BUCK
ENGINEERING, LLC
*consulting environmental engineers*

January 21, 2009

Mr. Thomas P. Festa
Geologist
NYSDEC
625 Broadway, 12th Floor
Albany, NY 12233-7017

Re: **SCM/SCWP Site # 712006**
***2008 Annual Report***

Dear Tom:

This report will summarize the remediation activities at the subject site during the year 2008 and is submitted in support of the consent agreement between SCM and NYSDEC. The report will also summarize well monitoring for the year and present analysis of data trends. The property is owned by S.C.W.P., LLC and this report is submitted at SCWP's direction, consistent with agreements between SCM and SCWP.

**Remediation System** -The remediation system, consisting of a recovery well, an aeration tower, a pipeline, a rock cascade, and an infiltration lagoon system, remains in place and has not been altered since its construction by SCM under agreement with NYSDEC. Tom Conrad and Ono Groulx, both of SCWP, are responsible for system operation, maintenance, and record keeping. Various operational points from 2008 follow:

- The remediation system operated without major breakdown or other incidents during 2008. The system was shut-down 37 hours during the year for routine maintenance.

- In recent years and during the first few months of 2008, there were difficulties maintaining design flow (800 gpm) through the system. The problem was reviewed and attributed to a restricted heat exchanger inside the building. SCWP personnel were able to modify the piping to restore flow rates to 800+ gpm as of late May, 2008. Pumping rates are currently better than they have been since 2006.

- During 2008, the system pumped approximately 380 million gallons and removed approximately 23.9 lb of TCE, at an average influent concentration of 7.6 ug/l. (see Fig. A, attached)

- Twelve monthly system samples were obtained as per the 5/10/2001 communication from Kevin Delaney of NYSDEC. None of the tower discharge samples or the cascade outfall samples exceeded the regulatory limit of 5 ug/l. The 2008 average TCE concentration in discharge samples was 1.4 ug/l. The system has never had an exceedance under SCWP ownership and operation. Graphs of the monthly system sample TCE concentrations are attached as Figures B, C, and D.



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**Monitoring Well System** - There are 18 monitoring wells on SCWP property that were associated with the original settlement agreement. The agreement stipulates a target cleanup objective of 5.0 ug/l. In 2006 the Department placed approximately 8 additional wells on SCWP property along Lime Hollow Road. During 2008, SCWP constructed an interior monitoring well near building column L16, and data from that well are included in the historical database. Under agreement with the Department, SCWP samples and analyzes the original monitoring wells annually. The original wells were sampled on 11/26/08, well L16 was sampled on 12/11/08, and the data are summarized in the historical database provided in Fig. E. Water level data are provided in Fig. N. The wells are categorized within four groups as either perimeter or interior, and either shallow or deep. Graphs of TCE concentrations in these four well groups are attached in both 10-year format and 18-year format. Comments on data trends follow by group:

- Perimeter Shallow Wells (Lime Hollow Rd.) – Wells along the northern property line; MW-5s, MW-1s, MW-10s, MW-2s, and MW-4s, continue to indicate a slightly decreasing, trend (see Figs. F,G). Four of these wells have TCE concentrations meeting the cleanup objective of 5.0 ug/l, with MW-10s declining to 5.8 ug/l during the year.

- Perimeter Deep Wells – Deep wells MW-5d, MW-1d, and MW-10d, had increases in TCE concentrations, but only MW-10d (at 7.1 ug/l) did not meet the cleanup objective (see Figs. H, I). MW-4d continued to demonstrate non-detectable levels of TCE as it has previously.

- Interior Shallow Wells – Wells MW-6, MW-7, MW-8, and MW-12s continue to exhibit decreasing concentration trends, with only MW-6 (at 6.0 ug/l) and MW-12s (at 17 ug/l) exceeding the cleanup objective (see Figs. J, K). As in the past, MW-12s had the highest TCE concentration of the original monitoring wells.

- Interior Deep Wells – Wells MW-9 and MW-12d both declined in TCE concentration and both continued to meet cleanup objectives with respective TCE concentrations of nd and 2.8 ug/l (see Figs. L, M).

In summary, with the exception of three perimeter deep wells, the monitoring well data continue to exhibit general declining concentration trends.

**Groundwater Contours** – At the Department's request, groundwater isopotentiometric surfaces were plotted for both the shallow well data and the deep well data for the sampling date of 11/26/08 (see Figs. O, P). The general site groundwater gradient is to the North, but the recovery well continues to depress the water table sufficiently to influence groundwater flow direction along Lime Hollow Road. With the recovery well operational, the hydraulic gradient from MW-L16 to the recovery well is approximately 1.1%.



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**Planned 2009 Activities** – The groundwater remediation system operated very well in 2008 and no significant changes are planned. Three maintenance activities are planned for 2009.

- The gate valve in the valvehouse structure between the two lagoons is not completely operational due to lime buildup on the seat and gate. SCWP intends to shut down the system for 1-2 days in the summer of 2009 to disassemble and repair the gate valve.
- As in prior years, the system will need to be valved down or shut down for a few days to scarify the lagoons in the summer. This task may be coordinated with the gate valve repair.
- MW-7 has a broken upper casing and needs repair. While this well can still be sampled, the broken casing allows surface water to enter the well which potentially compromises water sample integrity.

Please let me or Tom Conrad know if there are questions concerning this report or the data presented.

Sincerely,

John H. Buck, P.E.
Principal Engineer

*Attachments:*

| | |
|---|---|
| Fig. A | System Volumetric and Mass Flow Summary |
| Fig. B-D | Graphs of Remediation System TCE Concentrations |
| Fig. E | Monitoring Well Historical Database |
| Fig. F-G | Graph of TCE Levels in Perimeter Shallow Wells |
| Fig. H-I | Graph of TCE Levels in Perimeter Deep Wells |
| Fig. J-K | Graph of TCE Levels in Interior Shallow Wells |
| Fig. L-M | Graph of TCE Levels in Interior Deep Wells |
| Fig. N | Table of Water Levels in Wells |
| Fig. O-P | Site Maps with Groundwater Contours |
| Appendix | Sampling Data Sheets |
| | Laboratory Reports (Life Science Laboratories) |

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| 2008 SYSTEM VOLUMETRIC AND MASS FLOW SUMMARY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| date | meter reading | total gal/time period | days in period | gal/day | gal/min | notes | | | | |
| 1/11/2008 | 7187987400 | | | | | | | | | |
| 12/16/2008 | 7567563400 | 379576000 | 340 | 1116400.00 | 775.28 | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | total processed= | | 379576000 | gals | |
| | | | | | | | | | | |
| | | | | | | total TCE removed= | | 23.9 | lb | (at 7.6 ppb) |

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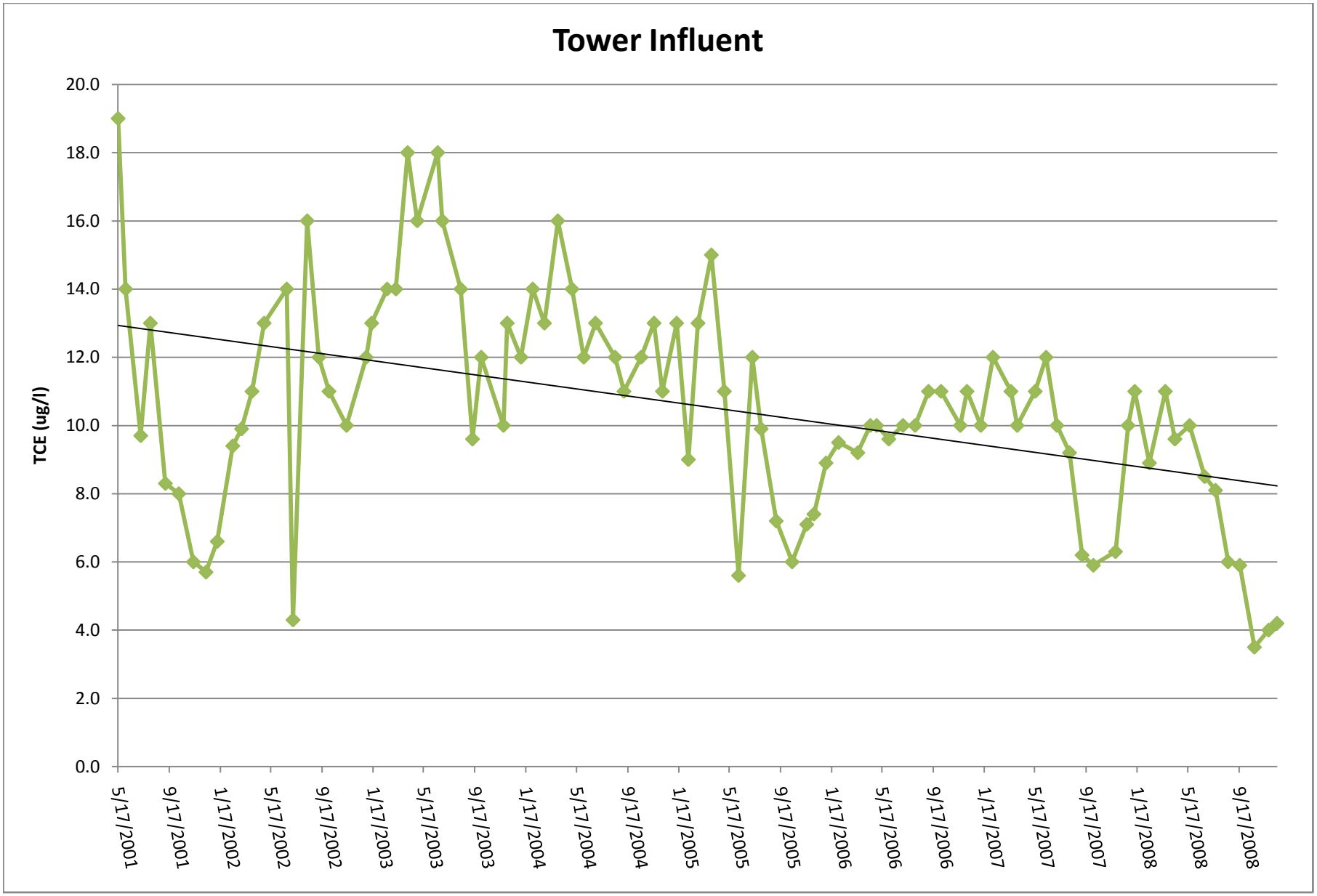
**Fig. A**




R:\SCWP_VOC_monthly graphs.xls

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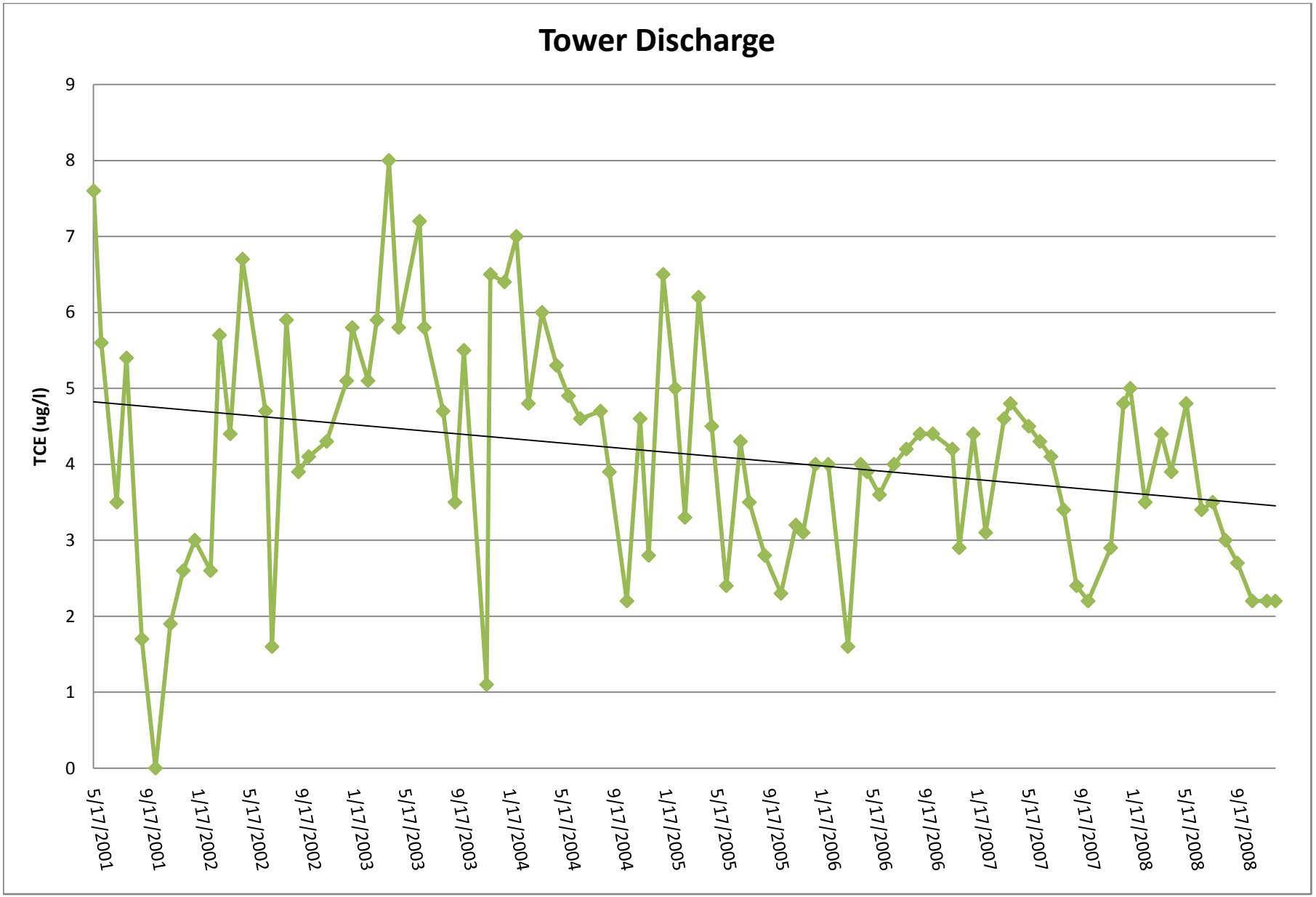
**Fig. B**




R:\SCWP_VOC_monthly graphs.xls

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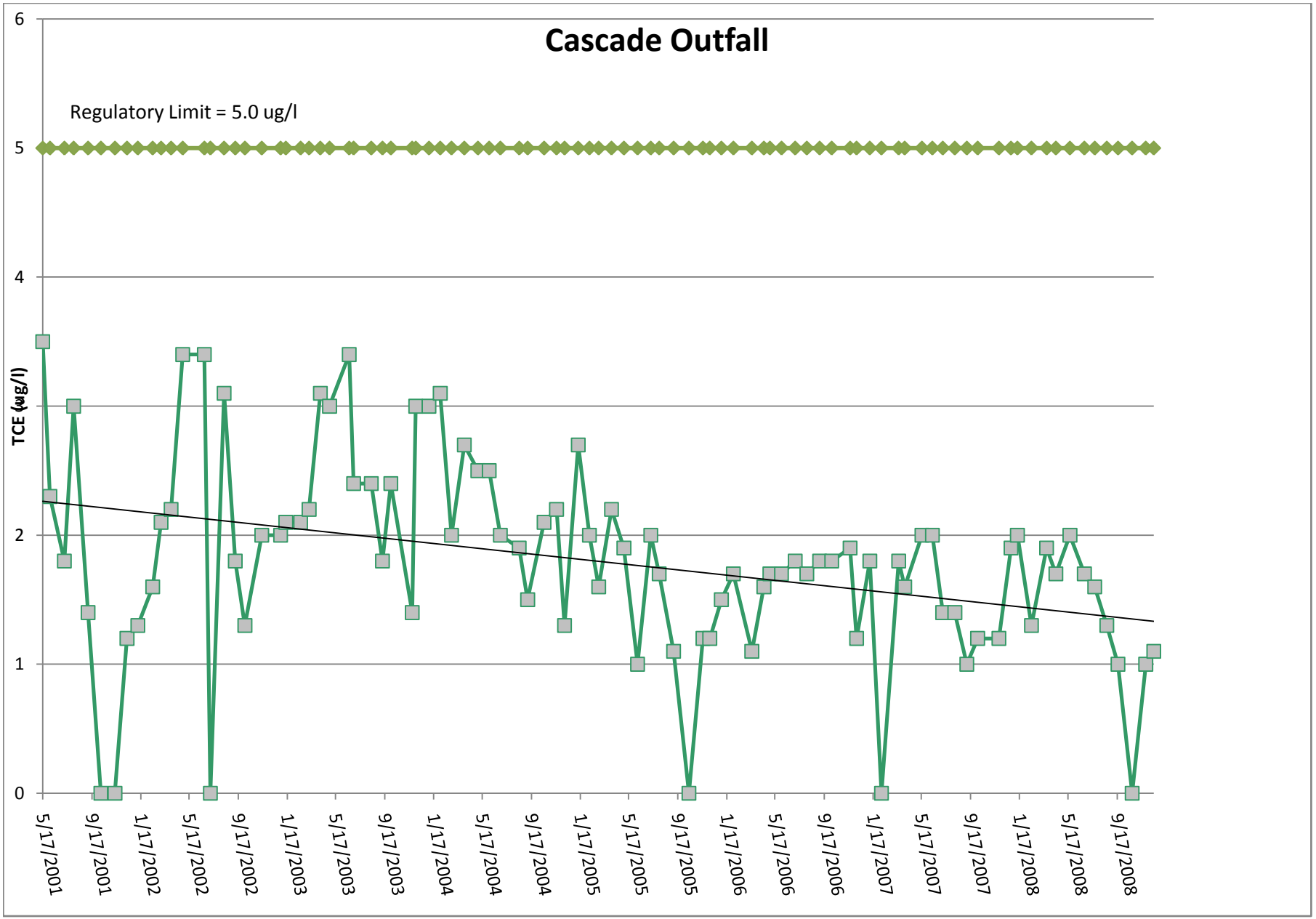
**Fig. C**




r:\SCWP_VOC_monthly graph.xls

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**Fig. D**

# SCWP SITE
## Town of Cortlandville
## Historical TCE Concentrations (ug/l)

| | | 2/90 | 4/90 | 8/90 | 11/90 | 2/91 | 5/91 | 8/91 | 11/91 | 2/92 | 5/92 | 8/92 | 11/92 | 2/93 | 5/93 | 8/93 | 11/93 | 2/94 | 6/94 | 9/94 | 12/94 | 2/95 | 11/03 | 11/04 | 12/05 | 9/06* | 11/06 | 5/07* | 11/07 | 11/08 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MW-1S** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | <1 | 39 | 47 | 41 | 25 | 17 | 19 | 12 | 9 | 13 | 15 | 2 | 11 | 26 | 3 | 13 | 7 | 19 | 13 | 9 | 11 | 5.8 | 11 | 6.4 | 7.2 | 3.6 | 3.4 | 1.6 | 4.8 |
| | TCE Yearly Ave. | | | | 32 | | | | 18 | | | | 10 | | | | 13 | | | | 13 | | 5.8 | 11 | 6.4 | | 3.6 | | | |
| | Total VOC's | <1 | 39 | 47 | 41 | 25 | 21 | 23 | 13 | 9 | 15 | 17 | 2 | 13 | 34 | 3 | 13 | 7 | 22 | 15 | 9 | 13 | 5.8 | 11 | 6.4 | 7.2 | 3.6 | 3.4 | 1.6 | 4.8 |
| | Tot. VOC Yearly Ave. | | | | 32 | | | | 21 | | | | 11 | | | | 16 | | | | 13 | | 5.8 | 11 | 6.4 | | 3.6 | | | |
| **MW-1D** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 32 | 28 | <1 | 25 | 25 | 18 | 19 | 12 | 13 | 13 | 14 | 13 | 14 | 13 | 12 | 16 | 12 | 13 | 9 | 11 | 12 | 2.3 | 2.6 | 5.0 | NS | 2.6 | NS | 4.3 | 4.5 |
| | TCE Yearly Ave. | | | | 21 | | | | 19 | | | | 13 | | | | 14 | | | | 11 | | 2.3 | 2.6 | 5.0 | | 2.6 | | | |
| | Total VOC's | 32 | 28 | <1 | 25 | 25 | 24 | 24 | 12 | 13 | 14 | 16 | 15 | 16 | 16 | 115 | 17 | 13 | 13 | 10 | 13 | 14 | 2.3 | 2.6 | 5.0 | | 2.6 | | 4.3 | 4.5 |
| | Tot. VOC Yearly Ave. | | | | 21 | | | | 21 | | | | 15 | | | | 16 | | | | 12 | | 2.3 | 2.6 | 5.0 | | 2.6 | | | |
| **MW-2S** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 4 | 5 | 5 | 6 | 8 | 6 | 8 | 10 | 5 | 7 | 5 | 5 | 5 | 7 | 7 | 4 | 4 | 4 | 3 | 4 | 4 | 2.3 | 2.0 | 1.9 | 2.2 | 2.0 | 2.5 | 2.0 | 1.8 |
| | TCE Yearly Ave. | | | | 5 | | | | 8 | | | | 6 | | | | 6 | | | | 4 | | 2.3 | 2.0 | 1.9 | | 2.0 | | | |
| | Total VOC's | 4 | 5 | 5 | 6 | 8 | 6 | 8 | 12 | 5 | 7 | 8 | 5 | 5 | 7 | 7 | 4 | 4 | 4 | 3 | 4 | 4 | 2.3 | 2.0 | 1.9 | 2.2 | 2.0 | 2.5 | 2.0 | 1.8 |
| | Tot. VOC Yearly Ave. | | | | 5 | | | | 9 | | | | 6 | | | | 6 | | | | 4 | | 2.3 | 2.0 | 1.9 | | 2.0 | | | |
| **MW-2D** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 6 | 6 | 9 | 8 | 7 | 5 | 7 | 9 | 5 | 5 | 5 | 5 | 3 | 4 | 6 | 3 | 3 | 2 | 3 | 2 | 2 | plugged | plugged | damaged | NS | NS | NS | NS | NS |
| | TCE Yearly Ave. | | | | 7 | | | | 7 | | | | 5 | | | | 4 | | | | 3 | | plugged | plugged | damaged | | | | | |
| | Total VOC's | 6 | 6 | 9 | 8 | 7 | 5 | 7 | 10 | 5 | 5 | 5 | 5 | 3 | 4 | 6 | 3 | 3 | 2 | 6 | 2 | 2 | plugged | plugged | damaged | | | | | |
| | Tot. VOC Yearly Ave. | | | | 7 | | | | 7 | | | | 5 | | | | 4 | | | | 3 | | plugged | plugged | damaged | | | | | |
| **MW-3** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | 4 | <1 | <1 | <1 | 1.7 | 1.4 | <1 | NS | 2.0 | NS | <1 | NS |
| | TCE Yearly Ave. | | | | 0 | | | | 0 | | | | 0 | | | | 0 | | | | 1 | | 1.7 | 1.4 | <1 | | 2.0 | | | |
| | Total VOC's | <1 | <1 | <1 | < | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 1 | <1 | <1 | <1 | <1 | 4 | <1 | <1 | <1 | 3.0 | 1.4 | 1.8 | | 4.5 | | <1 | |
| | Tot. VOC Yearly Ave. | | | | 0 | | | | 0 | | | | 1 | | | | 0 | | | | 1 | | 3.0 | 1.4 | 1.8 | | 4.5 | | | |
| **MW-4S** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | <1 | 1 | <1 | 2 | <1 | 1 | 2 | 1 | <1 | 1 | 1 | 1 | <1 | 1 | <1 | <1 | na | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| | TCE Yearly Ave. | | | | 1 | | | | 1 | | | | 1 | | | | 0 | | | | 0 | | <1 | <1 | <1 | | <1 | | | |
| | Total VOC's | <1 | 1 | <1 | 2 | <1 | 1 | 2 | 1 | <1 | 1 | 1 | 1 | <1 | 1 | <1 | <1 | na | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| | Tot. VOC Yearly Ave. | | | | 1 | | | | 1 | | | | 1 | | | | 0 | | | | 0 | | <1 | <1 | <1 | | <1 | | | |
| **MW-4D** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | <1 | 1 | 1 | <1 | 1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | na | <1 | <1 | <1 | <1 | <1 | <1 | <1 | NS | <1 | NS | <1 | <1 |
| | TCE Yearly Ave. | | | | 1 | | | | 1 | | | | 0 | | | | 0 | | | | 0 | | <1 | <1 | <1 | | <1 | | | |
| | Total VOC's | <1 | 1 | 1 | <1 | 1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | na | <1 | <1 | <1 | <1 | <1 | <1 | <1 | | <1 | | <1 | <1 |
| | Tot. VOC Yearly Ave. | | | | 1 | | | | 1 | | | | 0 | | | | 0 | | | | 0 | | <1 | <1 | <1 | | <1 | | | |
| **MW-5S** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 1 | 1 | 2 | 3 | <1 | 1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1.2 | 2.0 | 1.3 | 1.7 | 1.1 | 1.3 | <1 | <1 |
| | TCE Yearly Ave. | | | | 2 | | | | 1 | | | | 0 | | | | 0 | | | | 0 | | 1.2 | 2.0 | 1.3 | | 1.1 | | | |
| | Total VOC's | 1 | 1 | 3 | 3 | <1 | 1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1.2 | 2.0 | 1.3 | 1.7 | 1.1 | 1.3 | <1 | <1 |
| | Tot. VOC Yearly Ave. | | | | 2 | | | | 1 | | | | 0 | | | | 0 | | | | 0 | | 1.2 | 2.0 | 1.3 | | 1.1 | | | |
| **MW-5D** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 2 | 3 | 3 | 5 | 3 | 3 | 3 | 1 | <1 | 1 | 2 | 1 | <1 | 2 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | 1.3 | 2.0 | 1.1 | NS | 1.0 | NS | <1 | 1.7 |
| | TCE Yearly Ave. | | | | 3 | | | | 3 | | | | 1 | | | | 1 | | | | 0 | | 1.3 | 2.0 | 1.1 | | 1.0 | | | |
| | Total VOC's | 2 | 3 | 8 | 5 | 3 | 3 | 3 | 1 | <1 | 1 | 2 | 1 | <1 | 2 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | 1.3 | 2.0 | 1.1 | | 1.0 | | <1 | 1.7 |
| | Tot. VOC Yearly Ave. | | | | 5 | | | | 3 | | | | 1 | | | | 1 | | | | 0 | | 1.3 | 2.0 | 1.1 | | 1.0 | | | |
| **MW-6** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | na | 26 | 43 | 35 | 38 | 62 | 8 | na | 18 | 30 | 40 | 21 | 21 | 70 | 32 | 19 | 45 | 50 | 20 | 17 | 18 | 16 | 20 | 15 | NS | 7.8 | NS | 9.8 | 6 |
| | TCE Yearly Ave. | | | | 35 | | | | 36 | | | | 27 | | | | 36 | | | | 33 | | 16 | 20 | 15 | | 7.8 | | | |
| | Total VOC's | na | 26 | 43 | 35 | 38 | 62 | 8 | na | 18 | 30 | 40 | 21 | 21 | 70 | 32 | 19 | 45 | 50 | 20 | 17 | 18 | 16 | 20 | 15 | | 7.8 | | 9.8 | 6 |
| | Tot. VOC Yearly Ave. | | | | 26 | | | | 27 | | | | 27 | | | | 36 | | | | 33 | | 16 | 20 | 15 | | 7.8 | | | |
| **MW-7** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 290 | 300 | 19 | 63 | 190 | 57 | 19 | na | 11 | 57 | 130 | 130 | 120 | 67 | 25 | 18 | 85 | 60 | 49 | 49 | 45 | 9.4 | 4.6 | 19 | NS | 6.2 | NS | 7.5 | 3.2 |
| | TCE Yearly Ave. | | | | 168 | | | | 89 | | | | 82 | | | | 58 | | | | 61 | | 9.4 | 4.6 | 19 | | 6.2 | | | |
| | Total VOC's | 290 | 300 | 19 | 63 | 190 | 157 | 30 | na | 15 | 167 | 250 | 250 | 175 | 136 | 25 | 19 | 137 | 153 | 84 | 82 | 84 | 13 | 4.6 | 30 | | 7.7 | | 7.5 | 3.2 |
| | Tot. VOC Yearly Ave. | | | | 168 | | | | 94 | | | | 171 | | | | 89 | | | | 114 | | 13 | 4.6 | 30 | | 7.7 | | | |
| **MW-8** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 70 | 260 | 10 | 48 | 31 | 110 | 8 | 3 | 31 | 31 | 48 | 16 | 12 | 14 | 18 | 10 | 61 | 11 | 10 | 12 | 9 | 3.3 | 5.4 | 3.2 | NS | 2.6 | NS | 2.9 | 5 |
| | TCE Yearly Ave. | | | | 97 | | | | 38 | | | | 32 | | | | 14 | | | | 24 | | 3.3 | 5.4 | 3.2 | | 2.6 | | | |
| | Total VOC's | 70 | 283 | 10 | 48 | 31 | 110 | 8 | 3 | 31 | 31 | 48 | 16 | 12 | 14 | 18 | 10 | 61 | 11 | 10 | 12 | 9 | 3.3 | 5.4 | 3.2 | | 2.6 | | 2.9 | 5 |
| | Tot. VOC Yearly Ave. | | | | 103 | | | | 38 | | | | 32 | | | | 14 | | | | 24 | | 3.3 | 5.4 | 3.2 | | 2.6 | | | |
| **MW-9** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 16 | 3 | 5 | 10 | 4 | 11 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 33 | 8 | 1 | 2 | 24 | 5 | 3 | 5 | 6.7 | 17 | 6.0 | NS | 11 | NS | 4.8 | <1 |
| | TCE Yearly Ave. | | | | 9 | | | | 6 | | | | 4 | | | | 12 | | | | 9 | | 6.7 | 17 | 6.0 | | 11 | | | |
| | Total VOC's | 16 | 4 | 5 | 10 | 4 | 14 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 42 | 8 | 1 | 2 | 24 | 5 | 3 | 5 | 6.7 | 17 | 6.0 | | 12 | | 4.8 | <1 |
| | Tot. VOC Yearly Ave. | | | | 9 | | | | 6 | | | | 4 | | | | 14 | | | | 9 | | 6.7 | 17 | 6.0 | | 11.5 | | | |
| **MW-10S** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 73 | 63 | 110 | 59 | 63 | 27 | 32 | 50 | 44 | 170 | 40 | 32 | 26 | 25 | 37 | 27 | 28 | 31 | 24 | 15 | 16 | 9.8 | 9.9 | 9.6 | NS | 6.7 | 6.1 | 8.4 | 5.8 |

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Cortland, NY 13045-0427

# SCWP SITE
## Town of Cortlandville
## Historical TCE Concentrations (ug/l)

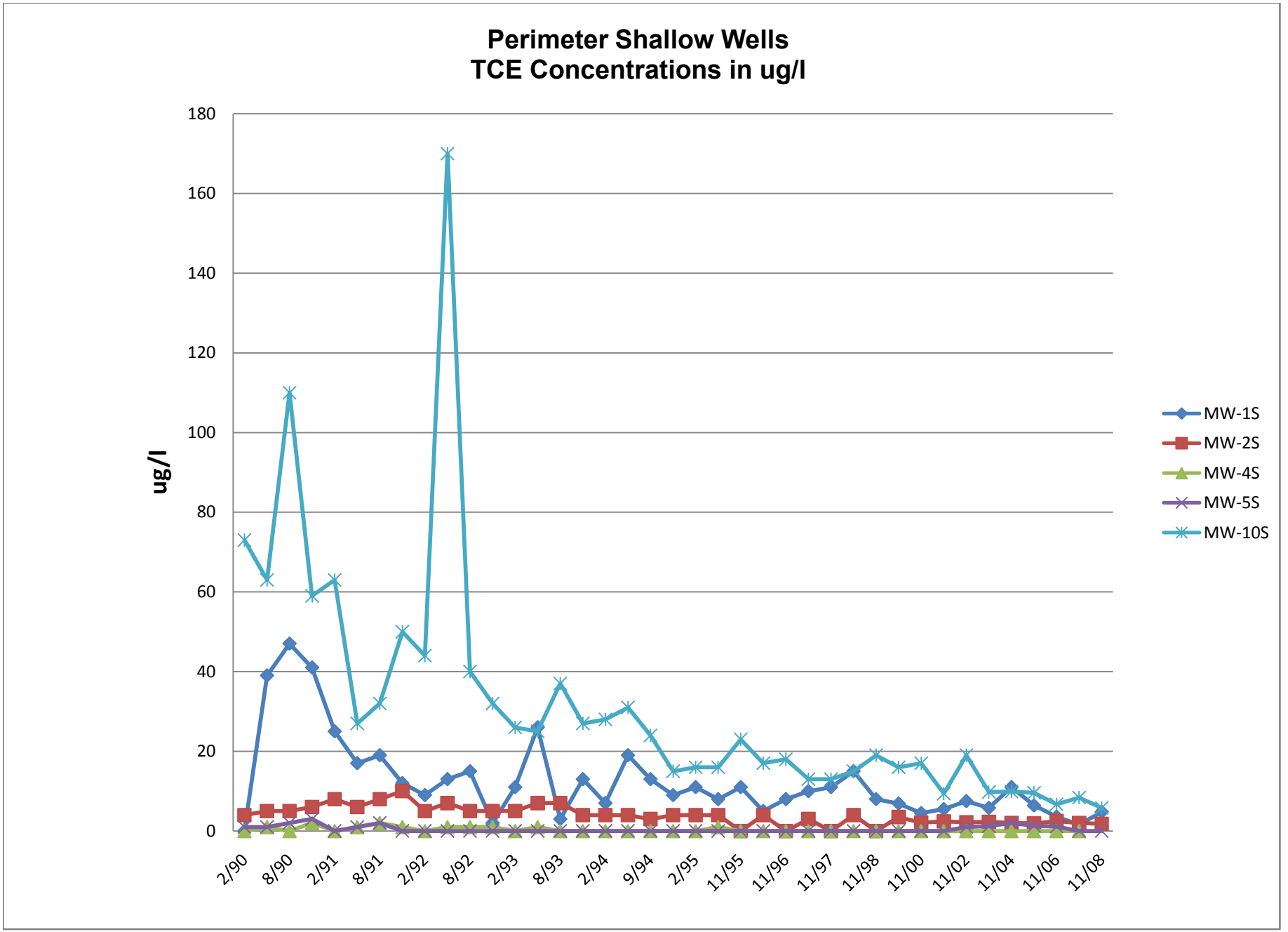
| | | 2/90 | 4/90 | 8/90 | 11/90 | 2/91 | 5/91 | 8/91 | 11/91 | 2/92 | 5/92 | 8/92 | 11/92 | 2/93 | 5/93 | 8/93 | 11/93 | 2/94 | 6/94 | 9/94 | 12/94 | 2/95 | 11/03 | 11/04 | 12/05 | 9/06* | 11/06 | 5/07* | 11/07 | 11/08 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TCE Yearly Ave. | | | | 76 | | | | 43 | | | | 72 | | | | 29 | | | | 25 | | 9.8 | 9.9 | 9.6 | | 6.7 | | | |
| | Total VOC's | 73 | 63 | 110 | 59 | 110 | 33 | 44 | 62 | 57 | 228 | 46 | 37 | 29 | 32 | 37 | 31 | 31 | 31 | 27 | 16 | 17 | 9.8 | 9.9 | 11 | | 6.7 | 6.1 | 8.4 | 5.8 |
| | Tot. VOC Yearly Ave. | | | | 76 | | | | 62 | | | | 92 | | | | 32 | | | | 26 | | 9.8 | 9.9 | 11 | | 6.7 | | | |
| MW-10D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 23 | 27 | 33 | 60 | 33 | 54 | 31 | 40 | 30 | 10 | 41 | 37 | 32 | 19 | 32 | 25 | 21 | 21 | 22 | 22 | 30 | 7.6 | 5.0 | 4.6 | NS | 5.5 | | 5.8 | 7.1 |
| | TCE Yearly Ave. | | | | 36 | | | | 40 | | | | 30 | | | | 27 | | | | 23 | | 7.6 | 5.0 | 4.6 | | 5.5 | | | |
| | Total VOC's | 23 | 27 | 33 | 60 | 33 | 66 | 39 | 45 | 35 | 12 | 46 | 43 | 36 | 21 | 32 | 28 | 22 | 21 | 25 | 24 | 32 | 7.6 | 5.0 | 4.6 | | 5.5 | | 5.8 | 7.1 |
| | Tot. VOC Yearly Ave. | | | | 36 | | | | 46 | | | | 34 | | | | 29 | | | | 23 | | 7.6 | 5.0 | 4.6 | | 5.5 | | | |
| MW-11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 2600 | 150 | 44 | 3400 | 480 | 290 | 31 | na | 50 | 420 | 29 | <50 | 54 | 170 | <50 | <50 | 72 | <50 | 51 | 51 | 42 | 21 | 11 | 12 | NS | 18 | | 7.9 | 6.4 |
| | TCE Yearly Ave. | | | | 1549 | | | | 267 | | | | 125 | | | | 56 | | | | 44 | | 21 | 11 | 12 | | 18 | | | |
| | Total VOC's | 2600 | 150 | 44 | 3400 | 480 | 5090 | 141 | na | 440 | 630 | 375 | 230 | 344 | 1170 | 1700 | <50 | 1062 | 1260 | 105 | 130 | 101 | 49 | 11 | 32 | | 40 | | 7.9 | 6.4 |
| | Tot. VOC Yearly Ave. | | | | 1549 | | | | 1428 | | | | 419 | | | | 804 | | | | 639 | | 49 | 11 | 32 | | 40 | | | |
| MW-12S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 190 | 220 | 280 | 120 | 270 | 190 | 100 | 21 | 46 | 50 | 150 | 140 | 150 | 150 | 180 | 100 | 110 | 170 | 88 | 88 | 100 | 62 | 46 | 27 | NS | 44 | | 25 | 17 |
| | TCE Yearly Ave. | | | | 203 | | | | 145 | | | | 97 | | | | 145 | | | | 114 | | 62 | 46 | 27 | | 44 | | | |
| | Total VOC's | 190 | 220 | 280 | 120 | 270 | 330 | 137 | 23 | 83 | 62 | 196 | 179 | 172 | 183 | 180 | 109 | 119 | 192 | 99 | 102 | 101 | 67 | 49.3 | 29.5 | | 46 | | 25 | 17 |
| | Tot. VOC Yearly Ave. | | | | 203 | | | | 190 | | | | 130 | | | | 161 | | | | 128 | | 67 | 49.3 | 29.5 | | 46 | | | |
| MW-12D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 21 | 13 | 17 | 23 | 17 | 12 | 12 | 13 | 10 | 45 | 10 | 9 | 13 | 11 | 15 | 8 | 7 | 16 | 9 | 5 | 7 | 4.2 | 10 | 3.3 | NS | 5.9 | | 4.4 | 2.8 |
| | TCE Yearly Ave. | | | | 19 | | | | 14 | | | | 19 | | | | 11 | | | | 9 | | 4.2 | 10 | 3.3 | | 5.9 | | | |
| | Total VOC's | 21 | 13 | 17 | 23 | 17 | 14 | 12 | 13 | 11 | 52 | 12 | 9 | 13 | 13 | 15 | 8 | 7 | 16 | 9 | 5 | 7 | 4.2 | 10 | 3.3 | | 5.9 | | 4.4 | 2.8 |
| | Tot. VOC Yearly Ave. | | | | 19 | | | | 14 | | | | 21 | | | | 12 | | | | 9 | | 4.2 | 10 | 3.3 | | 5.9 | | | |

**Misc. Wells not in Settlement Agreement**

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-L16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 41 |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 42.4 |
| MW-BE1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | | | | | | | | | | | | | | | | | | | | | na | na | na | | | | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | na | na | na | | | | | |
| MW-BE2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | | | | | | | | | | | | | | | | | | | | | na | na | na | | | | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | na | na | na | | | | | |
| DEC-23 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | <1 | | <1 | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | <1 | | <1 | | |
| DEC-24 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | NS | | <1 | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | NS | | <1 | | |
| DEC-25 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | 2.3 | | 2.2 | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | 2.3 | | 2.2 | | |
| DEC-26 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | 9.9 | | NS | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | 9.9 | | NS | | |
| DEC-27 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | 4.7 | | NS | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | 4.7 | | NS | | |
| DEC-28 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | 3.5 | | NS | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | 3.5 | | NS | | |
| DEC-29 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | 2.4 | | NS | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | 2.4 | | NS | | |
| DEC-30 | TCE | | | | | | | | | | | | | | | | | | | | | | | | | 1.4 | | 1.2 | | |
| | Total VOC's | | | | | | | | | | | | | | | | | | | | | | | | | 1.4 | | 1.2 | | |

Notes: 1. Units are ug/l.
2. Data from 2/90 thru 11/98 were transcribed from an OBG spreadsheet.
3. Data after 11/98 were entered directly from lab reports.
4. Earliest data are from Upstate Labs, Inc. Data after 3/99 are from Buck Env. Labs, Inc.
5. Wells MW-BE1 and MW-BE2 were installed in 1999 by Buck Engineering.
* Sampling performed by URS; analytical performed by Buck Environmental Laboratories, Inc.
6. Lab analysis by Life Sciences Lab beginning 2/08.
7. Well L16 was constructed inside the building on 12/5/08.
NS = Not Sampled

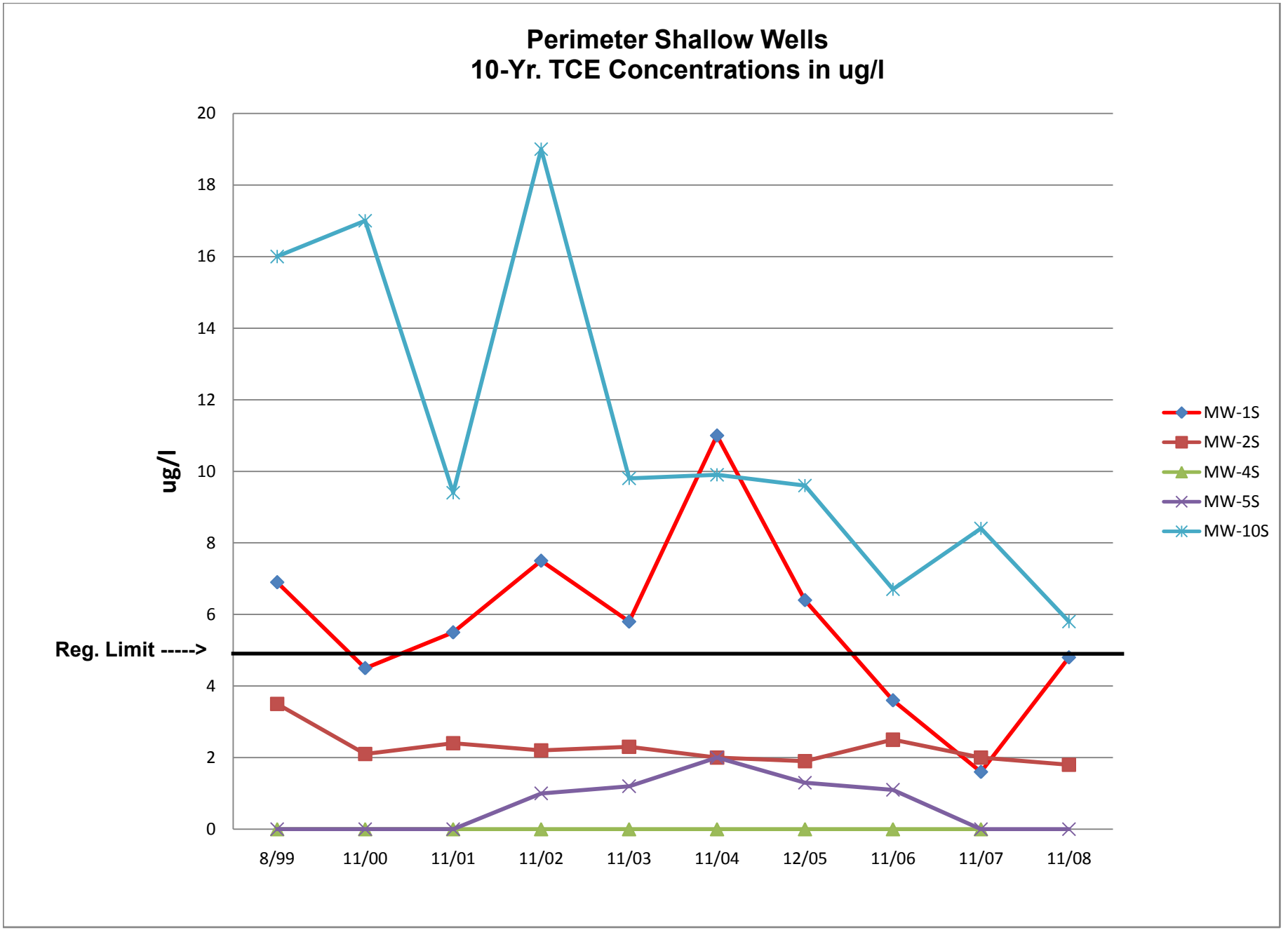
Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*r:\graphs historical TCE*

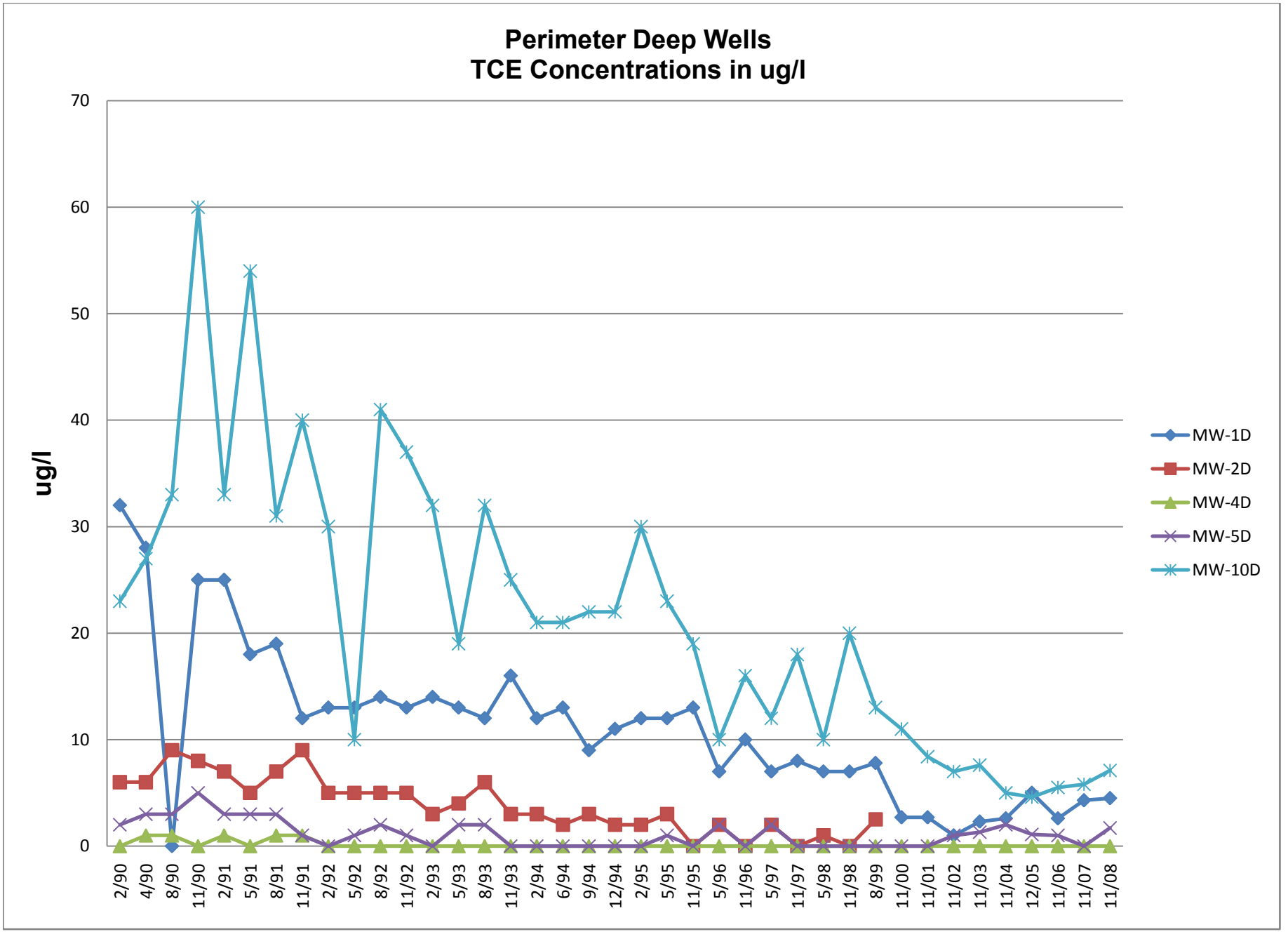
**Fig. F**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*r:\graphs historical TCE*

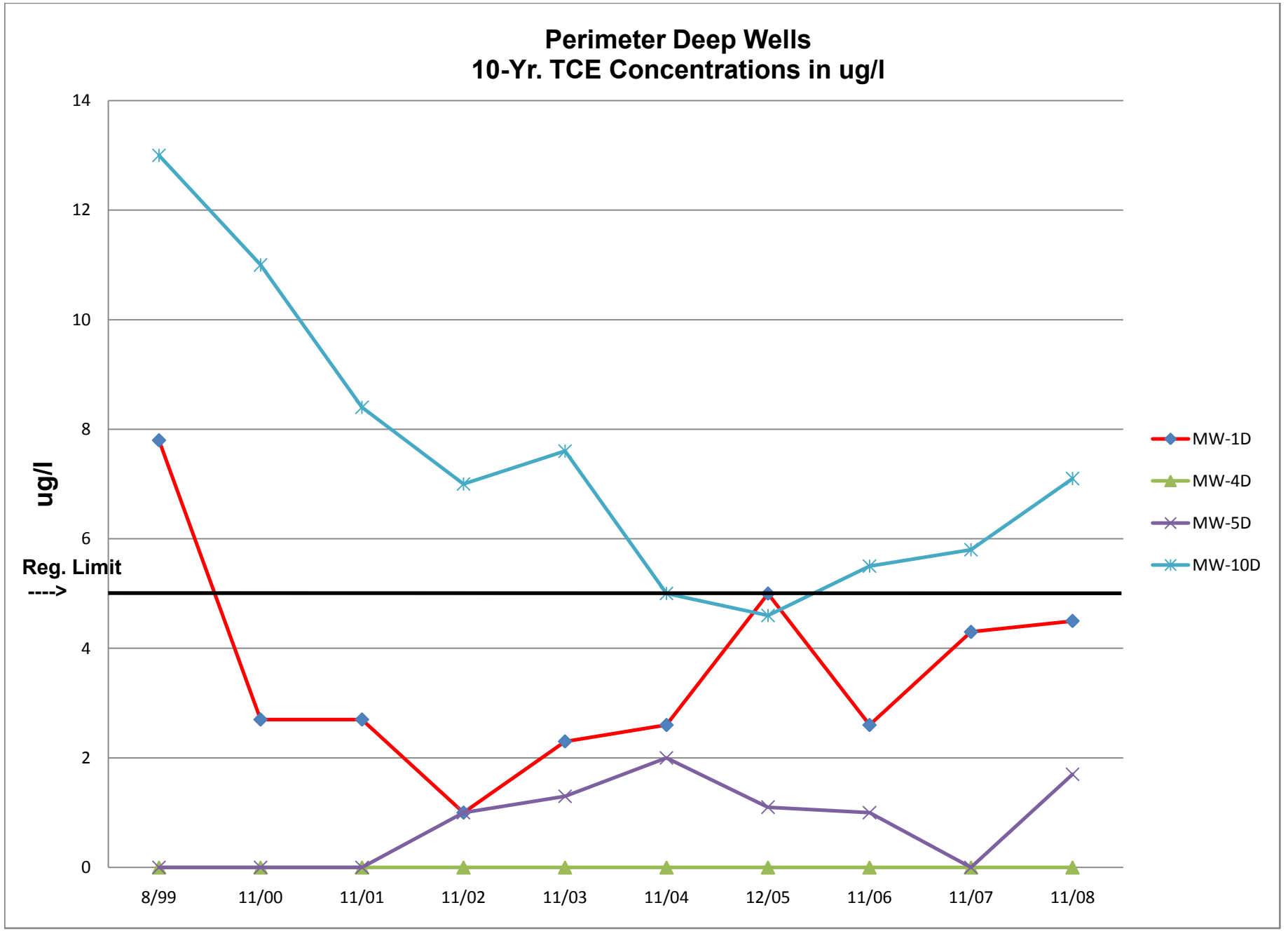
**Fig. G**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*R:\graphs historical TCE*

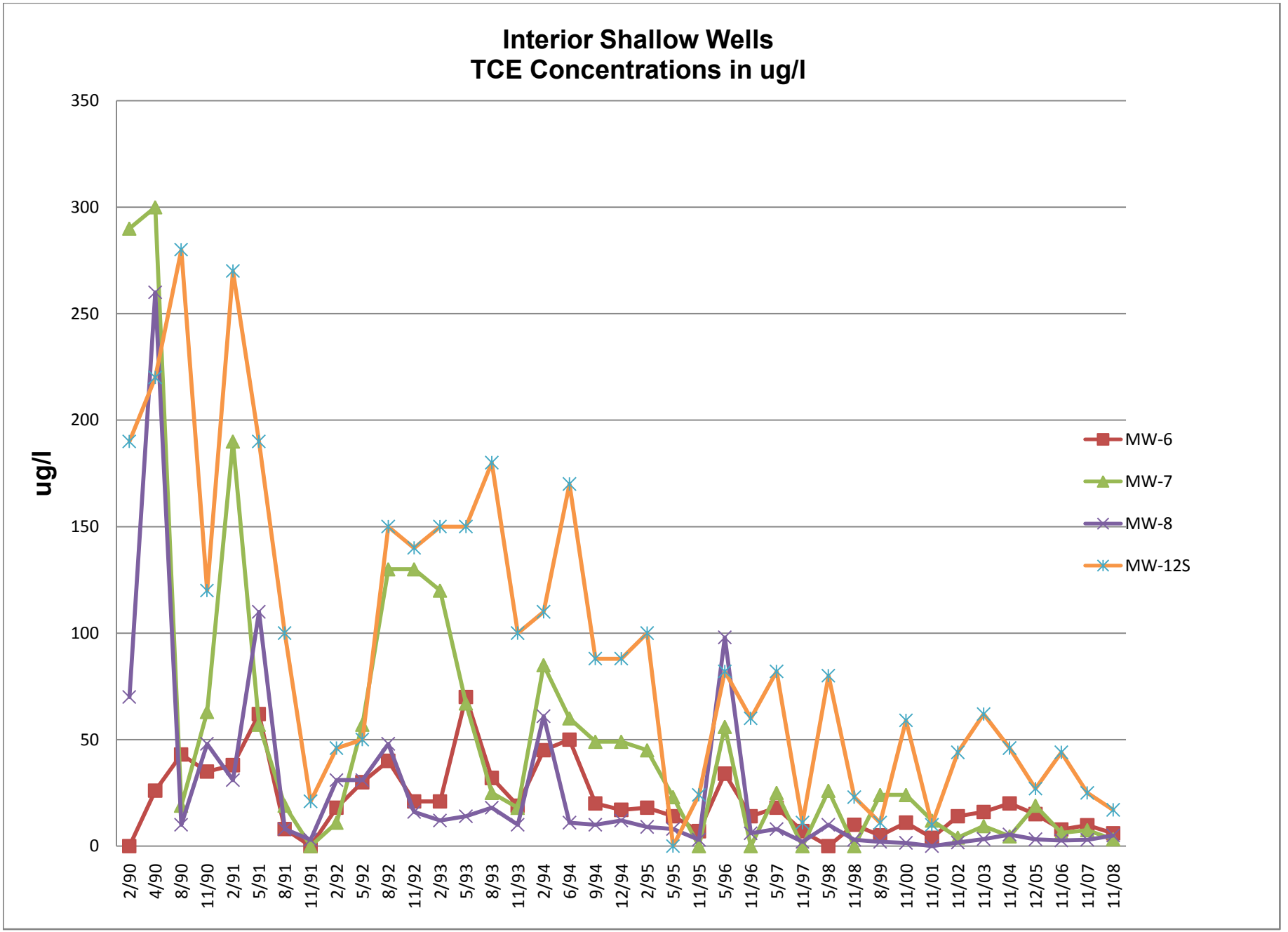
**Fig. H**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*R:\graphs historical TCE*

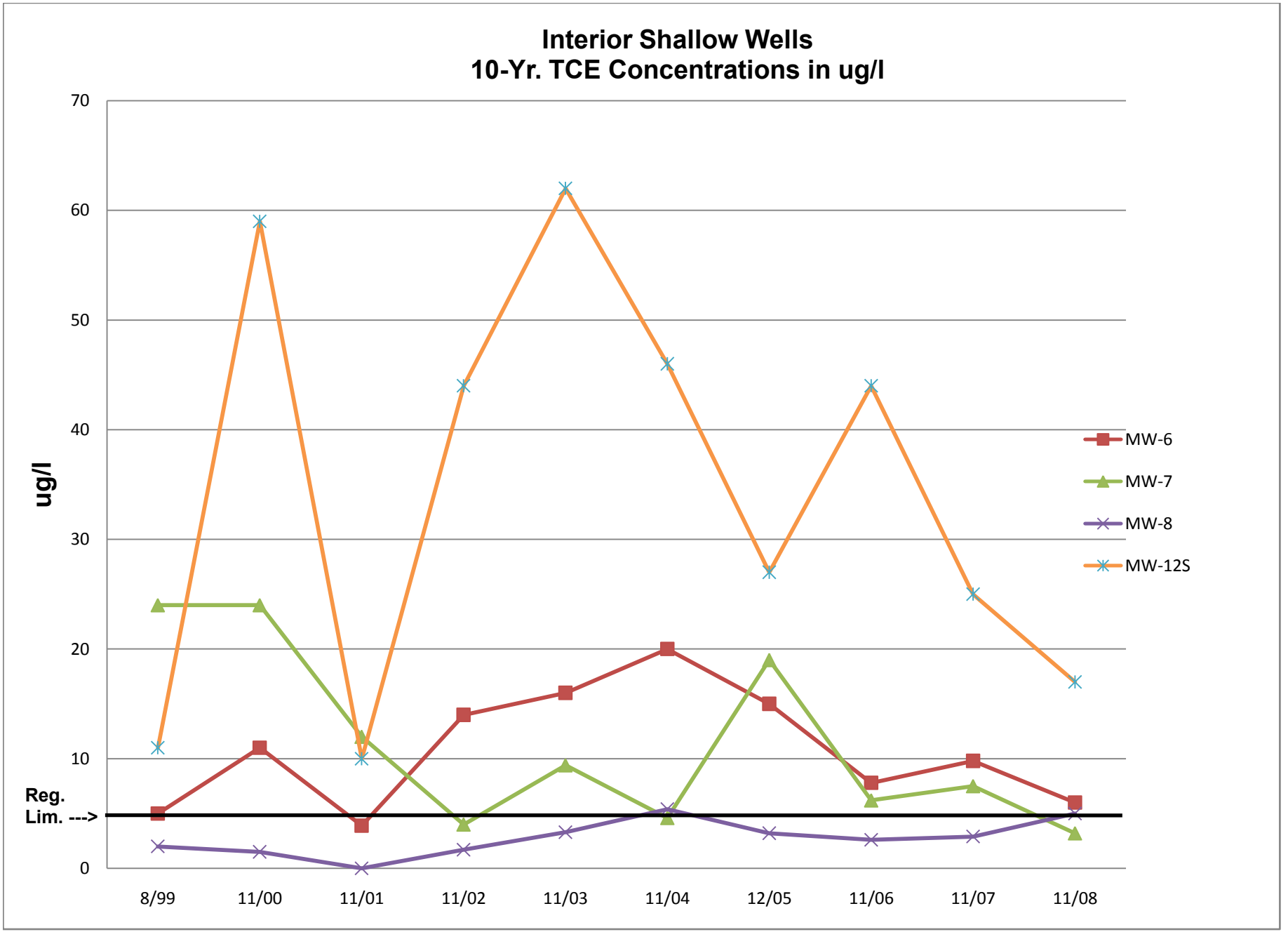
**Fig. I**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*R:\graphs historical TCE*

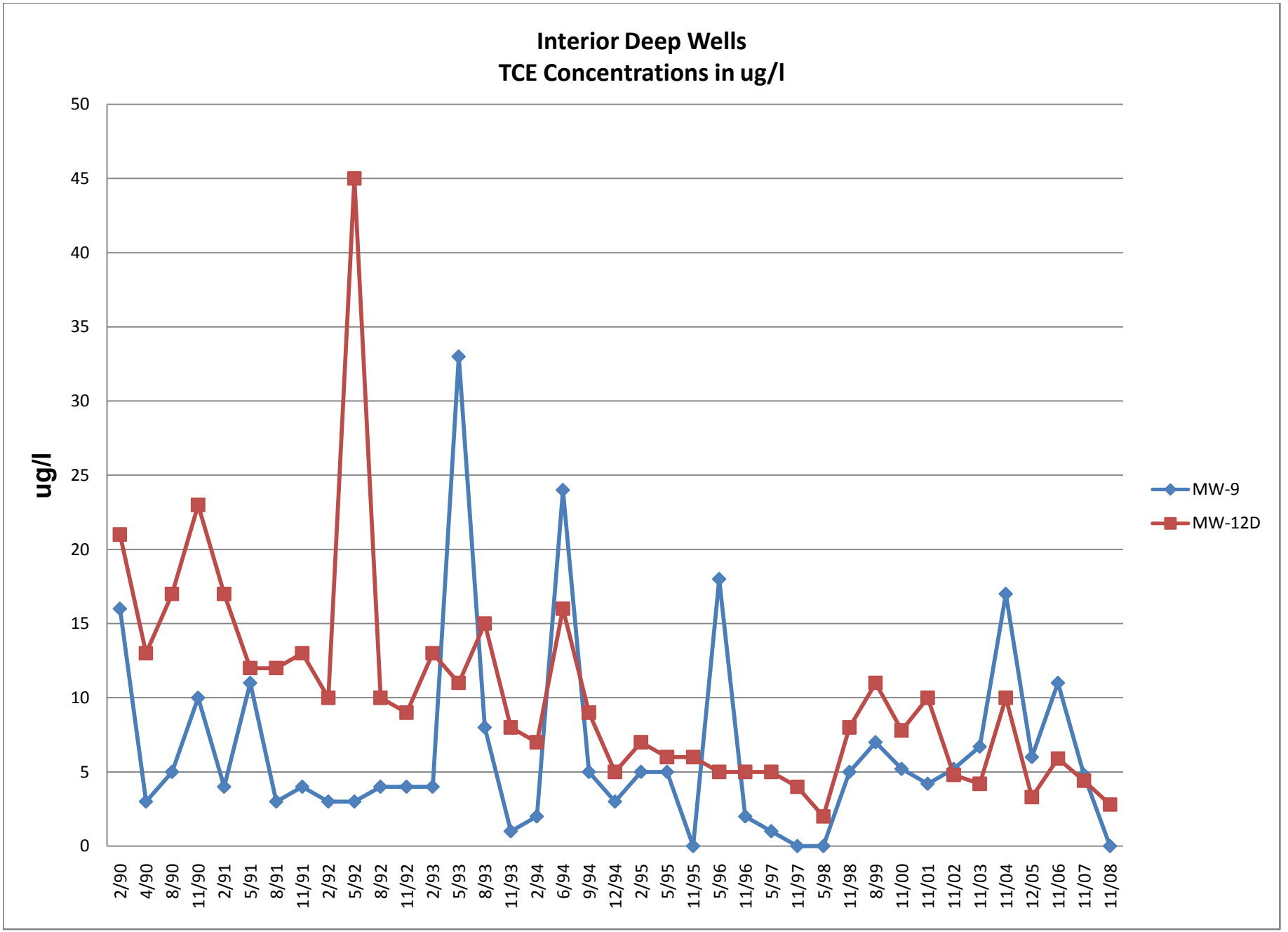
**Fig. J**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*R:\graphs historical TCE*

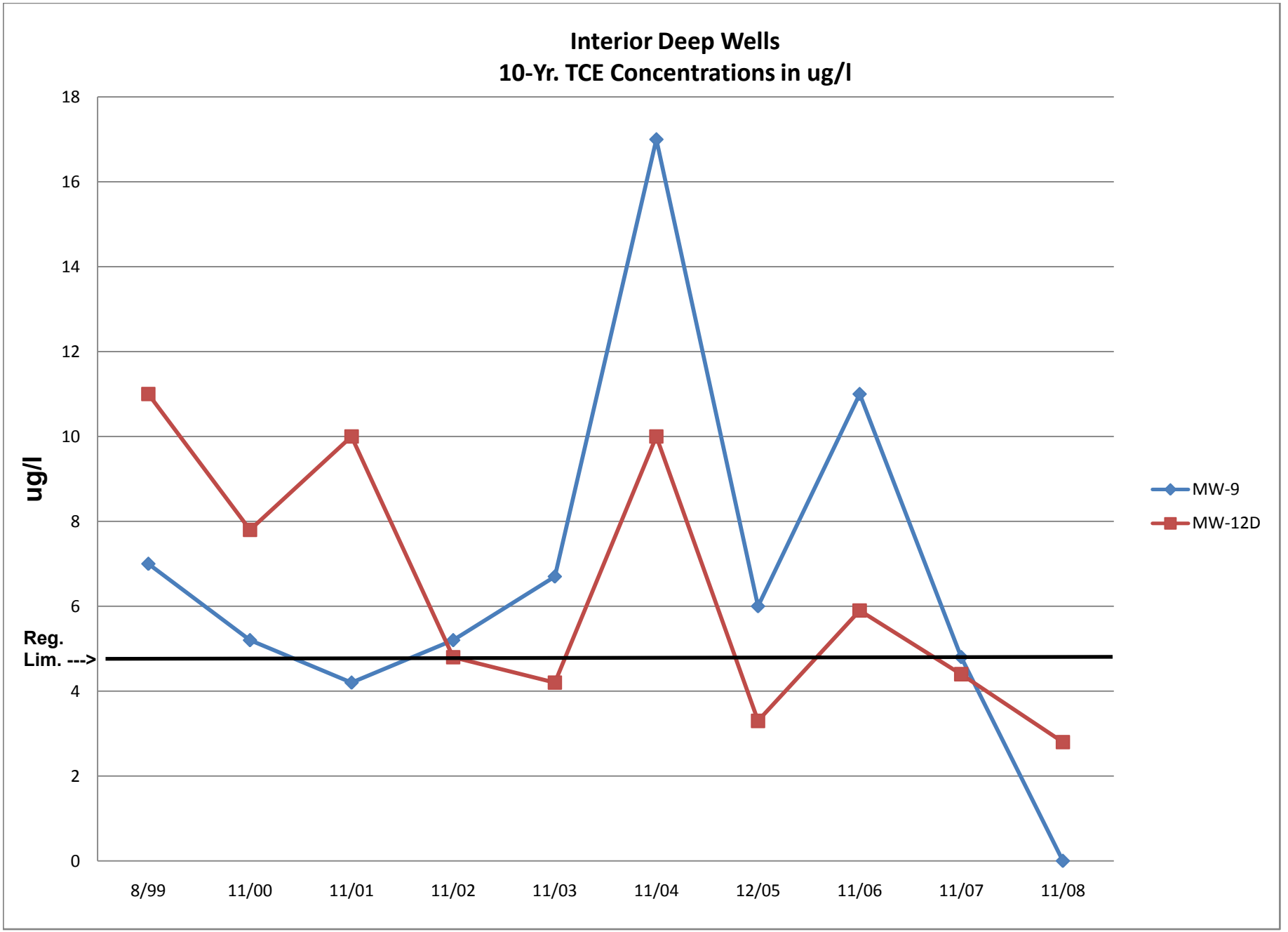
**Fig. K**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*R:\graphs historical TCE*

**Fig. L**




Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427

*R:\graphs historical TCE*

**Fig. M**

## Groundwater Elevation Measurements at SCWP Site, Town of Cortlandville, NY

| NUMBER | reference** CASING ELEV. | CATEGORY. | ELEV 12/5/2005 | ELEV 4/7/2006 | ELEV 5/3/2006 | ELEV 11/20/2006 | ELEV 11/27/2007 | ELEV 2/25/2008 | ELEV 11/26/2008 | ELEV 12/11/2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1S | 1185.75 | s | 1164.69 | 1167.33 | 1166.15 | 1167.44 | 1165.29 | 1168.95 | 1159.70 | |
| MW-1D | 1185.85 | d | 1164.71 | 1167.3 | 1166.08 | 1167.39 | 1163.44 | 1168.89 | 1159.67 | |
| MW-2S | 1210.91 | s | 1164.86 | 1167.47 | 1166.15 | 1167.71 | 1163.49 | 1169.25 | 1159.65 | |
| MW-2D | 1211.61 | d | | | na | na | na | na | na | |
| MW-3 | na | s | | | na | na | na | na | na | |
| MW-4S | 1209.72 | s | 1165.48 | 1168.1 | 1166.52 | 1168.47 | 1163.98 | 1169.99 | 1159.99 | |
| MW-4D | 1210.14 | d | 1165.23 | 1167.58 | 1166.12 | 1168.02 | 1163.74 | 1169.44 | 1159.69 | |
| MW-5S | 1178.46 | s | 1165.14 | 1168.04 | 1167.06 | 1168.06 | 1163.26 | 1169.6 | 1160.54 | |
| MW-5D | 1178.86 | d | 1164.66 | 1167.28 | 1166.28 | 1167.35 | 1162.74 | 1168.84 | 1159.94 | |
| MW-6 | 1212.20 | s | 1166.29 | 1170.15 | 1168.66 | 1170.11 | 1165.11 | 1172.33 | 1161.59 | |
| MW-7 | 1213.82 | s | 1165.92 | 1169.33 | 1167.77 | 1169.31 | 1164.57 | 1171.34 | 1160.84 | |
| MW-8 | 1212.76 | s | 1166.39 | 1170.24 | 1168.69 | 1170.20 | 1165.11 | 1172.44 | 1161.61 | |
| MW-9 | 1212.94 | d | 1165.68 | 1168.94 | 1167.45 | 1169.02 | 1164.36 | 1170.92 | 1160.59 | |
| MW-10S | 1207.23 | s | 1164.7 | 1167.29 | 1166.02 | 1167.46 | 1163.39 | 1168.97 | 1159.58 | |
| MW-10D | 1207.52 | d | 1164.59 | 1167.17 | 1165.89 | 1167.34 | 1163.27 | 1168.78 | 1159.50 | |
| MW-11 | 1214.44 | s | 1166.18 | 1169.59 | 1168.00 | 1169.69 | 1164.79 | 1171.71 | 1161.06 | |
| MW-12S | 1212.94 | s | 1165.47 | 1168.65 | 1167.13 | 1168.76 | 1164.13 | 1170.66 | 1160.32 | |
| MW-12D | 1212.80 | d | 1165.29 | 1168.37 | 1166.82 | 1168.42 | 1163.97 | 1170.3 | 1160.12 | |
| MW-BE1 | 1208.06 | s | | | na | na | na | na | na | |
| MW-BE2 | 1210.55 | s | | | na | na | na | na | na | |
| piezom | 1212.59 | s | na | 1167.535 | 1166.22 | 1167.71 | 1163.51 | 1169.31 | 1159.67 | |
| Recov Wel | 1205.62 | s&d | na | na | 1164.66 | 1166.07 | 1162.06 | 1168.06 | 1157.64 | |
| MW-L16 | 1212.99 | s | | | | | | | | 1163.31 |

** Well casing elevations were determined from survey by Jim Stockwin, LS, 2006

Buck Engineering, LLC
87 Central Ave.
Cortland, NY 13045-0427
607-753-8010

**Fig. N**

## Notes

Basemap by
R. James Stockwin, PLS, May, 2001

Date of Water Elevation Data: 11-26-08 for all wells except MW-16L. MW-L16 elevation measured on 12-11-08.

MW- L16 installed 12-05-08

Add 1100' to Water Elevations Indicated


BUCK ENGINEERING, LLC
87 Central Avenue, P.O.Box 427
Cortland, NY 13045
607-753-8010 Fax 607-753-8037


LICENSED PROFESSIONAL ENGINEER
JOHN H. BUCK
No. 55460
STATE OF NEW YORK

# S.C.W.P., LLC
# Town of Cortlandville
# New York

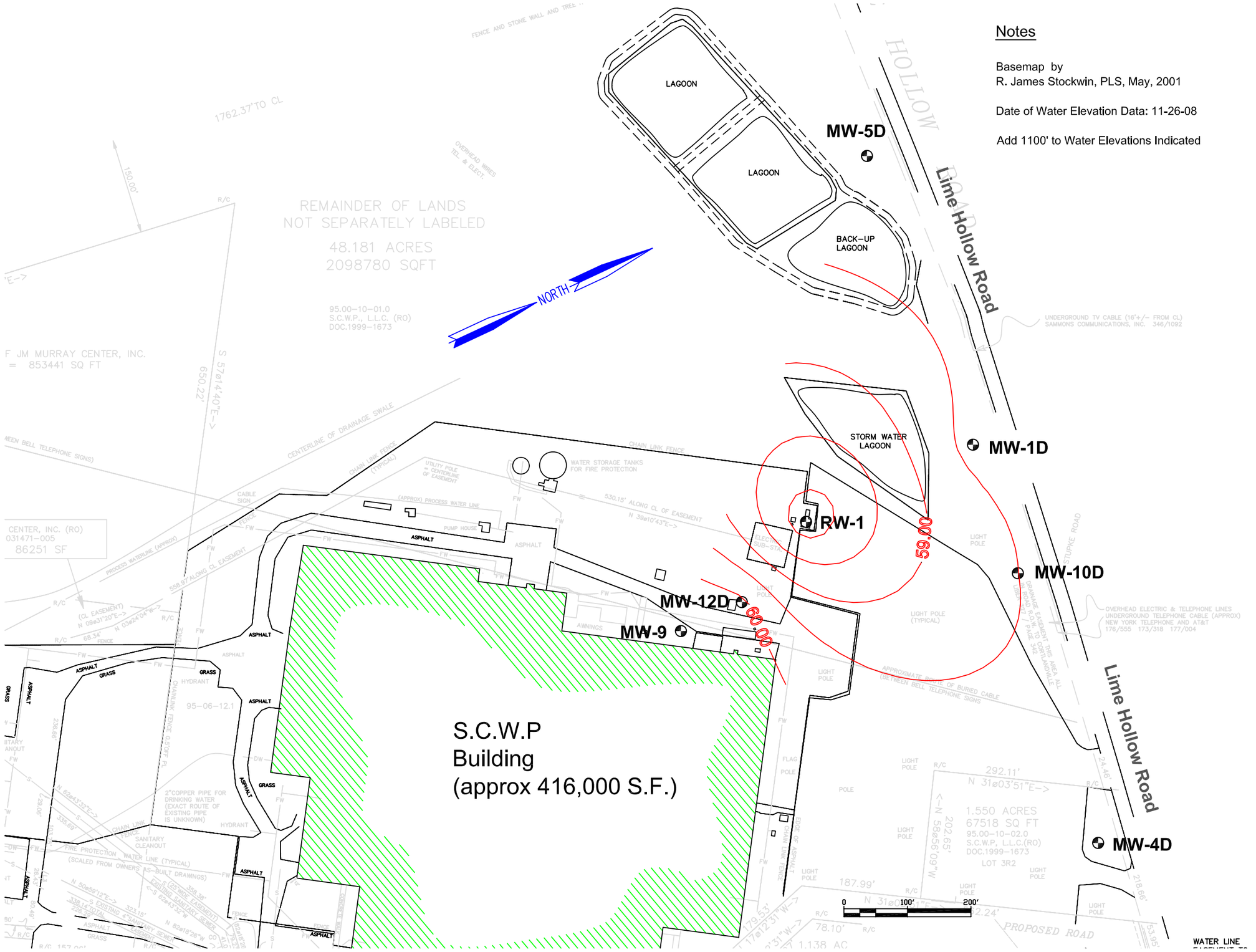
| No. | Revision/Issue | Date |
|---|---|---|
| | | |
| | | |

Groundwater Contours
Shallow Wells
11-26-08

| | |
|---|---|
| Date: | 1-19-09 |
| Project: | S.C.W.P.,LLC. |
| Scale: | See Map |
| Drawn By: | JRH |

**Fig. O**

FNAME 2008 template.dwg
REVDATE
USER




## Notes

Basemap by
R. James Stockwin, PLS, May, 2001

Date of Water Elevation Data: 11-26-08

Add 1100' to Water Elevations Indicated

BUCK
ENGINEERING, LLC
87 Central Avenue, P.O.Box 427
Cortland, NY 13045
607-753-8010 Fax 607-753-8037

LICENSED PROFESSIONAL ENGINEER
JOHN H. BUCK
No. 55460
STATE OF NEW YORK

# S.C.W.P., LLC
# Town of Cortlandville
# New York

| No. | Revision/Issue | Date |
|---|---|---|
| | | |

Groundwater
Contours
Deep Wells
11-26-08

| | |
|---|---|
| Date: | 1-15-09 |
| Project: | S.C.W.P.,LLC. |
| Scale: | See Map |
| Drawn By: | JRH |

FNAME 2008 template.dwg
REVDATE
USER

**Fig. P**

# APPENDIX

Sampling Log Sheets and Chain of Custody Form

Laboratory Reports from Life Sciences Laboratories

87 CENTRAL AVENUE • P.O. BOX 427
CORTLAND, NY 13045-0427
(607)753-8010 • FAX (607)753-8037

Date: 11/26/08 Tech: J. Houskamp, J. Buck Lab Log No: _____

Client: SCWP Site: _____

| Well I.D: | MW4-S | MW-4d | MW-2S | MW-2d | MW-5d | MW-5S | MW-1S |
|---|---|---|---|---|---|---|---|
| Total Well Depth (ft) | ~61' | 765' | 64' | | ~55' | ~32' | ~38 |
| Well Diameter (inches) | 2" | 2" | 2" | 2" | 2" | 2" | 2" |
| Depth to Free Product (ft) | | | | | | | |
| Product Thickness (ft) | | | | | | | |
| | | | | | | | |
| Depth to Groundwater (ft) | 49.73 | 50.45 | 51.26 | | 18.92 | 17.92 | 26.05 |
| | | | | | | | |
| Required Purge Volume (gal) (See calculations below) | 5gal | 8gal | | | 7gal | 10gal | 6 |
| Actual Purge Volume (gal) | | | | | | | |
| Purge Method (see list below) | | | | | | | |
| Time Sampled: | | | | | | | |
| Observations | | | | damaged casing | | | |
| Color | | | | | | | |
| Odor (Y/N) | | | | | | | |
| Sheen (Y/N) | | | | | | | |
| Temp (°C) | | | | | | | |
| Turbidity (NTU) | | | | | | | |
| pH | | | | | | | |
| EH (mv) | | | | | | | |
| Conductivity (uMHO) | | | | | | | |
| DO (ug/L) | | | | | | | |

**Purge Volume Calculations:** Purge volumes are directly proportional to the height of the water column and diameter of the monitoring well casing as follows:

2" Monitoring Well: Water column height (ft) / 2 = 3 well volume purge (gallons)
3" Monitoring Well: Water column height (ft) = 3 well volume purge (gallons)
4" Monitoring Well: Water column height (ft) x 2 = 3 well volume purge (gallons)

**Purge Method(s):** (1) Laboratory hand bailer, (2) Dedicated hand bailer, (3) Disposable hand bailer, (4) Bladder pump, (5) Peristaltic pump
(6) Other _____

**Comments:** _____

Date: 11/26/08 Tech: J. Houskamp Lab Log No: _____

Client: _____ Site: _____

| Well I.D: | MW-1d | MW-10D | MW-10S | MW-6 | MW-8 | MW-7 | MW-11 |
|---|---|---|---|---|---|---|---|
| Total Well Depth (ft) | ~62' | >67' | 60' | 58 | 63 | | 58 |
| Well Diameter (inches) | 2" | 2" | 2" | 2" | 2" | 2" | 2" |
| Depth to Free Product (ft) | | | | | | | |
| Product Thickness (ft) | | | | | | | |
| Depth to Groundwater (ft) | 26.18 | 48.02 | 47.65 | 50.61 | 51.15 | 52.98 | 53.38 |
| Required Purge Volume (gal) (See calculations below) | 15gal | 10gal | 6.5gal | 4 | 6 | 4 | 25 |
| Actual Purge Volume (gal) | | | | | | | |
| Purge Method (see list below) | | | | | | | |
| Time Sampled: | | | | | | | |
| Observations | | | | | | Brown Water Around Casing | Brown bailer & water |
| Color | | | | | | | |
| Odor (Y/N) | | | | | | | |
| Sheen (Y/N) | | | | | | | |
| Temp (°C) | | | | | | | |
| Turbidity (NTU) | | | | | | Broken | |
| pH | | | | | | | |
| EH (mv) | | | | | | | |
| Conductivity (uMHO) | | | | | | | |
| DO (ug/L) | | | | | | | |

**Purge Volume Calculations:** Purge volumes are directly proportional to the height of the water column and diameter of the monitoring well casing as follows:

2" Monitoring Well: Water column height (ft) / 2 = 3 well volume purge (gallons)
3" Monitoring Well: Water column height (ft) = 3 well volume purge (gallons)
4" Monitoring Well: Water column height (ft) x 2 = 3 well volume purge (gallons)

**Purge Method(s):** (1) Laboratory hand bailer, (2) Dedicated hand bailer, (3) Disposable hand bailer, (4) Bladder pump, (5) Peristaltic pump
(6) Other _____

**Comments:** _____

Date: 11/26/08 Tech: J Houskamp / J Buck Lab Log No: _____

Client: SCWP Site: _____

| Well I.D: | MW-9 | MW-12d | MW-12s | | | | |
|---|---|---|---|---|---|---|---|
| Total Well Depth (ft) | >65' | 765 south | north 60' | | | | |
| Well Diameter (inches) | 2" | 2" | 2" | | | | |
| Depth to Free Product (ft) | | | | | | | |
| Product Thickness (ft) | | | | | | | |
| | | | | | | | |
| Depth to Groundwater (ft) | 52.35 | 52.68 | 52.62 | | | | |
| | | | | | | | |
| Required Purge Volume (gal) (See calculations below) | 10 gal | 10 gal | 4 gal | | | | |
| Actual Purge Volume (gal) | | | | | | | |
| Purge Method (see list below) | | | | | | | |
| Time Sampled: | | | | | | | |
| Observations | | | | | | | |
| Color | | | | | | | |
| Odor (Y/N) | | | | | | | |
| Sheen (Y/N) | | | | | | | |
| Temp (°C) | | | | | | | |
| Turbidity (NTU) | | | | | | | |
| pH | | | | | | | |
| EH (mv) | | | | | | | |
| Conductivity (uMHO) | | | | | | | |
| DO (ug/L) | | | | | | | |

**Purge Volume Calculations:** Purge volumes are directly proportional to the height of the water column and diameter of the monitoring well casing as follows:

2" Monitoring Well: Water column height (ft) / 2 = 3 well volume purge (gallons)
3" Monitoring Well: Water column height (ft) = 3 well volume purge (gallons)
4" Monitoring Well: Water column height (ft) x 2 = 3 well volume purge (gallons)

**Purge Method(s):** (1) Laboratory hand bailer, (2) Dedicated hand bailer, (3) Disposable hand bailer, (4) Bladder pump, (5) Peristaltic pump
(6) Other _____

**Comments:** _____

Life Science Laboratories, Inc.
5854 Butternut Drive
East Syracuse, NY 13057

# Chain of Custody Record

0821466

Phone # (315) 445-1105 Telefax # (315) 445-1301

Contact Person: John Buck

LSL Project # BuckEng

Client: Buck Engineering Phone # (607) 753-8010

Address: 87 Central Ave. Fax # (607) 753-8032

Cortland, NY 13045

Client's Site I.D.: SCWP

Authorization:

Client's Project I.D.:

| LSL Sample Number | Client's Sample Identifications | Sample Date | Sample Time | Type: grab | Type: comp. | Matrix | Preserv. Added | Containers: # | Containers: size/type | Analyses | Free Cl (mg/l) | Pres. Check |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001 AB | MW-4S | 11/26/08 | 935 | ✓ | | W | HCl | 2 | 40ml | TCE + (see note below) | | |
| 002 | MW-4d | | 930 | ✓ | | | | | | | | |
| 003 | MW-2S | | 956 | | | | | | | | | |
| 004 | MW-5S | | 1030 | | | | | | | | | |
| 005 | MW-5d | | 1035 | | | | | | | | | |
| 006 | MW-1S | | 1130 | | | | | | | | | |
| 007 | MW-1d | | 1130 | | | | | | | | | |
| 008 | MW-10S | | 1205 | | | | | | | | | |
| 009 | MW-10d | | 1158 | | | | | | | | | |
| 010 | MW-6 | | 200 | | | | | | | | | |
| 011 | MW-8 | | 155 | | | | | | | | | |
| 012 | MW-7 | | 235 | | | | | | | | | |
| 013 | MW-11 | | 230 | | | | | | | | | |
| 014 | MW-9 | | 255 | | | | | | | | | |
| 015 | MW-12S | | 350 | | | | | | | | | |
| 016 ↓ | MW-12d | | 340 | | | | | | | | | |
| 017 AB | | | | | | | | | | Trip Blank | | |

Notes and Hazard identifications:

**Analyte List:**
Trichloroethene, Tetrachloroethene,
11-Dichloroethene, 12-Dichloroethene,
111 trichloroethane, vinyl chloride

| Custody Transfers | | Date | Time |
|---|---|---|---|
| Sampled By: John R Hawley | Received By: | | |
| Relinquished By: J. E. Buck | Received By: | | |
| Relinquished By: | Received for Lab By: R Dunbar | 12-01-08 | 09:30 IN |

Shipment Method: Samples Received Intact: Y N 6.0°C

**John Buck**
**Buck Engineering, LLC**
**PO Box 427**
**87 Central Ave**
**Cortland, NY 13045**

**Phone: (607) 753-8010**

# Laboratory Analysis Report

# For

# Buck Engineering, LLC

Client Project ID:

**SCWP**

LSL Project ID: **0821466**

**Receive Date/Time:** 12/01/08 9:30

**Project Received by:** RD



# Life Science Laboratories, Inc.

| | | |
|---|---|---|
| (1) LSL Central Lab, East Syracuse, NY | (315) 445-1105 | NYS DOH ELAP #10248 PA DEP #68-2556 |
| (2) LSL North Lab, Waddington, NY | (315) 388-4476 | NYS DOH ELAP #10900 |
| (3) LSL Finger Lakes Lab, Wayland, NY | (585) 728-3320 | NYS DOH ELAP #11667 |
| (4) LSL Southern Tier Lab, Cuba, NY | (585) 968-2640 | NYS DOH ELAP #10760 |
| (5) LSL MidLakes Lab, Canandaigua, NY | (585) 396-0270 | NYS DOH ELAP #11369 |
| (6) LSL Brittonfield Lab, East Syracuse, NY | (315) 437-0200 | NYS DOH ELAP #10155 |

*This report was reviewed by:* Debby Kompf, QA *Date:* 12/15/08

Life Science Laboratories, Inc.

*A copy of this report was sent to:*



**Date Printed:** 12/15/08

# - - LABORATORY ANALYSIS REPORT - -

*Buck Engineering, LLC  Cortland, NY*

**Sample ID:** MW-4S  **LSL Sample ID:** 0821466-001

**Location:**

**Sampled:** 11/26/08 9:35  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/2/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/2/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/2/08 | BD |
| Trichloroethene | <1 | ug/l | | 12/2/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/2/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/2/08 | BD |
| Surrogate (1,2-DCA-d4) | 101 | %R | | 12/2/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/2/08 | BD |
| Surrogate (4-BFB) | 101 | %R | | 12/2/08 | BD |

**Sample ID:** MW-4D  **LSL Sample ID:** 0821466-002

**Location:**

**Sampled:** 11/26/08 9:36  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/2/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/2/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/2/08 | BD |
| Trichloroethene | <1 | ug/l | | 12/2/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/2/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/2/08 | BD |
| Surrogate (1,2-DCA-d4) | 99 | %R | | 12/2/08 | BD |
| Surrogate (Tol-d8) | 102 | %R | | 12/2/08 | BD |
| Surrogate (4-BFB) | 102 | %R | | 12/2/08 | BD |

**Sample ID:** MW-2S  **LSL Sample ID:** 0821466-003

**Location:**

**Sampled:** 11/26/08 9:56  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/2/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/2/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/2/08 | BD |
| Trichloroethene | 1.8 | ug/l | | 12/2/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/2/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/2/08 | BD |
| Surrogate (1,2-DCA-d4) | 103 | %R | | 12/2/08 | BD |
| Surrogate (Tol-d8) | 102 | %R | | 12/2/08 | BD |
| Surrogate (4-BFB) | 102 | %R | | 12/2/08 | BD |

# - - LABORATORY ANALYSIS REPORT - -

*Buck Engineering, LLC  Cortland, NY*

**Sample ID:** MW-5S  **LSL Sample ID:** 0821466-004

**Location:**

**Sampled:** 11/26/08 10:30  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/2/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/2/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/2/08 | BD |
| Trichloroethene | <1 | ug/l | | 12/2/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/2/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/2/08 | BD |
| Surrogate (1,2-DCA-d4) | 103 | %R | | 12/2/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/2/08 | BD |
| Surrogate (4-BFB) | 100 | %R | | 12/2/08 | BD |

**Sample ID:** MW-5D  **LSL Sample ID:** 0821466-005

**Location:**

**Sampled:** 11/26/08 10:35  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/2/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/2/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/2/08 | BD |
| Trichloroethene | 1.7 | ug/l | | 12/2/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/2/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/2/08 | BD |
| Surrogate (1,2-DCA-d4) | 105 | %R | | 12/2/08 | BD |
| Surrogate (Tol-d8) | 102 | %R | | 12/2/08 | BD |
| Surrogate (4-BFB) | 105 | %R | | 12/2/08 | BD |

**Sample ID:** MW-1S  **LSL Sample ID:** 0821466-006

**Location:**

**Sampled:** 11/26/08 11:30  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/2/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/2/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/2/08 | BD |
| Trichloroethene | 4.8 | ug/l | | 12/2/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/2/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/2/08 | BD |
| Surrogate (1,2-DCA-d4) | 104 | %R | | 12/2/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/2/08 | BD |
| Surrogate (4-BFB) | 103 | %R | | 12/2/08 | BD |

# -- LABORATORY ANALYSIS REPORT --

*Buck Engineering, LLC  Cortland, NY*

**Sample ID:** MW-1D  **LSL Sample ID:** 0821466-007

**Location:**

**Sampled:** 11/26/08 11:30  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 4.5 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 100 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 103 | %R | | 12/3/08 | BD |

**Sample ID:** MW-10S  **LSL Sample ID:** 0821466-008

**Location:**

**Sampled:** 11/26/08 12:05  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 5.8 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 103 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 102 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 103 | %R | | 12/3/08 | BD |

**Sample ID:** MW-10D  **LSL Sample ID:** 0821466-009

**Location:**

**Sampled:** 11/26/08 11:58  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 7.1 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 103 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 100 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 103 | %R | | 12/3/08 | BD |



**Life Science Laboratories, Inc.**

**Date Printed:** 12/15/08

**Analysis performed at:** *(1) LSL Central, (2) LSL North, (3) LSL Finger Lakes, (4) LSL Southern Tier, (5) LSL MidLakes, (6) LSL Brittonfield*

# - - LABORATORY ANALYSIS REPORT - -

*Buck Engineering, LLC  Cortland, NY*

**Sample ID:** MW-6 **LSL Sample ID:** 0821466-010
**Location:**
**Sampled:** 11/26/08 14:00 **Sampled By:** JRH
**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 6.0 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 103 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 100 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 104 | %R | | 12/3/08 | BD |

**Sample ID:** MW-8 **LSL Sample ID:** 0821466-011
**Location:**
**Sampled:** 11/26/08 13:55 **Sampled By:** JRH
**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 5.0 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 101 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 103 | %R | | 12/3/08 | BD |

**Sample ID:** MW-7 **LSL Sample ID:** 0821466-012
**Location:**
**Sampled:** 11/26/08 14:35 **Sampled By:** JRH
**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 3.2 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 102 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 102 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 104 | %R | | 12/3/08 | BD |



**Life Science Laboratories, Inc.**

**Date Printed:** 12/15/08

**Analysis performed at:** *(1) LSL Central, (2) LSL North, (3) LSL Finger Lakes, (4) LSL Southern Tier, (5) LSL MidLakes, (6) LSL Brittonfield*

# - - LABORATORY ANALYSIS REPORT - -

*Buck Engineering, LLC  Cortland, NY*

**Sample ID:** MW-11 **LSL Sample ID:** 0821466-013
**Location:**
**Sampled:** 11/26/08 14:30 **Sampled By:** JRH
**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 6.4 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 102 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 100 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 102 | %R | | 12/3/08 | BD |

**Sample ID:** MW-9 **LSL Sample ID:** 0821466-014
**Location:**
**Sampled:** 11/26/08 14:55 **Sampled By:** JRH
**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | <1 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 104 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 102 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 100 | %R | | 12/3/08 | BD |

**Sample ID:** MW-12S **LSL Sample ID:** 0821466-015
**Location:**
**Sampled:** 11/26/08 15:50 **Sampled By:** JRH
**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 17 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 104 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 103 | %R | | 12/3/08 | BD |

# - - LABORATORY ANALYSIS REPORT - -

*Buck Engineering, LLC  Cortland, NY*

**Sample ID:** MW-12D  **LSL Sample ID:** 0821466-016

**Location:**

**Sampled:** 11/26/08 15:40  **Sampled By:** JRH

**Sample Matrix:** NPW

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | 2.8 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 104 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 100 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 104 | %R | | 12/3/08 | BD |

**Sample ID:** Trip Blank  **LSL Sample ID:** 0821466-017

**Location:**

**Sampled:** 11/26/08 0:00  **Sampled By:**

**Sample Matrix:** TB

| Analytical Method / Analyte | Result | Units | Prep Date | Analysis Date & Time | Analyst Initials |
|---|---|---|---|---|---|
| (1) EPA 8260B Volatiles (Partial List) | | | | | |
| 1,1,1-Trichloroethane | <1 | ug/l | | 12/3/08 | BD |
| 1,1-Dichloroethene | <1 | ug/l | | 12/3/08 | BD |
| 1,2-Dichloroethene, Total | <1 | ug/l | | 12/3/08 | BD |
| Trichloroethene | <1 | ug/l | | 12/3/08 | BD |
| Tetrachloroethene | <1 | ug/l | | 12/3/08 | BD |
| Vinyl chloride | <1 | ug/l | | 12/3/08 | BD |
| Surrogate (1,2-DCA-d4) | 103 | %R | | 12/3/08 | BD |
| Surrogate (Tol-d8) | 101 | %R | | 12/3/08 | BD |
| Surrogate (4-BFB) | 100 | %R | | 12/3/08 | BD |



**Life Science Laboratories, Inc.**

**Date Printed:** 12/15/08

**Analysis performed at:** *(1) LSL Central, (2) LSL North, (3) LSL Finger Lakes, (4) LSL Southern Tier, (5) LSL MidLakes, (6) LSL Brittonfield*

LSL

## SURROGATE RECOVERY CONTROL LIMITS FOR ORGANIC METHODS

| Method | Surrogate(s) | Water Limits, %R | SHW Limits, %R |
|---|---|---|---|
| EPA 504 | TCMX | 80-120 | NA |
| EPA 508 | DCB | 70-130 | NA |
| EPA 515.4 | DCAA | 70-130 | NA |
| EPA 524.2 | 1,2-DCA-d4, 4-BFB | 80-120 | NA |
| EPA 525.2 | 1,3-DM-2-NB, TPP, Per-d12 | 70-130 | NA |
| EPA 526 | 1,3-DM-2-NB, TPP | 70-130 | NA |
| EPA 528 | 2-CP-3,4,5,6-d4, 2,4,6-TBP | 70-130 | NA |
| EPA 551.1 | Decafluorobiphenyl | 80-120 | NA |
| EPA 552.2 | 2,3-DBPA | 70-130 | NA |
| EPA 601 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | NA |
| EPA 602 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | NA |
| EPA 608 | TCMX, DCB | 30-150 | NA |
| EPA 624 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | NA |
| EPA 625, AE | 2-Fluorophenol | 21-110 | NA |
| EPA 625, AE | Phenol-d5 | 10-110 | NA |
| EPA 625, AE | 2,4,6-Tribromophenol | 10-123 | NA |
| EPA 625, BN | Nitrobenzene-d5 | 35-114 | NA |
| EPA 625, BN | 2-Fluorobiphenyl | 43-116 | NA |
| EPA 625, BN | Terphenyl-d14 | 33-141 | NA |
| EPA 8010 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | 70-130 |
| EPA 8020 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | 70-130 |
| EPA 8021 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | 70-130 |
| EPA 8081 | TCMX, DCB | 30-150 | 30-150 |
| EPA 8082 | DCB | 30-150 | 30-150 |
| EPA 8151 | DCAA | 30-130 | 30-120 |
| EPA 8260 | 1,2-DCA-d4, Tol-d8, 4-BFB | 70-130 | 70-130 |
| EPA 8270, AE | 2-Fluorophenol | 21-110 | 25-121 |
| EPA 8270, AE | Phenol-d5 | 10-110 | 24-113 |
| EPA 8270, AE | 2,4,6-Tribromophenol | 10-123 | 19-122 |
| EPA 8270, BN | Nitrobenzene-d5 | 35-114 | 23-120 |
| EPA 8270, BN | 2-Fluorobiphenyl | 43-116 | 30-115 |
| EPA 8270, BN | Terphenyl-d14 | 33-141 | 18-137 |
| DOH 310-13 | Terphenyl-d14 | 40-110 | 40-110 |
| DOH 310-14 | Terphenyl-d14 | 40-110 | 40-110 |
| DOH 310-15 | Terphenyl-d14 | 40-110 | 40-110 |
| DOH 310-34 | 4-BFB | 50-150 | 50-150 |
| DOH 313-4 | DCB | NA | 30-150 |
| 8015M_GRO | 4-BFB | 50-150 | 50-150 |
| 8015M_DRO | Terphenyl-d14 | 50-150 | 50-150 |

| Units Key: | ug/l = microgram per liter<br>ug/kg = microgram per kilogram<br>mg/l = milligram per liter<br>mg/kg = milligram per kilogram<br>%R = Percent Recovery |
|---|---|