

AFFIDAVIT OF FARSAD FOTOUHI

FARSAD FOTOUHI, being first duly sworn, deposes and says:

1. I am Vice President of Health, Safety and Environmental Affairs for Pall Corporation.

2. Prior to the purchase by Pall Corporation of Gelman Sciences Inc., I was environmental manager for Gelman Sciences Inc., commencing in January, 1996.

3. In my positions for Gelman Sciences and now for Pall Corporation, I have responsibility for and personal knowledge of the activities undertaken pursuant to the Consent Judgment entered in the matter of *Attorney General v Gelman Sciences, Inc.*

4. I am an Environmental Engineer and a hydrogeologist and have been practicing for 18 years, including 5 years at MDEQ.

5. I am the designated Project Coordinator for Gelman Sciences Inc., n/k/a Pall Life Sciences ("PLS") under the Consent Judgment, and, as such, I either have generated myself or have obtained copies in due course of correspondence, reports, data analyses, maps, and other documents generated or received by PLS in connection with the Consent Judgment.

6. As Project Coordinator, I am responsible for maintaining files of correspondence between the parties on the Consent Judgment. The copies of correspondence attached to my affidavit are true and accurate copies of documents from those files.

7. Attached to this Affidavit as Exhibit 1 is a chronology of events related to the Evergreen System that were performed in connection with PLS' obligations under the Consent Judgment. Exhibit 1 lists events and conditions that I considered relevant to the

decisions I made regarding the operation, maintenance and replacement of the Allison Street extraction wells (AE-1, AE-2, and AE-3).

8. Attached to this Affidavit as Exhibit 2 are hydrographs showing the changes in water level elevations in the monitoring wells in the vicinity of the Allison Street extraction wells over the last nine years. These hydrographs were prepared based on information obtained by PLS from those wells and are to the best of my knowledge true and accurate depictions of the changes in water levels in those wells.

9. Attached to this Affidavit as Exhibit 3 is a map showing the well names and locations of wells in the Evergreen System.

10. The Evergreen System currently consists of three extraction wells and associated piping. The three extraction wells are denoted as LB-1, LB-3, and AE-3, and are shown on Exhibit 3.

11. LB-1 and LB-3 are operated to meet the objective in the Consent Judgment of capturing the leading edge of the contamination in the Evergreen subdivision. At the time these wells were designed and installed, they were intended to capture and draw water from the contaminated aquifer commonly known as the Unit D₂ Aquifer.

12. PLS has installed a total of three extraction wells along Allison Street (AE-1, AE-2, and AE-3) for the purpose of capturing a small amount of the D₂ plume that appeared to have passed LB-1 during 1996 when PLS had to change water disposal methods and the Evergreen System had to be temporarily shut down. The circumstances underlying the need for the Allison Street extraction wells were brought to this Court previously in connection with the State's claim for civil penalties in 2000, and the

relevant facts are set forth in those pleadings and in my Affidavit provided in connection with PLS' defense to the State's claim.

13. When AE-1 first commenced operation in 1998, it was able to support an extraction rate of 50 gallons per minute ("gpm"). This purge rate was supported by the water level elevations in the area of Allison Street at the time.

14. AE-1 periodically experienced a drop in flow rate due to depressed water levels around the purge well. These instances are noted on Exhibit 1. In most instances, the water levels would recover after AE-1 was shut down for a brief period. In order to enhance flow and maintain minimum purge rates, PLS also periodically rehabilitated the well using outside contractors who would, in essence, clean the well screen using acid, oxidizers, and pressure. Rehabilitation would usually increase the maximum flow rate, at least temporarily. Rehabilitation events of the Allison extraction wells are noted on Exhibit 1.

15. Despite the regenerative effect of these recovery periods and rehabilitation, the capacity of AE-1 (i.e., its maximum sustainable flow rate) degraded over time as the average water levels in the vicinity of Allison Street continued to decline. Beginning in September 1999, PLS began having trouble maintaining a 50 gpm flow rate. In 2000, these difficulties became chronic. When PLS presented its Five-Year Plan to the DEQ in October 2000, PLS proposed a flow rate of 35 gpm for AE-1. That rate soon became unsustainable as water levels continued to decline. After the DEQ sought stipulated penalties based on PLS' inability to maintain the approved 35 gpm flow rate, PLS obtained approval of a lower minimum extraction rate of 28 gpm.

16. When it became clear that it would be difficult for AE-1 to meet even this reduced minimum purge rate despite frequent maintenance and rehabilitation, PLS tried operating more than one well along Allison Street by installing AE-2 in 2001. (Exhibit 1).

17. AE-2 was intended to operate concurrently with AE-1 in order to "make up" AE-1's lost capacity. Although the location for AE-2 was selected based on the best information available, the AE-2 location turned out to be an area with very low levels of contamination. Consequently, AE-2 was not a solution to the problem, and AE-2 was operated only periodically during times when AE-1 was unable to meet the DEQ-approved minimum purge rate. During these times, I operated AE-2 even though it was essentially pumping clean water in order to avoid a DEQ claim for stipulated penalties.

18. Even though the DEQ lowered the approved minimum purge rate for the Allison Street extraction well to 25 gpm in February 2004, it became clear that AE-1 could not sustain this level despite repeated rehabilitation, periodic shut downs, and maintenance. AE-3 was installed in June of 2004 to replace AE-1. I decided to place the well screen for AE-3 in the lowest portion of the D₂ aquifer in order to maximize the available drawdown and to sustain a higher extraction rate despite the declining water levels. Initial extraction rates for AE-3 were 30 to 32 gpm.

19. Unfortunately, AE-3 has required increasingly frequent rehabilitation in order to sustain the minimum approved extraction rate. Flow rates have declined in the well as the aquifer water levels continue to fall.

20. Based on my experience and expertise, it is my opinion that the Allison extraction wells have required significantly more maintenance and rehabilitation than

other typical extraction wells, including such wells installed elsewhere for the PLS remediation project. In my opinion, the primary causes for this are: (1) declining water levels in the D₂ aquifer in the vicinity of the extraction wells; and (2) relatively poor aquifer characteristics in the Allison Street vicinity.

21. The water levels around the Allison extraction wells are measured by monitoring wells in the D₂ unit (MW-BE1s, MW-92, MW BE1d, 373 Pinewood (shallow), 593 Allison, LBOW-1, MW-47-d, 2819 Dexter, MW KD-1s, MW 47s, 26652 Dexter, MW KD-1d, MW KZ-1). As Exhibit 2 shows, the water levels in the D₂ Unit have fallen steadily over the life of the operation of AE-1, then AE-2, and AE-3. Water levels have fallen approximately six to seven feet over that time span.

22. As noted in Exhibit 1, AE-3 was shut down for rehabilitation in January of this year. Extraction from the well subsequently was able to resume at 31 gpm. However, on March 4, 2007, AE-3 extraction rates began to fluctuate. I instructed my staff to shut down the well and replace the pump.

23. Pumping from AE-3 resumed on March 6. I informed DEQ (Sybil Kolon) of the work on the well via email.

24. On March 14, the flow rate from AE-3 had to be reduced due to the presence of air bubbles, which indicate that there is not enough water in the well. I reduced the rate to 25 gpm, and then to 20 gpm. The well could not support either flow rate.

25. I notified DEQ (Sybil Kolon, via email) about this problem, and informed DEQ I believed this was due to low levels in the aquifer. I provided data to DEQ to

support this hypothesis, and informed DEQ I would like to let the well rest and see if the water levels would recover sufficiently to permit resumption of purge operations.

26. I tried to resume purging on March 15, 2007, and again on March 19, 2007. On both occasions the pump drew in air, even at low flow rates. I decided to let the well rest for a while longer. In years past when I have rehabilitated the wells I have on occasion let the aquifer recover for a period of time (the "recovery" period has increased in length over time) as a way to recover flow rates in the Allison extraction wells. I hoped that this would work as an alternative to further rehabilitation. AE-3 had been rehabilitated only three months before and should have been in good condition.

27. On April 3, 2007, I informed DEQ (Sybil Kolon, via email) that we were still having problems with AE-3. I told her we would keep the well off for the time being while we considered options for restoring flow.

28. On April 20, 2007, I informed DEQ (Sybil Kolon, via email) that we would try once again to rehabilitate AE-3. Although I doubted that rehabilitation would have a significant long term impact, since the well had just been rehabilitated three months prior, I was hoping that rehabilitation combined with the extended recovery period for the aquifer would allow normal purge operations to resume, at least temporarily. I was and I am still of the opinion that installation of new or additional extraction wells in the Allison Street area would not be a viable long term solution because of the poor characteristics of the aquifer and the fact that the water levels in the aquifer are now so low that any such actions would provide no benefit or only a short term benefit.

29. PLS rehabilitated AE-3 again on April 26, 2007. When I began operating AE-3 again, I tried to extract 10 gpm and was receiving some air into the well. I increased the rate to 15 gpm and decided to try to change the pump head to a smaller size to reduce back pressure.

30. On April 30, 2007, I determined that I had exhausted all possible efforts to resume pumping from AE-3 at the required purge rate. I had let the aquifer rest, I had tried replacing the pump, I had tried altering the pump head, I had rehabilitated the well twice in four months to remove biological plugging, and I had tried reduced flow rates to eliminate air bubbling. After consultation with legal counsel, I decided to declare a Force Majeure event.

31. I am aware of DEQ's general response to our Force Majeure event. In my opinion, neither replacing AE-3 and/or adding additional extraction wells in the Allison area would solve the problems that have led to the declining performance and replacement of the prior Allison Street wells. These problems stem from lowered water tables and poor aquifer characteristics, and these circumstances would negatively impact any new well or wells placed in this area. In addition, PLS' prior experience with AE-2 illustrates that there is no guarantee that placing a new extraction well in this area will be successful.

32. Obtaining access to an additional well location (or locations as the DEQ has proposed) in this area would be very difficult. Access would be needed from either the City of Ann Arbor or private property owners. Available space for drilling wells is also very limited in the area where the well(s) would have to be installed. As I discovered when obtaining access for the previous wells, the utility corridor along

Allison Street is very crowded, and there is little space for extensive piping infrastructure. Other locations are ruled out by overhanging trees that will not allow the drill rig to operate. I have spoken to the private homeowners, and they are very hostile to the idea of further disruption of their street. Consequently, it would be difficult to site a single additional well, let alone the multi-well system suggested by the DEQ.

33. It is also my opinion that operating a purge well at the Allison Street location is not in the best interests of the cleanup program, even if it was practical to do so. I agree with the conclusions set forth in Mr. Brode's affidavit regarding the interaction between the Unit E plume and the Evergreen System extraction wells. As PLS suggested in its May 17, 2007 Evergreen System Review (the "ESR"), the current minimum 200 gpm combined purge rate for the Evergreen System extraction wells is more than the rate needed to accomplish the Consent Judgment's objective for the Evergreen System (capturing the entire width of the plume migrating in to the Evergreen Subdivision within the D₂ aquifer) and is actually counterproductive in that this operation has pulled a portion of the Unit E plume into the capture zones of the Evergreen extraction wells. This unintended consequence of the Evergreen System operation will continue to negatively affect the cleanup program in a number of ways, including the following:

- The northern edge of the Unit E plume has been pulled beyond the original boundary of the Prohibition Zone established by the Court's Unit E Order. PLS and the DEQ have already agreed to expand the boundary of the Prohibition Zone, and further expansion may be necessary if the Evergreen System wells continue to

operate at the current levels. Continued distortion of the Unit E plume could potentially cause some portion of the plume to flow in an unanticipated direction.

- PLS is extracting and treating 1,4-dioxane from the Unit E plume that would otherwise be addressed by the Unit E Order.
- The excessive purging from the Evergreen System consumes limited treatment capacity that could be more effectively allocated to other extraction wells that have higher contamination levels, which would increase mass removal.
- The Evergreen System operation will continue indefinitely if Unit E contamination continues to be pulled into the Evergreen Subdivision area. This is a concern because the transmission pipeline that conveys the groundwater back to the Wagner Road facility for treatment has a limited lifespan, and there is no practical alternative method of conveyance.
- PLS is operating the Evergreen System and the transmission pipeline at its maximum capacity in order to comply with the 200 gpm requirement. Operating any engineering system at its maximum capacity reduces its expected lifespan.

34. Consistent with the proposed purge rate reductions described in the ESR and the July 2, 2007 Work Plan, I have concluded that the groundwater cleanup program under this Court's supervision will be best served by: a) taking AE-3, which at this point is primarily extracting 1,4-dioxane from the Unit E plume, out of service; and b) lowering the combined purge rate for the LB wells to the minimum rate that is determined to be sufficient to capture the entire width of the D₂ plume at that location, using the procedures described in the July 2, 2007 Work Plan.

35. I am in the process of attempting to obtain access and the necessary permits for installing a single extraction well along Allison Street so that a new well could be quickly installed if the Court rules against PLS on its petition for dispute resolution. This area, including the underground right-of-way, is extremely congested and may not support another well and related pipelines, let alone a multi-well system. Moreover, although installation of such a well might temporarily allow PLS to obtain a 25 gpm purge rate, it would only be a stopgap remedy and would only put off resolution of this issue.

FURTHER AFFIANT SAYETH NOT

Farsad Fotouhi
Farsad Fotouhi

Subscribed and sworn before me this
9th day of July, 2007

[Signature]
Notary Public

Washtenaw County, Michigan

My Commission Expires: 9-11-2012

LAURELA A. BEYER
NOTARY PUBLIC, STATE OF MI
COUNTY OF WASHTENAW
MY COMMISSION EXPIRES Sep 11, 2012
ACTING IN COUNTY OF

EXHIBIT 1

EXHIBIT 1
Chronology of Evergreen System

| Date | Description | Reference |
|-------------|---|------------------|
| 07-08-98 | AE-1 Installed | |
| 07-14-98 | AE-1 begins extraction. Initial discharge is to sanitary sewer | |
| 09-02-99 | AE-1 temporarily shut down due to inability to maintain 50 gpm | |
| 12-01-99 | AE-1 shut down briefly due to low flow | |
| 02-01-00 | AE-1 shut down briefly due to low flow | |
| 03-17-00 | AE-1 shut down briefly due to low flow | |
| 03-18-00 | AE-1 shut down briefly due to low flow | |
| 09-15-00 | AE-1 shut down briefly due to low flow | |
| 09-16-00 | AE-1 shut down briefly due to low flow | |
| 09-17-00 | AE-1 shut down briefly due to low flow | |
| 10-13-00 | AE-1 rehabilitated and pump replaced | |
| 10-16-00 | Five year plan submitted to DEQ proposing 35 gpm extraction rate for AE-1 | |
| 10-17-00 | AE-1 unable to maintain flow | |
| 10-17-00 | Fotouhi notifies DEQ that AE-1 has been rehabilitated, but is not stable and fluctuates between 18-40 gpm | 1 |
| 11-17-00 | AE-1 shut down briefly due to low flow | |
| 11-18-00 | AE-1 shut down briefly due to low flow | |
| 12-09-00 | AE-1 shut down briefly due to low flow | |
| 12-12-00 | AE-1 shut down briefly due to low flow | |
| 12-13-00 | AE-1 shut down briefly due to low flow | |
| 05-08-01 | Approved extraction rate for AE-1 lowered to 28 gpm | |
| 05-25-01 | AE-1 shut down briefly due to low flow | |
| 05-31-01 | AE-1 shut down briefly due to low flow | |
| 06-03-01 | AE-1 shut down briefly due to low flow | |
| 06-04-01 | AE-1 rehabilitated | |
| 06-05-01 | AE-1 rehabilitated | |
| 06-06-01 | AE-1 rehabilitated | |
| 05-30-01 | PLS prepares graphic showing declining flow rates in AE-1 | |
| 08-01 | AE-2 installed | |
| 08-12-01 | AE-1 shut down briefly due to low flow | |
| 09-06-01 | AE-2 commences operation | |
| 01-10-02 | AE-2 shut down because it was not removing any contamination | |
| 03-30-02 | AE-1 shut down briefly due to low flow | |
| 11-18-02 | PLS submits a revised capture zone analysis to DEQ supporting 25 gpm extraction rate at AE-1 | |
| 01-14-03 | AE-1 flow rate starts to drop, AE-2 turned on temporarily to meet required purge rate | |
| 01-17-03 | AE-1 shut down and rehabilitated | |
| 01-18-03 | AE-1 shut down and rehabilitated | |
| 01-19-03 | AE-1 shut down and rehabilitated | |
| 06-12-03 | AE-1 flow rate declines below 30 pgm | |

Affidavit of Farsad Fotouhi
Exhibit 1

07-07-03 PLS writes DEQ, noting that water levels have fallen, AE-1 will only support 25 gpm extraction rate.

01-12-04 AE-2 turned back on to meet required purge rate

02-08-04 AE-1 and AE-2 shut down temporarily due to low flow

02-09-04 AE-1 and AE-2 shut down temporarily due to low flow

02-18-04 Approved extraction rate for AE-1 changed to 25 gpm

02-26-04 AE-1 and AE-2 shut down for rehabilitation

03-09-04 AE-1 and AE-2 resume operation, flow rates still too low

04-14-04 AE-1 and AE-2 shut down

04, 05-04 New well location selected and new extraction well (AE-3) installed

06-04-04 AE-3 begins operation

06-05-04 AE-3 shut down temporarily due to flow fluctuations

06-06-04 AE-3 shut down temporarily due to flow fluctuations

01-02-06 AE-3 shut down for rehabilitation

01-03-06 AE-3 shut down for rehabilitation

04-07-06 AE-3 shut down for rehabilitation

04-08-06 AE-3 shut down for rehabilitation

04-09-06 AE-3 shut down for rehabilitation

04-10-06 AE-3 shut down for rehabilitation

07-20-06 AE-2 closed and properly abandoned

01-16-07 AE-3 rates fall below minimum.

01-18-07 AE-3 shut down for rehabilitation

01-19-07 AE-3 shut down for rehabilitation

01-20-07 AE-3 shut down for rehabilitation

01-21-07 AE-3 shut down for rehabilitation

03-04-07 AE-3 shut down due to purge rate fluctuations; pump replaced

03-14-07 AE-3 flow reduced to 25 gpm due to air bubbling (not enough water). Would not run at 20 gpm

03-19-07 Ae-3 restarted at 10 gpm for two hours, still sucking air

03-29-07 AE-3 restarted at 10 gpm, shut down after 4 hours due to air in line

04-26-07 AE-3 rehabilitation completed; began pumping at 10 gpm, still sucking some air; raised rate to 15 gpm to see if there would be improvement, changed pump head to smaller size

EXHIBIT 2

Evergreen Hydrographs

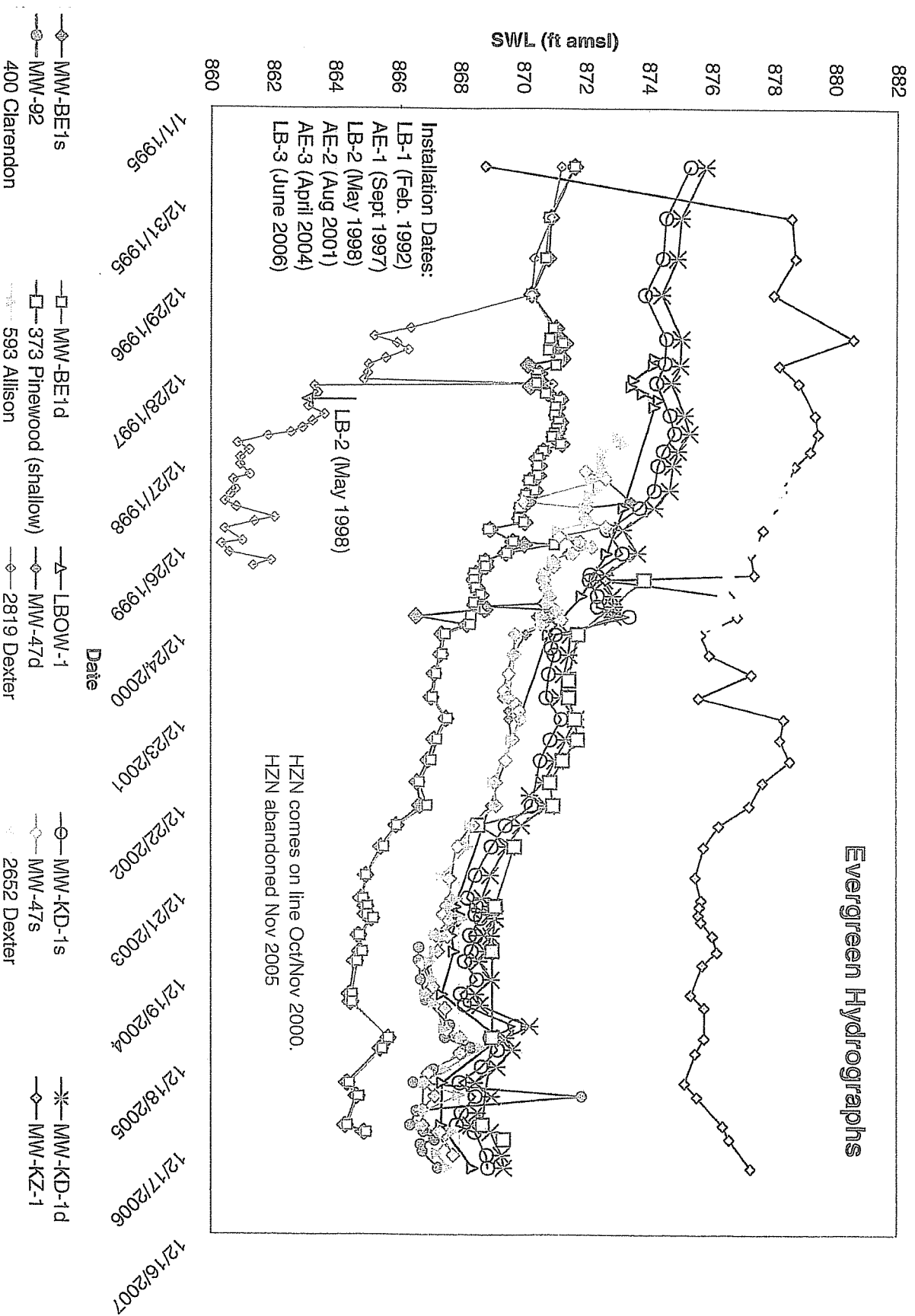


EXHIBIT 3

