permitted flow is negligible when considered with the total storm/flood flows. Therefore, stream velocities during and/or following wet weather events and the resulting stream bank erosion will not be significantly impacted by Pall's discharge.

The DEQ must have more substantive data and information regarding the impacts of the Pall effluent prior to considering whether it is appropriate to implement measures to address these flow quantity issues.