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# OU 1 Annual Report

# Pump & Treat, Air Sparge, and Soil Vapor Extraction

# System Start through December 1998

**Volume 2 of 2**

**Mound Plant**
**Miamisburg, OH**

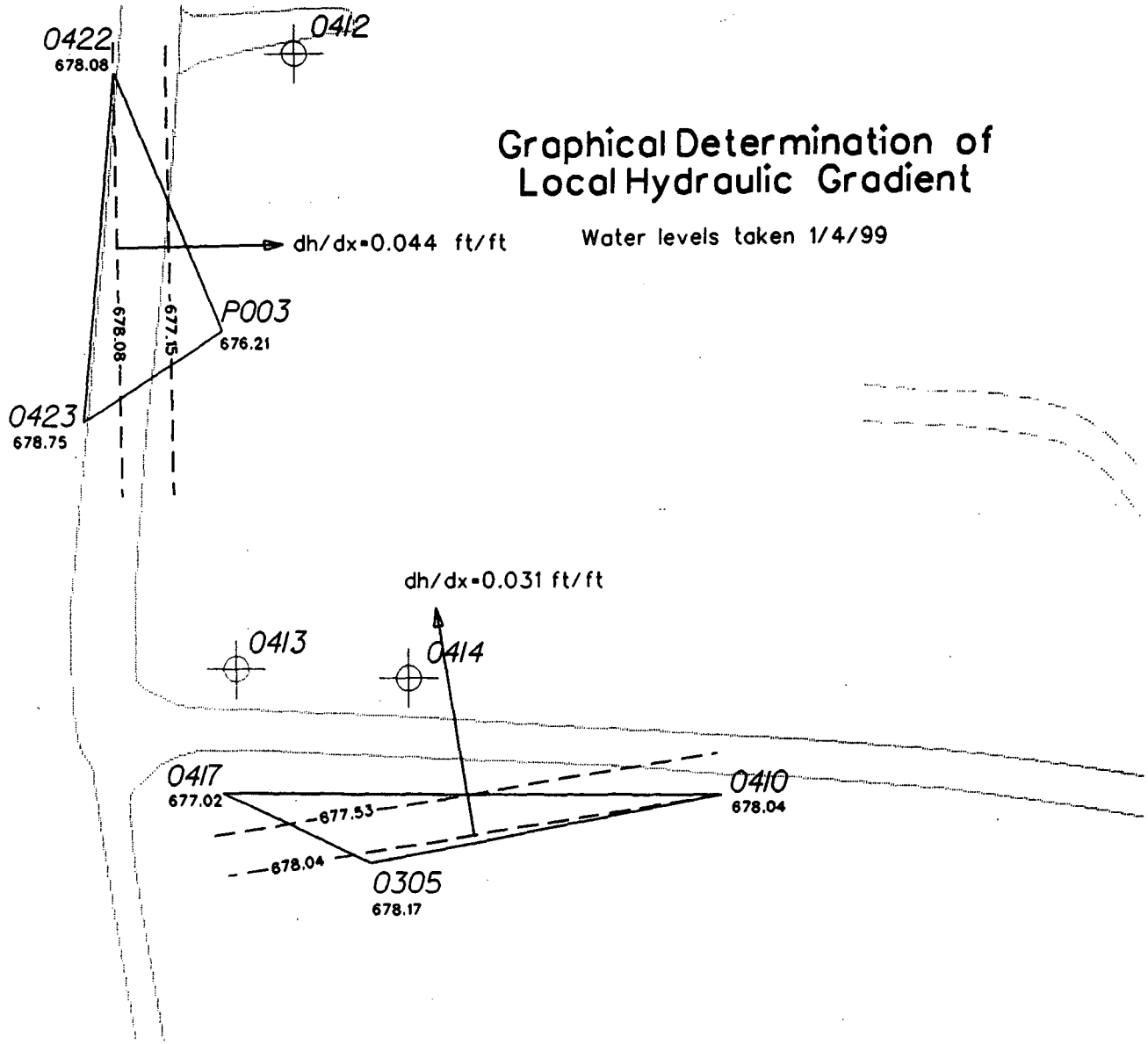
**August 1999**

**Department of Energy**
**Ohio Field Office**

**Prepared by the Soils Project of**
**BABCOCK & WILCOX OF OHIO**

# Graphical Determination of Local Hydraulic Gradient

Water levels taken 1/4/99

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Scale in Feet

MOUND
Environmental Restoration Geographic Information System

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PART CLASSIFICATION

DRAWING CLASSIFICATION: UNCLASSIFIED

SIZE | DRAWING NUMBER | JOB NUMBER

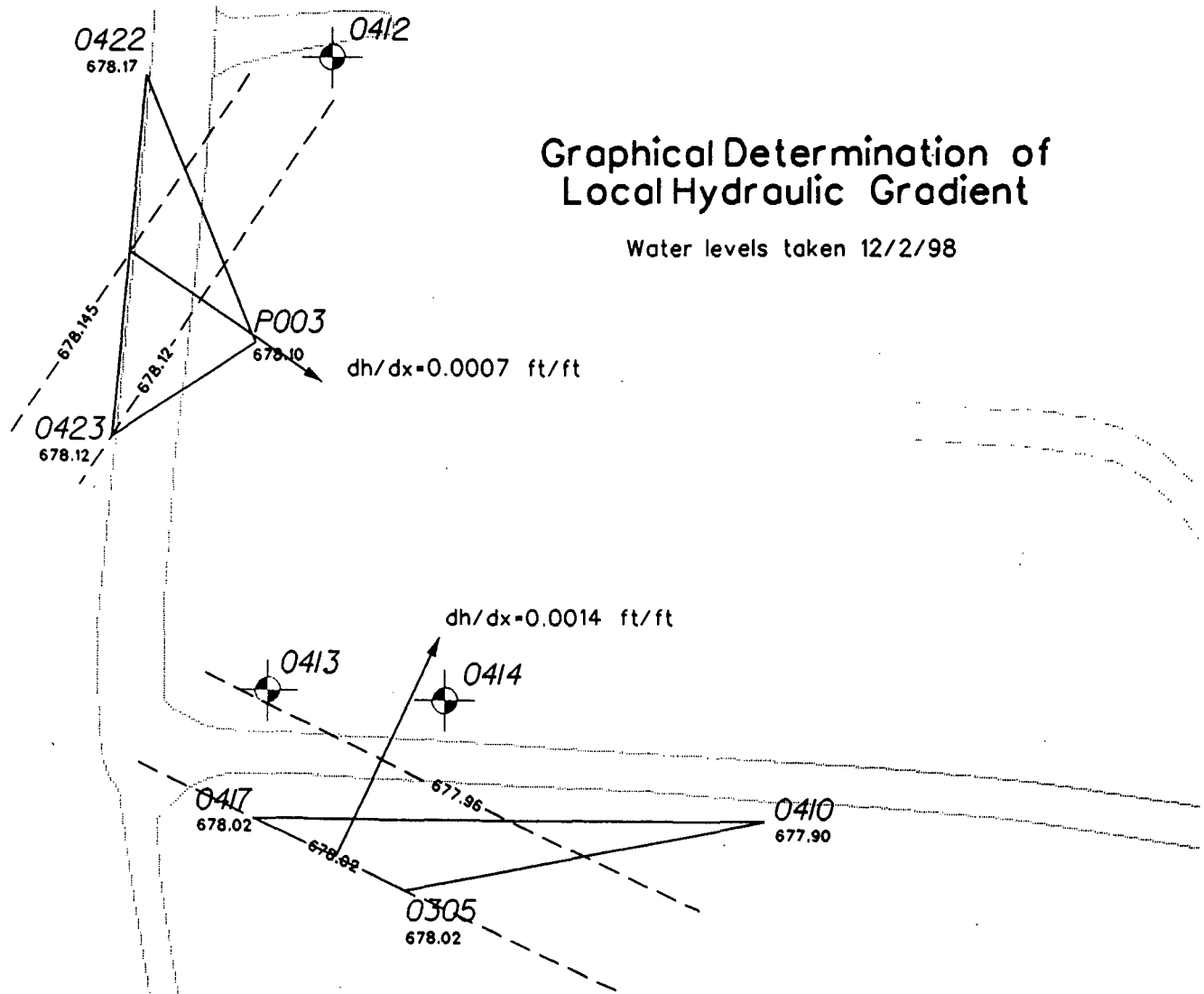
DWG TYPE: STE | PROJ: ER-CTS | CHECK | SCALE | SHEET 1 OF

STATUS | ORIGIN: MSTATION 5.0

| ISS | DATE | REVISION | BY | CHK'R | DWG | UPDTD | APVD | M |
|---|---|---|---|---|---|---|---|---|

# Graphical Determination of Local Hydraulic Gradient

Water levels taken 12/2/98




0 50
Scale in Feet

MOUND
Environmental Restoration Geographic Information System

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DRAWING CLASSIFICATION: UNCLASSIFIED

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DWG TYPE: STE | PROJ: ER-GIS | CADEC | SCALE | SHEET 1 OF

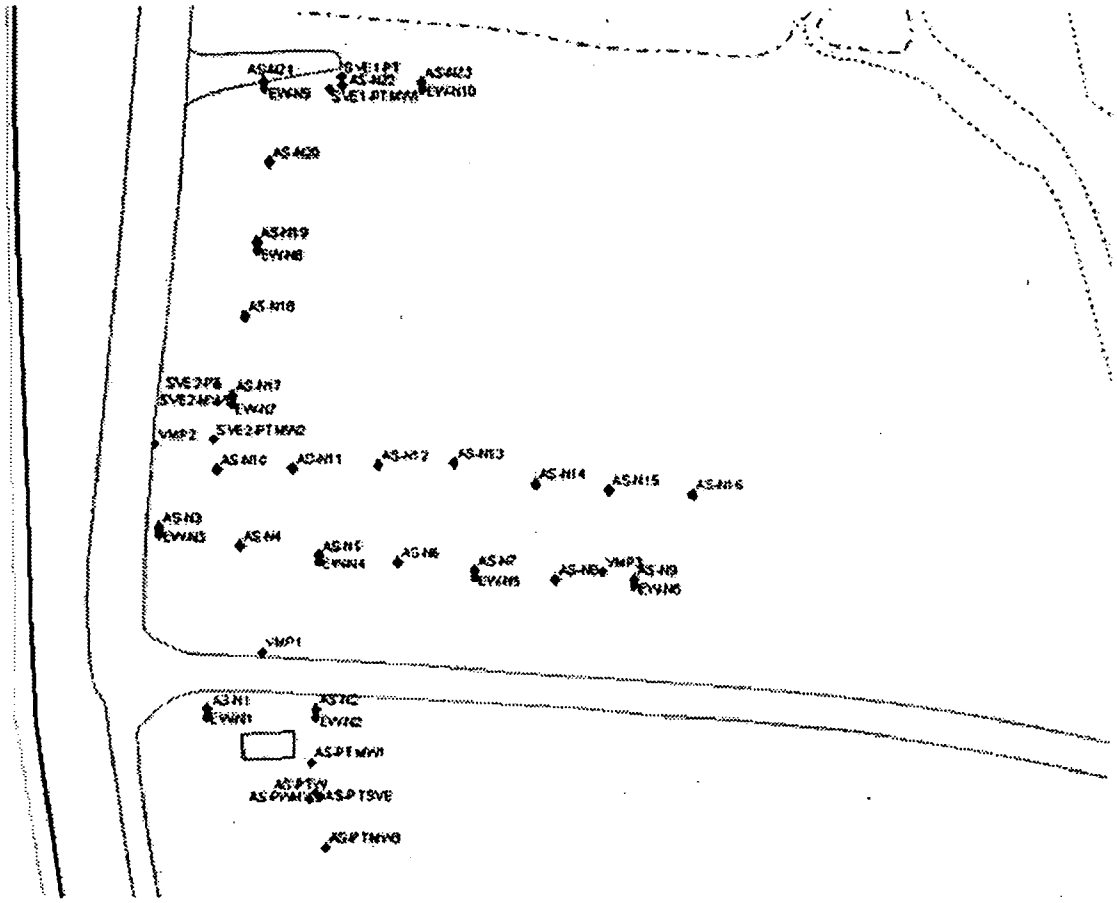
STATUS | ORIGIN: MSTATION 5.0

| ISS | DATE | REVISION | BY | CHK'R | ENG | LPM'R | APVD | M |
|---|---|---|---|---|---|---|---|---|

Prepared by Large Soils Project Group 10/14/97

| West Bench Well I.D. (North to South) | Th-232 (pCi/g) | South Bench Well I.D. (West to East) | Th-232 (pCi/g) | North Bench Well I.D. (West to East) | Th-232 (pCi/g) | By Road Well I.D. (North to South) | Th-232 (pCi/g) | Angle Bores Well I.D. (West to East) | Th-232 (pCi/g) |
|---|---|---|---|---|---|---|---|---|---|
| EW-N9 | 0.58 | AS-N4 | 16.13 | AS-N22 | 0.4 | VPMP-3 | 0.37 | AS-N11 (1) | 0.49 |
| AS-N21 | 0.55 | EW-N4 | 98.64 | AS-N23 | 0.37 | AS-N3 | 0.52 | AS-N11 (2) | 0.3 |
| AS-N20 | 0.42 | AS-N5 (1) | 132.8 | EW-N10 | MIA | EW-N3 | 0.42 | AS-N12 (1) | 1.21 |
| EW-N8 | 0.42 | AS-N5 (2) | 106.2 | | | VPMP-4 | 0.36 | AS-N12 (2) | 31.03 |
| AS-N19 | 0.36 | AS-N6 | 1.91 | | | EW-N1 | 0.39 | AS-N13 | 0.4 |
| AS-N18 | 0.27 | AS-N7 | 561.7 | | | AS-N1 | 0.44 | AS-N14 | 0.44 |
| EW-N7 | 0.47 | EW-N5 | 1.53 | | | EW-N2 | 0.43 | AS-N15 | 0.39 |
| AS-N17 | 0.35 | AS-N8 | 0.61 | | | AS-N2 | 0.37 | AS-N16 | 0.46 |
| AS-N10 | 2.01 | VPMP-2 | 0.66 | | | | | | |
| | | AS-N9 | 0.47 | | | | | | |
| | | EW-N6 | 0.52 | | | | | | |

# SVE AS Well Locations





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Last Updated 06/17/1998 (mhp)

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Contains Proprietary Information

# Mound OU1 ITRD Project Conference Call Summary -- 26 September 1996

## Participants:

| | | | | | | |
|---|---|---|---|---|---|---|
| Gene Peters | Gordon Horn | Dick Neff | Ron Church | James Johnson | Alec Bray | Ken Hacker |
| Rich Steimle | Matt Justice | Nam Baek | Kathy Lee Fox | Mike Hightower | Kelvin Potter | |

July activities included completion on treatability study reports and review & comment from the partnership. We had a conference call on 25 June 1996. Mound was going to implement and incorporate the comments and develop the SOW.

Mound is getting a new on-site contractor; James provided a brief update on the specific situation. Although the contractor will replace EG&G, many of the people working on the projects may remain the same, providing some continuity on the ITRD Project. The anticipated contract award date for the new contractor is approximately February-March, 1997, time frame.

The contracts (design and development) for the Two-Phase Extraction and the AS/SVE systems should be awarded on or about 15 October. Design of the systems will commence immediately and proceed through the winter; field work is expected to begin in February-March, 1997.

The three containment system extraction wells (35 gpm each) in Phase I of the existing ROD are installed. Phase II includes the air stripper and drainage control and is in progress. The foundations for the stripper building is under construction. At a location about 90 feet east of the bend in the road were found a couple of buried, crushed thorium drums at about two feet below ground. The thorium levels in soil was < 2 pCi in the soil below drums; the drums themselves were only slightly higher. There was some suspicion that these drums were present but had never been discovered before.

The June 25 conference call concluded that 15 pounds of contaminants from the Two-Phase in the fill material. The system in the till was short-circuited by a sand lens and did not withdraw as much contamination. The system around Well 370 could remove a great deal of contamination in a short period of time.

The AS/SVE tests showed a radius of influence of thirty feet or so; a series of wells could address the low concentration/high permeability areas in a cost-effective fashion.

Mound was going to take the comments from all and incorporate them into the revised SOW and put out for general bid.

Once the contract is awarded, the ITRD Group will be involved in the design, in December, 1996. Mound recommends that the ITRD participate in the 30% and 90% design reviews; Gene recommends 30%, 60%, 90% and 100%.

The group feels that the 30% review has the most impact and value-added to the process; depending on how that goes, we may get involved at later stages. The 30% design package will be distributed to

the group, who will return comments to Gene. Gene will redistribute everyone's comments, after which we will hold a conference call. At the conference call, we will discuss the preliminary design and decide on the need for meeting. Mound will provide the project schedule, which Gene will get out to all.

Alec discussed the OU4 Canal re-route excavation. Due west of the OU1 pond, the contractors found a concrete slab, under which was found <55 gallons of NAPL believed to be Stoddard solvent.

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Last Updated 03/19/1997 (mhp)

# Mound OU 1 ITRD Project Conference Call--13 December 1996

| | | | | | | |
|---|---|---|---|---|---|---|
| Jim Phelan | Gene Peters | Mark Gilliat | Kelvin Potter | Matt Darwood (ICI) | Dick Neff | |
| Mike Hightower | Tim Tharp | Gordon Horn | Alec Bray | Ken Hacker | James Johnson | Ron Church |

Mike Hightower begin the call by noting that the ITRD Partnership's function in the review of the 30% Design package was to provide technical input into the efficacy and appropriateness of the design process.

Ken Hacker, EG&G Project Manager for Mound OU 1 reviewed all the comments submitted by the Partnership and said that the consensus was that the contractor did not address the problem in the way that the ITRD felt it should be addressed and in accordance with the pilot scale tests.

Specific questions and comments on the vapor extraction system in the north end were common. Everyone was uncertain whether the system would be able to pull out the VOCs from the low permeability soils.

The primary feelings of the reviewers was that the contractor did not understand the requirements and did not review the Mound OU 1 RI and the pilot reports.

Alec noted that a lot of the SVE wells were outside the plume area, and would tend to pull the plume outward, enlarging the plume; and that the SVE wells were set into the water table, which would cause them to foul and become inefficient.

Kelvin asked whether the contractor was asked to design a system in accordance with the pilot system recommendations, or to design a system to clean up to a certain criterion. Alec said that the contractor was told to meet MCLs in ground water, but that the soils did pose a continuing source in sols. However, no "acceptable" concentrations to be left in soil were determined. R. E. Wright and Mound were supposed to agree on this before the 30% Design. Alec's preliminary work suggests being able to leave between 1 and 10 ppb in soil in order to be protective of ground water. R. E. Wright issued the 30% Design without contacting Mound. Mound may have left the impression with the contractor that Mound did not want sparging in the north end.

Dick felt that in spite of this, the contractor missed the boat on aspects of the project independent of this and will probably have to start over.

Jim Phelan questioned the quality of the Radian report on which presumably, the 30% Design was based, and in particular the radius of influence data. Kelvin thought that it looked like the radius of influence and spacing of wells had been dictated to the contractor.

At this point Gene had to bail out and go take his Advanced Structural Geology Final Exam and adds

his comments for the record:

The design parameters are not specified, nor are the assumptions that went into the design, for example the carbon system capacity, etc.;

The Two-Phase system is not included, although it was specified in the Statements of Work we reviewed;

I am concerned about the SVE well design in the northern area. I think that these wells may draw in a lot of water, as the till unit and capillary fringe dewater. Plus SVE causes localized mounding of the water table, as does sparging. There appears to be no provision for this, plus the screen length extends into the water table;

I think we need sample ports in line on both the SVE system and the air sparging system, both before and after vapor/liquid separator tanks;

The air volume balance from south SVE system does not add up. One comment in the drawing says 16 SVE wells @ 50 SCFM each, while another line says 400 SCFM total. If the total is 800 SCFM (16*50), then we would be may be putting in more air than taking out with the SVE system, which is a bad thing;

Please specify the function & capability of coalescing filter in south sparge system. We need to have something to intercept potential contaminants from the compressor;

We need to make sure that the intake from the compressor and the exhaust from the SVE systems are far enough apart so that no contaminant vapors are drawn into the sparge system;

There are no estimates of mass removal capabilities;

This design does not include a sparge system in the north area, although such as system was recommended in the pilot test;

The pilot test recommended a heater in line before the carbon to improve efficiency. Should we have this?;

No cost data are provided;

No time frame, remediation goals, etc., are provided;

The pilot test concluded that there should be no need for vapor phase treatment in the south system. We should have calculations supporting this and the permit requirements, if needed;

There is no explanation provided for the number and location of SVE/AS wells; it is especially unclear why the middle well line in the south is longer than the up- or down-gradient lines.

In general, I believe that this report needs to include the supporting calculations, design parameters and assumptions, preliminary cost schedules, etc.

About This Document
Last Updated 04/21/997 (mhp)

# Ken Hacker's ITRD Mound OU 1 Project Update - March 18, 1997

The last ITRD Telecon was held in December. At that time the group discussed the A/E's 30% design package for the Operable Unit 1 Air Sparging/Soil Vapor Extraction and High Vacuum Extraction systems. The group's consensus was that the A/E did not do a thorough job of explaining their reasoning and basis for the 30% design. The ITRD group's comments, at that time, were passed on to the A/E for their response. In a letter to EG&G, on December 19th, the A/E formally responded to DOE and ITRD's concerns and explained the assumptions and basis for design on both the South and North OU 1 Areas. This A/E response was passed on to Mike Hightower for distribution to the ITRD group.

On January 13th, a letter was received from Mike Hightower which indicated that the ITRD advisory group did not have any major problems with the A/E's explanation of how they developed the 30% design, once the A/E took the time to explain the layouts and design assumptions. The advisory group only had a few issues of concern. One issue was the radius of influence for the high vacuum extraction wells and whether this influence could be more conservative. Another issue was the east and south extent of the AS/SVE wells and whether the Vapor Extraction Wells, which the A/E had located west of the road, were in fact necessary. The third issue the advisory group had was that of pulsing or alternating pumping of the wells and whether this would be effective. These issues were passed on to the A/E and evaluated during the 70% design.

On January 29th, the A/E visited Mound and presented the 70% design package to DOE, EG&G, Ohio EPA, and Mike Hightower, who represented the ITRD group. This turned out to be a productive meeting and the 70% design package was a more organized package than the 30% submittal. One of the two main points which came out of this meeting was that Air Sparging wells were not being designed for the North Area. The group decided that it would be appropriate to have at least a limited Air Sparge system in the north area. The A/E agreed to do this. The second item discussed was the requirement for having Vapor Extraction wells on the west side of the road. It was decided that Mound would take a series of Geo-Probe samples along the west side of the Landfill west road. In February, Mound installed 4 boreholes with findings of VOC levels consistent with that observed just east of the road, in the area of Well 397. The primary VOCs were seen in the southern-most borehole and consisted of 1,2-Dichloroethene and Trichloroethene in the 2-4 ppm levels. Based on these findings, it was determined that vapor extraction wells would not be installed on the West side of the road and the VOCs found under the road could be handled with vapor extraction wells located on the east side of the road.

Several teleconferences have been held between the A/E, EG&G, and DOE to discuss the details of the ongoing design. At this time the 90% design review is ongoing and is expected to be finalized this week. Discussions between DOE and the Ohio EPA have resulted in an agreement that the area south of the Compliance Boundary would not have a remediation system installed at this time. The south side Air Sparge system design will be completed, but the design will be shelved for the time being. An ongoing well monitoring program will be conducted in the south area instead.

The North area design now consists of 23 Air Sparge Wells and 13 Vapor Extraction Wells. Six of the air sparge wells will be installed on a 45 degree angle to allow for placing the air sparge points directly

above the bedrock surface under the landfill cap. Three of the existing french drains under the landfill will be used as horizontal soil vapor extraction wells. These french drains will be connected to the soil vapor extraction manifold system and each drain will be considered one SVE well.

Because it is felt that all of the questionable design concerns have been addressed, and it now appears that the design will be completed this week, a contractor pre-bid/site walkthru has been scheduled for next week, March 27th.

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Last Updated 04/15/997 (mhp)

# Minutes from Mound OU 1 Conference Call -- 4/10/97

## Participants:

| | | | | |
|---|---|---|---|---|
| Hacker | Neff | Bray | Johnson | Church |
| Gilliat | Martin | Tharp | Brown | Darwood |

Ken Hacker provided a quick update on activities since the March 18th conference call. The AE completed the design and Mound sent out the RFP to contractors to bid. In the last couple of days, a question or concern came up with the way the SVE wells were installed.

Yesterday Mound sent out 2 sketches to Mike and Gene (who are both out of the office this week): one showing the existing design of SVE/AS wells and an alternative design. Alec Bray summarized the details of the issue. Discussing a site cross sectional view that shows the low perm till with most contaminated area near the water level "smear" zone, he explained that the existing plan consists of AS wells going into the aquifer to assist with removing VOCs from ground water, while SVE wells stop at base of till. Several bidders expressed concerns that, by designing the high vacuum extraction wells at (or so close to) the base of the till, they could upcone (i.e., draw) water into the extraction wells, effectively shutting those wells down from extracting vapor.

One alternative would be to have a water extraction mechanism suck the water out of the bottom of the well (2-phase, or bioslurping approach), or another alternative would be to move the screened interval of the high vacuum extraction wells up higher into the till. As he recalled from the 2 test wells, the one that was completed 5 ft above the base of the till performed well, while the second well penetrated the base of the till, and even though the base was grouted, it still had water coming in from the underlying aquifer.

A second concern is that if we sparge into the aquifer and don't extract from the aquifer, we may spread the contaminated plume laterally.

The bidding contractors are now on hold while Mound and the AE are reevaluating the situation.

Alec said they are favoring having a lower and upper series of wells with some extracting from the till (high vacuum) and some extracting from the aquifer (low vacuum); he is currently estimating it will take about 12 additional wells.

***If anyone has comments, ideas, or direct experience with this type of problem, please contact Ken Hacker ASAP at (513) 865-5132. Otherwise, Mound will continue to work the issue with the AE and bidding contractors, and let the ITRD group know the results at the April 29th meeting.***

# Conference Call Notes
# ITRD – Mound OU1
# August 20, 1997

**Participants:**

| | | | | | |
|---|---|---|---|---|---|
| Melinda Trizinsky | Gene Peters | Dick Neff | Matt Justice | Jim Phelan | Ken Hacker |
| Mark Gilliat | Nam Baek | Kelvin Potter | Dan Carfagno | Tim Tharp | Mike Hightower |

## New Team Member

Jim Phelan of Sandia National Laboratory will be joining the Mound-OU1 partnership. Jim will be the technical lead for the performance monitoring and evaluation phase of this project. Please add Jim's name to your records. Contact information for Jim is given below:

Jim Phelan 505-845-9892 (voice)
Sandia National Laboratory 505-845-0543 (fax)
MS-0719, Org-6621
PO Box 5800 jmphela@sandia.gov
1515 Eubank St. SE
Albuquerque, NM 87123

## Field Update

Installation of the air sparge (AS) and soil vapor extraction (SVE) wells is continuing, but progress has been slow in the last two weeks because of inclement weather, equipment breakdowns, and continuing problems with buried thorium drums. 14 vertical AS and 8 vertical SVE wells have been completed. Drillers are currently working on ASN7. Four vertical wells (ASN8, ASN9, EWN5, and EWN6) have not been started. None of the angled wells have been drilled. Two clustered piezometers are also pending. Two clustered piezometers have been installed. Work with the French drains has not been started.

## Schedule

We hope to complete drilling sometime in mid-September. Equipment is on order to complete system installation. A tentative date for system start-up is "towards the end of October or beginning of November". We may want to start time-zero sampling during the last week in September or first week in October to avoid conflicts with system start-up.

The contractor will start the system and troubleshoot for 30 days. There was some question as to what the system checkout includes. Ken Hacker will check the contract to determine what will be done. It is highly unlikely that the system checkout includes testing ROI or tracer tests.

## Treatment Objectives

In a combined air sparge/soil vapor extraction (AS/SVE) system, the AS strips VOCs from contaminated groundwater so that the SVE system can capture those contaminants in the vadose zone. The SVE system also removes source VOCs from the vadose zone. If the system has not been designed for proper recovery of volatilized contaminants, air movement in the vadose zone may mobilize contamination in unexpected directions. To be certain that this system has been designed properly the following tests are recommended:

1. Test ROI of SVE wells and compare with ROI used to design system. As designed, the ROI of the SVE wells do not overlap. If the ROI are significantly smaller than expected we may not be providing proper capture (i.e., 7 of the vertical AS wells are placed on the edge of the expected ROI of the two nearest SVE wells). Since the site is very heterogeneous and testing all SVE wells would be cost prohibitive, it was suggested that the SVE wells should be grouped according to the observed lithology. One representative well from each group should be tested. There are many piezometers on site; Mark Gilliat will provide locations and construction details for the existing piezometers.

2. Test ROI of AS wells to determine if our groundwater treatment zone is continuous and agrees with the ROI used as a design parameter. All of the AS wells are screened in the gravel aquifer; therefore, differences in lithology should not affect ROI. However the depth of the AS wells does vary, so we may want to test 2 wells chosen to represent the minimum and maximum water column depths being treated.

3. Conduct tracer tests in which a nonreactive, nonsorptive, volatile tracer is introduced into the AS system. Monitor 1) gases in SVE headers and 2) soil gas from the soil gas monitoring points installed along the compliance boundary to determine if 1) the SVE system is capturing gases from the AS system and 2) if any volatiles mobilized by the AS system are escaping from the treatment zone. Jim Phelan will contact Tracer Research to discuss the installation of monitoring points along the southern and western boundaries of OU1 and performance of a tracer test.

## System Optimization

In addition to the tests previously mentioned, the system will be monitored to determine contaminant mass removal, operating parameters, and treatment efficiency. System optimization will be one of the goals of this demonstration. The system will be pulsed during operation (i.e., one half wells will be operating at any one time). The question was raised as to how the cycle will be determined. Are there models available to predict the effects of pulsed operation on AS/SVE systems? Jim Phelan will check to see what is available.

## Groundwater Sampling

The two technologies being considered for discrete level groundwater sampling are the passive DMLS system and the Flexible Liner Underground Technologies (FLUTe) system. Matt Justice of the Ohio EPA stressed that obtaining accurate information about the groundwater contamination plume via discrete level sampling may be an important tool to determine the success of the AS/SVE system. Melinda Trizinsky and Mark Gilliat are working together to determine which existing groundwater monitoring wells might be suitable for discrete level sampling. Melinda will contact the vendors to

obtain additional information about these options. If you would like a copy of the information currently available about these technologies contact Melinda at trizinsky@theonramp.net or 703-739-1217.

**Health & Safety Plan**

A H&SP is needed to bring people on site for monitoring, etc. A certain amount of lead-time is necessary to prepare a H&SP, so Ken needs to get information about the activities that will be conducted on site. Eventually the names of individuals involved will also be necessary.

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About This Document
Last Updated 08/28/1997 (mhp)

# Conference Call Notes
# ITRD – Mound OU1
# September 3, 1997

**Participants:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Melinda Trizinsky | Dick Neff | Matt Justice | Jim Phelan | Ken Hacker | Mark Gilliat | Kelvin Potter |
| Dan Carfagno | Tim Tharp | Mike Hightower | Kathy Lee Fox | Paul Beam | John Martin | |

**Note: Melinda Trizinsky, Mark Gilliat, Matt Justice and Jim Phelan spoke together on a second conference call on September 3, 1997 to discuss the monitoring plan for Mound OU1. Notes from this second call are included *in italics.***

## Drilling Update

All vertical AS and SVE wells have been completed. Drillers are currently working on the first angled AS well (AS-N11). The well has been drilled to about 70 ft and refusal has not been encountered. They will build this well today. There are five additional angled wells to be drilled.

## Well Deviation

There is **no evidence** that the clay liner has been encountered. The Ohio EPA wanted to know if we would recognize the liner if we did hit it. Upon discussion it seemed that it might be difficult to distinguish the liner from other materials because the liner may have been built from existing clays on site. The liner is expected to be 3 or more feet thick. Based on existing site data, Mark G. believes that the drillers will miss hitting the liner as they drill.

It was suggested that deviation surveys might be useful to pinpoint the subsurface location of the angled wells. Deviation surveys measure the angle and crookedness of wells. We may be able to get a logging company to do this type of survey if the drillers do not have the capability. Mark G. will check with the drillers to see if they have the capability to do this or can possibly recommend someone that can.

## Schedule

The weather has been good, and there have not been any more problems with RAD waste. The first angled well has taken 3+ days to drill, but the early problems have been worked out of the system. We hope to complete drilling sometime between September 19-26th. Equipment is on order to complete the system installation, and delivery is expected Sept. 22. It will probably take 2-3 weeks to complete the above-ground installation. The contractor will start the system and troubleshoot for 30 days. *This leaves us with a limited time frame to collect baseline data and prepare for system optimization monitoring.*

**Mound Contractor Change**

The DOE has chosen a new O&M contractor for Mound. The switch from EG&G to Babcock and Wilcox will occur on Oct. 1st. We don't know if this will cause any problems. James Johnson and Ron Church should be contacted to determine if DOE intends to continue with this project as originally planned. We do not know what is in B&W's bid. It may be necessary to brief B&W when they come on. In the meantime, we will continue with the project as planned and hope for the best. *This change makes it very difficult to plan our monitoring activities because we do not know if on site personnel will be available to collect samples or not. Normally, Mound has an environmental monitoring group that would be eager for the chance to collect samples, but the priorities of the new contractor are uncertain. We also do not know if the EG&G personnel currently participating in this project will be working at Mound after Oct. 1. It was suggested that Mike Hightower, Mark Gilliat, and Kathy Lee Fox should all contact Ron, James, or Art to encourage ongoing support for this project and possibly determine what support may be available through the new contractor.*

**System Optimization**

The system will be pulsed during operation (i.e., one half of wells will be operating at any one time). Jim Phelan has found references to 8 papers about the pulsed operation of AS/SVE wells. He has requested copies of these papers and will summarize the information for the group.

It appears that pulsed air sparging is generally used in conjunction with continuous SVE operation. This type of operation may limit contaminant migration from the treatment zone by allowing the SVE wells to "catch up" with the AS system. The system designed for Mound probably cannot be operated this way because the AS and SVE wells cannot be controlled separately and the capacity of the pumps is probably insufficient to run all SVE wells simultaneously.

Pulsing the SVE system is generally used when contaminant removal is limited by diffusion from pore spaces or dead end paths. The pulsing frequency in this type of system is on the order of minutes.

Mark Gilliat mentioned another paper that reported how the ROI for AS wells grows to its maximum extent during the transient period after the AS system is turned on, then the ROI collapses as preferential pathways develop. The time at which the maximum ROI of influence is achieved is chosen as the pulse frequency to maximize treatment efficiency.

Kelvin Potter asked whether the original design (i.e., 24 hour cycle) was chosen for a particular reason (treatment efficiency?). Was the design driven by technology or cost considerations? Most people seemed to think that cost savings associated with smaller equipment drove the design. Ken Hacker will ask the design engineer to join the next conference call (Sept. 17) to answer some of these questions.

**Groundwater Sampling**

The two technologies being considered for discrete level groundwater sampling are the passive DMLS system and the Flexible Liner Underground Technologies (FLUTe) system. Melinda spoke with the vendor of the FLUTe system this week. The FLUTe system includes a flexible liner that everts into the well and places monitoring points at discrete intervals in the well. The system is not limited by the depth of our wells, and 10-14 monitoring point are common in 4 inch wells. The liners are durable, and assuming that well construction is relatively similar, they can be reused for multiple wells by

decontaminating the liners between samples. The system uses air to evert the liner. The air filled liner displaces the water in the well (usually into the formation). Because we would be using this system for active monitoring, water displacement might disturb the accuracy of the sampling.

*After reviewing the existing groundwater monitoring wells, it appears that very few of the active wells are suitable for discrete level monitoring. Most of the screened intervals span the capillary fringe, and the data collected from the wells in the past often represent 2-3 foot intervals. The groundwater responds quickly to fluctuations in the river level and may be too variable for the DMLS system to work. Even if it did work, it is questionable whether the information obtained would enhance our understanding of the contaminant mass or help us evaluate the performance of the system. Unless someone in the group has a compelling argument for discrete level sampling, we will rely on conventional groundwater monitoring data. The next quarterly groundwater monitoring event is scheduled to begin next week, and will be used as baseline data for this system. Nearly all of the active groundwater monitoring wells in the vicinity of OU1 will be sampled at that time.*

**Soil Gas Monitoring**

Jim Phelan talked with Tracer Research about the installation of soil gas monitoring points along the southern and western compliance boundaries. Their eastern office can handle routine installation of soil gas monitoring points, but their Tucson office helps design and implement tracer studies. Mark Gilliat is working with the GIS team at Mound to produce some cross sections of the subsurface lithology along the southern and western compliance boundaries. These should be finished by Sept. 5 and will help Tracer Research design and give cost estimates for our soil gas monitoring points and tracer tests.

*We will collect gas samples from numerous points in the system (SVE well, combined air flow from entire system, air stream exiting GAC treatment, piezometers within the treatment zone, and compliance wells).*

*We will collect baseline soil gas samples from existing and new piezometers prior to system start up. Gary Brown at Sandia is preparing to collect the baseline samples. We are still weighing the pros and cons of various sampling and analysis methods. The choice is partially dependant upon on-site personnel availability.*

**Continuous Monitoring System**

We need a site for the continuous air monitoring system. We are hoping to use this system (available through Sandia) to continuously monitor contaminant mass removal and GAC performance. The system needs to be located within 30' of well header. Ideally we would like approximately 100 sq. ft. of interior space in an existing or planned building. A portable building might also be appropriate if a suitable location can be found. Ken Hacker will check on building/space availability.

**Monitoring Plan**

Jim Phelan hopes to complete the monitoring plan by next week. He is currently gathering information regarding costs. *The following monitoring needs have been identified:*

*Soil Contamination – baseline collected during well installation to estimate contaminant distribution and mass.*

*Groundwater monitoring – baseline plus quarterly events, may collect groundwater samples from 3 extraction wells (sampled weekly) to determine effects of AS/SVE on baseline remedy.*

*Soil gas monitoring – baseline plus quarterly monitoring events at piezometers*

*SVE extraction performance – continuous at sample ports before and after GAC treatment, periodically at SVE well headers to assess performance and aid system optimization.*

*ROI testing – to evaluate system design and aid performance evaluation.*

*Tracer testing - to evaluate the capture effectiveness of the SVE system for contaminant vapors generated by the AS system.*



About This Document
Last Updated 09/15/1997 (mhp)

# Conference Call Notes
# ITRD - Mound OU1
# November 24, 1997

**Participants:**

| | | | | |
|---|---|---|---|---|
| Dick Neff | Matt Justice | Jim Phelan | Mark Gilliat | Dan Carfagno |
| Tim Tharp | Mike Hightower | Ron Church | Mark Spivey | Melinda Trizinsky |

**Agenda**

Review and approve changes to the Cost and Performance Monitoring Plan
Cost sharing
Installation progress
Data Collection and Sharing
Schedule

**Cost and Performance Plan**

An updated version of the Cost and Performance Monitoring Plan was distributed November 7, 1997, and partners were asked to provide comments to Jim Phelan by November 19, 1997. Jim Phelan received comments from Mike Hightower, Mark Spivey, Dick Neff and Mark Gilliat. Comments from Melinda Trizinsky were received prior to distribution. Jim led the discussion by reviewing proposed changes to the document. These changes included:

- Changing the wording of the first Remediation System Objective to eliminate references to risk reduction and regulatory goals.
- Adding language to the introductory paragraph to distinguish the goals of this project from the requirements of the ROD.
- Mark Gilliat and the GIS group at Mound will provide an updated map of the AS/SVE system and the monitoring network (plan view). This map will replace Figure 3 in the document.
- Add a bullet in Section 4 to reflect technical concerns regarding the impact of geochemical changes (precipitation) on the pump and treat system (specifically monitoring changes in well drawdown and well yield). Mound has been collecting this information since March 1997, so hopefully Mark will be able to tell if the AS system induces any major changes.
- The timing of the tracer test for AS vapor mobility was changed from second quarter FY98 to ASAP (assuming groundwater levels remained low). The most likely time for vapor phase migration to be a problem is when groundwater levels are low, so we should plan the test accordingly. The test needs to be conducted ASAP, so that if there is a problem we can correct it. Mark Gilliat will contact Geoprobe to install monitoring point(s). In order to place these

points just below the till, cores will be collected prior to emplacement (cores will be taken within 2 feet of monitoring point location).

- The ROI for the SVE wells will be determined at 2 wells (representing the lowest and highest permeability zones). These two tests should provide the minimum and maximum ROI in the system. If feasible, we will also try to test the ROI for one of the five french drains.

It was pointed out that the vacuum pump used to take samples from the SVE manifolds will need to be able to draw greater than 18 inches of mercury to overcome the vacuum in the system. Jim says that the pumps available can draw between 20 and 22 inches of mercury, so this should not be a problem.

It was agreed that we should try to collect as much cost information as possible; therefore the breakdown suggested in the plan was acceptable. It remains to be seen if it will be feasible to differentiate costs according to above ground and below ground costs. Many of the costs should be available now, so it was suggested that we should begin collecting this cost information ASAP while it was still fresh in everyone's mind. Mark Spivey will try to get the contractor to breakdown costs as per the plan. Jim Phelan and Mike Hightower will assemble the costs related to the pilot tests, etc.

**Cost Sharing**

Jim Phelan will assemble cost estimates for each of the activities in the monitoring plan. After this information is available, DOE will determine who will pay for each activity. It is understood that the monitoring plan may need to be revised if costs are prohibitive. Costs for some activities have already been allocated, and the money has been spent.

**Installation Progress**

All below ground equipment, except additional monitoring points, has been installed. Above ground piping is being installed now. The blowers from Great Lakes are expected to be delivered by ~Dec. 3rd, and then it will probably take a week to install and test them. Great Lakes will run the blowers for approximately 15 minutes in each zone to insure that they are operating properly. Mark Spivey hopes to finish the installation by Dec. 15, 1997. R. E. Wright's 30-day testing period will begin when installation is complete.

Jim Phelan will order pitot tubes and magnehelics to measure the pneumatics in the AS/SVE system. Hopefully this equipment will be available while the system is undergoing initial testing.

The phone and electrical hook-ups for the continuous emission monitoring (GC) are nearly complete. Mark Gilliat and Mark Spivey will obtain a portable shed to house the GC.

**Data Collection and Sharing**

The baseline samples for soil gas have been collected. Results should be available in the next week or two. Raw data will be put into Excel spreadsheets and will be available to the partnership through the password protected ITRD website. Data will be sent out as hardcopy and e-mail as deemed necessary. Periodic updates on the project will be made available to the public as information is released by DOE (quarterly updates?).

**Schedule**

System installation is expected to be complete by approximately Dec. 15, 1997. The thirty day testing phase will begin then.

Jim Phelan will finish updating the cost and performance monitoring plan.

He will begin assembling cost estimates for the various components of the plan.

Pneumatic testing will begin approximately the first week in January (after system has been dewatered and has stabilized).

**Our next conference call will be Dec. 15, 1997 at 10:00 AM EST. The confirmation number is 240406, and the call in numbers are 800-425-7617 (domestic) and 212-748-2220 (international).**



About This Document
Last Updated 12/30/1997 (mhp)

# Conference Call Notes
# ITRD - Mound OU1
# December 17, 1997

**Participants:**

| | | | | |
|---|---|---|---|---|
| Dick Neff | Matt Justice | Jim Phelan | Mark Gilliat | Dan Carfagno |
| Kelvin Potter | Mike Hightower | Ron Church | Mark Spivey | John Price |

## Agenda

System start-up
System optimization
Costs
Tracer studies
Data Collection and Sharing
Schedule

## System Start-up

The AS/SVE system installation is complete, and the system underwent its initial connection check a couple weeks ago. On Dec. 16, the system began full time operation. A fair amount of water is being extracted from the French drains. This was expected. The water is controlling the rates for the system right now, but this is expected to clear up within a short time. The system appears to be operating properly. One crack has been detected, and it will be repaired.

## System Optimization

The system is being alternated between the north and south systems every 6 hours. The pressures measured in the SVE well heads vary according to the screened interval. At this time, maximum mass removal rates will be used as the criteria for system optimization. This will be monitored with Summa canisters for the first month, when the continuous emission monitor (CEM) arrives, it will be used to monitor the mass removal for the two portions of the system.

## Costs

Mark Spivey has obtained cost information from the contractors. This information will be incorporated into the cost and performance report for the system.

## Tracer Studies

Jim Phelan has been in contact with Tracer Research about performing tracer studies at Mound OU1. We expect to perform these studies some time in February 1998. Two tracer studies are planned:

Vapor mobility: There is some concern that it will be difficult to capture contaminants volatilized by

the AS system because of the low permeability till. The concern is that contaminated air pockets might form on the underside of the till unit. If they form, these air bubbles might migrate in unexpected directions along small scale heterogeneities on the underside of the low permeability units. Since it would be difficult to pin-point the location of these small scale flow paths, it might be easier to detect this by looking for evidence of this transport in the aqueous phase in contact with these air pockets. A gaseous tracer which is soluble in water will be used to look for evidence of contaminant migration toward the compliance boundary. Water samples will be taken for tracer analysis. Tracer detection in groundwater would indicate potential for off-site migration of contaminants.

The second tracer test would determine if the AS vapors are being effectively captured by the SVE system.

**Data Collection and Sharing**

Operating data will be collected for each well and for the two systems (North and South). Raw data will be put into Excel spreadsheets and will be available to the partnership through the password protected ITRD website. Data will be sent out as hardcopy and e-mail as deemed necessary. Periodic updates on the project will be made available to the public as information is released by DOE (quarterly updates?).

**Schedule**

The thirty day test period is underway now.

Pneumatic testing will begin approximately the first week in January (after system has been dewatered and has stabilized).

Mark Spivey is putting together a schedule for summa cannister collection prior to getting the online auto-gc. He said he will take summa cannisters every Monday through Jan.

Cost and Performance Monitoring Plan will be distributed this week.

Next conference call will be Jan. 28, 1998.

Next meeting will be approximately March 24-25, 1998.

**Our next conference call will be Jan. 28, 1998 at 10:00 AM EST. The confirmation number is 180371, and the call in numbers are 800-425-7617 (domestic) and 212-748-2220 (international).**

# Conference Call Notes
# ITRD - Mound OU1
# January 28, 1998

**Participants:**

| | | | | | |
|---|---|---|---|---|---|
| Dick Neff | Matt Justice | Jim Phelan | Mark Gilliat | Dan Carfagno | Mike Hightower |
| Ron Church | Melinda Trizinsky | Tom Ham | John Martin | James Johnson | |

**Agenda**
Project status
Dewatering
Tracer studies
Discrete monitoring points
Data collection and sharing
Schedule

**System Status**

The AS/SVE system began full time operation on Dec. 16, and it has been operating without major incident for almost a month and a half now. A fair amount of water is being extracted from the French drains after rain events. Recall that the French drain area contained a lot of water when the system first started up. It now appears that the French drains respond quickly to rain events and transport a lot of water to the base of the drains. This quick response has been duly noted by those that have had to respond to a system shutdown at 2 AM after a rain event. The good news is that the notifications system works. The bad news is that there does not seem to be an engineered water removal mechanism designed into the French drain system, and the SVE system was not engineered as a water removal system. The SVE system extracts this water when it is present, but the pump that empties the knock-out pot can only pump 9 gallons per minute, and the rate of water extraction is higher than that at peak times. The water is controlling the rates for the system right now, but Mark Spivey is installing a larger pump to increase the pumping rate.

The system appears to be operating properly. The SVE wells screened in the till areas are showing very low flow rates relative to the SVE wells screened in non-till areas. A very high vacuum is being applied to the wells screened in the till, but the flow from these zones is still insignificant. When contaminant concentration data is available, we may try to optimize VOC removal by adjusting flow rates to individual wells.

A pressure increase has been noted in the AS system. It is uncertain whether this is significant or not. The magnehelics have arrived and they are being installed this week, so individual well flow data will soon be available.

**Air Sampling**

Results have not been returned yet from the interim weekly manifold samples (Summa canisters), but they are expected soon. The automated GC system is being installed today. The manufacturers

representative will be on site to train the field personnel how to use the system. The water being drawn into the system from the French drains may create problems for the automated GC because the sampling ports which we had planned to use may allow water to get into the GC. Options are being examined to alleviate this potential problem.

**Tracer Studies**

Jim Phelan has been in contact with Tracer Research about performing tracer studies at Mound OU1. We expect to perform these studies some time in February 1998. Two tracers are under consideration for these tests: $SF_6$ and Halon 1211. The Halon compound is being considered for the vapor mobility test because of its greater solubility. The Ohio EPA wants more information about this tracer before they will approve its use. Jim Phelan and Melinda Trizinsky are checking on it.

A decision also needs to be made concerning the criteria which will be used to evaluate the vapor mobility test. If the system is working properly (i.e. the SVE system is capturing vapors from the AS system), then we should not detect the tracer in the wells being tested. Since we are hoping not to detect any tracer, how do we determine when we have satisfied the objective.

**Discrete Sampling Points**

Solinist and Geoprobe have been contacted to determine the best points to be used for the discrete sampling system. The contract is on hold until this decision is made. Jim Phelan and Mark Gilliat are still evaluating where to install these monitoring points.

**Data Collection and Sharing**

Data of interest to the partnership will be placed on the web for easy access. Jim Phelan, Mark Gilliat, Melinda Trizinsky, and Tom Ham will have a brief conference call on Wed., Feb. 4th at 10 AM EST to discuss which data should be displayed and what format should be used.

**Schedule**

Next conference call will be Feb. 25, 1998.

Next meeting in Miamisburg, OH will be approximately March 24-25, 1998.

**Our next conference call will be Feb. 25, 1998 at 10:00 AM EST. The confirmation number is 300347, and the call in numbers are 800-425-7617 (domestic) and 212-748-2220 (international).**

# Conference Call Notes
# ITRD - Mound OU1
# June 10, 1998

**Participants:**

| | | | | |
|---|---|---|---|---|
| Gary Brown | Jim Phelan | Mike Hightower (Sandia) | Dick Neff | Mark Gilliat |
| Dan Carfagno | Mark Spivey | Art Scheer (Mound) | Melinda Trizinsky (Clean Sites) | Kevin Potter (ICI) |

## Agenda

VOC mass removal/ SVE System Performance
Automated GC performance
Performance testing
Air Sparging system
Web site
Groundwater Currents Article

**VOC Mass Removal/ SVE System Performance**

Mark Spivey used the latest Summa canister data (collected March 25) to update the mass removal data using the fitted functions presented at the last meeting. Based on this data, he estimates that 1186 pounds of VOCs were removed between 12/18/97 and 3/25/98. TCE, toluene, and cis-1,2-DCE account for approximately 90% of the VOCs being removed. When the most recent data from the automated GC is used, it appears that approximately 1700 pounds of VOCs had been removed by May 31,1998. Most of the contamination (~90%) is being removed from Zone 2 (North section). Zone 2 includes the French drains, and the pond area. On May 5, 1998, Mound temporarily stopped cycling the SVE system between Zones 1 and 2. The system is currently extracting from Zone 2 continuously. The group agreed that this was a good strategy for the following reasons:

- Zone 2 accounts for approximately 90% of the contamination being removed. Therefore, continuous extraction from this zone should maximize overall removal rates. There still appears to be plenty of easily extracted VOCs in Zone 2; therefore, the removal rates do not seem to be significantly affected by desorption kinetics. The SVE system is currently extracting about 6.25 pounds of VOCs per day from Zone 2.

- During cyclic operation, when Zone 2 vacuum was shut off, the water discharged by the French drains tended to accumulate. Then when the cycle switched to draw from Zone 2, the SVE knock-out tank pump had trouble keeping up with the water collected, and would cause a system shut-down. Continuous operation allows the system to work more efficiently and handle rain events with less problems.

- The difference in vapor VOC concentrations from the two zones made it impossible to calibrate the automated GC for continuous operation. When the concentrations being recovered from Zone 2 drop down to the levels previously removed from Zone 1, then Zone 1 can be returned

to service.

A GAC filter system (~4000 pounds GAC) is currently being used to remove the VOCs from the air stream extracted by the SVE system. The large mass removals have necessitated four carbon change-outs so far, and a fifth change-out is expected soon. Each change-out costs approximately $6500, so Mound is assessing the VOC removal rate to determine when it drops below the de minimis rate stipulated by local air emissions regulations. GAC filtration should be optional when discharge rates are below this level. The de minimis value is thought to be a discharge of less than 10 pounds of VOCs to the atmosphere per day and a discharge of less than one ton of VOCs to the atmosphere per year. Mound will check to determine the exact discharge limit. Since the VOC removal rate is below that rate now, Mound wants to collect another Summa canister and pay for a rapid analysis (7day turnaround). This data would be used to evaluate the current discharge rate and give us more defensible data from the automated GC. Then, the automated GC could be used to provide near real time evaluation of removal rates. Mound wants to take the GAC unit off-line ASAP to reduce operating costs. The AS/SVE system already includes a valve that routes the SVE vapor stream either through the GAC units or to atmosphere; therefore, no pluming changes are required to make this change. Mound is going to check with the Ohio regulators to make sure that taking the AS/SVE system off GAC is acceptable. We expect that we will need to show the regulators defensible data showing that we are well below the discharge limits and trendlines that demonstrate the mass removal rates dropping over time. Data reports will be updated to facilitate getting this data to the state. Dick Neff noted that when we take the GAC unit offline, we will increase flow rates and therefore might extract additional VOCs from the subsurface. Thus we probably need to allow an additional buffer before we take the system off GAC (i.e. GC measurements of ~6-7 pounds VOCs per day).

## Automated GC System

The GC is working well now, but as previously noted, when we cycled between the two systems we had trouble calibrating because there was nearly an order of magnitude difference in concentrations being removed in the two zones. The uncertainty in the GC results is approximately ±20%. When conditions are wet (as after rain events) Mark S. is running manual samples (1 per week). Mark S. and Gary think that the coalescing filters are probably not large enough to handle the amount of water being generated by the French drains. When conditions are drier at the site, Mound will switch back to automated GC operation and will collect data twice a day. The moisture problems at Mound have resulted in fairly high maintenance costs for the GC system (i.e. manual operation).

## SVE Radius of Influence Testing

When Mark S. is able to get around a little better on his injured leg, he would like to try to evaluate the radius of influence (ROI) for the SVE wells. He suggested evaluating the following SVE wells:

EW-N3 – this well has a short screen interval and is located in the till formation.

EW-N7 – this well is one of the top producers, it is located in a looser formation with high contaminant concentrations measured during well installation.

ED-N2 - this is one of the French drains.

Mark S. hopes to utilize magnahelics on existing wells and piezometers located near these wells to conduct these tests. Expect to conduct these tests near the end of July. Uncertain if he intends to vary

the vacuum applied to the wells to determine the relationship between vacuum applied and ROI.

## Contaminant Removal Data

Tedlar bags were used to collect dynamic vapor samples from individual well headers between 4/15/98 and 4/17/98. Gary B. needs to tabulate this data and check contaminant distribution.

## Air Sparge Plugging Evaluation

Mound collected water samples from the AS wells and analyzed for iron and alkalinity to try to identify a chemical explanation for the apparent plugging of the AS well points. Iron concentrations were below 1 ppm; therefore, iron or iron oxidizing bacteria are not likely to have caused the pressure increase noted in the system. Carbonate (calcite) deposits or biofouling may be more likely causes. Mark G. was unable to take a scraping from the inside of the AS well (as suggested at last meeting); therefore we have not found any direct evidence to identify the cause of the plugging. This uncertainty makes it difficult to know how to redevelop the wells. The well points in our system are made of PVC that reportedly produce a 50 *m bubble; most AS systems use 0.010 inch which is 50 times larger than our mesh. The small diameter holes are probably more easily plugged than other AS systems. Mound will contact the system designer (RE Wright) to determine their experience with this type of AS well design. Mound will also contact Groundwater Technology Inc. to discuss possible causes of AS well fouling and experience in the Ohio area. These companies may be able to help us fix the air sparge system or improve future designs.

There are several commercial products available to chemically treat fouled wells. Johnson Screen sells a product that treats iron precipitation, carbonate buildup and biofouling. The chemicals are not expensive, but the treatment is involved. Acid granules are added to the well, water is added, the well is surged, then the chemicals must be pumped out. Sandia will hire a local contractor to try the treatment on 3 or 4 wells. Wells whose flow rates decreased over time and currently have low flow rates will be chosen for redevelopment.

If the AS system can be redeveloped, it is possible that we may see an increase in VOC removals. It will be important to monitor VOC removal rates with and without the AS system. It is unlikely that significant VOC will be removed from the groundwater relative to the VOCs being removed from the vadose zone. However, the addition of air below the SVE wells may change the shape of the treatment zone around each SVE well (i.e. extract more effectively from the capillary fringe and points below the SVE wells because of air movement through these zones) and thus treat some high concentration zones which are not currently being treated.

## Groundwater Sampling

Terran will be on site next week for quarterly groundwater sampling. Data from the last sampling event (March) shows that most VOC concentrations were declining in wells south of the pump & treat system. 1,1,1-TCA levels increased in these wells, but this compound has an offsite source. Mark G. will send groundwater data to Jim P. for web posting. Water levels are being collected. We also have monthly data from the pump and treat system. Water level measurements are being collected daily.

## Groundwater Currents Article

An article about the Mound AS/SVE system appeared in the in the March 1998 issue of *EPA's*

*Ground Water Currents*, EPA 542-N-98-004, which is on the web at http://clu-in-com. The article about the Mound AS/SVE system prompted a few inquiries. One of these inquiries was from a representative of an ALCOA Plant in southern Ohio that is currently installing a large AS/SVE system. They probably have DNAPLs in their treatment area. It might be worthwhile to stay in close touch with this group.

## Other

Jim Phelan/Mark Spivey will put together a schedule for this project (attached below). Our next conference call will be on July 22, 1998.

---

## Mound OU- 1 Schedule

### June 1998

| Day(s) | Action | By Whom |
|---|---|---|
| 15 - 26 | quarterly groundwater monitoring | Gilliat/Terran |
| 15 - 19 | query GTI on AS issues/resolutions in OH | Gilliat |
| 15 | develop questions for RE Wright on AS design (request response by 6/25) | Spivey |
| 15 -16 | carbon by-pass proposal to DOE-MD | Spivey |
| 17 - 18 | DOE-MD review carbon by-pass proposal | Kleinrath |
| 23 | DOE-MD submit carbon by-pass proposal to Ohio-EPA (request response by 7/20) | Kleinrath |
| 23 | mass removal report and data posted on web | Phelan |
| 23 | individual well VOC data posted on web | Phelan/Brown |
| 23 | pressure/flow report & data posted on web | Phelan |
| 24 | SVE vacuum/flow measurement | Spivey |
| 24 | Summa/Sentex combo sample on Zone 2 (7-day results) | Spivey/Brown |

### July 1998

| Day(s) | Action | By Whom |
|---|---|---|
| 1 - 19 | SVE carbon change out | Spivey |
| 1 | Spivey on Vacation | Spivey |
| 1 - 8 | Phelan on Vacation | Phelan |
| 7 | AS treatment proposal to DOE-MD | Gilliat |
| 8 | AS treatment proposal review by DOE-MD | Kleinrath |
| 9 | AS treatment proposal submitted to Ohio-EPA (request response by 7/20) | Kleinrath |
| 10 - 19 | Gilliat on Vacation | Gilliat |
| 20 - 24 | SVE individual well quarterly samples/Sentex analysis | Spivey/Brown |

| | | |
|---|---|---|
| 22 | conference call | Phelan |
| 27 | SVE vacuum/flow measurement | Spivey |
| 27 - 31 | AS restart for flow/pressure tests | Gilliat/Spivey |
| 28 - 29 | SVE rebalance | Spivey |
| 30 | potential SVE carbon change/bypass | Spivey |

## August 1998

| Day(s) | Action | By Whom |
|---|---|---|
| 3 - 7 | SVE radius of influence tests | Spivey |
| 10 - 14 | SVE system rebalance | Spivey |
| 10 - 14 | AS well treatment and restart | Phelan/Gilliat |
| ? | quarterly groundwater monitoring data (12/97, 3/98) | Gilliat |

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About This Document
Last Updated 07/08/1998 (mhp)

# Performance Monitoring Group
# Conference Call Minutes
# July 22, 1998

## Agenda

- Review Schedule/Action Items (included in 6/10 conference call notes)
- GAC Bypass Proposal Response
- AS Treatment Proposal Response
- Web site Reports
- Plans for Discrete Level Monitoring and Radius of Influence Test
- Open Discussion

### Participants on the Conference Call

| | | | | |
|---|---|---|---|---|
| Jim Phelan, (Sandia Labs) | Kathy Lee Fox | Matt Justice (Ohio EPA) | Nam Baek (Oxy Chemical) | Dick Neff |
| Ron Church | Dan Carfagno | Mark Gilliat | Mark Spivey (Mound) | Melinda Trizinsky (Clean Sites) |

### Review Schedule/Action Items

Reviewed the June, July and August items on the schedule. The quarterly groundwater monitoring was completed the week of June 15. Results will be available in about 60 to 90 days. M. Gilliat asked GTI if they would consult with us on issues related to the AS system, and methods they have used to maintain AS systems. They would be open to consult with us, but no commitments were made. M. Spivey talked to RE Wright about questions on the design of the AS system. They said that their contract commitments were complete (except for the as built drawings) and that an additional contract for consulting would be required. M. Spivey completed the GAC bypass proposal and submitted it to DOE. The proposal seemed to have stalled out and additional efforts will begin to push it through to Ohio EPA. Apparently, the local air pollution authority (Andy Roth) needs to be consulted. J. Phelan reported that the latest mass removal report, individual well VOC data, and pressure/flow report were submitted to ORNL, but due to a loss of administrative staff at Sandia, approval to transfer the reports to the public server was never completed. Those reports are now on the Web. The SVE vacuum/flow measurements were not obtained in June as planned, but will be obtained in July. A Summa/Sentex replicate samples were obtained and it was found that the Sentex auto GC provides accurate number to about 15% compared to the Summa lab data, some were high, and some were low. The SVE system had a carbon system change out on July 3. The AS treatment proposal was not drafted. However, M. Justice stated that completing the AS treatments with the commercial products described would not require any approvals. The SVE individual well VOC samples were being collected this week by G. Brown and M. Spivey along with vacuum/flow measurements. The quarterly groundwater monitoring data is available in spreadsheet form, M. Gilliat will send to J. Phelan for posting on the web. The AS restart to measure pretreatment flow/pressure is scheduled for August 27 - 31 or the following week. The AS well treatment will be performed by Terran under contract to Sandia National Laboratories, hopefully about August 10.

**GAC Bypass Proposal Response**

The proposal was stalled at Mound. The proposal will be sent out this week.

**AS Treatment Proposal Response**

M. Justice stated that no approval is necessary for treatment of the AS wells. Courtesy copies of the methods to be used should be submitted. More discussion ensued on the AS treatment plan. The plan is to use Johnson WellScreen product NuWell 110 - a concentrated granular acid and NuWell 310 a concentrated liquid polymeric acid enhancer. See www.johnsonscreens.com for a description of the products. M. Gilliat explained that the field tests for ferric and ferrous iron showed levels below instrument detection limits (~ 1 ppm). Others reported the Mound production well to have about 0.3 ppm and the Miamisburg production well to have less than 50 ppb. This implies that the iron may not be a culprit in the AS well plugging. The high alkalinity as shown by the air stripper treatments that are needed may be one of the culprits. The alkalinity values are about 200-300 ppm. It also could be that the AS system stirred up clay particles that have clogged the pores of the AS wells.

**Web Site Reports**

J. Phelan questioned the group on whether they would like to see the web reports emailed to them as well as have them available on the web, and the general consensus was yes. Also, whether the data tables were of value, and the general consensus was yes.

**Plans for Discrete Level Monitoring and ROI Tests**

The discrete level monitoring well installations and sampling/analysis efforts will have to be paid by ITRD since Mound has insufficient budget for the effort. J. Phelan will identify the costs and propose the budget to M. Hightower. M. Spivey is planning on completing the ROI tests in early August. He will measure pressures in piezometers at various distances when only one SVE well operating.

**Open Discussion**

The question was raised on what was the system impact on the VOC levels in the groundwater. M. Gilliat stated that the concentrations have declined, however, for well 410, the TCE concentrations have not declined as compared to the PCE and VC. The same is occurring for P015 that is in the spoils area. M. Gilliat will send the groundwater data to J. Phelan for posting on the web site.

It was decided that the next conference call should be on August 27 at 8 am MDT to discuss the results of the AS treatment.

# Mound OU-1
# Innovative Technology Remediation Demonstration Program (ITRD)

## Performance Monitoring Group
## Conference Call Minutes
## August 31, 1998

**Agenda**

- Results of the AS Treatment
- Results of the ROI Tests
- Latest Mass Removal Estimates
- Report on Quarterly Static Soil Gas Measurements
- Groundwater Contaminant Data Discussion
- Open Discussion

**Participants on the Conference Call**

Jim Phelan, Mike Hightower (Sandia Labs); Kathy Lee Fox, Matt Justice (Ohio EPA); Nam Baek (Oxy Chemical); Dick Neff, Ron Church, Dan Carfagno, Mark Gilliat, Mark Spivey (Mound); Melinda Trizinsky (Clean Sites).

**Results of the AS Treatment**

M. Spivey reported that the air sparge treatment was a success. Flow rates for AS-N19, AS-N20, and AS-N21 were 13, 11 and 33 cfm (measured by the thermal anemometer) on 12/23/97. Using the integrating pitot tube, these same wells showed 0, 0, 12 cfm during the pre-test on 8/3/98, after being off since mid February. After completion of the chemical treatment, these wells showed flow rates of 47, 27, and 39 cfm, respectively. The general procedure followed was as recommended by the manufacturer and was as follows: add the enhancer, add acid granules, surge, add some water, let set for 96 hours, pump. The process was started on Wednesday, August 26 and was completed by COB Friday, August 28, 1998. Jim Phelan will get the details of the treatment from Terran. The group discussed plans for treatment of the remaining AS wells. Since only zone 2 is running, only those needed to be treated. Three of the AS wells on the east side are currently above the water table. That leaves about 8 more for treatment. The group discussed the timing of the treatments in relation to the next quarterly groundwater sampling in October. If the AS system was not turned on until after the October quarterly GW sampling, then we would have 3 quarters of data (March, June and October) to see the results of just the SVE system. The AS system could then be turned on and the groundwater could be checked to see future impacts. Jim Phelan will discuss with B&W regarding treatment of the AS wells.

**Groundwater Contaminant Data Discussion**

M. Gilliat has contour plots of the groundwater contaminant concentrations before turning on the P&T system (1/97), and then after the AS/SVE/P&T systems were on (3/98). Plots for the 6/98 data are still pending new fiscal year funds and work authorization. M. Gilliat reminded the group that the OU-1 RI/FS showed the correlation between groundwater elevation and contaminant concentration in monitoring wells (shows the vadose zone source).

**Radius of Influence**

M. Spivey relayed data collected on the ROI tests. He indicated that EW-N7 exerts a vacuum of 0.13 in water on EW-N2, 0.115 in. water on EW-N10, 0.9 in water on ITRD-N9, 0.5 in. water on EW-N9, 1.8 in water on EW-N8, 0.085 on EW-N6, and 3.4 in water on VPMP-2 shallow. This shows that EW-N7 has a very wide area coverage of most of the site. Other data will be reported in a report soon to be prepared.

**Latest Mass Removal Estimates**

G. Brown prepared the latest estimates for mass removal through 7/31/98. This report states that Zone 1 remains at about 165 pounds removed (it has been off since mid May) and Zone 2 has removed about 1867

pounds for a total of about 2032 pounds. There are still the same principal compounds (TCE, cisDCE and Toluene). The carbon system bypass started 8/31/98, which provides some additional vacuum (15 in Hg vs 12 in Hg with the carbon system inline).

**Report on Quarterly Static Soil Gas Measurements**
G. Brown and M. Spivey completed the sampling and analysis on 7/21/98. The results report will be posted on the web soon. The general trends are for declining concentrations with wells EW-N7, EW-N8, EW-N9, EW-N10, ITRD-N9 and ITRD-N7 being the principal wells contaminants are found.

**Open Discussion**
The Mound site prepared an abstract describing the results from the OU-1 project for Waste Management '99. It was submitted in the soil and groundwater section under chair D. Lee. With knowledge that the AS system can be brought back online, it was suggested that we review the plans and methods for the tracer test on the next conference call. Next, project completion/termination criteria were discussed. The ITRD project will continue through FY99, with a cost and performance report being the principal deliverable in late FY99. The next conference call is scheduled for October 7 to discuss the tracer test, AS well treatments, and measurement of effect of AS on SVE performance. A tentative conference call is scheduled for November 7.

# Mound OU-1
# Innovative Technology Remediation Demonstration Program (ITRD)

## Performance Monitoring Group
## Conference Call Minutes
## October 7, 1998

**Agenda**

- AS Well Treatment Progress
- Web Reports
  - AS Treatment #1
  - Radius of Influence #1
- Measurement of Effect of AS on SVE Performance
- Groundwater Contaminant Downgradient Plots
- Groundwater Contaminant June Data
- Discrete Level Monitoring
- Tracer Test
- Cost and Performance Report

**Participants on the Conference Call**

Jim Phelan, Mike Hightower (Sandia Labs); Art Kleinrath, Dick Neff, Ron Church, Dan Carfagno, Mark Gilliat, Mark Spivey (Mound); Melinda Trizinsky (Clean Sites); Kelvin Potter (ICI).

### AS Well Treatment Progress

The balance of the AS wells on Zone 2 will be treated next week. This includes 7 wells, three of which are angled wells.

### Web Reports

**AS Treatment #1** – This report describes the well treatment procedure used in the field, the measurement data and results of air flow testing.

**Radius of Influence #1** – This report documents the ROI test completed by M. Spivey and analyzes the effective velocity from the pressure gradients and permeability estimates. The group discussed that additional ROI testing might be valuable for other high flow wells, given the ease of collecting the data.

### Measurement of Effect of AS on SVE Performance

With all of the Zone 2 AS wells treated, the potential for additional mass removal by the SVE system due to altered vadose zone flow paths caused by the AS air flow was discussed. It was suggested that the frequency of automated GC data collection should be several times a day for the first week, if possible.

### Groundwater Contaminant Downgradient Plots

M. Gilliat created some TCE and cisDCE contour plot south of OU-1 for January 1997 and March 1998. These plots indicate a decrease in maximum concentration over this time period. The pump and treat system was on for most of this time interval and the SVE system began in December 1997.

## Groundwater Contaminant June Data

M. Gilliat provided data tables showing contaminant concentrations from the June sampling event. This data will be plotted to show trends in contaminant concentrations over time.

## Discrete Level Monitoring

J. Phelan sent out by email an appendix from the RI/FS that shows the relationship between contaminant concentrations and water levels. This report uses this data to support the conclusion that vadose zone soils are a source of contaminants. In addition, the fact that over 1500 lbs of contaminants have been removed by the SVE system is another piece of evidence indicating a source in the vadose zone. J. Phelan proposed that this information might be sufficient and that additional effort for discrete level monitoring may not be warranted. Since the Ohio EPA group was not on the conference call, A. Kleinrath will take an action to contact M. Justice to see whether he would support dropping this task, or developing better justification to complete the effort.

## Tracer Test

The original purpose stated for the tracer test was to 1) determine if the AS system would push contaminants off site, and 2) assess the capture efficiency of the SVE system. The T0 individual well soil gas sampling determined that vapors were already present in vadose soils west of the Conrail. Since there would be very little additional mass moved by the AS system (very low concentrations in the groundwater), there was less concern over the potential for adding a little more to the little found off-site already. However, the group did feel the need to show the connectivity of the AS to the SVE system. J. Phelan took the action to develop a tracer test plan and present it to the group.

## Cost and Performance Report

J. Phelan stated that his goal was to produce a draft of the cost and performance report by end of March 1999, have the group evaluate it and make changes by end of June 1999, and produce a final document by the end of September 1999.

## Future Plans

It was decided that the next conference call should be November 23.

# Mound OU-1
# Innovative Technology Remediation Demonstration Program (ITRD)

## Performance Monitoring Group
## Conference Call Minutes
## November 23, 1998

**Agenda**

- SVE Contaminant Extraction Performance
  - Total Mass Removal
  - Individual Well Data
- SVE System Breakdown, Restart and Contaminant Rebound
- Sentex GC Problems/Resolution
- AS System
  - Zone 2 Treatment Completion
  - Change in Pneumatic Performance
  - Effect on SVE Contaminant Concentrations
- Tracer Test Plan

**Participants on the Conference Call**

Jim Phelan, Mike Hightower, Vince Fusconi (Sandia Labs); Art Kleinrath, Dick Neff, Dan Carfagno, Mark Gilliat, Mark Spivey (Mound); Matt Justice (Ohio EPA); Nam Baek (OxyChem).

### SVE Contaminant Extraction Performance

#### Total Mass Removal

The total mass of contaminants removed through October 31, 1998 was 2000 lbs. No changes were noted to the pattern of contaminants found (cis-1,2-DCE, TCE and Toluene). A data logger was installed to capture manifold flow rate data from the pitot tube. G. Brown will complete the mass removal report and it will be posted on the website.

#### Individual Well Data

The quarterly static soil gas measurements were obtained in October. These data showed that individual well vapor concentrations generally were stable or declined, except for well EW-N7, which showed increases for all compounds by a factor of up to two. G. Brown will complete this report and it will be posted on the website.

### SVE System Breakdown, Restart and Contaminant Rebound

The SVE system experienced a primary vacuum extraction pump seizure on October 21, 1998. This problem has been attributed to passage of liquid water through the vacuum extraction pump as a result of bypass of the carbon treatment beds and failure of the water knockout tank pump. It is unknown how much water passed through the pump, however, liquid water was observed being blown from the roof exhaust stack. Upon observation of the internal components of the blower, it was evident that a solid mixture has precipitated on the blower lobes. Due to the low tolerances of the blower, small amounts of this solid can cause seizure. It is believed that calcium carbonate precipitated out of solution as the aqueous phase evaporated upon passage through the blower. A new blower was obtained (~$3800) and the system was placed back on line on November 5, 1998, about two weeks after failure. It was noted that this problem had occurred at a Whirlpool installation, following carbon bed bypass,

however, no details were available. System restart showed a rebound of vapor concentrations that lasted about 2-3 days, where the concentration of compounds were about double pre-failure levels. In order to prevent reoccurrence the carbon beds will be placed inline with a lower grade of carbon ($0.20/lb less) for use as a packing.

## Sentex GC Problems/Resolution

The automated gas sampling gas chromatograph started experiencing trouble with temperature regulation during the trap mode of operation. Replacement electronics were obtained from Sentex, but were found to be faulty as well. No combination of existing boards and new components solved the problem. Sentex is fabricating and testing a new motherboard. Installation is planned for the week of November 30. Without this equipment, contaminant monitoring will be performed weekly with Summa canisters.

## AS System

### Zone 2 Treatment Completion

Terran Corp completed treatment of the remainder of the AS wells, including the angled wells, on Zone 2 using the same procedure used from the first group.

### Change in Pneumatic Performance

Some initial data was collected on the AS system pneumatic performance; however, the system was turned off until the Sentex GC can be repaired.

### Effect on SVE Contaminant Concentrations

This effort is still pending until the Sentex GC becomes operational. It is planned to collect 2-3 manifold samples per day for 2-3 days to evaluate whether the AS system changes the collection of vapors through the SVE system.

## Tracer Test Plan

A tracer test plan was distributed with the conference call agenda. This plan considers the objectives (collection efficiency of AS system generated vapors and evaluation of off-site migration of AS system generated vapors), methods (pulse vs. continuous), tracer material (Halon 1211, SF6, others), and injection/extraction locations. Three options are being considered: 1) inject in AS-N18, extract and monitor on the entire Zone 2 SVE system, 2) inject on AS-N21 or AS-N23, extract and monitor on the entire Zone 2 SVE system, and 3) inject on Zone 2 AS manifold, extract and monitor on the entire Zone 2 SVE system. The group should consider these and send comments to Jim Phelan. The mass of tracer to be used might be more for option 3 and this will be determined in consultation with Tracer Research. The schedule for the tracer test is anticipated to be starting in early January and last for 1-2 weeks.

## Future Plans

It was decided that the next conference call should be December 14.

# Mound OU-1
# Innovative Technology Remediation Demonstration Program (ITRD)

## Performance Monitoring Group
## Conference Call Minutes
## December 14, 1998

**Agenda**

- Sentex GC System Repair
- AS System
  - pneumatic performance
  - effect on SVE contaminant concentrations
- Tracer Test Plan
  - Halon 1211 (GC compatibility, regulatory acceptance)
  - pulse injection – 1 lb
  - test duration – 1-2 days
  - schedule – week of 1/11/99

**Participants on the Conference Call**

Jim Phelan, Mike Hightower, Gary Brown Vince Fusconi (Sandia Labs); Dick Neff, Dan Carfagno, Mark Gilliat (Mound); Matt Justice (Ohio EPA); Nam Baek (OxyChem); Melinda Trizinsky (Clean Sites).

### Sentex GC System Repair

The Sentex GC system has had hardware problems for several weeks. Sentex has been responsive in sending replacement parts that Mark and Gary thought would solve problems with the heater circuits for the trap mode. All of the issues have not been resolved, but there does not look like there are any serious roadblocks.

### AS System

**Pneumatic Performance**

All of the AS wells on zone 2 have been treated. The flow rates measured on October 21, 1998 showed flow and pressure data that were about the same or better than those measured when the system first started up on December 23, 1997.

**Effect on SVE Contaminant Concentrations**

Due to problems with the Sentex GC, this measurement has not been made. The AS system will not be turned on until the Sentex GC can operate in the trap mode. The trap mode is necessary to monitor the VOCs in the range of 1 to 10 ppmv and be able to see if the AS system causes any significant change. This effort is scheduled to occur just prior to the tracer test.

### Tracer Test Plan

Vince Fusconi completed some initial calculations on travel times and expected concentrations of the tracer gas. He found that the tracer may take only 3 – 6 hours to show up, last from 1.5 to 5 hours and show concentrations of 1 to 120 ppm. [After the conference call, Vince talked to Randy Golding from Tracer Research. R. Golding relayed that they had performed two tracer tests with

Halon 1211. Results from the two tests they ran had the tracer appearing between 40-100 hrs, development of a distinct peak, and then drop off to 10% of the peak value within 2-3 days. The trailing tail of the curve, however, lasted weeks at very low concentration ( <1ppm). This was supposedly due to adsorption. He also stated that mass balances were not good, and that he wouldn't be surprised if we returned 20-30 % of the initial mass. Here are some of the particulars: 1) injected about 10 grams of Halon 1211 2) flow rates of between 12& 15 cfm 3) injected in a low permeable, moist clay dominated soil.]

In addition, G. Brown and M. Spivy completed GC compatibility tests and found that the GC could be run with no change in operating parameters, other than starting the data collection slightly earlier.

The discussion next centered on what test option should be used. It seemed that all favored injection through the entire AS manifold into all AS wells except those that are currently above the water table, and monitor through the entire SVE manifold. By injecting through the entire manifold, it was recommended that the injection mass be increased from 1 lb to 10 lbs, since the 1 lb estimate was based on injection into a single well, and there are 10 operating AS wells on Zone 2. There was some concern over a lengthy tail on the mass removal curve. V. Fusconi estimated that at 500 cfm SVE flow rate, a 1 ppm halon 1211 gas concentration is equivalent to 0.75 lbs per hour.

M. Justice explained that there are no regulatory permitting requirements, only that the test plan be submitted to the Underground Injection Control group and the Air Pollution Control group.

**Future Plans**

A decision was made not to schedule the next conference call, however, J. Phelan will provide an email update regarding tentative results from the tracer test.

AS / SVE System Log
Started 02/02/98



2/2/98 7:35 took System readings on Zone 2
all params look O.K. Mark Spivey
8:08 opened AS-N1 & N3 full open increased
EW-N2 & N4 Air flow to compensate SVE mag
to 10 Mark Spivey
Cleared AS each well on Zone 1 - Blow out
Cleared AS on Zone 2 @ AS-N14? 3rd from end angle
and from end angle well. Shut off as-N14?
2/3/98 11:26 Took System Readings on Zone 2 MR Spivey
13:40 " " " " " 1 MR
2/4/98 07:00 Took System Readings on Zone 2
Shut off CRT on GC - No Scrn Save. Mark Spivey
2/4/98 0900 Took System Readings on Zone 1
KO. Pump shut off + valved off to let $H_2O$ build up
@ 7:08 Am Mark Spivey
2/4/98 10:00 Air Sparge System Shut down until
reason for reduced Air flow vs pressure
can be determined. Mark Spivey
10:08 SVE Shut Down for GC Sample # 108 chnl #3
AS-N2 Mag. observed going from 0-1 then
recycle over & over....
GC took Sample @ 10:09 Short sample pump run
Restarted SVE @ 10:11
SVE system on Zone 2 10 → 12
10:37 SVE shutdown for GC Sample # 109 chnl # 4
10:38 GC took sample (pump ran 34 seconds)
10:39 SVE System restarted
11:00 Temp msmt of 301-A High = 72°F Low = 60°F
12:00 SVE System Shut Down
Valves turned off Breakers turned off
and Box Locked Mark Spivey

2/11 1300 - Lube all blowers Terran
Change -20 $H_2O$ pump to -30 (replace pack, stay bolts, & Spacer)

2/12/98 Great Lakes Carbon Treatment in to change out carbon Started on tank B @ 8:40 Finished
Started filling with tank A @ 11:30
Finished Job & Gone from Site at 1300 hrs
Restarted System - Zone 1 at 13:02 hrs shut off 14:40 p

2/13/98 8:07 pump running on GC Hot to touch & smelled hot Shut System down & restarted
SVE Restarted at 7:30 AM zone 2 gal EX is 10,405 @ 8:05

2/16/98 System Readings taken at 5:59 for Zone 1 and @ 7:55 for Zone 2 MR Spaniey
10 AM Raining K.O. $H_2O$ meter @ Same as 7:55 tank 1/2 full

2/17/98 5:55 Light Burned out Sylvania 150W Vibration Service System, params. on zone 1 recorded. No AS Mark Spaniey
7:55 Zone 2 system (SVE) params. Recorded
8:15 Chip replaced on board behind pump/valves
11:26 GC restarted Calibration run #140 ok
11:59 Zone 1? just before carb. Pump ran Normal #141 Flat Lin
12:36 Zone 2? #142 Flat Lin
Between Tanks? (3) System off for Samp. ~~#143~~
Post Tanks? (4) " " " " ~~#144~~
K.O. Tank $H_2O$ Meter 11266.5 gallons @ 12:05 PM
Pump Not running when it is supposed to! Shut System down & restarted
13:36 Calibration #143 Aborted - not recognize pe
13:51 Calibration restarted #144 ok
14:23 Zone 1 / Port #1 #145 ok
Zone 2 / Port #2 #146 switched off for samp. ok
15:32 Between Tanks / Port #3 #147 switched off for samp.
16:06 Post Tank B / Port #4 #148 "
Mark Spaniey

2/18/98 5:55 Took system readings on Zone 1.
6:00 Removed ports 3 & 4 from GC backflushed with Argon & re-connected. 12,017 gal $H_2O$ pumped as of 6:20
8:02 SVE Shut down at 8:02; Took Zone 2 Readings @ 7:50
GC sampled at 08:04 #176, chnl #3 pump ran 43 sec
8:05 SVE restarted calculated $H_2O$ from Zone 2 6:20 12,017 8:00 12,617 6gpm
8:38 SVE shut down
8:39 GC sampled #177 chnl #4 pump ran 43 sec
8:40 SVE restarted Mark Squiney
2/19/98 Took Zone 2 Readings @ 07:55 Ran pump manually till water was pulsing in lower region of site tube 14,975 gal
Took Zone 1 Readings @ 13:55
2/23/98 Took Zone 1 readings @ 05:57 GC sampled Zone 1 at 6:02 - #194 Just after change over.
Back flush lines 3 + 4 ≈ 2 min ea. with Argon
@ 6:35 manually chg. to Zone 1 for Zone 2 Sample
Zone 2 Sample 6:36 #195 Change back to Zone 2
@ 7:05 Shut system down with GC Sample Valves closed
opened valve #3 after backflush - System reversal stopped
Zone/Port 3 sample 7:10 #196 Between tanks
Took Zone 2 readings @ 07:37
System Shut down @ 7:39 valve # 3 & 4 opened after System spun down completely
Zone/port 4 sample 7:44 #197 After tanks
System (SVE) Shut down @ 12:00
2/24/98 Restarted GC pump not working
Started SVE with Fresh air intake only ran ≈ 15 min (13:30 - 13:45)
2/25/98 Disconnect lines from tanks - suspended mid air
Mnd980224a #41 + #42 moisture detected out of exch 45 + 46
13:40 inlet to GC removed - Terran will be Cleaning Stripper SVE ran from ≈ 130 → 200 pm

| | |
|---|---|
| 2/26/98 | System restarted (SVE) @ 16:08 |
| | GC Run #90 used tube to Sample air outside |
| 2/27/98 | 7:50 Took System readings on Zone 2 |
| | GC trace looks much better i.e. rel. flat line |
| | 13:15 Took System readings on Zone 1 |
| 3/2/98 | Take Sys readings on Zone 1 @ 5:57 |
| | download telogs |
| | Took System Reading on Zone 2 @ 11:50 |
| 3/3/98 | Took System Reading on zone 2 @ 7:45 |
| | shut System off at 8:45 |
| | Reconnected Pump + coeles filters on A+B |
| 12:00 | System restarted Run #316 ok |
| | |
| 3/5/98 | GC ok as is |
| | Rebal Zone 1 + 2 with Dwyer Mags |
| | Took System readings |
| 3/6/98 | Take Sys Readings Zone 2 @ 07:45 |
| | 8:00 SVE shut down Just before GC #443 zone1 off 2hrs #444 zone off |
| | #445 Between Tanks A+B Normal flow dir Sys off |
| | #446 Post Tank B Norm. Flow dir. sys. off #447 Co |
| | #448 → ~~#450~~ zone/Port 1 Sample tubes Not connected in |
| | Bldg. after filter |
| | #449 Zone/Port 1 Tube disconn @ Heated/ |
| | extension point in Bldg. |
| | #450 Zone/Port 1 tube disconn @ Syntex cab |
| | ~~#405~~ #451 Zone/Port 1 tube disconn @ pump inpu |
| | #452 output of pump disconn. DCE 1:94 pm TCE |
| | #453 Back to Config for #448 |
| | Rename MND980306 input to pump discon |
| | (sewlex) |
| | SVE Restarted @ 1400 hrs conections as Normal inte |
| | to BD 301 |

Run # 42 aborted Cal run
Magnification (display) set to 2.0
Run # 43 Calibration Run
Run # 44 Sample port #4 System off - see peaks left over from calibration run Run # 45 port #5 open
Run # 46 & 47 pump input open
3/9/98 Run # 48 Calibration in Auto Mode input to pump open Empty #2 + #4 liquid filters. Mound trades installing louvers in doors
9:07 System Shut Down
9:09 #53 MND980306 Port #4 TCE may be real (Peak #4)
9:11 System restarted
9:28 #54 MND980306 Port #5 open to 301-A
#55 "
12:09 #56 Auto run bypass cal ports on side of Syntex (1-4) not connected. #56 - #59
Preconcentrator cleaned via utility selection
14:23 #60 port #1 (open to 301-A)
#61 with new settings port 1
1700 set Dry purge to 180 from 40
set menu # 31 to 1
Set temp to 150°C Conn 3,4,+1 to 1,2,3, 4-8 open
3/10/98 530 Am capped 5-8 Line 3+4 on 1+2, port 3+4 open
Set temp to 47 °C
7:30 #62 Calibration Run
#63 manual anal.
#64 → 69 Automode ports 1-4 open 68 & 69 1/8" Tube Disconn
#70 Abort
#71 4 3 + 1 conn to port 1 2 3 respect. port
Start auto 1/8" tube disconn. & "T" Capped.
Input to pump disconn.
#74 Argon.

3/10/98 Run # 75 Auto on ch 8 Argon
Through #78
16:4 MND980304 #79 →
Automatic Mode Ports 1-4 open to room
3/11/98 Run #104 showed signs of calibration peaks
Run #105 looked much better
Sample tubes disconn inside 301 & conn in 301-A
(Ports 1-4)
#106 looks Great
#107 connect port 4 to tank Shut system
off pump (scanner) @ ambient press has
39 SCFH flow
#108 port 3 open inside 301 (disconn) manual mode (
#109 Port 3 connected between Carbon Tanks
#110 port 1 open in Bldg (Note Connected Argon to port.
poss. resid. Contam. in B
#111 Repeat port 1 MSMT purged port 5 + tubes 1+
for 30 min with Argon
#112 Repeat port 1 msmt - Suspect port 5 contam still
in #111 ABORTED
#113 Auto Mode port 1 Disconn.
#116 W/ Argon on port #1 Aborted
#117 Port #2 open in Bldg Argon flushed via
Backside #118 Aborted Cal
Auto Seq: 4,3,2,1 Calib on Run # 119
Set to calibrate after 24 runs 24 / 143
Ports are open to inside Bldg 301 proper
1+2 are approx 1' apart and between AS + SVE
risers 3+4 are approx 1' apart and betwe
Tank A+B all ports are approx waist
to chest high off floor
3/12/98 Run #144 calibration Run Connected ex. Tube Routed to o
for all exhausts between #144
#145 Port 4 Show

3/12/98 Run # 154 Zone 2 sample 12:10 Summa Ø36980-ØØ1
Zone1 Summa sample @ 14:10 Ø36979-~~ØØ1~~ 101 MRS 4/14/98
Set Display mag. to 1.5
Set auto # For ports 1-4 (scanner menu #33)
Overide Calibration on auto startup Auto began on
Port #1 Run # 158 ports 1-4 open in
Bldg.

14:53 SVE System Shut down (manual) Air Stripper
@ 25" Water Col. and needs to be shut down
orderly!
158 + 24 = 182 184 + 24 = 208 210 + 24 = 234 236 + 24 = 260
262 + 24 = 286 288 + 24 = 312 314 + 24 = 338

3/16/98 Stopped after Run # 310

3/17/98 Moved Syntex.prm to c:\mrstrap. Copied C:\LOOP\Syntex.?
to C:\SNX. Renamed Syntex.Log + Syntex.idx
to syntexØ7.log + SyntexØ7.idx. Powered down system
and changed to loop mode. New name for auto
runs MNDØ8Ø318. Let sit overnight to thermally
stabilize.

3/18/98. Runs #1 - #17 in loop mode with various changes
- logged in Mark Spivey's log book. Temp @ 70°C
Copy C:\MRSTrap\Syntex.prm back to C:\SNX
make changes to each applicable setting manually.
#19 Display mag = 9, #1 - MNDSCOTT, #2 = 180, #4 = 10, #5 = 0.1
+ Ø, #6 = 0, #7 = 60, #8 = 47, #9 = 13, #10 = 24, #11 = 27
#12 = 2, 840, 600; #19 = 9, #20 = off, #21 = off, #22 = off,
#23 = M MXT-VOL, 15, AID, Carboxen; #26 = off, #27 = Mound
#29 = Mound, #30 = off, #34 = off
Blowers greased. System restarted at 19:00 hrs

3/19/98 GC stopped after run # 45
Run # 46 Port / Zone 2 8:1Ø AM
OP Param #11 chgd. to 27
Run # 47 Port 8 (Blank)

| | |
|---|---|
| 3/19/98 | 11:33 Run# 48 ch/port #3 system off |
| | 11:37 System ON |
| | Run# 48 looks like Breakthrough |
| | #49 Blank Port 8 |
| | 12:28 Run# 50 ch/port#4 System off |
| | 12:32 System ON |
| | Run # 50 looks like slight Breakthrough on |
| | C-1,2-DCE ≈ 2 ppm by guess |
| | Run#51 Blank port 8 |
| 13:33 | System manually Shut down |
| | GC Run # 52 Port/Zone 1 |
| | System Restarted |
| 1619 | Rerun Zone 1 #53 manual close of valves |
| | may be diluting - try post Normal chgover |
| 3/20/98 | Run # 54 Calib. |
| | 12:02 Zone 1 Just shut/changed to off |
| | Sample Run # 55 port #1 |
| | |
| 3/24/98 | Z1 Down 17:00 - 17:30 |
| 3/25/98 | Calibration Run #56 @ 03:23 |
| 04:04 | Analysis Run #57 Zone/Port #2 |
| 04:08 | Summa Sample COC 510157 #036981-001 (9536 |
| | Zone 2 |
| 04:31 | Analysis Run #58 port #4 post Carbon tanks |
| | System (SVE) Shut down for Sample Restart Syst |
| | following Purge (sample) |
| 04:58 | Analysis Run #59 port# 3 between Carbon tank |
| | System (SVE) Shut down for Sample Restart |
| | System following sample Purge |
| 06:02 | Analysis Run #60 port #1 Just after changeover |
| | (vac. 999. @ 0) summa 036982-001 COC 510157 |
| | followed GC sample @ 0606 (Q# 93256) |

3/25/98 7:30 System shut down for Carbon Change
SVE/AS sched. change all days:

~~Zone 1~~ ~~Zone 2~~

| ON | off | ON | off |
|---|---|---|---|
| ~~800AM~~ | 801AM | 800AM | 2:01PM |
| 2:00pm | 4:01pm | ~~4:00pm~~ | ~~10:00pm~~ 10 |
| | | 4:00pm | 10:01pm |
| 1000pm | 12:02AM | 1201AM | 6:01AM |
| 6:00AM | | | |

| Zone 1 | Zone 2 |
|---|---|
| ON / off | ON / off |
| 6:00AM / 8:01AM | 8:00AM / 2:01pm |
| 2:00PM / 4:01pm | 4:00pm / 10:01PM |
| 10:00PM / 12:02AM | 12:01AM / 6:01AM |

System Flow Direction Changed to Down through Carbon tanks. Carbon tank A had some water in bottom and lower 1/3 showed signs
12:40 that carbon had been wet! (stiff/clumpy).
System Restarted on New Sched., open to Room closed to wells
Sample Analysis Run #61., Baseline w/new Carbon Port 4 (Chg. to New location due to flow)
Power Dropped to anal. Bldg. during change of Carbon. Restarted Synter and Ran Cal (after waiting on temp.) Run# 61
Started auto-run on 3+4 with system down started on Run # 62 = Port 4, 63 = OK port 3, ...
Run#64 Aborted Ran System open to RM only 2hrs.
Run#65 Calibration purged lines (Needed due to temp stabil.
Run#66 Ch#4 Baseline OK
~~Run# 67 Ch#3 Baseline~~ MRS

| | |
|---|---|
| 3/25/98 | SVE |
| 15:55 | System on line active on Zone 1 |
| | chg. at 16:00 hrs to Zone 2 - ok |
| | Note Zone 2 on @ 16:01, zone 1 off @ 16:02 by my watch |
| 3/30/98 | Run # 67 Calibration MND SCOTT 05:32 |
| | 05:40 record system params Δ on tanks looking |
| | high! may need to return to orig. flow pat. |
| | Run # 68 Analysis Port/Zone 2 @ 06:02 |
| | Run # 69 " Port/Zone 3 @ 06:55 between |
| | tanks system shutdown for event only (3-4 min) |
| | Trace/Spectra shows what could be the start of break through on |
| | cis-1,2-DCE but did not I.D. as such. |
| | Run # 70 Analysis port/Zone 3 @ 07:21 following |
| | tanks system shut down for event only (3-4 min) |
| | Note Mag was reading 0.70 before run # 69 now |
| | reads 0.80 just prior to shutdown |
| | Run # 71 Analysis port/Zone 1 @ 08:01 following |
| | change over and gauge return to 0" Hg |
| 08:04 | System chged. to pulling ambient air from |
| | building via air makeup valve. Prep for flow di |
| | change back to orig. Hyp. due to vibration + |
| | pulling carbon bed down - it becomes too comp |
| | ∴ Reduced flows higher vac. see Zone 2 |
| | readings for 3/30/98 @ ≈ 05:50 |
| 0855 | System shut off - changed sample port locat. |
| | Run # 72 Analysis Port/Zone 4 baseline for switch |
| | back Note: Hoses not switched yet so port 4 |
| | is act. between tanks - see comment on Run # 69 |
| | this run I.D. as DCE @ ≈ 13 ppm (bogus) |
| 0938 | Analysis Zone 3 hoses changed dir of flow chgd |
| | @ startup |
| 10:00 | Restart SVE |
| 12:10 | ED-N1, N2, N4, + N5 set to 0.7" WC with test |
| | gauge took system readings @ 12:20 MRG |

4/2/98 SVE Shut down @ 10:00 am for Stripper Maint.
Restart SVE System @ 10:40
12:30 Calibration Run # 74
12:51 Port #4 Analysis # 75 (MND 980318) System off 4 min.
13:15 Port #3 Analysis # 76 " Shows Breakthrough! "
14:02 Port #2 Analysis # 77 " Post Zone Change
16:01 Port #1 " # 78 " "
Zone 2 Params recorded @ 13:55
Zone 1 Params recorded @ 15:50
Mark Sawyer

4/3/98 Calibration Run # 79 @ 6:34
16:02 Port #1 Analysis # 80, MND 980318, Post Zone Change

4/7/98 SYSTEM OFF 9:00 AM → 3:30 PM
MAINTENANCE → LUBE BLOWERS
& AS SAMPLING w/ SYSTEM OFF

4/9/98 CALIBRATION RUN # 80 2:10 PM
NOTE: LOOKS LIKE SYSTEM CALIBRATED STYRENE @ 19.9 ppm

3:30 system kicked off due to high water in knockout tank - Decided to leave system off for wknd - shut off VE Blower, Heat exchanger & transfer pump → reset & run knockout tank empty w/ VE Blower off → shut system completely off @ 4:30 pm
MRG

4/13/98 02:00 System Restarted on Zone 2 with air make-up pump meter @ 26682
02:45 System Caught up with $H_2O$ input No-Air makeup
$H_2O$ drained from filter & line on SP2 CPU Turned on
04:41 Calibration Run # 85 MND SCOTT
05:05 Analysis Run # 86 MND980318 Chnl/Port #4 System off
05:31 Analysis Run # 87 " Chnl/Port #3 " "
06:04? Analysis Run # 88 " Chnl/Port #2 Just aft change
Port # 4 Shows no breakthrough yet
" # 3 " breakthrough
08:02 Analysis Run # 89 chnl/port #1 Just after chg

Scanner Purge = 180 to start Port #5
Check for Tedlar reduced to ~~30~~ 180 w/20ga needle
May need to puncture septum! yes! works Good!
Run # 90 air from Vam in Bd 300 - Blank
Mark Spivey

4/14/98 Run # 91 Calibration @ 06:54 MND SCOTT
07:28 Run # 92 Blank Tedlar Taken inside Bd 300 w/
pump - Borrowed from HP, Do not recall seeing
the GC backflush post Cal., it did backflush post.
Ran pump during time of anal & backflush, took second
Blank for anal since first was'nt totally ND
8:11 Run # 93 second Blank Tedlar
System Readings taken at:
Zone 1 : 15:44 hrs
Zone 2 : 13:30 hrs
Mark Spivey

4/15/98 5:00 Calibration Run #94
5:30 Blank Run # 95
5:50 Connected to VPMP-3 M (≈ 23.2' deep) pulled $H_2O$ into samp tube. Disconn. & blew out.
6:05 checked depth of well to confirm medium
6:15 conn. to VPMP-3 M - pulled $H_2O$ again (≈ 40 sec) flow approx 40 scfH.
6:25 Blew back into well with flow
6:31 Connected Vac to VPMP-3 M init flow ≈ 42 scfH steadily dropping
6:31:45 $H_2O$! abandon attempts Purge Samp. Tubes
6:36 VPMP-3 S (≈ 18.65' (Tot) deep) init flow ≈ 44 scfH
Appears Stable
Note: 1" Diam PVC
6:51 Sample taken on VPMP-3 S flow ≈ 44 SCFH
* 06:55 VPMP-3S Analysis Run #96
7:06 Purge pump & Tubes (open to atmosphere) flow ≈ 44 scfH
7:18 Pump turned off
7:20 Started pump on EW-N1 init flow 44 SCFH 0" Hg
7:21:30 flow = 32 SCFH, Vac = -16 " Hg
7:23:00 flow = 22 scfH, Vac = -21.5" Hg
7:24:00 flow = 18 scfH Vac = -23.9" Hg
7:26:00 flow = 11 SCFH Vac = -26 " Hg
7:27:00 flow = irratic 8-10 scfH Vac = -26.5" Hg
7:30:00 Sample EW-N1
7:34 Aborted - No flow Vac = -27" Hg wait for other pump
7:42 Purge pump
7:45 pumping on EW-N3 init flow 43 scfH Vac 0" Hg
7:46 flow 34 scfH -14.5
7:47 flow = 26 scfH, Vac = -20.4" Hg
7:48 Sample flow = 16 scfH Vac = -25" Hg

4/15/98

| | |
|---|---|
| 7:56 | Finished Sample flow = Almost Non exist. Vac = -27.4" Hg |
| ★ 8:01 | Analysis Run # 97 EW-N3 |
| 8:16 | Started pump to purge |
| | VPMP-2 28.8' deep 1" Diam (dry!) |
| 8:19:40 | Started flow ≈ 44 SCFH VPMP-2 |
| 8:21:40 | flow ≈ 42 scfH |
| 8:23:40 | flow ≈ 42 scfH |
| 8:30:00 | sample VPMP-2 flow ≈ 42 SCFH |
| ★ 8:39 | Analysis Run # 98 VPMP-2 |
| 8:51 | pump purge flow 44 SCFH |
| 8:55 | Start on EW-N7 init flow ≈ 43 SCFH Vac = ~~off~~ Just ~~0~~ Stop "Hg |
| 8:58 | flow ≈ 43 SCFH Vac = Negl. |
| 9:00 | Sample EW-N7 flow ≈ 43 scfH Vac = Negl. |
| ★ 9:06 | Analysis Run # 99 EW-N7 let pump purge |
| | until 9:12 |
| 9:21 | Start on EW-N8 flow 43 scfH Vac ≈ -1" Hg |
| 9:23 | flow ≈ 43 scfH Vac ≈ -0.9" Hg |
| 9:25 | flow ≈ 43 SCFH Vac ≈ -0.5 "Hg |
| 9:30 | Sample EW-N8 flow ≈ 44 scfH Vac ≈ -Negl. "Hg |
| ★ 9:40 | Analysis Run # 100 EW-N8 let samp pump purg |
| | until 9:48 |
| 9:50 | Start on well flow ≈ 44 scfH Vac = Negl |
| 9:52 | flow ≈ 44 scfH |
| 9:54 | flow ≈ 44 scfH |
| 9:55 | Sample ED-N1 flow ≈ 44 scfH Negl. Vac |
| ★ 10:07 | Analysis Run # 101 ED-N1 let sample pump purge |
| | until 10:15 |
| 10:17 | ED-N2 Started flow ≈ 44 scfH Vac = Negl. "H |
| 10:20 | flow ≈ 44 scfH Vac ≈ Negl. "Hg |
| 10:25 | Sample ED-N2 flow ≈ 44 scfH Vac = Negl. "Hg |
| ★ 1033 | Analysis Run # 102 ED-N2 let sample pump |
| | until 10:40 |

18

16: Started on ED-N4 flow ≈ 42 scfH vac ≈ Ø"Hg (Negl.)

19 flow ≈ 42 SCFH Vac = Negl.

55 Sample ED-N4 flow ≈ 42 scfH Vac ≈ Ø"Hg (Negl.)

59 Analysis Run # 103 ED-N4 let sample pump purge until 11:07

15 connected / Started on ED-N5 initial flow 44 scfH Water in line giving false flow Readings Vac = 0 "Hg (Negl)

25 Sample ED-N5 flow undeterm. $H_2O$

29 Analysis Run # 104 ED-N5 let sample pump + lines purge until 11:40

nch Break + Go to Grenger to P.U. pump + misc.

3:48 took System Readings + Ran Calibration Run# 105

3:56 Sample ED-N3 init. flow 30 SCFH Final 5-10 irratic vac ≈ -25.5" Hg Quit ≈ 14:03

407 Analysis Run # 106 ED-N3 let Sample pump/lines purge until 14:~~36~~ 17 MPB

4:22 Start EW-N2 init. flow 44 SCFH vac ≈ 0" Hg (Negl.)

14:25 flow 43 SCFH Vac = 0

4:27 SAmple ED-N2 flow 43 scfH Vac ≈ 0" Hg Analysis Run # 107 ED-N2 let Sample pump / lines purge until 1440

Rain, stopped Sampling due to elec. hazard.

/16/98 12:00 AM System shutdown due to high $H_2O$ in K.O.

5:06 system restart w/ air makeup

05:30 Change system to manual zone switch mode to keep working on zone 2.

Ran Calibration #108 looks BAD. System may of had power glitch due to T-Storm. Will reboot sys. and start over.

6:34 Calibration Run # 109 looks much better!

:00 Air makeup on notch just before fully closed $H_2O$ meter = 30,150 gal. Will stay on zone 2 until caught up. No Sampling Today, Too wet!

4/16/98

10:00 Switched SVE Zone 2 fully on - No Air make $H_2O$ meter at 31,200 gal

13:30 Took System Readings for Zone 2 set to auto cycle

15:55 Took System Readings for Zone 1

Mark Squire

4/17/98 Calibration Run #110 MMDSCOTT

5:40 Pump turned on to purge flow ≈ 44 SCFH

5:50 pump Connected to VPMP-4 Shallow ~~flow ≈~~

~~5:50~~ flow ≈ SCFH

~~5:55~~ flow ≈ SCFH

~~5:58~~ Sample VPMP-4 Shallow flow ≈ SCFH

$H_2O$ in well abandon sample event let pump run to purge

6:30 connected to HP of Prope (Pitot) and let purge on EW-N4 (let stay Active)

6:32 Sample EW-N4 (Note Vac Gauge 90° elb cracked. flow ≈ 42 SCFH

★ 6:35 Analysis Run #111 EW-N4 let pump & Tubes pur until conn. with EW-N6

6:47 Connect to EW-N6 via Pitot HP well active flow ≈ 42 SCFH

6:52 Sample EW-N6 via pitot Flow ≈ 40 SCFH

★ 6:59 Analysis Run #112 EW-N6 let pump purge until Conn. with EW-N5

7:12 Flow @ 38 SCFH Before Conn EW-N5 Showing 0.52" on Mag. will sample active

7:13 Conn. to EW-N5 HP on Pitot flow ≈ 32

7:18 Sample EW-N5 flow ≈ 32 SCFH End Flow Discon. = 40 s

★ 7:23 Analysis Run #113 EW-N5 let pump/tubes pur until 7:38

New pump to be used on EW-N1

7:50 Blank taken to be Ran later on GC

98

Connected to EW-N1 init flow >100 (valved off)
flow ≈ 18 SCFH Vac ≈ -24.5" Hg
Sample EW-N1
No indication of Flow Vac ≈ -25.5" Hg
Ended Sample
03 Analysis Run # 114 EW-N1 let pump run till
to purge
26 Matheson Cal gas in Tedlar as benchmark 1ppm std.
Run #115 Cyl # SX-33599 mix: 105-86-00460
:39 pump on purge ambient air
8:40 Connect to ITRD #2 (has low flow, Mag = 0.1) Valved off
flow > 100 SCFH Vac ≈ -2.9" Hg
8:45 Sample ITRD-2 flow > 100 scfm Vac ≈ -3.0" Hg
8:46 Pump running disconn. ITRD mag reads ≈ 1.7" WC
8:50 Analysis Run # 116 ITRD-2
EW-N9 minimal flow indicated on Mag.
Will value well off for sample Vac ≈ -11.1" Hg
9:05 Pump conn. to EW-N9 via Pitot HP
flow ≈ >100 SCFH Vac ≈ -2.6" Hg
9:14 Sample EW-N9 flow > 100 SCFH Vac ≈ -2.2" Hg
9:18 Analysis Run # 117 EW-N9 pump moved to EW-N10
and left running to purge pump and lines
9:29 Connected to EW-N10 (Shut value to sample due to low flow)
via Hp Pitot flow > 100 SCFH Vac - 3" Hg
9:35 flow > 100 SCFH Vac ≈ -2.8" Hg
9:40 Sample EW-N10 flow > 100 SCFH Vac - 2. "Hg
9:49 Analysis Run # 118 EW-N10 pump and tubes at
ITRD-1 purging to ambient air
9:55 Conn. to ITRD-1 Flow ≈ 80 SCFH Vac ≈ -12" Hg
9:58 flow ≈ 90 SCFH Vac ≈ -10.7" Hg Note Conn to Pitot
Hp LP was inadvert. left open
10:00 flow 40 SCFH Vac - 23" Hg Sample ITRD-1
10:56 Analysis ITRD-1 Pump purging at well Run # 119

4/17/98

11:26 Blank Run # 120

11:49 Calibration Run # 121

14:31 Analysis Run # 122 Port 2 / Zone 2

14:56 Analysis Run # 123 Port 3 / Bet. Tanks Sys off

15:19 Analysis Run # 124 port 4 / Post Tanks Sys off

16:11 Analysis Run # 125 port 1 / Zone 1

Took System Readings at 11:28 = zone 2 & 15:51 = Zone

Note moisture in line on #125 Mark Sorey

Run #125 Aborted

17:12 oven temp changed from 47° to 150°

4/20/98 5:50 chg. Oven temp back to 47°

15:37 Run # 128 Calibration MNDSCOTT had to turn Sys off - power off reseat connectors prior to run - getting off scale readings for oven temp.

Took System (SVE) Readings @ 13:40 Zone 2 and 15:35 Zone 1

4/21/98 06:29 Run # 129 Calibration MNDSCOTT

07:11 Run # 130 " " first didn't look right

07:36 Run # 131 Port 4 post carbon tanks used Sys. off bypass

08:02 Run # 132 Port 1 / Zone 1 just after changeover

08:27 Run # 133 Port 3 / Bet. Carbon tanks used Sys. off power

08:53 Run # 134 Port 2 / Zone 2 manual zone chg.

09:16 Run # 135 Port 4 post Carbon Sys off used pur off

Break through observed! Called GLCT

4/22/98 Calibration Run # 1 MNDSCOTT 7:50 took Z1 Rdgs.

Looks low but will go with it. will Cal Post runs

7:58 Blank Run # 2 MND980421

8:07 Sys Shut down for tour (Zone 2)

8:30 Restart system (Zone 2)

10:15 took Z2 Rdgs.

10:20 Calibration Run # 3 MNDSCOTT

4/27/98

12:53 Sample/Analysis Run#4 MND980421 Port 3
System off 5min. (on Zone 2)
13:16 Sample/Analysis Run#5 MND980421 Port 4
System off ≈ 5min (on Zone 2)
14:02 Drained Coel. Filter Zone 2
14:04 Sample/Analysis Run#6 MND980421 Port 2
16:03 Sample/Analysis Run#7 MND980421 Port 1
16:24 Calibration Run#8

Mark Spivey

4/28/98 System taken off line at 06:45 for carbon replacement. System Ran on Bldg. intake until 07:15.
AC Controls on 80°F → off 70°F Heat controls Low(on) 61°F → High(off) 69°F
Started Carbon remov. @ ≈ 07:50
Stopped to service Vac. @ 08:50
Finish Carbon Remov. @ ≈ 10:20
Started Filling w/ new carbon ≈ 10:30
Finished Carbon Fill ≈ 12:30
Blowers Lubed, Filters changed, y-strainer cleaned, sight tube replaced, coeles. filters emptied, cleaned HT Exchger.
System Restarted at 12:45
13:58 Took Zone 2 System Readings
15:56 manual over ride system change over to take piz Rdgs.
15:58 Took Zone 1 System Readings
16:10 Piz ~~by South Rd VPMP~~ Readings

| | | Before Bal | After |
|---|---|---|---|
| VPMP-1 S. | S | 2.6"WC | ~~2.8~~ 2.9" |
| VPMP-1 | M | 5.0"WC | 4.6"WC |
| VPMP-1 | D | 0 | NA |
| VPMP-3 | 3 | 5"WC | Skipped |
| VPMP-2 | S | 0.7"WC | 0.66"WC |
| VPMP-2 | M | 0 | 0 |
| VPMP-2 | D | 0 | 0 |

20

Bar : 30.28 Air Dens = 0.0775

4/28/98

| | Before | After |
|---|---|---|
| EW-N6 | 3.6" WC 7340 -3.6" Hg | 4" WC 7890 -4.1" Hg |
| EW-N5 | 0.40" WC 2480 -8.9" Hg | 0.48" WC 2725 -9.75 |
| EW-N4 | 5.5" WC 9250 -2.25" Hg | 4" WC 7890 -1.75 |
| EW-N3 | x̄ 30 FPM -10.1" Hg | — -11.1" |
| EW-N2 | 4.7" WC 2640 8550 0" Hg | 4" WC 7890 0 |
| EW-N1 | x̄ 15 FPM -11.2" Hg | — -12. |

17:10 Change to Zone 2 TOOK Zone 1 Rdgs @ 17:07

17:40 TOOK Zone 2 System Readings

| | | Before | After |
|---|---|---|---|
| VPMP-A1 | S | 0.96" WC | 0.85" |
| VPMP-1 | M | 0.76" WC | 0.7" |
| VPMP-23 | | 0.6" WC | 0.52 |
| VPMP-3 | S | 4.5" WC | 4.2" |
| VPMP-2 | M | 0 | — |
| VPMP-2 | D | 0 | — |

Bar = 30.25 air-dens. = 0.776

| | Before | After |
|---|---|---|
| EW-N7 | 2.8" WC 6600 -6.5" Hg | 2.0 5580 -6.1 |
| EW-N8 | 2.0" WC 5540 -3.7" Hg | 2.1 5700 -3.75 |
| EW-N9 | 0.005" WC ≈300 -8.8" Hg | 0.005 ≈300 -9.4 |
| EW-N10 | Found Closed x̄ = 195 FPM -8.9" Hg | — -9.5 |
| ED-N1 | 0.62" WC 3100 0" Hg | 0.60 3050 0 |
| ED-N2 | 0.73" WC 3375 0" Hg | 0.60 3050 0 |
| ED-N3 | x̄ 5 FPM -8.6" Hg | — -9.1 |
| ED-N4 | 0.54" WC 2840 -2.1" Hg | 0.60 3050 -2.1 |
| ED-N5 | 0.68" WC 3250 -5.25" Hg | 0.60 3050 -5.0 |
| ITRD-1 | x̄ 15 FPM -9.25" Hg | — -10.0 |
| ITRD-2 | 0.105" WC 402 -8.9" Hg | 0.115 422 -9.4 |

~~06:45~~ 18:42 TOOK Zone 2 Sys. Rdgs.

Mark Lowry

29/98

| | |
|---|---|
| 10 | Calibrate Run# 9 MNDSCOTT |
| 7:30 | following readings, System shut Down to Baseline Sample Carbon tanks + Prime pump, drain #2 Coal. filt. |
| 07:34 | Sample Run# 10 Port 4 |
| 07:56 | Sample Run#11 Port 3 |
| 08:00 | System back on Running |
| 10:55 | System Shut down for Stripper Maint. |
| 11:15 | Restart System |
| 4/30/98 | 5:50 Took Zone 2 Readings - Rain started 4/29/98 @ ≈ 20:00 hrs and has continued to Rain all night |
| | 7:50 Took Zone 1 Readings |
| 10:33 | System Shut Down to bring Extract wells on line |
| 10:50 | Restart System |
| | Mark Spivey |
| 5/1/98 | 13:50 + 15:50 Took System Readings K.O. Tank and metal fittings sweating. |
| 5/4/98 | 05:58 Took Zone 2 System Readings in 301 |
| | 07:02 Calibration Run#12 MNDSCOTT 225lbs. @ 5psi |
| | 08:02 Analysis Run#13 MND980421 Port 1 Just after change |
| | 08:26 Analysis Run # 14 MND980421 Port 4 System off 4 min |
| | 08:50 Analysis Run # 15 MND980421 Port 3 System off 4 min |
| | 09:40 Analysis Run # 16 MND980421 Port 2 manual switch for sample |
| | 09:34 Calibration Run#17 MNDSCOTT |
| | 07:50 Took Zone 1 System Readings in 301 |

Mark R Spivey

5/7/98 Set System to Run on Zone 2 only
13:00 Hope is to get Zone 2 contamin. down to the levels of Zone 1. This would enable the change of the GC to Trap mode.

★ UPDate to HASP - Read & Sign ★

5/11/98 06:19 Calibration Run#18 MNDSCOTT 225lbs 5psi
06:20 Took System Rdgs. Zone 2 on full time
06:40 Calibration Run#19 MNDSCOTT
06:59 Analyze Run#20 MD980421 CHNL#4 - port 4 System off 3
07:22 Analyze Run#21 MD980421 CHNL#3 - port 3 System off 3 manual
07:44 Analyze Run#22 MD980421 CHNL#2 - port 2 chg Z1
NOTE: Run#21 shows break through of first Carbon V
~~Calibration~~ BLANK Run#23 ~~MNDSCOTT~~ CHNL#5
Calibration Run#24 MNDSCOTT
Matheson 1PPM Cal Run#25, 26, 27, 28, 29
14:25 Scott Run#30 Port 5
Calibration Run#31 MNDSCOTT
Changed to 30 sec purge from 10 sec
15:11 Calibration Run#32 MNDSCOTT
Looks better - may need to extend to 40-60 sec to get it to look like Run#30 (which it should).
Mark Spivey

5/12/98 07:18 Took system readings.

5/14/98 1431 Set to PoT with 3 preconcentrator
Conditionings
Calibration Run#35
Analysis Run#36 Ambient air port 5
15:41 Analysis Run#37 Port 4 Run aborted
No observ. breakthrough
Put UHP Argon on Port 8 set to Auto Port 8 then 5

5/18/98 System shutdown 13:00 hrs - breakthrough check. System kept off due to breakthrough detect / GB.

5/19/98 System restarted port 3 had significant
12:30pm breakthrough while port 4 showed minimal breakthrough. Carbon sched. to be changed on 5/21.

5/20/98 System Readings taken by Dan Kapsch Summa
- Sample # 041041 Quanterra # 9313BB
taken on Scott 10ppm Cal Gas. Argon gas CA81105 hooked to port 8 empty. Moved SCOTT & Argon Cyls. outside 301-A Moved Matheson 10ppm Cal gas into 301-A. Mark Spiney

5/21/98 Took System Readings at 7:25 AM
7:30 AM System shut down for Carbon Change
12:30 System Restarted following Carbon Replacement
Mark Spiney

5/22/98 - Summa sample taken on Matheson 1ppm
Cal Gas ID# 041042-001 Q # 04717
at 11:30
System Changed over (GC) to Loop Mode
- Summa Sample taken on Matheson 10ppm
Cal Gas ID# 041043-001 Q # 0098
at 12:00
- Summa Sample taken on Zone 2
ID# 041044-001 Q # 0135 at 13:50
GC Run @ 13:45 on Zone 2 Just prior to
- Changed to Zone 1 at 13:44
Changed back to Zone 2 at 15:44
GC Run @ 15:45 on Zone 1 Run # 126 Just prior
to Summa ID# 041045-001 Q # A-331 @ 15:50 03:50pm

08:15 MD980421
5/28/98 Calibration Run #148, #149, #150 Matheson 10
Port #5 room air Run # 151
20 55 gal drums of Spent Carbon picked up
10:42 Analysis Run # 152 Zone 2 Chged to Zone 1 for 5 min
Aborted interfy peak of CDCE
11:00 Analysis Run #153 Zone 2 System shut off 5
11:39 Analysis Run #154 Port 3 System shut off 4 m
1201 Analysis Run # 155 Port 4 System Shut off 4 r
1221 Analysis Run # 156 Port 3 System " " 4 m
1245 Analysis Run # 157 Port/Zone 2 System chg. to Zone
for approx. 5 min (orderly chg over)
1306 Calibration Run #158, #159, #160 Matheson 10
Port #5 Run # 161
Calibration Run # 162
Monthly measures Port #5 Run # 163 ABORTED
6/3/98 Set GC to Run 2 cals 2 samples on port 5
08:40 Run # 199 Calibration Automatic Mode
Run # 200 Port 5
201 Port 5
202 Calibration
203 Port 5
204 Port 5
205 Calibration
206 Port 5
207 Port 5
Bad Run 208 ~~Calibration~~ Room Port 5 interupt cal run
~~209~~
1403 Run 209 Port 5 Blank
1419 Run 210 Port 2 orderly change over to 1 for ≈ 4 m
1433 Run 211 Port 4 System shut down 4 min.
1445 Run 212 Port 3 System shut down 4 min.
Run 213 Calibration Matheson 10
A Note Calibrations set to 2 but only Ran 1!

| | |
|---|---|
| 8/98 | System Down from 9:25 AM to 15:30 6 hrs 5 min |
| 9/98 | 10:25 Run 214 Calibration |
| | Run 215 port 5 |
| | " 216 " |
| | " 217 Calib. |
| | " 218 port 5 |
| | " 219 Port 5 |
| | Automatic Mode |
| | Run 220 Calib. - ABORTED - |
| | " 220 Port 5 - SCRUB Run - |
| | 12:57 Run# 221 Port 4 System shut down (SVE) for sample ≈ 4 min. |
| | 13:10 Run# 222 Calib. |
| | " 223 - 228 (Aborted) Auto mode |
| | 2 samples on port 5 then Calib. |
| | No breakthrough observed. |
| 6/10/98 | MD980609 |
| 12:18 | Run#1 Calibration (Matheson 10) |
| Auto | " 2 Port 5 (301-A Air) |
| | " 3 Calibration |
| | " 4 Port 5 |
| | " 5 Calibration |
| | " 6 ~~Calib~~ Port 5 |
| | " 7 Calibration |
| | " 8 Port 5 (Aborted) |
| 13:55 | Run #9 Port 2 (zone 2) orderly change to zone 1 for 4 minuts |
| 14:08 | " #10 Port 3 System shut down for 4 min. |
| 14:21 | " #11 Port 4 System shut down for 4 min. |
| 14:34 | " #12 Port 8 New Argon Cyl. for use as Carr. |
| Auto | " #13 Calibration |
| | " #14 Port 5 |
| | " #15 Calibration |
| | " #16 Port 5 |
| | " #17 Calibration |
| | " #18 Port 5 (Aborted) Argon @ 360 lbs matheson 10 @ 1,750 lbs |

6/12/98 09:20 System readings taken at 09:30 @ 09:20
SVE Vac. Relief was reset from trip due to
lots! of rain.
13:25 System readings taken again - System getting better
flow. Temp ≈ 104°F inside Bd. GC (BD.301-A) AC
working great. Mark Spivey

6/15/98 Automatic Acquisition Started MD980609
Run# 19 Calibration Matheson 10
" 20 Port 5
" 21 Calibration
" 22 Port 5
" 23 Calibration
10:14 " 24 Port 5 (Aborted) Run time = 300 sec
10:21 " 25 Port 4 System Shut down 4 minutes
13:43 Auto Mode " 26 Calibration Matheson 10
" 27 Port 5
" 28 Calibration
" 29 Port 5
" 30 Calibration
" 31 Port 5
14:53 " 32 Calibration → Aborted → Port 5 to clear

6/16/98 06:24 modem not answering GC System shut down and
computer rebooted - GC Temp @ 62 Modem picked
up when called. Took SVE System readings @ 6:20

6/17/98 08:24 Run# 44 Automatic Mode Calibration Matheson 10
Run# 45 Port 5
" " 46 Calibration
" " 47 Port 5
" " 48 Calibration
" " 49 Aborted Port 5 went into Cal + Aborted
" " 49 Bad Run Do Not Use
09:47 Run# 50 Chnl/Port 2 orderly change to Zone 1
for approx. 4 minutes

Continue
6/17/98

10:02 Run #51 Chnl/Port # 3 System Shut off for ≈ 4 min.
Run 51 aborted Strange Peaks, moisture?
10:12 Run 52 Chnl./Port #3 re-run system shut off for approx. 4 min.
10:37 Run 53 Chnl./Port #4 system off for ≈ 4 min
Run 54 ? Asked Gary Brown to run ending Cals.
Since he was wanting to work via modem with Sys.

6/18/98 06:15 TOOK SVE system readings MRS
6/19/98 10:35 TOOK SVE system readings MRS
6/22/98 06:45 " " " "
08:16 Automatic mode Calibration Run # 55 MD980609 Matheson 10
Run # 56 Port/Chnl. 5 (301-A Ambient Air)
" " 57 Calib.
" " 58 Port 5
" " 59 Calib.
" " 60 Port 5 - Aborted @ 600 sec.
09:30 Analysis Run #61 Chnl./Port 4 system shut down ≈ 4 min.
09:44 " " " 62 Chnl./Port 3 system " " ≈ 4 min.
09:59 " " " 63 Chnl/Port 2 System orderly chg. to zone 1 for approx. 4 min.
10:13 Calibration Run # 64 Matheson 10 MRSpivey
Note: Slight Break Throug observed ≈ 0.5 ppm TCE

6/23/98 Automatic Operation
09:19 Run # 65 Calibration Matheson 10
" 66 Port 5
" 67 Calibration
" 68 Port 5
" 69 Calibration
10:20 " 70 Port 5 (Aborted @ 600 sec)
Mark Gillict asked me to delay summa + GC until 6/24/98 so intern could be trained. Also rec. 0.5" of rain since midnight --- may be too wet for good sample!

Mark Spivey

Checked Cal gas press. reduced to 5 PSIG

| | |
|---|---|
| 6/24/98 | Automatic Operation of Calibration & Chnl. 5 |
| ≈06:22 | Run # 71 Calibration MD980609 w/ matheson 10 |
| ≈06:37 | Run # 72 Port 5 Note: Some variation in Cals may be observed due to disconn of tube |
| | " 73 Cal |
| | " 74 Port 5 |
| | " 75 Cal |
| | " 76 Port 5 Aborted - Strange Stuff |
| | " 77 Port 5 |
| 08:09 | " 78 Port 4 System Shut off for Approx. 4 min |
| 08:28 | " 79 Port 3 " " " " " " " |
| 08:51 | " 80 Port 2 System Changed to Zone 1 for App |
| | 15 minutes (total). Summa Sample 041047-001 |
| | taken on Zone 2 directly following GC Sample |
| | Summa Sample 041046-001 taken on |
| | Matheson 10 std. Gas. |
| | Run # 80 Aborted - looked as though 1 ppm or Poss. stuck chk va |
| | Std. Hooked to port 8 was bleeding thro |
| 09:00 | Run # 81 Port 2 System still on Zone 1 |
| 09:06 | Changed Back to Zone 2 ΔT = 15 min |
| 09:14 | Run # 82 Port 5 Blank |
| 09:33 | Run # 83 Port 8 Matheson 1 ppm Std Gas |
| | Cyl. SN: SX-33599 |
| | Run # 84 Calibration Matheson 10 |
| 10:04 | Run # 85 " " |
| | Run # 86 " " |
| | System Shut off (GC) Changed Argon Cyl |
| | set Argon to 15 psig. Had to discon. |
| | Cal gas to move cyl. set Cal gas to 5 psi |
| 11:00 | Restarted (Powered-up) GC System |
| | Cal gas (matheson 10) @ 1,700 psi |
| | Argon gas (carrier) @ > 2,000 psi |
| | Let sit to come into Thermal Equilibrium |

6/24/98 Automatic Operation MD980609
16 Run # 87 Calibration Matheson 10 - Aborted NO ~~peak~~ ID
~~Run# 88 Port 5 (Bd. 301-A Ambient Air) Abort~~
peaks shifted lowerd Carrier gas press to 14 psig
temp. @ 63.
Run # 88 Calibration ID peaks OK - Aborted
12:25 Run # ~~91~~ 89 Port 5 - Bad Run to clear out Sys.
Automatic operation MD980609:
Run # 90 Calibration Matheson 10
Run # 91 Port 5 (Bd. 301-A Ambient Air)
: 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112 Calibration Runs
: 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113 (Abort) Blank/Port 5 Runs
Run # 113 Mark Somers
6/25/98 System Readings Taken - Monthly EPA Measures
6/29/98 7:00 System Readings taken Heat Exch. bottom cleaned.
10:38 System Readings taken
10:43 Automatic Operation MD980609
Run # 116 Port 5
: 117, 119, 121, 123 Calibrations Matheson 10
: 118, 118, 120, 122, 124 Port # 5
Run # 124 port 5 @ 1224 Aborted after 620 sec
1400 System Down for Maint. Blowers lubed
1630 System Restarted
6/30/98 Automatic Operation MD980609
Run # 125 Calibration Matheson 10
Run # 126 Port 5
127 & 129 Cal
128 & 130 (Aborted @ 600 sec) Port 5
09:02 Run # 131 Chnl./Port 2 System changed to zone 1 for ≈ 4 min
09:17 Run # 132 Chnl/Port 3 System Shut off for ≈ 4 min
Run # 133 Chnl/Port 4 System Shut off for ≈ 4 min
9:48 Run # 134 Calibration Run Matheson 10
1320 Take System Readings

E. Burnette

7/2/98 SYSTEM TAKEN OFF LINE 9:00 AM FOR CARBON REPLACEMENT

STARTED CARBON REMOV @ ≈ 09:15 AM, STARTED TO SERVICE @ 10:4
FINISHED CARBON REMOV @ ≈ 12:00
STARTED FILLING W/NEW CARBON ≈ 12:10
FINISHED CARBON FILL ≈ 1325
SYSTEM RESTARTED @ ≈ 1350 } PUMP SHUT OFF @ 1415, PUMP BAC
TAKE SYSTEM READING ≈ 1545 } ON @ 1430

7/6/98 PUMP SHUT DOWN SOMETIME OVER WEEK END, START PUMP BACK @ 06:0
7/6/98 TAKE SYSTEM READING ≈ 06:15
CHECK ON PUMP @ 10:15 OK

7/7/98 PUMP SHUT DOWN OVER NIGHT SOMETIME.
STARTED PUMP BACK UP @ 06:15
TAKE SYSTEM READING ≈ 09:30
CHECKED PUMP EVERY HOUR FROM 0615 – 1400 @ THAT TIME
PUMP WENT DOWN AGAIN.
MARK GILLIAT + MYSELF DEEPDOD TO TAKE IT OFF PROGRAM. @ 1430
SYSTEM WAS SHUT DOWN AND RESTARTED AT THAT TIME.
SYSTEM LOOKED GOOD @ 1615
MARK GILLIAT CHECK SYSTEM BEFORE HE WENT HOME. OR
SYSTEM WAS CHECKE AGAIN @ 2245 SYSTEM LOOKED OK

7/8/98 CHECKED SYSTEM @ ≈ 0630 LOOKED GOOD.
TAKE SYSTEM READING @ ≈ 08:20
CHECKED SYSTEM @ ≈ 11:10
TAKE SYSTEM READINGS @ ≈ 15:00
CHECKED SYSTEM @ ≈ 1620 OK

7/9/98 CHECKED SYSTEM @ ~0625 LOOKED GOOD
TAKE SYSTEM READINGS @ ~ 07:50
CHECKED SYSTEM @ ~ 11:10 OK
TAKE SYSTEM READINGS @ ~1525
CHECKED SYSTEM @ ~ 1615 OK

7/13/98 CHECKED SYSTEM @ ~ 06:15 LOOKED GOOD
TAKE SYSTEM READINGS @ ~ 08:10
CHECKED SYSTEM @ ~ 11:05
TAKE SYSTEM READINGS @ ~ 14:15
CHECKED SYSTEM @ ~ 16:10 OK

7/14/98 CHECKED SYSTEM @ ~ 0630 OK
TAKE SYSTEM READINGS @ ~ 0800
CHECKED SYSTEM @ ~ 11:10 OK
TAKE SYSTEM READINGS @ ~ 1430
CHECKED SYSTEM @ ~ 1612 OK

7/15/98 CHECKED SYSTEM @ ~ 06:20 OK
TAKE SYSTEM READINGS @ ~ 08:10
CHECKED SYSTEM @ ~ 11:05 OK
TAKE SYSTEM READING @ ~ 1420
CHECKED SYSTEM @ ~ 1615 OK

7/16/98 CHECKED SYSTEM @ ~ 0620 OK
TAKE SYSTEM READINGS @ ~ 08:05
CHECK SYSTEM @ ~ 11:00
TAKE SYSTEM READINGS @ ~ 1415
CHECK SYSTEM @ ~ 1610 OK

7/20/98 Checked System params. Recorded readings
06545 Run#135 GC Calibration Matheson 10 @09:25
" 136 ~~Port 5~~ Calibration @ 09
" 137 Port 5 MD980609 @ 09:48
Changed to Zone 1 for GC Run @10:04 on
Zone 2
10:07 Port 2 Run# 138 Ret. Times Changed
for Cal peaks just prior to run
1018 Switched back to zone 2
10:20 bypassed Carbon Run# 139 Calib
10:30 port 4 Run# 140 on ex to Atmosphere
10:46 Change to Zone 1 + Run# 141 Port 2
(carbon bypassed)
10:52 Carbon in line Zone 1 (manual)
11:03 Port 5 Tedlar Blank 15 sec Scanner Purge
Run# 142 could Run 20 sec
13:09 Run# 143 Zone 1
~~Run# 144 Zone~~
13:10 SVE Shut down for maintenance
System Set to run Auto Mode (SVE) Z1 + Z2
7/20/98 Inlet blowers and changed mineral oil
7/20/98 1440 System restarted MRS
7/21/98 0536 Calibration Run # 144 Matheson 10
Renamed Sentex.idx & Sentex.log to Sentex10.idx &
Sentex10.log Restart Count (Run)
05:49 Calibration Run #1 Matheson 10
quarterly well sampling analysis
- tedlar bag grab sample
- analysis - Sentex - loop mode
for high level wells
- analysis - Sentex - trap mode
for low level wells

- cal gas - 10 ppm matheson for high level wells
- cal gas - 1 ppm matheson for low level wells
- scanner purge time - 15 sec

06:56 EWN7 #2 (sentex 11.*)
07:08 EWN7 #3
time id run #
07:20 ITRD-1 #4
07:31 ITRD-1 5
07:43 EW-N8 6 loop
07:54 EW-N8 7 mode
08:06 EW-N9 8
08:17 EW-N9 9
08:30 EW-N10 10
08:42 EW-N10 11
09:16 blank 14
08:53 ITRD-2 12
09:04 ITRD-2 13
09:41 cal 10 ppm 16
09:28 blank 15

change GC configuration to trap mode - dry purge 40s
delay 40s

9:35 changed to zone 1 vacuum
10:55 run #21 1 ppm cal trap mode
12:16 run low level well samples trap mode
12:16 blnk run # 24 trap
12:34 cal 1 ppm math run #25
12:47 ED-N2 # 26
12:59 ED-N1 # 27
13:10 ED-N1 # 28 abort not enough volume

13:17 EDN3 #29
13:28 EDN3 #30
13:41 EDN4 #31
13:52 EDN4 #32
14:04 EDN5 #33
14:16 EDN5 #34
14:27 VPMP-2S #35
14:39 VPMP-2S #36
14:53 Zone1 #37 Changed to Zone 2 F.T.
15:09 Zone1 #38
15:24 VPMP-4S #39
15:37 VPMP-4S #40
15:48 VPMP-4M #41
16:00 VPMP-4M #42
16:12 math 1ppm #43
16:24 math 1ppm #44
calibration check @ 2.5 psi run #45
- cal gas pressure affects quantitation
7/22/98 08:04 matheson 1ppm in tedlar to establish cal @ ambient pressure run # 46
08:16 matheson 1ppm in tedlar run # 47
08:28 matheson 1ppm in tedlar run #48
08:39 matheson 1ppm in tedlar run #49
08:51 EW-N1 #50 } large unknown
09:03 EW-N1 #51 } peak @ 89 sec
09:15 EW-N2 #52
09:34 EW-N2 #53 } large unk
09:46 EW-N3 #54 } peak @ 89 sec
09:58 EW-N3 #55
10:09 EW-N4 #56
10:21 EW-N4 #57

10:32 EN-N5 #58
10:44 EN-N5 #59
10:55 EN-N6 #60
11:12 VPMP-1S #61
11:24 VPMP-1S #62
11:36 VPMP-1M #63
11:47 VPMP-1M #64
11:59 VPMP-3 #65
12:54 VPMP-3 #66
13:06 blank #67
15:00 return system to loop mode and 10 ppm cal gas @ ~~0.5~~ 2.5 psi.

-15:20 Calibration Run# 77 Matheson 10

7/23/98 8:16 Calibration Matheson 10 Run# 78 } 15-17K
8:27 Calib. " " Run# 79 } 2.5 psig
8:38 " " " " # 80
8:58 Calib " " " # 81 } Nom 5 psig
9:08 " " " " # 82
9:19 " " " " # 83
9:35 Change to Zone 1
9:35 Sample Zone 2 GC Run# 84 Chnl#2
09:48 blank room air Run #85 ch 5
09:53 Changed back to Zone 2
10:04 Tedlar Zone 2 Run# 86
10:15 Tedlar Zone 2 Run # 87
10:26 Exhaust port Run #88 chan 4
- carbon tanks bypassed.
10:39 Duplicate of above Run # 89
10:45 System changed back to Carbon
10:53 Tedlar w/Matheson 10 ppm Run# 90 & 91
11:15 Port 5 Matheson 10 @ 5psi Run #92 & 93

7/23/98 14:25 tedlar sample exhaust port with pumps on Run # 94.
14:36 tedlar exhaust port pumps on run #9

7/28/98 Changed to Zone 1 Full time at 15:22
following Zone 2 Monthly readings:

| | | | |
|---|---|---|---|
| VPMP-1S | 0.63 " $H_2O$ | | |
| VPMP-1M | 0.27" $H_2O$ | | |
| VPMP-2S | 4.2 " $H_2O$ | | |
| VPMP-2M | 0 | | |
| VPMP-3 | 0.185" $H_2O$ | | |
| VPMP-4S | 0 | | |
| VPMP-4M | 12.5" $H_2O$ | | |
| EW-N7 | -7.25" Hg | 3.2" $H_2O$ | 7050 FPM |
| EW-N8 | -5" Hg | 2.6" $H_2O$ | 6350 FPM |
| EW-N9 | -7.6" Hg | 285 FPM (KURZ) | |
| EW-N10 | -7.75" Hg | 600 FPM (KURZ) | |
| ITRD-N7 (ITRD-1) | -7.9" Hg | 40 FPM (KURZ) | |
| ITRD-N9 (ITRD-2) | -7.6" Hg | 0.0125" $H_2O$ | 440 FP |
| ED-N1 | -0" Hg | 0.53" $H_2O$ | 2870 FPM |
| ED-N2 | -0" Hg | 0.66" $H_2O$ | 3200 FPM |
| ED-N3 | -7.5" Hg | 7 FPM (KURZ) | |
| ED-N4 | -0" Hg | 0.53" $H_2O$ | 2870 FPM |
| ED-N5 | -4.4" Hg | 0.55" $H_2O$ | 292~~5320~~ FPM |

Lamps in cont. A1. 949 ALBA

7/29/98 Changed to Zone 2 Full time at 8:23 Following Zone 1 monthly readings:

| | | | |
|---|---|---|---|
| VPMP-1S | 1.1" H20 | | |
| VPMP-1M | 2.325" H20 | | |
| VPMP-2S | 0.29" H20 | | |
| VPMP-2M | 0 | | |
| VPMP-3 | 3.55" H20 | | |
| VPMP-4S | 0 | | |
| VPMP-4M | 0.095" H20 | | |
| EW-N1 | -9.75" Hg | 18 FPM | |
| EW-N2 | -0" Hg | 4.3" H20 | 8,200 FPM |
| EW-N3 | -8.5" Hg | 30 FPM | |
| EW-N4 | -1.75" Hg | 4.5" H20 | 8,400 FPM |
| EW-N5 | -7.5" Hg | .26 ~~2.6~~ mps" H20 | ~~6,390~~ mps FPM 2100 |
| EW-N6 | -4.25" Hg | 4.5" H20 | 8,400 FPM |

7/30/98 Run #97 @ 7:22 Calibration Matheson 10
" 98 @ 7:32 " " "
" 99 @ 7:48 " " "
" 100 @ 8:08 Port 4 (Hot) System Running
moved to old port Location
" 101 @ 9:06 ~~Zone~~ Port 5 After oops!
Garbage Run
" 102 Zone 2 orderly change to Zone 1 4min.
" 103 Zone 4 System off 4min
" 104 Zone 3 " " "
" 105 Calibration Matheson 10
DOE Monthly measures

8/4/98 8:25 Base readings for EW-N7 & ED-N2 for Radius of Influence measurements.

ED-N2: Vac. = -0" Hg Mag. = 0.44" WC

EW-N7: Vac. = -6.9" Hg Mag. = AVE. 3.3" WC

8:35 Started pinch-off of wells and open air makeup val. in 301 to compensate.

Readings:

| | | | | |
|---|---|---|---|---|
| VPMP-1S | = | 0.46" | $H_2O$ | Vac |
| VPMP-1M | = | 0.17 | " | " |
| VPMP-2S | = | 3.4" | " | " |
| VPMP-2M | = | 0" | " | " |
| ED-N1 | = | 0" | " | " |
| ITRD-N7 | = | 0.25" | " | " |
| ED-N2 | = | 0.08" | " | " |
| EW-N8 | = | 1.8" | " | " |
| ED-N4 | = | 0" | " | " |
| ED-N5 | = | 0.034" | " | " |
| EW-N9 | = | 0.5" | " | " |
| ITRD-N9 | = | 0.9" | " | " |
| EW-N10 | = | 0.115" | " | " |
| VPMP-4M | = | 0.03" | " | " |
| VPMP-4S | = | 0" | " | " |
| VPMP-3 | = | 0.08" | " | " |
| EW-N6 | = | 0.085" | " | " |
| EW-N5 | = | 0.14" | " | " |
| EW-N4 | = | 0.165" | " | " |
| EW-N2 | = | 0.13" | " | " |

EW-N7 = Vac. 7.1" Hg Mag. ≈ 3.4" WC ($H_2O$ Vac)

9:45 Change to ED-N2 for ROI

| | | | | |
|---|---|---|---|---|
| ITRD-N7 | = | 0.01" | $H_2O$ | Vac |
| ED-N1 | = | 0" | " | " |
| VPMP-2S | = | 0" | " | " |
| VPMP-1S | = | 0" | " | " |

8/4/98 ED-N2 = Vac = Ø" Hg Mag = Ø.44" WC
10:06 Change to Zone 1 EW-N3 only - let equil. during Lunch. EW-N3 set to Vac. of -11" Hg
VPMP-1S = Ø" $H_2O$ Vac
VPMP-1M = Ø" " "
VPMP-2S = Ø" " "
VPMP-2M = Ø" " "
VPMP-2D = Ø" " "

13:15 Changed back to Zone 2 Full time, closed Air make up + set EW-N7 & N8 to 3" $H_2O$, ED-N1, N2, N4, + N5 to Ø.4" $H_2O$ will let run overnight.

8/5/98 7:35 Set EW-N7 + N8 to 2.6" $H_2O$; ED-N1, N2, N4, + N5 to Ø.4"
7:46 Run# 106 Calibration @ 5psig Matheson 10
7:58 107 " " " " "
8:22 108 " " " " "
8:35 109 Zone 2 Switched to Zone 1 4min
8:49 110 Bet. Tanks System off ≈ 4min.
9:02 111 After Tanks " " " TCE @ ≈ Ø.74 ppm
9:16 112 Calibration @ 5psig Matheson 10

Adjusted wells i.e. EW-N7 + N8 to 3.0" $H_2O$
ED-N1 ... N5 (No N3) @ Ø.36" $H_2O$ ETRD-N9 @ Ø.02" $H_2O$

~~Re Adjusted wells due to higs System Vac.~~

8/7/98 System Down for 1 hour due to power Drop

| | |
|---|---|
| 8/13/98 | 7:32 Calibrate Run # 112 Matheson 10 |
| | 7:43 " " 113 " |
| | 7:54 " " 114 " |
| | 8:08 Port 4 After Carbon Run # 115 System OFF Approx 4 m |
| | 8:23 Port 3 Between " Run # 116 " |
| | 8:42 Port 2 Zone 2 " 117 Changed to Zone 1 ≈ 4 m |
| | 8:58 Calibrate Run # 118 Matheson 10 |
| 8/19/98 | SYSTEM TAKEN OFF LINE @ 07:15 FOR CARBON REPLACEMENT |
| | STARTED CARBON REMOV @ ≈ 07:30 |
| | FINISHED CARBON REMOV @ ≈ 09:30 |
| | STARTED FILLING W/NEW CARBON ≈ 09:45 |
| | FINISHED CARBON FILL ≈ 11:30 |
| | System Restart ≈ 11:57 |
| 8/20/98 | 9:45 CALIBRATE RUN # 119 MATHESON 10 |
| | 9:55 " " 120 " |
| | 10:05 " " 121 " |
| | 10:17 PORT 4 AFTER CARBON RUN 122 SYSTEM OFF APP 4 MIN |
| | 10:32 PORT 3 BET TANKS RUN 123 " |
| | 10:50 PORT 2 ZONE 2 " 124 Changed TO ZONE 1 ≈ 4 MIN |
| | 11:05 Calibrate Run # 125 |
| 8/25/98 | System Shut down at 10:00 for treatment of AS wells 19, 20, + 21 |

28/98 11:30 System Restarted by Terran

1/98 6:57 Calibrate Run # 126 Matheson 10 @ ≈ 3psig

7:09 " " 127 " "

7:19 " " 128 " "

7:35 Analysis Zone 2, Port 2 Run # 129 system on ≈ 4min

7:49 " Bet. Tanks, Port 3 " 130 sys. off 4min

Cleaned filters on port 3 + 4 (inside 301), back flush lines

8:04 Analysis Bet. Tanks, Port 3 Run # 131 sys. off 4min

8:19 " After Tanks, Port 4 " 132 " "

Changed valves to bypass carbon, moved port 4 to Exh.

8:29 Restarted System (off for 10 min!)

ED-N1, ED-N2, ED-N4, + ED-N5 set to 0.41" WC

EW-N7 & EW-N8 set to 4.0" WC

ITRD-N9 @ 0.052" WC

8:43 Zone 2, Port 2 Run # 133 Chg. to Zone 1 ≈ 4min.

8:53 AS turned on and maximized inside Bldg. 301

9:00 AS-N19 13 Psig 4.5" WC ≈ 47 cfm

AS-N20 12.5 psig 1.5" WC ≈ 27 cfm

AS-N21 12.5 psig 3" WC ≈ 38 cfm

Main Header = 0.95" WC @ 226°F 13.5 psig 30.07" Bar

Zone Header = 12 psig

1 9:02 Analysis Port 4 on Ex., System ON, Run # 134

~~12:43 Zone 2, port 2~~ MPS, Run # 135 Calibrate Matheson 10

12:43 Zone 2, Port 2, Run # 136 chg to Zone 1 4min

2 Zone 4, Port 4, Run # 137 System on Zone 2

13:10 System shut down for DOE Tour

13:24 System restarted

13:24 Calibrate Matheson 10 Run # 138

Adjusted wells:

ED-N1, N2, N4, N5 to 0.3" WC

EW-N7 & N8 to 4.0" WC

ITRD-N9 @ 0.1" WC

MRS

9/1/98 Runs# 139 → 141 Calibrations Matheson 1
Run# 142 Zone 4 (Hot Exh.) System on
3 Run# 143 Zone 2 Changed to Zone 1 ≈ 4 min
Run# 144 Calibration Matheson 10
Rebalance System – No Carbon Filtratio
ED-N1, N2, N4, & N5 @ 0.3" $H_2O$ Col
EW-N7 & N8 @ 4.0" WC
I+RD-N9 @ 0.09" WC
Mark Spivey

9-2-98 8:55 SVE System Shut down
20 min 9:15 SVE System Restarted
10:00 SVE System Shut down for maint.
Blower lubed (greased), SS. filter cleaned, poly filter cleaned, Belt dressing applied to SVE Blower Belts.
15:55 SVE System Restarted.
Mark Spivey

| Time | | | | |
|---|---|---|---|---|
| 9-3-98 07:46 | Calibration | Run# | 145 | Matheson 10 |
| 07:57 | " | " | 146 | " |
| 08:09 | " | " | 147 | " |
| 4 08:21 | Analysis | Run# | 148 | Zone 4 / Port 4 |
| 08:40 | " | " | 149 | Zone 2 / Port 2 |
| Changed to Zone 1 for ≈ 4 min | | | | |
| 08:58 | Calibration | Run# | 150 | Matheson 10 |

| TIME | | | | |
|---|---|---|---|---|
| 9-10-98 07:53 | CALIBRATION | RUN # | 151 | MATHESON 10 |
| 08:04 | " | " | 152 | " |
| 08:15 | " | " | 153 | " |
| 08:27 | ANALYSIS | RUN # | 154 | ZONE 4 / PORT 4 |
| 08:50 | " | " | 155 | ZONE 2 / PORT 2 |
| CHANGED TO ZONE 1 FOR ≈ 4 MIN | | | | |
| 09:05 | CALIBRATION | RUN # | 156 | MATHESON 10 |

15-98 Renamed sentex.idx & sentex.log to Sentex11.idx and Sentex11.Log respectively Number sequence to restart@1
9:14 Calibration Run# 1 Matheson 10
/16/98 7:25 Calibration Run#2 Matheson 10
7:35 " " # 3 "
7:45 " " # 4 "
8:00 Analysis Run# 5 Port/Zone 4 Effluent
8:03 Summa Quanterra # 93195 SNL#
Beg. Press - 29.5" Hg End Ø psig
8:16 Analysis Run# 6 Port/Zone 2 Influent
8:14 Switched to Zone 1 for Approx. 18 min.
8:21 Summa Quanterra # 04189 SNL#
Beg Press - 29" Hg End Ø psig
8:32 Calibration Run# 7 Matheson 10
8:32 Changed Back to Zone 2
9/21/98 Calibration Run# 8 @07:24 Matheson 10
" " 9 07:36 "
" " 10 07:47 "
Analysis Run# 11 07:57 Effluent ch/port 4
" " # 12 08:14 HEADER ch/PORT 2
Changed TO ZONE 1 APP 4 MIN
CALIBRATION RUN # 13 @ 08:27 MATHESON 10

9/22/98 Calibration RUN # 14 @ 07:16 MATHESON 10
" " # 15 @ 07:27 "
" " # 16 @ 07:39 "
ANALYSIS RUN # 17 @ 07:50 EFFLUENT ch/PORT 4
" " # 18 @ 08:07 HEADER ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
Calibration RUN # 19 @ 08:20 MATHESON 10

| | | | | | |
|---|---|---|---|---|---|
| 9/23/98 | CALIBRATION | RUN # 20 | @ 07:32 | MATHESON | 10 |
| | " | " # 21 | @ 07:42 | " | " |
| | " | " # 22 | @ 07:54 | " | " |
| | ANALYSIS | RUN # 23 | @ 08:06 | EFFLUENT | CH/PORT |
| | " | RUN # 24 | @ 08:22 | HEADER | CH/PORT |
| | Changed TO ZONE 1 APP. 4 MIN | | | | |
| | CALIBRATION | RUN #25 | @ 08:36 | MATHESON | 10 |
| 9/24/98 | CALIBRATION | RUN # 26 | @ 07:04 | MATHESON | 10 |
| | " | " # 27 | @ 07:18 | " | " |
| | CALIBRATION | " # 28 | @ 07:29 | " | " |
| | ANALYSIS | RUN # 29 | @ 07:41 | EFFLUENT | CH/PORT |
| | " | " # 30 | @ 08:05 | HEADER | CH/PORT |
| | Changed TO ZONE 1 APP. 4 MIN | | | | |
| | CALIBRATION | RUN # 31 | @ 08:18 | MATHESON | 10 |
| | Down 4 hrs Terran Maint. Lube/Grease Blowers | | | | |
| 9/28/98 | CALIBRATION | RUN # 32 | @ 07:05 | MATHESON | 10 |
| | " | " # 33 | " 07:16 | " | " |
| | " | " # 34 | " 07:31 | " | " |
| | ANALYSIS | RUN # 35 | @ 07:43 | EFFLUENT | CH/PORT |
| | " | " # 36 | " 07:59 | HEADER | CH/PORT |
| | Changed TO ZONE 1 APP. 4 MIN | | | | |
| | CALIBRATION | RUN # 37 | @ 08:12 | MATHESON | 10 |
| 9/29/98 | CALIBRATION | RUN # 38 | @ 06:54 | MATHESON | 10 |
| | " | " # 39 | " 07:06 | " | " |
| | " | " # 40 | " 07:17 | " | " |
| | ANALYSIS | RUN # 41 | @ 07:28 | EFFLUENT | CH/PORT |
| | " | " # 42 | " 07:44 | HEADER | CH/PORT |
| | Changed TO ZONE 1 APP. 4 MIN | | | | |
| | CALIBRATION | RUN #43 | @ 07:58 | MATHESON | 10 |

30/98 CALIBRATION RUN # 44 @ 08:03 MATHESON 10
" " # 45 @ 08:13 " "
" " # 46 @ 08:24 " "
ANALYSIS RUN # 47 @ 08:36 EFFLUENT CH/PORT 4
" " # 48 @ 08:53 HEADER CH/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 49 @ 9:09 MATHESON 10
(Monthly Measures)

2/1/98 CALIBRATION RUN # 50 @ 08:00 MATHESON 10
" " # 51 @ 08:11 " "
" " # 52 @ 08:22 " "
ANALYSIS RUN # 53 @ 08:34 EFFLUENT CH/PORT 4
" " # 54 @ 08:50 HEADER CH/PORT 2
CHANGED TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 55 @ 09:04 MATHESON 10

10/3/98 on site at 19:53 SVE Down - Called in via Auto dialer
Restarted @ 8 PM Shut down later $H_2O$
Drained from plugs in mufflers on ex. exh. showed
positive prior to draining. Restarted at 8:50 for
rest of weekend.
CALLED BY AUTO dialer @ 6:30 PM 10/3/98 @ MOUND # 4184
REASON SYSTEM WENT DOWN, PUMP LOST PRIME, HAD TO BE RE-PRIMED.
DOWN TIME APP. 2 HRS
10/5/98 CALIBRATION RUN # 56 @ 07:19 MATHESON 10
" " # 57 @ 07:30 " "
" " # 58 @ 07:41 " "
ANALYSIS RUN # 59 @ 07:53 EFFLUENT CH/PORT 4
" " # 60 @ 08:12 HEADER CH/PORT 2
Changed TO ZONE 1 APP 4 MIN
CALIBRATION RUN # 61 @ 08:25 MATHESON 10

| | | | | | |
|---|---|---|---|---|---|
| 10/6/98 | CALIBRATION | RUN # 62 | @ 06:44 | MATHESON | 1 |
| | " | " # 63 | @ 06:55 | " | |
| | " | " # 64 | @ 07:06 | " | |
| | ANALYSIS | RUN # 65 | @ 07:18 | EFFLUENT | ch/ |
| | " | " # 66 | @ 07:33 | HEADER | ch/ |
| | Changed TO ZONE 1 APP. 4 MIN. | | | | |
| | CALIBRATION | RUN # 67 | @ 07:47 | MATHESON | 10 |
| 10/7/98 | CALIBRATION | RUN # 68 | @ 06:47 | MATHESON | 10 |
| | " | " # 69 | @ 06:57 | " | " |
| | " | " # 70 | @ 07:08 | " | " |
| | Analysis | RUN # 71 | @ 07:20 | Effluent | ch/4 |
| | " | " # 72 | @ 07:38 | HEADER | ch/2 |
| | Changed TO ZONE 1 APP. 4 MIN | | | | |
| | CALIBRATION | RUN # 73 | @ 07:54 | MATHESON | 10 |
| 10/8/98 | CALIBRATION | RUN # | @ | MATHESON | 10 |
| | " | " # | @ | " | " |
| | " | " # | @ | " | " |
| | ANALYSIS | RUN # | @ | Effluent | ch/4 |
| | " | " # | @ | HEADER | ch/2 |
| | Changed TO ZONE 1 APP. | | | | |

System down overnight est. shut down @ 16:30 on 10/7/98 autodialer was in disabled position. System K.O. pump not working properly. Replaced gasket & cleaned bowls & "Y" strainer. Cleaned lower level seas. Restarted at 12:30 and seems to be running at 11 gpm ave with ≈ 18" Hg Vac.

10/9/98 System Readings Taken @ 10:30

| | | | | | |
|---|---|---|---|---|---|
| 1/10/98 | CALIBRATION | RUN # 74 | @ 06:40 | MATHESON | 10 |
| | " | " # 75 | @ 06:52 | " | " |
| | " | " # 76 | @ 07:06 | " | " |
| | ANALYSIS | RUN # 77 | @ 07:19 | Effluent | ch/4 Tedlar dup. |
| | " | " # 78 | @ 07:34 | Influent 2 | ch/2 sys on zero 10 min |

Summa & Tedlar taken directly after back to back

Calibration Run #79 @ 07:47 Matheson 10

" " #80 @ 08:08 "

- purge time 15 sec
- bag analysis from port 5
- rename *.idx, *.log sentex12.log sentex12.idx

08:55 Start quarterly tedlar bag well survey (sentex13.*) int mode #2

high concentration wells - LOOP MODE

| ~~08:55~~ Id | time | ran |
|---|---|---|
| 10 ppm matheson tedlar | 0857 | #1 |
| calibration 10 ppm matheson | 0909 | #2 |
| calibration 10 ppm matheson | 0920 | #3 |
| 10 ppm matheson tedlar | 0932 | #4 |
| 10 ppm matheson tedlar | 0944 | #5 |
| EW-N7 | 0955 | #6 |
| EW-N7 | 1006 | #7 |
| EW-N7 | 1017 | #8 |
| ITRD-1 (N7) | 1028 | #9 |
| ITRD-1 (N7) | 1038 | #10 |
| EW-N8 | 1050 | #11 |
| EW-N8 | 1100 | #12 |
| ITRD-2 (N9) | 1111 | #13 |
| ITRD-2 (N9) | 1121 | #14 |
| EW-N9 | 1132 | #15 |
| EW-N9 | 1143 | #16 |
| EW-N9 | 1153 | #17 |
| blank | 1204 | #18 |

| | id | time | run # | mod |
|---|---|---|---|---|
| | blank | 12:14 | # 19 | LOOP |
| | zone 2 | 12:25 | # 20 | |
| | zone 2 | 12:35 | # 21 | |
| | zone 4 | 12:46 | # 22 | |
| | zone 4 | 12:56 | # 23 | |
| | 10ppm cal | | # 24 | |
| bad | 1 ppm cal | 13:29 | # 25 | TRAP |
| | 1 ppm cal | 13:51 | # 26 | |
| | zone 5 | | # 27 | |
| | alternate cal-5 | | automode | |
| | 1 ppm cal | | #28 | |
| | zone 5 | | #29 | |
| | 1 ppm cal | 14:54 | #30 | |
| | blank | 15:08 | #31 | |
| | 1ppm tedlar | 15:20 | #32 | low |
| | 1ppm tedlar | 15:31 | #33 | low |
| | 1ppm tedlar | 15:43 | #34 | |
| 0.5 psi | 1ppm calibration | 15:55 | #35 | |
| | 1ppm cal port 5 | 16:06 | #36 | Changed to Zo |
| 3psi | 1ppm cal port 5 | 16:18 | #37 | |
| | argon blank | 16:30 | #38 | |
| 1 clean cycle | argon blank | 16:46 | #39 | |
| 3 clean cycles | auto mode | zone 5 / cal | #40 | |
| | 2 clean cycles | | #41 | |

10/13/98 07:00 hrs System on Run# 44 Aborted NO Cal System must have experienced lockup - not pumping sample / cal. Shut down system after discovery of oven temp = 0 with reading of >4,xxx - Re powered System and waited for thermal Equilibrium.

:10 temp equilibrating
- calibrate and check for peaks
run # 41
run #42 prelim calibration peak check
/98 renamed ~~sentex~~.* ~~sentex~~13.*
GC brought to temp - system
apparently OK

| | Id | time | run # | mode |
|---|---|---|---|---|
| ppm | calibration | bad | #1 | TRAP |
| ppm | calibration | 9:13 | #2 | |
| ycle | argon blank | 9:29 | #3 | |
| ycle | 1ppm calibration | 9:47 | #4 | |
| | argon blank | 10:07 | #5 | |
| lean | 1ppm tedlar | 10:29 | #6 | purge pump pump |
| ush | Power failure at ≈ 10:40 | | | |

GC System Running with Generator 11:10
Started ~~Cal Run~~ @ 11:39 Following Oven EQ.
power restored 1ppm Tedlar @ 12:00

| | | | |
|---|---|---|---|
| 1ppm calibration | 12:12 | #8 | TRAP |
| SVE Restarted | 12:24 | | |
| argon blank | 12:37 | #9 | |
| 1ppm tedlar | 12:50 | #10 | |
| 1ppm tedlar | 13:04 | #11 | |
| 1ppm tedlar | 13:14 | #12 | |
| 1ppm tedlar | 13:29 | #13 | |
| 1ppm calibration | 13:43 | #14 | |
| 1ppm calibration | 13:58 | #15 | |
| EW-N1D | 14:09 | #16 | |
| EW-N1O | 14:25 | #17 | |
| EW-N1O | 14:36 | #18 | |
| VPMP-4S | 14:51 | #19 | |
| VPMP-4S | 15:03 | #20 | |

| | id | time | run # | mode |
|---|---|---|---|---|
| 1 clean | VPMP-4M | 15:18 | #21 | Trap |
| 1 clean | VPMP-4M | 15:33 | #22 | |
| 1 clean | ED-N5 | 15:48 | #23 | |
| 1 clean | ED-N5 | 16:03 | #24 | |
| 1 clean | ED-N4 | 16:18 | #25 | |
| | ED-N4 | 16:30 | #26 | |
| 1 clean | 1ppm calibration | 16:41 | #27 | |
| 1 clean | 1ppm tedlar | 16:56 | #28 | |
| 1 clean | argon blank | 17:10 | #29 | |
| | ED-N3 | 17:22 | #30 | |
| | ED-N3 | 17:34 | #31 | |
| | ED-N2 | 17:45 | #32 | |
| | ED-N2 | 17:57 | #33 | |
| | ED-N1 | 18:08 | #34 | |
| | ED-N1 | 18:20 | #35 | |
| | VPMP-2S | 18:32 | #36 | |
| | VPMP-2S | 18:43 | #37 | |
| | ITRD-1 (N7) | 18:55 | #38 | |
| | ITRD-1 (N7) | 19:07? | #39 | |
| | 1ppm calibrate | 19:22 | #40 | |
| low volume → | 1ppm tedlar | 19:36 | #41 | low volume |
| | argon blank | 19:48 | #42 | |
| | 1ppm tedlar | 20:00 | #43 | |
| 10/15/98 | ~~Calibrate~~ (after 3 clean cycles - manual) | 06:22 | #44 | Trap |
| | Calibrate (3 C.S. Runs) | 06:45 | #45 | Trap |
| | Calibrate " 1PPM | 7:11 | #46 | " |
| | Note: Filled Tedlar w/ cal Gas Prior to Start | | | |
| | 1PPM Tedlar (3CS) 15 sec S.P. | 735 | #47 | |
| | 1PPM Tedlar (3C.S.) 10 sec S.P. | 7:56 | #48 | |
| | 1PPM tedlar (3CS) 10 S S.P. | 8:08 | #49 | |
| | argon blank " 1.5 S S.P. | 8:39 | #50 | |

| | id | time | run # | mode |
|---|---|---|---|---|
| | argon blank | 08:53 | #51 | trap |
| | argon blank | 09:05 | #52 | |
| SVE | changed to zone 2 | 09:19 | | extraction |
| | zone 1 header | 9:19 | #53 | |
| | zone 1 header | 9:38 | #54 | |
| | zone 1 tedlar | 9:53 | #55 | |
| | zone 1 tedlar | 10:05 | #56 | |
| | EW-N1 | 10:16 | #57 | large unknown |
| | EW-N1 | 10:28 | #58 | peak at 88s |
| clean | EW-N2 | 10:42 | #59 | |
| | EW-N2 | 10:54 | #60 | unk @ 87s |
| | EW-N3 | 11:06 | #61 | ↵ |
| | EW-N3 | 11:17 | #62 | |
| clean | 1ppm calibration | 11:29 | #63 | |
| Bclean | 1ppm tedlar | 11:4453 | #64 | |
| clean | VPMP-1S | 12:07 | #65 | |
| | VPMP-1S | 12:19 | #66 | |
| | VPMP-1M | 12:30 | #67 | |
| | VPMP-1M | 12:42 | #68 | |
| | EW-N4 | 12:54 | #69 | |
| | EW-N4 | 13:09 | #70 | |
| 13:00pm | Change to Zone 2 FT | | | Trap |
| | EW-N5 | 13:24 | #71 | 2c.c. post |
| | EW-N5 | 13:41 | #72 | 2cc. post |
| 1329 | System shut down for maint. (SVE) | | | |
| | Zeroed AS & SVE Magn. Gauges | | | |
| 1352 | SVE System Restarted Blowers Lubed (Grease) | | | |
| | VPMP-3 S | 13:59 | #73 | Trap |
| | VPMP-3 S | 14:14 | #74 | |
| | EW-N6 | 14:29 | #75 | |
| | EW-N6 | 14:45 | #76 | |
| | Calibrate 1PPM | 15:08 | #77 | |

| | id | time | Run# | mode |
|---|---|---|---|---|
| 2clean | calibrate 1ppm | 15:26 | #78 | trap |
| 2clean | ca 1ppm tedlar | 15:46 | #79 | |
| 2 clean | 1ppm tedlar | 16:27 | #80 | |
| 2 clean | argon blank | 16:47 | #81 | |
| | argon blank | 16:58 | #82 | Sentry 14. * |

17:15 REPLACE Sentex System board!
17:30 Replaced original system board
new board caused purge pump
fibrillation

17:30 Run #1 calibration 10ppm LOOP MODE
- oven not equilibrated abort run
17:39 run #2 10 ppm calibration
run #3 abort
run #4 start auto loop test
- every 3 hrs (180 min) run
sample
- 1 calibration for 2 samples

10/16 Manual Mode Cal Run #9

10/18 Call in High $H_2O$ in KO Tank
Low level Switch not working properly &
Manual Cal Mode & Restart auto

10/19 Stop Auto Run & Run Calibration Manual
Calibrate Matheson 10 7:41 Run #34
ANALYSIS RUN #35 @ 08:18 EFFLUENT ch/4
" " #36 @ 08:38 HEADER ch/2
Changed TO ZONE 1 APP. 4min
CALIBRATION RUN #37 @ 08:57 MATHESON 10
System off @ 1330 for 10 min
Trap Port 5 #39 12:02 Aborted 3 clean cycles
Trap Port 5 Argon #40 12:23
" " " #41 13:52
" " " #42

Run Noted Regulator moved - Reset to Approx. 3psig
43
44 Aborted (Argon)
#45 Argon Blank @ 14:59
#46 " " 15:22
#47 " " 15:42
#48 Automatic start w/cal
↓
10/20/98
#74 Clean! last cal was Run#
Set for 3 clean cycles w/each run + 180 sec Back flush
Run# 48, 58 & 67 calibrations
07:40 Calibration Run# 75 Matheson 1ppm
Analysis Run# 76 Port 5 301-A Air
0821 Analysis Run # 77 Port 5 301-A Air
Analysis Run # 78 " "
Changed Dry Purge from 40 to 50 } per Richard @ Sentex
Changed Delay Time from 40 to 60
set anal per cal. to 5 20 min/run 2hrs = 1 cal 5 Blanks
12:45 Analysis Run# 79 Port 5 301-A Air
Changed Calibration Peak info to PPB + Put in AVG between Quanterra analysis & Matheson anal:

| Peak | PPB |
|---|---|
| 1 dcm | 925 |
| 2 CACE | 931 |
| 3 Ben | 987 |
| 4 TCE | 952 |
| 5 TOL | 956 |
| 6 PCE | 947 |
| 7 EBZ | 981 |
| 8 Xyl | 961 |

13:00 Automatic Analysis Starting w/Cal.
Run # 80 = Calibration

10/20/98 observed failed via Remote
11:40 oven Temp Reading: 4 074
Temp: 0
Reboot
OF Not working
Changed Board U20 Pin 3 = 0 Pin 4 ≈ 5v
10/21/98 12 30A Restarted System Running Anal on port 5 to clear out Preconcentrator Run#92
Calibration Run# 93 skipped 1st peak set INH to c
Analysis Run #94 Abort
Analysis Run #95
Trap mode
Automatic Mode Starting w/cal
Run# 96 3 samps bet. cals.
96 cal
97 98 99 Blank
100 cal
101 102 103 Blank
104 cal
105, 106, 107 Blank
108 cal
109 110 111 Blank
112 cal
113, 114, 115 Blank
Renamed sentex.idx & .log to sentex15.idx &
Loop mode
Copied c:\Loop\sentex.prm to SNX Dir
Calibration (to purge lines) Run#1 Matheson 10 ppm
Run# 4
Run#5 Calibrate Loop Orig. Board
#6
#7
#8 Blank (Port #5)
#9 Calibrate
#10 "
#11 "

| | |
|---|---|
| 0/21/98 | Run # 12 Blank (Port 5) |
| | Run # 13 Calibration |
| | Run # 14 Calibration |
| | Run # 15 Calibration |
| | Run # 16 Calibration |
| 13:38 | Run # 17 Zone/Port 4 Effluent Note Short Scanner Purge |
| | Run # 18 Zone/Port 4 Effluent |
| 14:07 | Run # 19 Zone 2 influent |
| 14:22 | Run # 20 Zone 2 influent |
| | Analysis mis identified Peaks + values |
| 14:30 | A.S. restarted on Zone 2 - Full time |
| 14:35 | Run #21 Calibration |
| 14:48 | Run # 22 Calibration |
| 15:00 | Run # 23 Calibration |
| 15:11 | Run # 24 Blank - Port 5 |
| 15:23 | Run # 25 Blank - Port 5 |
| 1536 | Run # 26 Calibration |
| | Run #27 Zone 2 influent > Sparge on line |
| 16:08 | Run #28 Zone 2 influent |
| 16:20 | Run # 29 Calibration |
| 16:30 | Run # 30 Calibration starting Automatic Mode |
| | 10 Anals. between Calibrations Anals. are port 5 |
| 10/22/98 | System went down at approx. 10/21/98 9:40 - due to a VE motor overheat. This was caused by the failuer of the 6LP Blower (Siezed). Auto Analysis terminated with Run# |
| 09:51 | Calibrate Run # 64 Matheson 10 Cyl. |
| 10:12 | Analysis Run # 65 Tedlar w/10ppm Matheson |
| | Calibrate Run # 66 & 67 Matheson 10 through cal port Tedlar Aborted |
| | ~~Analysis Run # 69 Tedlar w/10 ppm matheson~~ |
| | ~~Analysis Run # 68 Blank~~ |
| | Changed Purge time to clear lines and get good Cal Sample from Tedlar |

10/22/98

Calibrate Run# 68 Matheson 10 in Tedlar
Aborted Couldn't pull properly past septum?
Used needle to bypass septum
Calibrate Run#69 Matheson 10ppm Tedlar (Aborted
Reconnected to cyl.
Calibrate Run#70 matheson 10 ppm Cyl.
Aborted - Purged Time Reset values
Calibrate Run#71 matheson 10 ppm Cyl
Not Quite right
Analysis Run#72 Blank - outside air Abort
AUTO mode 3and 1eal
Abort Run#83
Run#84 Calibration Matheson 10 ppm Cyl.
Run#85 Analysis Port 5 10ppm Tedlar

11/3/98 Calibrate Run# 86
Started to Trouble Shoot Sentex GC Main Bo
Changed out orig. U1 w/ new board U1
Calibrate Run# 87
Changed out orig. U2 w/ new board U2
Calibrate Run# 88 - Scanner purge, pum
chatter - New board U2 defective.
Re installed orig. U1 & U2 (Note: orig board in G
Changed out U3 & U14
Calibrate Run # 89
Note: Oven temp reading higher than
before. Logic used for chip replaceme
is: U3 Driver for preconcentrator heat fila
U14 intermittent oven temp. Flake out (>4000
and also inputs/links with U3
Temp Reading 1951 (68°C)
Calib Run #90 (temp rdg 1962 (68°C)

13/98 Automatic Mode
Cal #91
Ports #92
" #93
Cal #94
Ports #95
" #96
Cal #97
Adjusted Pot for U18 Reading of .92 V (was .91)
Per Richard at Sentex
Reading on U14 pin 39 2.048 V could only
Read 2.04 on DVM - No adjustment
Cal #98 Following adjustment.
Automatic Mode Started with Run #99
14:10 Change mode of operation to PKT
Note! Due to change / Adj of P2 to set .92V
on pin 6 of U18 (was .91V) xylene & other
peaks RT longer - must have something
to do with oven temp-! Will Continue
with tests.
~~Cal~~ Run# 113 Reset to orig voltage!
Auto mode started with Run# 114
5 anals / Cal. Override Cal "Y"
Messed up
11/4/98 put old U1 & U2 on new board all components
except U1 & U2 on orig. boards inst. new
board in GC. Used Fluke 8840A (calibrated)
to set P3 to Read 2.048 V between U14 pin39
and Q7 leg 3. Set pin6 to Ground Of U18 to 0.92V
Run# 119 Before Settings
Run# 120 After Settings
Run# 121 Closed - Temp Reading 72°C
Aborted Peaks Shifted

11/4/98 Changed GC Temp to 50°C from 60°C & let Stabilize for 1hr. Changed Clean Cycles to 1
Calibrate Run# 122 Temp 66°C
Controller for heated sample lines worked on - wasnt heating - checked/reseated all connections

| | | |
|---|---|---|
| 1, dcm, 55 | 4, tce, 123 | 7, eth ben, 371 |
| 2, cis dce, 76 | 5, Toluene, 193 | 8, xylenes, 470 |
| 3, benzene, 101 | 6, Pce, 251 | |

Trap Cal / Peak I D Set at: No chg
Dropped temp to 49°C
Oven temp reading 60°C (1587)
Cal in DB:

| | | |
|---|---|---|
| 1, dcm, 57 (5%) | 925 | PPB |
| 2, cis dce, 80 (5%) | 931 | PPB |
| 3, benzene, 107 (5%) | 987 | PPB |
| 4, tce, 130 (5%) | 952 | PPB |
| 5, toluene, 205 (5%) | 956 | PPB |
| 6, pce, 269 (5%) | 947 | PPB |
| 7, eth benzene, 402 (5%) | 981 | PPB |
| 8, xylene, 509 (5%) | 961 | PPB |

Cal Run # 123 - Change temp back to 50°C Peaks RT too long. clean cycles set
Reset Cal / Peak ID in DB. to those obtained in Run # 122
Auto Analysis - Trap Test Samal / Cal
Cal Run # 123

/5/98 Changed back to orig Board & Config.
Set up in loop mode - Chgd. Com1 settings
Set Voltages 0.92 & 2.048 let system
Warm up - close to temp
Calibration Run # 132
Check Voltages Adj.
Automatic Analysis start @ 10:00 1 Anal/1 cal
Calibrate Run # 133 Generated 10ppm tedlar just prior
134, 136, 138, 140, 142, 144 Blanks
133, 135, 137, 139, 141, 143, 145 Cals.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 RT | 49 | 48 | 49 | 49 | 48 | 49 | Set | 49 |
| 2 | 69 | 68 | 69 | 69 | 68 | 69 | Set | 69 |
| 3 | 92 | 92 | 92 | 93 | 92 | 93 | | 92 |
| 4 | 112 | 112 | 112 | 112 | 111 | 112 | | 112 |
| 5 | 177 | 176 | 177 | 177 | 176 | 177 | | 177 |
| 6 | 232 | 231 | 231 | 232 | 230 | 231 | | 231 |
| 7 | 343 | 341 | 342 | 343 | 340 | 341 | | 342 |
| 8 | 431 | 433 | 435 | 435 | 430 | 433 | | 433 |

Set new RTs
Calibrate Run # 146 Betw. Runs GC Temp Regs: 1908 (67°c)
Cal Gas in tedlar Run # 147 Bag may have sucked onto stem?
#148
#149 Bag det. sucked shut Aborted
after xylenes
started autoanalysis 5 runs/cal
9:20 PM System Started to break in new belts & blower
at approx. 16:40 running off line (Pulling Bd. Air)
Vac post Tank A has stabilized at ≈ -13" Hg -
let run til 9:20pm (2120) changed to Tank B
B @ -7.75" Hg with pre tank (post filter) @ -5" Hg
Will need to run off Tank B with A as last Resort.
Waiting on Quote from Great Lakes on
Change & Clean of A

9:30 PM Change to Active on Zone 2 full on
Let stabilize
Stopped GC auto following Cal Run # 175
Cal Run # 176 - Aborted NO Cal Gas on Port
~~Analysis Run # 177 Matheson 10 ppm in Tedlar Port 5~~
(2200) Cal Run # 177
10:00 System Readings Outside = ~~43°~~ 38 est.
Exh. Temp = 190°F Bar = ~~30.21~~ est 30.1
Mag = 0.77" $H_2O$ Back press = ∅
GLP Temp = 185°F
Sys Vac = -17.5" Hg
Heat exc Vac = -11.25" Hg
Vac Pre Filter = -16.25" Hg
Vac Post Filter = -15.4" Hg
Vac Zone 2 Hdr = -14" Hg
$H_2O$ meter = 600686 gallons
Bd. Temp = 66°F
- Analysis Run # 178 Cal Gas in Tedlar
Analysis Run # 179 Port 4 System active Effluent
Note System Running Through Tank B
22:33 Analysis Run # 180 port 2 System to Zone 1
Analysis Run # 181 Ports Cal Gas Tedlar
Renamed sentex.idx & sentex.log to
Sentex16.idx & Sentex16.log
Started Auto anal Scanner purge set to 60 sec
5 Anal / Cal
Run #1 to #20 1, 7, 13, 19 Calibrations

/98 Calibrate Run# 21 Matheson 10 ppm
Analyze Run# 22 Outside Air Scan Purge 180 Port 5
e Note Analyze Run# 23 Cal. gas in Tedlar Scan Purge 15 Port 5
Analyze Run# 24 Effluent Sys. Running " " 180 Port 4 (was 20)
- Note: Between Runs #22 + #23 changed Purge time to 40
based upon looking at residual in blank Runs
Temp. checked: Reading = 1895 (67°c)
After Run #23 changed back (Purge time) to 20
had less recovery on tedlar cal gas than before
We should consider "Optimization" of purge time
Such as the least amount we could do with/while
minimizing carryover

09:40am System Readings Bldg temp = 68°F outside = 43°F
Exh. Temp = 191°F Back Press = Ø psig Bar = 30.21
Mag. = 0.79" $H_2O$ 6LP Temp = 190°F
Sys. Vac = -17.4" Hg Post Filter = ~~-16.25~~ -16.1
Pre filter = ~~-10.1~~ -15.25 Zone 2 = -13.9
Cal $H_2O$ pumped = 60686 Ht Exchg - 11.1

943 Analyze Zone 2 Run# 25 changed to Zone 1 x 4 min
Analyze Run# 26 Port 5 Cal gas in Tedlar scan Purge 15
Automatic Run# 27 Calibrate 5 runs/Cal scan Purge 60
↓ Run # 122

11/7/98 Calibrate Run# 123 @ 10:55
Temp Reading: 1910 (67°F)
Analyze Run# 124 @ 11:07 Cal Gas in Tedlar Port 5
Analyze Run# 125 @ ≈11:20 Port 4 Sys Effluent w/ON
System Readings @ 11:20
Bldg Temp 70°F Mag. = 0.82 outside 39°
Eff Temp = 189°F Back Press = 0 Bar = 30.43
Ht Exchg = -10.9" Hg 6LP Temp = 189°F
Sys Vac = -17.4" Hg Post Filter = -16.1
Prefilter = -15.25 Header Z2 = -13.9
$H_2O$ Pumped = 60686

11/7/98 Analyze Run#126 Inflvent Zone 2 System to zone 1 ≈ 4
1147 Analyze Run#127 Cal Gas in Tedlar ports
Calibrate Run#128 Matheson 10
11/8/98 Temp. Reading 1888 (606°F)
Calibrate Run#129 Matheson 10
Calibrate Run#130 Matheson 10
Analyze Run#131 Tedlar w/ Cal Gas
Temp Reading 1894 (607°F)
Analyze Run#132 Effluent Port 4
System Readings Bldg temp 73°F
16:50 Mag = 0.82 Eff Temp 192°F
Bk press = 0 HTexp = -10.75
LP Temp = 192°F Sys Vac = -17.3" Hg
Post Filter = -16" Hg prefilter = -15.1" Hg
Zone 2 = -13.75 $H_2O$ = 60686
Analysis Run#133 Zone 2 Switch to zone 1 ≈ 4 min
Analysis Run#134 Cal Gas in Tedlar
Calibrate Run#135 Matheson 10
Calibrate Run#136 " "
11/9/98 Temp Reading: 1880 (606°C)

07:02 CALIBRATE RUN #136 @07:02 MATHESON 10
" RUN# 137 @ 07:13 " "
" " #138 @ 07:25 " "
ANALYSIS RUN # 139 @ 07:36 Effluent ch/port 4
" RUN # 140 @ 07:51 Header ch/port 2
Changed TO ZONE 1 APP. 4 min
CALIBRATION RUN #141 @ 08:03 MATHESON 10
- purge time to 10 sec from 20 sec
Calibration Run #142 @ 8:16

| | Calibration Run # | purge time | time |
|---|---|---|---|
| port | 143 | 30 s | 08:28 |
| | 144 | 30~~40~~ s | 8:40 |
| | 145 | 40 s | 8:54 |
| | 146 | 5 s | 9:05 |
| | tedlar cal | | |
| ? | 147 | 40 s | 9:21 |
| | 148 | 40 s | 9:31 |
| | 149 | 30 s | 9:43 |
| | 150 | 20 s | 9:53 |
| | 151 | 10 s | 10:04 |
| port 5 | 152 | 40 s | 10:15 |
| 15ssscamp | 153 | 30 s | 10:26 |
| 5ssscamp | 154 | 20 s | 10:36 |
| | 155 | 10 s | 10:47 |
| cal bottle | 156 BAD | 20 s | 10:59 |

\# 157 - cal gas, purge time 1 sec 13:32
158 - tedlar 10, purge time 1 sec 13:43
159 - cal gas, 1 sec purge
160 - tedlar 10, 1 sec
161 - cal gas, 1 sec
162 - tedlar 10, 1 sec
163 - cal gas, 1 sec
164 - tedlar 10, 1 sec
165 - cal gas, 1 sec
166 - tedlar 10, 1 sec

11/10/98 Change to trap mode
Run # 167 - 1ppm cal gas
60 sec dry purge
40 sec delay
10 sec purge
* aborted - no purge pump activation

Run #167 1 ppm cal gas 08:57
- 40s dry purge
- 60s delay
- 10s sample purge
- no clean cycle
- no backflush
Run #168 1 ppm cal gas ~~08~~ 09:07
auto mode, alternate ports 4,5
Run #169 port 4 09:22
Run #170 port 5 09:37
Run #171 calibration (peak id run) 9:46

| | |
|---|---|
| dcm | 54 |
| cis 12dce | 74 |
| benzene | 101 |
| tce | 119 |
| toluene | 187 |
| pce | 240 |
| ebenzene | 350 |
| xylene | 442 |

file rename sentex17.log, sentex17.idx
Run #1 1 ppm calibration manual mode
Run #2 1 ppm cal auto mode
missed benzene ID
Run #3 PORT 4 auto mode
Run #4 → Run #7
Run #8 calibration no purge pump
flat line abort
Run #8 calibration test - over
temp low → oven off if no peaks
found
→ Replace system board 14:00

SVE pump down hi water level
11/11/98 repaired oven heater circuit in
new system board
new system board installed

11/18/98 Attempted to start GC in loop mode temp reading
4084 (0°c) Shut down GC turned off Gasses.
Took Summa Sample on Zone 2 @ 9:15 AM
#043707-001

11/24/98 SYSTEM TAKEN OFF LINE @ 07:00 FOR CARBON REPLACEMENT
AND CLEAN OUT TANK (A)
STARTED CARBON REMOV @ 07:15 on TANK (A) ONLY
FINISHED CARBON REMOV @ 08:15
STARTED CLEANING OUT TANK @ 08:30 on TANK (A)
Finished Cleaning TANK @ 09:20 " " "
STARTED FILLING w/ NEW CARBON @ 09:55
Finished CARBON Fill @ 10:45
SYSTEM RESTART @ 10:55 ON HAND TO CHECK IT OUT.
FOR about 5 MIN.
SYSTEM SHUT down again FOR MAINT.
SYSTEM RESTARTED @ 15:10

11/25 High Vacuum Reading :- VMPMP:4 (MS to check)
Summa taken on Zone 2 # 043708-001 @ 14:30

12/7/98 SYSTEM SHUT down for MAINT @ 14:00 to 14:30

12/8/98 Board Rec from Sentex - No relays! for Alarm (Gas ON was off)
13:33 in System Voltages check out letting col. Htr equil.
System in loop mode
14:04 Temp near equilibrium Reading 1740 (63°)
Run #13 Calibration Run (may be low) Matheson 10

| | |
|---|---|
| | 14:15 |
| 12/8/98 | Run#14 Calibrate Matheson 10 Still low in Amplitude |
| | Set Inhibit to 40sec from 45 sec |
| 14:25 | Run#15 Calibrate Matheson 10 |
| | Checked Regulator Press. Set cal gas to 3psig |
| | Adj Argon |
| 14:35 | Run#16 Calibration Matheson 10 |
| | Aborted - Set Inhibit to 45 |
| | Run#17 Calibration Jacked UP |
| | Run# 18 Calibration Matheson 10 Adj Carrier Ga |
| | " 19 " " Abort Raise oven temp t |
| | Set Inhib to 40 |
| | Run# 20 Cal SET ~~Start~~ inhibit to 45sec |
| | 21 Cal |
| | 22 |
| 15:45 | Automatic Start with Cal Run#22 |
| | 5 Anal / cal |
| | Stopped after Run#94 |
| | Cals: 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94 |
| 12/9/98 6:30 | Column Temp Reading: 1982 (68°) |
| | Filled Tedlar with 10 ppm Matheson |
| | Shut down due to letting windows finish loading |
| 6:40 | Restarted and let temp settle reading 1997 (69) |
| 6:42 | Run#95 Calibrate Matheson 10 |
| | Set Scanner purge to 10 sec. |
| 6:54 | Blank Run# 96 Port / Chnl #5 301-A Air |
| 7:06 | Temp Rdg: 2000 (69) |
| 7:06 | Run#97 Tedlar w/ cal gas Port/Chnl #5 Matheson 10 |
| 7:17 | Run#98 Tedlar w/ cal gas port/chnl #5 Matheson 10 |
| 7:28 | Run#99 " " " " " " |
| 7:38 | Run # 100 Calibrate Matheson 10 (fill tedlar during run) |
| 7:49 | Run# 101 Tedlar w/ cal gas Port/Chnl. 5 Matheson 10 |
| 8:00 | Run# 102 " " " " " " " |

9/98 Temp Reading: 2016 (69)
12 Run# 103 Tedlar w/cal gas Port/chnl. 5 Matheson 10
23 Run# 104 " " " " " " "
8:33 Run# 105 Calibrate Matheson 10 ~~Temp Reading:~~ 8144
8:43 Run# 106 Calibrate Matheson 10 (fill tedlar during Run)
8:54 Temp. Reading: 2013 (69)
8:54 Run# 107 Tedlar w/cal gas Port/chnl. 5 Matheson 10
9:05 Run# 108 " " " " " " "
9:16 Run# 109 " " " " " " "
9:26 Run# 110 " " " " " " "
9:37 Run# 111 Calibrate Matheson 10
9:54 Temp Reading: 1951 (68°) Scanner purge set to 180 sec
9:55 Run# 112 Port/Chnl. 4 Effluent Zone 2 running
10:10 Run# 113 Port 2/Zone 2 Influent Zone 2 Chg to Zone 1 x 4 min.
10:15 Summa Sample Taken #
10:23 Run# 114 Calibrate Matheson 10
10:34 Temp Reading: 1957 (68°) Scanner purge set to 10 sec
10:35 Run# 115 Halon 1211 on port 5 Aborted (mix w/ Argon) ≈ 1/4 (SWAG)
Added more Argon to tedlar
10:44 Run# 116 Blank (Scanner purge for 180) Recovered! Run Aborted
10:53 Run# 117 Halon 1211 on port 5 Added more Argon
11:04 Run# 118 " " " Added more Argon
11:14 Calibrate Run# 119 Matheson 10
11:25 Run# 120 Halon 1211 on port 5 Added more Argon
13:24 Run# 121 Blank 301-A Air Scan Purge 10 sec.
13:36 Run# 122 Argon Blank scan Purge 25 sec purge 50 sec
1347 Temp. Reading 2050 (70°)
1348 Run# 123 Calibrate - Bad
Set scan purge back to 10 & purge back to 20
~ 1358 Run# 124 Calibrate
~ 14:09 Run# 125 Halon 1211
14:23 Temp Reading 2029 (69°)
Set oven temp to 150°C to bake over night

FAXED

Mark Spivey

12/10/98 operated from Remote System
Tests showing reduction in resp. based on Amount of purge time in loop mode

12/15/98 7:00 temp rdg. 2017 (69°)
Switched to purge and trap mode
7:15 SVE system switched to Air makeup only
? off line changed Tank A to down flow to
8:45 back flush - GLCT (Richard) Recc.
7:45 GC Temp Rdg: 1984 (69°)
8:57 Attempted to run blank with 3 condition cycle. CARBOXEN filament not heating
Called Sentex (Richard) Looks like it Could be the micro-P (U3)
Checked Connections and continu. per ins.
Still NOT WORKING (Dumb term. OFF)
Talked to Julio @ Sentex - Replace U
Filament works on OFF "Blew up"
on Analysis - jog of Scanner purge pu
13:30 Sentex to FEDEX Micro Controller Chips
Late entry 9:15 Tank A in upflow main Vac = -19.2" Hg post filter = 12.6" Hg Δ 6.6"
9:25 Changed to Tank B in upflow main = -17.7" Hg Post filter = 16.4" Hg Δ 1.3"
12/16/98 Changed GC back to Loop mode Ran 1 Cal & 1 Halon 1211. Set Scan Purge to 5 sec. set temp 55°C

12/7/98 Renamed Sentex.idx & Sentex.log to Sentex18.*
Cal Run #1
" Run #2
Blank Run #3
Cal Run #4
Blank Run #5
Cal Run #6
Blank " 7
Cal Run 8 Run 9 & 10 waste Runs

| Peak | RT | | | | | | Set |
|---|---|---|---|---|---|---|---|
| 1 | 57, | 57, | 56, | 57, | 57, | 58 | 57 |
| 2 | 76, | 76, | 75, | 76, | 76, | 77 | 76 (77) |
| 3 | 99, | 100, | 100, | 101, | 100, | 100 | 100 |
| 4 | 118, | 118, | 118, | 119, | 118, | 119 | 118 (119) |
| 5 | 180, | 180, | 182, | 183, | 182, | 182 | 182 |
| 6 | 232, | 232, | 234, | 235, | 234, | 234 | 234 |
| 7 | 335, | 335, | 339, | 340, | 339, | 339 | 339 |
| 8 | 420, | 421, | 427, | 429, | 427, | 426 | 427 |

12/18/98 Set new RT for Cal peaks Cal Run # 11
Cal Run # 12 Precon Filament not red hot
Peak areas look low - checked cal gas press. ok
13:12 Blank Run #13 Display mpu = .1 (was .05) Duration Changed to 8 min (was 9)
Cal Run # 14 Chart duration set to 7 min
~~Port Analysis Run # 15 scan purge set to 180~~
Check Cal areas against prev. - about off.
Changed MPU on GC started GC on initial inst.
Cal Run # 15 - Precon Filament Glows red!
let system finish loading windows & PC Anywhere
54, 73, 96, 114, 176, 228, 331, 416 Temp reading (20.3 - 70°)
3 3 4 4 6 6 7 11 reset RT for cal gas
Cal Run # 16 - Did not glow Red
Restart System

12/18/98

Run# 16 Calibration
Changed to NO precon clean
Run# 17 Zone 2 14:58 Zone 1
Summa Sample @ 14:55 on for.
Run# 18 Port 5 @ 15:09 ≈ 12 min
Changed back to 3 clean cycles
Changed Scan Purge to 60 sec
Started ~~[illegible]~~ run #19 calib
#20 Cal Gas in tedlar ~~Start of~~ Auto

12/21/98 SYSTEM WENT DOWN @ 3:10 BACK on @ 3:50
DUE TO High Level SWITCH NOT WORKING RIGHT.
19:40 SYSTEM WENT DOWN again, STARTED BACK @ 20:40

12/22/98 12:30 AM SYSTEM WENT DOWN, STARTED BACK @ 2:00 AM
5:20 SYSTEM WENT DOWN, STARTED BACK @ 6:00
12:05 SYSTEM WENT DOWN, STARTED BACK @ 12:20

12/23/98 CALIBRATION RUN # 135 @ 06:55 MATHESON 10
" RUN # 136 @ 07:14 " "
scanner purge 60 sec " " # 137 @ 07:31 " "
ANALYSIS RUN # 138 @ 07:53 EFFLUENT Ch/PORT 4
" RUN # 139 @ 08:15 HEADER Ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 140 @ 08:36 MATHESON 10

12/30/98 CALIBRATION RUN # 141 @ 06:49 MATHESON 10
" RUN # 142 @ 07:06 " "
scanner purge 60 sec " RUN # 143 @ 07:23 " "
ANALYSIS RUN # 144 @ 07:53 EFFLUENT Ch/PORT 4
" RUN # 145 @ 08:20 HEADER Ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 146 @ 08:44 MATHESON 10

/99 SYSTEM WENT DOWN @ 1:10 AM BACK ON @ 2: AM
PUMP LOST PRIM.
6:10 AM OFF BACK ON @ 6:50 AM
Air make-up on first Notch from closed

4/99 CALIBRATION RUN# 147 @ 08:02 MATHESON 10
" RUN # 148 @ 08:20 " "
nner " RUN # 149 @ 08:41 " "
ge ANALYSIS RUN # 150 @ 09:04 EFFLUENT ch/PORT 4
sec " RUN # 151 @ 09:26 HEADER ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 152 @ 09:47 MATHESON 10

1/5/99 CALIBRATION RUN # 153 @ 07:32 MATHENSON 10
" RUN # 154 @ 07:52 " "
Scanner " RUN # 155 @ 08:12 " "
Purge Analysis RUN # 156 @ 08:35 EFFLUENT ch/PORT 4
60 sec " RUN # 157 @ 09:00 HEADER ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 158 @ 09:20 MATHESON 10

1/6/99 CALIBRATION RUN # 159 @ 06:58 MATHESON 10
" RUN # 160 @ 07:17 " "
Scanner " RUN # 161 @ 07:38 " "
Purge Analysis RUN # 162 @ 07:57 EFFLUENT ch/PORT 4
60 sec " RUN # 163 @ 08:22 HEADER ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 164 @ 08:42 MATHESON 10
1/7/99 CALIBRATION RUN # 166 @ 07:06 MATHESON 10
" RUN # 167 @ 07:28 " "
anner " RUN # 168 @ 07:44 " "
rge Analysis RUN # 169 @ 08:03 EFFLUENT ch/PORT 4
sec " RUN # 170 @ 08:23 HEADER ch/PORT 2
Changed TO ZONE 1 APP. 4 MIN
CALIBRATION RUN # 171 @ 08:46 MATHESON 10

# to DECEMBER 14 97

| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY | | SATURDAY |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY DEC 14 1997 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
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| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

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| 1997 | | | DECEMBER | | | 1997 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

# from DECEMBER 15 97

| MONDAY DEC 15 1997 | TUESDAY DEC 16 1997 | WEDNESDAY DEC 17 1997 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 SVE/AS | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 6hour Zone | 7:45 |
| 8 | 8 Switch Interval | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 ★ System Start | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 15 | 6 24 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to DECEMBER 21 97

| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY DEC 18 | FRIDAY DEC 19 | SATURDAY DEC 20 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 Shut Down SVE | 8 |
| 8:15 | 8:15 Tighten Belts | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 etc. | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 Restart | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 24 |
| 5:45 | 5:45 | SUNDAY DEC 21 355/10 |
| 6 24 | 6 19.5 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | 24 |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
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| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

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| 1997 | | | DECEMBER | | | 1997 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

# from DECEMBER 22 97

| MONDAY DEC 22 1997 | TUESDAY DEC 23 1997 | WEDNESDAY DEC 24 1997 |
|---|---|---|
| 7 | 7 Hanukkah begins at sundown | 7 Hanukkah |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 manual Set Zone 2 on | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 Switch to Zone 1 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 $H_2O$ Shutdown |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 SVE: | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 AVG Zone 1 564 scfm | 4 |
| 4:15 | 4:15 " " 2 587 scfm | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| | 5 | 5 |
| 5:15 | 5:15 Chg man to Zone 2 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 24 | 6 Set to Auto 4 hr | 6 20 |
| 6:15 | 6:15 prog. Zone interv. | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 24 | 7:45 |
| | 8 | 8 $H_2O$ Shutdown |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to DECEMBER 28

97

| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY DEC 25 359-6 | FRIDAY DEC 26 360-5 | SATURDAY DEC 27 361-4 |
|---|---|---|
| 7 Christmas Day | 7 Boxing Day (Canada) | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 24 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY DEC 28 362-3 |
| 6 24 | 6 24 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | 24 |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

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| 1997 | | | DECEMBER | | | 1997 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

# from DECEMBER 29 97

| MONDAY | TUESDAY | WEDNESDAY |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 Stripper |
| 11:15 | 11:15 | 11:15 Down |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 24 | 6 24 | 6 11 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to JANUARY 4 1998

| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY JANUARY 1 | FRIDAY JANUARY 2 | SATURDAY JANUARY 3 |
|---|---|---|
| 7 New Year's Day | 7 Train in | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 Systems Restart |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 11 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JANUARY 4 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 0 | 7:45 0 | 24 |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

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| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

# from JANUARY 5

| MONDAY JAN 5 | TUESDAY JAN 6 | WEDNESDAY JAN 7 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 Zone 2 Summa | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 Zone 1 Summa | 12:15 | 12:15 |
| 12:30 SVE (ET 401.5hrs) | 12:30 | 12:30 |
| 12:45 System Shut down | 12:45 | 12:45 |
| 1 Grease Blowers | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 System Restart | 5 | 5 SVE: scfm |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 Avg Zone 1 546 |
| 5:45 | 5:45 | 5:45 Avg Zone 2 558 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 Before Summa | 6:45 | 6:45 |
| 7 1: 8 | 7 12/12 | 7 |
| 7:15 2: 4 | 7:15 | 7:15 12/12 |
| 7:30 | 7:30 | 7:30 |
| 7:45 19.75 hrs | 7:45 24 | 7:45 24 |
| 8 After Summa | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 1: 3+ = 3 | 8:30 | 8:30 |
| 8:45 2: .75+ 4 = 4.75 | 8:45 | 8:45 |

12 mid.

# to JANUARY 11

| 1998 | | | FEBRUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

| | | |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 SVE/AS | 7:45 | 7:45 |
| 8 System Changed | 8 | 8 |
| 8:15 to 2hr Interval | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 12/12 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 24 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | |
| 6 | 6 | |
| 6:15 | 6:15 | 12/12 |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | 24 |
| 7 12/12 | 7 | |
| 7:15 | 7:15 12/12 | |
| 7:30 | 7:30 | |
| 7:45 24 | 7:45 24 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

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| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

# from JANUARY 12

| | | |
|---|---|---|
| 7 mid - 2 1 | 7 | 7 |
| 7:15 2 - 4 2 | 7:15 | 7:15 |
| 7:30 4 - 6 1 | 7:30 | 7:30 |
| 7:45 6 - 8 2 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Zone 1 Before | 1 | 1 |
| 1:15 summa = 83 runhrs | 1:15 | 1:15 |
| 1:30 Bet. summas | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 Zone 1 SummA | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 84.7 Shrs run time | 3:15 | 3:15 |
| 3:30 between 22 summas | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 Zone 2 Summa | 4 | 4 |
| 4:15 8 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 24 | 7:45 24 | 7:45 24 |
| 8 8-10:1 | 8 | 8 |
| 8:15 10-12:2 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 zone 1 post summa = 4 | 8:45 | 8:45 |
| " " " " = 4 | | |

| 1998 | FEBRUARY | 1998 |
|---|---|---|

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# to JANUARY 18

| THURSDAY JAN 15 | FRIDAY JAN 16 | SATURDAY JAN 17 |
|---|---|---|
| 7 Martin Luther King, Jr.'s Birthday | 7 M-2 :1 | 7 |
| 7:15 | 7:15 2-4 :2 | 7:15 |
| 7:30 | 7:30 4-6 :1 | 7:30 |
| 7:45 | 7:45 6-8 :2 | 7:45 |
| 8 | 8 SVE Down (Grease ET 255 hrs) | 8 |
| 8:15 | 8:15 Complete | 8:15 |
| 8:30 | 8:30 Lube, Filter, Oil | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 (oil ET 656.5) | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 24 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JAN 18 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 SVE Restart 1.25 | 24 |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 24 | 7:30 13 | |
| 7:45 | 7:45 (5) | |
| 8 | 8 8-10:1 | |
| 8:15 | 8:15 10-12:2 | |
| 8:30 | 8:30 zone1 = 6 | |
| 8:45 | 8:45 zone2 7.25 | |

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| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

# from JANUARY 19

| [illegible] | THURSDAY [illegible] | WEDNESDAY JAN 21 [illegible] |
|---|---|---|
| 7 Martin Luther King, Jr. Day | 7 | 7 |
| 7:15 12-2 : 1 | 7:15 | 7:15 |
| 7:30 2-4 : 2 | 7:30 | 7:30 |
| 7:45 4-6 : 1 | 7:45 | 7:45 |
| 8 Zone 2 Summa | 8 | 8 1 |
| 8:15 | 8:15 | 8:15 |
| 8:30 before summa = 4hrs | 8:30 | 8:30 |
| 8:45 10%. | 8:45 | 8:45 |
| 9 | 9 | 9 Systems Down |
| 9:15 | 9:15 | 9:15 Stripper Cleaning |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 Zone 1 bef. Summa - 18hrs | 11:30 | 11:30 |
| 11:45 " 2 " " = 75.25 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 before summa = 8hrs | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 Zone 1 Summa | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 Post Summa | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 24 | 7:45 24 | 7:45 9 |
| 8 | 8 | 8 |
| 8:15 6/8 | 8:15 12/12 | 8:15 4/5 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | | FEBRUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# to JANUARY 25

| | | |
|---|---|---|
| 7 | 7 SVE Down from Midnight to 9AM | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 SVE Restart | 9 |
| 9:15 | 9:15 $H_2O$ Shutdown | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 Systems Restart | 2:15 | 2:15 |
| 2:30 Cleaning Done | 2:30 | 2:30 |
| 2 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 24 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 12/12 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | 24 |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 10 | 7:45 15 | 12/12 |
| 8 | 8 | |
| 8:15 4/5.75 | 8:15 7/8 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | | JANUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

# from JANUARY 26

| | | |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 AS/SVE Shut down | 8 |
| 8:15 | 8:15 Sandia mods. | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 Sys. Restart | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 12 - 4.5 = 7.5 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 12/12 | 7:15 7.5/8 | 7:15 12/12 |
| 7:30 | 7:30 | 7:30 |
| 7:45 24 | 7:45 15.5 | 7:45 24 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | | FEBRUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# to FEBRUARY 1

| THURSDAY JAN 29 | FRIDAY JAN 30 | SATURDAY JAN 31 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 12/12 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 24 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY FEB 1 |
| 6 | 6 | |
| 6:15 | 6:15 | 12/12 |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | 24 |
| 7 | 7 12/12 | |
| 7:15 12/12 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 24 | 7:45 24 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

AT-A-GLANCE ™

| 1998 | | | FEBRUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# from FEBRUARY 2

| MONDAY FEB 2 '98 | TUESDAY FEB 3 '98 | WEDNESDAY FEB 4 '98 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 AS Shut down |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 SVE Shut Down |
| 12:15 | 12:15 | 12:15 filters, |
| 12:30 | 12:30 | 12:30 (Grease, + Oil |
| 12:45 | 12:45 | 12:45 ET 402.5 hrs) |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 44.125 days |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 Operation |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 (1059 hrs) |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 SVE Avg SCFM |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 zone1 = 565 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 zone2 = 601 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 12/12 | 7:15 12/12 | 7:15 6/6 |
| 7:30 | 7:30 | 7:30 |
| 7:45 24 | 7:45 24 | 7:45 12 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to FEBRUARY 8

| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

| THURSDAY | FRIDAY | SATURDAY |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | FEBRUARY | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# from FEBRUARY 9

| MONDAY FEB 9 | TUESDAY FEB 10 | WEDNESDAY FEB 11 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 SVE Blowers |
| 8:15 | 8:15 | 8:15 greased |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 0 | 7:45 0 | 7:45 0 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to FEBRUARY 15

| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

| THURSDAY FEB 12 | FRIDAY FEB 13 | SATURDAY FEB 14 |
|---|---|---|
| 7 Lincoln's Birthday | 7 | 7 Valentine's Day |
| 7:15 | 7:15 Blowers | 7:15 |
| 7:30 | 7:30 Lubed (Grease) | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 Restarted System (SVE) | 8 |
| 8:15 | 8:15 Zone 1 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 Great Lakes In. Changed | 9 | 9 |
| 9:15 out Carbon | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 Zone 2 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 Zone 1 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Restart SVE on Zone 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 SVE High level Shut down | 2 Zone 2 | 2 |
| 2:15 SVE | 2:15 | 2:15 |
| 2:30 System Shut down | 2:30 | 2:30 |
| 2:45 Ran 20 Min Zone 2 | 2:45 | 2:45 |
| 3 Leaking Pump | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 Zone 1 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 12/12 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 24 |
| 5:45 | 5:45 | SUNDAY FEB 15 |
| 6 | 6 Zone 2 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 1/.5 | 7 8-10 Zone 1 | |
| 7:15 | 7:15 10-12 Zone 2 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 Zone 1 = 8 hrs | |
| 8:15 | 8:15 Zone 2 = 8 hrs | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 16 | 12/12 24 |

AT-A-GLANCE™ (164)

| 1998 | | | FEBRUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# from FEBRUARY 16

| MONDAY FEB 17 | TUESDAY FEB 18 | WEDNESDAY FEB 19 |
|---|---|---|
| 7 Washington's Birthday (Observed) | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 12/12 | 8 12/12 | 8 12/12 |
| 8:15 24 | 8:15 24 | 8:15 24 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| .19" rain | .34" rain | |

# to FEBRUARY 22

| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

| THURSDAY FEBRUARY 19 | FRIDAY FEBRUARY 20 | SATURDAY FEBRUARY 21 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 12/12 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 24 |
| 5:45 | 5:45 | |
| 6 | 6 | Washington's Birthday |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | 12/12 |
| 8 12/12 | 8 12/12 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 24 | 8:45 24 | 24 |

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| 1998 | | | FEBRUARY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

# from FEBRUARY 23

| MONDAY FEB 23 | TUESDAY FEB 24 | WEDNESDAY FEB 25 |
|---|---|---|
| 7 | 7 | 7 Ash Wednesday |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 Conference Call (TRD) |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 SVE Shut Down | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 Start SVE System |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 Shut Down SVE Sys |
| 2:15 | 2:15 | 2:15 Stripper Cleaning |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 6/6 | 8:15 0 | 8:15 Zone1 .5hr |
| 8:30 | 8:30 | 8:30 |
| 8:45 12 | 8:45 | 8:45 .5 |

# to MARCH 1

| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

| THURSDAY FEB 26 | FRIDAY FEB 27 | SATURDAY FEB 28 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 FFA | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 Restart SVE Sys | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 12/12 |
| 5:30 | 5:30 | 5:30 24 |
| 5:45 | 5:45 | SUNDAY MARCH 1 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 4/4 | 8:15 12/12 | |
| 8:30 | 8:30 | |
| 8:45 8 | 8:45 24 | 12/12 24 |

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| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

# from MARCH 2

| MONDAY MARCH 2, 1998 | TUESDAY MARCH 3, 1998 | WEDNESDAY MARCH 4, 1998 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 8.75 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 SVE Shut down | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 2 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 SVE System Restart | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 ? | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 1: 10.75 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 2: 10 | 8 12/12 | 8 |
| 8:15 | 8:15 | 8:15 12/12 |
| 8:30 | 8:30 | 8:30 |
| 8:45 20.75 | 8:45 24 | 8:45 24 |

| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

# to MARCH 8

| THURSDAY | | FRIDAY | | SATURDAY | |
|---|---|---|---|---|---|
| 7 | | 7 | | 7 | |
| 7:15 | | 7:15 | | 7:15 | |
| 7:30 | | 7:30 | | 7:30 | |
| 7:45 | | 7:45 | 8 | 7:45 | |
| 8 | | 8 SVE System Shutdown | | 8 | |
| 8:15 | | 8:15 | | 8:15 | |
| 8:30 | | 8:30 | | 8:30 | |
| 8:45 | | 8:45 | | 8:45 | |
| 9 | | 9 | | 9 | |
| 9:15 | | 9:15 | | 9:15 | |
| 9:30 | | 9:30 | | 9:30 | |
| 9:45 | | 9:45 | | 9:45 | |
| 10 | | 10 | | 10 | |
| 10:15 | | 10:15 | | 10:15 | |
| 10:30 | | 10:30 | | 10:30 | |
| 10:45 | | 10:45 | | 10:45 | |
| 11 | | 11 | | 11 | |
| 11:15 | | 11:15 | | 11:15 | |
| 11:30 | | 11:30 | | 11:30 | |
| 11:45 | | 11:45 | | 11:45 | |
| 12 | | 12 | | 12 | |
| 12:15 | | 12:15 | | 12:15 | |
| 12:30 | 6/6 | 12:30 | | 12:30 | |
| 12:45 | | 12:45 | | 12:45 | |
| 1 | | 1 | | 1 | |
| 1:15 | | 1:15 | | 1:15 | |
| 1:30 | 258.75 | 1:30 | | 1:30 | |
| 1:45 | Rebalance Z1 | 1:45 | | 1:45 | |
| 2 | | 2 SVE Restarted | | 2 | |
| 2:15 | | 2:15 | | 2:15 | |
| 2:30 | 268.5 | 2:30 | 10 | 2:30 | |
| 2:45 | Rebalance Z2 | 2:45 | | 2:45 | |
| 3 | | 3 | | 3 | |
| 3:15 | | 3:15 | | 3:15 | |
| 3:30 | | 3:30 | | 3:30 | |
| 3:45 | | 3:45 | | 3:45 | |
| 4 | | 4 | | 4 | |
| 4:15 | | 4:15 | | 4:15 | |
| 4:30 | 6/6 | 4:30 | | 4:30 | |
| 4:45 | | 4:45 | | 4:45 | 12/12 |
| 5 | | 5 | | 5 | |
| 5:15 | | 5:15 | | 5:15 | |
| 5:30 | | 5:30 | | 5:30 | 24 |
| 5:45 | | 5:45 | | SATURDAY | |
| 6 | | 6 | | | |
| 6:15 | | 6:15 | | | |
| 6:30 | | 6:30 | | | |
| 6:45 | | 6:45 | | | |
| 7 | | 7 | | | |
| 7:15 | | 7:15 | | | |
| 7:30 | | 7:30 | | | |
| 7:45 | | 7:45 | 1:8 | | |
| 8 | | 8 | | | |
| 8:15 | 12/12 | 8:15 | 2:10 | | 12/12 |
| 8:30 | | 8:30 | | | |
| 8:45 | 24 | 8:45 | 18 | | 24 |

~~SVE Lube Tank~~

523.25

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| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

# from MARCH 9

| MONDAY MARCH 9 | TUESDAY MARCH 10 | WEDNESDAY MARCH 11 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 12/12 | 8:15 12/12 | 8:15 12/12 |
| 8:30 | 8:30 | 8:30 |
| 8:45 24 | 8:45 24 | 8:45 24 |

# to MARCH 15

| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

| THURSDAY MARCH | FRIDAY MARCH | SATURDAY MARCH |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 22 Before | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 ? | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 22 Summa @ 12:10 | 12 | 12 |
| 12:15 0316980 001 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 14:10 Summa Samp | 2:15 | 2:15 |
| 2:30 21 ~~0316980 001~~ | 2:30 | 2:30 |
| 2:45 0369979 -1010 | 2:45 Following Summa Zone 1: 1 hr Zone 2: 1 hr | 2:45 |
| 3 SVE System Shutdown | | 3 |
| 3:15 Due to Air Stripper | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 22:2+ | 4:15 | 4:15 |
| 4:30 21. | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 @ Summa | 5:15 | 5:15 |
| 5:30 from Jan 19 | 5:30 | 5:30 |
| 5:45 | 5:45 | |
| 6 | 6 | |
| 6:15 Zone1-452.75 | 6:15 | |
| 6:30 2=457.25 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 1:8 | 7:30 | |
| 7:45 | 7:45 | |
| 8 2:7 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 15 | 8:45 | |

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AT-A-GLANCE™

| 1998 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

# from MARCH 16

| | | |
|---|---|---|
| 7 | 7 St. Patrick's Day | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 SVE Blowers |
| 5:45 | 5:45 | 5:45 Greased |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 SVE + Air Stripper |
| 7:15 | 7:15 | 7:15 Restarted |
| 7:30 | 7:30 | 7:30 |
| 7:45 0 | 7:45 0 | 7:45 |
| 8 | 8 | 8 1: 2hrs |
| 8:15 | 8:15 | 8:15 2: 3hrs |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

12-2
4-6
8-10
2-2

# to MARCH 22

| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

| | | |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 GC Part 1 (Zone 1 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 .5 ~~7.5 hrs~~ (-4.5 hrs) | 2 Zone 1 GC | 2 |
| 2:15 | 2:15 8 hrs (-4) | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 4.5 | 2:45 | 2:45 |
| 3 2 1 | 3 | 3 |
| 3:15 2 | 3:15 | 3:15 |
| 3:30 4-6 | 3:30 | 3:30 |
| 3:45 8-10 | 3:45 | 3:45 |
| 4 1 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 12/12 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 12/12 | 8 12/12 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | 12/12 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

101

| 1996 | | | MARCH | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

# from MARCH 23

Z1
6:06 Summa 03982
Z2 4:08 " 03981

| | | |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 SVE Shut Down |
| 7:45 | 7:45 | 7:45 for Carbon Change |
| 8 | 8 | 8 On Both Tanks |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 Run time |
| 9 | 9 | 9 Zone 1: M-2 (4) |
| 9:15 | 9:15 | 9:15 4-6 |
| 9:30 | 9:30 | 9:30 Zone 2: 2-4 (3.5) |
| 9:45 | 9:45 | 9:45 6-730 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 System Restarted |
| 1 | 1 | 1 Open to Room — Not |
| 1:15 | 1:15 | 1:15 ON Zones |
| 1:30 | 1:30 | 1:30 New Cycle Schd. |
| 1:45 | 1:45 | 1:45 6hrs on 2 |
| 2 | 2 | 2 2" on 1 |
| 2:15 | 2:15 | 2:15 Zone 1: 6-801 AM |
| 2:30 | 2:30 | 2:30 2-401 pm |
| 2:45 | 2:45 | 2:45 10p-1202 AM |
| 3 | 3 | 3 Zone 2: 8A-201P |
| 3:15 | 3:15 | 3:15 4P-1001P |
| 3:30 | 3:30 | 3:30 1201A-601A |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 3:55 System Switched to Remed. |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 Akkik Summa |
| 5:15 | 5:15 | 5:15 Zone 2: 6 |
| 5:30 | 5:30 | 5:30 Zone 1: 2 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 Before Summa: |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 Z1: 4 |
| 7 | 7 | 7 Z2: 2 |
| 7:15 | 7:15 11.5 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 12/12 | 7:45 12/12 | 7:45 |
| 8 | 8 | 8 Zone 1: 6 |
| 8:15 | 8:15 | 8:15 Zone 2: 9.5 |
| 8:30 | 8:30 | 8:30 |
| 8:45 24 | 8:45 ~~24~~ 23.5 | 8:45 19 |

# to MARCH 29

| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

| THURSDAY MARCH 26 | FRIDAY MARCH 27 | SATURDAY MARCH 28 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 6 / 18 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY MARCH 29 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 Zone 1 / Zone 2 | 8 | |
| 8:15 ~~Zone 2~~ | 8:15 6 / 18 | 6 / 18 |
| 8:30 6 / 18 | 8:30 | |
| 8:45 24 | 8:45 24 | 24 |

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24

| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

# from MARCH 30

| MONDAY MARCH 30 1998 | TUESDAY MARCH 31 1998 | WEDNESDAY APRIL 1 1998 |
|---|---|---|
| 7 (6):02 GC on Zone 2 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 Zone 1 22 6 hrs 0 70.25 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 Zone 1 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 (10-12p Zone 1) | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 6/1B | 8:15 6/1B | 8:15 6/1B |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to APRIL 5

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY | FRIDAY | SATURDAY |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 GCon Part 2 | 2 | 2 |
| 2:15 1030.25 hrs | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 6/18 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | |
| 6 | 6 | Palm Sunday |
| 6:15 | 6:15 | Daylight Saving Time begins |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | Zone 2: |
| 7:15 | 7:15 | 886.25 |
| 7:30 | 7:30 | + |
| 7:45 | 7:45 | 204 |
| 8 6/18 | 8 6/18 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | 6/18 |
| 8:45 | 8:45 | |

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| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

# from APRIL 6

| SUNDAY APRIL | TUESDAY APRIL | WEDNESDAY APRIL 8, 1998 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 SVE | 8:45 |
| 9 | System Shut down | 9 |
| 9:15 | for Lubrication | 9:15 |
| 9:30 | & Sampling | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 -5 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 1.5 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 System Restarted | 3:30 |
| 3:45 | 3:45 .5 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 4.5/13 | 7:30 6/18 |
| 7:45 6/18 | 7:45 | 7:45 |
| 8 | 8 17.5 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 24 |
| 8:45 | 8:45 | 8:45 |
| | (8.5) | |

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24/31 | 25 | 26 | 27 | 28 | 29 | 30 |

# to APRIL 12

| THURSDAY APRIL 9, 1998 | FRIDAY APRIL 10, 1998 | SATURDAY APRIL 11, 1998 |
|---|---|---|
| 7 | 7 Good Friday | 7 Passover |
| 7:15 | 7:15 Passover begins at sundown | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 2:6 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 1:2 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 6 | 11:30 | 11:30 |
| 2 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 1.5 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 1 3:15 | 3:15 | 3:15 |
| 3:30 System Auto Shut down | 3:30 | 3:30 |
| 3:45 High $H_2O$ | 3:45 | 3:45 |
| 4 Lots of Rain | 4 | 4 |
| 4:15 Left off | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/0 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY APRIL 12, 1998 |
| 6 | 6 | Easter Sunday |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | Zone 2 |
| 7 | 7 | 886.25 |
| 7:15 | 7:15 | + |
| 7:30 | 7:30 | |
| 7:45 3.5/12 | 7:45 0/0 | 265 |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 15.5 | 8:45 | 0/0 |

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| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

Z2 2-6 1151.25 (1155.25 hrs) + 4 hrs

# from APRIL 13

Clean Part 2

| MONDAY APRIL 13, 1998 | TUESDAY APRIL 14, 1998 | WEDNESDAY APRIL 15, 1998 |
|---|---|---|
| 7 System Restarted @ | 7 | 7 |
| 7:15 2 am zone 2 : 4hrs | 7:15 | 7:15 |
| 7:30 Found CPU off turned | 7:30 | 7:30 |
| 7:45 on to thermally EQ | 7:45 | 7:45 |
| 8 GC on part/zone 1 (2hrs) | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 Z1 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 Z1: 6 | 8:15 | 8:15 6/18 |
| 8:30 Z2: 16 | 8:30 6/18 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 22 | 24 | 24 |

12 10 AM Auto Shutdown
High H2O

# to APRIL 19

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

| | | | |
|---|---|---|---|
| 7 | 5:06 System restart | 7 | 7 |
| 7:15 | Manual mode | 7:15 | 7:15 |
| 7:30 | Zone 2 | 7:30 | 7:30 |
| 7:45 | | 7:45 | 7:45 |
| 8 | | 8 | 8 |
| 8:15 | | 8:15 | 8:15 |
| 8:30 | | 8:30 | 8:30 |
| 8:45 | | 8:45 | 8:45 |
| 9 | | 9 | 9 |
| 9:15 | | 9:15 | 9:15 |
| 9:30 | | 9:30 | 9:30 |
| 9:45 | | 9:45 | 9:45 |
| 10 | Switched to | 10 | 10 |
| 10:15 | Auto mode | 10:15 | 10:15 |
| 10:30 | | 10:30 | 10:30 |
| 10:45 | | 10:45 | 10:45 |
| 11 | | 11 | 11 |
| 11:15 | | 11:15 | 11:15 |
| 11:30 | | 11:30 | 11:30 |
| 11:45 | | 11:45 | 11:45 |
| 12 | | 12 | 12 |
| 12:15 | 22:4 hrs | 12:15 | 12:15 |
| 12:30 | | 12:30 | 12:30 |
| 12:45 | | 12:45 | 12:45 |
| 1 | | 1 | 1 |
| 1:15 | | 1:15 | 1:15 |
| 1:30 | | 1:30 | 1:30 |
| 1:45 | | 1:45 | 1:45 |
| 2 zone 1 | 2 hrs | 2 | 2 |
| 2:15 | | 2:15 | 2:15 |
| 2:30 | | 2:30 | 2:30 |
| 2:45 | | 2:45 | 2:45 |
| 3 | | 3 | 3 |
| 3:15 | | 3:15 | 3:15 |
| 3:30 | | 3:30 | 3:30 |
| 3:45 | | 3:45 | 3:45 |
| 4 | | 4 | 4 |
| 4:15 | | 4:15 | 4:15 |
| 4:30 | | 4:30 | 4:30 |
| 4:45 | | 4:45 | 4:45 |
| 5 | | 5 | 5 6/18 |
| 5:15 | | 5:15 | 5:15 |
| 5:30 | | 5:30 | 5:30 24 |
| 5:45 | | 5:45 | |
| 6 | | 6 | |
| 6:15 | | 6:15 | |
| 6:30 | | 6:30 | |
| 6:45 | | 6:45 | |
| 7 | | 7 | |
| 7:15 | | 7:15 | |
| 7:30 | | 7:30 | 886.25 |
| 7:45 | | 7:45 | + 386 |
| 8 | | 8 | |
| 8:15 | | 8:15 | 6/18 |
| 8:30 | 10-12 21 6 | 8:30 6/18 | |
| 8:45 | 4/15 19 | 8:45 24 | 24 |

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| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

# from APRIL 20

| MONDAY, APRIL 20 / 110/255 | TUESDAY, APRIL 21 / 111/254 | WEDNESDAY, APRIL 22 / 112/253 |
|---|---|---|
| 7 | 7 | 7 Professional Secretaries Day® |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 1290.25 + 6 = 1296.25 | 8:45 |
| 9 ~~Glen~~ | 9 GC on Zone 2 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 6/18 | 8:15 6/18 | 8:15 6/18 |
| 8:30 | 8:30 | 8:30 |
| 8:45 24 | 8:45 24 | 8:45 24 |

# to APRIL 26

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY APRIL 23 113/252 | FRIDAY APRIL 24 114/251 | SATURDAY APRIL 25 115/250 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 6/18 |
| 5:15 | 5:15 | 5:15 24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY APRIL 26 116/249 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | 886.25 |
| 7:30 | 7:30 | + 512 |
| 7:45 | 7:45 | |
| 8 6/18 | 8 6/18 | 6/18 |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 24 | 8:45 24 | 24 |

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| 1998 | | | APRIL | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

Z1
6-8A
2-4P
10-12P

Z2
12:-6A
8-2P
4-10P

# from APRIL 27

| MONDAY APRIL 27 117/248 | TUESDAY APRIL 28 118/247 | WEDNESDAY APRIL 29 119/246 |
|---|---|---|
| 7 | 6:45 System | 7 |
| 7:15 | 7:15 Shut Down to | 7:15 |
| 7:30 | 7:30 change Carbon | 7:30 |
| 7:45 | 7:45 and PMOs | 7:45 |
| 8 | 8 (lube, filters, etc) | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 Zone1: 0.75 hrs | 10:30 |
| 10:45 | 10:45 Zone2: 6 | 10:55 System Shut down |
| 11 | 11 | 11 for Air Stripper PMO |
| 11:15 | 11:15 | 11:15 System back ON |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 System Restarted | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 1.25 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 2 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 [redacted] 4/7.25 | 7:45 6 |
| 6/18 | 8 | 8 ~~5.66~~/17.667 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 24 | 8:45 6.75 | 8:45 23.67 |
| | 407.75 | 11.25 |

# to MAY 3

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24/31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY APRIL 30 | FRIDAY MAY 1 | SATURDAY MAY 2 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 System Shut | 10:30 | 10:30 |
| 10:45 down to bring AS on | 10:45 | 10:45 |
| 10:50 Line (Stripper) 10:50 | 11 | 11 |
| 11:15 System restart | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 6/18 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY MAY 3 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 6/18 | 6266637 |
| 8 6/17.72 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 24 | 6/18 |
| 8:45 23.72 | 8:45 | 24 |

TEO 1.111

130.625

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| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

# from MAY 4

| MONDAY MAY 4 | TUESDAY MAY 5 | WEDNESDAY MAY 6 |
|---|---|---|
| 7 Calibration #12 | 7 | 7 |
| 7:15 MND SCOTT | 7:15 | 7:15 |
| 7:30 Analysis MND980421 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 Analysis #13 Port 1 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 Analysis #14 Port 4 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 Analysis #15 Port 3 | 9 | 9 |
| 9:15 Analysis #16 Port 2 | 9:15 | 9:15 |
| 9:30 Calibration #17 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 Notes: | 10 | 10 |
| 10:15 System off 4min | 10:15 | 10:15 |
| 10:30 for port 3 + 4 msmts. | 10:30 | 10:30 |
| 10:45 Manual change to | 10:45 | 10:45 |
| 11 Port 1 to take Zone | 11 | 11 |
| 11:15 2 (Port 2) msmt. | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 6/18 | 7:45 6/18 | 7:45 6/18 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 24 | 8:30 24 | 8:30 24 |
| 8:45 | 8:45 | 8:45 |

# to MAY 10

| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

| THURSDAY MAY 7 127/238 | FRIDAY MAY 8 128/237 | SATURDAY MAY 9 129/236 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Changed Cycle to | 1 | 1 |
| 1:15 Run on Zone 2 | 1:15 | 1:15 |
| 1:30 full time | 1:30 | 1:30 |
| 1:45 LOTS of Rain! | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY MAY 10 130/235 |
| 6 | 6 | Mother's Day |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 2/22 | 7:15 | |
| 7:30 | 7:30 | 774.637 |
| 7:45 ~~6/18~~ | 7:45 0/24 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 24 | 8:30 | 0/24 |
| 8:45 | 8:45 | |

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| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

# from MAY 11

| MONDAY MAY 11 131/234 | TUESDAY MAY 12 132/233 | WEDNESDAY MAY 13 133/232 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 Zone 2 off for 10 min | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 Break-Through observed | 8 | 8 |
| 8:15 on first Carbon Tank | 8:15 | 8:15 |
| 8:30 CDCE + TCE | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 9/24 | 8:30 0/24 |
| 8:45 0/23.85 | 8:45 | 8:45 |

| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

# to MAY 17

| THURSDAY MAY 14 (134-231) | FRIDAY MAY 15 (135-230) | SATURDAY MAY 16 (136-229) |
|---|---|---|
| 7 | 7 | 7 Armed Forces Day |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0124 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY MAY 17 (137-228) |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | 0447.467 |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 0124 | |
| 8:30 0124 | 8:30 | 0124 |
| 8:45 | 8:45 | |

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4/6/6.6!!

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

# from MAY 18

| MONDAY, MAY 18, 138/227 | TUESDAY, MAY 19, 139/226 | WEDNESDAY, MAY 20, 140/225 |
|---|---|---|
| 7 Victoria Day (Canada) | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 System Restarted | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Shutdown SVE | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0/13 | 8:15 0/11.5 | 8:15 0/24 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to MAY 24

| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

| THURSDAY MAY 21 141/224 | FRIDAY MAY 22 142/223 | SATURDAY MAY 23 143/222 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 System Shutdown | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 Carbon Change | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 System Restart | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 Changed to Zone 1 | 1:45 |
| 2 | 2 Summa 041044 | 2 |
| 2:15 | 2:15 on Zone 2 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 Z\ 1095.8 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 Changed to Zone 2 | 3:45 |
| 4 | 4 Summa 041045 | 4 |
| 4:15 | 4:15 on Zone 1 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0/24 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 22 19 0.22 | SUNDAY MAY 24 141/221 |
| 6 | 6 (8) | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 0/19 | 8 2/22 | |
| 8:15 | 8:15 Z\ 1095.9 | 0/24 |
| 8:30 | 8:30 | |
| 8:45 Z\ 230 hrs since last summa | 8:45 | |

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126.5

| 1998 | | | MAY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

# from MAY 25

| MONDAY, MAY 25 145/220 | TUESDAY, MAY 26 146/219 | WEDNESDAY, MAY 27 147/218 |
|---|---|---|
| 7 Memorial Day (Observed) | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 0/24 | 8 0/24 | 8 0/24 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

# to MAY 31

| THURSDAY MAY 28 | FRIDAY MAY 29 | SATURDAY MAY 30 |
|---|---|---|
| 7 | 7 | 7 Memorial Day |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 Sewtex Zone 2 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 2050.22 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0/24 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY MAY 31 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 0.17/23.55 | 7:30 | |
| 7:45 | 7:45 0/24 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 23.72 | 8:30 | 0/24 |
| 8:45 | 8:45 | |

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| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

# from JUNE 1

| MONDAY JUNE 1 152/213 | TUESDAY JUNE 2 153/212 | WEDNESDAY JUNE 3 154/211 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 0.07/23.8 |
| 8:30 C/2 | 8:30 C/2 | 8:30 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# to JUNE 7

| THURSDAY JUNE 4 165/200 | FRIDAY JUNE 5 166/199 | SATURDAY JUNE 6 167/198 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0/24 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JUNE 7 168/197 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 0/24 | 8 0/24 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | 0/24 |
| 8:45 | 8:45 | |

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| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

# from JUNE 8

| MONDAY JUNE 8 159/206 | TUESDAY JUNE 9 160/205 | WEDNESDAY JUNE 10 161/204 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 Shut down SVE & P+T | 9:30 | 9:30 |
| 9:45 for Maint. | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 Grease Blowers | 10:30 | 10:30 |
| 10:45 Change Filters | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 Grease Blowers Due – | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 Restart P+T + SVE | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| | 8 | 8 |
| 8:15 0/18 | 8:15 0 24 | 8:15 0/23.93 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 8.5 | | |

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# to JUNE 14

| THURSDAY JUNE 11 162/203 | FRIDAY JUNE 12 163/202 | SATURDAY JUNE 13 164/201 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 Naira Vac Relief | 9:30 |
| 9:45 | 9:45 Active - Reset | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0/24 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JUNE 14 165/200 |
| 6 | 6 | Flag Day |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 0/24 | |
| 8:15 0.07/23.8 | 8:15 | |
| 8:30 | 8:30 | 0/24 |
| 8:45 | 8:45 | |
| 23.87 | | 172.3 |

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| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

# from JUNE 15

| MONDAY JUNE 15 167/198 | TUESDAY JUNE 16 168/197 | WEDNESDAY JUNE 17 169/196 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 Zone 1 on 4 min. |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0/24 | 8:15 0/24 | 8:15 0.067/23.733 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# to JUNE 21

| THURSDAY JUNE 18 - 169/195 | FRIDAY JUNE 19 - 170/195 | SATURDAY JUNE 20 - 171/195 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JUNE 21 - 172/194 |
| 6 | 6 | Father's Day |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 0/24 | |
| 8:15 | 8:15 | |
| 8:30 0/24 | 8:30 | 0/24 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | | JUNE | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

# from JUNE 22

| MONDAY JUNE 22 173/192 | TUESDAY JUNE 23 174/191 | WEDNESDAY JUNE 24 175/190 |
|---|---|---|
| 7 | 7 | 7 St-Jean (Québec) |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 Summa 041047 Zone 2 |
| 9:15 | 9:15 | 9:15 477.613 |
| 9:30 | 9:30 | 9:30 (2687.8, Zone 2) |
| 9:45 | 9:45 | 9:45 |
| 10 Zone 1 on for 4 min | 10 | 10 |
| 10:15 | 10:15 | 10:15 (15) |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0.067/23.80 | 8:15 0/24 | 8:15 0.25/23.62 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

10.48 total from midwest (9.85)

AT HRS run 2616.89

# to JUNE 28

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

| THURSDAY JUNE 25 | FRIDAY JUNE 26 | SATURDAY JUNE 27 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JUNE 28 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 0/24 | 8:15 0/24 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | 0/24 |

AT-A-GLANCE™

1120 >

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# from JUNE 29

| MONDAY JUNE 29 | TUESDAY JUNE 30 | WEDNESDAY JULY 1 |
|---|---|---|
| 7 | 7 | 7 Canada Day (Canada) |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 GL Zone 2 | 9 |
| 9:15 | 9:15 2829.3 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 14.9 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 SVE Blower Lube | 12 | 12 |
| 12:15 DUE! | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 System Shutdown | 2 | 2 |
| 2:15 for Maint. | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 System Restart 163° | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 0.07 / 23.8 | 8:15 |
| 8:30 0 / 21.5 | 8:30 | 8:30 0/24 |
| 8:45 | 8:45 | 8:45 |

HG 7.5

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 30 | 24 31 | 25 | 26 | 27 | 28 | 29 |

# to JULY 5

| THURSDAY JULY 2 183/182 | FRIDAY JULY 3 184/181 | SATURDAY JULY 4 185/180 |
|---|---|---|
| 7 | 7 | 7 Independence Day |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 Off for Carbon Change | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 System Restarted | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 -4 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/18 |
| 5:30 | 5:30 | 5:30 |
| 5:45 6 | 5:45 | SUNDAY JULY 5 186/179 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 0/11 | 8:15 0/18 | |
| 8:30 | 8:30 | 0/18 |
| 8:45 | 8:45 | |

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| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# from JULY 6

| MONDAY JULY 6 187/178 | TUESDAY JULY 7 188/177 | WEDNESDAY JULY 8 189/176 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 -2 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 -.5 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 Zone 2 full time | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0/18 | 8:15 0/21.5 | 8:15 0/24 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to JULY 12

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23/30 | 24/31 | 25 | 26 | 27 | 28 | 29 |

| THURSDAY JULY 7 | FRIDAY JULY 10 | SATURDAY JULY 11 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0/24 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JULY 12 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 0/24 | 8:30 0/24 | 0/24 |
| 8:45 | 8:45 | |

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| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# from JULY 13

| MONDAY JULY 13, 1998 | THURSDAY JULY 16, 1998 | WEDNESDAY JULY 15, 1998 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0/24 | 8:15 0/24 | 8:15 |
| 8:30 | 8:30 | 8:30 0/24 |
| 8:45 | 8:45 | 8:45 |

# to JULY 19

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23/30 | 24/31 | 25 | 26 | 27 | 28 | 29 |

| THURSDAY JULY 16 197/168 | FRIDAY JULY 17 198/167 | SATURDAY JULY 18 199/166 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | :15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JULY 19 200/165 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 0/24 | |
| 8:30 0/24 | 8:30 | 0/24 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# from JULY 20

| MONDAY JULY 20 201/164 | TUESDAY JULY 21 202/163 | WEDNESDAY JULY 22 203/162 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 1.5 22 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 Changed to Zone1 | 9:30 ~~Chg to Zone 1~~ MRS |
| 9:45 | 9:45 | 9:45 |
| 10 ☆ Chg to Zone1 | 10 | 10 ~~Chg to Zone 2~~ MRS |
| 10:15 Chg back to Zone2 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 Chg. to Zone1 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Change to Zone2 | 1 | 1 |
| 1:15 System Shut down | 1:15 | 1:15 |
| 1:30 for maint. | 1:30 | 1:30 |
| 1:45 Blowers Greased | 1:45 | 1:45 |
| 2 Synth. Mineral oil | 2 | 2 |
| 2:15 Changed in SVE | 2:15 | 2:15 |
| 2:30 Blowers | 2:30 | 2:30 |
| 2:45 System Restarted | 2:45 | 2:45 |
| 3 ~~Lift Zone 2~~ | 3 Changed to Zone 2 | 3 |
| 3:15 Auto Cycle | 3:15 FULL Time | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 3.75 | 4 11.02 hrs | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 22- | 4:45 | 4:45 |
| 5 3282.11 | 5 Zone1 1109.82 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 7 1/2 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 5.75/16.75 | 8:15 7.5/16.5 | 8:15 8/24 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to JULY 26

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 30 | 24 31 | 25 | 26 | 27 | 28 | 29 |

| THURSDAY JULY 23 204/161 | FRIDAY JULY 24 205/160 | SATURDAY JULY 25 206/159 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 3327.36 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 Chg to Zone 1 GC2 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 Chg to Zone 2 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 hrs | 10:45 | 10:45 |
| 11 22 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 14 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JULY 26 207/158 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 0.5 / 23.5 | 8:30 0/24 | 0/24 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | | JULY | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

# from JULY 27

| MONDAY JULY 27 208/157 | TUESDAY JULY 28 209/156 | WEDNESDAY JULY 29 210/155 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 8:23 Changed |
| 8:30 | 8:30 | 8:30 to Zone 2 F.T. |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 1522 Changed to Zone 1 | 3:15 |
| 3:30 | 3:30 Full Time | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 8.38/15.62 |
| 8:30 0/29 | 8:30 8.633/15.367 | 8:30 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 30 | 24 31 | 25 | 26 | 27 | 28 | 29 |

# to AUGUST 2

| THURSDAY JULY 30 212/153 | FRIDAY JULY 31 212/153 | SATURDAY AUGUST 1 213/152 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 25 Zone 2 Gr | 9:30 | 9:30 |
| 9:45 3477.109 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 2 | 11:15 | 11:15 |
| 11:30 2.5 | 11:30 | 11:30 |
| 11:45 14.5 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY AUGUST 2 214/151 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 3516.15 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 ~~3517.14~~ | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 .07 / 23.8 | 8:15 0/24 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 9/17/94 3516.19 | 0/24 |

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370.87

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23/30 | 24/31 | 25 | 26 | 27 | 28 | 29 |

# from AUGUST 3

| MONDAY AUGUST 3 215/150 | TUESDAY AUGUST 4 216/149 | WEDNESDAY AUGUST 5 217/148 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 ~~30~~ 39 Zone 2 GC |
| 8:45 | 8:45 | 8:45 3620.811 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0124 | 8:30 0124 | 8:30 ~~0124~~ |
| 8:45 | 8:45 | 8:45 |

0.01/23.4

# to AUGUST 9

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

| THURSDAY, AUGUST 6, 219/147 | FRIDAY, AUGUST 7, 219/146 | SATURDAY, AUGUST 8, 220/145 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0124 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY, AUGUST 9, 221/144 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 System Down 1hr | 7:15 | |
| 7:30 electrical outage | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 0/23 | 8:15 | |
| 8:30 | 8:30 0124 | 0124 |
| 8:45 | 8:45 | |

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447.74

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 30 | 24 31 | 25 | 26 | 27 | 28 | 29 |

# from AUGUST 10

| MONDAY AUGUST 10 222/143 | TUESDAY AUGUST 11 223/142 | WEDNESDAY AUGUST 12 224/141 |
|---|---|---|
| 7 SVE Maint Due | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0/2cf | 8:30 0/2cf | 8:30 0/2cf |
| 8:45 | 8:45 | 8:45 |

2,802.49

287

# to AUGUST 16

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

| THURSDAY AUGUST 13 | FRIDAY AUGUST 14 | SATURDAY AUGUST 15 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 System Down | 7:15 | 7:15 |
| 7:30 x 2 hours for | 7:30 | 7:30 |
| 7:45 maint. | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 Blowers Lubed | 8:15 | 8:15 |
| 8:30 + | 8:30 | 8:30 |
| 8:45 GC Runs | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 x8.68= | 9:15 | 9:15 |
| 9:30 3211.67 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0/24 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY AUGUST 16 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 ~~0.07~~/21.8 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 ~~0/22~~ | 8:30 0/24 | 0/24 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

93.97

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23/30 | 24/31 | 25 | 26 | 27 | 28 | 29 |

# from AUGUST 17

| MONDAY, AUGUST 17 - 229/136 | TUESDAY, AUGUST 18 - 230/135 | WEDNESDAY, AUGUST 19 - 231/134 |
|---|---|---|
| 7 | 7 | 7 Carbon Change |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 System Restarted |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 0, @ 97.81 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0/24 | 8:15 0/24 | 8:15 0/19 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

3.79

# to AUGUST 23

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

| THURSDAY AUGUST 20, 2231-144 | FRIDAY AUGUST 21, 2231-145 | SATURDAY AUGUST 22, 2231-146 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 GC Runs on System | 9:45 | 9:45 |
| 10 Zone 4, 3, 2 | 10 | 10 |
| 10:15 System off 8 min. | 10:15 | 10:15 |
| 10:30 ~~45~~ 52 System on Zone 1 4min | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 +10.80 = | 11 | 11 |
| 11:15 3974.59 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY AUGUST 23, 2231-147 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 0.07 / 23.80 | 8:15 0/24 | 0/24 |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

AT-A-GLANCE™

156.74

| 1998 | | | AUGUST | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 30 | 24 31 | 25 | 26 | 27 | 28 | 29 |

Call Terran
320-3601

# from AUGUST 24

| MONDAY AUGUST 24, 2015 | TUESDAY AUGUST 25, 2015 | WEDNESDAY AUGUST 26, 2015 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 System Shut | 10 |
| 10:15 | 10:15 Down for AS | 10:15 |
| 10:30 | 10:30 Treatment | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 0/10 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0/24 | 8:30 ~~0/24~~ | 8:30 0/0 |
| 8:45 | 8:45 | 8:45 |

Blowers
Need Lubed
Next Week

# to AUGUST 30

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

| THURSDAY AUGUST 27 239/126 | FRIDAY AUGUST 28 240/125 | SATURDAY AUGUST 29 241/124 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 System Restarted | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY AUGUST 30 242/123 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 0/12.5 | |
| 8:30 0/0 | 8:30 | 0/24 4151.09 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

351.24

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

4154.25
x 6 38.1

# from AUGUST 31

| MONDAY AUGUST 31 243/122 | TUESDAY SEPT 1 244/121 | WEDNESDAY SEPT 2 245/120 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 4161.74 @ 7.39 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 ~~7148.587~~ | 8:45 | ~~8:45~~ 8:55 SVE System Shut |
| 9 Z2 on 8:53 hrs | 9 | 9 down |
| 9:15 for Day | 9:15 | 9:15 SVE System Restart |
| 9:30 | 9:30 GC Run Z2 | 9:30 |
| 9:45 ~~6154.42~~ | 9:45 ~~6173.59~~ | 9:45 (0.33) |
| 10 4162.78 | 10 4186.95 | 10 SVE System Shut down |
| 10:15 | 10:15 | 10:15 Blowers greased |
| 10:30 | 10:30 | 10:30 SS Filter Cleaned |
| 10:45 | 10:45 | 10:45 Poly & Pre Filters |
| 11 | 11 | 11 Cleaned Belt dress |
| 11:15 | 11:15 | 11:15 on SVE Belts |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 Δ 3.42 | 12:30 | 12:30 |
| 12:45 Z2 on for 11.95 — | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 ~~6157.84~~ | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 4166.2 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 (5.92) |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | ~~3:45~~ 3:55 SVE Restarted |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 0/17.75 |
| 7:45 | 7:45 0.07/23.93 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0.20/23.20 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 4218.97 |
| 8:45 | 8:45 | 8:45 |

3516

# to SEPTEMBER 6

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY SEPT 3 247/118 | FRIDAY SEPT 4 247/119 | SATURDAY SEPT 5 247/120 |
|---|---|---|
| 7 ~~Blower Lube Due!~~ | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:~~15~~ 21 GC Zone 4 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:~~30~~ 41 GC Zone 2 chg | 8:45 | 8:45 |
| 9 to Zone 1 ≈ 4 min | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY SEPT 6 247/121 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 0.07/23.93 | 7:30 | |
| 7:45 | 7:45 0/24 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | 0/24 |
| 8:45 | 8:45 | |

24 24 40 (104)

AT-A-GLANCE™

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

# from SEPTEMBER 7

| MONDAY SEPT 7 250/115 | TUESDAY SEPT 8 251/114 | WEDNESDAY SEPT 9 252/113 |
|---|---|---|
| 7 Labor Day | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 0/24 | 8:15 0/24 | 8:15 0/24 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to SEPTEMBER 13

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY SEPT 10 257/12 | FRIDAY SEPT 11 254/111 | SATURDAY SEPT 12 255/10 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0124 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY SEPT 13 256/109 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 0.07/ 23.93 | 8:15 0/24 | |
| 8:30 | 8:30 | 0124 |
| 8:45 | 8:45 | |

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| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

F

# from SEPTEMBER 14

| MONDAY, SEPT. 14, 257/108 | TUESDAY, SEPT. 15, 258/107 | WEDNESDAY, SEPT. 16, 259/106 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 Summa à P.C. |
| 8:15 | 8:15 | 8:15 4539.33 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 Zone 7 | 7:15 |
| 7:30 | 7:30 4530.83 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 0.3/23.7 |
| 8:30 0/24 | 8:30 0/24 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# to SEPTEMBER 20

| 1998 | | OCTOBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY SEPT 17 260/105 | FRIDAY SEPT 18 261/104 | SATURDAY SEPT 19 262/103 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 0124 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY SEPT 20 263/102 |
| 6 | 6 | Rosh Hashanah begins at sundown |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 0124 | 8:15 0124 | |
| 8:30 | 8:30 | 0124 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

(440)

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

46.50.53

# from SEPTEMBER 21

| MONDAY SEPT 21 264/101 | TUESDAY SEPT 22 265/100 | WEDNESDAY SEPT 23 266/99 |
|---|---|---|
| 7 Rosh Hashanah | 7 | 7 SVE Blower |
| 7:15 | 7:15 | 7:15 Lube Svc by Dan |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 GC | 8 GC | 8 |
| 8:15 | 8:15 | 8:15 GC |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 0.07/23.93 | 8:45 0.07/23.93 | 8:45 0.07/23.93 |

47238

# to SEPTEMBER 27

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY, SEPTEMBER 26, 1996 | FRIDAY, SEPTEMBER 26, 2896/1974 | SATURDAY, SEPTEMBER 28, 2897/1975 |
|---|---|---|
| 7 | 7 ~~Block Lube Due~~ | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 GC | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 Blouse | 12:30 | 12:30 |
| 12:45 Sold | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 HS Fall Chg. | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0124 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY, SEPTEMBER 27, 2970/1976 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 0.07/19.93 | 8:45 0124 | 0124 |

AT-A-GLANCE™

| 1998 | | SEPTEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

4814

# from SEPTEMBER 28

| MONDAY SEPT 28 271/94 | TUESDAY SEPT 29 272/93 | WEDNESDAY SEPT 30 273/92 |
|---|---|---|
| 7 | 7 Yom Kippur begins at sundown | 7 Yom Kippur |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 GC | 7:45 |
| 8 GC | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 GC |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0.07/23.93 | 8:30 0.07/23.93 | 8:30 0.07/23.93 |
| 8:45 | 8:45 | 8:45 |

4862

# to OCTOBER 4

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| THURSDAY OCT. 1 271/91 | FRIDAY OCT. 2 270/90 | SATURDAY OCT. 3 269/89 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 Gl | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 0/22 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY OCT. 4 268/88 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 0/24 | 0/24 |
| 8:30 0.07/23.93 | 8:30 | |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

4941.97

# from OCTOBER 5

| MONDAY OCT 5 278/87 | TUESDAY OCT 6 279/86 | WEDNESDAY OCT 7 280/85 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 GL | 7:30 GL |
| 7:45 | 7:45 | 7:45 |
| 8 GL | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 System Down. |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0.07/23.93 | 8:30 0.07/23.93 | 8:30 0.07/16.43 |
| 8:45 | 8:45 | 8:45 |

# to OCTOBER 11

| 1998 | | NOVEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

| THURSDAY | FRIDAY | SATURDAY |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 System Restart | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 0/11.5 | 8:30 0/24 | 0/24 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

| 1998 | | OCTOBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

5129.74

# from OCTOBER 12

| MONDAY OCTOBER 12, 1998 | TUESDAY OCTOBER 13, 1998 | WEDNESDAY OCTOBER 14, 1998 |
|---|---|---|
| 7 Columbus Day | 7 | 7 |
| 7:15 Thanksgiving Day (Canada) | 7:15 | 7:15 |
| 7:30 GC Zone 2 | 7:30 | 7:30 |
| 7:45 Summa | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:40 Power Failure |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 System Restart |
| 12:45 | 12:45 | 12:45 1.53 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 Changed to Zone 1 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 (5141.59) | 7 | 7 |
| 7:15 4/9.27 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 10.17/13.83 | 8:30 24/0 | 8:30 22.17/0 |
| 8:45 | 8:45 | 8:45 |

| 1998 | | NOVEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

# to OCTOBER 18

| THURSDAY OCT 15 289/77 | FRIDAY OCT 16 289/76 | SATURDAY OCT 17 290/75 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 Change to Zone 2 | 9:15 | 9:15 |
| 9:30 Summa | 9:30 | 9:30 |
| 9:45 GL Z1 1194.75 | 9:45 | 9:45 |
| 10 tot. | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Blowers | 1 | 1 |
| 1:15 Lubed | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 Down 3 hrs | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 Kendall | 3:15 | 3:15 |
| 3:30 Grease | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY OCT 18 291/74 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | Call in Sys. Down 6:30pm |
| 7 | 7 | System Back up 9:00pm |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | Down 2.5 hrs |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 C/24 | |
| 8:30 9.32/11.68 | 8:30 | 0/21.5 |
| 8:45 | 8:45 | |

AT-A-GLANCE™

77.5

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

Z1= 1194.75
Z2= 5222.77

# from OCTOBER 19

| MONDAY OCT 19 | TUESDAY OCT 20 | WEDNESDAY OCT 21 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

2,120 hrs on oil

Zone 1 = 1194.82
Zone 2 = 5292.37
6487.19
(5292.37)

21.67

124

0.07/23.93

6LP Blower Failure @ ≈ 9:40 pm System Down

# to OCTOBER 25

| 1998 | | | NOVEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

| THURSDAY | FRIDAY | SATURDAY |
|---|---|---|
| 7 | 7 | 7 United Nations Day |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/0 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY, OCTOBER 26, 1998 |
| 6 | 6 | Daylight Saving Time ends |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | 0/0 |
| 8 | 8 | |
| 8:15 0/0 | 8:15 0/0 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | AT-A-GLANCE™ |

| 1998 | | | OCTOBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

# from OCTOBER 26

| MONDAY OCT 26 2015 | TUESDAY OCT 27 2015 | WEDNESDAY OCT 28 2015 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0/0 | 8:30 0/0 | 8:30 0/0 |
| 8:45 | 8:45 | 8:45 |

# to NOVEMBER 1

| 1998 | | NOVEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

| THURSDAY OCT 29 302/63 | FRIDAY OCT 30 303/62 | SATURDAY OCT 31 304/61 |
|---|---|---|
| 7 | 7 | 7 Halloween |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 O/O |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY NOV 1 305/60 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 O/O | 8:30 O/O | O/O |
| 8:45 | 8:45 | |

Martha Measimer

AT-A-GLANCE™

| 1998 | | | NOVEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

# from NOVEMBER 2

| MONDAY NOV 2 306/59 | TUESDAY NOV 3 307/58 | WEDNESDAY NOV 4 308/57 |
|---|---|---|
| 7 | 7 Election Day | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0/0 | 8:30 0/0 | 8:30 0/0 |
| 8:45 | 8:45 | 8:45 |

011 2120

# to NOVEMBER 8

| 1998 | | | DECEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

| THURSDAY NOV 5 | FRIDAY NOV 6 | SATURDAY NOV 7 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 Run Hours | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 Zone 1: 1194.82 | 9:30 (Sentex 17.*) | 9:30 |
| 9:45 | 9:45 Sentex Run # 25 Zone 2 | 9:45 |
| 10 Zone 2: 5292.37 | 10 5304.55 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 (Sentex 17.*) |
| 11:45 | 11:45 | 11:45 Sintex Run # 126 Zone 2 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 Sentex 16.* Run # 179 Part 4 | 1 | 1 |
| 1:15 Run # 180 Zone 2 | 1:15 | 1:15 |
| 1:30 " | 1:30 | 1:30 |
| 1:45 @ 22:33 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 Blowers Lubed. | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 System Restarted | 4:30 | 4:30 |
| 4:45 in bypass mode | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 A20 @ 606686 | 5:15 | 5:15 0.07 / 23.93 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY NOV 8 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | 2 16150 Sentex Run #133 |
| 6:45 | 6:45 | Zone 2 |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| ~~8:15~~ 9:30 System Switched | 8:15 | |
| 8:30 to Zone 2 | 8:30 | |
| 8:45 | 8:45 | |

0.07 / 2.42 | 0.07 / 23.93 | 0.07 / 23.93

AT-A-GLANCE ™

| 1998 | | | NOVEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

# from NOVEMBER 9

| MONDAY NOV 9, 313/52 | TUESDAY NOV 10, 314/51 | WEDNESDAY NOV 11, 315/50 |
|---|---|---|
| 7 | 7 | 7 Veterans Day |
| 7:15 | 7:15 | 7:15 Remembrance Day (Canada) |
| 7:30 | 7:30 | 7:30 |
| 7:45 (Sector 17) | 7:45 | 7:45 |
| 8 7:51 Senter Run # 140 | 8 | 8 |
| 8:15 Zone 2 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 20:00 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 18:15 System Down | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 545 (1.75 hrs) | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 22.25 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 0.07/23.93 | 0/~~[illegible]~~ | 0/24 |

# to NOVEMBER 15

| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

| THURSDAY NOV 12 317/49 | FRIDAY NOV 13 317/48 | SATURDAY NOV 14 316/49 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 0/24 |
| 5:45 | 5:45 | SUNDAY NOV 15 318/48 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | 0/24 |
| 0/24 | 0/24 | |

AT-A-GLANCE™

| 1998 | | | NOVEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

# from NOVEMBER 16

| MONDAY NOV 16 320/45 | TUESDAY NOV 17 321/44 | WEDNESDAY NOV 18 322/43 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 Summc Zone 2 |
| 9:30 | 9:30 | 9:30 # 043 707-001 |
| 9:45 | 9:45 | 9:45 5590.02 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 5580.77 | 8:30 |
| 8:45 0/24 | 8:45 0/24 | 8:45 0.07/23.93 |

# to NOVEMBER 22

| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

| THURSDAY NOV 19 323/42 | FRIDAY NOV 20 324/41 | SATURDAY NOV 21 325/40 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 0/24 |
| 5:45 | 5:45 | SUNDAY NOV 22 326/39 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 0/24 | 8:45 0/24 | 0/24 |

AT-A-GLANCE™

| 1998 | | | NOVEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

# from NOVEMBER 23

| MONDAY NOV. 23 327/38 | TUESDAY NOV. 24 328/37 | WEDNESDAY NOV. 25 329/36 |
|---|---|---|
| 7 | 7 System Shut down | 7 |
| 7:15 | 7:15 for Maint. | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 5731.7 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 N.N. | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 Blowers Lubed | 10 |
| 10:15 | 10:15 Carbon Changed | 10:15 |
| 10:30 | 10:30 in tank A | 10:30 |
| 10:45 | 10:45 System to oper. | 10:45 |
| 11 | 11 on Tank A | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 MRS | 2:15 |
| 2:30 | 2:30 ~~Summa Zone 2~~ | 2:30 Summa Zone 2 |
| 2:45 | 2:45 ~~#043708-001~~ | 2:45 #043708-001 |
| 3 | 3 | 3 5755.03 |
| 3:15 | 3:~~15~~10 System Restarted | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 24-13.17 / 8.83 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 New | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 0/24 | 8:30 5740.53 | 8:30 |
| 8:45 | 8:45 0/15.83 | 8:45 0.07 / 23.93 |

# to NOVEMBER 29

| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

| THURSDAY NOV 26 | FRIDAY NOV 27 | SATURDAY NOV 28 |
|---|---|---|
| 7 Thanksgiving Day | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY NOV 29 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 | 8:45 | |

0124 0124 0124

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| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

# from NOVEMBER 30

| MONDAY NOV 30 334/31 | TUESDAY DEC 1 335/30 | WEDNESDAY DEC 2 336/29 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

768 hrs/period
594.33 running hrs
77.490 Running
22.690 Down

H20 meter
61233

547 gal for month

0124

0124

0124

Monthly Measures (M.D)

# to DECEMBER 6

| 1999 | | | JANUARY | | | 1999 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24,31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY DEC | FRIDAY DEC | SATURDAY DEC |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 0/24 |
| 5:45 | 5:45 | SUNDAY DEC |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 0/24 | 8:45 0/24 | 0/24 |

AT-A-GLANCE™

| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

6028.46

# from DECEMBER 7

| MONDAY DEC 7 | TUESDAY DEC 8 | WEDNESDAY DEC 9 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 Summa |
| 10:30 | 10:30 | 10:30 6086.21 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 Lubricate Blowers | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 System Restart | 2:15 | 2:15 |
| 2:30 (Check Tele for | 2:30 | 2:30 |
| 2:45 Down Time) | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 Down | 3:15 | 3:15 |
| 3:30 005 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 6075.96 | 8:30 |
| 8:45 0/23.5 | 8:45 0/24 | 8:45 0/24 |

# to DECEMBER 13

| 1999 | | | JANUARY | | | 1999 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY DEC 10 344/21 | FRIDAY DEC 11 345/20 | SATURDAY DEC 12 346/19 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 0124 |
| 5:45 | 5:45 | SUNDAY DEC 13 347/18 |
| 6 | 6 | Hanukkah begins at sundown |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 0124 | 8:45 0124 | 0124 |

AT-A-GLANCE™

| 1998 | | | DECEMBER | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

72
6195.96

# from DECEMBER 14

| MONDAY DEC 14 348/17 | TUESDAY DEC 15 349/16 | WEDNESDAY DEC 16 350/15 |
|---|---|---|
| 7 Hanukkah | 7 | 7 |
| 7:15 | 7:15 Off Line | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 1.5 hrs | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 On Line | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 Changed to Tank B | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 NCW S | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 0/24 | 8:45 0/22.5 | 8:45 0/24 |

# to DECEMBER 20

| 1999 | | | JANUARY | | | 1999 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24/31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY DEC 17 | FRIDAY DEC 18 | SATURDAY DEC 19 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:~~45~~ 55 Summa 6305.46 | 2:45 |
| 3 | 3 58 SEnTex | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 0/24 |
| 5:45 | 5:45 | SUNDAY DEC 20 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 6290.46 | 8:30 | |
| 8:45 0/24 | 8:45 0.2/23.8 | 0/24 |

AT-A-GLANCE™

| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

# from DECEMBER 21

| MONDAY DEC 21 | TUESDAY DEC 22 | WEDNESDAY DEC 23 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 Other Down Times 0000 → 0200 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 (2) | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 0300 – 0600 | 8:15 |
| 8:30 | 8:30 (3) | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 Air make up | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 Other Down Times 2300 → 2400 | 9:45 | 9:45 |
| 10 (1) | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 12:05 | 12 |
| 12:15 | 12:15 Down (.25) | 12:15 |
| 12:30 | 12:30 12:20 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 System Down | 3 | 3 |
| 3:15 Down T. ▷ (.75 hrs) | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 System UP | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 915 Down | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 Down Tm 0.25 hrs | 5:45 | 5:45 |
| 6 ▷ | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 SYS UP 0/18 | 8:45 0/18.75 | 8:45 0.07/23.93 |

# to DECEMBER 27

| 1999 | | | JANUARY | | | 1999 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY DEC 24 (359/7) | FRIDAY DEC 25 (359/6) | SATURDAY DEC 26 (360/5) |
|---|---|---|
| 7 | 7 Christmas Day | 7 Boxing Day (Canada) |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 Vac. Rel. Active | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 0/24 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY DEC 27 (359/4) |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | 0/24 |
| 8:45 0/24 | 8:45 0/24 | |

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| 1998 | | DECEMBER | | | | 1998 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

ZZ 6518.94

# from DECEMBER 28

| MONDAY, DEC. 28 362/3 | TUESDAY, DEC. 29 363/2 | WEDNESDAY, DEC. 30 364/1 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 Vac Rel. Reset |
| 8:30 | 8:30 | 8:30 GC Run 6575.44 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 6566.94 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 0/24 | 8:45 0/24 | 8:45 0.07 / 23.93 |

2

5 years to below Reporting Limit 42750 | 2 years to practical | 1 year to Pulse

# to JANUARY 3 1999

| 1999 JANUARY 1999 | | | | | | |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24/31 | 25 | 26 | 27 | 28 | 29 | 30 |

| THURSDAY DEC 31 3650 | FRIDAY JAN 1 1864 | SATURDAY JAN 2 2 365 |
|---|---|---|
| 7 Terran Maint | 7 New Year's Day | 7 |
| 7:15 Blowers | 7:15 | 7:15 |
| 7:30 Lubed | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 Vac Rel. Active | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 Hours on Oil: | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 3143 | 11 |
| 11:15 | 11:15 @ midnight Jan 1, 1999 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 Zone 1 = 1195.45 | 11:45 |
| 12 | 12 Zone 2 = 6614.12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 119 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 Maint. | 2:30 | 2:30 |
| 2:45 0.75 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 Vac Rel. Active | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | SUNDAY JAN 3 3 3 2 |
| 6 | 6 | |
| 6:15 | 6:15 | |
| 6:30 | 6:30 | |
| 6:45 | 6:45 | |
| 7 | 7 | |
| 7:15 | 7:15 | |
| 7:30 | 7:30 | |
| 7:45 | 7:45 | |
| 8 | 8 | |
| 8:15 | 8:15 | |
| 8:30 | 8:30 | |
| 8:45 0123.25 | 8:45 | |

AT-A-GLANCE™

| 1999 | | | JANUARY | | | 1999 |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 31 | 25 | 26 | 27 | 28 | 29 | 30 |

# from JANUARY 4 1999

| MONDAY JAN. 4 4/361 | TUESDAY JAN. 5 5/360 | WEDNESDAY JAN. 6 6/359 |
|---|---|---|
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |
| 9 | 9 | 9 |
| 9:15 | 9:15 | 9:15 |
| 9:30 | 9:30 | 9:30 |
| 9:45 | 9:45 | 9:45 |
| 10 | 10 | 10 |
| 10:15 | 10:15 | 10:15 |
| 10:30 | 10:30 | 10:30 |
| 10:45 | 10:45 | 10:45 |
| 11 | 11 | 11 |
| 11:15 | 11:15 | 11:15 |
| 11:30 | 11:30 | 11:30 |
| 11:45 | 11:45 | 11:45 |
| 12 | 12 | 12 |
| 12:15 | 12:15 | 12:15 |
| 12:30 | 12:30 | 12:30 |
| 12:45 | 12:45 | 12:45 |
| 1 | 1 | 1 |
| 1:15 | 1:15 | 1:15 |
| 1:30 | 1:30 | 1:30 |
| 1:45 | 1:45 | 1:45 |
| 2 | 2 | 2 |
| 2:15 | 2:15 | 2:15 |
| 2:30 | 2:30 | 2:30 |
| 2:45 | 2:45 | 2:45 |
| 3 | 3 | 3 |
| 3:15 | 3:15 | 3:15 |
| 3:30 | 3:30 | 3:30 |
| 3:45 | 3:45 | 3:45 |
| 4 | 4 | 4 |
| 4:15 | 4:15 | 4:15 |
| 4:30 | 4:30 | 4:30 |
| 4:45 | 4:45 | 4:45 |
| 5 | 5 | 5 |
| 5:15 | 5:15 | 5:15 |
| 5:30 | 5:30 | 5:30 |
| 5:45 | 5:45 | 5:45 |
| 6 | 6 | 6 |
| 6:15 | 6:15 | 6:15 |
| 6:30 | 6:30 | 6:30 |
| 6:45 | 6:45 | 6:45 |
| 7 | 7 | 7 |
| 7:15 | 7:15 | 7:15 |
| 7:30 | 7:30 | 7:30 |
| 7:45 | 7:45 | 7:45 |
| 8 | 8 | 8 |
| 8:15 | 8:15 | 8:15 |
| 8:30 | 8:30 | 8:30 |
| 8:45 | 8:45 | 8:45 |

# Building 01 SVE System Parameters

| Date (USA) | Time (24 hr) | Hdr. Zone | Bar. Press. ("Hg) | In Temp. (°F) | Out Temp. (°F) | SVE: Ex. Temp. (°F) | Mag. ("$H_2O$) | Bk. Press. (psig) | Ht. Excg. ("Hg) | 6LP Temp. (°F+50) | Sys. Vac. ("Hg) | Post Flt. ("Hg) | Pre Flt. ("Hg) | Hdr. Vac. ("Hg) | H2O Mtr. (gal.) | Calc. Flow (Ft./Min.) | Flow (CFM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/18/97 | 12:45 | 1 | 30.05 | 72 | 42 | 197 | 0.85 | 0 | -10 | | -17.25 | -14.5 | -14 | -12.25 | 2226.5 | 4100 | 559 |
| 12/19/97 | 13:48 | 1 | 30 | 80 | 54 | 200 | 0.9 | 0 | -9.5 | | -17 | -14.5 | -13.5 | -12 | 2294 | 4250 | 580 |
| 12/22/97 | 13:30 | 1 | 29.9 | 78 | 45 | 190 | 0.9 | 0 | -9.4 | | -16.75 | -14.2 | -13.4 | -12 | 2361 | 4200 | 573 |
| 12/23/97 | 17:15 | 1 | 30 | | | 204 | 0.8 | 0 | -10.5 | | -17.75 | -15.4 | -14.6 | -13.1 | 3367.5 | 4000 | 545 |
| 12/29/97 | 11:30 | 1 | 30 | | | 200 | 0.75 | 0 | -10.5 | | -17.7 | -14.9 | -14.1 | -12.6 | 4374 | 3900 | 532 |
| 1/5/98 | 12:00 | 1 | 30.2 | 82 | | 212 | 0.825 | 0 | -10 | 208 | -17.6 | -15 | -14.25 | -13 | 4923.5 | 4100 | 559 |
| 1/5/98 | 12:45 | 1 | | | | | | | | | | | | | | | |
| 1/9/98 | 13:30 | 1 | 30 | 74 | 40 | 204 | 0.8 | 0 | -10.25 | 196 | -17.6 | -15.1 | -14.4 | -13 | 8758 | 4000 | 545 |
| 1/12/98 | 13:51 | 1 | 30 | 76 | | 206 | 0.825 | 0 | -10.25 | | -17.6 | -15.25 | -14.4 | -13 | 9036 | 4100 | 559 |
| 1/13/98 | 13:50 | 1 | 30.3 | 68 | 30 | 199 | 0.825 | 0 | -10.6 | 190 | -17.9 | -15.25 | -14.5 | -13.1 | 9058 | 4100 | 559 |
| 1/14/98 | 13:49 | 1 | 30.2 | 70 | 38 | 204 | 0.825 | 0 | -10.5 | 192 | -17.8 | -15.1 | -14.4 | -13.8 | 9058 | 4100 | 559 |
| 1/15/98 | 9:53 | 1 | 30 | 75 | 38 | 203 | 0.825 | 0 | -10.4 | 194 | -17.6 | -15 | -14.1 | -12.75 | 9058 | 4100 | 559 |
| 1/16/98 | 8:00 | 1 | | | | | | | | | | | | | | | |
| 1/19/98 | 13:45 | 1 | 30.03 | 70 | 32 | 200 | 0.8 | 0 | -10.5 | 190 | -17.75 | -15 | -14.4 | -13 | 9090 | 4000 | 545 |
| 1/27/98 | 8:00 | 1 | | | | | | | | | | | | | | | |
| 1/29/98 | 13:46 | 1 | 29.76 | 74 | 40 | 206 | 0.8 | 0 | -10.4 | 194 | -17.5 | -15 | -14.25 | -13 | 9730.5 | 4050 | 552 |
| 1/30/98 | 13:50 | 1 | 30.01 | 73 | 35 | 202 | 0.82 | 0 | -10.5 | 188 | -17.75 | -15.1 | -14.4 | -13.25 | 9778 | 4100 | 559 |
| 2/2/98 | 9:50 | 1 | 30.07 | 82 | 49 | 192 | 0.95 | 0 | -8.6 | 199 | -16.25 | -13.25 | -12.6 | -8.75 | 9778 | 4350 | 593 |
| 2/3/98 | 13:40 | 1 | 30.13 | 73 | 40 | 187 | 0.98 | 0 | -8.75 | 192 | -16.4 | -13.25 | -12.5 | -11.4 | 9778 | 4400 | 600 |
| 2/4/98 | 9:00 | 1 | 29.88 | 63 | 28 | 180 | 0.95 | 0 | -8.9 | 181 | -16.3 | -13.2 | -12.5 | -11.25 | 9778 | 4300 | 586 |
| 2/13/98 | 9:50 | 1 | 30.11 | 66 | 40 | 180 | 0.95 | 0 | -8.9 | 186 | -16.4 | -12.6 | -11.9 | -10.75 | 10405 | 4300 | 586 |
| 2/16/98 | 5:58 | 1 | 30.04 | 63 | 38 | 180 | 0.95 | 0 | -8.75 | 189 | -16.25 | -12.6 | -11.9 | -10.7 | 11147 | 4300 | 586 |
| 2/17/98 | 5:55 | 1 | 29.65 | 69 | 45 | 187 | 0.95 | 0 | -8.6 | 196 | -16 | -12.4 | -11.75 | -10.5 | 11193 | 4325 | 590 |
| 2/18/98 | 5:55 | 1 | 29.37 | 69 | 45 | 186 | 0.95 | 0 | -8.5 | 194 | -15.9 | -12.4 | -11.7 | -10.4 | 11866 | 4350 | 593 |
| 2/19/98 | 13:55 | 1 | 29.87 | 69 | 41 | 186 | 0.95 | 0 | -8.9 | 192 | -16.25 | -12.75 | -12 | -10.4 | 14999 | 4300 | 586 |
| 2/23/98 | 5:57 | 1 | 29.79 | 65 | 37 | 184 | 0.93 | 0 | -8.9 | 189 | -16.25 | -12.25 | -11.5 | -9.9 | 15330 | 4275 | 583 |
| 2/27/98 | 13:15 | 1 | 29.65 | 79 | 62 | 194 | 0.95 | 0 | -8.4 | 205 | -15.9 | -12 | -11.4 | -10.25 | 15330 | 4350 | 593 |
| 3/2/98 | 5:57 | 1 | 29.78 | 56 | 28 | 172 | 0.95 | 0 | -8.75 | 176 | -16 | -12.4 | -11.8 | -10.5 | 15330 | 4250 | 580 |
| 3/4/98 | 15:55 | 1 | 29.89 | 64 | 33 | 177 | 0.95 | 0 | -8.5 | 182 | -16 | -12 | -11.5 | -10.5 | 15330 | 4300 | 586 |
| 3/5/98 | 9:48 | 1 | 30.12 | 60 | 33 | 176 | 0.95 | 0 | -8.75 | 180 | -16.25 | -12.25 | -11.6 | -9.5 | 15330 | 4275 | 583 |
| 3/5/98 | 13:51 | 1 | 30.12 | 66 | 37 | 190 | 0.85 | 0 | -9.9 | 184 | -17.25 | -13.9 | -13.1 | -11.9 | 15330 | 4100 | 559 |
| 3/9/98 | 13:50 | 1 | 29.41 | 68 | 35 | 186 | 0.825 | 0 | -9.75 | 186 | -16.75 | -13.5 | -12.7 | -11.4 | 16862 | 4075 | 556 |
| 3/10/98 | 5:50 | 1 | 30.1 | 66 | 20 | 191 | 0.85 | 0 | -10.1 | 190 | -17.4 | -14 | -13.2 | -11.7 | 17578 | 4075 | 556 |
| 3/11/98 | 9:45 | 1 | 30.46 | 68 | 20 | 188 | 0.85 | 0 | -10 | 187 | -17.4 | -14.1 | -13.4 | -11.9 | 17648 | 4050 | 552 |
| 3/12/98 | 15:00 | 1 | | | | | | | | | | | | | | | |
| 3/19/98 | 13:15 | 1 | 29.82 | 83 | 58 | 200 | 0.85 | 0 | -9.6 | 204 | -17 | -13.8 | -13 | -11.9 | 18450 | 4100 | 559 |
| 3/20/98 | 13:55 | 1 | 29.5 | 68 | 42 | 190 | 0.825 | 0 | -9.8 | 190 | -17 | -13.8 | -13 | -11.8 | 19539 | 4075 | 556 |
| 3/22/98 | 5:55 | 1 | 29.99 | 64 | 30 | 188 | 0.825 | 0 | -10.1 | 184 | -17.2 | -14.2 | -13.4 | -12.1 | 22860 | 4050 | 552 |
| 3/24/98 | 17:00 | 1 | | | | | | | | | | | | | | | |
| 3/25/98 | 5:57 | 1 | 30.31 | 66 | 38 | 189 | 0.825 | 0 | -10.3 | 186 | -17.6 | -14.25 | -13.4 | -11.9 | 22906 | 4050 | 552 |
| 3/26/98 | 7:40 | 1 | 30.16 | 78 | 57 | 210 | 0.775 | 0 | -10.9 | 204 | -18 | -14.2 | -13.4 | -11.8 | 22930 | 4000 | 545 |
| 3/27/98 | 15:05 | 1 | 30.02 | 100 | 77 | 232 | 0.775 | 0 | -10.7 | 227 | -17.9 | -13.4 | -12.5 | -11.1 | 22930 | 4050 | 552 |
| 3/30/98 | 7:45 | 1 | 29.93 | 87 | 66 | 225 | 0.8 | 0 | -10.4 | 212 | -17.6 | -13.8 | -13.1 | -11.75 | 22930 | 4075 | 556 |
| 3/31/98 | 7:35 | 1 | 29.77 | 88 | 67 | 216 | 0.8 | 0 | -10.1 | 213 | -17.5 | -14.4 | -13.6 | -12 | 22930 | 4075 | 556 |
| 4/1/98 | 7:30 | 1 | 29.78 | 76 | 49 | 204 | 0.8 | 0 | -10.25 | 200 | -17.4 | -14.4 | -13.6 | -12.3 | 23152 | 4000 | 545 |
| 4/2/98 | 15:50 | 1 | 29.98 | 82 | 55 | 210 | 0.8 | 0 | -10.4 | 209 | -17.6 | -14.6 | -13.6 | -12 | 23175 | 4025 | 549 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4/7/98 | 9:00 | 1 | | | | | | | | | | | | | | | |
| 4/8/98 | 15:50 | 1 | | 91 | | 216 | 0.77 | 0 | -10 | 212 | -17.2 | -13.9 | -13 | -11.8 | 23770 | 3950 | 539 |
| 4/9/98 | 15:30 | 1 | | | | | | | | | | | | | | | |
| 4/13/98 | 7:45 | 1 | 30.05 | 74 | 54 | 206 | 0.775 | 0 | -10.75 | 196 | -17.8 | -14.6 | -13.9 | -12.5 | 27517 | 3950 | 539 |
| 4/14/98 | 15:44 | 1 | 29.77 | 87 | 65 | 215 | 0.78 | 0 | -10.6 | 209 | -17.7 | -14.5 | -13.6 | -12 | 27563 | 4000 | 545 |
| 4/15/98 | 15:45 | 1 | 29.81 | 82 | 59 | 206 | 0.78 | 0 | -10.4 | 204 | -17.5 | -14 | -13.1 | -11.5 | 27563 | 3975 | 542 |
| 4/16/98 | 15:55 | 1 | 29.6 | 92 | 71 | 220 | 0.78 | 0 | -10.25 | 214 | -17.5 | -14.1 | -13.25 | -12 | 31557 | 4050 | 552 |
| 4/17/98 | 15:51 | 1 | 30.05 | 80 | 54 | 220 | 0.72 | 0 | -11.6 | 202 | -18.5 | -15.25 | -14.4 | -12.9 | 32567 | 3850 | 525 |
| 4/18/98 | 15:35 | 1 | 30.12 | 87 | 63 | 220 | 0.77 | 0 | -11 | 209 | -18.1 | -14.7 | -13.9 | -12.5 | 34283 | 3950 | 539 |
| 4/20/98 | 15:35 | 1 | 30.12 | 87 | 63 | 220 | 0.77 | 0 | -11 | 209 | -18.1 | -14.7 | -13.9 | -12.5 | 34283 | 3950 | 539 |
| 4/21/98 | 7:30 | 1 | 30.07 | 70 | 47 | 205 | 0.75 | 0 | -11.2 | 190 | -18.2 | -14.7 | -13.8 | -12.5 | 34472 | 3875 | 528 |
| 4/22/98 | 15:30 | 1 | 29.95 | 84 | 50 | 212 | 0.78 | 0 | -10.7 | 204 | -17.8 | -14.3 | -13.4 | -11.9 | 34732 | 4000 | 545 |
| 4/23/98 | 15:40 | 1 | 2993 | 86 | 62 | 214 | 0.78 | 0 | -10.5 | 208 | -17.7 | -14 | -13.1 | -11.5 | 34871 | 4000 | 545 |
| 4/27/98 | 7:50 | 1 | 30.19 | 73 | 40 | 200 | 0.83 | 0 | -10.3 | 194 | -17.5 | -13.6 | -12.75 | -11.5 | 35244 | 4050 | 552 |
| 4/28/98 | 15:58 | 1 | 30.28 | 90 | 65 | 206 | 0.88 | 0 | -9.75 | 213 | -17.1 | -13.9 | -13.2 | -11.8 | 35321 | 4200 | 573 |
| 4/28/98 | 17:07 | 1 | 30.27 | 90 | 65 | 216 | 0.8 | 0 | -10.5 | 215 | -17.6 | -14.6 | -13.9 | -12.6 | 35321 | 4050 | 552 |
| 4/29/98 | 7:30 | 1 | 30.16 | 77 | 54 | 207 | 0.8 | 0 | -10.7 | 202 | -17.75 | -14.7 | -14 | -12.75 | 35321 | 4025 | 549 |
| 4/30/98 | 7:50 | 1 | 30.01 | 80 | 57 | 212 | 0.78 | 0 | -10.6 | 206 | -17.6 | -14.7 | -13.9 | -12.7 | 35802 | 3975 | 542 |
| 5/1/98 | 15:50 | 1 | 29.63 | 85 | 62 | 214 | 0.77 | 0 | -10.3 | 209 | -17.4 | -14.5 | -13.75 | -12.5 | 38397 | 3975 | 542 |
| 5/4/98 | 7:50 | 1 | 29.72 | 72 | 49 | 203 | 0.76 | 0 | -10.7 | 193 | -17.6 | -14.6 | -13.9 | -12.6 | 39012 | 3925 | 535 |
| 5/6/98 | 6:55 | 1 | 29.91 | 73 | 54 | 203 | 0.77 | 0 | -10.7 | 194 | -17.6 | -14.7 | -13.9 | -12.6 | 39152 | 3950 | 539 |
| 5/7/98 | 7:50 | 1 | 29.69 | 84 | 62 | 212 | 0.78 | 0 | -10.4 | 206 | -17.4 | -14.6 | -13.8 | -12.5 | 39175 | 4000 | 545 |
| 5/7/98 | 13:05 | 1 | | | | | | | | | | | | | | | |
| 5/22/98 | 15:40 | 1 | 29.92 | 90 | 66 | 230 | 0.75 | 0 | -11 | 220 | -18 | -13.8 | -13 | -11.5 | 46250 | 3970 | 541 |
| 7/20/98 | 13:04 | 1 | 30.05 | 100 | 78 | 244 | 0.71 | 0 | -11.6 | 231 | -18.65 | -12.75 | -11.8 | -10.6 | 58755 | 3875 | 528 |
| 7/21/98 | 11:45 | 1 | 30.07 | 110 | 87 | 250 | 0.7 | 0 | -11.5 | 239 | -18.7 | -12.4 | -11.5 | -10.1 | 58755 | 3875 | 528 |
| 7/21/98 | 14:33 | 1 | 30.05 | 114 | 91 | 242 | 0.78 | 0 | -10.5 | 242 | -18 | -11.3 | -10.4 | -9.1 | 58755 | 4050 | 552 |
| 07/29/98 | 7:00 | 1 | 29.97 | 90 | 68 | 218 | 0.8 | 0 | -10.4 | 214 | -17.6 | -12.2 | -11.5 | -10.2 | 59521 | 4100 | 559 |
| 8/3/98 | 15:08 | 1 | | | | | | | | | | | | | | | 560 |
| 10/13/98 | 7:30 | 1 | 30.06 | 78 | 51 | 196 | 0.95 | 0 | -9.4 | 209 | -17.6 | -17.9 | -17 | -15.2 | 60434 | 4340 | 561 |
| 10/13/98 | 15:50 | 1 | 29.99 | 96 | 66 | 208 | 0.98 | 0 | -9.1 | 228 | -17.4 | -17.8 | -16.9 | -15.1 | 60434 | 4475 | 562 |
| 10/14/98 | 7:00 | 1 | 30.07 | 76 | 39 | 194 | 0.94 | 0 | -9.5 | 206 | -17.5 | -17.8 | -17 | -15.1 | 60434 | 4300 | 563 |
| 10/14/98 | 14:40 | 1 | 30.06 | 88 | 58 | 200 | 0.95 | 0 | -9.2 | 218 | -17.4 | -17.8 | -16.9 | -15.1 | 60434 | 4350 | 564 |
| 10/15/98 | 8:40 | 1 | 30.21 | 74 | 46 | 192 | 0.94 | 0 | -9.5 | 204 | -17.5 | -17.9 | -17.1 | -15.1 | 60434 | 4300 | 565 |
| 10/15/98 | 9:56 | 1 | 30.22 | 76 | 48 | 204 | 0.78 | 0 | -11.2 | 204 | -18.8 | -19.2 | -18.4 | -16.8 | 60434 | 3950 | 566 |
| 10/15/98 | 12:35 | 1 | 30.25 | 81 | 54 | 210 | 0.82 | 0 | -10.7 | 210 | -18.5 | -18.9 | -18.1 | -16.3 | 60434 | 4075 | 567 |
| 2/17/99 | 13:55 | 1 | 29.97 | 62 | 33 | 210 | 0.67 | 0 | -12.8 | 176 | -18.8 | -15.3 | -14.2 | -12.5 | 106311 | 3700 | 568 |

# Building [illegible]01 AS System Parameters

| Date (USA) | AS: Main Temp. (°F) | Mag. ("$H_2O$) | Main Press. (psig) | Zone Press. (psig) | Calc. Flow (Ft./Min.) | Flow (CFM) | Notes |
|---|---|---|---|---|---|---|---|
| 12/18/97 | 173 | 1.6 | 9 | 5.5 | 5550 | 272 | sample 036967-001 taken on zone 1 @ 13:20 |
| 12/19/97 | 194 | 2.1 | 9.5 | 5.25 | 6400 | 314 | Sys. Shut down at 8:00, tighten belts, replace bulb over carbon tanks, put bolts in uni, restart Zone 1 @ 12:30 |
| 12/22/97 | 190 | 2.15 | 9.5 | 5 | 6500 | 319 | Sample 036970-001 taken on zone 1 @ 14:04 |
| 12/23/97 | 202 | 2 | 11.5 | 7.4 | 6300 | 309 | Had to utilize AS bleed-off to building due to pressure relief pop-off valve actuation on zone switching |
| 12/29/97 | | 1.5 | 9.6 | 6 | 5500 | 270 | AS Temp. gauge broken, Estimated temp., Sample 036972-001 taken on zone 1 @ 12:05 |
| 1/5/98 | | 1.6 | 10 | 6.25 | 5600 | 275 | AS Temp. gauge broken, Est. Temp. 185, Sample 036974-001 taken on zone 1 @ 12:15 |
| 1/5/98 | | | | | | | System shut down, blowers greased, adjusted AS bypass valve, shut ED-N2 due to rain, replaced AS temp gauge |
| 1/9/98 | 150 | 1.75 | 11 | 7.4 | 5700 | 280 | |
| 1/12/98 | 160 | 1.5 | 12 | 8.25 | 5300 | 260 | Sample 036975-001 taken on zone 1 @ 14:05 |
| 1/13/98 | 150 | 1.55 | 12 | 8.75 | 5300 | 260 | |
| 1/14/98 | 155 | 1.45 | 12 | 8.5 | 5200 | 255 | |
| 1/15/98 | 159 | 1.4 | 12.1 | 8.75 | 5100 | 250 | |
| 1/16/98 | | | | | | | System shut down, blowers greased & lubed, belts tightened, filters changed, strainer cleaned, pump primed |
| 1/19/98 | 160 | 1.15 | 12.75 | 9.75 | 4650 | 228 | Sample 036977-001 taken on zone 1 @ 14:05 |
| 1/27/98 | | | | | | | System shut down for Sandia mods., restarted 1/28/98 14:30 |
| 1/29/98 | 183 | 0.5 | 14.5 | 11 | 3150 | 155 | |
| 1/30/98 | 183 | 0.6 | 14.75 | 11.5 | 3400 | 167 | |
| 2/2/98 | 197 | 0.5 | 14.9 | 11.25 | 3150 | 155 | Opened AS-N1 & N3 to full open, Increased EW-N2 & N4 to compensate @ 8:20 |
| 2/3/98 | 190 | 0.4 | 14.9 | 11.6 | 2800 | 137 | |
| 2/4/98 | 176 | 0.35 | 14.8 | 12 | 2600 | 128 | Snow & Freezing, precip. = 0.01" in last hour, system shut down at noon due to break through of contaminants |
| 2/13/98 | | | | | | | Carbon changed on 2/12/98 Zone 1 ran for 1 hour shut down at 14:40 leaking pump, restart @ 8:00 today |
| 2/16/98 | | | | | | | 0.19" of rain for the day |
| 2/17/98 | | | | | | | 0.34" of rain for the day |
| 2/18/98 | | | | | | | at 06:20 gal. pumped = 12,017, disconnected lines 3 & 4 from GC and purged them with argon, 0.43" of rain today |
| 2/19/98 | | | | | | | |
| 2/23/98 | | | | | | | Sample ports 3&4 on GC back-flushed with argon, shut down at noon, line contamination (argon) |
| 2/27/98 | | | | | | | System restart at 16:00 on 2/26, ran fron 13:30 to 14:00 on 2/25 shut down for stripper cleaning |
| 3/2/98 | | | | | | | |
| 3/4/98 | | | | | | | |
| 3/5/98 | | | | | | | |
| 3/5/98 | | | | | | | following rebalance of extraction wells with magnehelics |
| 3/9/98 | | | | | | | 0.7" precip. Past 24 hrs., Sys. shutdown @ midnight - high K.O. tank level - pump lost prime, GC exhib. Memory |
| 3/10/98 | | | | | | | GC baked overnight |
| 3/11/98 | | | | | | | |
| 3/12/98 | | | | | | | SVE System shut down due to Air Stripper fouling |
| 3/19/98 | | | | | | | |
| 3/20/98 | | | | | | | Rain, 04:00 - 16:00 0.72" |
| 3/22/98 | | | | | | | |
| 3/24/98 | | | | | | | System shut down for tour for 30 min. |
| 3/25/98 | | | | | | | summa 036982-001 @ 06:06, system carbon chg. 07:30 - 15:55, chg. To Z2=6hr & Z1=2hr cycles, flow dir. Chg. |
| 3/26/98 | | | | | | | |
| 3/27/98 | | | | | | | |
| 3/30/98 | | | | | | | system power cycled for ports 3 & 4 readings approx. 1 hour before zone 1 readings |
| 3/31/98 | | | | | | | |
| 4/1/98 | | | | | | | 0.53" of rain since 3/31 19:00 hrs |
| 4/2/98 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4/7/98 | | | | | | | System shut down for maint. Restarted at 15:30 |
| 4/8/98 | | | | | | | Flow is based upon an estimated Bar. Press. of 30.00 |
| 4/9/98 | | | | | | | High water level in K.O. tank, auto shut down, system left off for weekend |
| 4/13/98 | | | | | | | System restarted @ 02:00 hrs, GC #85 calib., GC #86 port 4, GC #87 port 3, GC #88 port 2, GC #89 port 1 |
| 4/14/98 | | | | | | | |
| 4/15/98 | | | | | | | Sampling wells via Tedlar |
| 4/16/98 | | | | | | | 2.7" rain in 24 hrs., auto-off @ 12:10, restarted @ 06:00 - 10:00 Z2 manual w/air makeup, 10:00 full on & auto |
| 4/17/98 | 160 | 0.4 | 14.6 | 13 | 2750 | 135 | following slight re-balance, re-balance postponed due to wet conditions, AS-N1 & N3 full on |
| 4/18/98 | | | | | | | |
| 4/20/98 | | | | | | | |
| 4/21/98 | | | | | | | |
| 4/22/98 | | | | | | | |
| 4/23/98 | | | | | | | |
| 4/27/98 | | | | | | | |
| 4/28/98 | | | | | | | Before Rebalance, carbon change |
| 4/28/98 | | | | | | | Following Rebalance |
| 4/29/98 | | | | | | | |
| 4/30/98 | | | | | | | Raining, ground saturated, 0.97" |
| 5/1/98 | | | | | | | |
| 5/4/98 | | | | | | | |
| 5/6/98 | | | | | | | |
| 5/7/98 | | | | | | | |
| 5/7/98 | | | | | | | System set to run on Zone 2 full time |
| 5/22/98 | | | | | | | |
| 7/20/98 | | | | | | | |
| 7/21/98 | | | | | | | |
| 7/21/98 | | | | | | | EW-N1, N4, & N6 set to 4" WC, EW-N5 at 0.2" WC, Following QTRLY Tedlar Sampling |
| 7/29/98 | | | | | | | |
| 8/3/98 | 270 | 0.5 | 13.75 | 10 | 3300 | 162 | |
| 10/13/98 | | | | | | | |
| 10/13/98 | | | | | | | |
| 10/14/98 | | | | | | | |
| 10/14/98 | | | | | | | |
| 10/15/98 | | | | | | | |
| 10/15/98 | | | | | | | |
| 10/15/98 | | | | | | | |
| 2/17/99 | | | | | | | Sampling wells via Tedlar. Ground condition are wet. |

# Building 01 SVE System Parameters

| Date (USA) | Time (24 hr) | Hdr. Zone | Bar. Press. ("Hg) | In Temp. (°F) | Out Temp. (°F) | SVE: Ex. Temp. (°F) | Mag. ("$H_2O$) | Bk. Press. (psig) | Ht. Excg. ("Hg) | 6LP Temp. (°F+50) | Sys. Vac. ("Hg) | Post Flt. ("Hg) | Pre Flt. ("Hg) | Hdr. Vac. ("Hg) | H2O Mtr. (gal.) | Calc. Flow (Ft./Min.) | Flow (CFM) | Date (USA) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/18/97 | 7:50 | 2 | 30.05 | 64 | 20 | 184 | 0.925 | 0 | -9.25 | | -16.5 | -14 | -13 | -11.5 | 2226.5 | 4200 | 573 | 12/18/97 |
| 12/18/97 | 16:55 | 2 | 30 | 78 | | 190 | 0.95 | 0 | -8.5 | | -16 | -13.5 | -12.5 | -11 | 2249.25 | 4250 | 580 | 12/18/97 |
| 12/19/97 | 17:25 | 2 | 30 | 78 | 42 | 190 | 1 | 0 | | | -16 | -13.5 | -12.5 | -11 | 2294 | 4450 | 607 | 12/19/97 |
| 12/22/97 | 7:30 | 2 | 30 | 68 | | 182 | 0.95 | 0 | -8.75 | | -16 | -13.5 | -12.5 | -10.75 | 2338.5 | 4300 | 586 | 12/22/97 |
| 12/23/97 | 7:30 | 2 | 30 | 68 | 37 | 186 | 0.95 | 0 | | 190 | -16.5 | -13.75 | -13 | -11 | 3296.5 | 4325 | 590 | 12/23/97 |
| 12/23/97 | 10:55 | 2 | 30 | 69 | | 208 | 0.8 | 0 | -10.75 | | -17.9 | -15.5 | -14.75 | -13 | 3343.5 | 4025 | 549 | 12/23/97 |
| 12/29/97 | 7:45 | 2 | 30 | 60 | | 200 | 0.75 | 0 | -10.9 | 180 | -17.9 | -15.2 | -14.4 | -12.8 | 4374 | 3900 | 532 | 12/29/97 |
| 12/30/97 | 7:00 | 2 | 30 | 63 | | 180 | 0.9 | 0 | -9 | 182 | -16.5 | -13.4 | -12.6 | -11 | 4908.25 | 4150 | 566 | 12/30/97 |
| 01/05/98 | 6:55 | 2 | 30.2 | 81 | 47 | 190 | 0.95 | 0 | -8.5 | 200 | -16.25 | -13.4 | -12.6 | -11.25 | 4923.5 | 4300 | 586 | 1/5/98 |
| 01/05/98 | 12:45 | 2 | | | | | | | | | | | | | | | | 1/5/98 |
| 01/08/98 | 7:50 | 2 | 30 | 76 | 44 | 192 | 0.9 | 0 | -8.9 | 199 | -16.4 | -13.7 | -12.9 | -11.2 | 7241 | 4200 | 573 | 1/8/98 |
| 01/09/98 | 11:30 | 2 | 30 | 79 | 40 | 190 | 0.95 | 0 | -8.6 | 200 | -16.25 | -13.6 | -12.8 | -11.1 | 8758 | 4300 | 586 | 1/9/98 |
| 01/12/98 | 15:40 | 2 | 30 | 80 | 51 | 184 | 1 | 0 | -8.25 | 198 | -16 | -13.25 | -12.4 | -10.6 | 9036 | 4400 | 600 | 1/12/98 |
| 01/13/98 | 15:59 | 2 | 30.3 | | | 174 | 1 | 0 | -8.5 | 196 | -16.1 | -13.1 | -12.25 | -10.5 | 9058 | 4350 | 593 | 1/13/98 |
| 01/14/98 | 15:45 | 2 | 30.1 | | | 180 | 1 | 0 | -8.4 | 190 | -16.1 | -13.1 | -11.2 | -10.5 | 9058 | 4400 | 600 | 1/14/98 |
| 01/15/98 | 7:45 | 2 | 30 | 73 | 33 | 180 | 1 | 0 | -8.4 | 189 | -16 | -13 | -12 | -10.4 | 9058 | 4400 | 600 | 1/15/98 |
| 01/16/98 | 8:00 | 2 | | | | | | | | | | | | | | | | 1/16/98 |
| 01/19/98 | 7:36 | 2 | 30.03 | 65 | 19 | 176 | 0.955 | 0 | -8.75 | 180 | -16.25 | -13.4 | -12.6 | -10.75 | 9084 | 4350 | 593 | 1/19/98 |
| 01/27/98 | 8:00 | 2 | | | | | | | | | | | | | | | | 1/27/98 |
| 01/29/98 | 7:50 | 2 | 29.76 | 66 | 38 | 180 | 1 | 0 | -8.5 | 186 | -16 | -13 | -12.4 | -11 | 9301.5 | 4425 | 603 | 1/29/98 |
| 01/30/98 | 15:55 | 2 | 30.01 | 70 | 34 | 171 | 1.05 | 0 | -7.9 | 180 | -15.6 | -12.5 | -11.8 | -10.1 | 9778 | 4450 | 607 | 1/30/98 |
| 02/02/98 | 7:35 | 2 | 30.06 | 75 | 45 | 178 | 1.1 | 0 | -7.6 | 192 | -15.5 | -12.25 | -11.5 | -10.1 | 9778 | 4600 | 627 | 2/2/98 |
| 02/03/98 | 11:46 | 2 | 30.21 | 68 | 39 | 173 | 1.08 | 0 | -7.75 | 185 | -15.6 | -12.25 | -11.6 | -10.1 | 9778 | 4554 | 621 | 2/3/98 |
| 02/04/98 | 7:00 | 2 | 29.87 | 65 | 29 | 170 | 1.05 | 0 | -7.9 | 184 | -15.4 | -12.1 | -11.5 | -10 | 9778 | 4500 | 614 | 2/4/98 |
| 02/13/98 | 11:55 | 2 | 30.07 | 67 | 44 | 184 | 0.95 | 0 | -8.9 | 190 | -16.4 | -12.6 | -11.9 | -10.2 | 11026 | 4300 | 586 | 2/13/98 |
| 02/16/98 | 7:55 | 2 | 30.02 | 62 | 39 | 172 | 1.05 | 0 | -7.9 | 185 | -15.5 | -11.7 | -11 | -9.6 | 11147 | 4475 | 610 | 2/16/98 |
| 02/17/98 | 7:55 | 2 | 29.56 | 70 | 45 | 179 | 1 | 0 | -7.9 | 194 | -15.4 | -11.6 | -10.9 | -9.6 | 11193 | 4440 | 605 | 2/17/98 |
| 02/18/98 | 7:50 | 2 | 29.42 | 70 | 44 | 202 | 0.8 | 0 | -9.9 | 195 | -17 | -13.9 | -13.1 | -11.5 | 12617 | 4050 | 552 | 2/18/98 |
| 02/19/98 | 7:55 | 2 | 29.86 | 63 | 38 | 179 | 0.95 | 0 | -8.6 | 188 | -16 | -12.5 | -11.75 | -10.1 | 14975 | 4300 | 586 | 2/19/98 |
| 02/23/98 | 7:37 | 2 | 29.78 | 64 | 37 | 177 | 0.98 | 0 | -8.5 | 188 | -15.8 | -11.75 | -11 | -9.5 | 15330 | 4375 | 597 | 2/23/98 |
| 02/27/98 | 7:48 | 2 | 29.6 | 75 | 53 | 180 | 1.05 | 0 | -7.5 | 196 | -15.1 | -11.1 | -10.4 | -9 | 15330 | 4550 | 620 | 2/27/98 |
| 03/02/98 | 11:50 | 2 | 29.76 | 67 | 31 | 170 | 1.05 | 0 | -7.6 | 188 | -15.2 | -11.5 | -10.75 | -9.5 | 15330 | 4500 | 614 | 3/2/98 |
| 03/03/98 | 7:45 | 2 | 29.76 | 62 | 33 | 166 | 1.05 | 0 | -7.6 | 179 | -15.2 | -11.5 | -10.75 | -9.5 | 15330 | 4500 | 614 | 3/3/98 |
| 03/04/98 | 7:04 | 2 | 29.88 | 65 | 32 | 168 | 1.05 | 0 | -7.6 | 185 | -15.2 | -11.6 | -10.8 | -9.5 | 15330 | 4500 | 614 | 3/4/98 |
| 03/05/98 | 7:42 | 2 | 30.1 | 73 | 28 | 172 | 1.05 | 0 | -7.9 | 188 | -15.5 | -11.5 | -10.9 | -9.5 | 15330 | 4475 | 610 | 3/5/98 |
| 03/05/98 | 14:45 | 2 | 30.12 | 68 | 37 | 182 | 0.95 | 0 | -9.9 | 186 | -16.4 | -12.8 | -12.1 | -10.9 | 15330 | 4300 | 586 | 3/5/98 |
| 03/06/98 | 7:45 | 2 | 30.2 | 62 | 34 | 180 | 0.95 | 0 | -9 | 182 | -16.4 | -12.9 | -12.1 | -10.9 | 15330 | 4275 | 583 | 3/6/98 |
| 03/09/98 | 11:55 | 2 | 29.38 | 64 | 42 | 192 | 0.8 | 0 | -10.1 | 166 | -17.2 | -14 | -13.25 | -11.5 | 16862 | 4025 | 549 | 3/9/98 |
| 03/10/98 | 7:45 | 2 | 30.13 | 66 | 19 | 180 | 0.9 | 0 | -9.6 | 185 | -16.8 | -13.4 | -12.6 | -11.2 | 17601 | 4175 | 569 | 3/10/98 |
| 03/11/98 | 7:58 | 2 | 30.43 | 66 | 18 | 176 | 0.925 | 0 | -9.5 | 183 | -16.9 | -13.4 | -12.6 | -11 | 17648 | 4200 | 573 | 3/11/98 |
| 03/12/98 | 7:38 | 2 | 30.55 | 67 | 10 | 181 | 0.9 | 0 | -9.6 | 183 | -17.1 | -13.75 | -12.9 | -11.3 | 17648 | 4150 | 566 | 3/12/98 |
| 03/19/98 | 7:45 | 2 | 29.88 | 73 | 51 | 189 | 0.9 | 0 | -9.4 | 194 | -16.75 | -13.4 | -12.6 | -11.1 | 18430 | 4200 | 573 | 3/19/98 |
| 03/20/98 | 15:51 | 2 | 29.5 | 68 | 43 | 211 | 0.7 | 0 | -11.4 | 192 | -18.2 | -15.3 | -14.7 | -12.9 | 20573 | 3800 | 518 | 3/20/98 |
| 03/23/98 | 7:45 | 2 | 30.02 | 65 | 32 | 182 | 0.9 | 0 | -9.5 | 184 | -16.8 | -13.5 | -12.7 | -11.4 | 22860 | 4200 | 573 | 3/23/98 |
| 03/25/98 | 3:57 | 2 | 30.29 | 65 | 38 | 184 | 0.875 | 0 | -9.9 | 182 | -17.25 | -13.9 | -13.1 | -11.5 | 22906 | 4100 | 559 | 3/25/98 |
| 03/26/98 | 5:50 | 2 | 30.13 | 76 | 54 | 202 | 0.825 | 0 | -10.25 | 200 | -17.5 | -13.5 | -12.7 | -11.2 | 22930 | 4050 | 552 | 3/26/98 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/27/98 | [illegible] | [illegible]S | 30.07 | 98 | 76 | 223 | 0.825 | 0 | [illegible] | [illegible]222 | -17.5 | -12.8 | -12 | -10.6 | 22930 | 4100 | [illegible] | 03/27/98 |
| 03/30/98 | 5:40 | 2 | 29.93 | 87 | 64 | 227 | 0.725 | 0 | -11.1 | 213 | -18.1 | -11.5 | -10.7 | -9.5 | 22930 | 3900 | [illegible] | 3/30/98 |
| 03/30/98 | 12:20 | 2 | 29.89 | 98 | 73 | 219 | 0.825 | 0 | -9.75 | 222 | -17.1 | -14 | -13.3 | -12 | 22930 | 4150 | 566 | 3/30/98 |
| 03/31/98 | 5:55 | 2 | 29.76 | 87 | 66 | 212 | 0.8 | 0 | -9.9 | 213 | -17.1 | -14.1 | -13.25 | -11.75 | 22930 | 4075 | 556 | 3/31/98 |
| 04/01/98 | 5:51 | 2 | 29.77 | 77 | 49 | 204 | 0.8 | 0 | -10.2 | 200 | -17.4 | -14.3 | -13.5 | -12.1 | 23152 | 4000 | 545 | 4/1/98 |
| 04/02/98 | 13:55 | 2 | 29.98 | 80 | 54 | 206 | 0.8 | 0 | -10.25 | 202 | -17.5 | -14.4 | -13.5 | -12 | 23175 | 4025 | 549 | 4/2/98 |
| 04/07/98 | 9:00 | 2 | | | | | | | | | | | | | | | | 4/7/98 |
| 04/08/98 | 13:50 | 2 | | 90 | | 216 | 0.8 | 0 | -10 | 212 | -17.4 | -14.5 | -13.3 | -12 | 23770 | 4050 | 552 | 4/8/98 |
| 04/09/98 | 13:50 | 2 | | 74 | | 200 | 0.81 | 0 | -10.2 | 200 | -17.5 | -14.2 | -13.2 | -12 | 26590 | 4000 | 545 | 4/9/98 |
| 04/09/98 | 15:30 | 2 | | | | | | | | | | | | | | | | 4/9/98 |
| 04/13/98 | 5:53 | 2 | 30.06 | 74 | 53 | 200 | 0.8 | 0 | -10.5 | 196 | -17.5 | -14.3 | -13.6 | -12 | 27517 | 4000 | 545 | 4/13/98 |
| 04/14/98 | 13:30 | 2 | 29.77 | 84 | 60 | 209 | 0.81 | 0 | -10.25 | 206 | -17.4 | -14.1 | -13.25 | -11.7 | 27563 | 4075 | 556 | 4/14/98 |
| 04/15/98 | 13:45 | 2 | 29.84 | 84 | 63 | 209 | 0.81 | 0 | -10.1 | 205 | -17.4 | -13.9 | -12.9 | -11.4 | 27563 | 4050 | 552 | 4/15/98 |
| 04/16/98 | 13:30 | 2 | 29.62 | 91 | 68 | 226 | 0.75 | 0 | -10.9 | 213 | -17.9 | -14.6 | -13.7 | -12.2 | 31532 | 3975 | 542 | 4/16/98 |
| 04/17/98 | 11:00 | 2 | 30.01 | 72 | 46 | 205 | 0.76 | 0 | -11 | 192 | -18 | -14.6 | -13.7 | -12.25 | 32494 | 3910 | 533 | 4/17/98 |
| 04/17/98 | 11:28 | 2 | 30.01 | 74 | 46 | 210 | 0.75 | 0 | -11.25 | 193 | -18.2 | -14.75 | -14 | -12.4 | 32494 | 3940 | 537 | 4/17/98 |
| 04/18/98 | 13:40 | 2 | 30.14 | 82 | 59 | 212 | 0.77 | 0 | -10.9 | 202 | -18 | -14.5 | -13.7 | -12.2 | 34260 | 3950 | 539 | 4/18/98 |
| 04/20/98 | 13:40 | 2 | 30.14 | 82 | 59 | 212 | 0.77 | 0 | -10.9 | 202 | -18 | -14.5 | -13.7 | -12.2 | 34283 | 3950 | 539 | 4/20/98 |
| 04/21/98 | 9:15 | 2 | 30.1 | 73 | 50 | 205 | 0.75 | 0 | -11 | 190 | -18.1 | -14.6 | -13.7 | -12.1 | 34472 | 3875 | 528 | 4/21/98 |
| 04/22/98 | 13:46 | 2 | 29.96 | 83 | 59 | 211 | 0.78 | 0 | -10.6 | 203 | -17.8 | -14.2 | -13.3 | -12 | 34732 | 4000 | 545 | 4/22/98 |
| 04/23/98 | 16:50 | 2 | 29.94 | 87 | 65 | 214 | 0.78 | 0 | -10.6 | 208 | -17.75 | -14.1 | -13.25 | -11.7 | 34871 | 4000 | 545 | 4/23/98 |
| 04/27/98 | 10:15 | 2 | 30.21 | 72 | 46 | 199 | 0.8 | 0 | -10.7 | 190 | -17.8 | -14.1 | -13.25 | -12 | 35244 | 4000 | 545 | 4/27/98 |
| 04/28/98 | 13:58 | 2 | 30.31 | 82 | 60 | 202 | 0.83 | 0 | -10.1 | 202 | -17.4 | -14.2 | -13.4 | -12.1 | 35321 | 4075 | 556 | 4/28/98 |
| 04/28/98 | 17:40 | 2 | 30.25 | 90 | 65 | 208 | 0.85 | 0 | -9.75 | 214 | -17.1 | -14 | -13.25 | -12 | 35321 | 4125 | 562 | 4/28/98 |
| 04/28/98 | 18:42 | 2 | 30.25 | 88 | 63 | 214 | 0.8 | 0 | -10.4 | 214 | -17.6 | -14.6 | -13.9 | -12.5 | 35321 | 4050 | 552 | 4/28/98 |
| 04/29/98 | 9:30 | 2 | 30.19 | 81 | 56 | 208 | 0.8 | 0 | -10.6 | 206 | -17.6 | -14.6 | -13.9 | -12.6 | 35321 | 4025 | 549 | 4/29/98 |
| 04/30/98 | 5:50 | 2 | 30.02 | 80 | 57 | 238 | 0.62 | 0 | -12.6 | 210 | -19.1 | -16.6 | -15.9 | -14.25 | 35802 | 3700 | 505 | 4/30/98 |
| 05/01/98 | 13:50 | 2 | 29.64 | 88 | 63 | 218 | 0.75 | 0 | -10.5 | 210 | -17.5 | -14.6 | -13.8 | -12.4 | 38397 | 3940 | 537 | 5/1/98 |
| 05/04/98 | 5:58 | 2 | 29.69 | 71 | 48 | 207 | 0.75 | 0 | -10.9 | 194 | -17.75 | -14.8 | -14 | -12.6 | 39012 | 3925 | 535 | 5/4/98 |
| 05/05/98 | 13:55 | 2 | 29.88 | 94 | 70 | 220 | 0.78 | 0 | -10.4 | 216 | -17.5 | -14.6 | -13.8 | -12.3 | 39106 | 4025 | 549 | 5/5/98 |
| 05/06/98 | 5:55 | 2 | 29.9 | 73 | 55 | 206 | 0.77 | 0 | -10.7 | 195 | -17.6 | -14.7 | -13.9 | -12.6 | 39152 | 3950 | 539 | 5/6/98 |
| 05/07/98 | 10:00 | 2 | 29.67 | 82 | 61 | 213 | 0.77 | 0 | -10.5 | 205 | -17.5 | -14.7 | -13.9 | -12.6 | 39175 | 3985 | 543 | 5/7/98 |
| 05/07/98 | 13:05 | 2 | 29.56 | 83 | 59 | 233 | 0.58 | | | | -19.4 | | | | 39707 | 3500 | 477 | 5/7/98 |
| 05/07/98 | 13:25 | 2 | 29.56 | 82 | 59 | 216 | 0.8 | 0 | -10 | 206 | -17 | -15.4 | -14.7 | -13.1 | 39771 | | | 5/7/98 |
| 05/08/98 | 10:30 | 2 | 29.47 | 85 | 62 | 227 | 0.685 | 0 | -11.4 | 210 | -18 | -15.4 | -14.7 | -13.1 | 44630 | 3825 | 522 | 5/8/98 |
| 05/11/98 | 6:20 | 2 | 29.83 | 77 | 51 | 213 | 0.74 | 0 | -11 | 199 | -17.9 | -15 | -14.2 | -12.6 | 45380 | 3900 | 532 | 5/11/98 |
| 05/11/98 | 14:30 | 2 | 29.83 | 92 | 68 | 225 | 0.75 | 0 | -10.8 | 214 | -17.8 | -15 | -14.2 | -12.6 | 45476 | 3975 | 542 | 5/11/98 |
| 05/12/98 | 7:18 | 2 | 29.87 | 74 | 50 | 210 | 0.74 | 0 | -11.1 | 194 | -17.9 | -15 | -14.25 | -12.9 | 45594 | 3900 | 532 | 5/12/98 |
| 05/12/98 | 13:30 | 2 | 29.92 | 95 | 71 | 224 | 0.76 | 0 | -10.6 | 217 | -17.75 | -14.8 | -14.1 | -12.75 | 45642 | 3960 | 540 | 5/12/98 |
| 05/13/98 | 7:25 | 2 | 29.95 | 84 | 62 | 217 | 0.75 | 0 | -10.9 | 206 | -17.8 | -14.9 | -14.1 | -12.8 | 45760 | 3925 | 535 | 5/13/98 |
| 05/13/98 | 15:51 | 2 | 29.94 | 104 | 84 | 232 | 0.775 | 0 | -10.4 | 228 | -17.7 | -14.75 | -13.9 | -12.6 | 45807 | 4025 | 549 | 5/13/98 |
| 05/14/98 | 8:22 | 2 | 30.1 | 85 | 67 | 217 | 0.75 | 0 | -10.9 | 206 | -17.9 | -15 | -14.2 | -12.9 | 45901 | 3925 | 535 | 5/14/98 |
| 05/14/98 | 14:40 | 2 | 30.1 | 106 | 84 | 232 | 0.78 | 0 | -10.4 | 229 | -17.8 | -14.75 | -13.9 | -12.7 | 45925 | 4100 | 559 | 5/14/98 |
| 05/20/98 | 13:50 | 2 | 30.01 | 99 | 75 | 230 | 0.78 | 0 | -11 | 220 | -17.8 | -14 | -13.4 | -12 | 46230 | 4050 | 552 | 5/20/98 |
| 05/21/98 | 7:25 | 2 | 30.01 | 84 | 60 | 222 | 0.75 | 0 | -11 | 208 | -18 | -14.1 | -13.4 | -12 | 46230 | 3950 | 539 | 5/21/98 |
| 05/22/98 | 12:45 | 2 | 29.95 | 90 | 65 | 226 | 0.75 | 0 | -11 | 220 | -18 | -14 | -13 | -12 | 46250 | 3950 | 539 | 5/22/98 |
| 05/26/98 | 15:35 | 2 | 30.02 | 94 | 71 | 220 | 0.75 | 0 | -10.9 | 225 | -17.9 | -13.9 | -12.9 | -11.9 | 48460 | 3940 | 537 | 5/26/98 |
| 05/27/98 | 14:51 | 2 | 30.04 | 100 | 75 | 235 | 0.75 | 0 | -10.5 | 230 | -18 | -13.9 | -13 | -12 | 48510 | 3975 | 542 | 5/27/98 |
| 05/28/98 | 9:15 | 2 | 30.11 | 95 | 69 | 231 | 0.75 | 0 | -10.9 | 225 | -18 | -14 | -13 | -12 | 48550 | 3970 | 541 | 5/28/98 |
| 05/28/98 | 13:20 | 2 | 30.09 | 100 | 79 | 231 | 0.75 | 0 | -10.5 | 240 | -18 | -14 | -13.2 | -12 | 48550 | 3970 | 541 | 5/28/98 |
| 06/01/98 | 14:15 | 2 | 29.85 | 92 | 73 | 239 | 0.75 | 0 | -10.4 | 230 | -17.9 | -14 | -13.1 | -12 | 48720 | 3990 | 544 | 6/1/98 |
| 06/02/98 | 15:30 | 2 | 29.59 | 100 | 84 | 244 | 0.75 | 0 | -10.2 | 238 | -17.8 | -14 | -13.1 | -11.7 | 78746 | 4025 | 549 | 6/2/98 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/03/98 | [illegible] | [illegible] | 29.89 | 85 | 67 | 234 | 0.75 | 0 | [illegible] | [illegible] | 220 | -18 | -14.2 | -13.2 | -12 | 48777 | 3975 | [illegible] | 6/3/98 |
| 06/04/98 | 15:[illegible] | 2 | 29.89 | 80 | 63 | 232 | 0.75 | 0 | -10.[illegible] | 220 | -18 | -14.1 | -13.2 | -12 | 48790 | 3975 | [illegible] | 6/4/98 |
| 06/08/98 | 8:15 | 2 | 30.22 | 75 | 55 | 226 | 0.74 | 0 | -10.9 | 200 | -18.25 | -14 | -13.1 | -12 | 48889 | 3900 | 532 | 6/8/98 |
| 06/09/98 | 13:00 | 2 | 30.01 | - | 60 | 222 | 0.74 | 0 | -11.5 | 200 | -18.4 | -14.5 | -13.5 | -12 | 49020 | 3900 | 532 | 6/9/98 |
| 06/10/98 | 13:50 | 2 | 29.96 | 102 | 79 | 234 | 0.75 | 0 | -10.8 | 224 | -17.9 | -13.9 | -13 | -11.6 | 49043 | 3975 | 542 | 6/10/98 |
| 06/11/98 | 12:55 | 2 | 29.96 | 90 | 68 | 245 | 0.64 | 0 | -12.2 | 218 | -18.9 | -15 | -14 | -12.7 | 49270 | 3700 | 505 | 6/11/98 |
| 06/12/98 | 9:30 | 2 | 29.82 | 96 | 74 | 225 | 0.73 | 0 | -11 | 219 | -18 | -14 | -13 | -11.7 | 50197 | 3920 | 535 | 6/12/98 |
| 06/12/98 | 13:25 | 2 | 29.83 | 104 | 83 | 236 | 0.74 | 0 | -10.75 | 229 | -17.9 | -13.8 | -12.9 | -11.9 | 50221 | 3950 | 539 | 6/12/98 |
| 06/14/98 | 15:15 | 2 | 29.63 | 96 | 72 | 230 | 0.73 | 0 | -11 | 220 | -17.9 | -13.9 | -12.9 | -11.9 | 52203 | 3925 | 535 | 6/14/98 |
| 06/15/98 | 10:10 | 2 | 29.44 | 92 | 67 | 233 | 0.69 | 0 | -11.4 | 215 | -18 | -14.25 | -13.3 | -12.1 | 54406 | 3825 | 522 | 6/15/98 |
| 06/16/98 | 6:20 | 2 | 29.63 | 89 | 66 | 231 | 0.7 | 0 | -11.3 | 212 | -18 | -14.4 | -13.5 | -12.2 | 54575 | 3850 | 525 | 6/16/98 |
| 06/16/98 | 15:46 | 2 | 29.7 | 94 | 67 | 240 | 0.66 | 0 | -11.75 | 220 | -18.5 | -14.9 | -13.9 | -12.6 | 54727 | 3760 | 513 | 6/16/98 |
| 06/17/98 | 9:40 | 2 | 30.02 | 94 | 70 | 233 | 0.71 | 0 | -11.5 | 215 | -18.4 | -14.7 | -13.7 | -12.5 | 54937 | 3860 | 526 | 6/17/98 |
| 06/17/98 | 15:10 | 2 | 30.06 | 102 | 81 | 241 | 0.71 | 0 | -11.3 | 228 | -18.3 | -14.6 | -13.6 | -12.5 | 55022 | 3900 | 532 | 6/17/98 |
| 06/18/98 | 6:15 | 2 | 30.09 | 88 | 66 | 232 | 0.7 | 0 | -11.6 | 212 | -18.4 | -14.7 | -13.75 | -12.5 | 55143 | 3850 | 525 | 6/18/98 |
| 06/18/98 | 16:00 | 2 | 30.01 | 105 | 84 | 242 | 0.73 | 0 | -11.1 | 232 | -18.2 | -14.6 | -13.7 | -12.4 | 55191 | 3925 | 535 | 6/18/98 |
| 06/19/98 | 10:35 | 2 | 29.9 | 98 | 72 | 240 | 0.6 | 0 | -12 | 222 | -18.6 | -15.1 | -14.2 | -12.8 | 57172 | 3560 | 485 | 6/19/98 |
| 06/22/98 | 6:45 | 2 | 30.08 | 90 | 66 | 231 | 0.71 | 0 | -11.5 | 214 | -18.4 | -14.6 | -13.75 | -12.6 | 57711 | 3860 | 526 | 6/22/98 |
| 06/23/98 | 13:40 | 2 | 30.09 | 102 | 77 | 240 | 0.7 | 0 | -11.4 | 225 | -18.4 | -14.7 | -13.75 | -12.4 | 58085 | 3850 | 525 | 6/23/98 |
| 06/24/98 | 9:10 | 2 | 30.12 | 98 | 77 | 230 | 0.73 | 0 | -11.25 | 220 | -18.25 | -14.5 | -13.7 | -12.6 | 58181 | 3925 | 535 | 6/24/98 |
| 06/25/98 | 9:45 | 2 | 30.05 | 103 | 81 | 240 | 0.73 | 0 | -11.3 | 228 | -18.3 | -14.6 | -13.7 | -12.4 | 58253 | 3925 | 535 | 6/25/98 |
| 06/25/98 | 14:30 | 2 | 30.06 | 114 | 91 | 247 | 0.74 | 0 | -11 | 239 | -18.1 | -14.4 | -13.5 | -12.4 | 58276 | 3960 | 540 | 6/25/98 |
| 06/26/98 | 14:00 | 2 | 29.95 | 113 | 89 | 248 | 0.72 | 0 | -11.1 | 242 | -18.2 | -14.5 | -13.5 | -12.2 | 58324 | 3960 | 540 | 6/26/98 |
| 06/29/98 | 7:00 | 2 | 30.01 | 96 | 72 | 237 | 0.7 | 0 | -11.5 | 220 | -18.4 | -14.6 | -13.7 | -12.25 | 58441 | 3850 | 525 | 6/29/98 |
| 06/29/98 | 10:38 | 2 | 29.98 | 102 | 79 | 240 | 0.7 | 0 | -11.25 | 229 | -18.25 | -14.5 | -13.5 | -12.4 | 58465 | 3850 | 525 | 6/29/98 |
| 06/30/98 | 13:25 | 2 | 29.71 | 104 | 78 | 240 | 0.73 | 0 | -11 | 232 | -18 | -14.4 | -13.5 | -12.4 | 58489 | 3950 | 539 | 6/30/98 |
| 07/01/98 | 15:30 | 2 | 29.96 | 100 | 80 | 240 | 0.7 | 0 | -11 | 230 | -18 | -14.5 | -13.5 | -12 | 58495 | 3875 | 528 | 7/1/98 |
| 07/02/98 | 15:45 | 2 | 30.01 | 104 | 79 | 238 | 0.75 | 0 | -11 | 232 | -18 | -14.5 | -13.5 | -12.5 | 58510 | 4000 | 545 | 7/2/98 |
| 07/06/98 | 6:15 | 2 | 30.1 | 87 | 61 | 210 | 0.85 | 0 | -11.2 | 220 | -16.5 | -13.5 | -12.5 | -11.2 | 58620 | 4150 | 566 | 7/6/98 |
| 07/07/98 | 9:30 | 2 | 30.03 | 98 | 73 | 208 | 0.9 | 0 | -11 | 225 | -16.5 | -13.5 | -12.5 | -11.3 | 58620 | 4280 | 584 | 7/7/98 |
| 07/07/98 | 15:30 | 2 | 29.96 | 102 | 81 | 236 | 0.75 | 0 | -11 | 234 | -18 | -14.2 | -13.5 | -12 | 58620 | 4000 | 545 | 7/7/98 |
| 07/08/98 | 8:20 | 2 | 29.94 | 99 | 74 | 232 | 0.75 | 0 | -11 | 226 | -18 | -14.4 | -13.4 | -12 | 58620 | 3950 | 539 | 7/8/98 |
| 07/08/98 | 15:00 | 2 | 29.95 | 108 | 84 | 240 | 0.75 | 0 | -10.8 | 236 | -18 | -14.2 | -13.3 | -12 | 58620 | 4000 | 545 | 7/8/98 |
| 07/09/98 | 7:50 | 2 | 29.98 | 92 | 71 | 230 | 0.75 | 0 | -11.3 | 222 | -18 | -14.4 | -13.4 | -12 | 58620 | 3960 | 540 | 7/9/98 |
| 07/09/98 | 15:25 | 2 | 30.01 | 107 | 84 | 240 | 0.75 | 0 | -11 | 236 | -18 | -14.3 | -13.3 | -12 | 58620 | 4000 | 545 | 7/9/98 |
| 07/13/98 | 8:10 | 2 | 30.03 | 86 | 66 | 225 | 0.73 | 0 | -11.5 | 212 | -18.1 | -14 | -13.2 | -12 | 58620 | 3800 | 518 | 7/13/98 |
| 07/13/98 | 14:15 | 2 | 30.02 | 109 | 83 | 241 | 0.75 | 0 | -11 | 236 | -18 | -14 | -13 | -11.7 | 58620 | 3975 | 542 | 7/13/98 |
| 07/14/98 | 8:00 | 2 | 30.11 | 95 | 71 | 232 | 0.74 | 0 | -11.3 | 220 | -18.1 | -14 | -13 | -11.8 | 58620 | 3950 | 539 | 7/14/98 |
| 07/14/98 | 14:30 | 2 | 30.11 | 98 | 73 | 235 | 0.75 | 0 | -11.3 | 223 | -18.1 | -14 | -13.1 | -11.8 | 58620 | 3975 | 542 | 7/14/98 |
| 07/15/98 | 8:10 | 2 | 30.09 | 96 | 72 | 235 | 0.72 | 0 | -11.3 | 221 | -18.1 | -14 | -13.1 | -11.8 | 58620 | 3900 | 532 | 7/15/98 |
| 07/15/98 | 14:20 | 2 | 30.07 | 99 | 75 | 236 | 0.74 | 0 | -11.3 | 225 | -18.1 | -13.8 | -13 | -11.8 | 58620 | 3960 | 540 | 7/15/98 |
| 07/16/98 | 8:05 | 2 | 30.04 | 95 | 71 | 235 | 0.72 | 0 | -11.4 | 222 | -18.2 | -13.8 | -13 | -11.8 | 58620 | 3900 | 532 | 7/16/98 |
| 07/16/98 | 14:15 | 2 | 30.02 | 107 | 82 | 242 | 0.74 | 0 | -11.1 | 234 | -18.1 | -13.6 | -12.8 | -11.9 | 58620 | 3950 | 539 | 7/16/98 |
| 07/20/98 | 6:45 | 2 | 30.03 | 94 | 69 | 240 | 0.67 | 0 | -12 | 220 | -18.75 | -13 | -12.2 | -11 | 58755 | 3775 | 515 | 7/20/98 |
| 07/21/98 | 5:40 | 2 | 30.05 | 98 | 73 | 244 | 0.69 | 0 | -11.75 | 229 | -18.75 | -12.4 | -11.6 | -10.5 | 58755 | 3825 | 522 | 7/21/98 |
| 07/21/98 | 15:33 | 2 | 30.04 | 116 | 92 | 246 | 0.76 | 0 | -10.6 | 244 | -18.1 | -11.5 | -10.6 | -9.4 | 58755 | 4025 | 549 | 7/21/98 |
| 07/22/98 | 7:30 | 2 | 30.11 | 98 | 72 | 234 | 0.75 | 0 | -11.1 | 227 | -18.1 | -11.5 | -10.6 | -9.3 | 58755 | 3975 | 542 | 7/22/98 |
| 07/22/98 | 15:26 | 2 | 30.02 | 113 | 86 | 244 | 0.75 | 0 | -10.75 | 242 | -18 | -11.5 | -10.6 | -9.3 | 58755 | 4000 | 545 | 7/22/98 |
| 07/27/98 | 6:00 | 2 | 30.05 | 84 | 60 | 220 | 0.75 | 0 | -11.1 | 211 | -18 | -12.6 | -11.7 | -10.4 | 59451 | 3925 | 535 | 7/27/98 |
| 07/28/98 | 7:11 | 2 | 30.01 | 87 | 63 | 220 | 0.76 | 0 | -10.75 | 212 | -17.8 | -12.6 | -11.7 | -10.5 | 59498 | 3950 | 539 | 7/28/98 |
| 07/28/98 | 13:30 | 2 | 30.01 | 106 | 80 | 234 | 0.76 | 0 | -10.6 | 233 | -17.9 | -12.6 | -11.6 | -10.2 | 59498 | 4000 | 545 | 7/28/98 |
| 07/29/98 | 14:45 | 2 | 29.94 | 111 | 86 | 237 | 0.8 | 0 | -10.3 | 239 | -17.6 | -11.8 | -11 | -10 | 59521 | 4100 | 559 | 7/29/98 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07/30/98 | [illegible] | [illegible] | 29.98 | 92 | 69 | 224 | 0.8 | 0 | [illegible] | 220 | -17.7 | -12.1 | -11.3 | -10 | 59521 | 4075 | [illegible] | 7/30/98 |
| 07/30/98 | 14:40 | 2 | 29.97 | 101 | 78 | 231 | 0.77 | 0 | -10.6 | 228 | -17.7 | -12.1 | -11.2 | -9.7 | 59521 | 4100 | [illegible] | 7/30/98 |
| 08/03/98 | 7:15 | 2 | 30.19 | 88 | 65 | 218 | 0.8 | 0 | -10.7 | 214 | -17.6 | -13 | -11.9 | -10.3 | 59544 | 4045 | 552 | 8/3/98 |
| 08/04/98 | 7:25 | 2 | 30.15 | 93 | 69 | 221 | 8 | 0 | -10.5 | 218 | -17.6 | -12.7 | -11.6 | -10.1 | 59544 | 4050 | 552 | 8/4/98 |
| 08/04/98 | 15:00 | 2 | 30.17 | 100 | 78 | 223 | 0.83 | 0 | -10 | 226 | -17.5 | -12.5 | -11.6 | -10.2 | 59544 | 4175 | 569 | 8/4/98 |
| 08/05/98 | 7:45 | 2 | 30.14 | 94 | 72 | 220 | 0.82 | 0 | -10.4 | 219 | -17.6 | -12.2 | -11.5 | -10 | 59544 | 4090 | 558 | 8/5/98 |
| 08/05/98 | 8:28 | 2 | 30.14 | 95 | 72 | 232 | 0.73 | 0 | -11.4 | 221 | -18.3 | -13.4 | -12.4 | -11 | 59544 | 3925 | 535 | 8/5/98 |
| 08/05/98 | 14:15 | 2 | 30.15 | 104 | 81 | 246 | 0.72 | 0 | -11.6 | 232 | -18.6 | -12.3 | -11.4 | -10.1 | 59544 | 3926 | 535 | 8/5/98 |
| 08/05/98 | 15:10 | 2 | 30.13 | 108 | 83 | 243 | 0.75 | 0 | -11 | 233 | -18.2 | -11.7 | -10.8 | -9.5 | 59544 | 3975 | 542 | 8/5/98 |
| 08/06/98 | 7:40 | 2 | 30.07 | 94 | 72 | 237 | 0.7 | 0 | -11.6 | 220 | -18.5 | -11.4 | -10.3 | -9.1 | 59544 | 3850 | 525 | 8/6/98 |
| 08/06/98 | 14:25 | 2 | 30.05 | 107 | 87 | 247 | 0.72 | 0 | -11.5 | 233 | -18.5 | -11.1 | -10.1 | -9 | 59544 | 3940 | 537 | 8/6/98 |
| 08/10/98 | 8:10 | 2 | 30.02 | 94 | 71 | 237 | 0.7 | 0 | -11.6 | 222 | -18.5 | -11.6 | -10.7 | -9.6 | 59717 | 3850 | 525 | 8/10/98 |
| 08/10/98 | 14:30 | 2 | 29.97 | 101 | 83 | 242 | 0.7 | 0 | -11.5 | 218 | -18.5 | -11.5 | -10.5 | -9.2 | 59717 | 3875 | 528 | 8/10/98 |
| 08/11/98 | 7:45 | 2 | 29.98 | 92 | 68 | 237 | 0.68 | 0 | -11.8 | 217 | -18.6 | -11.3 | -10.4 | -9.1 | 59741 | 3800 | 518 | 8/11/98 |
| 08/11/98 | 14:25 | 2 | 30.03 | 102 | 80 | 245 | 0.68 | 0 | -11.7 | 227 | -18.6 | -11.3 | -10.2 | -9.1 | 59741 | 3800 | 518 | 8/11/98 |
| 08/12/98 | 7:45 | 2 | 30.15 | 88 | 64 | 237 | 0.67 | 0 | -12.1 | 214 | -18.8 | -11.4 | -10.4 | -9 | 59741 | 3750 | 511 | 8/12/98 |
| 08/12/98 | 14:25 | 2 | 30.19 | 101 | 76 | 244 | 0.69 | 0 | -11.7 | 227 | -18.6 | -11.4 | -10.4 | -9.1 | 59741 | 3890 | 530 | 8/12/98 |
| 08/13/98 | 7:35 | 2 | 30.16 | 87 | 62 | 233 | 0.69 | 0 | -11.8 | 212 | -18.6 | -11.4 | -10.5 | -9.4 | 59765 | 3840 | 524 | 8/13/98 |
| 08/13/98 | 14:32 | 2 | 30.11 | 92 | 80 | 243 | 0.7 | 0 | -11.5 | 228 | -18.5 | -11.5 | -10.6 | -9.4 | 59765 | 3850 | 525 | 8/13/98 |
| 08/17/98 | 8:30 | 2 | 30.06 | 93 | 71 | 241 | 0.68 | 0 | -12.1 | 220 | -18.7 | -11.2 | -10.2 | -9.1 | 59799 | 3800 | 518 | 8/17/98 |
| 08/17/98 | 14:15 | 2 | 30.09 | 108 | 85 | 253 | 0.7 | 0 | -11.7 | 235 | -18.7 | -11.1 | -10.1 | -8.9 | 59799 | 3900 | 532 | 8/17/98 |
| 08/18/98 | 6:50 | 2 | 30.09 | 93 | 71 | 246 | 0.67 | 0 | -12.2 | 222 | -18.9 | -10.9 | -9.9 | -8.8 | 59799 | 3780 | 515 | 8/18/98 |
| 08/18/98 | 14:25 | 2 | 30.13 | 106 | 83 | 254 | 0.68 | 0 | -12.1 | 234 | -18.9 | -10.8 | -9.8 | -8.6 | 59799 | 3850 | 525 | 8/18/98 |
| 08/19/98 | 6:45 | 2 | 30.25 | 84 | 54 | 240 | 0.64 | 0 | -12.6 | 212 | -19.2 | -10.8 | -9.8 | -8.6 | 59799 | 3675 | 501 | 8/19/98 |
| 08/19/98 | 14:10 | 2 | 30.26 | 101 | 74 | 238 | 0.73 | 0 | -11.4 | 228 | -18.4 | -11.8 | -10.8 | -9.6 | 59799 | 3910 | 533 | 8/19/98 |
| 08/20/98 | 7:40 | 2 | 30.29 | 82 | 56 | 226 | 0.7 | 0 | -11.9 | 208 | -18.5 | -11.7 | -10.8 | -9.4 | 59799 | 3800 | 518 | 8/20/98 |
| 08/20/98 | 15:00 | 2 | 30.28 | 107 | 80 | 240 | 0.75 | 0 | -10.9 | 235 | -18.1 | -12.1 | -11.1 | -9.8 | 59799 | 3980 | 543 | 8/20/98 |
| 08/24/98 | 7:20 | 2 | 29.89 | 93 | 71 | 233 | 0.73 | 0 | -11.2 | 223 | -17.9 | -12.1 | -11.1 | -9.7 | 59799 | 3925 | 535 | 8/24/98 |
| 08/24/98 | 14:40 | 2 | 29.87 | 112 | 90 | 245 | 0.74 | 0 | -10.7 | 241 | -17.9 | -11.9 | -10.9 | -9.7 | 59799 | 3990 | 544 | 8/24/98 |
| 08/25/98 | 8:00 | 2 | 29.87 | 93 | 72 | 234 | 0.72 | 0 | -11.4 | 221 | -18.1 | -11.8 | -10.9 | -9.6 | 59799 | 3900 | 532 | 8/25/98 |
| 08/31/98 | 7:00 | 2 | 30.05 | 85 | 58 | 240 | 0.63 | 0 | -12.4 | 212 | -18.9 | -9.8 | -9 | -8.1 | 59799 | 3650 | 498 | 8/31/98 |
| 08/31/98 | 9:25 | 2 | 30.07 | 90 | 60 | 206 | 0.86 | 0 | -9.8 | 208 | -17.1 | -17.4 | -16.6 | -14.8 | 59799 | 4175 | 569 | 8/31/98 |
| 08/31/98 | 14:40 | 2 | 30.08 | 104 | 78 | 228 | 0.8 | 0 | -10.3 | 226 | -17.6 | -18 | -17.2 | -15.5 | 59799 | 4090 | 558 | 8/31/98 |
| 09/01/98 | 7:35 | 2 | 30.01 | 82 | 57 | 208 | 0.82 | 0 | -10.3 | 202 | -18.7 | -19 | -18 | -15.9 | 59799 | 4075 | 556 | 9/1/98 |
| 09/01/98 | 9:25 | 2 | 30.01 | 86 | 66 | 210 | 0.8 | 0 | -10.6 | 196 | -18.5 | -18.7 | -17.8 | -15.9 | 59799 | 4040 | 551 | 9/1/98 |
| 09/01/98 | 14:40 | 2 | 29.97 | 106 | 78 | 230 | 0.8 | 0 | -10.1 | 240 | -18.2 | -18.5 | -17.7 | -16.2 | 59799 | 4100 | 559 | 9/1/98 |
| 09/02/98 | 7:45 | 2 | 29.82 | 84 | 60 | 214 | 0.8 | 0 | -10.4 | 216 | -18.2 | -18.5 | -17.7 | -16 | 59799 | 4050 | 552 | 9/2/98 |
| 09/03/98 | 7:55 | 2 | 29.9 | 80 | 52 | 212 | 0.8 | 0 | -10.6 | 210 | -18.1 | -18.5 | -17.7 | -16 | 59799 | 4050 | 552 | 9/3/98 |
| 09/03/98 | 14:20 | 2 | 29.85 | 108 | 81 | 232 | 0.8 | 0 | -10 | 242 | -18.1 | -18.4 | -17.6 | -16 | 59799 | 4100 | 559 | 9/3/98 |
| 09/08/98 | 7:45 | 2 | 29.91 | 81 | 51 | 208 | 0.82 | 0 | -10.2 | 210 | -17.8 | -18.2 | -17.4 | -15.6 | 59799 | 4090 | 558 | 9/8/98 |
| 09/08/98 | 15:45 | 2 | 29.93 | 98 | 68 | 222 | 0.82 | 0 | -10.1 | 230 | -17.9 | -18.2 | -17.4 | -15.7 | 59799 | 4125 | 562 | 9/8/98 |
| 09/09/98 | 7:55 | 2 | 30.13 | 76 | 47 | 204 | 0.82 | 0 | -10.6 | 204 | -18 | -18.4 | -17.6 | -15.8 | 59799 | 4050 | 552 | 9/9/98 |
| 09/09/98 | 14:10 | 2 | 30.16 | 97 | 69 | 219 | 0.85 | 0 | -10.1 | 228 | -17.9 | -18.3 | -17.4 | -15.6 | 59799 | 4175 | 569 | 9/9/98 |
| 09/10/98 | 7:50 | 2 | 30.25 | 77 | 49 | 204 | 0.82 | 0 | -10.6 | 206 | -17.9 | -18.4 | -17.6 | -15.8 | 59799 | 4050 | 552 | 9/10/98 |
| 09/10/98 | 14:10 | 2 | 30.23 | 102 | 74 | 224 | 0.84 | 0 | -10 | 233 | -17.9 | -18.3 | -17.4 | -15.6 | 59799 | 4150 | 566 | 9/10/98 |
| 09/14/98 | 7:55 | 2 | 30.01 | 88 | 67 | 214 | 0.83 | 0 | -10.2 | 218 | -17.6 | -18.3 | -17.4 | -15.5 | 59799 | 4115 | 561 | 9/14/98 |
| 09/14/98 | 15:00 | 2 | 29.97 | 119 | 93 | 237 | 0.86 | 0 | -9.6 | 252 | -17.6 | -18 | -17.1 | -15.2 | 59799 | 4260 | 581 | 9/14/98 |
| 09/15/98 | 8:00 | 2 | 30.04 | 94 | 72 | 218 | 0.83 | 0 | -10.1 | 224 | -17.8 | -18.2 | -17.4 | -15.4 | 59799 | 4100 | 559 | 9/15/98 |
| 09/15/98 | 14:45 | 2 | 30.07 | 110 | 80 | 230 | 0.85 | 0 | -9.8 | 242 | -17.7 | -18.1 | -17.3 | -15.3 | 59799 | 4225 | 576 | 9/15/98 |
| 09/16/98 | 7:30 | 2 | 30.13 | 93 | 69 | 218 | 0.84 | 0 | -10.2 | 223 | -17.8 | -18.3 | -17.4 | -15.4 | 59799 | 4150 | 566 | 9/16/98 |
| 09/16/98 | 14:15 | 2 | 30.12 | 108 | 78 | 228 | 0.85 | 0 | -9.9 | 240 | -17.8 | -18.1 | -17.3 | -15.3 | 59799 | 4225 | 576 | 9/16/98 |
| 09/17/98 | 7:45 | 2 | 30.11 | 94 | 65 | 220 | 0.84 | 0 | -10.1 | 224 | -17.7 | -18.3 | -17.4 | -15.4 | 59799 | 4150 | 566 | 9/17/98 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09/17/98 | Sepa | [illegible] | s | 30.1 | 102 | 76 | 224 | 0.85 | 0 | Z2P | [illegible] | S233 | -17.8 | -18.2 | -17.4 | -15.3 | 59799 | 4175 | Pag | [illegible] | 16 9/17/98 |
| 09/21/98 | 7:20 | 2 | 29.9 | 93 | 66 | 219 | 0.83 | 0 | -10.1 | | 224 | -17.7 | -18.1 | -17.3 | -15.2 | 59799 | 4125 | [illegible] | 9/21/98 |
| 09/21/98 | 14:10 | 2 | 29.91 | 110 | 80 | 230 | 0.84 | 0 | -9.9 | | 242 | -17.6 | -18 | -17.2 | -15.1 | 59799 | 4200 | 573 | 9/21/98 |
| 09/22/98 | 7:20 | 2 | 29.92 | 89 | 62 | 214 | 0.83 | 0 | -10.1 | | 218 | -17.6 | -18.1 | -17.3 | -15.5 | 59799 | 4140 | 565 | 9/22/98 |
| 09/22/98 | 14:30 | 2 | 30.01 | 100 | 74 | 220 | 0.84 | 0 | -9.9 | | 229 | -17.7 | -18.1 | -17.3 | -15.5 | 59799 | 4150 | 566 | 9/22/98 |
| 09/23/98 | 7:40 | 2 | 30.21 | 78 | 47 | 206 | 0.83 | 0 | -10.4 | | 205 | -17.9 | -18.4 | -17.5 | -15.7 | 59799 | 4075 | 556 | 9/23/98 |
| 09/23/98 | 15:20 | 2 | 30.21 | 94 | 66 | 216 | 0.84 | 0 | -10.1 | | 222 | -17.8 | -18.3 | -17.4 | -15.6 | 59799 | 4140 | 565 | 9/23/98 |
| 09/24/98 | 7:10 | 2 | 30.13 | 74 | 46 | 202 | 0.82 | 0 | -10.4 | | 202 | -17.8 | -18.3 | -17.5 | -15.6 | 59799 | 4025 | 549 | 9/24/98 |
| 09/24/98 | 15:45 | 2 | 30.05 | 95 | 73 | 218 | 0.85 | 0 | -10 | | 224 | -17.7 | -18.1 | -17.3 | -15.5 | 59799 | 4200 | 573 | 9/24/98 |
| 09/28/98 | 7:10 | 2 | 30.04 | 86 | 58 | 212 | 0.84 | 0 | -10.2 | | 216 | -17.7 | -18.2 | -17.4 | -15.3 | 59799 | 4140 | 565 | 9/28/98 |
| 09/28/98 | 14:10 | 2 | 30.06 | 101 | 73 | 224 | 0.85 | 0 | -9.9 | | 232 | -17.7 | -18.1 | -17.3 | -15.2 | 59799 | 4200 | 573 | 9/28/98 |
| 09/29/98 | 7:05 | 2 | 30.02 | 84 | 54 | 212 | 0.83 | 0 | -10.3 | | 212 | -17.7 | -18.3 | -17.4 | -15.3 | 59799 | 4115 | 561 | 9/29/98 |
| 09/29/98 | 14:10 | 2 | 29.94 | 106 | 81 | 228 | 0.85 | 0 | -9.8 | | 238 | -17.6 | -18.1 | -17.2 | -15.2 | 59799 | 4225 | 576 | 9/29/98 |
| 09/30/98 | 8:10 | 2 | 29.93 | 83 | 57 | 210 | 0.82 | 0 | -10.2 | | 212 | -17.7 | -18.2 | -17.4 | -15.3 | 59799 | 4100 | 559 | 9/30/98 |
| 09/30/98 | 14:10 | 2 | 29.9 | 105 | 77 | 226 | 0.85 | 0 | -9.8 | | 234 | -17.6 | -18 | -17.2 | -15.2 | 59799 | 4225 | 576 | 9/30/98 |
| 10/01/98 | 8:10 | 2 | 30.07 | 82 | 51 | 210 | 0.82 | 0 | -10.3 | | 210 | -17.7 | -18.3 | -17.5 | -15.4 | 59799 | 4075 | 556 | 10/1/98 |
| 10/01/98 | 14:00 | 2 | 30.13 | 90 | 61 | 215 | 0.85 | 0 | -10.2 | | 219 | -17.9 | -18.3 | -17.5 | -15.4 | 59799 | 4160 | 567 | 10/1/98 |
| 10/05/98 | 7:10 | 2 | 30.18 | 80 | 55 | 208 | 0.85 | 0 | -10.6 | | 198 | -17.8 | -18.2 | -17.4 | -15.6 | 59827 | 4150 | 566 | 10/5/98 |
| 10/05/98 | 14:10 | 2 | 30.18 | 93 | 70 | 216 | 0.85 | 0 | -10.3 | | 212 | -17.7 | -18.1 | -17.3 | -15.5 | 59827 | 4165 | 568 | 10/5/98 |
| 10/06/98 | 6:50 | 2 | 30.14 | 86 | 64 | 214 | 0.86 | 0 | -10.4 | | 206 | -17.6 | -18.1 | -17.3 | -15.6 | 59827 | 4190 | 571 | 10/6/98 |
| 10/06/98 | 13:15 | 2 | 30.12 | 100 | 81 | 222 | 0.86 | 0 | -10.1 | | 220 | -17.6 | -18 | -17.2 | -15.4 | 59827 | 4200 | 573 | 10/6/98 |
| 10/07/98 | 6:55 | 2 | 30.05 | 90 | 67 | 217 | 0.84 | 0 | -10.3 | | 210 | -17.6 | -18 | -17.3 | -15.4 | 59827 | 4150 | 566 | 10/7/98 |
| 10/07/98 | 14:15 | 2 | 30.01 | 90 | 57 | 216 | 0.84 | 0 | -10.3 | | 209 | -17.6 | -18 | -17.2 | -15.4 | 59831 | 4150 | 566 | 10/7/98 |
| 10/08/98 | 14:20 | 2 | 30.17 | 82 | 57 | 212 | 0.82 | 0 | -10.8 | | 202 | -18 | -18.4 | -17.5 | -15.3 | 60383 | 4075 | 556 | 10/8/98 |
| 10/09/98 | 10:30 | 2 | 30.21 | 78 | 48 | 204 | 0.85 | 0 | -10.4 | | 199 | -18.4 | -18.7 | -17.6 | -15.7 | 60407 | 4100 | 559 | 10/9/98 |
| 10/12/98 | 6:45 | 2 | 30.2 | 72 | 46 | 198 | 0.86 | 0 | -10.4 | | 192 | -18.7 | -19 | -17.9 | -15.9 | 60406 | 4125 | 562 | 10/12/98 |
| 10/12/98 | 16:30 | 2 | 30.14 | 98 | 72 | 216 | 0.9 | 0 | -9.8 | | 224 | -18.4 | -18.6 | -17.5 | -15.8 | 60434 | 4300 | 586 | 10/12/98 |
| 10/15/98 | 15:40 | 2 | 30.23 | 87 | 61 | 214 | 0.8 | 0 | -10.2 | | 218 | -18.1 | -18.5 | -17.6 | -15.8 | 60434 | 4050 | 552 | 10/15/98 |
| 10/19/98 | 8:10 | 2 | 30.23 | 74 | 43 | 198 | 0.82 | 0 | -10.3 | | 202 | -18.2 | -18.6 | -17.7 | -15.5 | 60685 | 4050 | 552 | 10/19/98 |
| 10/19/98 | 14:00 | 2 | 30.23 | 84 | 59 | 206 | 0.84 | 0 | -10.1 | | 214 | -18.5 | -18.9 | -17.8 | -15.7 | 60685 | 4100 | 559 | 10/19/98 |
| 10/20/98 | 7:10 | 2 | 30.28 | 72 | 45 | 200 | 0.83 | 0 | -10.3 | | 204 | -18.5 | -19 | -17.8 | -15.7 | 60685 | 4050 | 552 | 10/20/98 |
| 10/20/98 | 14:10 | 2 | 30.28 | 90 | 59 | 210 | 0.85 | 0 | -9.9 | | 220 | -18.5 | -18.9 | -17.8 | -15.8 | 60685 | 4150 | 566 | 10/20/98 |
| 10/21/98 | 9:10 | 2 | 30.23 | 74 | 44 | 198 | 0.83 | 0 | -10.2 | | 202 | -18.6 | -19 | -17.8 | -15.7 | 60685 | 4050 | 552 | 10/21/98 |
| 10/21/98 | 15:40 | 2 | 30.14 | 84 | 56 | 206 | 0.84 | 0 | -10 | | 210 | -18.6 | -19 | -17.8 | -15.7 | 60685 | 4125 | 562 | 10/21/98 |
| 11/05/98 | 22:00 | 2 | 30.1 | 66 | 38 | 190 | 0.77 | 0 | -11.25 | | 185 | -17.5 | -16.25 | -15.4 | -14 | 60686 | 3900 | 532 | 11/5/98 |
| 11/06/98 | 9:40 | 2 | 30.21 | 68 | 43 | 191 | 0.79 | 0 | -11.1 | | 190 | -17.4 | -16.1 | -15.25 | -13.9 | 60686 | 3950 | 539 | 11/6/98 |
| 11/07/98 | 11:20 | 2 | 30.43 | 70 | 39 | 189 | 0.82 | 0 | -10.9 | | 189 | -17.4 | -16.1 | -15.25 | -13.9 | 60686 | 4000 | 545 | 11/7/98 |
| 11/08/98 | 16:50 | 2 | 30.19 | 73 | 44 | 192 | 0.82 | 0 | -10.75 | | 192 | -17.3 | -16 | -15.1 | -13.75 | 60686 | 4000 | 545 | 11/8/98 |
| 11/09/98 | 6:50 | 2 | 30.25 | 68 | 41 | 192 | 0.8 | 0 | -10.9 | | 188 | -17.4 | -16 | -15.2 | -13.8 | 60686 | 3950 | 539 | 11/9/98 |
| 11/09/98 | 14:00 | 2 | 30.16 | 76 | 51 | 196 | 0.82 | 0 | -10.8 | | 196 | -17.4 | -15.9 | -15.1 | -13.7 | 60686 | 4025 | 549 | 11/9/98 |
| 11/10/98 | 6:40 | 2 | 29.79 | 82 | 61 | 198 | 0.82 | 0 | -10.4 | | 202 | -17 | -15.7 | -14.9 | -13.4 | 60686 | 4050 | 552 | 11/10/98 |
| 11/10/98 | 14:25 | 2 | 29.59 | 83 | 57 | 202 | 0.82 | 0 | -10.4 | | 204 | -17 | -15.7 | -14.9 | -13.3 | 60686 | 4100 | 559 | 11/10/98 |
| 11/11/98 | 7:00 | 2 | 30.06 | 70 | 38 | 198 | 0.8 | 0 | -11 | | 194 | -17.4 | -16.2 | -15.3 | -13.6 | 61086 | 4000 | 545 | 11/11/98 |
| 11/11/98 | 14:15 | 2 | 30.23 | 78 | 47 | 198 | 0.82 | 0 | -10.8 | | 198 | -17.4 | -16.1 | -15.2 | -13.8 | 61086 | 4025 | 549 | 11/11/98 |
| 11/12/98 | 7:00 | 2 | 30.45 | 64 | 33 | 190 | 0.82 | 0 | -10.9 | | 188 | -17.4 | -16.2 | -15.3 | -13.8 | 61086 | 4000 | 545 | 11/12/98 |
| 11/12/98 | 13:50 | 2 | 30.39 | 78 | 51 | 198 | 0.82 | 0 | -10.8 | | 198 | -17.4 | -16.1 | -15.3 | -13.7 | 61086 | 4025 | 549 | 11/12/98 |
| 11/16/98 | 7:15 | 2 | 29.9 | 60 | 36 | 188 | 0.77 | 0 | -11.2 | | 178 | -17.4 | -16.1 | -15.1 | -13.5 | 61086 | 3900 | 532 | 11/16/98 |
| 11/16/98 | 13:30 | 2 | 29.8 | 78 | 53 | 200 | 0.78 | 0 | -10.8 | | 196 | -17.2 | -15.9 | -14.9 | -13.2 | 61086 | 3975 | 542 | 11/16/98 |
| 11/17/98 | 7:10 | 2 | 29.99 | 70 | 44 | 196 | 0.78 | 0 | -11.1 | | 188 | -17.4 | -16.1 | -15.1 | -13.4 | 61086 | 3950 | 539 | 11/17/98 |
| 11/17/98 | 14:00 | 2 | 30.14 | 74 | 48 | 198 | 0.8 | 0 | -11.1 | | 192 | -17.5 | -16.1 | -15.1 | -13.4 | 61086 | 4000 | 545 | 11/17/98 |
| 11/18/98 | 7:20 | 2 | 30.32 | 58 | 32 | 188 | 0.77 | 0 | -11.4 | | 174 | -17.7 | -16.4 | -15.3 | -13.5 | 61086 | 3875 | 528 | 11/18/98 |
| 11/18/98 | 14:25 | 2 | 30.19 | 80 | 54 | 200 | 0.8 | 0 | -11 | | 196 | -17.6 | -16.2 | -15.1 | -13.4 | 61086 | 4000 | 545 | 11/18/98 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/19/98 | Sveps | | JS | 30 | 76 | 54 | 199 | 0.78 | 0 | Z2F | IS | 192 | -17.5 | -16.1 | -15 | -13.4 | 61086 | 3950 | Pa | 16 | 11/19/98 |
| 11/19/98 | 13:45 | 2 | | 29.98 | 80 | 61 | 202 | 0.8 | 0 | -10.9 | | 197 | -17.4 | -16.1 | -15 | -13.3 | 61086 | 4025 | | | 11/19/98 |
| 11/20/98 | 10:30 | 2 | | 30.04 | 80 | 38 | 201 | 0.78 | 0 | | | | | | | | 61086 | 3950 | 539 | | 11/20/98 |
| 11/23/98 | 8:50 | 2 | | 30.03 | 70 | 48 | 195 | 0.82 | 0 | -11.1 | | 184 | -17.6 | -16.2 | -15 | -13.4 | 61086 | 4050 | 552 | | 11/23/98 |
| 11/23/98 | 13:50 | 2 | | 30.01 | 80 | 58 | 200 | 0.83 | 0 | -10.9 | | 196 | -17.5 | -16.1 | -15 | -13.3 | 61086 | 4075 | 556 | | 11/23/98 |
| 11/24/98 | 6:20 | 2 | | 30.24 | 67 | 39 | 196 | 0.8 | 0 | -11.1 | | 190 | -17.6 | -16.2 | -15.1 | -13.5 | 61086 | 3975 | 542 | | 11/24/98 |
| 11/24/98 | 16:10 | 2 | | 30.22 | 76 | 56 | 210 | 0.75 | 0 | -11.8 | | 200 | -17.9 | -14.6 | -13.6 | -12.3 | 61093 | 3900 | 532 | | 11/24/98 |
| 11/25/98 | 6:20 | 2 | | 30.04 | 68 | 37 | 206 | 0.75 | 0 | -11.6 | | 194 | -17.9 | -14.5 | -13.6 | -12.4 | 61093 | 3900 | 532 | | 11/25/98 |
| 11/25/98 | 14:15 | 2 | | 29.84 | 77 | 54 | 210 | 0.75 | 0 | -11.6 | | 200 | -17.8 | -14.4 | -13.6 | -12.3 | 61093 | 3900 | 532 | | 11/25/98 |
| 11/30/98 | 6:50 | 2 | | 30 | 78 | 58 | 216 | 0.7 | 0 | -12.1 | | 200 | -18.3 | -13.7 | -12.9 | -11.6 | 61233 | 3800 | 518 | | 11/30/98 |
| 11/30/98 | 14:00 | 2 | | 29.92 | 88 | 66 | 224 | 0.72 | 0 | -11.9 | | 210 | -18.2 | -13.6 | -12.8 | -11.5 | 61233 | 3850 | 525 | | 11/30/98 |
| 12/01/98 | 7:15 | 2 | | 30.31 | 64 | 40 | 210 | 0.7 | 0 | -12.4 | | 186 | -18.5 | -13.8 | -12.9 | -11.6 | 61233 | 3750 | 511 | | 12/1/98 |
| 12/01/98 | 13:20 | 2 | | 30.4 | 78 | 50 | 216 | 0.72 | 0 | -12.3 | | 196 | -18.5 | -13.8 | -12.9 | -11.5 | 61233 | 3825 | 522 | | 12/1/98 |
| 12/02/98 | 7:00 | 2 | | 30.24 | 66 | 41 | 212 | 0.7 | 0 | -12.6 | | 190 | -18.6 | -13.7 | -12.7 | -11.5 | 61233 | 3775 | 515 | | 12/2/98 |
| 12/02/98 | 14:20 | 2 | | 30.09 | 85 | 61 | 222 | 0.72 | 0 | -12.2 | | 206 | -18.4 | -13.6 | -12.6 | -11.3 | 61233 | 3850 | 525 | | 12/2/98 |
| 12/03/98 | 6:15 | 2 | | 29.96 | 76 | 54 | 216 | 0.68 | 0 | -12.3 | | 196 | -18.4 | -13.5 | -12.5 | -11.2 | 61233 | 3750 | 511 | | 12/3/98 |
| 12/03/98 | 13:20 | 2 | | 29.96 | 85 | 62 | 223 | 0.7 | 0 | -12.1 | | 206 | -18.4 | -13.4 | -12.4 | -11.1 | 61233 | 3800 | 518 | | 12/3/98 |
| 12/07/98 | 7:00 | 2 | | 29.96 | 74 | 48 | 220 | 0.67 | 0 | -12.6 | | 194 | -18.6 | -12.9 | -12.1 | -11 | 61233 | 3700 | 505 | | 12/7/98 |
| 12/07/98 | 13:40 | 2 | | 30.03 | 73 | 45 | 220 | 0.66 | 0 | -12.6 | | 194 | -18.7 | -12.9 | -12.1 | -10.9 | 61233 | 3690 | 503 | | 12/7/98 |
| 12/08/98 | 7:00 | 2 | | 30.11 | 72 | 39 | 222 | 0.66 | 0 | -12.8 | | 194 | -18.8 | -13.1 | -12.1 | -10.9 | 61233 | 3700 | 505 | | 12/8/98 |
| 12/08/98 | 15:10 | 2 | | 30.14 | 70 | 41 | 218 | 0.67 | 0 | -12.8 | | 192 | -18.8 | -13.1 | -12.1 | -10.9 | 61233 | 3700 | 505 | | 12/8/98 |
| 12/09/98 | 7:05 | 2 | | 30.37 | 70 | 30 | 218 | 0.67 | 0 | -12.9 | | 192 | -19 | -13.1 | -12.1 | -10.9 | 61233 | 3700 | 505 | | 12/9/98 |
| 12/09/98 | 14:00 | 2 | | 30.41 | 72 | 45 | 220 | 0.66 | 0 | -12.9 | | 192 | -19.1 | -13.2 | -12.1 | -11 | 61233 | 3675 | 501 | | 12/9/98 |
| 12/10/98 | 7:10 | 2 | | 30.42 | 64 | 33 | 220 | 0.66 | 0 | -13.2 | | 190 | -19.1 | -13 | -11.9 | -10.8 | 61233 | 3675 | 501 | | 12/10/98 |
| 12/10/98 | 14:10 | 2 | | 30.35 | 68 | 42 | 220 | 0.65 | 0 | -13.1 | | 190 | -19.1 | -12.9 | -11.9 | -10.7 | 61233 | 3650 | 498 | | 12/10/98 |
| 12/14/98 | 7:15 | 2 | | 30.33 | 58 | 24 | 216 | 0.62 | 0 | -13.6 | | 176 | -19.3 | -12.4 | -11.4 | -10.2 | 61233 | 3550 | 484 | | 12/14/98 |
| 12/14/98 | 13:20 | 2 | | 30.35 | 68 | 41 | 224 | 0.64 | 0 | -13.4 | | 190 | -19.4 | -12.4 | -11.4 | -10.2 | 61233 | 3625 | 494 | | 12/14/98 |
| 12/15/98 | 7:00 | 2 | | 30.37 | 59 | 29 | 222 | 0.62 | 0 | -13.1 | | 184 | -19.4 | -12.4 | -11.4 | -10.2 | 61233 | 3550 | 484 | | 12/15/98 |
| 12/15/98 | 14:15 | 2 | | 30.28 | 73 | 50 | 202 | 0.78 | 0 | -11.6 | | 190 | -18.1 | -16.5 | -15.4 | -13.8 | 61233 | 3950 | 539 | | 12/15/98 |
| 12/16/98 | 7:15 | 2 | | 30.05 | 62 | 32 | 196 | 0.75 | 0 | -11.7 | | 180 | -18.1 | -16.4 | -15.3 | -13.5 | 61233 | 3850 | 525 | | 12/16/98 |
| 12/16/98 | 14:05 | 2 | | 29.93 | 68 | 40 | 196 | 0.75 | 0 | -11.6 | | 182 | -17.8 | -16.3 | -15.2 | -13.5 | 61233 | 3850 | 525 | | 12/16/98 |
| 12/17/98 | 7:15 | 2 | | 29.92 | 59 | 30 | 190 | 0.75 | 0 | -11.7 | | 174 | -17.9 | -16.3 | -15.2 | -13.4 | 61233 | 3850 | 525 | | 12/17/98 |
| 12/17/98 | 13:55 | 2 | | 29.99 | 64 | 35 | 195 | 0.76 | 0 | -11.6 | | 178 | -17.9 | -16.3 | -15.1 | -13.5 | 61233 | 3900 | 532 | | 12/17/98 |
| 12/21/98 | 6:55 | 2 | | 30.08 | 71 | 50 | 200 | 0.75 | 0 | -11.6 | | 184 | -17.9 | -16.1 | -14.9 | -13.3 | 61233 | 3875 | 528 | | 12/21/98 |
| 12/21/98 | 14:10 | 2 | | 29.9 | 75 | 55 | 232 | 0.62 | 0 | -13.4 | | 194 | -19.3 | -17.7 | -16.6 | -15.1 | 61583 | 3600 | 491 | | 12/21/98 |
| 12/22/98 | 9:45 | 2 | | 30.49 | 60 | 12 | 180 | 0.8 | 0 | -11.2 | | 176 | -17.9 | -16.1 | -15 | -13.1 | 63644 | 3900 | 532 | | 12/22/98 |
| 12/22/98 | 13:00 | 2 | | 30.51 | 63 | 13 | 184 | 0.75 | 0 | -11.7 | | 174 | -18.1 | -16.4 | -15.4 | -13.6 | 64302 | 3800 | 518 | | 12/22/98 |
| 12/23/98 | 7:00 | 2 | | 30.52 | 56 | 10 | 188 | 0.8 | 0 | -11.6 | | 180 | -17.9 | -16.1 | -15 | -13.5 | 64517 | 3925 | 535 | | 12/23/98 |
| 12/23/98 | 14:15 | 2 | | 30.5 | 58 | 15 | 189 | 0.78 | 0 | -11.4 | | 178 | -17.9 | -16.1 | -15.2 | -13.6 | 64517 | 3900 | 532 | | 12/23/98 |
| 12/30/98 | 9:50 | 2 | | 30.13 | 68 | 11 | 190 | 0.75 | 0 | -11.6 | | 176 | -18.1 | -15.9 | -14.9 | -13.5 | 64849 | 3850 | 525 | | 12/30/98 |
| 12/30/98 | 14:10 | 2 | | 30.16 | 56 | 18 | 192 | 0.75 | 0 | -11.9 | | 176 | -18.3 | -16.1 | -15.1 | -13.3 | 64849 | 3850 | 525 | | 12/30/98 |
| 01/04/99 | 9:35 | 2 | | 30.24 | 54 | 3 | 176 | 0.82 | 0 | -11.2 | | 172 | -17.7 | -15.9 | -14.4 | -12.9 | 65776 | 3950 | 539 | | 1/4/99 |
| 01/04/99 | 13:40 | 2 | | 30.25 | 52 | 5 | 182 | 0.82 | 0 | -10.9 | | 174 | -17.6 | -15.2 | -13.9 | -12.1 | 65776 | 3975 | 542 | | 1/4/99 |
| 01/05/99 | 7:40 | 2 | | 30.39 | 64 | -7 | 188 | 0.8 | 0 | -11.5 | | 174 | -18.1 | -15.9 | -14.8 | -12.9 | 65824 | 3950 | 539 | | 1/5/99 |
| 01/05/99 | 14:10 | 2 | | 30.36 | 68 | 6 | 186 | 0.8 | 0 | -11.4 | | 174 | -17.9 | -15.5 | -14.6 | -13.1 | 65848 | 3950 | 539 | | 1/5/99 |
| 01/06/99 | 7:05 | 2 | | 30.01 | 58 | 21 | 182 | 0.84 | 0 | -10.9 | | 174 | -17.4 | -14.9 | -13.8 | -11.9 | 65873 | 4050 | 552 | | 1/6/99 |
| 01/06/99 | 13:45 | 2 | | 29.94 | 58 | 30 | 180 | 0.84 | 0 | -10.8 | | 172 | -17.3 | -14.8 | -13.8 | -12.1 | 65897 | 4050 | 552 | | 1/6/99 |
| 01/07/99 | 7:10 | 2 | | 30.35 | 47 | 6 | 180 | 0.82 | 0 | -11.4 | | 166 | -17.6 | -15.2 | -14.1 | -11.9 | 65946 | 3975 | 542 | | 1/7/99 |
| 01/07/99 | 13:25 | 2 | | 30.42 | 62 | 12 | 176 | 0.88 | 0 | -10.6 | | 174 | -17.3 | -14.7 | -13.8 | -12.1 | 65979 | 4100 | 559 | | 1/7/99 |
| 01/11/99 | 6:55 | 2 | | 30.25 | 64 | 0 | 184 | 0.73 | 0 | -12.1 | | 172 | -18.5 | -15.8 | -14.9 | -13.6 | 66933 | 3750 | 511 | | 1/11/99 |
| 01/11/99 | 14:15 | 2 | | 30.02 | 52 | 15 | 182 | 0.76 | 0 | -11.6 | | 172 | -17.8 | -15.3 | -14.1 | -12.6 | 67068 | 3850 | 525 | | 1/11/99 |
| 01/12/99 | 7:05 | 2 | | 29.87 | 63 | 37 | 184 | 0.83 | 0 | -10.8 | | 176 | -17.2 | -14.5 | -13.4 | -11.9 | 67183 | 4050 | 552 | | 1/12/99 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01/12/99 | [illegible] | [illegible] | 29.89 | 67 | 42 | 189 | 0.82 | 0 | [illegible] | [illegible] | -17.2 | -14.7 | -13.5 | -11.9 | 67345 | 4025 | [illegible] | 1/12/99 |
| 01/14/99 | 14:15 | 2 | 30.11 | 66 | 14 | 196 | 0.73 | 0 | -12.1 | 172 | -18.3 | -15.9 | -14.8 | -12.9 | 70692 | 3800 | [illegible] | 1/14/99 |
| 01/18/99 | 7:40 | 2 | 29.72 | 63 | 36 | 192 | 0.72 | 0 | -11.9 | 174 | -18.2 | -15.3 | -14.2 | -11.4 | 78674 | 3800 | 518 | 1/18/99 |
| 01/18/99 | 13:55 | 2 | 29.71 | 68 | 39 | 200 | 0.74 | 0 | -11.8 | 178 | -18.1 | -15.1 | -13.9 | -11.1 | 79085 | 3875 | 528 | 1/18/99 |
| 01/19/99 | 7:10 | 2 | 30.06 | 56 | 28 | 192 | 0.74 | 0 | -11.9 | 170 | -18.1 | -14.9 | -13.9 | -12.2 | 79683 | 3825 | 522 | 1/19/99 |
| 01/19/99 | 15:30 | 2 | 30.08 | 66 | 37 | 200 | 0.75 | 0 | -11.8 | 180 | -18.1 | -14.9 | -13.8 | -11.9 | 79866 | 3875 | 528 | 1/19/99 |
| 01/20/99 | 6:35 | 2 | 30 | 60 | 33 | 199 | 0.72 | 0 | -12.2 | 172 | -18.4 | -15.2 | -14.1 | -12.5 | 80192 | 3800 | 518 | 1/20/99 |
| 01/20/99 | 13:40 | 2 | 29.98 | 72 | 50 | 206 | 0.74 | 0 | -11.9 | 184 | -18.1 | -15 | -13.9 | -12.3 | 80355 | 3900 | 532 | 1/20/99 |
| 01/21/99 | 7:15 | 2 | 29.87 | 65 | 39 | 205 | 0.72 | 0 | -12.1 | 178 | -18.3 | -15.1 | -14.1 | -12.5 | 80750 | 3800 | 518 | 1/21/99 |
| 01/21/99 | 14:10 | 2 | 29.85 | 69 | 45 | 212 | 0.68 | 0 | -12.5 | 184 | -18.6 | -15.6 | -14.5 | -12.9 | 81534 | 3725 | 508 | 1/21/99 |
| 01/25/99 | 7:10 | 2 | 30.13 | 64 | 34 | 200 | 0.72 | 0 | -12.4 | 178 | -18.4 | -15.3 | -14.3 | -12.5 | 90663 | 3800 | 518 | 1/25/99 |
| 01/25/99 | 14:00 | 2 | 30.31 | 62 | 35 | 198 | 0.75 | 0 | -12.1 | 176 | -18.4 | -15.2 | -14.1 | -12.5 | 90834 | 3850 | 525 | 1/25/99 |
| 01/26/99 | 7:15 | 2 | 30.44 | 66 | 26 | 200 | 0.75 | 0 | -12.1 | 178 | -18.5 | -15.3 | -14.1 | -12.5 | 91215 | 3850 | 525 | 1/26/99 |
| 01/26/99 | 9:45 | 2 | 30.45 | 66 | 28 | 205 | 0.72 | 0 | -12.6 | 176 | -18.8 | -15.7 | -14.6 | -12.9 | 91276 | 3800 | 518 | 1/26/99 |
| 01/26/99 | 13:45 | 2 | 30.38 | 68 | 41 | 208 | 0.72 | 0 | -12.6 | 182 | -18.8 | -15.6 | -14.5 | -12.9 | 91370 | 3800 | 518 | 1/26/99 |
| 01/27/99 | 6:55 | 2 | 30.01 | 62 | 44 | 205 | 0.7 | 0 | -12.5 | 174 | -18.5 | -15.4 | -14.4 | -12.8 | 91739 | 3750 | 511 | 1/27/99 |
| 01/27/99 | 13:50 | 2 | 29.91 | 84 | 62 | 222 | 0.72 | 0 | -12.2 | 198 | -18.4 | -15.3 | -14.2 | -12.7 | 91871 | 3850 | 525 | 1/27/99 |
| 01/28/99 | 7:10 | 2 | 30.06 | 69 | 42 | 210 | 0.7 | 0 | -12.4 | 184 | -18.5 | -15.4 | -14.3 | -12.8 | 92193 | 3775 | 515 | 1/28/99 |
| 01/28/99 | 13:25 | 2 | 30.11 | 68 | 39 | 212 | 0.7 | 0 | -12.5 | 184 | -18.6 | -15.6 | -14.5 | -12.9 | 92315 | 3775 | 515 | 1/28/99 |
| 02/01/99 | 7:15 | 2 | 30.2 | 63 | 37 | 202 | 0.72 | 0 | -12.4 | 180 | -18.6 | -15.2 | -14.1 | -12.5 | 93618 | 3775 | 515 | 2/1/99 |
| 02/01/99 | 13:45 | 2 | 30.08 | 67 | 43 | 228 | 0.6 | 0 | -13.7 | 182 | -19.6 | -16.4 | -15.4 | -13.7 | 94876 | 3550 | 484 | 2/1/99 |
| 02/02/99 | 8:05 | 2 | 29.79 | 66 | 44 | 210 | 0.7 | 0 | -12.4 | 182 | -18.5 | -15 | -14 | -12.4 | 95802 | 3800 | 518 | 2/2/99 |
| 02/02/99 | 13:25 | 2 | 29.73 | 69 | 44 | 210 | 0.7 | 0 | -12.4 | 184 | -18.4 | -15 | -13.9 | -12.2 | 95894 | 3800 | 518 | 2/2/99 |
| 02/03/99 | 7:40 | 2 | 29.96 | 71 | 30 | 206 | 0.7 | 0 | -12.4 | 176 | -18.5 | -15.2 | -14.1 | -12.4 | 96230 | 3775 | 515 | 2/3/99 |
| 02/03/99 | 13:35 | 2 | 29.89 | 68 | 45 | 208 | 0.7 | 0 | -12.3 | 180 | -18.5 | -15.1 | -14 | -12.5 | 96339 | 3775 | 515 | 2/3/99 |
| 02/04/99 | 7:10 | 2 | 29.8 | 60 | 39 | 204 | 0.68 | 0 | -12.3 | 174 | -18.4 | -15 | -14 | -12.4 | 96571 | 3700 | 505 | 2/4/99 |
| 02/04/99 | 13:40 | 2 | 30.06 | 66 | 40 | 206 | 0.72 | 0 | -12.3 | 180 | -18.5 | -15.1 | -13.9 | -12.5 | 96662 | 3825 | 522 | 2/4/99 |
| 02/08/99 | 7:10 | 2 | 30.05 | 60 | 32 | 206 | 0.68 | 0 | -12.6 | 172 | -18.6 | -15.2 | -14.1 | -12.5 | 101912 | 3700 | 505 | 2/8/99 |
| 02/08/99 | 13:40 | 2 | 30.04 | 68 | 42 | 210 | 0.7 | 0 | -12.5 | 182 | -18.6 | -15.1 | -14 | -12.5 | 102031 | 3775 | 515 | 2/8/99 |
| 02/09/99 | 7:05 | 2 | 29.97 | 64 | 43 | 208 | 0.68 | 0 | -12.5 | 176 | -18.5 | -15.1 | -14 | -12.5 | 102309 | 3725 | 508 | 2/9/99 |
| 02/09/99 | 13:55 | 2 | 30.05 | 80 | 54 | 220 | 0.7 | 0 | -12.5 | 194 | -18.5 | -15.1 | -14 | -12.5 | 102399 | 3800 | 518 | 2/9/99 |
| 02/10/99 | 7:05 | 2 | 30.25 | 54 | 33 | 200 | 0.68 | 0 | -12.8 | 166 | -18.7 | -15.3 | -14.3 | -12.6 | 102676 | 3675 | 501 | 2/10/99 |
| 02/10/99 | 14:10 | 2 | 30.18 | 78 | 54 | 219 | 0.7 | 0 | -12.5 | 192 | -18.6 | -15.3 | -14.2 | -12.5 | 102782 | 3800 | 518 | 2/10/99 |
| 02/11/99 | 7:05 | 2 | 30.02 | 70 | 51 | 210 | 0.68 | 0 | -12.5 | 182 | -18.5 | -15.2 | -14.1 | -12.5 | 103053 | 3725 | 508 | 2/11/99 |
| 02/11/99 | 13:40 | 2 | 29.91 | 86 | 68 | 222 | 0.72 | 0 | -12.2 | 200 | -18.5 | -15 | -13.9 | -12.2 | 103123 | 3850 | 525 | 2/11/99 |
| 02/15/99 | 7:05 | 2 | 30.23 | 54 | 31 | 200 | 0.68 | 0 | -12.8 | 168 | -18.8 | -15.3 | -14.2 | -12.5 | 105696 | 3675 | 501 | 2/15/99 |
| 02/15/99 | 14:00 | 2 | 30.12 | 74 | 49 | 220 | 0.68 | 0 | -12.8 | 186 | -18.9 | -15.4 | -14.3 | -12.7 | 105786 | 3750 | 511 | 2/15/99 |
| 02/16/99 | 7:05 | 2 | 29.99 | 62 | 40 | 208 | 0.67 | 0 | -12.8 | 178 | -18.7 | -15.4 | -14.3 | -12.6 | 106001 | 3700 | 505 | 2/16/99 |
| 02/16/99 | 13:50 | 2 | 29.89 | 78 | 55 | 218 | 0.7 | 0 | -12.5 | 190 | -18.5 | -15.1 | -14 | -12.5 | 106101 | 3800 | 518 | 2/16/99 |
| 02/17/99 | 7:10 | 2 | 29.97 | 62 | 32 | 208 | 0.68 | 0 | -12.7 | 176 | -18.6 | -15.2 | -14.1 | -12.5 | 106281 | 3725 | 508 | 2/17/99 |
| 02/18/99 | 8:40 | 2 | 30.01 | 56 | 28 | 200 | 0.7 | 0 | -12.5 | 168 | -18.5 | -15 | -13.9 | -12.1 | 106446 | 3750 | 511 | 2/18/99 |
| 02/18/99 | 13:55 | 2 | 30.01 | 60 | 30 | 200 | 0.7 | 0 | -12.5 | 172 | -18.5 | -15 | -13.9 | -12.1 | 106491 | 3750 | 511 | 2/18/99 |
| 02/22/99 | 7:10 | 2 | 30.41 | 52 | 11 | 199 | 0.72 | 0 | -12.5 | 168 | -18.6 | -15 | -13.9 | -12.4 | 107141 | 3760 | 513 | 2/22/99 |
| 02/22/99 | 13:45 | 2 | 30.38 | 56 | 27 | 196 | 0.72 | 0 | -12.5 | 170 | -18.6 | -15.1 | -14 | -12.3 | 107170 | 3775 | 515 | 2/22/99 |
| 02/23/99 | 7:10 | 2 | 30.24 | 56 | 24 | 212 | 0.7 | 0 | -11.6 | 206 | -18 | -14.6 | -13.5 | -12 | 107276 | 3775 | 515 | 2/23/99 |
| 03/17/99 | 7:00 | 2 | 29.91 | 72 | 42 | 196 | 0.78 | 0 | -9.9 | 192 | -17.5 | -15.5 | -14.5 | -12.9 | 108840 | 3950 | 539 | 3/17/99 |
| 03/17/99 | 13:40 | 2 | 29.83 | 94 | 66 | 212 | 0.82 | 0 | -9.4 | 214 | -17.4 | -15.3 | -14.4 | -12.8 | 108900 | 4100 | 559 | 3/17/99 |
| 03/18/99 | 7:30 | 2 | 30.07 | 77 | 37 | 206 | 0.78 | 0 | -9.9 | 200 | -17.6 | -15.5 | -14.6 | -12.9 | 109045 | 3975 | 542 | 3/18/99 |
| 03/18/99 | 13:50 | 2 | 30.15 | 80 | 41 | 206 | 0.8 | 0 | -9.8 | 202 | -17.6 | -15.5 | -14.5 | -12.9 | 109089 | 4000 | 545 | 3/18/99 |
| 03/22/99 | 7:35 | 2 | 30.01 | 66 | 31 | 206 | 0.76 | 0 | -10.2 | 196 | -17.9 | -15.4 | -14.4 | -12.6 | 109661 | 3925 | 535 | 3/22/99 |
| 03/22/99 | 14:15 | 2 | 30.08 | 82 | 39 | 214 | 0.78 | 0 | -9.8 | 214 | -17.6 | -15.2 | -14.3 | -12.9 | 109705 | 4000 | 545 | 3/22/99 |
| 03/23/99 | 7:30 | 2 | 30.15 | 68 | 31 | 210 | 0.75 | 0 | -10.1 | 204 | -17.7 | -15.3 | -14.3 | -12.6 | 109794 | 3900 | 532 | 3/23/99 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/23/99 | 15:30 | 2 | 30.06 | 83 | 45 | 220 | 0.76 | 0 | -9.8 | 222 | -17.6 | -15.2 | -14.2 | -12.5 | 109838 | 3950 | 539 | 3/23/99 |
| 03/24/99 | 7:20 | 2 | 30 | 69 | 33 | 214 | 0.75 | 0 | -9.9 | 210 | -17.6 | -15.1 | -14.1 | -12.5 | 109925 | 3900 | 532 | 3/24/99 |
| 03/25/99 | 6:40 | 2 | 30.19 | 68 | 24 | 198 | 0.77 | 0 | -10.4 | 182 | -18.1 | -15.4 | -14.4 | -12.5 | 110013 | 3925 | 535 | 3/25/99 |
| 03/25/99 | 13:35 | 2 | 30.2 | 68 | 43 | 196 | 0.76 | 0 | -10.4 | 182 | -18.1 | -15.3 | -14.4 | -12.6 | 110042 | 3900 | 532 | 3/25/99 |
| 03/29/99 | 7:40 | 2 | 30.27 | 72 | 46 | 202 | 0.8 | 0 | -10.4 | 192 | -18 | -15.2 | -14.2 | -12.4 | 110387 | 3983 | 543 | 3/29/99 |
| 03/29/99 | 13:05 | 2 | 30.28 | 89 | 59 | 212 | 0.86 | 0 | -9.6 | 212 | -17.6 | -14.6 | -13.6 | -12.1 | 110416 | 4160 | 567 | 3/29/99 |
| 03/30/99 | 7:15 | 2 | 30.35 | 76 | 39 | 202 | 0.85 | 0 | -9.8 | 200 | -17.6 | -14.6 | -13.6 | -12 | 110521 | 4101 | 559 | 3/30/99 |
| 03/30/99 | 14:00 | 2 | 30.32 | 96 | 65 | 218 | 0.86 | 0 | -9.4 | 220 | -17.5 | -14.3 | -13.3 | -11.9 | 110551 | 4176 | 569 | 3/30/99 |
| 03/31/99 | 7:00 | 2 | 30.18 | 69 | 44 | 202 | 0.83 | 0 | -9.8 | 196 | -17.5 | -14.4 | -13.4 | -11.9 | 110623 | 4063 | 554 | 3/31/99 |
| 03/31/99 | 13:10 | 2 | 30.11 | 94 | 68 | 220 | 0.85 | 0 | -9.4 | 224 | -17.5 | -14.3 | -13.3 | -11.5 | 110639 | 4172 | 569 | 3/31/99 |
| 04/01/99 | 7:10 | 2 | 29.94 | 85 | 53 | 216 | 0.83 | 0 | -9.5 | 218 | -17.5 | -14.3 | -13.2 | -11.5 | 110711 | 4123 | 562 | 4/1/99 |
| 04/01/99 | 13:00 | 2 | 29.94 | 92 | 60 | 222 | 0.84 | 0 | -9.4 | 228 | -17.3 | -14.1 | -13.1 | -11.6 | 110740 | 4166 | 568 | 4/1/99 |
| 04/05/99 | 7:50 | 2 | 30.14 | 84 | 41 | 226 | 0.83 | 0 | -9.3 | 238 | -17.1 | -14 | -13 | -11.6 | 111044 | 4139 | 564 | 4/5/99 |
| 04/05/99 | 15:00 | 2 | 30.12 | 99 | 62 | 236 | 0.83 | 0 | -9.3 | 254 | -17.1 | -14.1 | -13.1 | -11.5 | 111058 | 4171 | 569 | 4/5/99 |
| 04/06/99 | 6:40 | 2 | 29.86 | 94 | 56 | 232 | 0.82 | 0 | -9.2 | 248 | -17 | -14 | -13 | -11.5 | 111117 | 4151 | 566 | 4/6/99 |
| 04/06/99 | 15:10 | 2 | 29.92 | 92 | 69 | 214 | 0.83 | 0 | -9.6 | 208 | -17.6 | -13.8 | -12.9 | -11.5 | 111148 | 4118 | 561 | 4/6/99 |
| 04/07/99 | 7:10 | 2 | 30.23 | 74 | 45 | 202 | 0.82 | 0 | -10.1 | 194 | -17.9 | -14.1 | -13.1 | -11.7 | 111205 | 4036 | 550 | 4/7/99 |
| 04/07/99 | 14:10 | 2 | 30.16 | 95 | 63 | 218 | 0.84 | 0 | -9.9 | 218 | -17.8 | -14 | -13 | -11.5 | 111228 | 4138 | 564 | 4/7/99 |
| 04/08/99 | 6:50 | 2 | 29.95 | 80 | 53 | 210 | 0.82 | 0 | -9.9 | 202 | -17.6 | -14 | -12.9 | -11.6 | 111294 | 4079 | 556 | 4/8/99 |
| 04/08/99 | 13:35 | 2 | 29.9 | 100 | 73 | 226 | 0.83 | 0 | -9.7 | 226 | -17.6 | -13.9 | -12.9 | -11.3 | 111319 | 4156 | 567 | 4/8/99 |
| 04/12/99 | 7:20 | 2 | 30.12 | 76 | 37 | 215 | 0.78 | 0 | -10.1 | 212 | -17.6 | -13.9 | -12.9 | -11.3 | 111644 | 3982 | 543 | 4/12/99 |
| 04/12/99 | 13:50 | 2 | 30.22 | 86 | 50 | 222 | 0.8 | 0 | -9.9 | 224 | -17.6 | -13.9 | -12.9 | -11.3 | 111675 | 4046 | 552 | 4/12/99 |
| 04/13/99 | 7:55 | 2 | 30.22 | 72 | 37 | 214 | 0.78 | 0 | -10.1 | 214 | -17.6 | -13.8 | -12.7 | -11.4 | 111759 | 3972 | 542 | 4/13/99 |
| 04/13/99 | 13:15 | 2 | 30.19 | 84 | 54 | 206 | 0.8 | 0 | -9.9 | 201 | -17.9 | -14.2 | -13.2 | -11.6 | 111759 | 4001 | 546 | 4/13/99 |
| 04/14/99 | 6:40 | 2 | 30.07 | 82 | 41 | 202 | 0.78 | 0 | -10 | 198 | -17.8 | -14.1 | -13 | -11.6 | 111826 | 3946 | 538 | 4/14/99 |
| 04/14/99 | 13:50 | 2 | 30.04 | 91 | 62 | 214 | 0.78 | 0 | -9.9 | 210 | -17.8 | -14 | -13 | -11.4 | 111849 | 3984 | 543 | 4/14/99 |
| 04/15/99 | 6:55 | 2 | 29.68 | 81 | 50 | 210 | 0.76 | 0 | -10.1 | 204 | -17.7 | -13.7 | -12.7 | -11.1 | 111901 | 3945 | 538 | 4/15/99 |
| 04/15/99 | 14:45 | 2 | 29.45 | 80 | 49 | 210 | 0.75 | 0 | -10 | 202 | -17.6 | -13.6 | -12.6 | -11.1 | 111939 | 3934 | 536 | 4/15/99 |
| 04/19/99 | 7:20 | 2 | 30.05 | 76 | 38 | 222 | 0.67 | 0 | -11.3 | 206 | -18.7 | -12.3 | -11.3 | -10 | 113281 | 3714 | 506 | 4/19/99 |
| 04/19/99 | 16:16 | 2 | 29.93 | 91 | 58 | 226 | 0.68 | 0 | -11.1 | 208 | -18.7 | -12.7 | -11.5 | -10.2 | 113328 | 3760 | 513 | 4/19/99 |
| 04/20/99 | 6:45 | 2 | 29.98 | 76 | 41 | 206 | 0.8 | 0 | -9.5 | 212 | -17.1 | -15.4 | -14.4 | -12.5 | 113432 | 4015 | 547 | 4/20/99 |
| 04/20/99 | 14:00 | 2 | 30.06 | 89 | 53 | 216 | 0.83 | 0 | -9.3 | 230 | -17 | -15.4 | -14.4 | -12.5 | 113475 | 4114 | 561 | 4/20/99 |
| 04/21/99 | 7:15 | 2 | 29.9 | 80 | 46 | 240 | 0.62 | 0 | -11.3 | 230 | -18.7 | -16.5 | -15.5 | -14.3 | 113898 | 3628 | 495 | 4/21/99 |

# AS System Parameters

| AS: | | | | | | |
|---|---|---|---|---|---|---|
| Main Temp. | Mag. | Main Press. | Zone Press. | Calc. Flow | Flow | |
| (°F) | ("$H_2O$) | (psig) | (psig) | (Ft./Min.) | (CFM) | Notes |
| 160 | 1.6 | 9.5 | 8.25 | 5400 | 265 | |
| 208 | 1.8 | 11.5 | 10 | 6000 | 295 | sample 036968-001 taken on zone 2 @ 17:02 |
| 200 | 2.05 | 10.5 | 9.25 | 6350 | 312 | Air pressure relief valve poping, adjusted dirverted air to compensate |
| 192 | 2.05 | 10.75 | 9.5 | 6350 | 312 | Rain, K.O. Tank pump ran and meter at 2361 gal. @ 08:01, sample 036969-001 taken on zone 2 @ 8:05 |
| 186 | 2.1 | 10.5 | 9 | 6400 | 314 | System/zone rebalanced at wells post readings |
| 202 | 2 | 11.6 | 10.1 | 6375 | 313 | Readings following rebalance, Zones set to cycle every 4 hours |
| | 1.55 | 10.6 | 9.2 | 5600 | 275 | AS Temp. gauge broken, Estimated temp. 200, Sample 036971-001 taken on zone 2 @ 8:05 |
| | 1.55 | 11 | 9.6 | 5450 | 268 | AS Temp. gauge broken, Est. Temp. 180 |
| | 1.4 | 12.5 | 11 | 5200 | 255 | AS Temp. gauge broken, Est. Temp. 185, Sample 036973-001 taken on zone 2 @ 8:06 |
| | | | | | | System shut down, blowers greased, adjusted AS bypass valve, shut ED-N2 due to rain, replaced AS temp gauge |
| 170 | 1.5 | 12.5 | 11 | 5350 | 263 | System zone cycle time set to 2 hr @ 9:40 |
| 175 | 1.45 | 13.5 | 11.9 | 5400 | 265 | |
| 165 | 1.5 | 12 | 10.5 | 5300 | 260 | Water blown out of AS system, AS-N14 turned on, Sample 036976-001 taken on zone 2 @ 16:05 |
| 150 | 1.55 | 11.8 | 10.4 | 5300 | 260 | |
| 155 | 1.45 | 11.6 | 10.1 | 5200 | 255 | |
| 152 | 1.45 | 11.5 | 10.25 | 5200 | 255 | |
| | | | | | | System shut down, blowers greased & lubed, belts tightened, filters changed, strainer cleaned, pump primed |
| 165 | 1.2 | 14.25 | 12.6 | 4750 | 233 | Water blown from AS system, Sample 036978-001 taken on zone 2 @ 8:05 |
| | | | | | | System shut down for Sandia mods., restarted 1/28/98 14:30 |
| 134 | 0.9 | 9.75 | 8.4 | 4050 | 199 | AS bypass opened more due to pressure relief pop-off on zone 1 @ 8:20 |
| 140 | 1.1 | 10.5 | 9.1 | 4475 | 220 | Adjusted AS bypass valve to keep pop-off from oscillating on zone 1 start-up |
| 145 | 1.05 | 10.1 | 8.75 | 4400 | 216 | |
| 165 | 0.5 | 13.5 | 11.9 | 3050 | 150 | AS-N14 closed after blow out of condensation from N14 & N16 2/2/98 @ 15:00 |
| 160 | 0.49 | 13.5 | 12 | 3025 | 148 | Shut K.O. pump off to ensure water build-up for sampling and pump change out |
| | | | | | | Carbon changed on 2/12/98 Zone 2 ran for 20 min. shut down at 14:40 leaking pump, restart @ 8:00 today |
| | | | | | | 0.19" of rain for the day |
| | | | | | | 0.34" of rain for the day |
| | | | | | | at 8:00 gal. Pumped = 12,617, this = 6 gpm from zone 2, 0.43" of rain for the day |
| | | | | | | ran pump manually till oscillation observed in site tube |
| | | | | | | System shut down at noon due to problems with line contamination |
| | | | | | | System restart at 16:00 on 2/26, ran fron 13:30 to 14:00 on 2/25 shut down for stripper cleaning |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | following rebalance of system with magnehelics |
| | | | | | | |
| | | | | | | north door open, Sys. Auto shutdown @ midnight due to high K.O. tank level - pump lost prime, GC exhib. Memory |
| | | | | | | |
| | | | | | | |
| | | | | | | Ground surface well frozen, summa 036980-001 @ 12:10, sve shut down @ 15:00 hours due to Stripper fouling |
| | | | | | | |
| | | | | | | Rain, 04:00 - 16:00 0.72" |
| | | | | | | |
| | | | | | | summa 036981-001 @ 04:08, system carbon chg. 07:30 - 15:55, chg. To Z2=6hr & Z1=2hr cycles, flow dir. Chg. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | carbon bed appears to b[illegible]ing too tight, will reverse flow back to normal/original |
| | | | | | | System shut off from 8:00 to 10:00 for flow change, seems to have worked, adj. ED-N1, N2, N4, & N5 Flow 0.7"WC |
| | | | | | | |
| | | | | | | 0.53" of rain since 3/31 19:00 hrs |
| | | | | | | |
| | | | | | | System shut down for maint. Restarted at 15:30 |
| | | | | | | Flow is based upon an estimated Bar. Press. of 30.00 |
| | | | | | | Flow is based upon an estimated Bar. Press. of 30.00 |
| | | | | | | High water level in K.O. tank, auto shut down, system left off for weekend |
| | | | | | | System restarted @ 02:00 hrs, GC #85 calib., GC #86 port 4, GC #87 port 3, GC #88 port 2, GC #89 port 1 |
| | | | | | | |
| | | | | | | Sampling wells via Tedlar |
| | | | | | | 2.7" rain in 24 hrs., auto-off @ 12:10, restarted @ 06:00 - 10:00 Z2 manual w/air makeup, 10:00 full on & auto |
| | | | | | | before adjustments |
| 160 | 0.2 | 14.5 | 13 | 1940 | 95 | slight adjustments made, proper re-balance will need to be accomplished with drier conditions |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | carbon change |
| | | | | | | Before rebalance |
| | | | | | | Following rebalance |
| | | | | | | |
| | | | | | | Raining, ground saturated, 0.97" |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | RAIN!, 0.82" in past 6 hours, Vac relief popped, zone 2 set to run full time |
| | | | | | | Vac. Relief open, K.O. pump running, tank 1/2 full |
| | | | | | | 1.76" of rain in the 24 hours preceding 5/8/98 @ 07:53 AM |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Rain, again! |
| | | | | | | |
| | | | | | | Summa taken on Scott 10 ppm cal gas |
| | | | | | | Rain during night, carbon change: system shut down from 07:30 to 12:30 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Ground conditions are moderate
Ground conditions are wet

RAIN, 0.8" in past 24 hours
1.0" of rain in past 24 hours, vac. relief valve actuated - readings taken 10 minutes following reset

Since 6/12/98 8:00 a.m. 1" of additional rain
1.58" of rain in past 24-hours

more rain
0.14" of rain in past 24 hrs.

Reset Vac. Relief at 10:20, 0.71" of rain since 02:00 hrs. 06/19/98, ~ 3" over monthly ave.

0.5" of rain since midnight

EW-N7 & N8 set to 2.6" WC, ED-N1, N2, N4, & N5 set to 0.5" WC, Following QTRLY Tedlar Sampling

| | | | | | | |
|---|---|---|---|---|---|---|
| 262 | 0.39 | 14.4 | 12.9 | 2900 | 142 | |
| | | | | | | Before Radius OF Influence testing |
| | | | | | | After ROI testing |
| | | | | | | Before Zone 2 re-adjustment |
| | | | | | | After Zone 2 re-adjustments, EW-N7 & N8 set to 2.6" WC, ED-N1, N2, N4, & N5 set to 0.4" WC |
| | | | | | | |
| | | | | | | system vac to high Readjusted |
| 226 | 0.95 | 13.5 | 12 | 4425 | 217 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 212 | 2.8 | 10.5 | 8.75 | 6600 | 324 | AS restarted at 14:00, readings in Bd. taken at 14:25, system off at 14:30 |
| | | | | | 0 | |
| 196 | 2.8 | 10.7 | 9 | 7500 | 368 | |
| | | | | | | system restarted with new blower, carbon tank B inline |

Kurz Meter reading an average of 4,600 (627 SCFM)

system shut down for carbon change tank (A) only.And maint.@ 7:00 to 15:10
system on carbon tank A

Rain-soil moist

system shut down for maint. @ 14:00 to 14:30

system changed back to carbon tank (b) due to high sys. Vac.

Rain-soil moist.
A lot of rain over night App. 2" to 3" soil real moist. Then it turned cold down to 12 degrees F

Soil Moist And Frozen. And monthly readings taken at this time.

System shut down for maint, @ 07:15 Blowers lubed. System back on @ 07:49 , Oil in blowers cheched also ( ok )

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Cross checked manual with formula on flow...Good...Start copy of cells Q,R,&S |
| | | | | | | Set up to calculate flow, system rebalanced (ed-N1,2,4,5=0.24;ew-n7&8=4.8) |
| | | | | | | |
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| | | | | | | |
| | | | | | | System Auto shut down@ 13:10 Blower motor over load. System back on @14:00. Sve Blowers@Elect Blower, |
| | | | | | | Motor Greased at this time. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | System shut down for belt alignment and tensioning, approx. 12 - 15 gal. Water removed from carbon tank A |
| | | | | | | |
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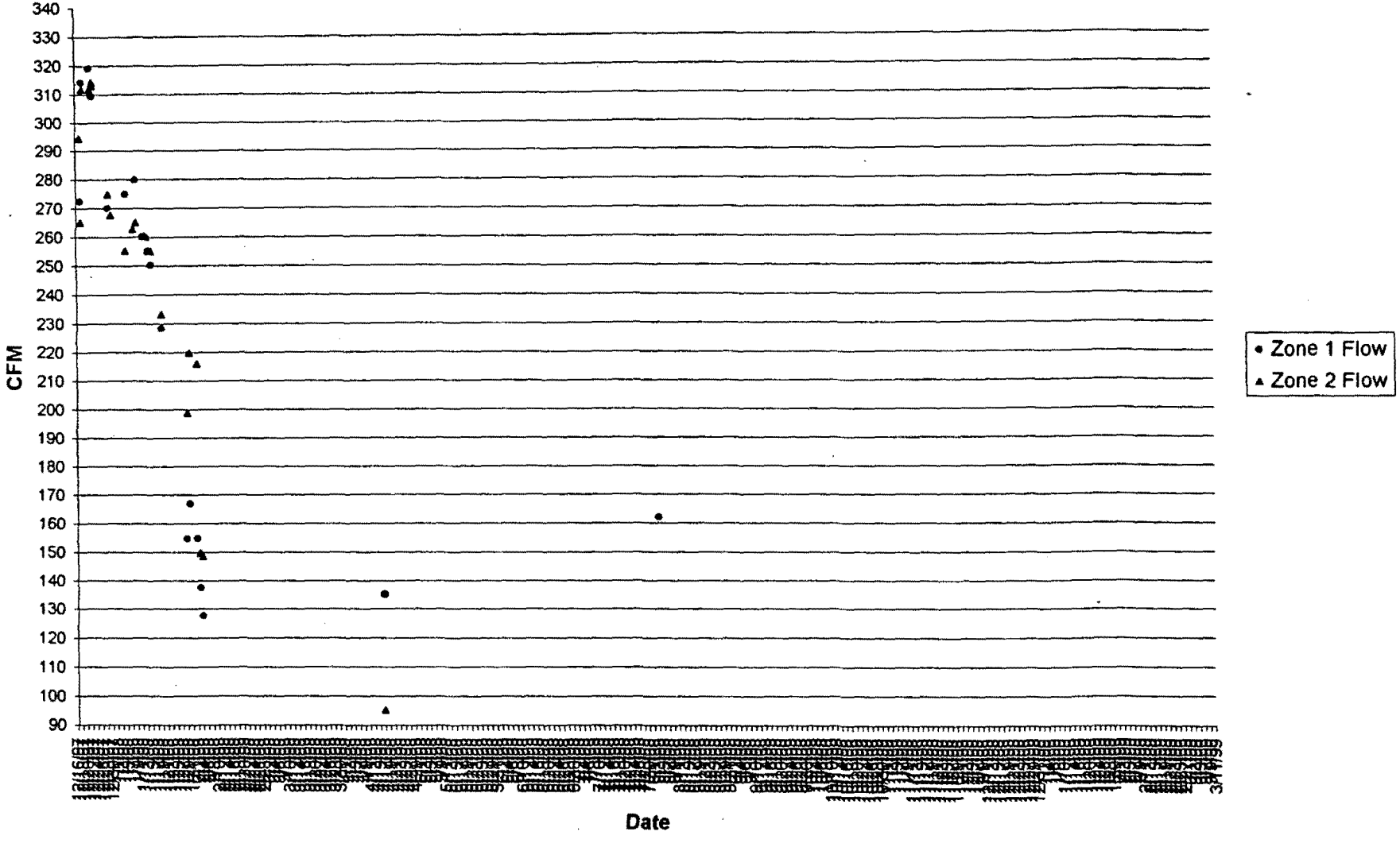
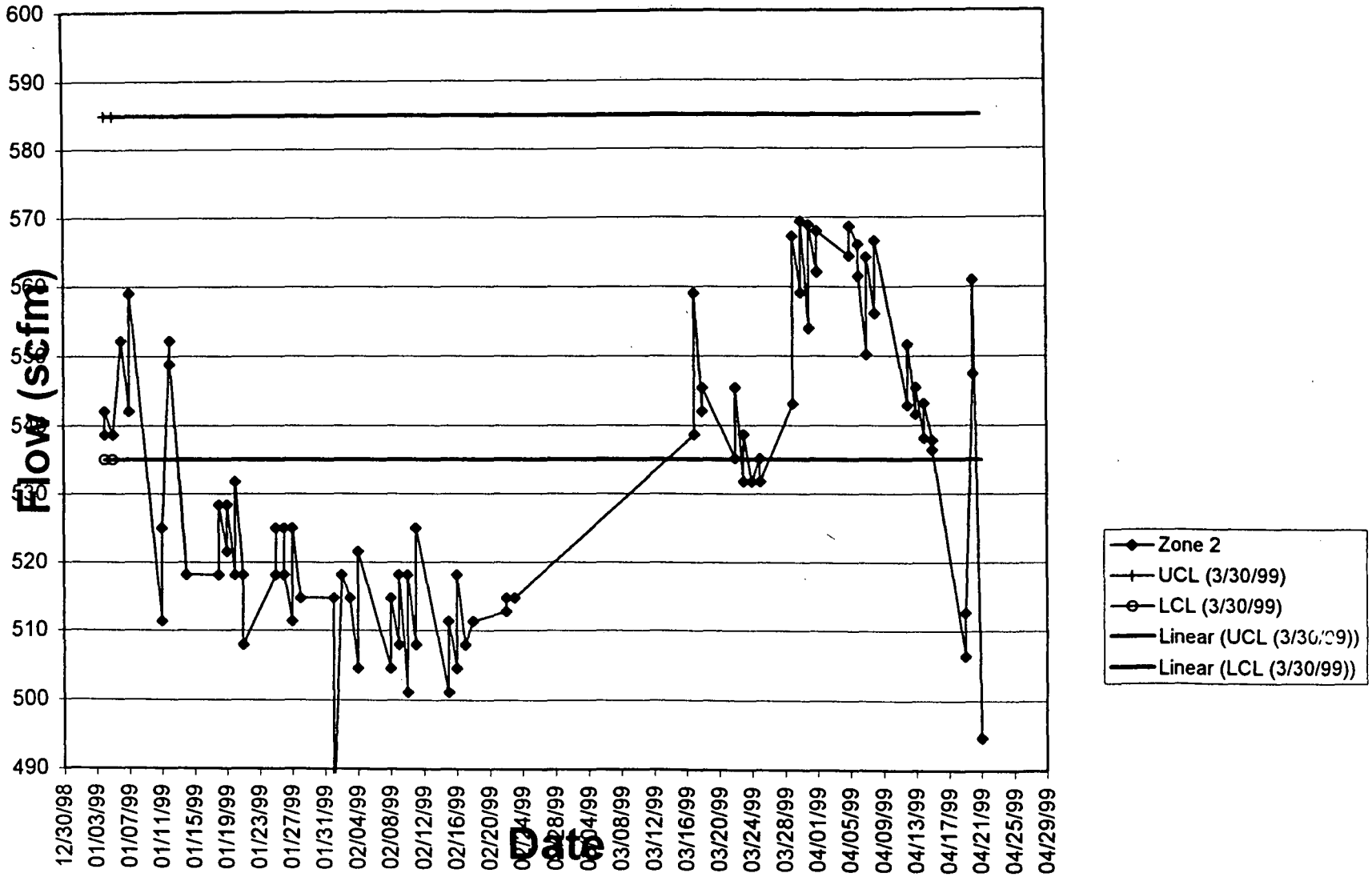
| | | | | | | |
| | | | | | | Rained soil moist. |

# OU-1 Air Sparge Flow



# Zone 2 SVE Flow



**Lubricants used:**

Aeon PD
Penzoil Pennlith EP Grease
Kendall High Temp EP Grease
(Note: Both greases comply with the manufacturer's recommendations.)

**Maintenance:**

| | | |
|---|---|---|
| December 16, 1998 | Initial Startup | ET 0 hours |
| January 5, 1998 | Greased | ET 401.5 hours |
| January 18, 1998 | Greased/Oil | ET 255 hours on grease; ET 656.5 hours on oil |
| February 4, 1998 | Greased | ET 402.5 hours |
| March 6, 1998 | Greased | ET 523 hours |
| March 18, 1998 | Greased | ET 120 hours (PM by contractor) |
| April 6, 1998 | Greased | ET 465 hours |
| April 27, 1998 | Greased | ET 407.75 hours |
| May 18, 1998 | Greased | ET 479.64 hours |
| June 8, 1998 | Greased | ET 472 hours |
| June 29, 1998 | Greased | ET 502.3 hours |
| July 20, 1998 | Greased/Oil | ET 460.87 hours on grease; ET 3,833 hours on oil |
| August 13, 1998 | Greased | ET 559.74 hours |
| September 2, 1998 | Greased | ET 408.64 hours |
| September 24, 1998 | Greased | ET 524.00 hours |
| October 15, 1998 | Greased | ET 480.17 hours |
| October 21, 1998 | Blower Failure | ET 147.17 hours on grease; ET 2,120 hours on oil |
| October 21 to November 5, 1998 System off due to failed blower. | | |
| November 24, 1998 | Greased | ET 442.75 hours on grease |
| December 7, 1998 | Greased | ET 307.83 hours |
| December 31, 1998 | Greased | ET 563.25 hours on grease, ET 3434 hours on oil |
| January 16, 1999 | Greased | ET 343.62 hours |
| February 1, 1999 | Greased | ET 388.5 hours |
| February 22, 1999 | Greased | ET 394.25 hours |
| February 23, 1998 | Electrical motor bearing failure, Blower Grease ET 26 hours, oil ET 4586.5 | |
| February 25, 1999 | 5LP Blower Squealing as if bearing going out 0.5 hours after restart | |

# System Balance on 12/17/97

(by: r.e.wright)

## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 12 | 450 | 2 | | EW-N1 | -8 | 10 | 0 | |
| AS-N2 | 8 | 6000 | 33 | • | EW-N2 | -1 | 5000 | 109 | 0.5 |
| AS-N3 | 11 | 15 | 0 | | EW-N3 | -6.5 | 37.5 | 1 | |
| AS-N4 | 8 | 2700 | 15 | | EW-N4 | -4.5 | 5000 | 109 | 0.5 |
| AS-N5 | 10.5 | 200 | 1 | | EW-N5 | -5.25 | 165 | 4 | |
| AS-N6 | 9 | 135 | 1 | | EW-N6 | -3.5 | 5000 | 109 | |
| AS-N7 | 8 | 5200 | 28 | | | | | | |
| AS-N8 | 10 | 1100 | 6 | | | | | | |
| AS-N9 | 8 | 6000 | 33 | * | | | | | |
| | | Sum: | 119 | | | | Sum: | 332 | |

## Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 11.75 | 6000 | 33 | • | EW-N7 | -5 | 3300 | 72 | |
| AS-N11 | 9 | 6000 | 33 | • | EW-N8 | -5 | 4000 | 87 | |
| AS-N12 | 11 | 280 | 2 | | EW-N9 | -5 | 75 | 2 | |
| AS-N13 | 12 | 140 | 1 | | EW-N10 | -5 | 75 | 2 | |
| AS-N14 | 0 | 0 | 0 | (OFF) | ED-N1 | -4.25 | 4500 | 98 | |
| AS-N15 | 0 | 0 | 0 | (OFF) | ED-N2 | -5 | 3000 | 65 | |
| AS-N16 | 0 | 0 | 0 | (OFF) | ED-N3 | -5 | 0 | 0 | ND |
| AS-N17 | 12 | 10 | 0 | | ED-N4 | -5 | 5500 | 120 | |
| AS-N18 | 11.5 | 10 | 0 | | ED-N5 | -4.75 | 2500 | 55 | |
| AS-N19 | 10 | 10 | 0 | | ITRD-1 | -5.5 | 80 | 2 | |
| AS-N20 | 9.5 | 15 | 0 | | ITRD-2 | -5 | 975 | 21 | |
| AS-N21 | 11 | 6000 | 33 | * | | | | | |
| AS-N22 | 9.5 | 3800 | 21 | | | | | | |
| AS-N23 | 10 | 18 | 0 | | | | | | |
| | | Sum: | 122 | | | | Sum: | 524 | |

FLAG: • = KURZ meter 6K range exceeded!, ND = Not Detectable

# System Balance on 12/23/97

## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|
| AS-N1 | 7.5 | 1000 | 5 | |
| AS-N2 | 7.25 | 3000 | 16 | |
| AS-N3 | 5.25 | 1000 | 5 | |
| AS-N4 | 8 | 6000 | 33 | * |
| AS-N5 | 9.4 | 450 | 2 | |
| AS-N6 | 8 | 2000 | 11 | |
| AS-N7 | 10 | 6000 | 33 | * |
| AS-N8 | 8.6 | 3800 | 21 | |
| AS-N9 | 8.75 | 6000 | 33 | * |
| | | Sum: | 160 | |

| Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|
| EW-N1 | -12.5 | 20 | 0 | |
| EW-N2 | 0 | 6000 | 131 | * |
| EW-N3 | -11.5 | 25 | 1 | |
| EW-N4 | -1.5 | 6000 | 131 | * |
| EW-N5 | -10.5 | 1200 | 26 | |
| EW-N6 | -4 | 6000 | 131 | * |
| | | Sum: | 420 | |

## Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|
| AS-N10 | 11.9 | 1600 | 9 | |
| AS-N11 | 12 | 6000 | 33 | * |
| AS-N12 | 11.6 | 5100 | 28 | |
| AS-N13 | 11.25 | 2400 | 13 | |
| AS-N14 | 0 | 0 | 0 | (OFF) |
| AS-N15 | 0 | 0 | 0 | (OFF) |
| AS-N16 | 0 | 0 | 0 | (OFF) |
| AS-N17 | 10.9 | 1800 | 10 | |
| AS-N18 | 12 | 5400 | 29 | |
| AS-N19 | 11 | 2300 | 13 | |
| AS-N20 | 10.75 | 2100 | 11 | |
| AS-N21 | 11 | 6000 | 33 | * |
| AS-N22 | 9.5 | 5800 | 32 | |
| AS-N23 | 10 | 325 | 2 | |
| | | Sum: | 212 | |

| Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|
| EW-N7 | -4.25 | 4600 | 100 | |
| EW-N8 | -3.5 | 4600 | 100 | |
| EW-N9 | -10 | 155 | 3 | |
| EW-N10 | -10 | 165 | 4 | |
| ED-N1 | -2 | 2000 | 44 | |
| ED-N2 | -1 | 4000 | 87 | |
| ED-N3 | -9.75 | 0 | 0 | ND |
| ED-N4 | -4.75 | 3000 | 65 | |
| ED-N5 | -6.75 | 5000 | 109 | |
| ITRD-1 | -10.4 | 325 | 7 | |
| ITRD-2 | -10 | 1500 | 33 | |
| | | Sum: | 553 | |

FLAG: * = KURZ meter 6K range exceeded!, ND = Not Detectable

# System Balance on 03/05/98

## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | -8.5 | | | * |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 7900 | 172 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | -9.5 | | | • |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | -1.75 | 7650 | 167 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | -10.75 | 2175 | 47 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | -3.75 | 7650 | 167 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 554 | |
| | | | | | | | Building Flow: | 559 | |

## Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -4.5 | 5600 | 122 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -3.4 | 5600 | 122 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -12.25 | | | • |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -12.2 | | | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 3275 | 71 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 3300 | 72 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -7.5 | | | • |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | -2.5 | 3300 | 72 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -7.25 | 3050 | 67 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-1 | -8 | | | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-2 | -12.25 | 1310 | 29 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 555 | |
| | | | | | | | Building Flow: | 586 | |

Flag: • = No Measurement of flow performed

# System Balance on 04/17/98

## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | - | | | * |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | - | 8400 | 183 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | - | | | * |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | - | 7900 | 172 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | - | 2800 | 61 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | - | 8400 | 183 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 600 | |
| | | | | | | | Building Flow: | 525 | |

onditions: Wet!

## Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | - | 5600 | 122 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | - | 5600 | 122 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | - | 320 | 7 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | - | | | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | - | 3300 | 72 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | - | 3300 | 72 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | - | | | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | - | 3300 | 72 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | - | 3300 | 72 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-1 | - | | | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-2 | - | 1480 | 32 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 572 | |
| | | | | | | | Building Flow: | 537 | |

onditions: Wet!

Flag: * = No Measurement/Unreliable Measurement of flow performed

# Before System Balance on 04/28/98
## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | -11.2 | 15 | 0 | |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 8550 | 187 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | -10.1 | 30 | 1 | |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | -2.25 | 9250 | 202 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | -8.9 | 2480 | 54 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | -3.6 | 7390 | 161 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 605 | |
| | | | | | | | Building Flow: | 573 | |
| Soil Conditions: Moderate | | | | | | | Delta: | -32 | |

| | "H2O WC |
|---|---|
| VPMP-3 | 5 |
| VPMP-2 S | 0.7 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-1 S | 2.6 |
| VPMP-1 M | 5 |
| VPMP-1 D | 0 |

# Before System Balance on 04/28/98
# Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -6.5 | 6600 | 144 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -3.7 | 5590 | 122 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -8.8 | 300 | 7 | |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -8.9 | 195 | 4 | |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 3100 | 68 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 3315 | 72 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -8.6 | 5 | 0 | |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | -2.1 | 2890 | 63 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -5.25 | 3250 | 71 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-1 | -9.25 | 15 | 0 | |
| AS-N20 | 0 | 0 | 0 | | ITRD-2 | -8.9 | 402 | 9 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 560 | |
| | | | | | | | Building Flow: | 562 | |
| Soil Conditions: Moderate | | | | | | | Delta: | 2 | |

| | "H2O WC |
|---|---|
| VPMP-3 | 0.6 |
| VPMP-2 S | 4.5 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-1 S | 0.96 |
| VPMP-1 M | 0.76 |
| VPMP-1 D | 0 |

# Following System Balance on 04/28/98
## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | -12.2 | 15 | 0 | * |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 7890 | 172 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | -11.1 | 30 | 1 | * |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | -1.75 | 7890 | 172 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | -9.75 | 2725 | 59 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | -4.1 | 7890 | 172 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 577 | |
| | | | | | | | Building Flow: | 552 | |
| Soil Conditions: Moderate | | | | | | | Delta: | -25 | |

| | "H2O WC |
|---|---|
| VPMP-3 | - |
| VPMP-2 S | 0.66 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-1 S | 2.9 |
| VPMP-1 M | 4.6 |
| VPMP-1 D | - |

Flag: * = Measurement performed with Kurz meter Prior to rebalance

# Following System Balance on 04/28/98
# Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -6.1 | 5580 | 122 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -3.75 | 5700 | 124 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -9.4 | 300 | 7 | |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -9.5 | 195 | 4 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 3050 | 67 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 3050 | 67 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -9.1 | 5 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | -2.1 | 3050 | 67 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -5 | 3050 | 67 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-1 | -10 | 15 | 0 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-2 | -9.4 | 422 | 9 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 533 | |
| | | | | | | | Building Flow: | 552 | |
| | | | | | | | Delta: | 19 | |

Soil Conditions: Moderate

| | "H2O WC |
|---|---|
| VPMP-3 | 0.52 |
| VPMP-2 S | 4.2 |
| VPMP-2 M | - |
| VPMP-2 D | - |
| VPMP-1 S | 0.85 |
| VPMP-1 M | 0.7 |
| VPMP-1 D | - |

Flag: * = Measurement performed with Kurz meter Prior to rebalance

# 05/28/98 System on Zone 2 Full Time

## Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | 0 | 0 | 0 | |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 0 | 0 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | 0 | 0 | 0 | |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | 0 | 0 | 0 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | 0 | 0 | 0 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | 0 | 0 | 0 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 0 | |
| | | | | | | | Building Flow: | 0 | |
| Soil Conditions: Moist | | | | | | | Delta: | 0 | |

| | "$H_2O$ WC |
|---|---|
| VPMP-3 | - |
| VPMP-2 S | - |
| VPMP-2 M | - |
| VPMP-2 D | - |
| VPMP-1 S | - |
| VPMP-1 M | - |
| VPMP-1 D | - |

# Readings on 05/28/98
# Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -7 | 5590 | 122 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -3.8 | 5720 | 125 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -9.2 | 682 | 15 | |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -8 | 600 | 13 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 3030 | 66 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 3400 | 74 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -9.3 | 5 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | -1.5 | 3100 | 68 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -3.9 | 3000 | 65 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-1 | -9.6 | 10 | 0 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-2 | -9.5 | 790 | 17 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 566 | |
| | | | | | | | Building Flow: | 541 | |
| | | | | | | | Delta: | -25 | |

Soil Conditions: Moist

| | "$H_2O$ WC |
|---|---|
| VPMP-3 | 0.25 |
| VPMP-2 S | 3.4 |
| VPMP-2 M | - |
| VPMP-2 D | - |
| VPMP-1 S | 0.66 |
| VPMP-1 M | 0.42 |
| VPMP-1 D | - |
| ITRD North S | 1.3 |
| ITRD North M | - |

Flag: * = Measurement performed with Kurz meter

# 07/21/98 System on Zone 1
# Pre Qtrly. Samp.

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | -10 | 0 | 0 | |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 7700 | 168 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | -8.75 | 0 | 0 | |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | -1.5 | 7050 | 154 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | -7.3 | 1850 | 40 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | -4 | 7900 | 172 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 535 | |
| | | | | | | | Building Flow: | 528 | |
| Soil Conditions: Dry | | | | | | | Delta: | -7 | |

| | "$H_2O$ WC |
|---|---|
| VPMP-3 | - |
| VPMP-2 S | - |
| VPMP-2 M | - |
| VPMP-2 D | - |
| VPMP-1 S | - |
| VPMP-1 M | - |
| VPMP-1 D | - |

e: EW-N1, EW-N4, & EW-N6 set to 170 CFM following sampling

# 07/21/98 System on Zone 2
# Pre Qtrly. Samp.

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -5.25 | 5000 | 109 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -3.4 | 5150 | 112 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -7.5 | 400 | 9 | |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -7.6 | 0 | 0 | |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 2650 | 58 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 2500 | 55 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -7.3 | 0 | 0 | |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 2850 | 62 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -3.5 | 2525 | 55 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | -7.75 | 0 | 0 | |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | -7.3 | 585 | 13 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 473 | |
| | | | | | | | Building Flow: | 522 | |
| Soil Conditions: Dry | | | | | | | Delta: | 49 | |

| | "$H_2O$ WC |
|---|---|
| VPMP-3 | - |
| VPMP-2 S | - |
| VPMP-2 M | - |
| VPMP-2 D | - |
| VPMP-1 S | - |
| VPMP-1 M | - |
| VPMP-1 D | - |
| ITRD North S | - |
| ITRD North M | - |

Note: ED-N1, ED-N2, ED-N4, & ED-N5 set to 60 CFM and EW-N7 & EW-N8 set to approx. 140 CFM following sampling

# 07/29/98 System on Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | -9.75 | 18 | 0 | * |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 8200 | 179 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | -8.5 | 30 | 1 | * |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | -1.75 | 8400 | 183 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | -7.5 | 2100 | 46 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | -4.25 | 8400 | 183 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 592 | |
| | | | | | | | Building Flow: | 559 | |
| Soil Conditions: Dry | | | | | | | Delta: | -33 | |

| | "$H_2O$ WC |
|---|---|
| VPMP-3 | 3.55 |
| VPMP-2 S | 0.29 |
| VPMP-2 M | 0 |
| VPMP-2 D | - |
| VPMP-1 S | 1.1 |
| VPMP-1 M | 2.325 |
| VPMP-1 D | - |
| D North S | 0 |
| D North M | 0.095 |

Flag: * = Measurement performed with Kurz meter

# 07/28/98 System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -7.25 | 7050 | 154 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -5 | 6350 | 139 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -7.6 | 285 | 6 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -7.75 | 600 | 13 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 2870 | 63 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 3200 | 70 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -7.5 | 7 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 2870 | 63 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -4.4 | 2925 | 64 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | -7.9 | 40 | 1 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | -7.6 | 440 | 10 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 581 | |
| | | | | | | | Building Flow: | 545 | |
| | | | | | | | Delta: | -36 | |

Soil Conditions: Dry

| | "$H_2O$ WC |
|---|---|
| VPMP-3 | 0.185 |
| VPMP-2 S | 4.2 |
| VPMP-2 M | 0 |
| VPMP-2 D | - |
| VPMP-1 S | 0.63 |
| VPMP-1 M | 0.27 |
| VPMP-1 D | - |
| ITRD North S | 0 |
| ITRD North M | 12.5 |

Flag: * = Measurement performed with Kurz meter

# 08/03/98 System on Zone 1
# AS Baseline

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 13.1 | 632 | 3 | | EW-N1 | | | 0 | * |
| AS-N2 | 12.6 | 2825 | 15 | | EW-N2 | | | 0 | |
| AS-N3 | 12.4 | 600 | 3 | | EW-N3 | | | 0 | * |
| AS-N4 | 12 | 5500 | 30 | | EW-N4 | | | 0 | |
| AS-N5 | 12.5 | 0 | 0 | | EW-N5 | | | 0 | |
| AS-N6 | 11.5 | 1740 | 9 | | EW-N6 | | | 0 | |
| AS-N7 | 11 | 0 | 0 | | | | | | |
| AS-N8 | 11 | 0 | 0 | | | | | | |
| AS-N9 | 12 | 1420 | 8 | | | | | | |
| | | Sum: | 69 | | | | Sum: | 0 | |
| | | Building Flow: | 162 | | | | Building Flow: | 0 | |
| | | Delta: | 93 | | | | Delta: | 0 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | |
| VPMP-1 M | |
| VPMP-1 D | |
| VPMP-2 S | |
| VPMP-2 M | |
| VPMP-2 D | |
| VPMP-3 | |
| VPMP-4S | |
| VPMP-4M | |

Flag: * = Measurement performed with Kurz meter

# 08/03/98 System on Zone 2
# AS Baseline

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 13 | 4125 | 22 | | EW-N7 | | | 0 | |
| AS-N11 | 13.1 | 1420 | 8 | | EW-N8 | | | 0 | |
| AS-N12 | 13.3 | 0 | 0 | | EW-N9 | | | 0 | * |
| AS-N13 | 13.4 | 1420 | 8 | | EW-N10 | | | 0 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | | | 0 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | | | 0 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | | | 0 | * |
| AS-N17 | 13.6 | 3160 | 17 | | ED-N4 | | | 0 | |
| AS-N18 | 13.25 | 2450 | 13 | | ED-N5 | | | 0 | |
| AS-N19 | 12.9 | 0 | 0 | | ITRD-N7 | | | 0 | * |
| AS-N20 | 12.6 | 0 | 0 | | ITRD-N9 | | | 0 | |
| AS-N21 | 12.75 | 2250 | 12 | | | | | | |
| AS-N22 | 12.25 | 3475 | 19 | | | | | | |
| AS-N23 | 12.6 | 1270 | 7 | | | | | | |
| | | Sum: | 107 | | | | Sum: | 0 | |
| | | Building Flow: | 142 | | | | Building Flow: | 0 | |
| | | Delta: | 35 | | | | Delta: | 0 | |

**Soil Conditions:**

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | |
| VPMP-1 M | |
| VPMP-1 D | |
| VPMP-2 S | |
| VPMP-2 M | |
| VPMP-2 D | |
| VPMP-3 | |
| VPMP-4S | |
| VPMP-4M | |

Flag: * = Measurement performed with Kurz meter

# 08/04/98 ROI on Zone 1

| Well ID | Vac. ("Hg) | Flow (fpm) |
|---|---|---|
| EW-N3 | -11 | * |

Soil Conditions: Dry

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0 |
| VPMP-1 M | 0 |
| VPMP-2 S | 0 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |

# 08/04/98 ROI on Zone 2

| Well ID | Vac. ("Hg) | "$H_2O$ WC | Flow (fpm) | Flow (cfm) |
|---|---|---|---|---|
| EW-N7 | 7 | 3.3 | 7175 | 157 |

Soil Conditions: Dry

| | "$H_2O$ WC | Approx. Dist. (X,Y) in feet from EW-N7 |
|---|---|---|
| EW-N2 | 0.13 | 151 |
| EW-N4 | 0.165 | 84 |
| EW-N5 | 0.14 | 138 |
| EW-N6 | 0.085 | 205 |
| EW-N8 | 1.8 | 74 |
| EW-N9 | 0.5 | 147 |
| EW-N10 | 0.115 | 170 |
| ED-N1 | 0 | ? |
| ED-N2 | 0.08 | ? |
| ED-N4 | 0 | ? |
| ED-N5 | 0.034 | ? |
| ITRD-N7 | 0.25 | 10 |
| ITRD-N9 | 0.9 | 160 |
| VPMP-1 S | 0.46 | 115 |
| VPMP-1 M | 0.17 | 115 |
| VPMP-2 S | 3.4 | 40 |
| VPMP-2 M | 0 | 40 |
| VPMP-3 | 0.08 | 189 |
| VPMP-4S | 0 | 153 |
| VPMP-4M | 0.03 | 153 |

| Well ID | Vac. ("Hg) | "$H_2O$ WC | Flow (fpm) | Flow (cfm) |
|---|---|---|---|---|
| ED-N2 | 0 | 0.44 | 2610 | 57 |

Soil Conditions: Dry

| | "$H_2O$ WC |
|---|---|
| ITRD-N7 | 0.01 |
| ED-N1 | 0 |
| VPMP-1 S | 0 |
| VPMP-2 S | 0 |

# 08/05/98 System on Zone 2
## Re-adjustment of wells following ROI

| Well ID | Vac. ("Hg) | "$H_2O$ WC | Flow (fpm) | Flow (cfm) |
|---|---|---|---|---|
| EW-N7 | • | 2.6 | 6375 | 139 |
| EW-N8 | • | 2.6 | 6375 | 139 |
| EW-N9 | • | 0 | 0 | 0 |
| EW-N10 | • | • | 0 | 0 |
| ED-N1 | • | 0.4 | 2500 | 55 |
| ED-N2 | • | 0.4 | 2500 | 55 |
| ED-N3 | • | • | 0 | 0 |
| ED-N4 | • | 0.4 | 2500 | 55 |
| ED-N5 | • | 0.4 | 2500 | 55 |
| ITRD-N7 | • | • | 0 | 0 |
| ITRD-N9 | • | 0.02 | 740 | 16 |

| | |
|---|---|
| Sum: | 512 |
| Building Flow: | 535 |
| Delta: | 23 |

Soil Conditions: Moderate to Dry

| | "$H_2O$ WC |
|---|---|
| MP-1 S | • |
| VPMP-1 M | • |
| VPMP-1 D | • |
| VPMP-2 S | • |
| VPMP-2 M | • |
| VPMP-2 D | • |
| VPMP-3 | • |
| VPMP-4S | • |
| VPMP-4M | • |

• = Measurement not performed

# 08/05/98 Syste
## Re-adjustment Fo

| Well ID | Vac. ("Hg) | "$H_2O$ WC |
|---|---|---|
| EW-N7 | • | 3 |
| EW-N8 | • | 3 |
| EW-N9 | • | 0 |
| EW-N10 | • | • |
| ED-N1 | • | 0.36 |
| ED-N2 | • | 0.36 |
| ED-N3 | • | • |
| ED-N4 | • | 0.36 |
| ED-N5 | • | 0.36 |
| ITRD-N7 | • | • |
| ITRD-N9 | • | 0.02 |

Buildin

Soil Conditions: Moderate to Dry

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | • |
| VPMP-1 M | • |
| VPMP-1 D | • |
| VPMP-2 S | • |
| VPMP-2 M | • |
| VPMP-2 D | • |
| VPMP-3 | • |
| VPMP-4S | • |
| VPMP-4M | • |

• = Measurement not performed

# m on Zone 2
# ollowing High Sys. Vac.

| Flow (fpm) | Flow (cfm) |
|---|---|
| 6825 | 149 |
| 6825 | 149 |
| 0 | 0 |
| 0 | 0 |
| 2360 | 51 |
| 2360 | 51 |
| 0 | 0 |
| 2360 | 51 |
| 2360 | 51 |
| 0 | 0 |
| 560 | 12 |

| | |
|---|---|
| Sum: | 516 |
| ng Flow: | 542 |
| Delta: | 26 |

# 08/17/98 System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -6.4 | 6100 | 133 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -4.8 | 6925 | 151 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -6.7 | 250 | 5 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -6.75 | 575 | 13 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 2350 | 51 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 2325 | 51 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -6.4 | 8 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 2325 | 51 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -2.5 | 2325 | 51 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | - | 0 | 0 | NM |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | -6.6 | 650 | 14 | * |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 520 | |
| | | | | | | | Building Flow: | 532 | |
| Soil Conditions: Dry | | | | | | | Delta: | 12 | |

| Piezometer | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0.56 |
| VPMP-1 M | 0.27 |
| VPMP-1 D | - |
| VPMP-2 S | 4.05 |
| VPMP-2 M | 0 |
| VPMP-2 D | - |
| VPMP-3 | 0.16 |
| VPMP-4S | 0 |
| VPMP-4M | 9.5 |

Flag: * = Measurement performed with Kurz meter

# System on Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | | | 0 | * |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | | | 0 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | | | 0 | * |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | | | 0 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | | | 0 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | | | 0 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 0 | |
| | | | | | | | Building Flow: | 0 | |
| | | | | | | | Delta: | 0 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | |
| VPMP-1 M | |
| VPMP-1 D | |
| VPMP-2 S | |
| VPMP-2 M | |
| VPMP-2 D | |
| VPMP-3 | |
| PMP-4S | |
| PMP-4M | |

Flag: * = Measurement performed with Kurz meter

# 09/01/98 System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -7.2 | 8000 | 175 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -5.1 | 8000 | 175 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -12 | 425 | 9 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -12.4 | 760 | 17 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 2150 | 47 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 2150 | 47 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -11.75 | 4 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 2150 | 47 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -2.5 | 2150 | 47 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | -11.75 | 1200 | 26 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | -12 | 1180 | 26 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 615 | |
| | | | | | | | Building Flow: | 551 | |
| | | | | | | | Delta: | -64 | |

Soil Conditions: Dry

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0.52 |
| VPMP-1 M | 0.31 |
| VPMP-1 D | 0 |
| VPMP-2 S | 4.3 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-3 | 0.26 |
| VPMP-4S | 0 |
| VPMP-4M | 5.5 |

Flag: * = Measurement performed with Kurz meter

# 09/23/98 System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -7 | 7700 | 168 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -5 | 6380 | 139 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -11.6 | 220 | 5 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -11.9 | 1050 | 23 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 2015 | 44 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 2190 | 48 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -11.6 | 4 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 2050 | 45 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -2 | 2125 | 46 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | -11.6 | 3600 | 79 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | -11.75 | 685 | 15 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 611 | |
| | | | | | | | Building Flow: | 565 | |
| Soil Conditions: Moderate to Dry | | | | | | | Delta: | -46 | |

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0.5 |
| VPMP-1 M | 0.39 |
| VPMP-1 D | 0 |
| VPMP-2 S | 4.1 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-3 | 0.2 |
| VPMP-4S | 0 |
| VPMP-4M | 9.6 |

Flag: * = Measurement performed with Kurz meter

# 10/15/98 System on Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | -14.3 | 20 | 0 | * |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 7800 | 170 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | -13.9 | 40 | 1 | * |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | -1.5 | 8100 | 177 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | -12.3 | 3475 | 76 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | -3.6 | 8000 | 175 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 599 | |
| | | | | | | | Building Flow: | 566 | |
| | | | | | | | Delta: | -33 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 1.8 |
| VPMP-1 M | 2.5 |
| VPMP-1 D | 0 |
| VPMP-2 S | 0.225 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-3 | 2.7 |
| VPMP-4S | 0 |
| VPMP-4M | 0.24 |

Flag: * = Measurement performed with Kurz meter

# 10/12/98 System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -6.25 | 7300 | 159 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -5 | 6350 | 139 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -11.6 | 290 | 6 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -11.9 | 1300 | 28 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 2025 | 44 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 2100 | 46 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -11.6 | 8800 | 5 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 2075 | 45 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | -2.1 | 2125 | 46 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | -12 | 3180 | 69 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | 11.75 | 680 | 15 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 603 | |
| | | | | | | | Building Flow: | 562 | |
| | | | | | | | Delta: | -41 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0.66 |
| VPMP-1 M | 0.48 |
| VPMP-1 D | 0 |
| VPMP-2 S | 4.1 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-3 | 0.28 |
| VPMP-4S | 0 |
| VPMP-4M | 7 |

Flag: * = Measurement performed with Kurz meter

# 10/20/98 AS System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|
| AS-N10 | 8.1 | 1760 | 10 | |
| AS-N11 | 9.2 | 1760 | 10 | |
| AS-N12 | 8.9 | 6800 | 37 | |
| AS-N13 | 9.1 | 1220 | 7 | |
| AS-N14 | off | off | | |
| AS-N15 | off | off | | |
| AS-N16 | off | off | | |
| AS-N17 | 8.5 | 2525 | 14 | |
| AS-N18 | 9.5 | 1760 | 10 | |
| AS-N19 | 9.3 | 1530 | 8 | |
| AS-N20 | 8.4 | 5150 | 28 | |
| AS-N21 | 9 | 8100 | 44 | |
| AS-N22 | 8.25 | 6900 | 38 | |
| AS-N23 | 9.25 | 970 | 5 | |
| | | Sum: | 210 | |
| | | Building Flow: | 324 | |
| | | Delta: | 114 | |

# 10/21/98 AS System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 5.2 | 700 | 3.81790774 | | EW-N7 | | | 0 | |
| AS-N11 | 5.5 | 3450 | 18.816831 | | EW-N8 | | | 0 | |
| AS-N12 | 5.6 | 8700 | 47.451139 | | EW-N9 | | | 0 | * |
| AS-N13 | 8.9 | 560 | 3.05432619 | | EW-N10 | | | 0 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | | | 0 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | | | 0 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | | | 0 | * |
| AS-N17 | 8.1 | 1680 | 9.16297857 | | ED-N4 | | | 0 | |
| AS-N18 | 8.7 | 3950 | 21.543908 | | ED-N5 | | | 0 | |
| AS-N19 | 8.9 | 1480 | 8.07214779 | | ITRD-N7 | | | 0 | * |
| AS-N20 | 8 | 4700 | 25.6345234 | | ITRD-N9 | | | 0 | |
| AS-N21 | 8 | 8150 | 44.4513544 | | | | | | |
| AS-N22 | 7.5 | 4350 | 23.7255695 | | | | | | |
| AS-N23 | 8.4 | 0 | 0 | | | | | | |
| | | Sum: | 205.730686 | | | | Sum: | 0 | |
| | | Building Flow: | 368 | | | | Building Flow: | | |
| | | Delta: | 162 | | | | Delta: | 0 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | |
| VPMP-1 M | |
| VPMP-1 D | |
| VPMP-2 S | |
| VPMP-2 M | |
| VPMP-2 D | |
| VPMP-3 | |
| VPMP-4S | |
| VPMP-4M | |

Flag: * = Measurement performed with Kurz meter

# System on Zone 1

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | 0 | 0 | | EW-N1 | 0 | 0 | 0 | • |
| AS-N2 | 0 | 0 | 0 | | EW-N2 | 0 | 0 | 0 | |
| AS-N3 | 0 | 0 | 0 | | EW-N3 | 0 | 0 | 0 | • |
| AS-N4 | 0 | 0 | 0 | | EW-N4 | 0 | 0 | 0 | |
| AS-N5 | 0 | 0 | 0 | | EW-N5 | 0 | 0 | 0 | |
| AS-N6 | 0 | 0 | 0 | | EW-N6 | 0 | 0 | 0 | |
| AS-N7 | 0 | 0 | 0 | | | | | | |
| AS-N8 | 0 | 0 | 0 | | | | | | |
| AS-N9 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 0 | |
| | | | | | | | Building Flow: | 0 | |
| | | | | | | | Delta: | 0 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | |
| VPMP-1 M | |
| VPMP-1 D | |
| VPMP-2 S | |
| VPMP-2 M | |
| VPMP-2 D | |
| VPMP-3 | |
| VPMP-4S | |
| VPMP-4M | |

Flag: • = Measurement performed with Kurz meter

# 11/25/98 System on Zone 2

| Well ID | Press. (psi) | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | 0 | 0 | | EW-N7 | -5.8 | 5850 | 128 | |
| AS-N11 | 0 | 0 | 0 | | EW-N8 | -4.5 | 5300 | 116 | |
| AS-N12 | 0 | 0 | 0 | | EW-N9 | -9.3 | 325 | 7 | * |
| AS-N13 | 0 | 0 | 0 | | EW-N10 | -9.5 | 1050 | 23 | * |
| AS-N14 | 0 | 0 | 0 | | ED-N1 | 0 | 1880 | 41 | |
| AS-N15 | 0 | 0 | 0 | | ED-N2 | 0 | 1700 | 37 | |
| AS-N16 | 0 | 0 | 0 | | ED-N3 | -9.5 | 0 | 0 | * |
| AS-N17 | 0 | 0 | 0 | | ED-N4 | 0 | 1960 | 43 | |
| AS-N18 | 0 | 0 | 0 | | ED-N5 | 0 | 1260 | 27 | |
| AS-N19 | 0 | 0 | 0 | | ITRD-N7 | -9.5 | 2480 | 54 | * |
| AS-N20 | 0 | 0 | 0 | | ITRD-N9 | -9.8 | 1280 | 28 | |
| AS-N21 | 0 | 0 | 0 | | | | | | |
| AS-N22 | 0 | 0 | 0 | | | | | | |
| AS-N23 | 0 | 0 | 0 | | | | | | |
| | | Sum: | 0 | | | | Sum: | 504 | |
| | | | | | | | Building Flow: | 518 | |
| Soil Conditions: Dry | | | | | | | Delta: | 14 | |

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0.58 |
| VPMP-1 M | 0.38 |
| VPMP-1 D | 0 |
| VPMP-2 S | 3.9 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-3 | 0.21 |
| VPMP-4S | 0 |
| VPMP-4M | 20 |

Flag: * = Measurement performed with Kurz meter

Note: Building Flow from Telog

# System on Zone 1

Barometric Pressure = 30
Temprature = 55

| Well ID | Press. (psi) | Mag. Rdg. | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Mag. Rdg. | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AS-N1 | 0 | | 0 | 0 | | EW-N1 | 0 | - | 0 | 0 | * |
| AS-N2 | 0 | | 0 | 0 | | EW-N2 | 0 | | 0 | 0 | |
| AS-N3 | 0 | | 0 | 0 | | EW-N3 | 0 | - | 0 | 0 | * |
| AS-N4 | 0 | | 0 | 0 | | EW-N4 | 0 | | 0 | 0 | |
| AS-N5 | 0 | | 0 | 0 | | EW-N5 | 0 | | 0 | 0 | |
| AS-N6 | 0 | | 0 | 0 | | EW-N6 | 0 | | 0 | 0 | |
| AS-N7 | 0 | | 0 | 0 | | | | | | | |
| AS-N8 | 0 | | 0 | 0 | | | | | | | |
| AS-N9 | 0 | | 0 | 0 | | | | | | | |
| | | | Sum: | 0 | | | | | Sum: | 0 | |
| | Building Flow: | | | 0 | | | Building Flow: | | | 0 | |
| | | | Delta: | 0 | | | | | Delta: | 0 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | |
| VPMP-1 M | |
| VPMP-1 D | |
| VPMP-2 S | |
| VPMP-2 M | |
| VPMP-2 D | |
| VPMP-3 | |
| VPMP-4S | |
| VPMP-4M | |

Flag: * = Measurement performed with Kurz meter

# 12/30/98 System on Zone 2

Barometric Pressure = 30.16
Temprature = 55

| Well ID | Press. (psi) | Mag. Rdg. | Flow (fpm) | Flow (cfm) | FLAG | Well ID | Vac. ("Hg) | Mag. Rdg. | Flow (fpm) | Flow (cfm) | FLAG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AS-N10 | 0 | | 0 | 0 | | EW-N7 | -6.8 | 1 | 3935 | 86 | |
| AS-N11 | 0 | | 0 | 0 | | EW-N8 | -5.2 | 1.8 | 5280 | 115 | |
| AS-N12 | 0 | | 0 | 0 | | EW-N9 | -10.5 | - | 280 | 6 | * |
| AS-N13 | 0 | | 0 | 0 | | EW-N10 | -10.4 | - | 1175 | 26 | * |
| AS-N14 | 0 | | 0 | 0 | | ED-N1 | 0 | 0.22 | 1846 | 40 | |
| AS-N15 | 0 | | 0 | 0 | | ED-N2 | 0 | 0.1 | 1244 | 27 | |
| AS-N16 | 0 | | 0 | 0 | | ED-N3 | -10.3 | - | 0 | 0 | * |
| AS-N17 | 0 | | 0 | 0 | | ED-N4 | 0 | 0.1 | 1244 | 27 | |
| AS-N18 | 0 | | 0 | 0 | | ED-N5 | -1.5 | 0.22 | 1846 | 40 | |
| AS-N19 | 0 | | 0 | 0 | | ITRD-N7 | -10.4 | - | 3100 | 68 | * |
| AS-N20 | 0 | | 0 | 0 | | ITRD-N9 | -10.4 | 0.065 | 1003 | 22 | |
| AS-N21 | 0 | | 0 | 0 | | | | | | | |
| AS-N22 | 0 | | 0 | 0 | | | | | | | |
| AS-N23 | 0 | | 0 | 0 | | | | | | | |
| | | | Sum: | 0 | | | | | Sum: | 457 | |
| | | | Building Flow: | 0 | | | | | Building Flow: | 525 | |
| | | | Delta: | 0 | | | | | Delta: | 68 | |

Soil Conditions:

| | "$H_2O$ WC |
|---|---|
| VPMP-1 S | 0.66 |
| VPMP-1 M | 0.46 |
| VPMP-1 D | 0 |
| VPMP-2 S | 3.8 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |
| VPMP-3 | 0.28 |
| VPMP-4S | 0.045 |
| VPMP-4M | >20 |

Flag: * = Measurement performed with Kurz meter
Note: SVE Mag readings could be in error due to below freezing outdoor temp.

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Static Soil Gas Monitoring Report - Time Zero ($T_o$)

### INTRODUCTION

The amount of volatile organic compounds (VOCs) contamination in the unsaturated zone at the Mound OU-1 Environmental Restoration site is being measured under both static and dynamic extraction conditions. Point measurements at each soil vapor extraction (SVE) well under static conditions will show how much contamination is present at each location. Localized areas of high and low contamination can be used to assess the value of each extraction well in relation to the system wide removal of VOCs. Quarterly static soil gas measurements are planned to track the mass removal near each extraction well (ITRD, 1997).

### SAMPLING AND ANALYSIS METHODS

The sampling methods were designed to obtain soil vapors from the formation in the area adjacent to each screened interval. A small portable rotary vane vacuum pump was connected to each sampling location and the air volume of the well was purged for about 5 minutes. A 4 liter Summa canister was then connected to the purge line and allowed to fill over about a 1-2 minute period. Samples were collected on November 11 and 12, 1997. Table 1 shows which wells were sampled and included: soil vapor extraction wells, French drain vapor extraction wells, ITRD pilot test vapor extraction wells, vadose zone piezometers, and soil gas samples from groundwater monitoring wells west of the Conrail railroad tracks. These groundwater monitoring wells had screened intervals that reached into soils above the current groundwater surface. Figure 1 shows the locations of these monitoring points at the Mound OU-1 site.

Table 1. Time Zero Soil Gas Sampling Locations

| Sample Location | Descritption |
|---|---|
| EW-N1 | SVE Extraction Well N1 |
| EW-N2 | SVE Extraction Well N2 |
| EW-N3 | SVE Extraction Well N3 |
| EW-N4 | SVE Extraction Well N4 |
| EW-N5 | SVE Extraction Well N5 |
| EW-N6 | SVE Extraction Well N6 |
| EW-N7 | SVE Extraction Well N7 |
| EW-N8 | SVE Extraction Well N8 |
| EW-N9 | SVE Extraction Well N9 |
| EW-N10 | SVE Extraction Well N10 |
| EW-ITRD-N7 | Pilot Test Well Near EW-N7 |
| EW-ITRD-N9 | Pilot Test Well Near EW-N9 |
| ED-1 | French Drain 1 |
| ED-2 | French Drain 2 |
| ED-3 | French Drain 3 |
| ED-4 | French Drain 4 |
| ED-5 | French Drain 5 |
| VP-MP2 | Vadose Zone Piezometer No. 2 |
| VP-MP3M | Vadose Zone Piezometer No. 3, Middle |
| VP-MP3D | Vadose Zone Piezometer No. 3, Deep |
| VP-MP4S | Vadose Zone Piezometer No. 4, Shallow |
| VP-MP4M | Vadose Zone Piezometer No. 4, Middle |
| 0388 | Groundwater Monitoring Well 0388 |
| 0376 | Groundwater Monitoring Well 0376 |
| 0377 | Groundwater Monitoring Well 0377 |

The soil gas samples were analyzed by EPA Compendium Method TO-14 (Winberry, et al. 1988). This method quantifies forty-nine (49) volatile organic compounds by gas chromatography/mass spectroscopy.

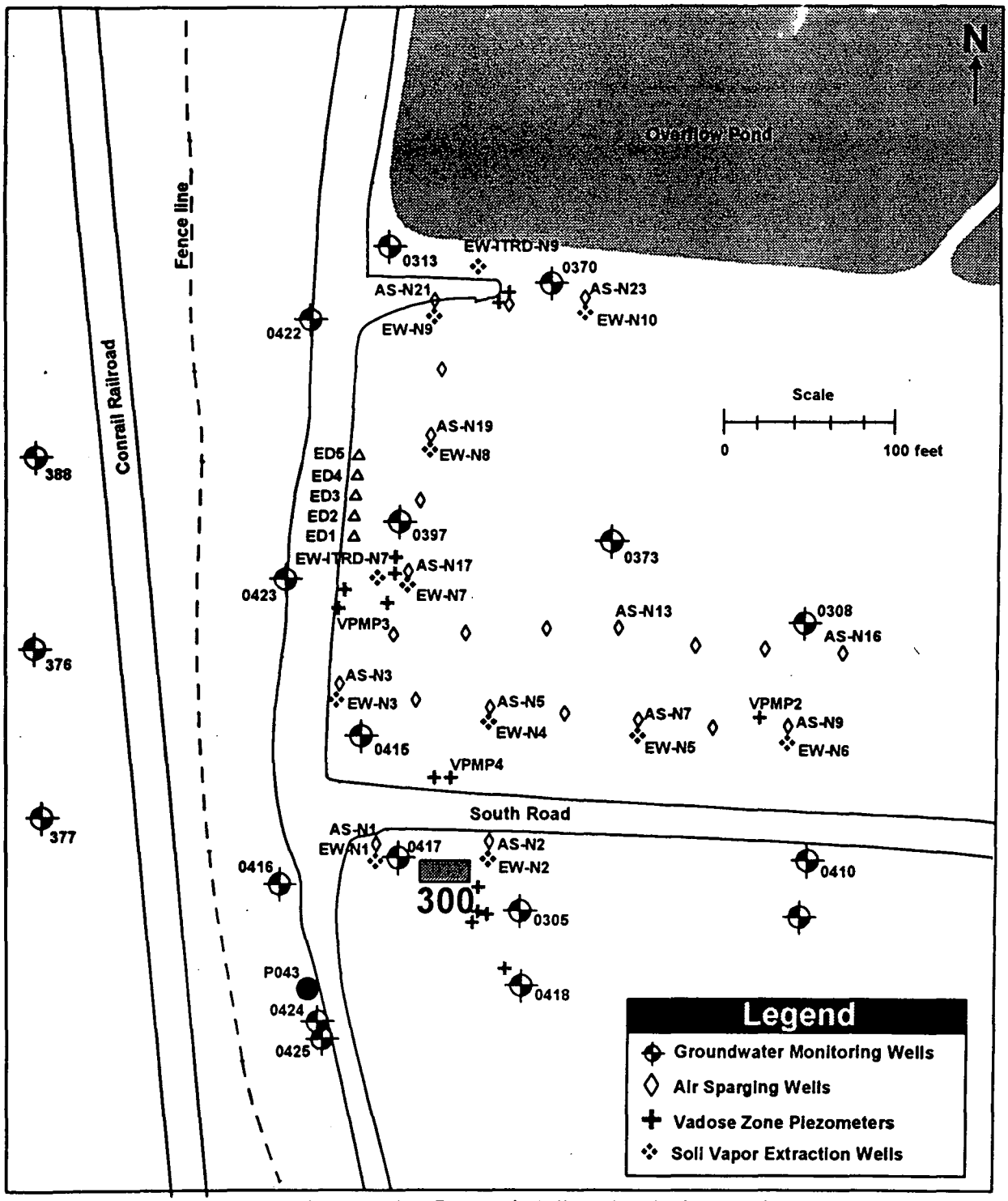



Figure 1. Time Zero Static Soil Gas Monitoring Locations

## RESULTS

Table 2 shows the results of only the detected compounds from each sampling location.

Table 2. Individual Well Summary Analytical Data - Detected Compounds Only

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| 0388 | Dichlorodifluoromethane | 0.8 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 340 | |
| | Methylene chloride | 2 | |
| | 1,1,1-Trichloroethane | 19 | |
| | Carbon tetrachloride | 2.1 | |
| | Trichloroethene | 3.5 | |
| | Tetrachloroethene | 2.7 | |
| 0376 | Dichlorodifluoromethane | 0.72 | J |
| | Trichlorofluoromethane | 6.6 | |
| | Carbon disulfide | 1.2 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 360 | |
| | Methylene chloride | 1.9 | J |
| | 1,1,1-Trichloroethane | 19 | |
| | Trichloroethene | 3.2 | |
| | Tetrachloroethene | 6.3 | |
| 0377 | Trichlorofluoromethane | 17 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 110 | |
| | Methylene chloride | 5.4 | JB |
| | 1,1,1-Trichloroethane | 940 | |
| | Trichloroethene | 11 | |
| | Tetrachloroethene | 9.3 | |
| EW-N1 | Dichlorodifluoromethane | 0.46 | J |
| | Carbon disulfide | 3.7 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.4 | |
| | Acetone | 4.1 | J |
| | Methylene chloride | 1.2 | J |
| | Chloroform | 1 | J |
| EW-N2 | Trichlorofluoromethane | 12 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 410 | |
| | trans-1,2-Dichloroethene | 460 | |
| | cis-1,2-Dichloroethene | 760 | |
| | Chloroform | 120 | |
| | Carbon tetrachloride | 35 | J |
| | Trichloroethene | 5100 | |
| | Toulene | 66 | |
| | Tetrachloroethene | 2500 | |
| | Ethylbenzene | 23 | J |
| | Xylenes (total) | 140 | |
| | 4-Ethyltoluene | 50 | J |
| | 1,3,5-Trimethylbenzene | 22 | J |
| | 1,2,4-Trimethylbenzene | 61 | |
| EW-N3 | Dichlorodifluoromethane | 0.48 | J |
| | Methylene chloride | 1.3 | J |
| | Benzene | 2.4 | |
| | Trichloroethene | 0.88 | J |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| | Toluene | 3.3 | |
| | Tetrachloroethene | 1.2 | J |
| | Ethylbenzene | 0.56 | J |
| VP-MP3D | Chloromethane | 2.7 | J |
| | Vinyl chloride | 13 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.82 | J |
| | Methylene chloride | 1 | JB |
| | trans-1,2-dichloroethene | 1.2 | J |
| | cis-1,2-dichloroethene | 140 | |
| | Trichloroethene | 10 | |
| | Toluene | 1.2 | J |
| | Tetrachloroethene | 2.6 | |
| EW-N4 | Dichlorodifluoromethane | 23 | |
| | Vinyl chloride | 410 | |
| | Trichlorofluoromethane | 2 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 85 | |
| | Methylene chloride | 7.5 | JB |
| | trans-1,2-Dichloroethene | 50 | |
| | cis-1,2-Dichloroethene | 220 | |
| | Chloroform | 35 | |
| | Carbon tetrachloride | 5.8 | J |
| | Trichloroethene | 920 | |
| | Toluene | 6.8 | J |
| | Tetrachloroethene | 420 | |
| EW-N5 | Vinyl chloride | 2300 | |
| | Methylene chloride | 120 | JB |
| | cis-1,2-Dichloroethene | 16000 | |
| | Benzene | 180 | J |
| | Trichloroethene | 780 | |
| | Tetrachloroethene | 230 | |
| EW-N6 | Dichlorodifluoromethane | 400 | |
| | Trichlorofluoromethane | 120 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1200 | |
| | Acetone | 100 | J |
| | Methylene chloride | 14 | JB |
| | cis-1,2-Dichloroethene | 290 | |
| | Chloroform | 40 | |
| | Benzene | 24 | |
| | Trichloroethene | 2800 | |
| | Tetrachloroethene | 80 | |
| VP-MP2 | Dichlorodifluoromethane | 35 | |
| | Vinyl chloride | 170 | |
| | Trichlorofluoromethane | 7.4 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 120 | |
| | Methylene chloride | 5 | |
| | trans-1,2-Dichloroethene | 17 | |
| | cis-1,2-Dichloroethene | 460 | |
| | Chloroform | 3.1 | J |
| | Benzene | 30 | |
| | Trichloroethene | 260 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| | Toluene | 6.6 | |
| | Tetrachloroethene | 14 | |
| | Ethylbenzene | 240 | |
| | Xylenes (total) | 15 | |
| | 1,2,4-Trimethylbenzene | 1.3 | J |
| ED-1 | Dichlorodifluoromethane | 4.8 | |
| | Vinyl chloride | 3.5 | |
| | Carbon disulfide | 1.1 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 7.3 | |
| | trans-1,2-Dichloroethene | 5.1 | |
| | cis-1,2-Dichloroethene | 150 | |
| | Chloroform | 1.8 | J |
| | Trichloroethene | 33 | |
| | Tetrachloroethene | 3 | |
| ED-2 | Dichlorodifluoromethane | 0.46 | J |
| | Vinyl chloride | 14 | |
| | Carbon disulfide | 1 | |
| | Acetone | 6.6 | J |
| | Methylene chloride | 1.2 | J |
| | trans-1,2-Dichloroethene | 1.2 | J |
| | cis-1,2-Dichloroethene | 190 | |
| | Benzene | 0.42 | J |
| | Trichloroethene | 7.8 | |
| | Tetrachloroethene | 1.7 | J |
| ED-3 | Dichlorodifluoromethane | 35 | |
| | Vinyl chloride | 370 | D |
| | 1,1-Dichloroethene | 30 | |
| | Carbon disulfide | 0.74 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 23 | |
| | Acetone | 20 | |
| | Methylene chloride | 2.2 | |
| | trans-1,2-Dichloroethene | 4.1 | |
| | cis-1,2-Dichloroethene | 96 | |
| | Chloroform | 0.67 | J |
| | Benzene | 2.5 | |
| | Trichloroethene | 41 | |
| | Bromodichloromethane | 0.29 | J |
| | 4-Methyl1-2-pentanone | 1.6 | J |
| | Tetrachloroethene | 5.2 | |
| ED-4 | Dichlorodifluoromethane | 4 | |
| | 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 0.41 | J |
| | Vinyl chloride | 6 | |
| | Carbon disulfide | 1.8 | J |
| | Methylene chloride | 2.1 | |
| | cis-1,2-Dichloroethene | 15 | |
| | Chloroform | 1.3 | J |
| | Trichloroethene | 2.7 | |
| | Tetrachloroethene | 1.4 | J |
| | Ethylbenzene | 0.65 | J |
| ED-5 | Dichlorodifluoromethane | 27 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| | Vinyl chloride | 39 | |
| | Chloroethane | 7.8 | |
| | 1,1-Dichloroethene | 1.4 | J |
| | Carbon disulfide | 1.2 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4 | |
| | Acetone | 24 | |
| | Methylene chloride | 2.5 | |
| | 1,1-Dichloroethene | 3.2 | |
| | Vinyl acetate | 1.4 | J |
| | cis-1,2-Dichloroethene | 12 | |
| | Chloroform | 1.1 | J |
| | 1,1,1-Trichloroethane | 0.54 | J |
| | Benzene | 3.1 | |
| | Trichloroethene | 5 | |
| | Toluene | 1.6 | J |
| | Tetrachloroethene | 2.5 | |
| | Dibromochloromethane | 0.38 | J |
| | Chlorobenzene | 1.7 | J |
| | Ethylbenzene | 1.2 | J |
| | Xylenes (total) | 5 | |
| EW-N7 | Dichlorodifluoromethane | 36000 | |
| | Vinyl chloride | 1600000 | D |
| | 1,1-Dichloroethene | 25000 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 140000 | |
| | Methylene chloride | 28000 | B |
| | trans-1,2-Dichloroethene | 19000 | |
| | cis-1,2-Dichloroethene | 3700000 | |
| | Chloroform | 8000 | J |
| | Benzene | 16000 | J |
| | Trichloroethene | 2800000 | |
| | Toluene | 2000000 | |
| | Tetrachloroethene | 75000 | |
| | Ethylbenzene | 4200 | J |
| | Xylenes (total) | 12000 | J |
| EW-N8 | Dichlorodifluoromethane | 260 | |
| | Vinyl chloride | 1400 | |
| | Chloroethane | 59 | J |
| | Methylene chloride | 24 | J |
| | trans-1,2-Dichloroethene | 22 | J |
| | 1,1-Dichloroethene | 270 | |
| | cis-1,2-Dichloroethene | 1300 | |
| | Benzene | 6000 | |
| | Trichloroethene | 2500 | |
| | Toluene | 4400 | |
| | Tetrachloroethene | 180 | |
| | Ethylbenzene | 120 | |
| | Xylenes (total) | 210 | |
| | 1,3,5-Trimethylbenzene | 15 | J |
| | 1,2,4-Trimethylbenzene | 37 | J |
| EW-ITRD-N7 | Dichlorodifluoromethane | 37 | |
| | Vinyl chloride | 490 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 150 | |
| | cis-1,2-Dichloroethene | 1900 | |
| | Benzene | 10 | J |
| | Trichloroethene | 1900 | |
| | Toluene | 3000 | |
| | Tetrachloroethene | 150 | |
| | Xylenes (total) | 57 | |
| | 4-Ethyltoluene | 7.8 | J |
| | 1,2,4-Trimethylbenzene | 11 | J |
| EW-N9 | Trichlorofluoromethane | 42 | J |
| | Methylene chloride | 120 | JB |
| | cis-1,2-Dichloroethene | 4400 | |
| | Trichloroethene | 8500 | |
| | Toluene | 13000 | |
| | Tetrachloroethene | 580 | |
| | Ethylbenzene | 62 | J |
| | Xylenes (total) | 220 | |
| EW-ITRD-N9 | Dichlorodifluoromethane | 1600 | |
| | Vinyl chloride | 10000 | |
| | Trichlorofluoromethane | 470 | |
| | 1,1-Dichloroethene | 210 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4400 | |
| | Methylene chloride | 140 | JB |
| | cis-1,2-Dichloroethene | 19000 | |
| | Chloroform | 2600 | |
| | Benzene | 79 | J |
| | Trichloroethene | 16000 | |
| | Toluene | 5000 | |
| | Tetrachloroethene | 13000 | |
| | Ethylbenzene | 65 | J |
| | Xylenes (total) | 160 | J |
| EW-N10 | Dichlorodifluoromethane | 38 | |
| | Vinyl chloride | 67 | |
| | Trichlorofluoromethane | 160 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 250 | |
| | Methylene chloride | 26 | JB |
| | cisi-1,2-Dichloroethene | 1900 | |
| | Chloroform | 12 | J |
| | Benzene | 15 | J |
| | Trichloroethene | 2700 | |
| | Toluene | 2900 | |
| | Tetrachloroethene | 160 | |
| | Ethylbenzene | 9.4 | J |
| | Xylenes (total) | 26 | J |
| VP-MP-3M | cis-1,2-dichloroethene | 4000 | |
| | Benzene | 25 | J |
| | Trichloroethene | 6800 | |
| | Toluene | 9300 | |
| | Tetrachloroethene | 450 | |
| | Ethylbenzene | 28 | J |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| | Xylenes (total) | 120 | |
| VP-MP-4S | Dichlorodifluoromethane | 160 | |
| | Vinyl chloride | 90 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1100 | |
| | Methylene chloride | 23 | JB |
| | trans-1,2-Dichloroethene | 470 | |
| | cis-1,2-Dichloroethene | 1600 | |
| | Chloroform | 26 | J |
| | Trichloroethene | 2700 | |
| | Toluene | 780 | |
| | Tetrachloroethene | 2400 | |
| | Xylenes (total) | 14 | J |
| VP-MP-4M | 1,1,2-Trichloro-1,2,2-trifluoroethane | 760 | |
| | Methylene chloride | 110 | JB |
| | trans-1,2-Dichloroethene | 930 | |
| | cis-1,2-Dichloroethene | 3000 | |
| | Chloroform | 240 | |
| | Carbon tetrachloride | 50 | J |
| | Trichloroethene | 13000 | |
| | Toluene | 540 | |
| | Tetrachloroethene | 4300 | |

J - Result is detected below the reporting limit or is an estimated concentration.
B - Compound is also detected in the blank.
D-Compound quantitated using a secondary dillution.

## DISCUSSION

Table 2 shows that most of the concentrations are fairly low with values in the tens of parts per million (ppm). However, Extraction Well N7 showed values in the thousands of ppm. Interestingly, Extraction Well ITRD N7, which is located very close to EW-N7, showed values more typical of the rest of the site. This extreme variability over close ranges re-emphasizes the difficulty of estimating the total mass of contaminant over the entire site. Table 3 shows a sorting of the data in Table 2 by each detected compound showing the range of concentrations found for each compound.

Table 3. Compound Concentration by Monitoring Location

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| 0377 | 1,1,1-Trichloroethane | 940 | |
| 0388 | 1,1,1-Trichloroethane | 19 | |
| 0376 | 1,1,1-Trichloroethane | 19 | |
| ED-5 | 1,1,1-Trichloroethane | 0.54 | J |
| EW-N7 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 140000 | |
| EW-ITRD-N9 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4400 | |
| EW-N6 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1200 | |
| VP-MP-4S | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1100 | |
| VP-MP-4M | 1,1,2-Trichloro-1,2,2-trifluoroethane | 760 | |
| EW-N2 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 410 | |
| 0376 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 360 | |
| 0388 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 340 | |
| EW-N10 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 250 | |
| EW-ITRD-N7 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 150 | |
| VP-MP2 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 120 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| 0377 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 110 | |
| EW-N4 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 85 | |
| ED-3 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 23 | |
| ED-1 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 7.3 | |
| EW-N1 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.4 | |
| ED-5 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4 | |
| VP-MP3D | 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.82 | J |
| EW-N7 | 1,1-Dichloroethene | 25000 | |
| EW-N8 | 1,1-Dichloroethene | 270 | |
| EW-ITRD-N9 | 1,1-Dichloroethene | 210 | |
| ED-3 | 1,1-Dichloroethene | 30 | |
| ED-5 | 1,1-Dichloroethene | 3.2 | |
| ED-5 | 1,1-Dichloroethene | 1.4 | J |
| EW-N2 | 1,2,4-Trimethylbenzene | 61 | |
| EW-N8 | 1,2,4-Trimethylbenzene | 37 | J |
| EW-ITRD-N7 | 1,2,4-Trimethylbenzene | 11 | J |
| VP-MP2 | 1,2,4-Trimethylbenzene | 1.3 | J |
| ED-4 | 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 0.41 | J |
| EW-N2 | 1,3,5-Trimethylbenzene | 22 | J |
| EW-N8 | 1,3,5-Trimethylbenzene | 15 | J |
| EW-N2 | 4-Ethyltoluene | 50 | J |
| EW-ITRD-N7 | 4-Ethyltoluene | 7.8 | J |
| ED-3 | 4-Methyl1-2-pentanone | 1.6 | J |
| EW-N6 | Acetone | 100 | J |
| ED-5 | Acetone | 24 | |
| ED-3 | Acetone | 20 | |
| ED-2 | Acetone | 6.6 | J |
| EW-N1 | Acetone | 4.1 | J |
| EW-N7 | Benzene | 16000 | J |
| EW-N8 | Benzene | 6000 | |
| EW-N5 | Benzene | 180 | J |
| EW-ITRD-N9 | Benzene | 79 | J |
| VP-MP2 | Benzene | 30 | |
| VP-MP-3M | Benzene | 25 | J |
| EW-N6 | Benzene | 24 | |
| EW-N10 | Benzene | 15 | J |
| EW-ITRD-N7 | Benzene | 10 | J |
| ED-5 | Benzene | 3.1 | |
| ED-3 | Benzene | 2.5 | |
| EW-N3 | Benzene | 2.4 | |
| ED-2 | Benzene | 0.42 | J |
| ED-3 | Bromodichloromethane | 0.29 | J |
| EW-N1 | Carbon disulfide | 3.7 | J |
| ED-4 | Carbon disulfide | 1.8 | J |
| 0376 | Carbon disulfide | 1.2 | J |
| ED-5 | Carbon disulfide | 1.2 | J |
| ED-1 | Carbon disulfide | 1.1 | J |
| ED-2 | Carbon disulfide | 1 | |
| ED-3 | Carbon disulfide | 0.74 | J |
| VP-MP-4M | Carbon tetrachloride | 50 | J |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| EW-N2 | Carbon tetrachloride | 35 | J |
| EW-N4 | Carbon tetrachloride | 5.8 | J |
| 0388 | Carbon tetrachloride | 2.1 | |
| ED-5 | Chlorobenzene | 1.7 | J |
| EW-N8 | Chloroethane | 59 | J |
| ED-5 | Chloroethane | 7.8 | |
| EW-N7 | Chloroform | 8000 | J |
| EW-ITRD-N9 | Chloroform | 2600 | |
| VP-MP-4M | Chloroform | 240 | |
| EW-N2 | Chloroform | 120 | |
| EW-N6 | Chloroform | 40 | |
| EW-N4 | Chloroform | 35 | |
| VP-MP-4S | Chloroform | 26 | J |
| EW-N10 | Chloroform | 12 | J |
| VP-MP2 | Chloroform | 3.1 | J |
| ED-1 | Chloroform | 1.8 | J |
| ED-4 | Chloroform | 1.3 | J |
| ED-5 | Chloroform | 1.1 | J |
| EW-N1 | Chloroform | 1 | J |
| ED-3 | Chloroform | 0.67 | J |
| VP-MP3D | Chloromethane | 2.7 | J |
| EW-N7 | cis-1,2-Dichloroethene | 3700000 | |
| EW-ITRD-N9 | cis-1,2-Dichloroethene | 19000 | |
| EW-N5 | cis-1,2-Dichloroethene | 16000 | |
| EW-N9 | cis-1,2-Dichloroethene | 4400 | |
| VP-MP-3M | cis-1,2-Dichloroethene | 4000 | |
| VP-MP-4M | cis-1,2-Dichloroethene | 3000 | |
| EW-ITRD-N7 | cis-1,2-Dichloroethene | 1900 | |
| VP-MP-4S | cis-1,2-Dichloroethene | 1600 | |
| EW-N8 | cis-1,2-Dichloroethene | 1300 | |
| EW-N2 | cis-1,2-Dichloroethene | 760 | |
| VP-MP2 | cis-1,2-Dichloroethene | 460 | |
| EW-N6 | cis-1,2-Dichloroethene | 290 | |
| EW-N4 | cis-1,2-Dichloroethene | 220 | |
| ED-2 | cis-1,2-Dichloroethene | 190 | |
| ED-1 | cis-1,2-Dichloroethene | 150 | |
| VP-MP3D | cis-1,2-Dichloroethene | 140 | |
| ED-3 | cis-1,2-Dichloroethene | 96 | |
| ED-4 | cis-1,2-Dichloroethene | 15 | |
| ED-5 | cis-1,2-Dichloroethene | 12 | |
| EW-N10 | cisi-1,2-Dichloroethene | 1900 | |
| ED-5 | Dibromochloromethane | 0.38 | J |
| EW-N7 | Dichlorodifluoromethane | 36000 | |
| EW-ITRD-N9 | Dichlorodifluoromethane | 1600 | |
| EW-N6 | Dichlorodifluoromethane | 400 | |
| EW-N8 | Dichlorodifluoromethane | 260 | |
| VP-MP-4S | Dichlorodifluoromethane | 160 | |
| EW-N10 | Dichlorodifluoromethane | 38 | |
| EW-ITRD-N7 | Dichlorodifluoromethane | 37 | |
| VP-MP2 | Dichlorodifluoromethane | 35 | |
| ED-3 | Dichlorodifluoromethane | 35 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| ED-5 | Dichlorodifluoromethane | 27 | |
| EW-N4 | Dichlorodifluoromethane | 23 | |
| ED-1 | Dichlorodifluoromethane | 4.8 | |
| ED-4 | Dichlorodifluoromethane | 4 | |
| 0388 | Dichlorodifluoromethane | 0.8 | J |
| 0376 | Dichlorodifluoromethane | 0.72 | J |
| EW-N3 | Dichlorodifluoromethane | 0.48 | J |
| EW-N1 | Dichlorodifluoromethane | 0.46 | J |
| ED-2 | Dichlorodifluoromethane | 0.46 | J |
| EW-N7 | Ethylbenzene | 4200 | J |
| VP-MP2 | Ethylbenzene | 240 | |
| EW-N8 | Ethylbenzene | 120 | |
| EW-ITRD-N9 | Ethylbenzene | 65 | J |
| EW-N9 | Ethylbenzene | 62 | J |
| VP-MP-3M | Ethylbenzene | 28 | J |
| EW-N2 | Ethylbenzene | 23 | J |
| EW-N10 | Ethylbenzene | 9.4 | J |
| ED-5 | Ethylbenzene | 1.2 | J |
| ED-4 | Ethylbenzene | 0.65 | J |
| EW-N3 | Ethylbenzene | 0.56 | J |
| EW-N7 | Methylene chloride | 28000 | B |
| EW-ITRD-N9 | Methylene chloride | 140 | JB |
| EW-N5 | Methylene chloride | 120 | JB |
| EW-N9 | Methylene chloride | 120 | JB |
| VP-MP-4M | Methylene chloride | 110 | JB |
| EW-N10 | Methylene chloride | 26 | JB |
| EW-N8 | Methylene chloride | 24 | J |
| VP-MP-4S | Methylene chloride | 23 | JB |
| EW-N6 | Methylene chloride | 14 | JB |
| EW-N4 | Methylene chloride | 7.5 | JB |
| 0377 | Methylene chloride | 5.4 | JB |
| VP-MP2 | Methylene chloride | 5 | |
| ED-5 | Methylene chloride | 2.5 | |
| ED-3 | Methylene chloride | 2.2 | |
| ED-4 | Methylene chloride | 2.1 | |
| 0388 | Methylene chloride | 2 | |
| 0376 | Methylene chloride | 1.9 | J |
| EW-N3 | Methylene chloride | 1.3 | J |
| EW-N1 | Methylene chloride | 1.2 | J |
| ED-2 | Methylene chloride | 1.2 | J |
| VP-MP3D | Methylene chloride | 1 | JB |
| EW-N7 | Tetrachloroethene | 75000 | |
| EW-ITRD-N9 | Tetrachloroethene | 13000 | |
| VP-MP-4M | Tetrachloroethene | 4300 | |
| EW-N2 | Tetrachloroethene | 2500 | |
| VP-MP-4S | Tetrachloroethene | 2400 | |
| EW-N9 | Tetrachloroethene | 580 | |
| VP-MP-3M | Tetrachloroethene | 450 | |
| EW-N4 | Tetrachloroethene | 420 | |
| EW-N5 | Tetrachloroethene | 230 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| EW-N8 | Tetrachloroethene | 180 | |
| EW-N10 | Tetrachloroethene | 160 | |
| EW-ITRD-N7 | Tetrachloroethene | 150 | |
| EW-N6 | Tetrachloroethene | 80 | |
| VP-MP2 | Tetrachloroethene | 14 | |
| 0377 | Tetrachloroethene | 9.3 | |
| 0376 | Tetrachloroethene | 6.3 | |
| ED-3 | Tetrachloroethene | 5.2 | |
| ED-1 | Tetrachloroethene | 3 | |
| 0388 | Tetrachloroethene | 2.7 | |
| VP-MP3D | Tetrachloroethene | 2.6 | |
| ED-5 | Tetrachloroethene | 2.5 | |
| ED-2 | Tetrachloroethene | 1.7 | J |
| ED-4 | Tetrachloroethene | 1.4 | J |
| EW-N3 | Tetrachloroethene | 1.2 | J |
| EW-N7 | Toluene | 2000000 | |
| EW-N9 | Toluene | 13000 | |
| VP-MP-3M | Toluene | 9300 | |
| EW-ITRD-N9 | Toluene | 5000 | |
| EW-N8 | Toluene | 4400 | |
| EW-ITRD-N7 | Toluene | 3000 | |
| EW-N10 | Toluene | 2900 | |
| VP-MP-4S | Toluene | 780 | |
| VP-MP-4M | Toluene | 540 | |
| EW-N2 | Toluene | 66 | |
| EW-N4 | Toluene | 6.8 | J |
| VP-MP2 | Toluene | 6.6 | |
| EW-N3 | Toluene | 3.3 | |
| ED-5 | Toluene | 1.6 | J |
| VP-MP3D | Toluene | 1.2 | J |
| EW-N7 | trans-1,2-Dichloroethene | 19000 | |
| VP-MP-4M | trans-1,2-Dichloroethene | 930 | |
| VP-MP-4S | trans-1,2-Dichloroethene | 470 | |
| EW-N2 | trans-1,2-Dichloroethene | 460 | |
| EW-N4 | trans-1,2-Dichloroethene | 50 | |
| EW-N8 | trans-1,2-Dichloroethene | 22 | J |
| VP-MP2 | trans-1,2-Dichloroethene | 17 | |
| ED-1 | trans-1,2-Dichloroethene | 5.1 | |
| ED-3 | trans-1,2-Dichloroethene | 4.1 | |
| VP-MP3D | trans-1,2-Dichloroethene | 1.2 | J |
| ED-2 | trans-1,2-Dichloroethene | 1.2 | J |
| EW-N7 | Trichloroethene | 2800000 | |
| EW-ITRD-N9 | Trichloroethene | 16000 | |
| VP-MP-4M | Trichloroethene | 13000 | |
| EW-N9 | Trichloroethene | 8500 | |
| VP-MP-3M | Trichloroethene | 6800 | |
| EW-N2 | Trichloroethene | 5100 | |
| EW-N6 | Trichloroethene | 2800 | |
| EW-N10 | Trichloroethene | 2700 | |
| VP-MP-4S | Trichloroethene | 2700 | |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| EW-N8 | Trichloroethene | 2500 | |
| EW-ITRD-N7 | Trichloroethene | 1900 | |
| EW-N4 | Trichloroethene | 920 | |
| EW-N5 | Trichloroethene | 780 | |
| VP-MP2 | Trichloroethene | 260 | |
| ED-3 | Trichloroethene | 41 | |
| ED-1 | Trichloroethene | 33 | |
| 0377 | Trichloroethene | 11 | |
| VP-MP3D | Trichloroethene | 10 | |
| ED-2 | Trichloroethene | 7.8 | |
| ED-5 | Trichloroethene | 5 | |
| 0388 | Trichloroethene | 3.5 | |
| 0376 | Trichloroethene | 3.2 | |
| ED-4 | Trichloroethene | 2.7 | |
| EW-N3 | Trichloroethene | 0.88 | J |
| EW-ITRD-N9 | Trichlorofluoromethane | 470 | |
| EW-N10 | Trichlorofluoromethane | 160 | |
| EW-N6 | Trichlorofluoromethane | 120 | |
| EW-N9 | Trichlorofluoromethane | 42 | J |
| 0377 | Trichlorofluoromethane | 17 | |
| EW-N2 | Trichlorofluoromethane | 12 | J |
| VP-MP2 | Trichlorofluoromethane | 7.4 | |
| 0376 | Trichlorofluoromethane | 6.6 | |
| EW-N4 | Trichlorofluoromethane | 2 | J |
| ED-5 | Vinyl acetate | 1.4 | J |
| EW-N7 | Vinyl chloride | 1600000 | D |
| EW-ITRD-N9 | Vinyl chloride | 10000 | |
| EW-N5 | Vinyl chloride | 2300 | |
| EW-N8 | Vinyl chloride | 1400 | |
| EW-ITRD-N7 | Vinyl chloride | 490 | |
| EW-N4 | Vinyl chloride | 410 | |
| ED-3 | Vinyl chloride | 370 | D |
| VP-MP2 | Vinyl chloride | 170 | |
| VP-MP-4S | Vinyl chloride | 90 | |
| EW-N10 | Vinyl chloride | 67 | |
| ED-5 | Vinyl chloride | 39 | |
| ED-2 | Vinyl chloride | 14 | |
| VP-MP3D | Vinyl chloride | 13 | |
| ED-4 | Vinyl chloride | 6 | |
| ED-1 | Vinyl chloride | 3.5 | |
| EW-N7 | Xylenes (total) | 12000 | J |
| EW-N9 | Xylenes (total) | 220 | |
| EW-N8 | Xylenes (total) | 210 | |
| EW-ITRD-N9 | Xylenes (total) | 160 | J |
| EW-N2 | Xylenes (total) | 140 | |
| VP-MP-3M | Xylenes (total) | 120 | |
| EW-ITRD-N7 | Xylenes (total) | 57 | |
| EW-N10 | Xylenes (total) | 26 | J |
| VP-MP2 | Xylenes (total) | 15 | |
| VP-MP-4S | Xylenes (total) | 14 | J |

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| ED-5 | Xylenes (total) | 5 | |

J - Result is detected below the reporting limit or is an estimated concentration.
B - Compound is also detected in the blank.

Table 4 shows the frequency of detection for each compound from the total of twenty five (25) samples collected. This table indicates that the principal contaminants are found fairly well distributed over the entire site.

Table 4. Frequency of Detection in All Samples

| Detected Compound | Frequency Detected |
|---|---|
| Tetrachloroethene | 24 |
| Trichloroethene | 24 |
| Methylene chloride | 21 |
| cis-1,2-Dichloroethene | 20 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 18 |
| Dichlorodifluoromethane | 18 |
| Toluene | 15 |
| Vinyl Chloride | 15 |
| Chloroform | 14 |
| Benzene | 13 |
| Ethylbenzene | 11 |
| trans-1,2-Dichloroethene | 11 |
| Xylenes (total) | 11 |
| Trichlorofluoromethane | 9 |
| Carbon Disulfide | 7 |
| 1,1-Dichloroethene | 6 |
| Acetone | 5 |
| 1,1,1-Trichloroethane | 4 |
| 1,2,4-Trimethylbenzene | 4 |
| Carbon Tetrachloride | 4 |
| 1,3,5-Trimethylbenzene | 2 |
| 4-Ethyltoluene | 2 |
| Chloroethane | 2 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 1 |
| 4-Methyl1-2-pentanone | 1 |
| Bromodichloromethane | 1 |
| Chlorobenzene | 1 |
| Chloromethane | 1 |
| Dibromochloromethane | 1 |
| Vinyl acetate | 1 |

Finally, Table 5 shows a sum of all the VOCs found and the number of compounds in each well ranked by total VOC concentration.

Table 5. Total VOCs and Number of Compounds per Well

| Well | Total VOC (ppb, v/v) | Compounds/Well |
|---|---|---|
| EW-N7 | 10,463,200 | 14 |
| EW-ITRD-N9 | 72,724 | 14 |
| EW-N9 | 26,924 | 8 |
| VP-MP-4M | 22,930 | 9 |
| VP-MP3M | 20,723 | 7 |

| Well | Total VOC (ppb, v/v) | Compounds/Well |
|---|---|---|
| EW-N5 | 19,610 | 6 |
| EW-N8 | 16,797 | 15 |
| EW-N2 | 9,759 | 14 |
| VP-MP-4S | 9,363 | 11 |
| EW-N10 | 8,263 | 13 |
| EW-ITRD-N7 | 7,713 | 11 |
| EW-N6 | 5,068 | 10 |
| EW-N4 | 2,185 | 12 |
| VP-MP2 | 1,384 | 15 |
| 377 | 1,093 | 6 |
| ED-3 | 632 | 15 |
| 376 | 399 | 8 |
| 388 | 370 | 7 |
| ED-2 | 224 | 10 |
| ED-1 | 210 | 9 |
| VP-MP3D | 173 | 9 |
| ED-5 | 146 | 21 |
| ED-4 | 35 | 10 |
| EW-N1 | 15 | 6 |
| EW-N3 | 10 | 7 |

Measurement of the amount of VOCs extracted from the soils under dynamic conditions will be performed with an automated gas sampling gas chromatograph manufactured by Sentex Systems, Inc. The results of this initial soil gas survey helped to narrow down the number of VOCs to quantify with the Sentex system. Table 6 shows the list of VOCs that will be quantified with the Sentex Auto-GC.

Table 6. VOCs Selected for Quantification with the Sentex Auto-GC.

| VOCs |
|---|
| Trichloroethene |
| Tetrachloroethene |
| Chloroform |
| Carbon Tetrachloride |
| 1,2-Dichloroethane |
| 1,2-cis-Dichloroethene |
| Dichlloromethane |
| Benzene |
| Toluene |
| Ethylbenzene |
| Xylenes |

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3. Winberry, W.T., Jr., N.T. Murphy, and R.M. Riggin. 1988. Compendium of Methods for the Determination of Toxic Organic Compounds in Air. U.S. EPA, Office of Research and Development, Atmospheric Research and Exposure Assessment Laboratory. Research Triangle Park, NC. EPA/600/4-89/018. June 1988.
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# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Static Soil Gas Monitoring Report – Time Series #1

### INTRODUCTION

The amount of volatile organic compound (VOC) contamination in the unsaturated zone at the Mound OU-1 Environmental Restoration site is being measured under both static and dynamic extraction conditions. Point measurements at each soil vapor extraction (SVE) well under static conditions will show how much contamination is present at each location. Localized areas of high and low contamination can be used to assess the value of each extraction well in relation to the system wide removal of VOCs. Periodic static soil gas measurements are planned to track the mass removal near each extraction well (ITRD, 1997).

### SAMPLING AND ANALYSIS METHODS

The sampling methods were designed to obtain soil vapors from the formation in the area adjacent to each screened interval. A small, portable rotary vane vacuum pump was connected to each sampling location and the air volume of the well was purged for about 5 minutes. For the Time Zero data, a 4-liter Summa canister was connected to the purge line and allowed to fill over about a 1-2 minute period. Time Zero samples were collected on November 11 and 12, 1997 and have been previously reported (ITRD, 1998). The SVE system began operation on December 16, 1997. Samples for Time Series # 1 static soil gas monitoring were collected on April 15, 1998. This is approximately 4 months after system startup. Table 1 shows which wells were sampled and include soil vapor extraction wells, French drain vapor extraction wells, ITRD pilot test vapor extraction wells, and vadose zone piezometers. Figure 1 shows the locations of these monitoring points at the Mound OU-1 site.

Table 1. Quarter #1 Soil Gas Sampling Locations

| Sample Location | Descritption |
|---|---|
| EW-N1 | SVE Extraction Well N1 |
| EW-N2 | SVE Extraction Well N2 |
| EW-N3 | SVE Extraction Well N3 |
| EW-N4 | SVE Extraction Well N4 |
| EW-N5 | SVE Extraction Well N5 |
| EW-N6 | SVE Extraction Well N6 |
| EW-N7 | SVE Extraction Well N7 |
| EW-N8 | SVE Extraction Well N8 |
| EW-N9 | SVE Extraction Well N9 |
| EW-N10 | SVE Extraction Well N10 |
| EW-ITRD-N7 | Pilot Test Well Near EW-N7 |
| EW-ITRD-N9 | Pilot Test Well Near EW-N9 |
| ED-1 | French Drain 1 |
| ED-2 | French Drain 2 |
| ED-3 | French Drain 3 |
| ED-4 | French Drain 4 |
| ED-5 | French Drain 5 |
| VP-MP2 | Vadose Zone Piezometer No. 2 |
| VP-MP3S | Vadose Zone Piezometer No. 3, Shallow |

The Time Zero soil gas samples were analyzed by EPA Compendium Method TO-14 (Winberry, et al. 1988). This method quantifies forty-nine (49) volatile organic compounds by gas chromatography/mass spectroscopy. The Time Series #1 samples were collected in a similar fashion; however, tedlar bags were used to capture the sample and the analysis was performed with a commercial multipoint monitoring system called a SSC Model SCENTOSCAN available from Sentex Systems, Inc. (Ridgefield, NJ). The SCENTOSCAN uses a 30m capillary column, micro argon ion detector, combination preconcentrator or sample loop and a scanner system capable of 16 points. A single point calibration standard is used daily as part of the sequencing program. Table 2 shows the compounds used in the calibration. Samples analyzed for this effort used the loop mode that has a practical quantitation limit of about 1 ppmv.

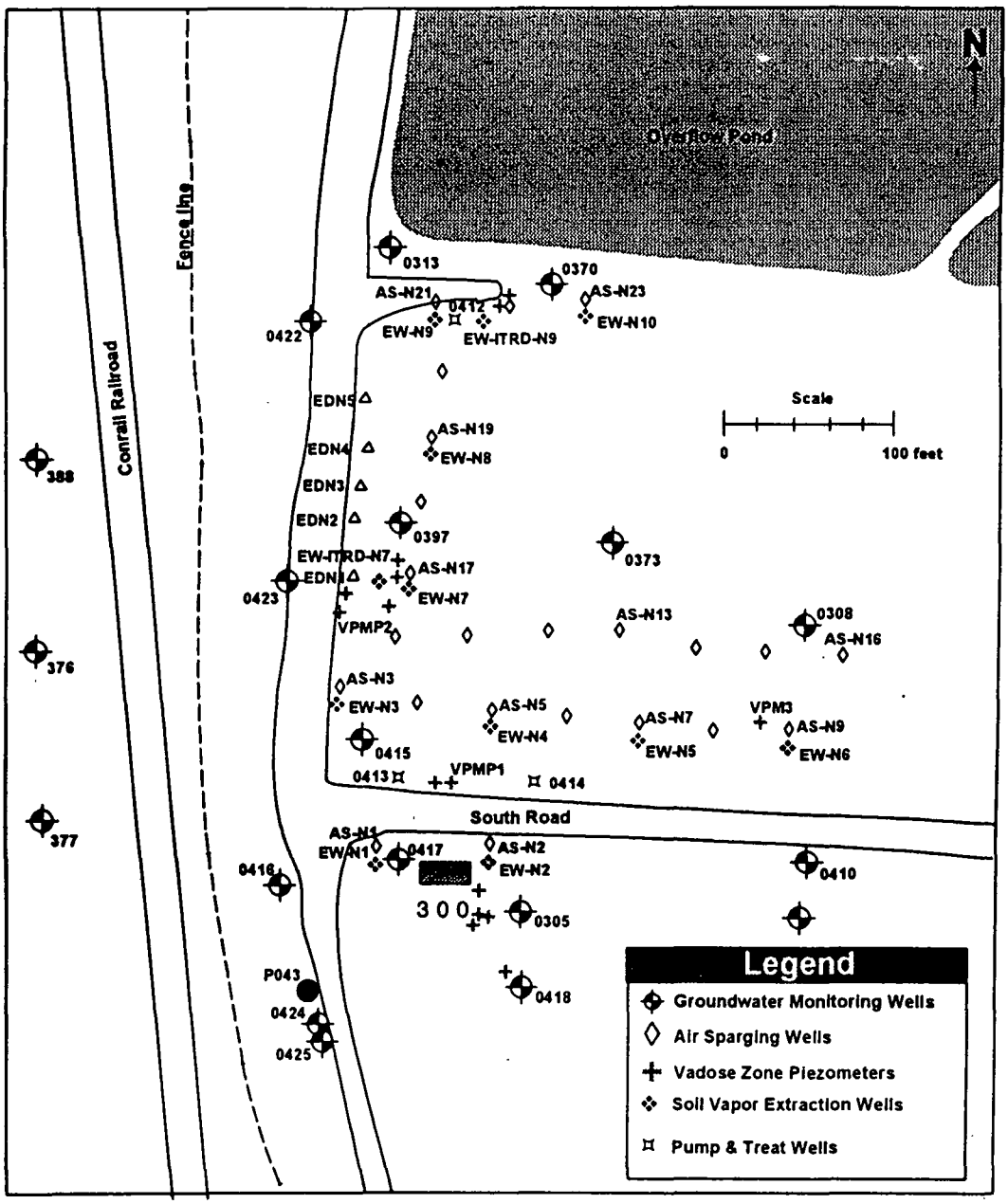


Figure 1. Mound OU-1 Well Locations

Table 2. Calibration Standards

| Sentex SCENTOSCAN System |
|---|
| Dichlormethane |
| cis-1,2-Dichloroethene |
| Benzene |
| Trichloroethene |
| Toluene |
| Tetrachloroethene |
| Ethylbenzene |
| Xylenes (total) |

## RESULTS

Table 3 shows the results for the principal compounds from each sampling location for Time Zero and Time Series #1.

Table 3. Sampling Results for Time Zero and Time Series #1

| SAMPLE | ANALYTE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DCM | | cisDCE | | BEN | | TCE | | TOL | |
| | (ppmv) | | (ppmv) | | (ppmv) | | (ppmv) | | (ppmv) | |
| | Time Zero | Time Series #1 | Time Zero | Time Series #1 | Time Zero | Time Series #1 | Time Zero | Time Series #1 | Time Zero | Time Series #1 |
| | 11/12/97 | 04/15/98 | 11/12/97 | 04/15/98 | 11/12/97 | 04/15/98 | 11/12/97 | 04/15/98 | 11/12/97 | 04/15/98 |
| tedlar blank | | nd | | nd | | nd | | nd | | nd |
| tedlar blank | | nd | | nd | | nd | | nd | | nd |
| tedlar blank | | nd | | nd | | nd | | nd | | nd |
| VPMP-2 | 0.005 | nd | 0.460 | nd | 0.030 | nd | 0.260 | nd | 0.007 | nd |
| VPMP-3S | | nd | | 3.2 | | nd | | nd | | nd |
| EW-N1 | 0.001 | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| EW-N2 | nd | nd | 0.760 | nd | nd | 1.4 | 5.100 | nd | 0.066 | nd |
| EW-N3 | 0.001 | nd | nd | nd | 0.002 | nd | 0.001 | nd | 0.003 | nd |
| EW-N4 | 0.008 | nd | 0.220 | 4.9 | nd | nd | 0.920 | nd | 0.007 | nd |
| EW-N5 | 0.120 | nd | 16.000 | 5.9 | 0.180 | nd | 0.780 | 4.1 | nd | nd |
| EW-N6 | 0.014 | nd | 0.290 | nd | 0.024 | nd | 2.800 | nd | nd | nd |
| EW-N7 | 28.000 | nd | 3700.000 | 4.9 | 16.000 | nd | 2800.000 | 8.0 | 2000.000 | 9.1 |
| EW-N8 | 0.024 | nd | 1.300 | 8.6 | 6.000 | nd | 2.500 | 7.2 | 4.400 | 5.0 |
| EW-N9 | 0.120 | nd | 4.400 | 28.8 | nd | nd | 8.500 | 24.0 | 13.000 | 4.7 |
| EW-N10 | 0.026 | nd | 1.900 | 9.7 | nd | nd | 2.700 | 1.5 | 2.900 | nd |
| ED-N1 | nd | nd | 0.150 | nd | nd | nd | 0.033 | nd | nd | nd |
| ED-N2 | 0.001 | nd | 0.190 | nd | | nd | 0.008 | nd | nd | nd |
| ED-N3 | 0.002 | nd | 0.096 | nd | 0.003 | nd | 0.041 | nd | nd | nd |
| ED-N4 | 0.002 | nd | 0.015 | nd | nd | nd | 0.003 | nd | nd | 5.0 |
| ED-N5 | 0.003 | nd | 0.012 | nd | 0.003 | nd | 0.005 | nd | 0.002 | nd |
| EW –ITRD-N7 | 0.140 | nd | 19.000 | 20.1 | 0.080 | nd | 16.000 | 2.8 | 5.000 | nd |
| EW-ITRD-N9 | nd | nd | 1.900 | nd | 0.010 | nd | 1.900 | 8.864 | 3.000 | nd |
| tedlar blank | | nd | | nd | | nd | | nd | | nd |

nd – not detected
DCM – Dichloromethane (methylene chloride)
cisDCE – cis-1,2-Dichloroethene
BEN – Benzene
TCE – Trichloroethene
TOL - Toluene

## DISCUSSION

Table 3 does not show tetrachloroethene, ethylbenzene and xylenes because the results for these compounds were not above the practical quantitation limit of 1 ppmv. For Zone 2, wells EW-N1 and EW-N3 are short-screened wells located in the glacial till. These wells have non-detectable (<1 ppmv) quantities of VOCs indicating that the value of these wells for mass removal is very limited. EW-N2 showed a slight increase in benzene and a disappearance of cis-1,2-dichloroethene and toluene. All the trace quantities in EW-N4 dropped, except cis-1,2-dichloroethene, which increased. EW-N5 had mixed results with cis-1,2-dichloroethene decreasing and trichloroethene increasing. EW-N6 showed only trace VOCs at time zero which have dropped to non-detectable levels at time series #1.

For Zone 2, the Time Zero report showed a significant amount of VOCs present in EW-N7 and much less in the rest of the extraction wells. The current samples show that these high concentrations have dropped substantially. EW-ITRD-N7 showed a stable but high level of cis-1,2-dichloroethene and a significant drop in the trichloroethene concentration. EW-N8 showed increased concentrations for cis-1,2-dichloroethene, trichloroethene and toluene. EW-N9 showed a significant increase in cis-1,2-dichloroethene and trichloroethene. The EW-ITRD-N9, which is adjacent to EW-N9, also showed a significant increase in trichloroethene but not for cis-1,2-dichloroethene. EW-N10 also showed a significant increase in cis-1,2-dichloroethene and little change in trichloroethene. The French drains all showed less than 1 ppmv for all compounds in the time zero sample event and, except for ED-N4, all time series #1 values were non-detectable (< 1 ppmv). ED-N4 showed a significant increase for toluene.

The results from the dynamic soil vapor extraction monitoring (ITRD, 1998b) indicate that the three most prevalent compounds are cis-1,2-dichlorethene, trichloroethene and toluene. These compounds are also most prevalent in the static soil gas results noted above. The active subsurface ventilation acts to remove and redistribute the VOCs. This may be an explanation for why some of the locations had increased vapor concentrations and others showed decreased concentrations. The data from the low permeability till screened wells (EW-N1 and EW-N3) show that there is very little VOC present in these locations. There still appears to be relatively high concentrations around EW-N7 and up near the overflow pond at EW-N9. The next static soil gas monitoring event is scheduled for July/August 1998.

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6. Data Tables excerpted from T1soilgas.xls, Microsoft Excel 97 SR-1/Windows 97.

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Static Soil Gas Monitoring Report – Time Series #2

### INTRODUCTION

The amount of volatile organic compound (VOC) contamination in the unsaturated zone at the Mound OU-1 Environmental Restoration site is being measured under both static and dynamic extraction conditions. Point source measurements at each soil vapor extraction (SVE) well, under static conditions, provide an estimate of contaminant mass at each location. Localized areas of high and low contamination can be used to assess the value of each extraction well in relation to the system wide removal of VOCs. Periodic static soil gas measurements are planned to track the mass removal near each extraction well (ITRD, 1997). Reports on earlier data sets include Mound OU-1 Air Sparging/Soil Vapor Extraction, Static Soil Gas Monitoring Report – Time Zero ($T_0$) (March 5, 1998), and Mound OU-1 Air Sparging/Soil Vapor Extraction, Static Soil Gas Monitoring Report - Time Series #1 (June 25, 1998)). The analysis results for current collection effort, Time Series #2, are reported in this document.

### SAMPLING AND ANALYSIS METHODS

The sampling method was designed to obtain soil vapors from the formation in the area adjacent to each well screen. A small, portable, rotary vane vacuum pump was connected to each sample location and the well air volume was purged for approximately 5 minutes. For the Time Zero sample collection, a 4-liter Summa canister was connected to the purge line and allowed to fill over a 1-2 minute period. Time Zero samples were collected on November 11 and 12, 1997 and analyzed by an off-site EPA certified laboratory. Analysis results were reported in Mound OU-1 Air Sparging/Soil Vapor Extraction, Static Soil Gas Monitoring Report – Time Zero ($T_0$) (ITRD, 1998a). For the Time Series #1 sample collection, a 10-liter Tedlar bag was connected to the purge line and allowed to fill over a 1-2 minute period. Time Series #1 samples were collected on April 15, 16, 17, and 18, 1998 and analyzed by an on-site gas chromatograph. Analysis results were reported in Mound OU-1 Air Sparging/Soil Vapor Extraction, Static Soil Gas Monitoring Report - Time Series #1 (ITRD, 1998b). Time Series # 2 samples were collected on July 21, 1998 in the same manner as Time Series # 1, and analyzed by an on-site gas chromatograph.

Table 1 provides information on sample locations, and includes soil vapor extraction wells, French drain vapor extraction wells, ITRD pilot test vapor extraction wells, and vadose zone piezometers. Figure 1 shows the locations of these monitoring points at the Mound OU-1 site.

The Time Zero soil gas samples were analyzed by EPA Compendium Method TO-14 (Winberry, et al. 1988). This method quantifies forty-nine (49) volatile organic compounds by gas chromatography/mass spectroscopy. The Time Series #1 and #2 samples were analyzed by a commercial multipoint monitoring system the SSC Model SCENTOSCAN available from Sentex Systems, Inc. (Ridgefield, NJ). The SCENTOSCAN uses a 30m capillary column, micro argon ion detector, preconcentrator/trap or sample loop injector, and a scanner system capable of sampling 16 ports.

A single point calibration standard is used daily as part of the sequencing program. Table 2 shows the compounds used in the calibration. The Time Series #2 high concentration samples, collected from wells EW-N7, EW-N8, EW-N9, EW-N10, EW-ITRD-N7, and EW-ITRD-N9, were analyzed using the loop injection mode and a 10 ppmv calibration standard. The Time Series #2 low concentration samples, collected from wells EW-N1, EW-N2, EW-N3, EW-N4, EW-N5, and EW-N6, ED-N1, ED-N2, ED-N3, ED-N4, ED-N5, VPMP-1S, VPMP-1M, VPMP-2S, and VPMP-3S were analyzed using the preconcentrator/trap injection mode and a 1.0 ppmv calibration standard.

Table 1. Quarter #1 Soil Gas Sampling Locations

| Sample Location | Description |
|---|---|
| EW-N1 | SVE Extraction Well N1 |
| EW-N2 | SVE Extraction Well N2 |
| EW-N3 | SVE Extraction Well N3 |
| EW-N4 | SVE Extraction Well N4 |
| EW-N5 | SVE Extraction Well N5 |
| EW-N6 | SVE Extraction Well N6 |
| EW-N7 | SVE Extraction Well N7 |
| EW-N8 | SVE Extraction Well N8 |
| EW-N9 | SVE Extraction Well N9 |
| EW-N10 | SVE Extraction Well N10 |
| EW-ITRD-N7 | Pilot Test Well Near EW-N7 |
| EW-ITRD-N9 | Pilot Test Well Near EW-N9 |
| ED-1 | French Drain 1 |
| ED-2 | French Drain 2 |
| ED-3 | French Drain 3 |
| ED-4 | French Drain 4 |
| ED-5 | French Drain 5 |
| VP-MP1S | Vadose Zone Piezometer No. 1, Shallow |
| VP-MP1M | Vadose Zone Piezometer No. 1, Middle |
| VP-MP2S | Vadose Zone Piezometer No. 2, Shallow |
| VP-MP3 | Vadose Zone Piezometer No. 3 |

Table 2. Calibration Standards

| Sentex SCENTOSCAN System |
|---|
| Dichloromethane |
| cis-1,2-Dichloroethene |
| Benzene |
| Trichloroethene |
| Toluene |
| Tetrachloroethene |
| Ethylbenzene |
| Xylenes (total) |

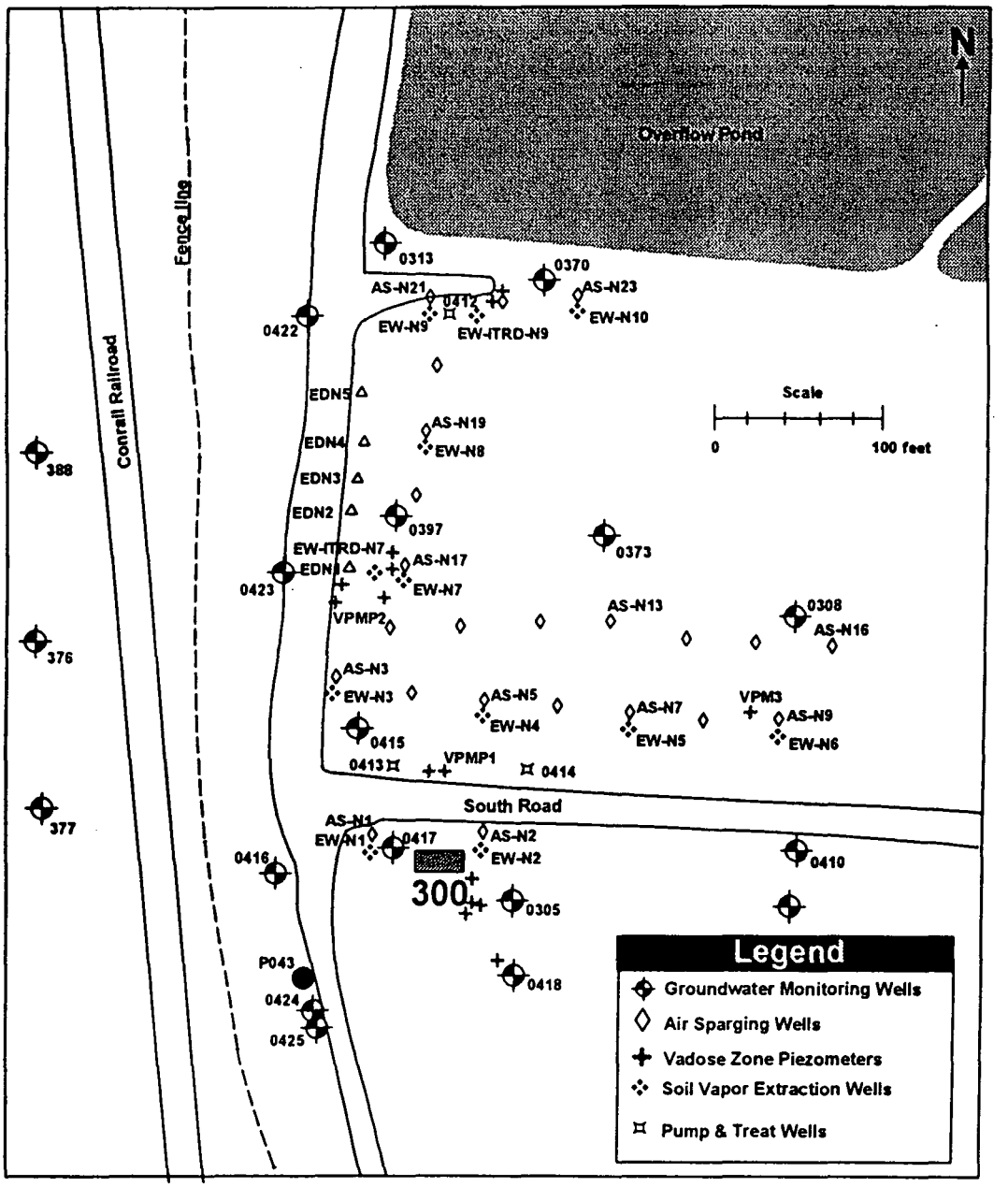


Figure 1. Mound OU-1 Well Locations

## RESULTS

Tables 3a and 3b show the analysis results for the principal compounds from each sampling location for Time Zero, Time Series #1, and Time Series #2.

Table 3a. Sampling Results for Time Zero, Time Series #1, and Time Series #2

| SAMPLE | ANALYTE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | dichloromethane | | | *cis*-1,2-dichloroethene | | | benzene | | |
| | (ppmv) | | | (ppmv) | | | (ppmv) | | |
| | Time Zero | Time Series #1 | Time Series #2 | Time Zero | Time Series #1 | Time Series #2 | Time Zero | Time Series #1 | Time Series #2 |
| | 11/12/97 | 04/15/98 | 07/21/98 | 11/12/97 | 04/15/98 | 07/21/98 | 11/12/97 | 04/15/98 | 07/21/98 |
| tedlar blnk | * | nd | 0.150 | * | nd | 0.068 | * | nd | 0.007 |
| VPMP-2 | 0.005 | nd | nd | 0.460 | nd | 0.106 | 0.030 | nd | nd |
| VPMP-3S | * | nd | 0.143 | * | 3.212 | 0.142 | * | nd | 0.036 |
| EW-N1 | 0.001 | nd | 0.040 | nd | nd | 0.141 | nd | nd | 0.034 |
| EW-N2 | nd | nd | 0.007 | 0.760 | nd | 0.014 | nd | 1.377 | 0.005 |
| EW-N3 | 0.001 | nd | 0.233 | nd | nd | 0.069 | 0.002 | nd | nd |
| EW-N4 | 0.008 | nd | nd | 0.220 | 4.866 | 0.145 | nd | nd | nd |
| EW-N5 | 0.120 | nd | 0.058 | 16.000 | 5.910 | 2.826 | 0.180 | nd | nd |
| EW-N6 | 0.014 | nd | nd | 0.290 | nd | 0.143 | 0.024 | nd | 0.008 |
| EW-N7 | 28.000 | nd | nd | 3700.000 | 4.935 | 0.936 | 16.000 | nd | nd |
| EW-N8 | 0.024 | nd | nd | 1.300 | 8.570 | 0.994 | 6.000 | nd | nd |
| EW-N9 | 0.120 | nd | nd | 4.400 | 28.849 | 2.258 | nd | nd | nd |
| EW-N10 | 0.026 | nd | nd | 1.900 | 9.737 | nd | nd | nd | nd |
| ED-N1 | nd | nd | nd | 0.150 | nd | 0.052 | nd | nd | 0.002 |
| ED-N2 | 0.001 | nd | nd | 0.190 | nd | 0.016 | | nd | nd |
| ED-N3 | 0.002 | nd | 0.016 | 0.096 | nd | 0.303 | 0.003 | nd | 0.002 |
| ED-N4 | 0.002 | nd | nd | 0.015 | nd | 0.051 | nd | nd | nd |
| ED-N5 | 0.003 | nd | 0.002 | 0.012 | nd | 0.025 | 0.003 | nd | nd |
| EW-ITRD-N7 | 0.140 | nd | nd | 19.000 | 20.128 | 0.176 | 0.080 | nd | nd |
| EW-ITRD-N9 | nd | nd | nd | 1.900 | nd | 4.533 | 0.010 | nd | nd |
| tedlar blnk | | nd | nd | | nd | nd | | nd | nd |

nd – not detected
• – not sampled

Table 3b. Sampling Results for Time Zero, Time series #1, and Time Series #2

| SAMPLE | ANALYTE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | trichloroethene | | | toluene | | | tetrachloroethene | | |
| | (ppmv) | | | (ppmv) | | | (ppmv) | | |
| | Time Zero | Time Series #1 | Time Series #2 | Time Zero | Time Series #1 | Time Series #2 | Time Zero | Time Series #1 | Time Series #2 |
| | 11/12/97 | 04/15/98 | 07/21/98 | 11/12/97 | 04/15/98 | 07/21/98 | 11/12/97 | 04/15/98 | 07/21/98 |
| tedlar blnk | * | nd | 0.356 | * | nd | 0.051 | * | * | 0.077 |
| VPMP-2 | 0.260 | nd | 0.280 | 0.007 | nd | 0.011 | 0.014 | * | 0.087 |
| VPMP-3S | * | nd | 0.453 | * | nd | 0.008 | 0.003 | * | 0.125 |
| EW-N1 | nd | nd | 0.284 | nd | nd | 0.064 | * | * | 0.143 |
| EW-N2 | 5.100 | nd | 0.089 | 0.066 | nd | 0.012 | 2.500 | * | 0.044 |
| EW-N3 | 0.001 | nd | 0.165 | 0.003 | nd | 0.012 | 0.001 | * | 0.058 |
| EW-N4 | 0.920 | nd | 0.684 | 0.007 | nd | 0.004 | 0.420 | * | 0.037 |
| EW-N5 | 0.780 | 4.062 | 1.830 | nd | nd | 0.987 | 0.230 | * | 1.572 |
| EW-N6 | 2.800 | nd | 0.389 | nd | nd | 0.041 | 0.080 | * | 0.152 |
| EW-N7 | 2800.000 | 8.007 | 5.563 | 2000.000 | 9.132 | 4.335 | 75.000 | * | nd |
| EW-N8 | 2.500 | 7.188 | 3.082 | 4.400 | 5.006 | nd | 0.180 | * | nd |
| EW-N9 | 8.500 | 24.009 | 24.245 | 13.000 | 4.748 | 1.540 | 0.580 | * | 3.855 |
| EW-N10 | 2.700 | 1.517 | 1.559 | 2.900 | nd | nd | 0.160 | * | 0.149 |
| ED-N1 | 0.033 | nd | 0.331 | nd | nd | 0.037 | 0.003 | * | 0.056 |
| ED-N2 | 0.008 | nd | 0.108 | nd | nd | 0.011 | 0.002 | * | 0.015 |
| ED-N3 | 0.041 | nd | 2.462 | nd | nd | 0.146 | 0.005 | * | 0.04 |
| ED-N4 | 0.003 | nd | 0.371 | nd | 4.984 | 0.026 | 0.001 | * | 0.032 |
| ED-N5 | 0.005 | nd | 0.216 | 0.002 | nd | 0.016 | 0.003 | * | 0.025 |
| EW-ITRD-N7 | 16.000 | 2.827 | 0.722 | 5.000 | nd | 0.656 | 0.015 | * | nd |
| EW-ITRD-N9 | 1.900 | 8.864 | 17.762 | 3.000 | nd | 0.345 | 13.000 | * | 0.721 |
| tedlar blnk | | nd | nd | | nd | | | * | nd |

nd – not detected
* – not sampled

## DISCUSSION

Better quantitation of low concentration contaminants was achieved through the use of the preconcentrator/trap injection mode of the on-site field gas chromatograph. The non-detection results for Time Series #1 were replaced in most instances by a sub ppmv value in the current series. All low concentration wells (EW-N1, EW-N2, EW-N3, EW-N4, EW-N5, and EW-N6, ED-N1, ED-N2, ED-N3, ED-N4, ED-N5, VPMP-1S, VPMP-1M, VPMP-2S, and VPMP-3S) showed a modest change in concentration after Time Zero, suggesting low contaminant removal with some relocation of volatiles in the sub-surface.

Table 3a and 3b do not show ethylbenzene and total xylenes because the analytical results for these compounds were not detected or were not reliable at the low concentrations found in the samples.

The high contaminant concentration wells, EW-N7, EW-N8, EW-N10, and EW-ITRD-N7, all show significant contaminant reduction. However, EW-N9 and EW-ITRD-N9 show an increase in contaminant concentration which is most probably linked to the influence of the vapor extraction system on a more permeable zone.

The dynamic soil vapor extraction monitoring results from this sampling series indicate that the three most prevalent compounds remaining in the sub-surface are cis-1,2-dichlorethene, trichloroethene and toluene. These compounds are also most prevalent in the current static soil gas, as reported in Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Soil Vapor Extraction System Monitoring – Time Series #4 (ITRD, 1998c). The active subsurface ventilation acts to remove and apparently redistribute the VOCs. This may explain why some of the locations had increased vapor concentrations and others showed decreased concentrations. The highest concentrations of contaminants, especially *cis*-1,2-dichloroethene, trichloroethene, and toluene, occur at EW-N7, EW-N9 and EW-ITRD-N9, which are located in extraction Zone 2.

The next static soil gas monitoring event is scheduled for October 1998.

## REFERENCES


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7. Data Tables excerpted from T1soilgas.xls, Microsoft Excel 97 SR-1/Windows 97.

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

# Soil Vapor Extraction System Monitoring - Time Series #1

## INTRODUCTION

The objective of the soil vapor extraction (SVE) process monitoring system is to measure the concentration of the influent and effluent vapors. An automated gas sampling gas chromatograph will be used to measure the concentrations of eleven volatile organic compounds (VOCs) at intervals as frequently as 30 minutes. SVE extraction flow rates are measured by a standard pitot read manually on a periodic frequency. The SVE system started operation on December 16, 1997; however, the process monitoring system was not yet installed and online. Therefore, six grab samples with Summa canisters were collected over the first five weeks of operation. This report describes the results of the four Summa canister samples collected during the first twenty days of system operation.

## SOIL VAPOR EXTRACTION SYSTEM DESIGN SUMMARY

The soil vapor extraction (SVE) system is segregated into two zones. Zone 1 includes six wells in the southern portion of the site. Zone 2 includes six SVE wells and five French drain vents in the northern portion of the site. Table 1 shows the zone assignment, screen length and geologic strata where each well is located.

Table 1. Extraction Well Details

| Extraction Well | Screen Length | Geologic Strata |
|---|---|---|
| | Zone 1 | |
| EW-N1 | 2 | till |
| EW-N2 | 15 | non-till |
| EW-N3 | 3 | till |
| EW-N4 | 22 | non-till |
| EW-N5 | 2.5 | clay |
| EW-N6 | 10 | non-till |
| | Zone 2 | |
| EW-N7 | 10 | non-till |
| EW-N8 | 10 | non-till |
| EW-N9 | 15 | non-till |
| EW-N10 | 12.5 | non-till |
| ED-1 | 5 | base of French drain |
| ED-2 | 5 | base of French drain |
| ED-3 | 5 | base of French drain |
| ED-4 | 5 | base of French drain |
| ED-5 | 5 | base of French drain |
| ITRD-1 | 4.5 | non-till |
| ITRD-2 | 8.5 | till |

All of the SVE wells in each zone intersect a main manifold that enters the treatment building 301. The SVE system operates with an adjustable scheduler that alternates Zone 1 and Zone 2 at specified equal intervals. The manifolds are connected to a water knock-out tank and then pass through two carbon beds in series before the air is discharged.

## SAMPLING AND ANALYSIS METHODS

Since the SVE system operates at a system vacuum of about 12 inches of mercury, grab samples collected with the Summa canisters must be performed on a zone that is currently not operating. A short section of teflon tubing is connected to the manifold sampling port, then the valve on the Summa canister is opened and the internal vacuum is allowed to fill the canister. When the automated process monitor comes online, samples will be collected from Zone 1 and Zone 2 manifolds; and, after the first and second carbon bed. Table 2 shows the dates of the first four grab samples with the Summa canisters.

Table 2. Sampling Dates

| Grab Sample Dates |
|---|
| December 18, 1997 |
| December 22, 1997 |
| December 29, 1997 |
| January 5, 1998 |

## RESULTS

The results of the grab samples for both Zone 1 and 2 showed exponential declines of the VOCs over time. Figure 1 shows an example for trichloroethene that shows this decline. Curve fits to the four data points were completed to estimate concentrations before and in between the sampling events. As shown in Figure 1, the early time concentrations fall very steeply and the curve fit lines may not be representative of the actual concentrations. Table 3 shows the equations and correlation factors for the curve fits for each of the VOCs where there was sufficient data to evaluate.

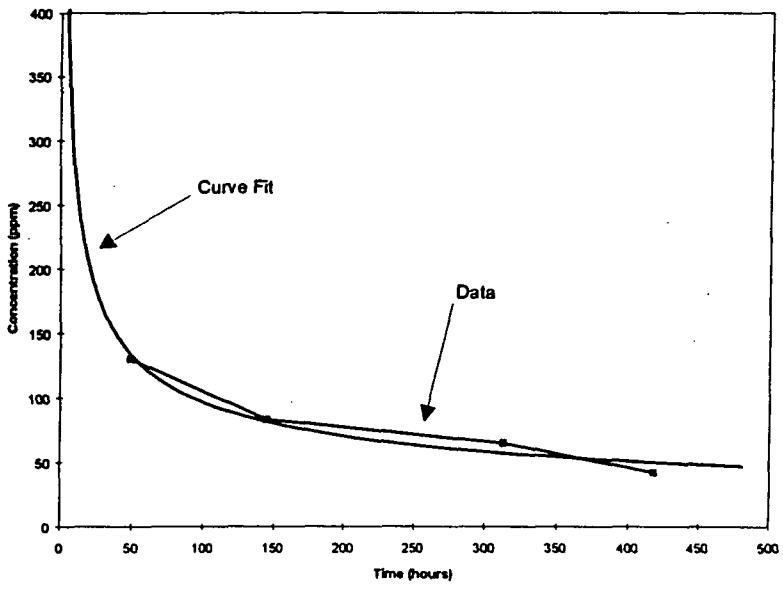


Figure 1. Time History of Trichloroethene and Curve Fit (Zone 2)

Table 3. Curve Fits and Correlation Factors for VOC Extraction Time History

| | Zone 1 | | Zone 2 | |
|---|---|---|---|---|
| VOC | Curve Fit | Correlation ($R^2$) | Curve Fit | Correlation ($R^2$) |
| Trichloroethene | $y = 196.21x^{-0.6400}$ | 0.9916 | $y = 806.01x^{-0.4603}$ | 0.9550 |
| Tetrachloroethene | $y = 18.062x^{-0.2076}$ | 0.9612 | $y = 50.17x^{-0.4147}$ | 0.9615 |
| cis-1,2-Dichlorethene | $y = 1955.6x^{-1.0484}$ | 0.9958 | $y = 2183.5x^{-0.716}$ | 0.9884 |
| Vinyl chloride | $y = 158.62x^{-1.1683}$ | 0.9996 | $y = 177.29x^{-0.7131}$ | 0.9653 |
| Freon 113 | $y = 2.3445x^{-0.5369}$ | 0.9005 | $y = 12.086x^{-0.3994}$ | 0.8751 |
| Benzene | $y = 32.97x^{-1.0255}$ | 0.9958 | $y = 14.992x^{-0.4646}$ | 0.9230 |
| Toluene | $y = 207.49x^{-0.4085}$ | 0.9935 | $y = 3171.4x^{0.6657}$ | 0.9698 |
| Ethyl benzene | insufficient data | | $y = 12.767x^{-0.5516}$ | 0.9679 |
| Xylenes | insufficient data | | $y = 49.06x^{-0.4675}$ | 0.9390 |
| Acetone | $y = 46.242x^{-0.707}$ | 0.7123 | insufficient data | |
| Dichloromethane | $y = 0.8515x^{-0.2907}$ | 0.8400 | insufficient data | |

To estimate the total mass of each contaminant extracted from the soils, the flow rate from each manifold is used with the concentration data as follows:

$$M_{VOC} = C_{VOC} \frac{MW_{VOC}}{MV_{T,P}} Vt(3.74E-6)$$

where, $M_{VOC}$ is the mass of the contaminant removed (lbs), $C_{VOC}$ is the concentration of the contaminant (ppm, v/v), $MW_{VOC}$ is the molecular weight of the VOC (g/mol), $MV_{T,P}$ is the molar volume of the vapor at a specific temperature and pressure (24.5 l/mol at 25°C and 1 atm), V is the volumetric flow rate in the extraction manifold (std $ft^3$/min), t is the time interval (min) and 3.74E-6 is for unit conversions. Figure 2 shows the Zone 1 and Zone 2 manifold flow rates during this initial operating period. From time zero to the operating time of 178 hours the system ran on six hour intervals. The system was switched to four hour intervals from hour 178 to 552 and to a two hour interval from hour 552 to date. These changes were made to keep automatic shutdowns from occurring when large amounts of water were being extracted from the French drains soon after rainfall events occurred. Table 4 shows the total mass of each VOC removed estimated from the curve fits of the grab samples and measured flow rates. Figure 3 shows the cumulative mass of all VOCs extracted from each zone.

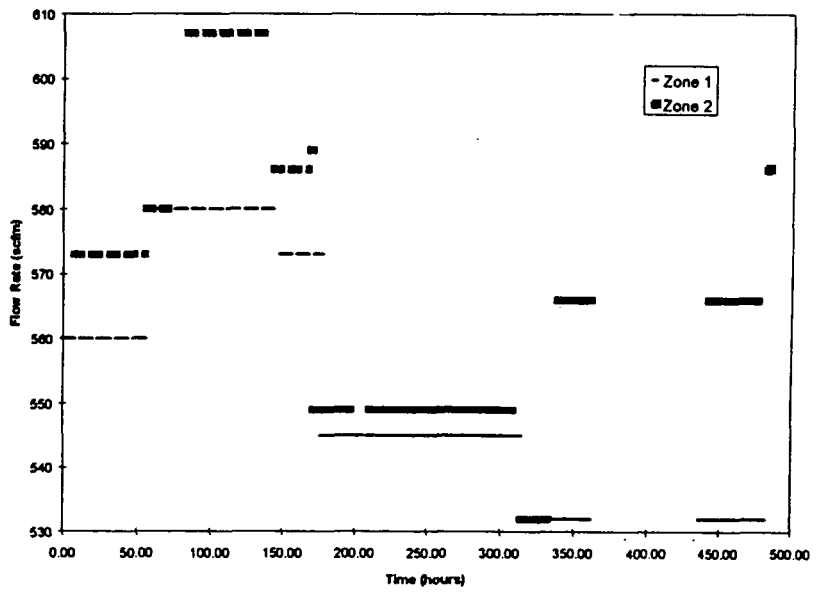


Figure 2. SVE Manifold Flow Rates for Zones 1 and 2

Table 4. VOC Mass Removals from Zones 1 and 2

| VOC | Zone 1 from 12/16/97 | Zone 1 from 12/18/97 | Zone 2 from 12/16/97 | Zone 2 from 12/18/97 | Zone 1 and 2 from 12/16/97 | Zone 1 and 2 from 12/18/97 |
|---|---|---|---|---|---|---|
| Trichloroethene | 26.61 | 14.35 | 191.51 | 137.32 | 218.12 | 151.67 |
| Tetrachloroethene | 19.08 | 15.48 | 18.54 | 13.66 | 37.62 | 29.15 |
| cis-1,2-Dichlorethene | 62.88 | 13.76 | 125.27 | 73.98 | 188.15 | 87.74 |
| Vinyl chloride | 2.65 | 0.40 | 6.64 | 3.93 | 9.29 | 4.33 |
| Freon 113 | 0.67 | 0.41 | 5.42 | 4.03 | 6.08 | 4.44 |
| Benzene | 0.89 | 0.21 | 2.07 | 1.48 | 2.97 | 1.69 |
| Toluene | 49.19 | 34.78 | 213.8 | 131.94 | 262.99 | 166.72 |
| Ethyl benzene | • | * | 1.63 | 1.10 | 1.63 | 1.10 |
| Xylenes | * | * | 9.12 | 6.51 | 9.12 | 6.51 |
| Acetone | 2.20 | 1.06 | • | * | 2.20 | 1.06 |
| Dichloromethane | 0.31 | 0.24 | * | • | 0.31 | 0.24 |
| Totals | 164.49 | 80.71 | 573.99 | 373.94 | 738.48 | 454.65 |

• - insufficient concentration data to estimate mass

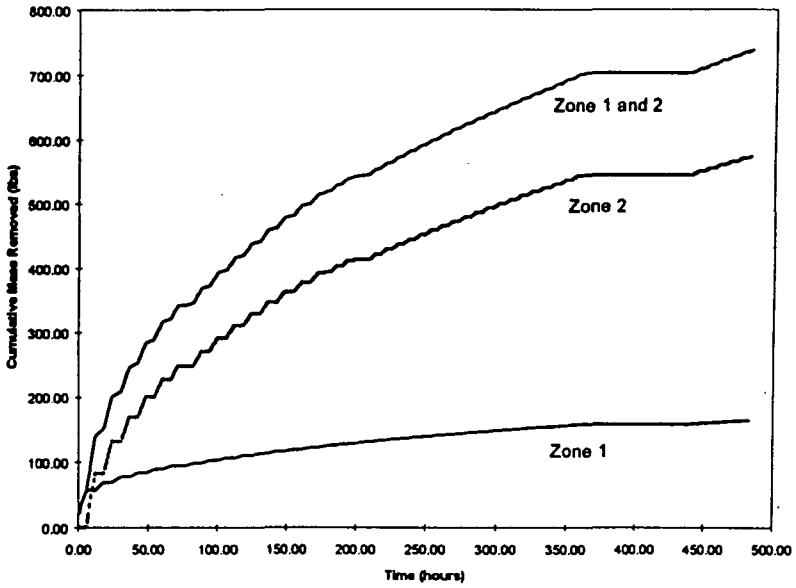


Figure 3. Cumulative Mass of VOC Extracted from Zones 1 and 2

## DISCUSSION

The early time periods in a SVE system provide much more mass removal than in the later periods due, principally, to the diffusion limitation condition where VOC must move from within dead end pore spaces to the locations experiencing active ventilation. Since a manifold sample was not able to be obtained during the first few hours of operation and very frequently in the first week, the method used herein to estimate total mass of contaminant removed may have significant errors in this early time period. Therefore, when reporting the amount of mass removed by the system, it is recommended that the individual and sum total of all VOCs removed be taken from the first sampling date (12/18/97) forward. This indicates that about 80 lbs of total VOCs were removed from Zone 1 and 375 lbs from Zone 2 for a total of about 450 lbs from both zones (Table 4).

## REFERENCES

1. ITRD, 1997. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Cost and Performance Data Collection Plan. December 1997.
2. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 129990-0001/004-SA, January 20, 1998.
3. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 130267-0001/004-SA, February 5, 1998.
4. Winberry, W.T., Jr., N.T. Murphy, and R.M. Riggin. 1988. Compendium of Methods for the Determination of Toxic Organic Compounds in Air. U.S. EPA, Office of Research and Development, Atmospheric Research and Exposure Assessment Laboratory. Research Triangle Park, NC. EPA/600/4-89/018. June 1988.
5. Data Tables excerpted from Z1summas.xls, Z2summas.xls and massremv.xls, Microsoft Excel ver. 7.0a/Windows 95. (J. M. Phelan, Sandia National Laboratories).

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Soil Vapor Extraction System Monitoring - Time Series #2

### INTRODUCTION

The objective of the soil vapor extraction (SVE) process monitoring system is to measure the concentration of the influent and effluent vapors. An automated gas sampling gas chromatograph will be used to measure the concentrations of eleven volatile organic compounds (VOCs) at intervals as frequently as 30 minutes. SVE extraction flow rates are measured by a standard pitot read manually on a periodic frequency. The SVE system started operation on December 16, 1997; however, the process monitoring system was not yet installed and online. Therefore, six grab samples with Summa canisters were collected over the first five weeks of operation. This report describes the results of all six Summa canister samples collected during the first thirty seven days of system operation. A report on the first four Summa canister results was prepared on March 5, 1998 (Soil Vapor Extraction System Monitoring – Time Series #2).

### SOIL VAPOR EXTRACTION SYSTEM DESIGN SUMMARY

The soil vapor extraction (SVE) system is segregated into two zones. Zone 1 includes six wells in the southern portion of the site. Zone 2 includes six SVE wells and five French drain vents in the northern portion of the site. Table 1 shows the zone assignment, screen length and geologic strata where each well is located.

Table 1. Extraction Well Details

| Extraction Well | Screen Length | Geologic Strata |
|---|---|---|
| | Zone 1 | |
| EW-N1 | 2 | till |
| EW-N2 | 15 | non-till |
| EW-N3 | 3 | till |
| EW-N4 | 22 | non-till |
| EW-N5 | 2.5 | clay |
| EW-N6 | 10 | non-till |
| | Zone 2 | |
| EW-N7 | 10 | non-till |
| EW-N8 | 10 | non-till |
| EW-N9 | 15 | non-till |
| EW-N10 | 12.5 | non-till |
| ED-1 | 5 | base of French drain |
| ED-2 | 5 | base of French drain |
| ED-3 | 5 | base of French drain |
| ED-4 | 5 | base of French drain |
| ED-5 | 5 | base of French drain |
| ITRD-1 | 8.5 | non-till |
| ITRD-2 | 4.5 | till |

All of the SVE wells in each zone intersect a main manifold that enters the treatment building 301. The SVE system operates with an adjustable scheduler that alternates Zone 1 and Zone 2 at specified intervals. The manifolds are connected to a water knock-out tank and then pass through two carbon beds in series before the air is discharged.

## SAMPLING AND ANALYSIS METHODS

Since the SVE system operates at a system vacuum of about 12 inches of mercury, grab samples collected with the Summa canisters must be performed on a zone that is currently not operating. A short section of teflon tubing is connected to the manifold sampling port, then the valve on the Summa canister is opened and the internal vacuum is allowed to fill the canister. Samples are shipped to an off-site contract laboratory for chemical analysis by EPA Method TO-14 (Winberry et al., 1988). When the automated process monitor comes online, samples will be collected from Zone 1 and Zone 2 manifolds; and, after the first and second carbon beds. Table 2 shows the dates of the first six grab samples with the Summa canisters.

Table 2. Sampling Dates

| Grab Sample Dates |
|---|
| December 18, 1997 |
| December 22, 1997 |
| December 29, 1997 |
| January 5, 1998 |
| January 12, 1998 |
| January 19, 1998 |

## RESULTS

Table 3 and 4 show the chemical specific results for Zone 1 and Zone 2, respectively. The results of the grab samples for both Zones 1 and 2 show exponential declines of the VOCs over time. Figure 1 and 2 show the time history for Zone 1 and 2, respectively, for the three compounds with the greatest concentrations (toluene, cis-1,2 dichloroethene and trichloroethene). Curve fits to the six data points were completed to estimate concentrations before and in between the sampling events. Tables 5 and 6 show the equations and correlation factors for the curve fits for each of the VOCs where there was sufficient data to evaluate.

Table 3. Contaminant Concentrations in Zone 1 (ppm, v/v)

| | 12/18/97 | 12/22/97 | 12/29/97 | 1/5/98 | 1/12/98 | 1/19/98 |
|---|---|---|---|---|---|---|
| Vinyl chloride | 8.0 | 1.4 | 0.5 | 0.4 | 0.2 | 0.1 |
| Trichlorofluoromethane | | | | | | |
| Freon 113 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Acetone | 3.3 | | 0.4 | 1.0 | 0.6 | 0.6 |
| Methylene chloride | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 |
| Trans-1,2-dichloroethene | | | | | | |
| cis-1,2-dichloroethene | 33.0 | 11.0 | 4.3 | 3.2 | 2.4 | 1.3 |
| Chloroform | 0.2 | | 0.1 | 0.1 | 0.1 | 0.1 |
| Benzene | 0.6 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 |
| Trichloroethene | 16.0 | 8.6 | 4.6 | 3.9 | 2.2 | 1.6 |
| Toluene | 42.0 | 28.0 | 19.0 | 17.0 | 8.8 | 3.2 |
| Tetrachloroethene | 8.3 | 6.1 | 5.4 | 5.2 | 3.5 | 1.8 |
| Ethylbenzene | | | 0.0 | 0.0 | 0.0 | 0.0 |
| Xylenes | 0.2 | 0.1 | 0.2 | 0.2 | 0.8 | 0.1 |
| Total | 112.1 | 55.8 | 34.9 | 31.2 | 18.8 | 8.9 |

Table 4. Contaminant Concentrations in Zone 2 (ppm, v/v)

| | 12/18/97 | 12/22/97 | 12/29/97 | 1/5/98 | 1/12/98 | 1/19/98 |
|---|---|---|---|---|---|---|
| Vinyl chloride | 10.0 | 6.2 | 2.9 | 2.0 | 1.7 | 1.1 |
| Trichlorofluoromethane | 1.7 | 1.5 | 1.4 | 0.8 | 1.1 | 0.6 |
| Freon 113 | 2.5 | 1.6 | 1.5 | 0.9 | 1.1 | 0.7 |
| Acetone | | | | 0.9 | 0.7 | |
| Methylene chloride | 1.6 | 1.9 | 1.6 | 0.9 | 0.7 | 0.7 |
| Trans-1,2-dichloroethene | | | 0.5 | 0.3 | 0.3 | |
| cis-1,2-dichloroethene | 130.0 | 64.0 | 39.0 | 24.0 | 21.0 | 17.0 |
| Chloroform | 1.2 | 0.5 | 0.8 | 0.5 | 0.7 | 0.6 |
| Benzene | 2.3 | 1.6 | 1.2 | 0.7 | 0.7 | 0.5 |
| Trichloroethene | 130.0 | 83.0 | 65.0 | 42.0 | 42.0 | 50.0 |
| Toluene | 220.0 | 130.0 | 75.0 | 46.0 | 35.0 | 41.0 |
| Tetrachloroethene | 10.0 | 6.1 | 5.2 | 3.6 | 3.6 | 3.3 |
| Ethylbenzene | 1.4 | 0.9 | 0.6 | 0.4 | 0.3 | 0.2 |
| Xylenes | 7.4 | 5.3 | 3.7 | 2.4 | 2.2 | 1.5 |
| Total | 518.1 | 302.6 | 198.4 | 125.4 | 111.1 | 117.2 |

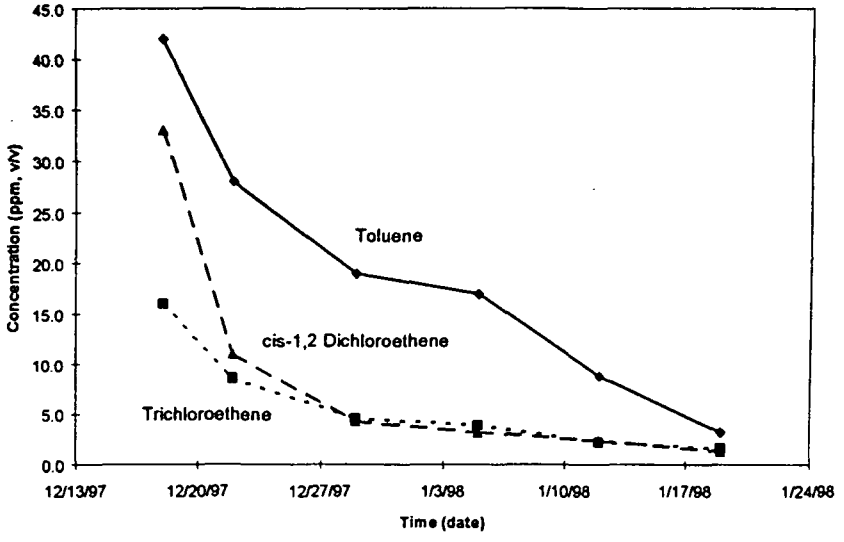


Figure 1. Time History for Zone 1

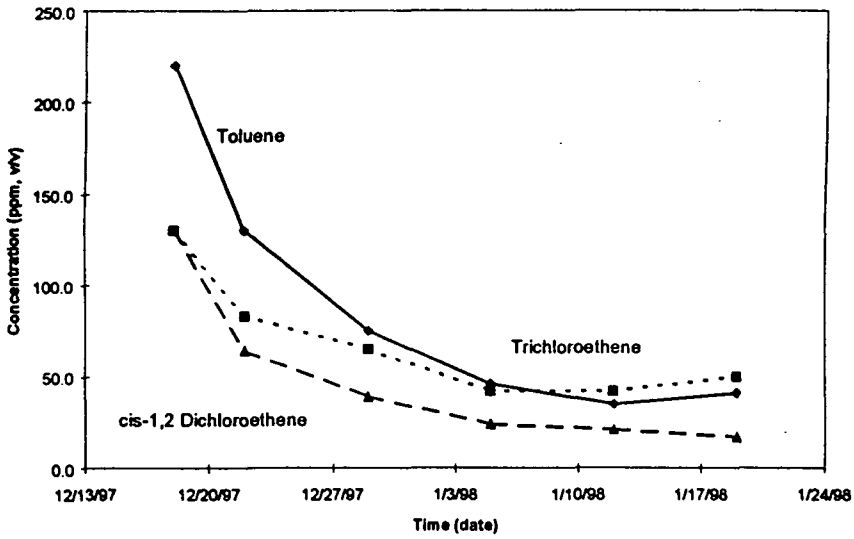


Figure 2. Time History for Zone 2

Table 5. Curve Fits and Correlation Factors for VOC Extraction Time History

| | Zone 1 | |
|---|---|---|
| VOC | Curve Fit | Correlation ($r^2$) |
| Trichloroethene | $y^{-1}$=0.0462+8.76e-5xlnx | 0.9943 |
| Tetrachloroethene | y=-6746.6+6754.52exp(-x/1006471.8) | 0.9266 |
| cis-1,2-Dichlorethene | $y^{-1}$=0.0090+0.000111xlnx | 0.9992 |
| Vinyl chloride | $y^{-1}$=-0.0808+0.00108xlnx | 0.9998 |
| Freon 113 | y=0.09689+0.62926exp(-x/49.34) | 0.9991 |
| Benzene | y=0.03523+0.9085exp(-x/94.82) | 0.9944 |
| Toluene | $y^{-1}$=0.0212+1.58xlnx | 0.9502 |
| Ethyl benzene | Insufficient data | |
| Xylenes | Insufficient data | |
| Acetone | $y^{-1}$=0.2515+0.000270xlnx | 0.9983 |
| Dichloromethane | y=-1.2307+1.502exp(-x/4674.6) | 0.9891 |

Table 6. Curve Fits and Correlation Factors for VOC Extraction Time History

| | Zone 2 | |
|---|---|---|
| VOC | Curve Fit | Correlation ($r^2$) |
| Trichloroethene | y=44.88+120.35exp(-x/136.96) | 0.9731 |
| Tetrachloroethene | y=3.522+9.053exp(-x/136.01) | 0.9691 |
| cis-1,2-Dichlorethene | $y^{-1}$=0.0056+1.144e-5xlnx | 0.9896 |
| Vinyl chloride | $y^{-1}$=0.0751+0.000127xlnx | 0.9951 |
| Freon 113 | $y^{-1}$=0.3909+0.000152xlnx | 0.8543 |
| Benzene | $y^{-1}$=0.3920+0.000264xlnx | 0.9845 |
| Toluene | $y^{-1}$=0.00363+5.06e-6xlnx | 0.9904 |
| Ethyl benzene | $y^{-1}$=0.5886+0.000677xlnx | 0.9975 |
| Xylenes | $y^{-1}$=0.1202+8.59e-5xlnx | 0.9921 |
| Acetone | Insufficient data | |
| Dichloromethane | Insufficient data | |

As shown in Figure 1 and 2, the early time concentrations fall very steeply and the curve fit lines may not be representative of the actual concentrations in the first 50 hours before the first sample was obtained on December 18, 1997. Therefore, mass removal estimates have been made starting from the first sample date. To estimate the total mass of each contaminant extracted from the soils, the flow rate from each manifold is used with the concentration data as follows:

$$M_{VOC} = C_{VOC} \frac{MW_{VOC}}{MV_{T,P}} Vt(3.74E-6)$$

where, $M_{VOC}$ is the mass of the contaminant removed (lbs), $C_{VOC}$ is the concentration of the contaminant (ppm, v/v), $MW_{VOC}$ is the molecular weight of the VOC (g/mol), $MV_{T,P}$ is the molar volume of the vapor at a specific temperature and pressure (24.5 l/mol at 25°C and 1 atm), V is the volumetric flow rate in the extraction manifold (std $ft^3$/min), t is the time interval (min) and 3.74E-6 is for unit conversions. Figure 3 shows the Zone 1 and Zone 2 manifold flow rates during this initial operating period. From time zero to the operating time of 178 hours the system ran on six hour intervals. The system was switched to four hour intervals from hour 178 to 552 and to a two hour interval from hour 552 to date. These changes were made to keep automatic shutdowns from occurring when large amounts of water were being extracted from the French drains soon after rainfall events occurred. Table 7 shows the total mass of each VOC removed estimated from the curve fits of the grab samples and measured flow rates. Figure 4 shows the cumulative mass of all VOCs extracted from each zone.

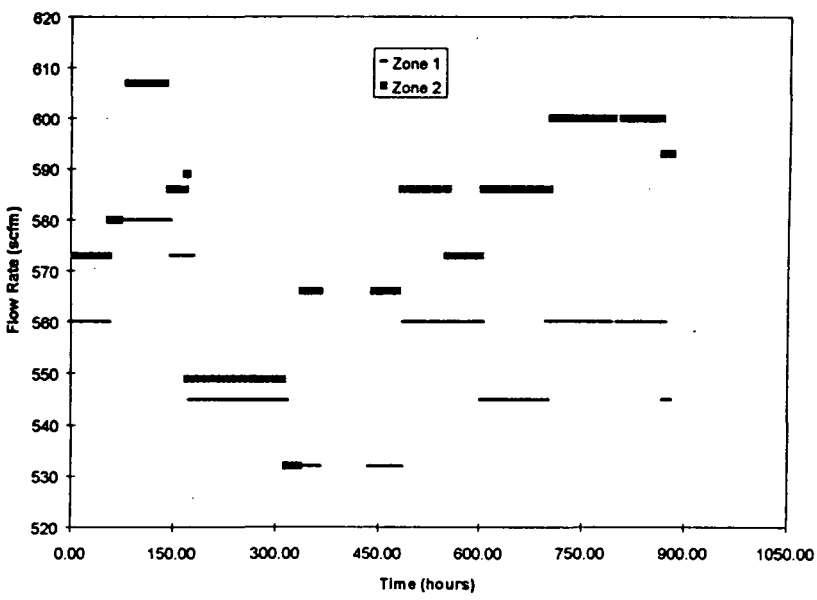


Figure 3. Total System Flow Rates

Table 7. VOC Mass Removal

| | Zone 1 | Zone 2 | Zone 1 + Zone 2 |
|---|---|---|---|
| Vinyl Chloride | 1.59 | 6.08 | 7.67 |
| cis1,2 Dichloroethene | 17.52 | 111.75 | 129.27 |
| Trichloroethene | 20.13 | 245.07 | 265.21 |
| Toluene | 53.28 | 210.74 | 264.02 |
| Tetrachloroethene | 25.18 | 23.98 | 49.16 |
| Freon 113 | 0.67 | 7.85 | 8.52 |
| Acetone | 2.32 | * | 2.32 |
| Xylene | * | 10.78 | 10.78 |
| Benzene | 0.26 | 2.51 | 2.76 |
| Ethylbenzene | * | 1.69 | 1.69 |
| Dichloromethane | 0.35 | * | 0.35 |
| total | 121.30 | 620.45 | 741.75 |

* - insufficient concentration data to estimate mass

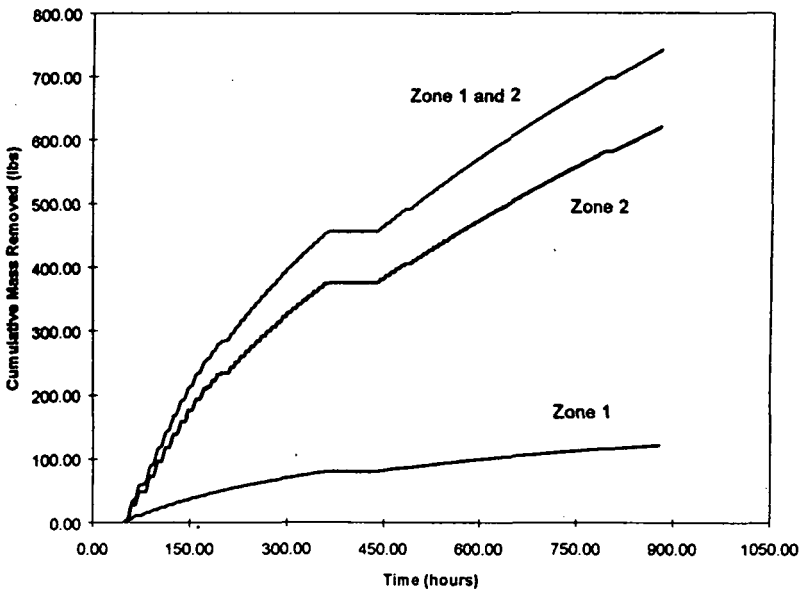


Figure 4. Cumulative Mass of VOC Extracted from Zones 1 and 2

## DISCUSSION

The early time periods in a SVE system provide much more mass removal than in the later periods due, principally, to the diffusion limitation condition where VOC must move from within dead end pore spaces to the locations experiencing active ventilation. The total mass removal rate (Figure 5) has reached a plateau at about 0.1 lb/hr for zone 1 and 1 lb/hr for zone 2. Future monitoring should provide more information on the stability of the total VOC mass removal rates. To optimize the total mass removal, consideration will be given to changing the cycle time for each zone and an evaluation of which wells can be closed. Individual SVE well grab samples are planned which will show proportionate mass removal.

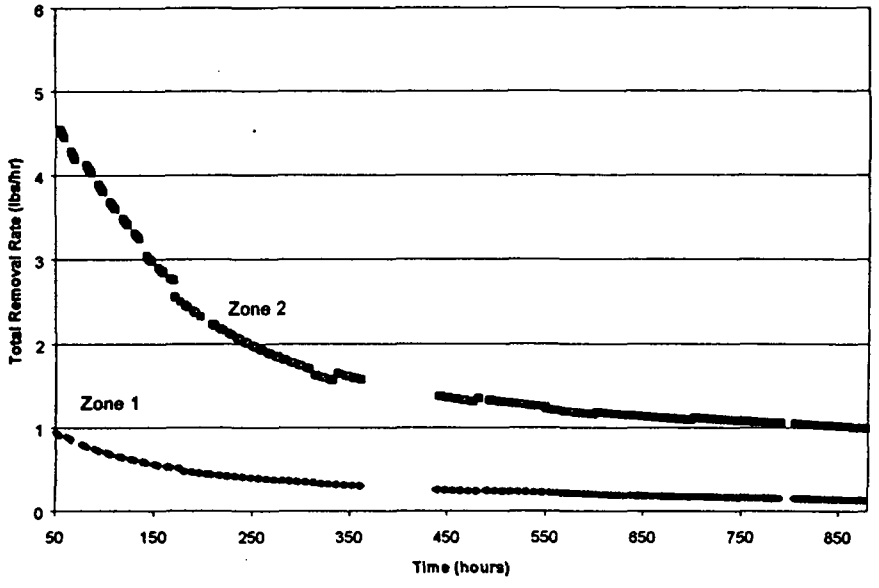


Figure 5. Total VOC Mass Removal Rate Over Time

## REFERENCES


1. ITRD, 1997. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Cost and Performance Data Collection Plan. December 1997.
2. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 129990-0001/004-SA, January 20, 1998.
3. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 130267-0001/004-SA, February 5, 1998.
4. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 130615-0001/004-SA, February 24, 1998.
5. Winberry, W.T., Jr., N.T. Murphy, and R.M. Riggin. 1988. Compendium of Methods for the Determination of Toxic Organic Compounds in Air. U.S. EPA, Office of Research and Development, Atmospheric Research and Exposure Assessment Laboratory. Research Triangle Park, NC. EPA/600/4-89/018. June 1988.
6. Data Tables excerpted from Z1suma2.xls, Z2suma2.xls and massremv2.xls, Microsoft Excel SR-1/Windows 97. (J. M. Phelan, Sandia National Laboratories).

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

# Soil Vapor Extraction System Monitoring - Time Series #3

## INTRODUCTION

The objective of the soil vapor extraction (SVE) process monitoring system is to measure the concentration of the influent and effluent vapors. A combination of grab samples with Summa canisters and automated gas sampling and analysis equipment is now used to measure the concentrations of volatile organic compounds (VOCs). SVE extraction flow rates are measured by a standard pitot read manually on a periodic frequency. The SVE system started operation on December 16, 1997. This report describes the results of the combined data set from Summa canisters and automated gas sampling and analysis samples up to May 31, 1998. Reports on earlier data sets included just the Summa canister results (Soil Vapor Extraction System Monitoring – Time Series #1 (March 5, 1998); Soil Vapor Extraction System Monitoring – Time Series #2 (May 18, 1998)).

## SOIL VAPOR EXTRACTION SYSTEM DESIGN SUMMARY

The soil vapor extraction (SVE) system is segregated into two zones. Zone 1 includes six wells in the southern portion of the site. Zone 2 includes six SVE wells and five French drain vents in the northern portion of the site. Table 1 shows the zone assignment, screen length and geologic strata where each well is located.

Table 1. Extraction Well Details

| Extraction Well | Screen Length | Geologic Strata |
|---|---|---|
| | Zone 1 | |
| EW-N1 | 2 | till |
| EW-N2 | 15 | non-till |
| EW-N3 | 3 | Till |
| EW-N4 | 22 | non-till |
| EW-N5 | 2.5 | Clay |
| EW-N6 | 10 | non-till |
| | Zone 2 | |
| EW-N7 | 10 | non-till |
| EW-N8 | 10 | non-till |
| EW-N9 | 15 | non-till |
| EW-N10 | 12.5 | non-till |
| ED-1 | 5 | base of French drain |
| ED-2 | 5 | base of French drain |
| ED-3 | 5 | base of French drain |
| ED-4 | 5 | base of French drain |
| ED-5 | 5 | base of French drain |
| ITRD-1 | 8.5 | non-till |
| ITRD-2 | 4.5 | Till |

All of the SVE wells in each zone intersect a main manifold that enters the treatment building 301. The SVE system operates with an adjustable scheduler that alternates Zone 1 and Zone 2 at specified intervals. The manifolds are connected to a water knock-out tank and then pass through two carbon beds in series before the vapors are discharged to the atmosphere.

## SAMPLING AND ANALYSIS METHODS

Since the SVE system operates at a system vacuum of about 12 to 18 inches of mercury, grab samples must be collected on a zone that has just been turned off. For the Summa canisters, a short section of teflon tubing is connected to the manifold sampling port, then the valve on the Summa canister is opened and the internal vacuum is allowed to fill the canister. Samples are shipped to an off-site contract laboratory for chemical analysis by EPA Method TO-14 (Winberry et al., 1988).

The automated process monitoring system is a commercial on-line multipoint monitoring system called a SSC Model SCENTOSCAN available from Sentex Systems, Inc (Ridgefield, NJ). The Sentex process monitor pulls vapors through a coalescing filter to remove entrained water and through a heated tubing bundle from the SVE/AS building to the analytical shed. The Sentex uses a 30m capillary column, micro argon ion detector, combination preconcentrator or sample loop and a scanner system capable of 16 points. A single point calibration standard is used daily as part of the sequencing program. Table 2 shows the compounds used in the calibration. Vinyl chloride was not included because it is a difficult compound to measure among the other compounds present.

Table 2. Calibration Standards

| Sentex SCENTOSCAN System |
|---|
| Dichlormethane |
| cis-1,2-dichloroethene |
| Benzene |
| Trichloroethene |
| Toluene |
| Tetrachloroethene |
| Ethylbenzene |
| Xylenes (total) |

The Sentex process monitor was put on line in February 1998. However, the precision of the calibration standards was very poor in data sets obtained in February and March. Changing the operational parameters to use longer sampling times for the preconcentrator mode would work for Zone 1 samples (low concentrations of target analytes); however, this would collect excessive amounts for Zone 2 samples. In May 1998, the system was switched to manual collection and sample loop mode for analysis of Zone 2 samples only. The SVE system was changed to pull only from Zone 2 due to the low concentrations produced from Zone 1. This may continue until concentrations in Zone 2 approach those of Zone 1. In addition, frequent heavy spring rains at the site would produce more water than the coalescing filters could manage. Thus, careful monitoring was required to prevent liquid water from being injected into the gas chromatograph.

## RESULTS

Table 3 and 4 show the chemical specific results for Zone 1 and Zone 2, respectively. The results of the grab samples for both Zones 1 and 2 show exponential declines of the VOCs over time. Figure 1 through 3 show the time history for Zone 1 for the three compounds with the greatest concentrations (toluene, cis-1,2 dichloroethene and trichloroethene). Figures 4 through 6 show the time history for Zone 2. Curve fits to the data were completed with TableCurve 2D (Ver 4, SPSS, Inc.) to estimate concentrations before and in between the sampling events. Tables 5 and 6 show the equations and correlation factors for the curve fits for each of the VOCs where there was sufficient data to evaluate.

## Table 3. Zone 1 Analyte Data (ppmv)

| Date | Source | Total Time (Hours) | VC | F113 | ACE | DCM | cisDCE | 2-BUT | TCM | BEN | TCE | TOL | PCE | EBZ | XYL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Dec-97 | Summa | 49 | 8.000 | 0.330 | 3.300 | 0.250 | 33.000 | 5.900 | 0.150 | 0.580 | 16.000 | 42.000 | 8.300 | | 0.230 |
| 22-Dec-97 | Summa | 145 | 1.400 | 0.130 | | 0.240 | 11.000 | | | 0.220 | 8.600 | 28.000 | 6.100 | | 0.130 |
| 29-Dec-97 | Summa | 313 | 0.490 | 0.100 | 0.440 | 0.160 | 4.300 | | 0.050 | 0.091 | 4.600 | 19.000 | 5.400 | 0.046 | 0.180 |
| 5-Jan-98 | Summa | 481 | 0.400 | 0.100 | 0.950 | 0.130 | 3.200 | 0.640 | 0.051 | 0.056 | 3.900 | 17.000 | 5.200 | 0.044 | 0.160 |
| 12-Jan-98 | Summa | 702 | 0.230 | 0.092 | 0.590 | 0.064 | 2.400 | | 0.055 | 0.026 | 2.200 | 8.800 | 3.500 | 0.028 | 0.830 |
| 19-Jan-98 | Summa | 870 | 0.140 | 0.047 | 0.590 | 0.015 | 1.300 | 0.280 | 0.055 | 0.017 | 1.600 | 3.200 | 1.800 | 0.016 | 0.074 |
| 19-Mar-98 | Sentex | 2280 | | | | | | | | | | 5.160 | | | |
| 20-Mar-98 | Sentex | 2304 | | | | | | | | | 3.980 | 4.960 | | | |
| 12-Mar-98 | Summa | 2118 | 0.130 | 0.050 | 0.063 | | 0.770 | 0.053 | 0.037 | 0.056 | 0.930 | 0.062 | 0.430 | | |
| 25-Mar-98 | Summa | 2432 | 0.130 | 0.042 | | | 0.750 | | 0.031 | 0.007 | 0.930 | 0.053 | 0.410 | | |
| 13-Apr-98 | Sentex | 2880 | | | | | | | | | 2.570 | | | | |
| 22-May-98 | Summa | 3816 | 0.023 | 0.017 | 0.690 | | 0.160 | 1.300 | 0.007 | | 0.300 | 0.048 | 0.260 | 0.004 | 0.005 |

VC – Vinyl chloride
F113 – 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
ACE – Acetone
DCM – Dichloromethane (methylene chloride)
cisDCE – cis-Dichloroethene
2-BUT – 2-Butanone
TCM – Trichloromethane (chloroform)
BEN – Benzene
TCE – Trichloroethene
TOL - Toluene
PCE – Perchloroethene (tetrachloroethene)
EBZ – Ethylbenzene
XYL – Xylenes (total)

Table 4. Zone 2 Analyte Data (ppmv)

| Date | Source | Total Time (hours) | VC | TCFM | F113 | ACE | DCM | t-DCE | cisDCE | TCM | BEN | TCE | TOL | PCE | EBZ | XYL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Dec-97 | Summa | 49 | 10.000 | 1.700 | 2.500 | | 1.600 | | 130.000 | 1.200 | 2.300 | 130.000 | 220.000 | 10.000 | 1.400 | 7.400 |
| 22-Dec-97 | Summa | 145 | 6.200 | 1.500 | 1.600 | | 1.900 | | 64.000 | 0.520 | 1.600 | 83.000 | 130.000 | 6.100 | 0.900 | 5.300 |
| 29-Dec-97 | Summa | 313 | 2.900 | 1.400 | 1.500 | | 1.600 | 0.500 | 39.000 | 0.770 | 1.200 | 65.000 | 75.000 | 5.200 | 0.580 | 3.700 |
| 5-Jan-98 | Summa | 481 | 2.000 | 0.810 | 0.880 | 0.870 | 0.920 | 0.290 | 24.000 | 0.510 | 0.730 | 42.000 | 46.000 | 3.600 | 0.380 | 2.400 |
| 12-Jan-98 | Summa | 704 | 1.700 | 1.100 | 1.100 | 0.690 | 0.690 | 0.330 | 21.000 | 0.700 | 0.680 | 42.000 | 35.000 | 3.600 | 0.280 | 2.200 |
| 19-Jan-98 | Summa | 864 | 1.100 | 0.590 | 0.670 | | 0.680 | | 17.000 | 0.630 | 0.540 | 50.000 | 41.000 | 3.300 | 0.190 | 1.500 |
| 12-Mar-98 | Summa | 2118 | 0.270 | 0.110 | 0.310 | | 0.200 | | 7.700 | 0.340 | 0.200 | 28.000 | 22.000 | 1.800 | | 0.890 |
| 25-Mar-98 | Summa | 2432 | | 0.120 | 0.400 | | | | 8.700 | 0.370 | 0.170 | 36.000 | 26.000 | 2.000 | 0.098 | 0.760 |
| 25-Mar-98 | Sentex | 2432 | | | | | 0.660 | | 12.050 | | | 26.480 | 20.530 | | | |
| 30-Mar-98 | Sentex | 2544 | | | | | | | 11.260 | | | 26.500 | 19.130 | 2.370 | | |
| 3-Apr-98 | Sentex | 2616 | | | | | | | 9.440 | | | 26.890 | 20.400 | 0.820 | | |
| 13-Apr-98 | Sentex | 2880 | | | | | | | 11.990 | | | 16.820 | 14.210 | | | |
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| 22-May-98 | Sentex | 3816 | | | | | | | 5.130 | | | 11.100 | 6.690 | | | |
| 22-May-98 | Summa | 3816 | | | 0.100 | | | | 3.300 | 0.300 | | 13.000 | 9.900 | 0.680 | 0.240 | 0.580 |
| 28-May-98 | Sentex | 3960 | | | | | | | 3.670 | | | 6.340 | | | | |

VC – Vinyl chloride
TCFM - Trichlorofluoromethane
F113 – 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
ACE – Acetone
DCM – Dichloromethane (methylene chloride)
t-DCE – trans-dichloroethene
cisDCE – cis-Dichloroethene
TCM – Trichloromethane (chloroform)
BEN – Benzene
TCE – Trichloroethene
TOL - Toluene
PCE – Perchloroethene (tetrachloroethene)
EBZ – Ethylbenzene
XYL – Xylenes (total)

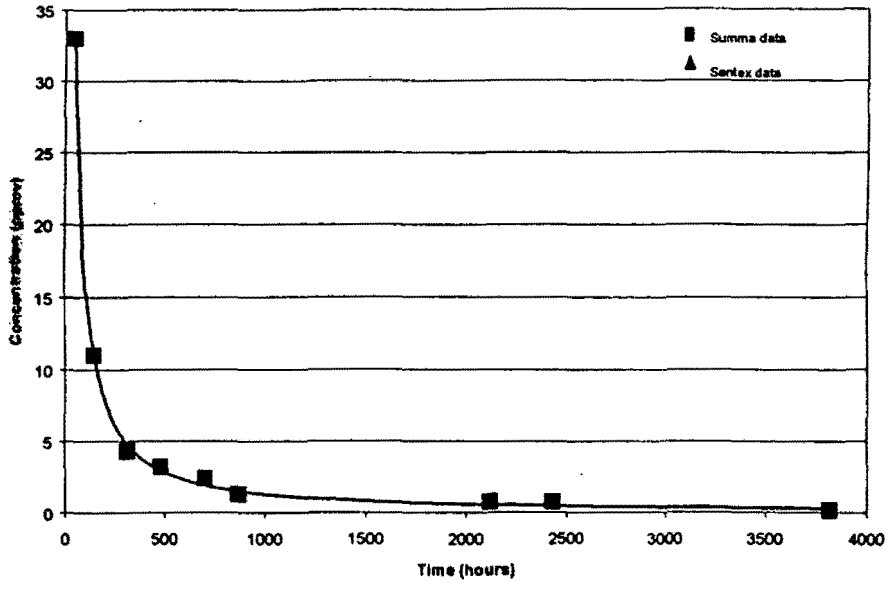


Figure 1. Zone 1 Time History – cis1,2-Dichloroethene

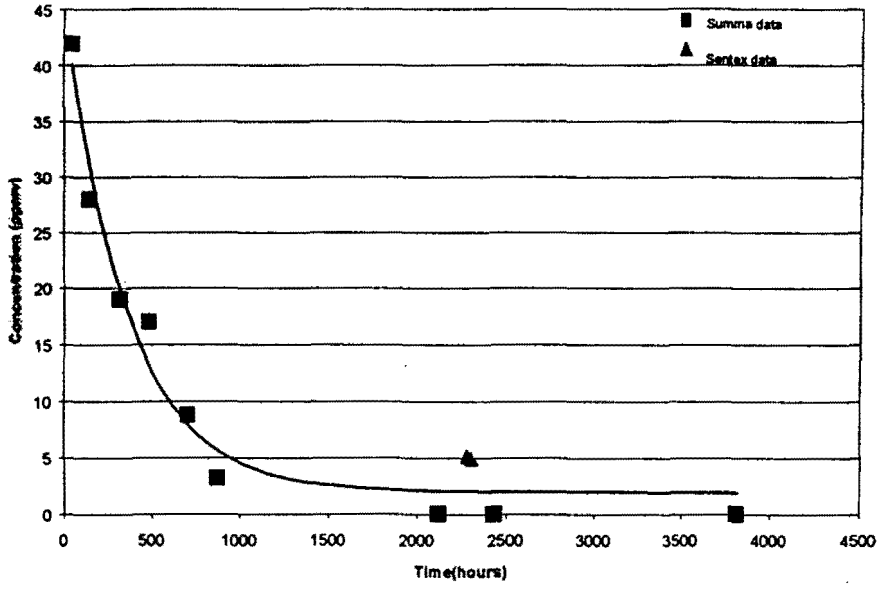


Figure 2. Zone 1 Time History - Toluene

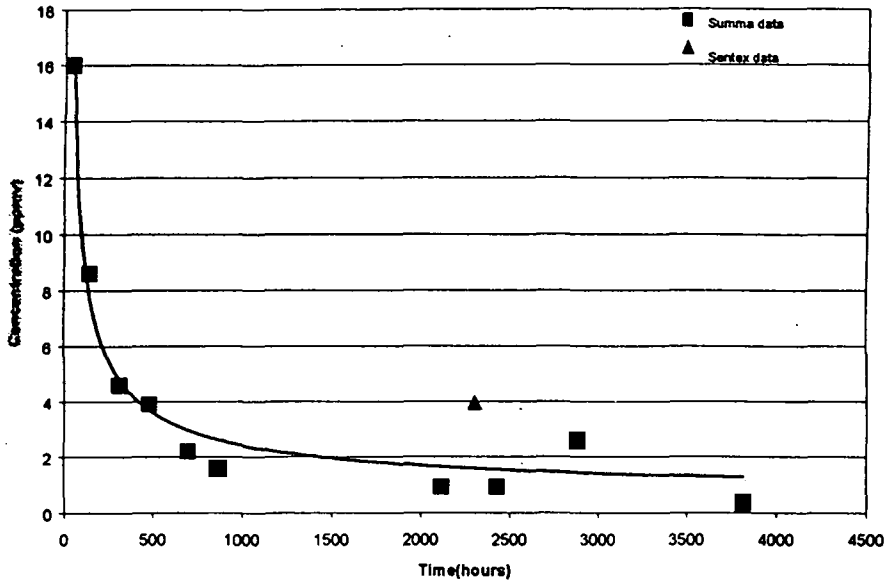


Figure 3. Zone 1 Time History – Trichloroethene

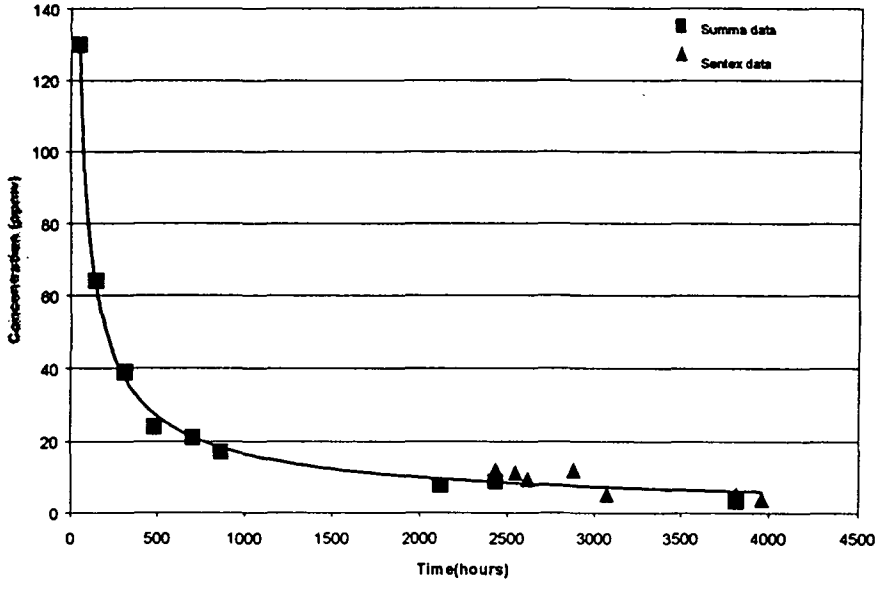


Figure 4. Zone 2 Time History – cis1,2-Dichlorethene

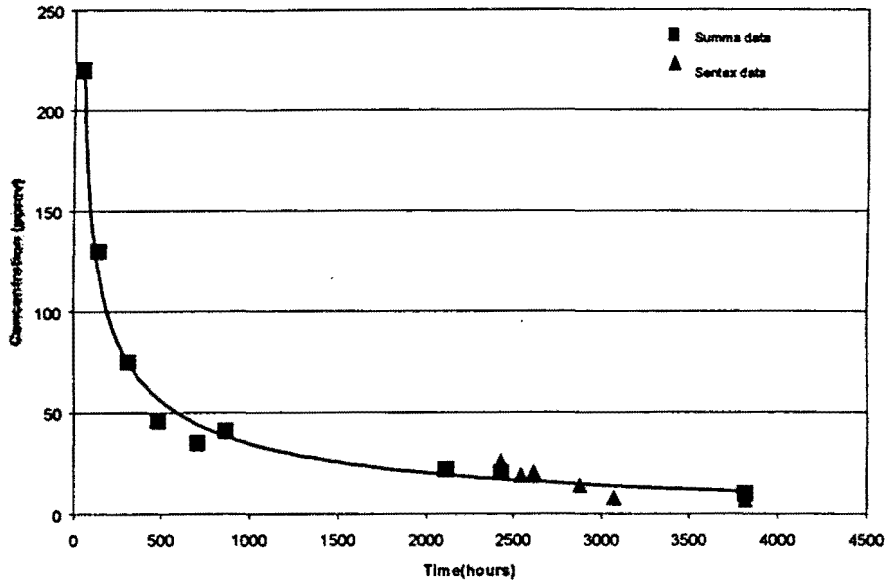


Figure 5. Zone 2 Time History – Toluene

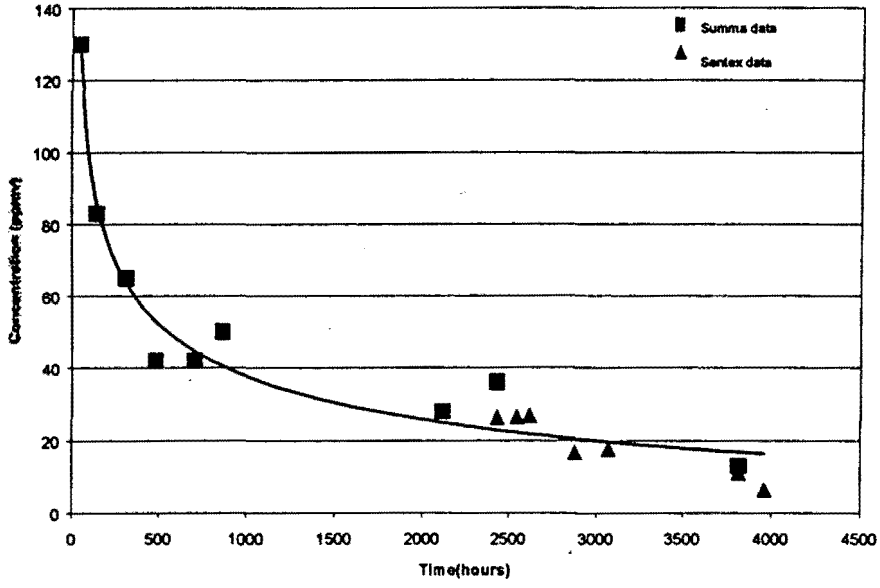


Figure 6. Zone 2 Time History - Trichloroethene

Table 5. Curve Fits and Correlation Factors for VOC Extraction Time History

| | Zone 1 | |
|---|---|---|
| VOC | Curve Fit | Correlation ($r^2$) |
| Trichloroethene | $y=0.53625+238.669x^{-0.700}$ | 0.9466 |
| Tetrachloroethene | $y=0.1015+8.3490exp(-x/709.205)$ | 0.9674 |
| cis-1,2-Dichlorethene | $y^{-1}=0.00923+0.000110xlnx$ | 0.9991 |
| Vinyl chloride | $y^{-1}=-0.1703+0.006027x$ | 0.9996 |
| Freon 113 | $y=0.0290+6.2606x^{-0.7843}$ | 0.9638 |
| Benzene | $y=0.0008045+26.215x^{-0.97826}$ | 0.9894 |
| Toluene | $y=1.9408+43.826exp(-x/355.146)$ | 0.9646 |
| Ethyl benzene | $y=0.003159+0.07944exp(-x/578.93)$ | 0.9412 |
| Xylenes | $y=-0.002799+0.2166exp(-x/1058.7099)$ | 0.8365 |
| Acetone | $y=0.4835+760.17x^{-1.4386}$ | 0.9389 |
| Trichloromethane | $y=0.003906+0.8697x^{-0.4616}$ | 0.9329 |
| Dichloromethane | $y=-1.2307+1.502exp(-x/4674.6)$ | 0.9891 |

Table 6. Curve Fits and Correlation Factors for VOC Extraction Time History

| | Zone 2 | |
|---|---|---|
| VOC | Curve Fit | Correlation ($r^2$) |
| Trichloroethene | $y=-27.6418+476.180x^{-0.28757}$ | 0.9580 |
| Tetrachloroethene | $y=-2.5708+36.335x^{-0.2763}$ | 0.9697 |
| cis-1,2-Dichlorethene | $y=-1.356+1727.7007x^{-0.6615}$ | 0.9947 |
| Vinyl chloride | $y^{-1}=0.07508+0.000127xlnx$ | 0.9954 |
| Freon 113 | $y=-2.7751+8.857x^{-0.13505}$ | 0.9628 |
| Benzene | $y^{-1}=0.39159+0.0002659xlnx$ | 0.9906 |
| Toluene | $y=-11.2187+1908.4769x^{-0.5394}$ | 0.9889 |
| Ethyl benzene | $y=-0.05655+10.600x^{-0.5042}$ | 0.9653 |
| Xylenes | $y^{-1}=0.12266+7.99e-5xlnx$ | 0.9909 |
| Trichlorofluoromethane | $y=-0.06286+1.846exp(-x/974.52)$ | 0.9368 |
| Acetone | Insufficient data | |
| Trichloromethane | $y=0.1807+4.0301x^{-0.3751}$ | 0.7371 |
| Dichloromethane | $y=0.3699+1.6438exp(-x/560.305)$ | 0.8434 |

As shown in Figures 1 through 6, the early time concentrations fall very steeply and the curve fit lines may not be representative of the actual concentrations in the first 50 hours before the first sample was obtained on December 18, 1997. Therefore, mass removal estimates have been made starting from the first sample date. To estimate the total mass of each contaminant extracted from the soils, the flow rate from each manifold is used with the concentration data as follows:

$$M_{VOC} = C_{VOC} \frac{MW_{VOC}}{MV_{T,P}} Vt(3.74E-6)$$

where, $M_{VOC}$ is the mass of the contaminant removed (lbs), $C_{VOC}$ is the concentration of the contaminant (ppm, v/v), $MW_{VOC}$ is the molecular weight of the VOC (g/mol), $MV_{T,P}$ is the molar volume of the vapor at a specific temperature and pressure (24.5 l/mol at 25°C and 1 atm), V is the volumetric flow rate in the extraction manifold (std $ft^3$/min), t is the time interval (min) and 3.74E-6 is for unit conversions. Figure 7 shows the Zone 1 and Zone 2 manifold flow rates during this initial

operating period. From time zero to the operating time of 178 hours the system ran on six-hour intervals. The system was switched to four-hour intervals from hour 178 to 552 and to a two-hour interval from hour 552 to 2422. These changes were made to keep automatic shutdowns from occurring when large amounts of water were being extracted from the French drains soon after rainfall events occurred. The system was changed to one hour on Zone 1 and 3 hours on Zone 2 from hour 2422 to 3453. From hour 3453 to date the system was set to only extract from Zone 2. Table 7 shows the total mass of each VOC removed estimated from the curve fits of the grab samples and measured flow rates. Figure 8 shows the cumulative mass of all VOCs extracted from each zone.

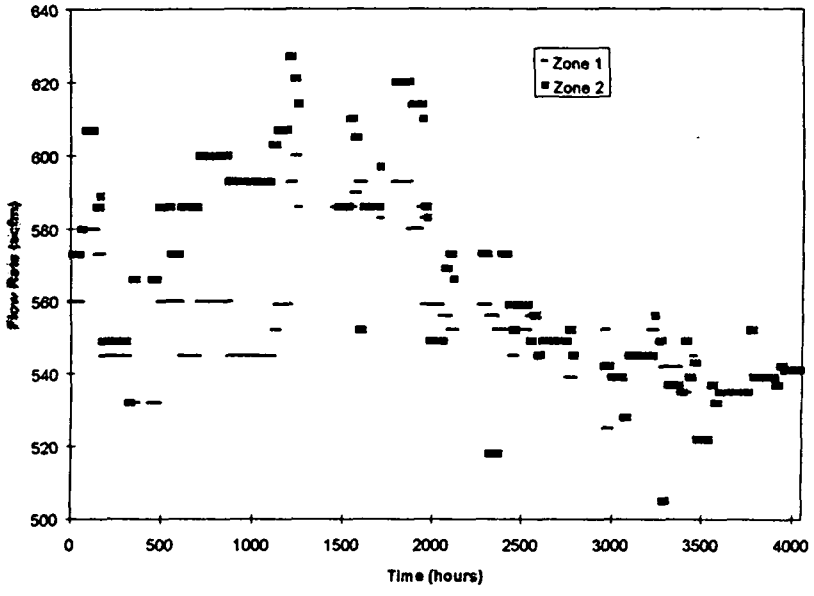


Figure 8. Total System Flow Rates

Table 7. VOC Mass Removal

| | Zone 1 | Zone 2 | Zone 1 + Zone 2 |
|---|---|---|---|
| Vinyl Chloride | 1.98 | 9.81 | 11.79 |
| cis1,2 Dichloroethene | 21.76 | 231.36 | 253.12 |
| Trichloroethene | 35.29 | 673.27 | 708.56 |
| Toluene | 64.54 | 434.27 | 498.81 |
| Tetrachloroethene | 33.66 | 62.10 | 95.77 |
| Freon 113 | 1.15 | 15.01 | 16.16 |
| Acetone | 3.27 | * | 3.27 |
| Xylene | 0.72 | 20.61 | 21.32 |
| Benzene | 0.36 | 4.61 | 4.97 |
| Ethylbenzene | 0.19 | 3.98 | 4.18 |
| Dichloromethane | 0.36 | 8.14 | 8.50 |
| Chloroform | 0.47 | 9.16 | 9.63 |
| Trichlorofluoromethane | * | 6.72 | 6.72 |
| Total | 163.76 | 1479.04 | 1642.80 |

* - insufficient concentration data to estimate mass

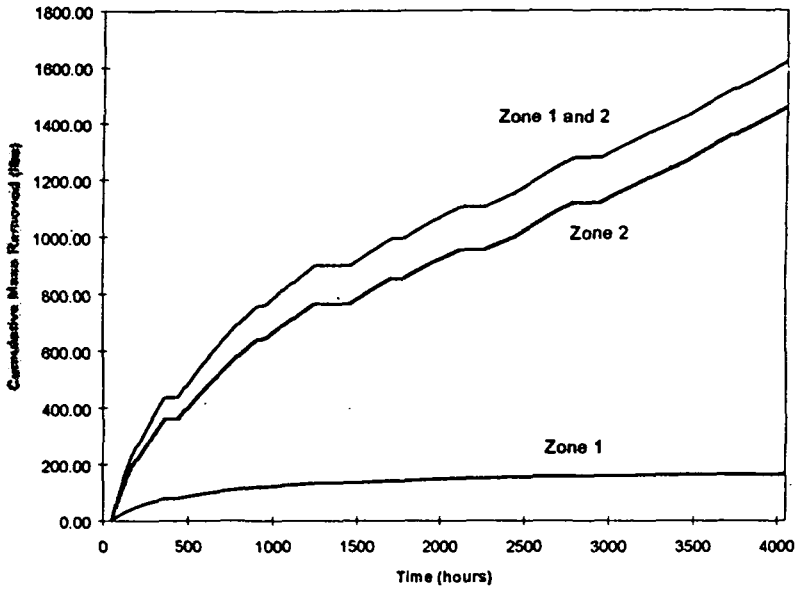


Figure 8. Cumulative Mass of VOC Extracted from Zones 1 and 2

## DISCUSSION

The early time periods in a SVE system provide much more mass removal than in the later periods due, principally, to the diffusion limitation condition in later time periods where VOCs must move from within dead end pore spaces to the locations experiencing active ventilation. The total mass removal rate (Figure 9) has reached a plateau at about 0.04 lb/hr for Zone 1 and 0.4 lb/hr for Zone 2. As of May 31, 1998 the total mass removal was near 10 lbs/day which is considered the deminimis level for air emissions regulations. Future monitoring should provide more information to support a proposal to bypass the carbon treatment system. Individual SVE well grab samples are planned which will show proportionate mass removal.

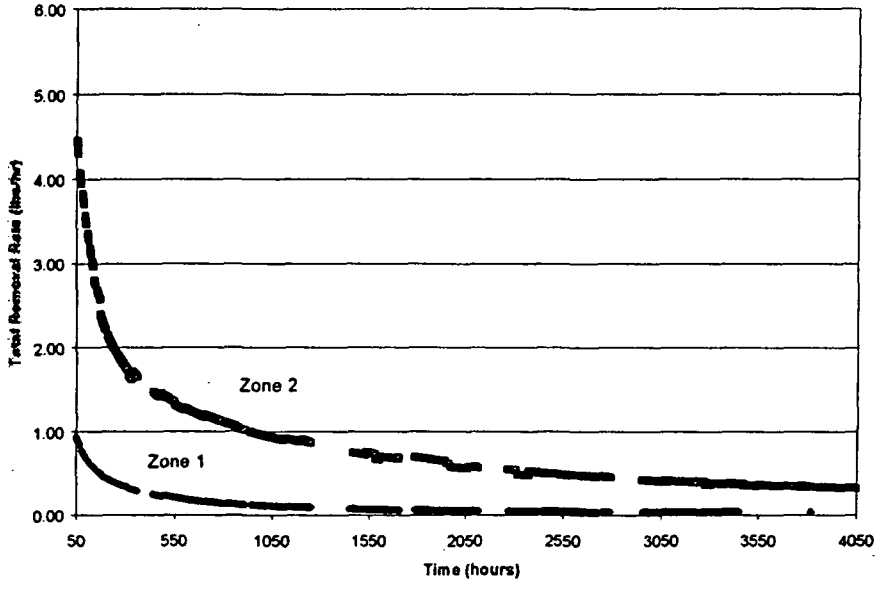


Figure 9. Total VOC Mass Removal Rate over Time

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2. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 129990-0001/004-SA, January 20, 1998.
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6. Winberry, W.T., Jr., N.T. Murphy, and R.M. Riggin. 1988. Compendium of Methods for the Determination of Toxic Organic Compounds in Air. U.S. EPA, Office of Research and Development, Atmospheric Research and Exposure Assessment Laboratory. Research Triangle Park, NC. EPA/600/4-89/018. June 1988.
7. Data Tables excerpted from sveparam.xls, Z1summas.xls, Z2summas.xls and masrem3b.xls, Microsoft Excel SR-1/Windows 97. (J. M. Phelan, Sandia National Laboratories).

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Soil Vapor Extraction System Monitoring - Time Series #4

### INTRODUCTION

The objective of the soil vapor extraction (SVE) process monitoring system is to measure the concentration of the influent and effluent vapors. A combination of Summa canister grab samples, and automated gas sampling and analysis equipment is now used to measure the concentrations of volatile organic compounds (VOCs) at the extraction headers of Zone 1 and Zone 2. SVE extraction flow rates are measured by a standard pitot, read manually on a quasi-daily basis. The SVE system started operation on December 16, 1997. This report describes the cumulative analytical results obtained from Summa canister and automated gas analysis up to July 31, 1998. Reports on earlier data sets include Soil Vapor Extraction System Monitoring – Time Series #1 (March 5, 1998); Soil Vapor Extraction System Monitoring – Time Series #2 (May 18, 1998)); Soil Vapor Extraction System Monitoring – Time Series #3 (June 23, 1998).

### SOIL VAPOR EXTRACTION SYSTEM DESIGN SUMMARY

The soil vapor extraction (SVE) system is segregated into two zones. Zone 1 includes six wells in the southern portion of the site. Zone 2 includes six SVE wells and five French drain vents in the northern portion of the site. Table 1 shows the zone assignment, screen length and geologic strata where each well is located.

Table 1. Extraction Well Details

| Extraction Well | Screen Length | Geologic Strata |
|---|---|---|
| | Zone 1 | |
| EW-N1 | 2 | till |
| EW-N2 | 15 | non-till |
| EW-N3 | 3 | Till |
| EW-N4 | 22 | non-till |
| EW-N5 | 2.5 | Clay |
| EW-N6 | 10 | non-till |
| | Zone 2 | |
| EW-N7 | 10 | non-till |
| EW-N8 | 10 | non-till |
| EW-N9 | 15 | non-till |
| EW-N10 | 12.5 | non-till |
| ED-N1 | 5 | base of French drain |
| ED-N2 | 5 | base of French drain |
| ED-N3 | 5 | base of French drain |
| ED-N4 | 5 | base of French drain |
| ED-N5 | 5 | base of French drain |
| EW-ITRD-N7 | 8.5 | non-till |
| EW-ITRD-N9 | 4.5 | Till |

All of the SVE wells in each zone intersect a main manifold that enters Treatment Building 301. The SVE system operates with an adjustable scheduler that alternates Zone 1 and Zone 2 at specified intervals. The manifolds are connected in series with a water knock-out tank, two flow through carbon beds, SVE pumps, and an atmospheric exhaust.

## SAMPLING AND ANALYSIS METHODS

Because of sample collection limitations inherent in the process monitoring system, grab samples are collected from a zone that is under ambient pressure, and not operating under the system vacuum of 12 to 18 inches of mercury. For the Summa canisters, a short section of teflon tubing is connected to the manifold sampling port, then the valve on the Summa canister is opened and the internal vacuum is allowed to fill the canister. Samples are shipped to an off-site contract laboratory for chemical analysis by EPA Method TO-14 (Winberry et al., 1988).

The automated process monitoring system is a commercial on-line multipoint gas chromatograph monitoring system, the SSC Model SCENTOSCAN available from Sentex Systems, Inc (Ridgefield, NJ). The Sentex process monitor pulls extraction manifold vapors through a coalescing filter, to remove entrained water, a heated tubing bundle, to prevent contaminant condensation during winter months, and into the gas chromatograph located in the analytical shed next to the SVE/AS building. The Sentex chromatograph uses a 30m capillary column, micro argon ion detector, preconcentrator/trap or loop sample injector. The system is capable of sampling 16 input ports.

A single point calibration standard is used daily as part of the sequencing program. Table 2 shows the compounds used in the calibration. Vinyl chloride was not included because of compound elution difficulties in an automated system.

Table 2. Calibration Standards

| Sentex SCENTOSCAN System |
|---|
| Dichloromethane |
| cis-1,2-dichloroethene |
| Benzene |
| Trichloroethene |
| Toluene |
| Tetrachloroethene |
| Ethylbenzene |
| Xylenes (total) |

The Sentex process monitor was put on line in February 1998. However, the precision of the calibration standards was very poor in data sets obtained in February and March. Changing the operational parameters to use longer sampling times for the preconcentrator/trap mode improved the quality of Zone 1 samples (low concentrations of target analytes); however, the increased sample collection time produced clipped peaks and contaminant carry-over for Zone 2 samples. In May 1998, the system was switched to manual collection and loop injection mode for the analysis of Zone 2 high contaminant concentration samples only. The SVE system was changed to pull only from Zone 2 because the vast majority of the contamination was found in that zone alone. The exclusive extraction from Zone 2 will continue until the Zone 2 contaminant concentrations approach those of Zone 1. The change to manual operation mode from automatic mode was done in response to frequent heavy rains at the site, which produced more water than the sample system coalescing filters could manage. Careful monitoring is required to prevent liquid water from being injected into the gas chromatograph.

## RESULTS

Tables 3 and 4 show the compound specific analytical results for Zone 1 and Zone 2, respectively. The results of the grab samples for both Zones 1 and 2 show exponential declines of the VOCs over time. Figures 1 through 3 show the time history for Zone 1 for the three compounds found in the greatest concentrations (cis-1,2 dichloroethene, trichloroethene, and toluene). Figures 4 through 6 show the time history for the same Zone 2 compounds. Curve fit equations were matched to the data by TableCurve 2D (Ver 4, SPSS, Inc.). The best fit equation for each compound was used to estimate contaminant

concentration between sampling events. Tables 5 and 6 show the equations and correlation factors for the curve fits for each of the VOCs where sufficient evaluation data are available.

As shown in Figures 1 through 6, the early time concentrations fall very steeply and the curve fit lines may not be representative of the actual concentrations in the first 50 hours before the first sample was obtained on December 18, 1997. Therefore, mass removal estimates have been made starting from the first sample date. To estimate the total mass of each contaminant extracted from the soils, the flow rate from each manifold is used with the concentration data as follows:

$$M_{VOC} = C_{VOC} \frac{MW_{VOC}}{MV_{T,P}} Vt(3.74E-6)$$

$M_{VOC}$ is the mass of the contaminant removed (lbs), $C_{VOC}$ is the concentration of the contaminant (ppm, v/v), $MW_{VOC}$ is the molecular weight of the VOC (g/mol), $MV_{T,P}$ is the molar volume of the vapor at a specific temperature and pressure (24.5 l/mol at 25°C and 1 atm), V is the volumetric flow rate in the extraction manifold (std $ft^3$/min), t is the time interval (min), and 3.74E-6 is for unit conversions.

Figure 7 shows the Zone 1 and Zone 2 manifold flow rates during the operating period. From time zero to the operating time of 178 hours the system ran on six-hour intervals. The system was switched to four-hour intervals from hour 178 to 552, and to a two-hour interval from hour 552 to 2422. These changes were made to keep automatic shutdowns from occurring when large amounts of water were being extracted from the French drains soon after rainfall events. The system was changed to one hour on Zone 1 and 3 hours on Zone 2 from hour 2422 to 3453. From hour 3453 to date the system was set to only extract from Zone 2. Table 7 shows the total mass of each VOC removed as estimated using grab sample curve fit equations, and measured flow rates. Figure 8 shows the cumulative mass of all VOCs extracted from each zone.

## DISCUSSION

The early time periods in a SVE system provide much more mass removal than in the later periods due, principally, to the diffusion limitation condition in later time periods where VOCs must move from within dead end pore spaces to the locations experiencing active ventilation. At the time of shutdown on May 7,1998, the Zone 1mass removal rate was approximately 0.04 lb/hr. The mass removal rate for Zone 2, shown in Figure 9, was approximately 0.25 lb/hr as of July 31, 1998, giving an estimated mass removal of 6 lbs/day, which is below the deminimis regulatory emission level for air of 10 lbs/day.

Table 3. Zone 1 Analyte Data (ppmv)

| Date | Source | Total Time (Hours) | VC | F113 | ACE | DCM | cisDCE | 2-BUT | TCM | BEN | TCE | TOL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Dec-97 | Summa | 49 | 8.000 | 0.330 | 3.300 | 0.250 | 33.000 | 5.900 | 0.150 | 0.580 | 16.000 | 42.000 |
| 22-Dec-97 | Summa | 145 | 1.400 | 0.130 | | 0.240 | 11.000 | | | 0.220 | 8.600 | 28.000 |
| 29-Dec-97 | Summa | 313 | 0.490 | 0.100 | 0.440 | 0.160 | 4.300 | | 0.050 | 0.091 | 4.600 | 19.000 |
| 5-Jan-98 | Summa | 481 | 0.400 | 0.100 | 0.950 | 0.130 | 3.200 | 0.640 | 0.051 | 0.056 | 3.900 | 17.000 |
| 12-Jan-98 | Summa | 702 | 0.230 | 0.092 | 0.590 | 0.064 | 2.400 | | 0.055 | 0.026 | 2.200 | 8.800 |
| 19-Jan-98 | Summa | 870 | 0.140 | 0.047 | 0.590 | 0.015 | 1.300 | 0.280 | 0.055 | 0.017 | 1.600 | 3.200 |
| 19-Mar-98 | Sentex | 2280 | | | | | | | | | | 5.160 |
| 20-Mar-98 | Sentex | 2304 | | | | | | | | | 3.980 | 4.960 |
| 12-Mar-98 | Summa | 2118 | 0.130 | 0.050 | 0.063 | | 0.770 | 0.053 | 0.037 | 0.056 | 0.930 | 0.062 |
| 25-Mar-98 | Summa | 2432 | 0.130 | 0.042 | | | 0.750 | | 0.031 | 0.007 | 0.930 | 0.053 |
| 13-Apr-98 | Sentex | 2880 | | | | | | | | | 2.570 | |
| 22-May-98 | Summa | 3816 | 0.023 | 0.017 | 0.690 | | 0.160 | 1.300 | 0.007 | | 0.300 | 0.048 |
| 21-Jul-98 | Sentex | 5271 | | | | | 0.158 | | | | 0.366 | 0.016 |
| 21-Jul-98 | Summa | 5271 | 0.017 | | 0.055 | | 0.120 | 0.140 | 0.005 | 0.002 | 0.270 | 0.036 |

VC – Vinyl chloride
F113 – 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
ACE – Acetone
DCM – Dichloromethane (methylene chloride)
cisDCE – cis-1,2-Dichloroethene
2-BUT – 2-Butanone
TCM – Trichloromethane (chloroform)
BEN – Benzene
TCE – Trichloroethene
TOL - Toluene
PCE – Perchloroethene (tetrachloroethene)
EBZ – Ethylbenzene
XYL – Xylenes (total)

Table 4. Zone 2 Analyte Data (ppmv)

| Date | Source | Total Time (hours) | VC | TCFM | F113 | ACE | DCM | t-DCE | cisDCE | TCM | BEN | TCE | TC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Dec-97 | Summa | 49 | 10.000 | 1.700 | 2.500 | | 1.600 | | 130.000 | 1.200 | 2.300 | 130.000 | 220. |
| 22-Dec-97 | Summa | 145 | 6.200 | 1.500 | 1.600 | | 1.900 | | 64.000 | 0.520 | 1.600 | 83.000 | 130. |
| 29-Dec-97 | Summa | 313 | 2.900 | 1.400 | 1.500 | | 1.600 | 0.500 | 39.000 | 0.770 | 1.200 | 65.000 | 75.( |
| 5-Jan-98 | Summa | 481 | 2.000 | 0.810 | 0.880 | 0.870 | 0.920 | 0.290 | 24.000 | 0.510 | 0.730 | 42.000 | 46.( |
| 12-Jan-98 | Summa | 704 | 1.700 | 1.100 | 1.100 | 0.690 | 0.690 | 0.330 | 21.000 | 0.700 | 0.680 | 42.000 | 35.( |
| 19-Jan-98 | Summa | 864 | 1.100 | 0.590 | 0.670 | | 0.680 | | 17.000 | 0.630 | 0.540 | 50.000 | 41.( |
| 12-Mar-98 | Summa | 2118 | 0.270 | 0.110 | 0.310 | | 0.200 | | 7.700 | 0.340 | 0.200 | 28.000 | 22.( |
| 25-Mar-98 | Summa | 2432 | | 0.120 | 0.400 | | | | 8.700 | 0.370 | 0.170 | 36.000 | 26.( |
| 25-Mar-98 | Sentex | 2432 | | | | | 0.660 | | 12.050 | | | 26.480 | 20.: |
| 30-Mar-98 | Sentex | 2544 | | | | | | | 11.260 | | | 26.500 | 19.: |
| 3-Apr-98 | Sentex | 2616 | | | | | | | 9.440 | | | 26.890 | 20.4 |
| 13-Apr-98 | Sentex | 2880 | | | | | | | 11.990 | | | 16.820 | 14.: |
| 21-Apr-98 | Sentex | 3072 | | | | | | | 5.200 | | | 17.790 | 7.9 |
| 22-May-98 | Sentex | 3816 | | | | | | | 5.130 | | | 11.100 | 6.6 |
| 22-May-98 | Summa | 3816 | | | 0.100 | | | | 3.300 | 0.300 | | 13.000 | 9.9 |
| 28-May-98 | Sentex | 3960 | | | | | | | 3.67 | | | 6.34 | |
| 17-Jun-98 | Sentex | 4455 | | | | | | | 2.324 | | | 14.029 | 10.: |
| 22-Jun-98 | Sentex | 4575 | | | | | | | 2.527 | | | 14.445 | 9.8 |
| 24-Jun-98 | Sentex | 4623 | | | | | | | 2.685 | | | 16.617 | 10.: |
| 30-Jun-98 | Sentex | 4767 | | | | | | | 1.736 | | | 8.555 | 5.8 |
| 20-Jul-98 | Sentex | 5247 | | | | | | | 1.177 | | | 6.595 | 3.7 |
| 23-Jul-98 | Sentex | 5319 | | | | | | | 0.994 | | | 6.577 | 5.6 |
| 23-Jul-98 | Summa | 5319 | | 0.076 | | | 0.027 | 0.040 | 2.600 | | 0.037 | 9.500 | 8.2 |
| 30-Jul-98 | Sentex | 5472 | | | | | | | 1.201 | | | 7.394 | 3.7 |

VC – Vinyl chloride
TCFM – Trichlorofluoromethane
F113 – 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
ACE – Acetone
DCM – Dichloromethane (methylene chloride)
t-DCE – trans-1,2-Dichloroethene
cisDCE – cis-1,2-Dichloroethene
TCM – Trichloromethane (chloroform)
BEN – Benzene
TCE – Trichloroethene
TOL - Toluene
PCE – Perchloroethene (tetrachloroethene)
EBZ – Ethylbenzene
XYL – Xylenes (total)

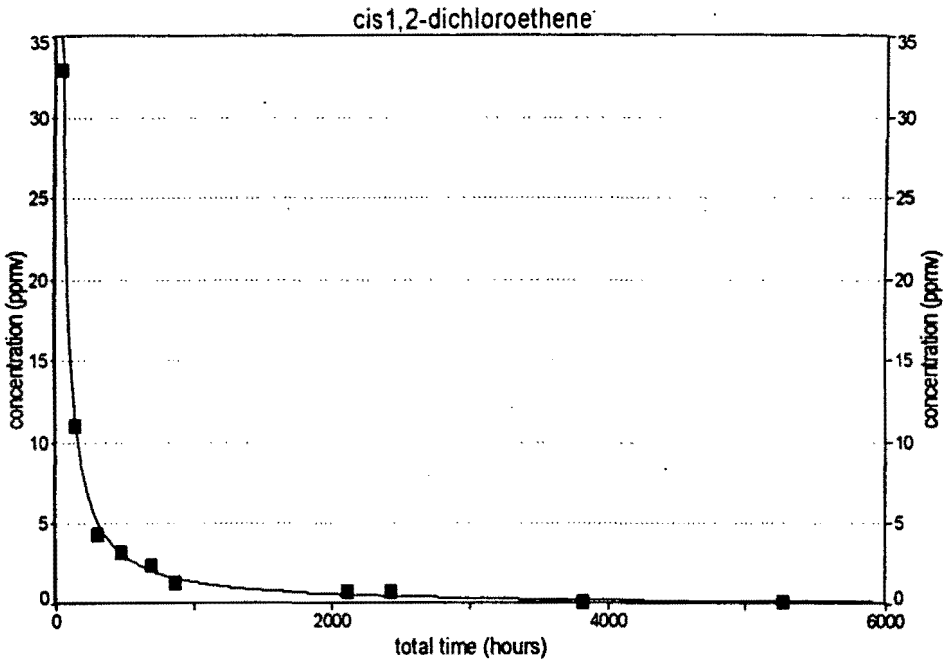


Figure 1. Zone 1 Time History – *cis*1,2-Dichloroethene

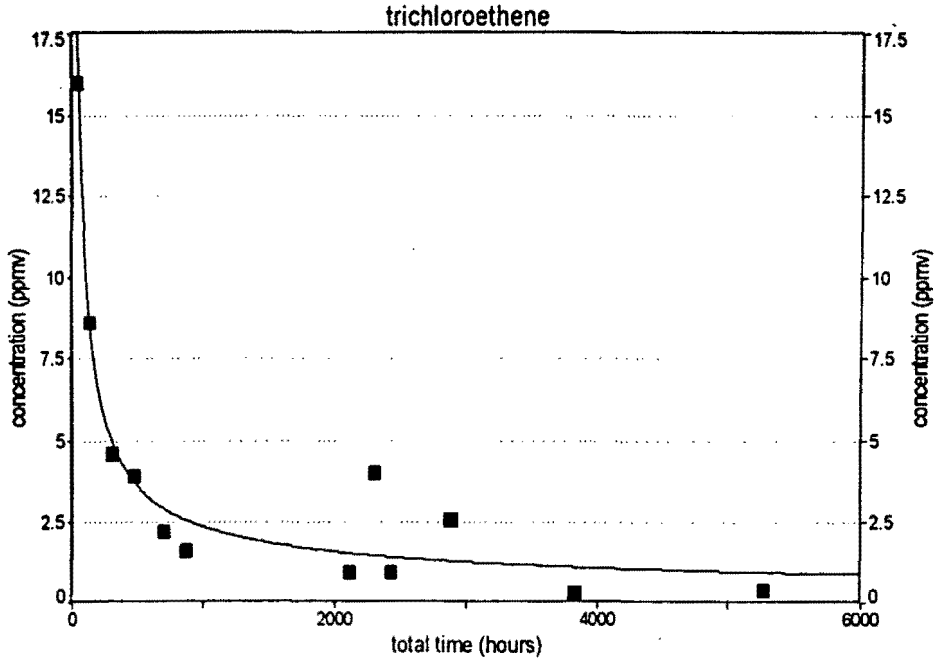


Figure 2. Zone 1 Time History - Trichloroethene

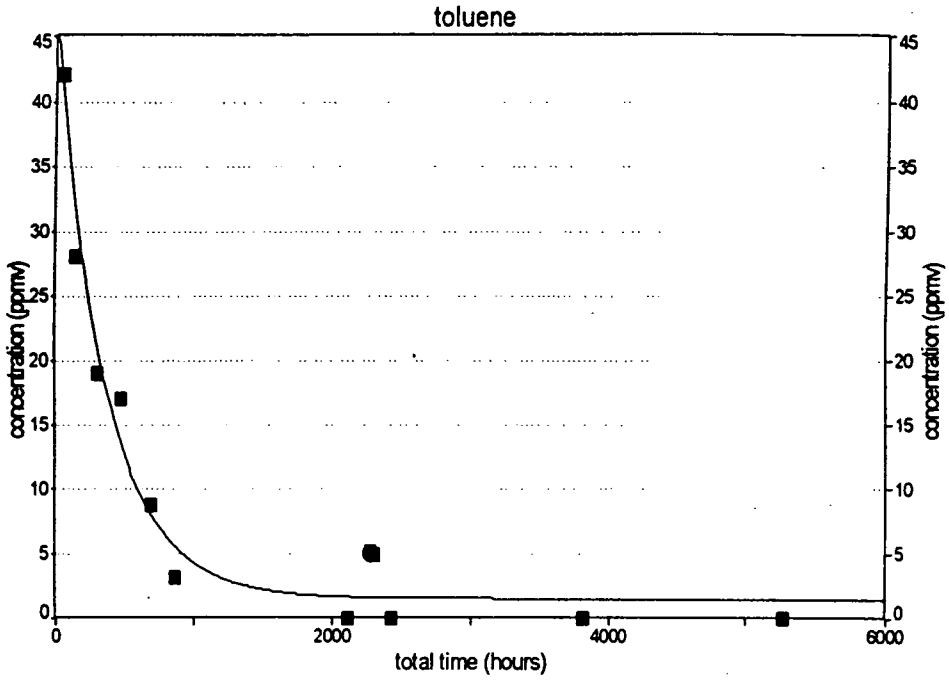


Figure 3. Zone 1 Time History – Toluene

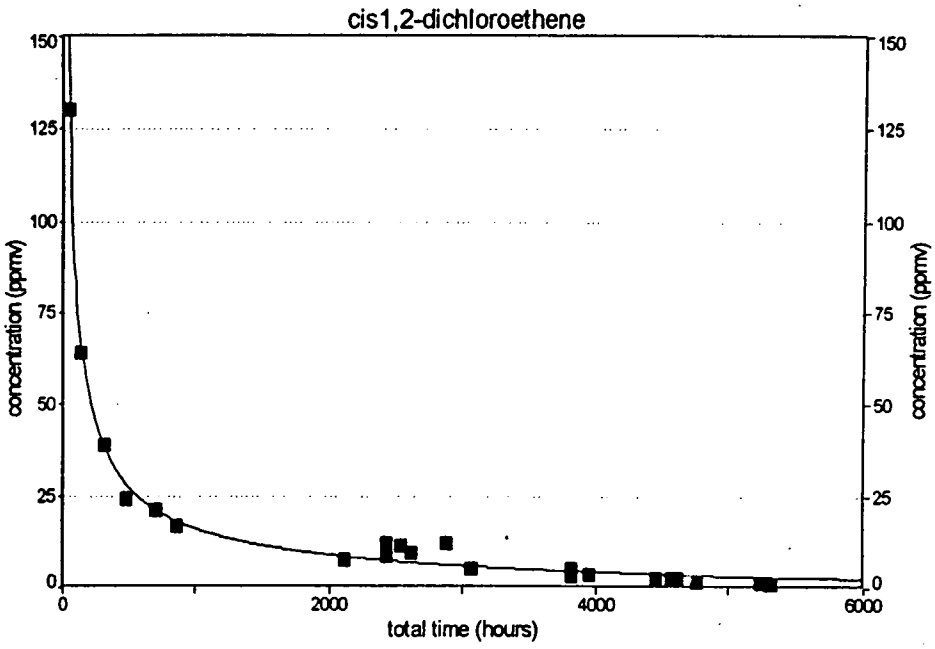


Figure 4. Zone 2 Time History – *cis*1,2-Dichlorethene

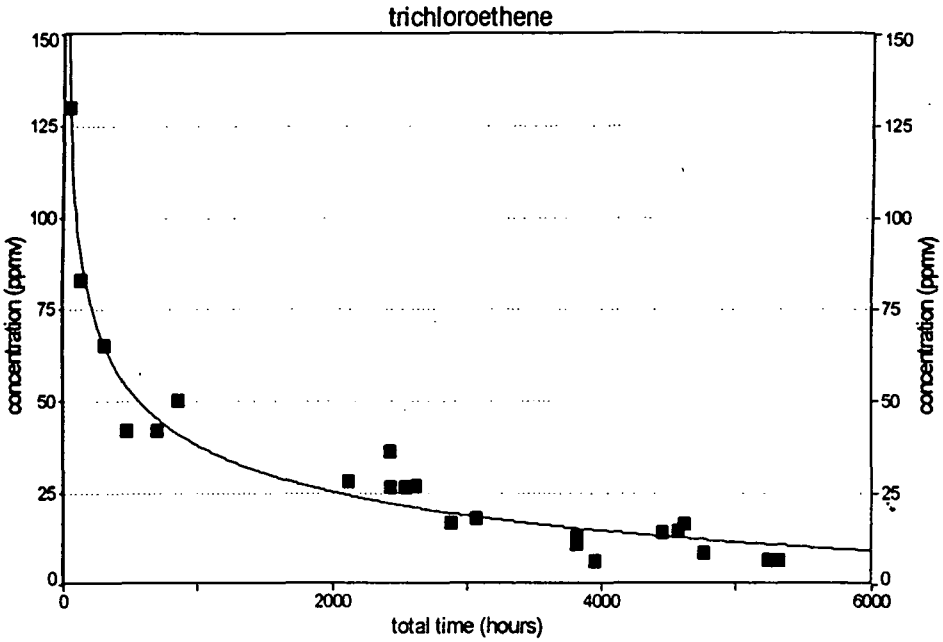


Figure 5. Zone 2 Time History – Trichloroethene

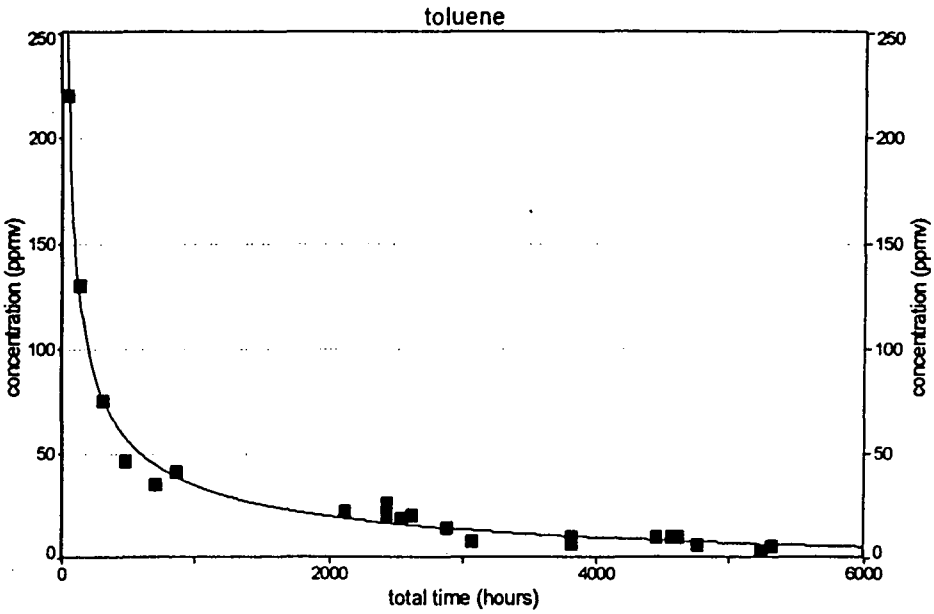


Figure 6. Zone 2 Time History - Toluene

Table 5. Curve Fits and Correlation Factors for VOC Extraction Time History

| Zone 1 | | |
|---|---|---|
| VOC | Curve Fit | Correlation ($r^2$) |
| Trichloroethene | $y=0.53625+238.669x^{-0.700}$ | 0.9466 |
| Tetrachloroethene | $y=0.1015+8.3490exp(-x/709.205)$ | 0.9674 |
| cis-1,2-Dichlorethene | $y^{-1}=0.00923+0.000110xlnx$ | 0.9991 |
| Vinyl chloride | $y^{-1}=-0.1703+0.006027x$ | 0.9996 |
| Freon 113 | $y=0.0290+6.2606x^{-0.7843}$ | 0.9638 |
| Benzene | $y=0.0008045+26.215x^{-0.97826}$ | 0.9894 |
| Toluene | $y=1.9408+43.826exp(-x/355.146)$ | 0.9646 |
| Ethyl benzene | $y=0.003159+0.07944exp(-x/578.93)$ | 0.9412 |
| Xylenes | $y=-0.002799+0.2166exp(-x/1058.7099)$ | 0.8365 |
| Acetone | $y=0.4835+760.17x^{-1.4386}$ | 0.9389 |
| Trichloromethane | $y=0.003906+0.8697x^{-0.4616}$ | 0.9329 |
| Dichloromethane | $y=-1.2307+1.502exp(-x/4674.6)$ | 0.9891 |

Table 6. Curve Fits and Correlation Factors for VOC Extraction Time History

| Zone 2 | | |
|---|---|---|
| VOC | Curve Fit | Correlation ($r^2$) |
| Trichloroethene | $y=-27.6418+476.180x^{-0.28757}$ | 0.9580 |
| Tetrachloroethene | $y=-2.5708+36.335x^{-0.2763}$ | 0.9697 |
| cis-1,2-Dichlorethene | $y=-1.356+1727.7007x^{-0.6615}$ | 0.9947 |
| Vinyl chloride | $y^{-1}=0.07508+0.000127xlnx$ | 0.9954 |
| Freon 113 | $y=-2.7751+8.857x^{-0.13505}$ | 0.9628 |
| Benzene | $y^{-1}=0.39159+0.0002659xlnx$ | 0.9906 |
| Toluene | $y=-11.2187+1908.4769x^{-0.5394}$ | 0.9889 |
| Ethyl benzene | $y=-0.05655+10.600x^{-0.5042}$ | 0.9653 |
| Xylenes | $y^{-1}=0.12266+7.99e-5xlnx$ | 0.9909 |
| Trichlorofluoromethane | $y=-0.06286+1.846exp(-x/974.52)$ | 0.9368 |
| Acetone | Insufficient data | |
| Trichloromethane | $y=0.1807+4.0301x^{-0.3751}$ | 0.7371 |
| Dichloromethane | $y=0.3699+1.6438exp(-x/560.305)$ | 0.8434 |

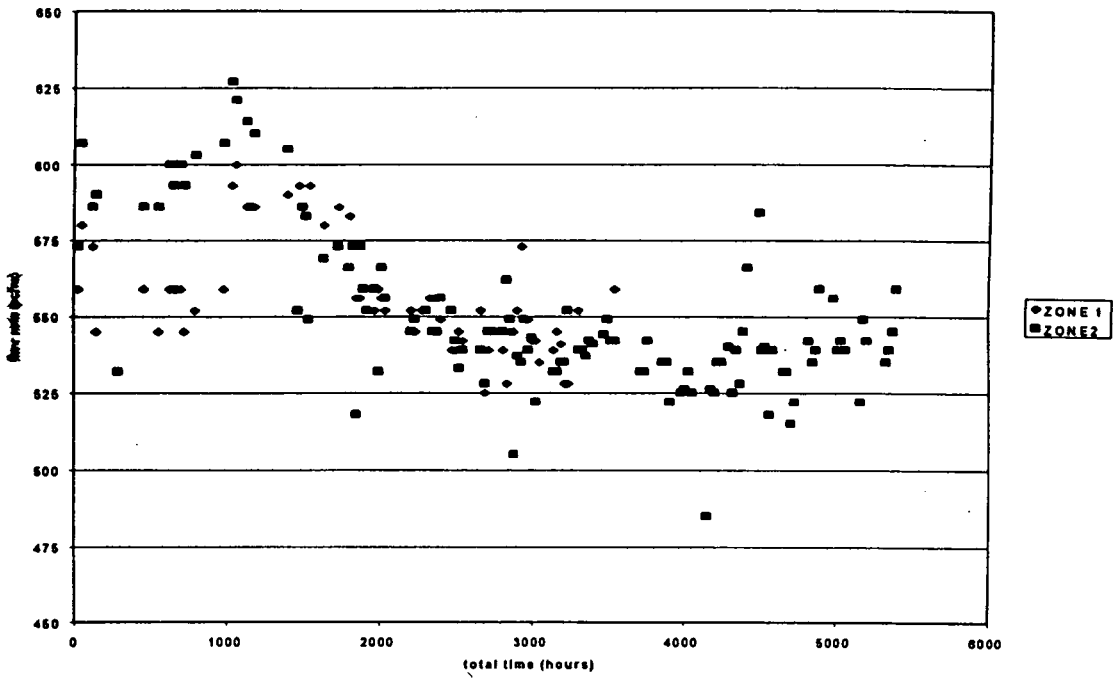


Figure 7. Total System Flow Rates

Table 7. VOC Mass Removal (lbs)

| | Zone 1 | Zone 2 | Zone 1 + Zone 2 |
|---|---|---|---|
| Vinyl Chloride | 1.99 | 11.18 | 13.16 |
| cis1,2 Dichloroethene | 21.81 | 286.72 | 308.53 |
| Trichloroethene | 35.66 | 883.11 | 918.77 |
| Toluene | 64.99 | 524.42 | 589.41 |
| Tetrachloroethene | 33.71 | 79.61 | 113.32 |
| Freon 113 | 1.17 | 16.03 | 17.20 |
| Acetone | 3.34 | * | 3.34 |
| Xylene | 0.72 | 24.22 | 24.94 |
| Benzene | 0.36 | 5.41 | 5.77 |
| Ethylbenzene | 0.19 | 5.09 | 5.28 |
| Dichloromethane | 0.36 | 11.71 | 12.06 |
| Chloroform | 0.48 | 13.86 | 14.34 |
| Trichlorofluoromethane | * | 5.99 | 5.99 |
| Total | 164.78 | 1867.36 | 2032.14 |

* - insufficient concentration data to estimate mass

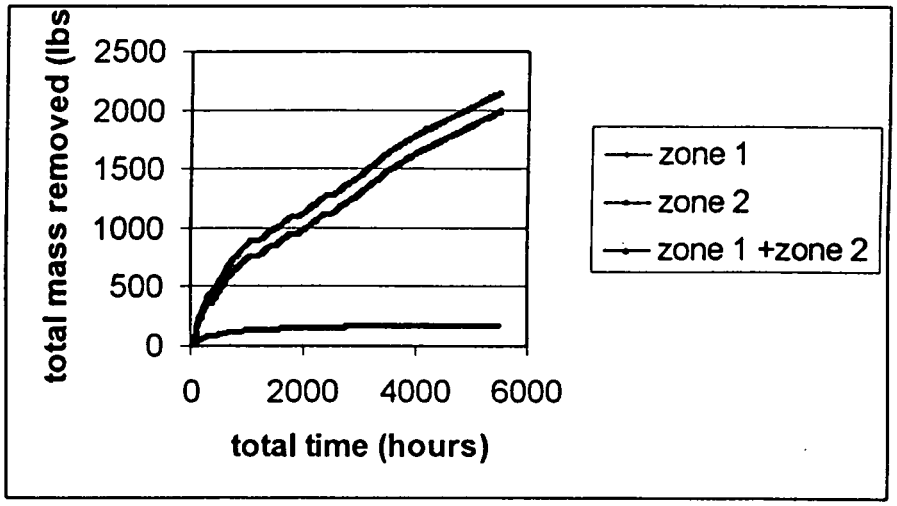


Figure 8. Total Mass of VOC Extracted from Zones 1 and 2

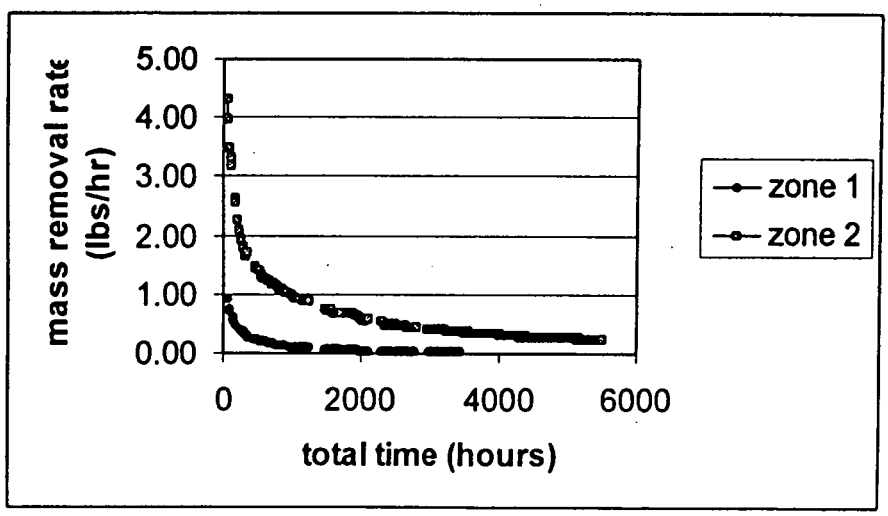


Figure 9. VOC Mass Removal Rate over Time

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1. ITRD, 1997. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Cost and Performance Data Collection Plan. December 1997.
2. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 129990-0001/004-SA, January 20, 1998.
3. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 130267-0001/004-SA, February 5, 1998.
4. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 130615-0001/004-SA, February 24, 1998.
5. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 131443-0001/0004-SA, April 10, 1998.
6. Quanterra Environmental Services. 1998. Project: Mound OU-1 Soil Gas Survey, Lab ID 131443-0001/0004-SA, July 30, 1998.
7. Winberry, W.T., Jr., N.T. Murphy, and R.M. Riggin. 1988. Compendium of Methods for the Determination of Toxic Organic Compounds in Air. U.S. EPA, Office of Research and Development, Atmospheric Research and Exposure Assessment Laboratory. Research Triangle Park, NC. EPA/600/4-89/018. June 1988.
8. Data Tables excerpted from sveparam.xls, Z1summas.xls, Z2summas.xls and masrem4.xls, Microsoft Excel SR-1/Windows 97. (J. M. Phelan, Sandia National Laboratories).

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

# Air Sparging and Soil Vapor Extraction Radius of Influence Report #1

## INTRODUCTION

The radial distance of subsurface vacuum and air flow established by individual soil vapor extraction wells is a principal parameter used in the design of SVE systems. The radius of influence is used to establish the spacing between individual wells and between rows. The radius of influence is poorly defined, but is generally described as the radial distance at which the SVE well vacuum is not longer significantly ventilating subsurface soils. Values of about one percent of the applied vacuum have been used. After well installation, measurement of the radius of influence of individual wells provides a gauge for the reasonableness of the design assumptions.

## TEST METHODS

The soil vapor extraction system was altered to have just one SVE well operating. A bypass valve at the pump house was used to provide makeup air to the extraction blowers. The vacuum and flow rate for the single well was set to be about the same values as when it was operating with the entire network. The vacuum and flow rates were set and allowed to stabilize. Pressure measurements were made at piezometers and SVE wells at various distances from the operating well with the ststem operating at steady state.

## RESULTS

On August 4, 1998, radius of influence tests were performed. Figure 1 shows the locations of the SVE wells and monitoring locations. Table 1 shows the results for Zone1, SVE well EW-N3, which has a screened interval of 3 feet, located in the glacial till.

Table 1. ROI, Zone 1, Low Flow Well

| Operating Well | | |
|---|---|---|
| Well ID | Vac. ("Hg) | Flow (fpm) |
| EW-N3 | -11 | * |

| Measurement Locations | |
|---|---|
| Location | "$H_2O$ WC |
| VPMP-1 S | 0 |
| VPMP-1 M | 0 |
| VPMP-2 S | 0 |
| VPMP-2 M | 0 |
| VPMP-2 D | 0 |

* below measurement resolution

EW-N3 produces very little airflow due to the low permeability of the glacial till. As a result, no measurable vacuum was found at the monitoring points.

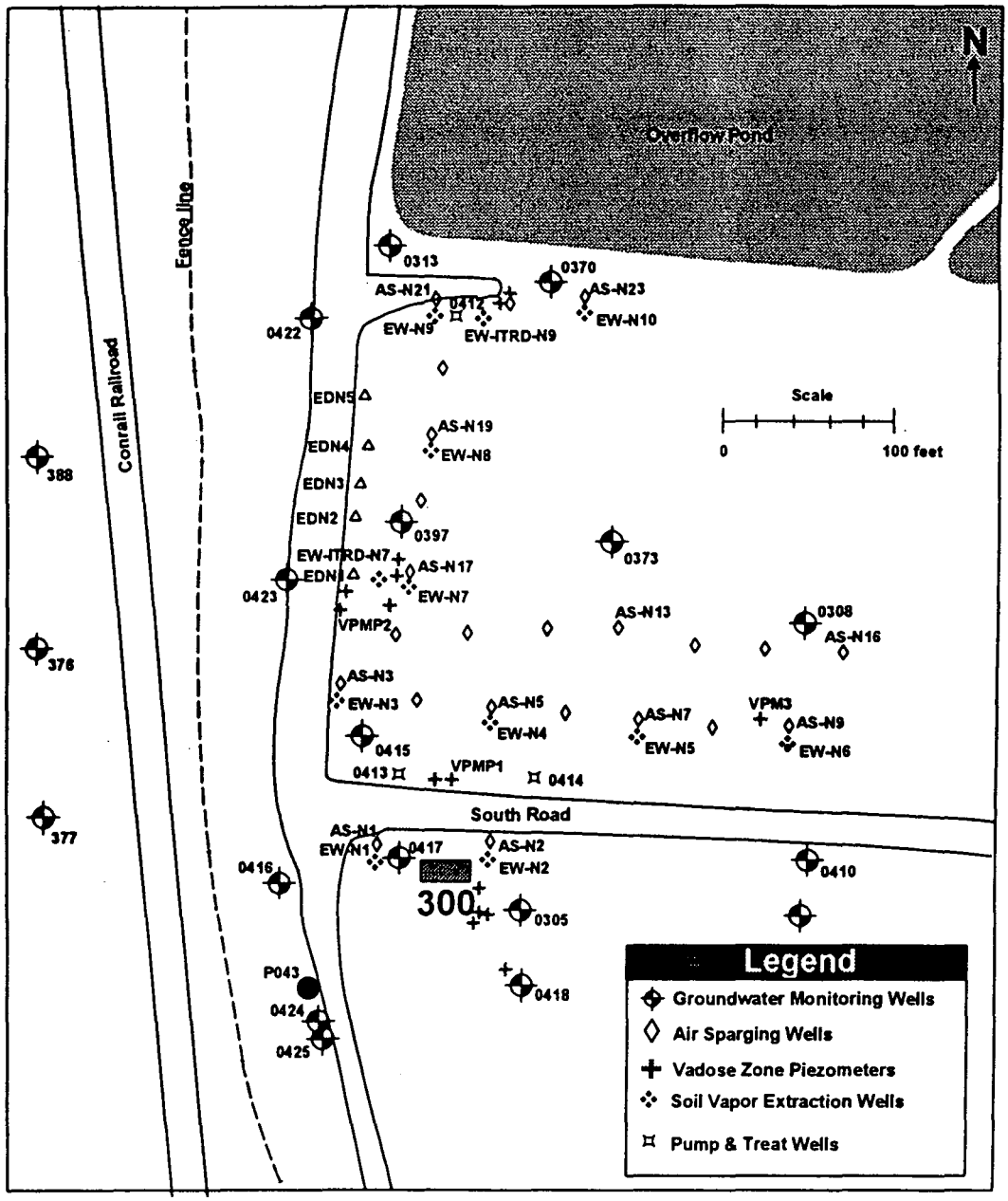


Figure 1. Air Sparge and Soil Vapor Extraction Well Locations

Table 2 shows the results for Zone 2, French drain SVE well ED-N2, which has a screened interval of 5 feet located in the base of the gravel French drain. The French drain SVE wells are connected to the Drench drains that were placed underneath the landfill during construction. This extends the effective length of the well screen to well over 200 to 300 feet. The results of Table 2 indicate that little vacuum is propagated laterally from these French Drains.

Table 2. ROI Test, Zone 2, French Drain

| Operating Well | | | | |
|---|---|---|---|---|
| Well ID | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | |
| ED-N2 | 0 | 2610 | 57 | |

| Measurement Locations | | | |
|---|---|---|---|
| Location | "$H_2O$ WC | Location | "$H_2O$ WC |
| ITRD-N7 | 0.01 | VPMP-1 S | 0 |
| ED-N1 | 0 | VPMP-2 S | 0 |

Table 3 shows the results for Zone 2, SVE well EW-N7, which has a screened interval of 10 feet in a non-till location. The distance column shows the length from the operating well to the measurement location. The results from tests of SVE well EW-N7 shows that this well provides effective ventilation over most of the site. EW-N7 also contains the largest source of SVE system produced contaminants, which are probably integrated from over most of the site.

Table 3. ROI Test, Zone 2, High Flow Well

| Operating Well | | | | | |
|---|---|---|---|---|---|
| Well ID | | Vac. ("Hg) | Flow (fpm) | Flow (cfm) | |
| EW-N7 | | 7 | 7175 | 157 | |
| Measurement Locations | | | | | |
| Location | "$H_2O$ WC | distance (ft) | Location | "$H_2O$ WC | Distance (ft) |
| EW-N2 | 0.13 | 151 | ED-N5 | 0.034 | NM |
| EW-N4 | 0.165 | 84 | ITRD-N7 | 0.25 | 10 |
| EW-N5 | 0.14 | 138 | ITRD-N9 | 0.9 | 160 |
| EW-N6 | 0.085 | 205 | VPMP-1 S | 0.46 | 115 |
| EW-N8 | 1.8 | 74 | VPMP-1 M | 0.17 | 115 |
| EW-N9 | 0.5 | 147 | VPMP-2 S | 3.4 | 40 |
| EW-N10 | 0.115 | 170 | VPMP-2 M | 0 | 40 |
| ED-N1 | 0 | NM | VPMP-3 | 0.08 | 189 |
| ED-N2 | 0.08 | NM | VPMP-4S | 0 | 153 |
| ED-N4 | 0 | NM | VPMP-4M | 0.03 | 153 |

NM– not measured

## DISCUSSION

Using the data from the test for EW-N7, Figure 2 shows the measured vacuum at the distances of each monitoring point. Curve (1) shows a fitted curve to all the data points except ITRD-N7 and VPMP-2M. ITRD-N7 was constructed for the pilot test and was found to have very low permeability and produced very little air flow. The screened interval for VPMP-2M was likely below the water table during these measurements. EW-N4 is located on Zone 1 and is considered one of the highest flow wells with small vacuum (172 cfm, -1.75 in Hg). However, EW-N7 shows a very little applied vacuum at EW-N4.

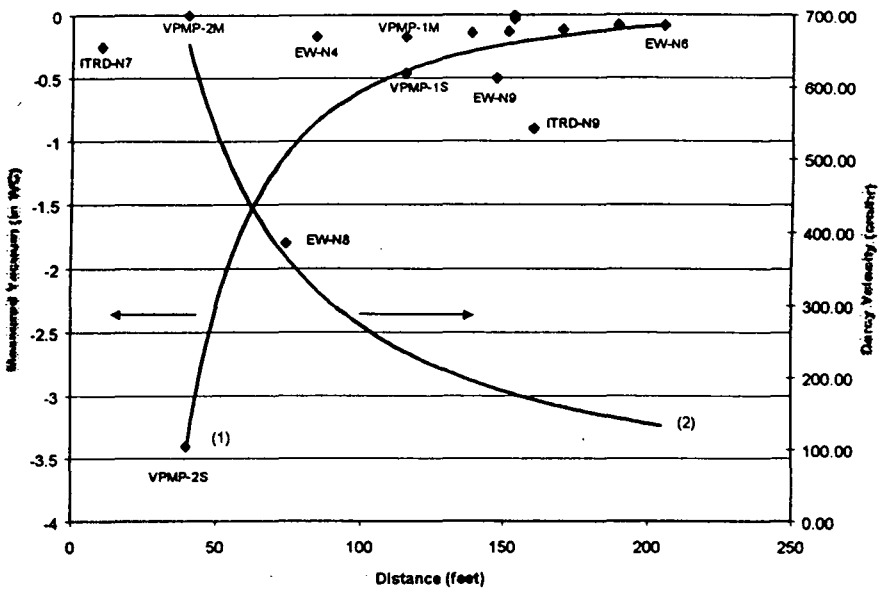


Figure 2. Radius of Influence and Estimated Air Velocity Induced by EW-N7

To develop an understanding for how significant the measured vacuums are, one can estimate the Darcy velocity of air using the pneumatic gradient and the intrinsic permeability. The intrinsic permeability can be estimated for all the flow into EW-N7 by using an equation for the steady state cylindrical flow into an extraction well:

$$K = \frac{QP_w \mu \ln(r_w / r_i)}{L\pi(P_w^2 - P_{atm}^2)}$$

where:

K = intrinsic permeability ($ft^2$)
Q = flow rate (157 ft3/min)
$P_w$= well pressure (7 in Hg = 780mbar)
$P_{atm}$ = atmospheric pressure (1013 mbar)
$\mu$ = viscosity of air (1.8E-7 mbar*sec)
$r_w$ = radius of well (0.017 ft)
$r_i$ = radius of influence (150 ft)
L = screen length (10 ft)

Applying the above parameters, the intrinsic permeability of EW-N7 is calculated to be 1.9E-10 $ft^2$, or 18 Darcy or 1.8E-7 $cm^2$. Comparing this value to general values for soils, this corresponds to ranges found for clean sand or silty sand, which is consistent given what is known about the site soils. To estimate the average velocity imparted by the measured vacuums at the distal locations, one can use Darcy's law, modified for any fluid, as:

$$V = \frac{-K}{\mu}\left(\frac{\Delta \rho g h}{\Delta l}\right)$$

where:

V = Darcy velocity (cm/sec)
K = intrinsic permeability ($cm^2$)
? = density of air (0.00582 $g/cm^3$)
g = acceleration due to gravity (980 $cm/sec^2$)
$\mu$= viscosity of air (1.8E-4 g/cm*sec)
? h = change in pneumatic head (ft of air)
? l = change in distance (ft)

Using the intrinsic permeability of 1.8E-7 cm2, change in pneumatic head of 7 in Hg (0.77 atm or 4477 ft air column) to 1 inch water column (0.9975 atm or 5800 ft air column) over 75 feet, the Darcy velocity is about 350 cm/hr. Figure 2 also contains the Darcy velocity (curve 2) as a function of distance using the pneumatic gradients from curve (1). This indicates that even at low vacuums, there is significant subsurface air velocity transporting contaminants to the extraction well.

## REFERENCES


1. ITRD, 1997. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Cost and Performance Data Collection Plan. December 1997.
2. Data tables from assveop3.xls, Microsoft Excel ver. 97 SR-1.

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

# Air Sparging and Soil Vapor Extraction Flow/Pressure/System Balance Report #1

## INTRODUCTION

The injection flow rate and pressure for each individual air sparge well can provide an indication of the relative performance of each well to transfer groundwater contaminants to the vadose zone. In a similar manner, the extraction flow rate and vacuum for each individual soil vapor extraction well can indicate the effective mass removal and radius of influence on each well. Periodic measurements on each well head can show performance changes over time and indicate the need for periodic maintenance.

## SAMPLING AND ANALYSIS METHODS

Upon initial startup in December 1997, airflow measurements were completed with a Kurz Model 441S thermal anemometer with a range of 10 to 6000 feet per minute. Over the time period from Jauary to April 1998, the air sparge and soil vapor extraction well heads were instrumented with individual integrating pitot tubes (Dwyer DS-300 Flow Sensor) and velocity pressure gauges (Dwyer Series 2000 Magnahelic Differential Pressure Gauges). In addition, the total flow rates and pressures/vacuums for both the AS and SVE were measured on a system basis with a standard centerline pitot tube/velocity pressure measurement. Pressure measurements were made with three inch diameter pressure and vacuum gauges located on the top of each well head. Figure 1 shows the locations of the air sparge and soil vapor extraction wells.

## RESULTS

Table 1A (Zone 1) and 1B (Zone 2) show the individual air flow rates and pressures on December 17, 1997 (startup plus one day). Table 2A (Zone 1) and 2B (Zone 2) show the same information for December 23, 1997. The AS wells AS-N14, AS-N15 and AS-N16 are located on the east side of the site where the groundwater to bedrock depth narrows. These three wells are currently above the groundwater surface and will only be used if there is a significant rise in the groundwater surface.

Table 1A. System Balance for Zone 1 – December 17, 1997

| Well ID | Pressure (psi) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
|---|---|---|---|---|---|
| AS-N1 | 12 | 2 | EW-N1 | -8 | 0 |
| AS-N2 | 8 | 33* | EW-N2 | -1 | 109 |
| AS-N3 | 11 | 0 | EW-N3 | -6.5 | 1 |
| AS-N4 | 8 | 15 | EW-N4 | -4.5 | 109 |
| AS-N5 | 10.5 | 1 | EW-N5 | -5.25 | 4 |
| AS-N6 | 9 | 1 | EW-N6 | -3.5 | 109 |
| AS-N7 | 8 | 28 | | | |
| AS-N8 | 10 | 6 | | | |
| AS-N9 | 8 | 33* | | | |
| Total | | 119 | | | 332 |

* - maximum reading of instrument

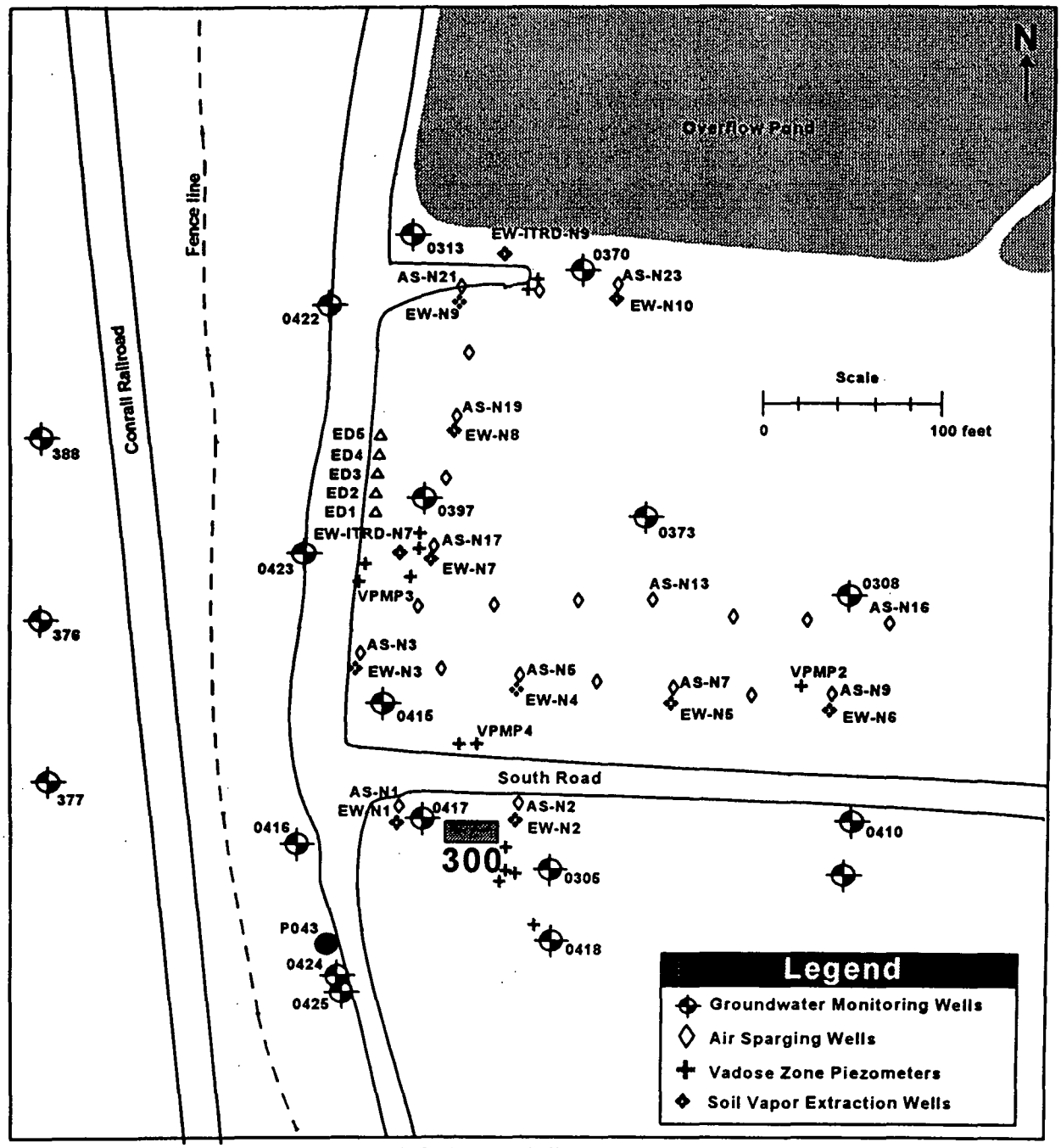


Figure 1. Air Sparge and Soil Vapor Extraction Well Locations

Table 1B. System Balance for Zone 2 – December 17, 1997

| Well ID | Pressure (psi) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
|---|---|---|---|---|---|
| AS-N10 | 11.75 | 33* | EW-N7 | -5 | 72 |
| AS-N11 | 9 | 33* | EW-N8 | -5 | 87 |
| AS-N12 | 11 | 2 | EW-N9 | -5 | 2 |
| AS-N13 | 12 | 1 | EW-N10 | -5 | 2 |
| AS-N14 | Off | Off | ED-N1 | -4.25 | 98 |
| AS-N15 | Off | Off | ED-N2 | -5 | 65 |
| AS-N16 | Off | Off | ED-N3 | -5 | 0 |
| AS-N17 | 12 | 0 | ED-N4 | -5 | 120 |
| AS-N18 | 11.5 | 0 | ED-N5 | -4.75 | 55 |
| AS-N19 | 10 | 0 | ITRD-1 | -5.5 | 2 |
| AS-N20 | 9.5 | 0 | ITRD-2 | -5 | 21 |
| AS-N21 | 11 | 33* | | | |
| AS-N22 | 9.5 | 21 | | | |
| AS-N23 | 10 | 0 | | | |
| Total | | 122 | | | 524 |

* - maximum reading of instrument

Table 2A. System Balance for Zone 1 – December 23, 1997

| Well ID | Pressure (psi) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
|---|---|---|---|---|---|
| AS-N1 | 7.5 | 5 | EW-N1 | -12.5 | 0.5 |
| AS-N2 | 7.25 | 16 | EW-N2 | 0 | 131* |
| AS-N3 | 5.25 | 5 | EW-N3 | -11.5 | 0.5 |
| AS-N4 | 8 | 33* | EW-N4 | -1.5 | 131* |
| AS-N5 | 9.4 | 2 | EW-N5 | -10.5 | 26 |
| AS-N6 | 8 | 11 | EW-N6 | -4 | 131* |
| AS-N7 | 10 | 33* | | | |
| AS-N8 | 8.6 | 21 | | | |
| AS-N9 | 8.75 | 33* | | | |
| Total | | 160 | | | 420 |

* - maximum reading of instrument

Table 2B. System Balance for Zone 2 – December 23, 1997

| Well ID | Pressure (psi) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
|---|---|---|---|---|---|
| AS-N10 | 11.9 | 9 | EW-N7 | -4.25 | 100 |
| AS-N11 | 12 | 33* | EW-N8 | -3.5 | 100 |
| AS-N12 | 11.6 | 28 | EW-N9 | -10 | 3 |
| AS-N13 | 11.25 | 13 | EW-N10 | -10 | 4 |
| AS-N14 | Off | Off | ED-N1 | -2 | 44 |
| AS-N15 | Off | Off | ED-N2 | -1 | 87 |
| AS-N16 | Off | Off | ED-N3 | -9.75 | 0 |
| AS-N17 | 10.9 | 10 | ED-N4 | -4.75 | 65 |
| AS-N18 | 12 | 29 | ED-N5 | -6.75 | 109 |
| AS-N19 | 11 | 13 | ITRD-1 | -10.4 | 7 |
| AS-N20 | 10.75 | 11 | ITRD-2 | -10 | 33 |
| AS-N21 | 11 | 33* | | | |
| AS-N22 | 9.5 | 32 | | | |
| AS-N23 | 10 | 2 | | | |
| Total | | 212 | | | 553 |

* - maximum reading of instrument

The air flow rates in the air sparge wells showed a significant declining trend after an initial increase. In addition, the delivery pressures were gradually increasing. Figure 2 and 3 shows the trend for both Zone 1 and Zone 2. When the system flow rates dropped to about 50% of the starting flows and the pressures were about double, the system was turned off and an investigation was started to determine the cause.

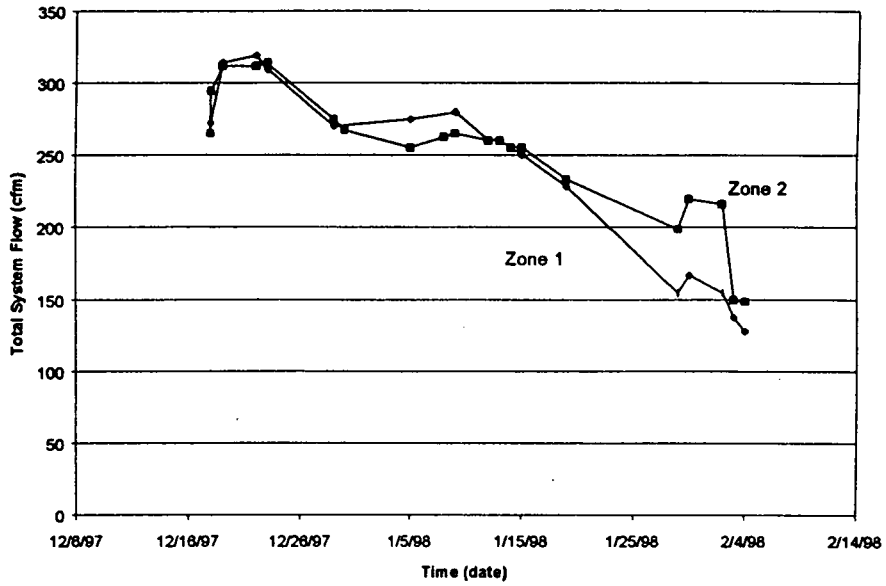


Figure 2. Air Sparge Flow Rates Over Time

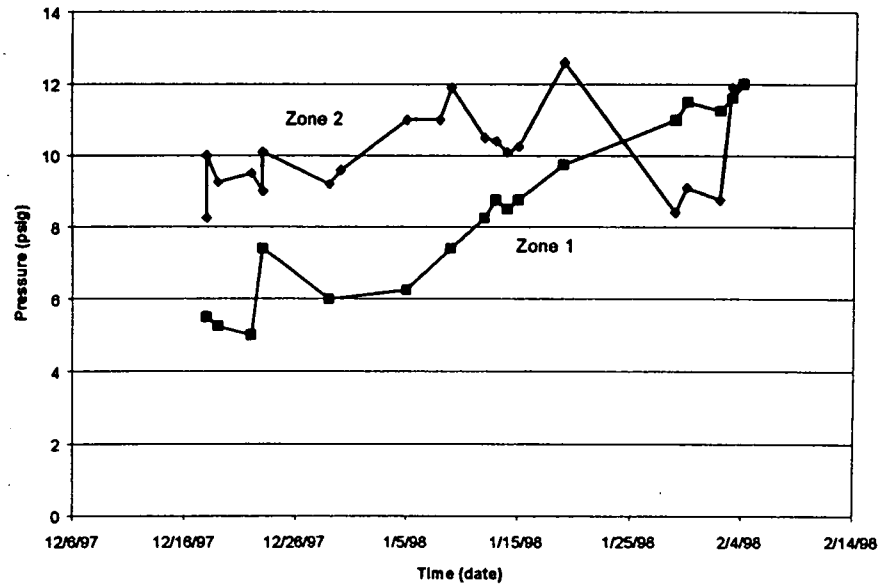


Figure 3. Air Sparge Delivery Pressures Over Time

The soil vapor extraction system continued to operate and the system balance data for March 5, 1998 is shown in Table 3A (Zone 1) and 3B (Zone 2).

Table 3A. System Balance for Zone 1 – March 5, 1998

| Well ID | Pressure (psi) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
|---|---|---|---|---|---|
| AS-N1 | Off | Off | EW-N1 | -8.5 | Ω |
| AS-N2 | Off | Off | EW-N2 | 0 | 172 |
| AS-N3 | Off | Off | EW-N3 | -9.5 | Ω |
| AS-N4 | Off | Off | EW-N4 | -1.75 | 167 |
| AS-N5 | Off | Off | EW-N5 | -10.75 | 47 |
| AS-N6 | Off | Off | EW-N6 | -3.75 | 167 |
| AS-N7 | Off | Off | | | |
| AS-N8 | Off | Off | | | |
| AS-N9 | Off | Off | | | |
| Total | | | | | 554 |

Ω - No flow measurement performed

Table 3B. System Balance for Zone 2 – March 5, 1998

| Well ID | Pressure (psi) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
|---|---|---|---|---|---|
| AS-N10 | Off | Off | EW-N7 | -4.5 | 122 |
| AS-N11 | Off | Off | EW-N8 | -3.4 | 122 |
| AS-N12 | Off | Off | EW-N9 | -12.25 | Ω |
| AS-N13 | Off | Off | EW-N10 | -12.2 | Ω |
| AS-N14 | Off | Off | ED-N1 | 0 | 71 |
| AS-N15 | Off | Off | ED-N2 | 0 | 72 |
| AS-N16 | Off | Off | ED-N3 | -7.5 | Ω |
| AS-N17 | Off | Off | ED-N4 | -2.5 | 72 |
| AS-N18 | Off | Off | ED-N5 | -7.25 | 67 |
| AS-N19 | Off | Off | ITRD-1 | -8 | Ω |
| AS-N20 | Off | Off | ITRD-2 | -12.25 | 29 |
| AS-N21 | Off | Off | | | |
| AS-N22 | Off | Off | | | |
| AS-N23 | Off | Off | | | |
| Total | | | | | 555 |

Ω - No flow measurement performed

## DISCUSSION

Of the air sparge wells, four (AS-N1, AS-N3, AS-N5 and AS-N23) were found to have very low to negligible flow rates (December 23, 1997 data). These locations all coincide with low extraction flow rates at adjacent soil vapor extraction wells (EW-N1, EW-N3, EW-N5 and EW-N10). In the time period between December 17, 1997 and December 23, 1997, the data show that seven of the air sparge wells had no significant change, two dropped, and eleven increased as the total system flow rate increased by over fifty percent. All of the air sparge flow adjusting valves were positioned fully opened.

For the soil vapor extraction wells, locations EW-N1, EW-N3, EW-N5 and ITRD-1 were showing low to negligible flow rates. These extraction wells were constructed into low permeability till or clay material with short-screened intervals. The ITRD well was the one used by Radian in the pilot test. Data from this test showed very low flow rates and the production of a significant amount of water. Aside from the French drains, all of the extraction wells showed a significant increase in flow rates. This may be attributable to the decline in water production as the wells began to dry out. The French drains produced a significant amount of water and the valves on these wells were throttled back to prevent shutdown of the system due to a high level condition in the water knockout tank.

Balancing of the SVE system was performed by partially closing wellhead valves on the high flow wells (e.g. EW-N2, EW-N4) to bring up the flows on the moderate producing wells. Attempts to bring up the flow rates on the low production wells by closing the high flow wells were generally unsuccessful. Small increases were possible, but at the cost of closing the high production wells and making the system run at near the maximum design vacuum. There is no quantitative indicator for the amount of closure used on each of the well head valves.

Potential causes for the decline in the flow rate and increase in pressure of the air sparge system include biofouling and formation of insoluble precipitates of iron and carbonate due to the addition of oxygen to the groundwater system. Testing and evaluation is planned and includes measurement of pH, eh, dissolved oxygen, total organic carbon, alkalinity, and speciation of ferrous and ferric ions.

## REFERENCES


1. ITRD, 1997. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Cost and Performance Data Collection Plan. December 1997.
2. Data tables from flo-pres.xls, Microsoft Excel ver. 97 SR-1.

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Air Sparging and Soil Vapor Extraction Flow/Pressure/System Balance Report #2

### INTRODUCTION

The injection flow rate and pressure for each individual air sparge well can provide an indication of the relative performance of each well to transfer groundwater contaminants to the vadose zone. In a similar manner, the extraction flow rate and vacuum for each individual soil vapor extraction well can indicate the effective mass removal and radius of influence on each well. Periodic measurements on each well head can show performance changes over time and indicate the need for periodic maintenance.

### SAMPLING AND ANALYSIS METHODS

Upon initial startup in December 1997, airflow measurements were completed with a Kurz Model 441S thermal anemometer with a range of 10 to 6000 feet per minute. Over the time period from Jauary to April 1998, the air sparge and soil vapor extraction well heads were instrumented with individual integrating pitot tubes (Dwyer DS-300 Flow Sensor) and velocity pressure gauges (Dwyer Series 2000 Magnahelic Differential Pressure Gauges). In addition, the total flow rates and pressures/vacuums for both the AS and SVE were measured on a system basis with a standard centerline pitot tube/velocity pressure measurement. Pressure measurements were made with three inch diameter pressure and vacuum gauges located on the top of each well head. Figure 1 shows the locations of the air sparge and soil vapor extraction wells.

### RESULTS

On February 4, 1998 the AS system was turned off because the injection pressure had doubled and the flow rate dropped to one half the startup values. Evaluation and restoration of the AS well point or aquifer plugging is still in progress. Therefore, this report will show results for only the SVE system. The mass removal rate for Zone 1 had leveled off at a value that was about ten percent of the rate for Zone 2. As a result, on May 7, 1998 the SVE system was set to extract from only Zone 2. Table 1 and 2 show the SVE vacuum and flow after rebalancing the system on April 28 and May 28, 1998, respectively. Data from previous measurements can be found in ITRD, 1998a.

Table 1. System Balance for Zone 1 and 2 – April 28, 1998

| Zone 1 | | | Zone 2 | | |
|---|---|---|---|---|---|
| Well ID | Vacuum (in Hg) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
| EW-N1 | -12.2 | 0 | EW-N7 | -6.1 | 122 |
| EW-N2 | 0 | 172 | EW-N8 | -3.75 | 124 |
| EW-N3 | -11.1 | 1 | EW-N9 | -9.4 | 7 |
| EW-N4 | -1.75 | 172 | EW-N10 | -9.5 | 4 |
| EW-N5 | -9.75 | 59 | ED-N1 | 0 | 67 |
| EW-N6 | -4.1 | 172 | ED-N2 | 0 | 67 |
| | | | ED-N3 | -9.1 | 0 |
| | | | ED-N4 | -2.1 | 67 |
| | | | ED-N5 | -5 | 67 |
| | | | EW-ITRD-N7 | -10 | 0 |
| | | | EW-ITRD-N9 | -9.4 | 9 |
| Total Individual | | 577 | | | 533 |
| Total Building | | 552 | | | 552 |

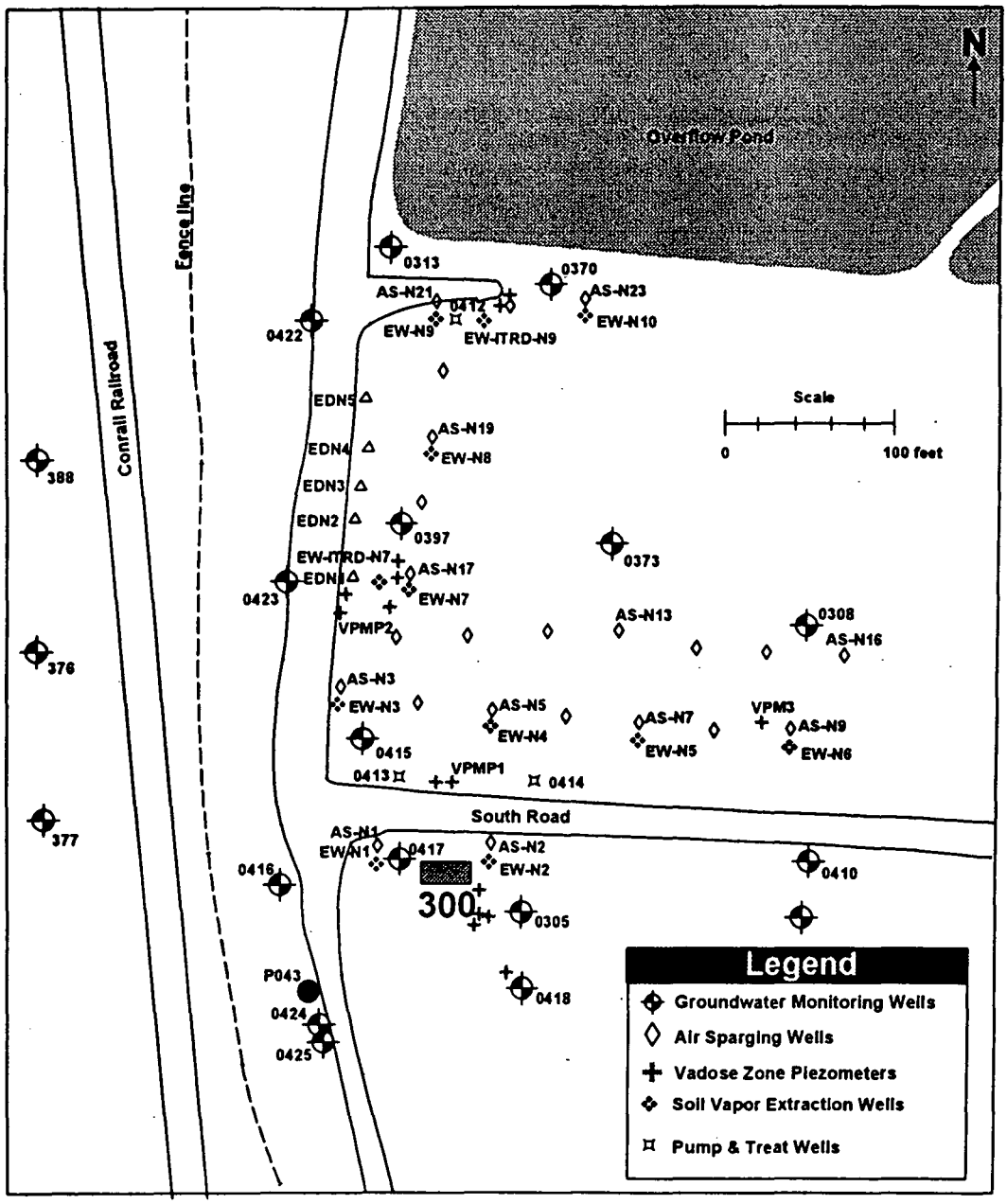


Figure 1. Air Sparge and Soil Vapor Extraction Well Locations

Table 2. System Balance for Zone 1 and 2 – May 28, 1998

| Zone 1 | | | Zone 2 | | |
|---|---|---|---|---|---|
| Well ID | Vacuum (in Hg) | Flow (cfm) | Well ID | Vacuum (in Hg) | Flow (cfm) |
| EW-N1 | 0 | 0 | EW-N7 | -7 | 122 |
| EW-N2 | 0 | 0 | EW-N8 | -3.8 | 125 |
| EW-N3 | 0 | 0 | EW-N9 | -9.2 | 15 |
| EW-N4 | 0 | 0 | EW-N10 | -8 | 13 |
| EW-N5 | 0 | 0 | ED-N1 | 0 | 66 |
| EW-N6 | 0 | 0 | ED-N2 | 0 | 74 |
| | | | ED-N3 | -9.3 | 0 |
| | | | ED-N4 | -1.5 | 68 |
| | | | ED-N5 | -3.9 | 65 |
| | | | EW-ITRD-N7 | -9.6 | 0 |
| | | | EW-ITRD-N9 | -9.5 | 17 |
| Total Individual | | 0 | | | 566 |
| Total Building | | 0 | | | 541 |

Table 3 and 4 show the measured vacuum and individual flow rates as a function of time for Zone 1 and Zone 2, respectively. Figures 2 and 3 graphically show the time history of the fraction of total flow from individual wells for Zone 1 and Zone 2, respectively.

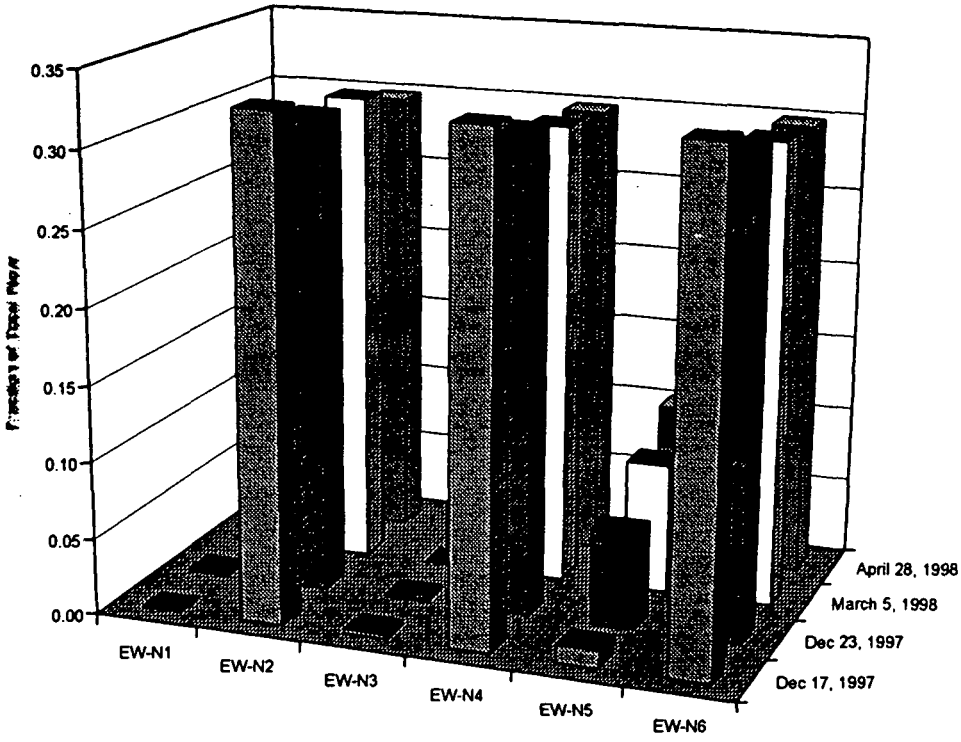


Figure 2. Fraction of Total Flow from Individual Wells on Zone 1

Table 3. Time History of Vacuum and Flow for Zone 1 SVE Wells

| Zone 1 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EW-N1 | | EW-N2 | | EW-N3 | | EW-N4 | | EW-N5 | | EW-N6 | |
| | vacuum | flow | vacuum | Flow | vacuum | flow | vacuum | flow | vacuum | flow | vacuum | flow |
| date | in Hg | cfm | in Hg | Cfm | in Hg | cfm | in Hg | cfm | in Hg | cfm | in Hg | cfm |
| 12/17/97 | -8 | 0 | -1 | 109 | -6.5 | 1 | -4.5 | 109 | -5.25 | 4 | -3.5 | 109 |
| 12/23/97 | -12.5 | 0.5 | 0 | 131 | -11.5 | 0.5 | -1.5 | 131 | -10.5 | 26 | -4 | 131 |
| 3/5/98 | -8.5 | | 0 | 172 | -9.5 | | -1.75 | 167 | -10.75 | 47 | -3.75 | 167 |
| 4/28/98 | -12.2 | 0 | 0 | 172 | -11.1 | 1 | -1.75 | 172 | -9.75 | 59 | -4.1 | 172 |
| 5/28/98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 4. Time History of Vacuum and Flow for Zone 2 SVE Wells

| Zone 2 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EW-N7 | | EW-N8 | | EW-N9 | | EW-N10 | | EW-ITRD-N7 | | EW-ITRD-N9 | |
| | vacuum | flow | vacuum | flow | vacuum | flow | vacuum | flow | vacuum | flow | vacuum | Flow |
| date | in Hg | cfm | in Hg | cfm | in Hg | cfm | in Hg | cfm | in Hg | cfm | in Hg | Cfm |
| 12/17/97 | -5 | 72 | -5 | 87 | -5 | 2 | -5 | 2 | -5.5 | 2 | -5 | 21 |
| 12/23/97 | -4.25 | 100 | -3.5 | 100 | -10 | 3 | -10 | 4 | -10.4 | 7 | -10 | 33 |
| 3/5/98 | -4.5 | 122 | -3.4 | 122 | -12.25 | | -12.2 | | -8 | | -12.25 | 29 |
| 4/28/98 | -6.1 | 122 | -3.75 | 124 | -9.4 | 7 | -9.5 | 4 | -10 | 0 | -9.4 | 9 |
| 5/28/98 | -7 | 122 | -3.8 | 125 | -9.2 | 15 | -8 | 13 | -9.6 | 0 | -9.5 | 17 |

Table 4. Time History of Vacuum and Flow for Zone 2 SVE Wells (continued)

| Zone 2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ED-N3 | | ED-N4 | | ED-N5 | | ED-N1 | | ED-N2 | |
| | vacuum | flow | vacuum | flow | vacuum | flow | vacuum | flow | vacuum | flow |
| date | in Hg | cfm | in Hg | cfm | in Hg | cfm | in Hg | cfm | in Hg | cfm |
| 12/17/97 | -5 | 0 | -5 | 120 | -4.75 | 55 | -4.25 | 98 | -5 | 65 |
| 12/23/97 | -9.75 | 0 | -4.75 | 65 | -6.75 | 109 | -2 | 44 | -1 | 87 |
| 3/5/98 | -7.5 | | -2.5 | 72 | -7.25 | 67 | 0 | 71 | 0 | 71 |
| 4/28/98 | -9.1 | 0 | -2.1 | 67 | -5 | 67 | 0 | 67 | 0 | 67 |
| 5/28/98 | -9.3 | 0 | -1.5 | 68 | -3.9 | 65 | 0 | 66 | 0 | 74 |

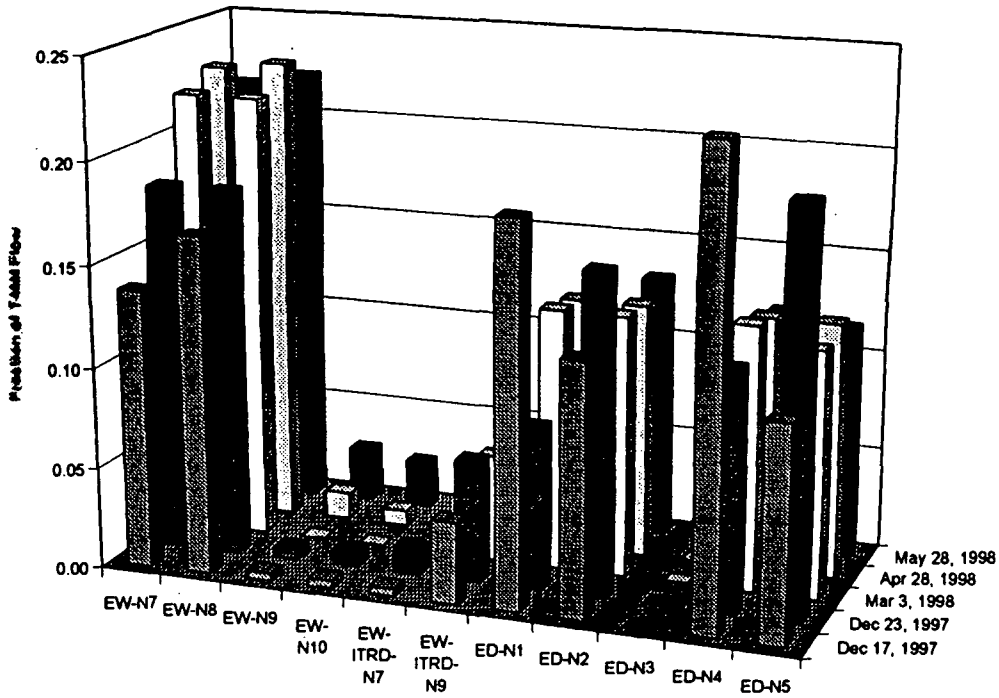


Figure 3. Fraction of Total Flow from Individual Wells on Zone 2

## DISCUSSION

The data collected from individual SVE wells shows that contributions to the total flow are found in two groups. One group (e.g. EW-N1 on Zone 1 and EW-N9 on Zone 2) includes those that produce less than five percent of the total flow. The other group (e.g. EW-N2 on Zone 1 and EW-N8 on Zone 2) includes those that produce fifteen to thirty percent of the total flow. If one looks at the individual well contributions to the mass extraction rate (ITRD, 1998b), there are only trace quantities in the low flow wells of Zone 1 (EW-N1 and EW-N3); however, the low flow wells of Zone 2 (EW-N9, EW-N10 and EW-ITRD-N7) all have significant concentrations of VOCs that are being removed by the SVE system. Field measurements have found there to be little to no change in the vacuum and flow before balancing on each Zone for the last three time steps.

## REFERENCES

1. ITRD, 1997. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Cost and Performance Data Collection Plan. December 1997.
2. ITRD, 1998a. Mound OU-1ITRD Project, Air Sparging/Soil Vapor Extraction, Flow/Pressure/System Balance Report #1, May 28, 1998.
3. ITRD, 1998b. Mound OU-1 ITRD Project, Air Sparging/Soil Vapor Extraction, Static Soil Gas Monitoring Report – Time Series #1. June 23, 1998.
4. Data tables from flopres2.xls, Microsoft Excel ver. 97 SR-1.

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Air Sparging and Soil Vapor Extraction Air Sparge Well Treatment Report #1

### INTRODUCTION

The Air Sparge (AS) system was installed with PVC well points designed to include micro porous sparge points (advertised to produce 50 micron size bubbles). The AS system was operational for about six weeks when the flow rate dropped in half and the applied pressure had doubled. This indicated significant AS well point or aquifer plugging. Aquifer tests for soluble ferrous iron showed low concentrations at the limits of detection of the measurement method (Hach colorimetric test kit). This is consistent with the knowledge of the aquifer as it is thought to be an oxidizing aquifer, with low organic carbon, indicating that any iron in the system would be oxidized and present as ferric, and not available to produce any significant fouling.. Carbonate fouling is thought to be a principal foulant for the AS system by analogy to the treatment required on the air stripper for the pump and treat system. The air stripper requires frequent treatment. The carbonate levels in the aquifer are 200 to 300 ppm and air sparging will tend to drive the equilibrium to produce insoluble carbonate salts. Biofouling is also thought to be a small contributor to the AS system performance decline. A treatment regime was designed to mitigate the carbonate, iron or bio fouling that was thought to have caused the decrease in AS system performance.

### TREATMENT METHOD

Commercial chemical treatment materials were selected due to their previous history in commerce and acceptability to Ohio State regulatory agencies. A granular acid (NW-110, US Filter Corporation, Johnson Screens) is advertised to remove carbonate, sulfate, barium and light iron-scale deposits. A concentrated liquid polymeric acid-enhancer (NW-310, US Filter Corporation, Johnson Screens) is advertised to dissolve the biofilm (a polysaccharide slime secreted by the bacteria for attachment and protection), disperse mineral salts and retain the mineral salts in suspension even at high pH.

Air sparge wells AS-N19, AS-N20 and AS-N21 were selected for treatment. Mobilization began on August 25, 1998. The air sparge well heads were modified to allow development with a bailer. Initial water levels were obtained and then each sparge well was evacuated. About 2 gallons of water was removed from each well and recovery was relatively slow. The pH of the recovered water averaged 6.5 initially. Following the manufacturer instructions, 0.1 gallons of acid enhancer was poured down each well. Next 2.8 pounds of granular acid was added. These were mixed with the bailer motion for about 10 minutes. The water levels were just above the screened interval when chemicals were added. An additional 0.4 gallons of distilled water was added and agitated. The wells set for 24 hours. The wells were then re-agitated and sampled for measurement of pH. The values were found to be in the 0.15 to 0.30 range. A decision was made to let the wells set for another 35 hours. On August 29, 1998, the well points were evacuated and the development water stored in a poly tank. The pH readings averaged 0.50. Water was added and evaluated several times until it raised the pH to 3.00 or above. The development water was neutralized by the addition of a lime slurry to a pH of 5.8 and disposed of at the Mound wastewater treatment facility.

### RESULTS

Table 1 shows the changes in air flow for each air sparge well treated.

Table 1. Air Sparge Treatment Results

| Date | AS-N19 | AS-N20 | AS-N21 |
|---|---|---|---|
| Initial Conditions (12/23/97) | 13 cfm | 11 cfm | 33 cfm |
| Pretreatment (8/3/98) | 0 | 0 | 12 |
| Post Treatment (~8/31/98) | 47 | 27 | 39 |

## DISCUSSION

Due to the success of this treatment regime, all of the remainder of the air sparge wells on Zone 2 will be treated. Since Zone 1 is not being used because of the low concentrations of contaminants being extracted, decisions to treat Zone 1 will be made if the decision to restart Zone 1 is made.

## REFERENCES


1. http://www.johnsonscreens.com, Innovative cleaning chemicals for the water industry.

Dec. 98

OU-1 Pump & Treat, Soil Vapor Extraction, Air Sparge and ITRD

## Operable Unit 1 Performance

| Monthly Pump & Treat Wells (Gallons) | Monthly SVE Knockout Tank (Gallons) | Monthly Total Water Treated (Gallons) | Cumulative Pump & Treat Wells (Gallons) | Cumulative SVE Knockout Tank (Gallons) | Cumulative Total (Gallons) |
|---|---|---|---|---|---|
| 3,563,795 | 3,616 | 3,567,411 | 89,213,310 | 64,849 | 89,278,159 |
| Last Calculated SVE Mass Removal (Pounds) | Date of Last Calculated SVE Mass Removal | Last Estimated Cumulative SVE Mass Removal (Pounds) | Date of Last Estimated Cumulative SVE Mass Removal | | |
| 2,380 | 10/31/98 | 2,594 | 12/31/98 | | |
| Possible Monthly Operating Hours | Air Stripper Down Time Hours | Operating Time (%) | Down Time (%) | | |
| 720 | 0.5 | 99.93 | 0.07 | | |
| Last Calculated Cumulative Air Stripper Mass Removal (Pounds) | Date of Last Calculated Cumulative Air Stripper Mass Removal | Last Estimated Cumulative Air Stripper Mass Removal (Pounds) | Date of Last Estimated Cumulative Air Stripper Mass Removal | | |
| 18 | 10/14/98 | 19 | 12/31/98 | | |
| SVE Down Time Hours | SVE Operating Time (%) | SVE Down Time (%) | | | |
| 10 | 98.61 | 1.39 | | | |

Nov. 98

OU-1 Pump & Treat, Soil Vapor Extraction, Air Sparge and ITRD

A new blower was installed on the SVE system on 11/05/98 replacing the failed blower. The system has run continuously, except for a brief scheduled maintenance shutdown, since returning to service.

## Operable Unit 1 Performance

| Monthly Pump & Treat Wells (Gallons) | Monthly SVE Knockout Tank (Gallons) | Monthly Total Water Treated (Gallons) | Cumulative Pump & Treat Wells (Gallons) | Cumulative SVE Knockout Tank (Gallons) | Cumulative Total (Gallons) |
|---|---|---|---|---|---|
| 4,015,405 | 547 | 4,015,952 | 85,649,515 | 61,233 | 85,710,748 |
| Last Calculated SVE Mass Removal (Pounds) | Date of Last Calculated SVE Mass Removal | Last Estimated Cumulative SVE Mass Removal (Pounds) | Date of Last Estimated Cumulative SVE Mass Removal | | |
| 2,182 | 08/31/98 | 2,380 | 10/31/98 | | |
| Possible Monthly Operating Hours | Air Stripper Down Time Hours | Operating Time (%) | Down Time (%) | | |
| 768 | 6.42 | 99.16 | 0.84 | | |
| Last Calculated Cumulative Air Stripper Mass Removal (Pounds) | Date of Last Calculated Cumulative Air Stripper Mass Removal | Last Estimated Cumulative Air Stripper Mass Removal (Pounds) | Date of Last Estimated Cumulative Air Stripper Mass Removal | | |
| 18 | 10/14/98 | - | - | | |
| SVE Down Time Hours | SVE Operating Time (%) | SVE Down Time (%) | | | |
| 173.67 | 77.4 | 22.6 | | | |

Oct. 98

OU-1 Pump & Treat, Soil Vapor Extraction, Air Sparge and ITRD

An area wide power outage occurred on 10/14/98 due to an interruption from the power company transformers. The P&T system provided expected service. The SVE system experienced a catastrophic failure of the larger of the two blowers utilized, in series, for providing system vacuum. The failure occurred on 10/22/98 at approximately 20:00 hours. A new blower is in transit to the facility to replace the failed blower. The remaining AS wells on the northern zone were chemically treated for fouling which resulted in restoration of original flow.

## Operable Unit 1 Performance

| Monthly Pump & Treat Wells (Gallons) | Monthly SVE Knockout Tank (Gallons) | Monthly Total Water Treated (Gallons) | Cumulative Pump & Treat Wells (Gallons) | Cumulative SVE Knockout Tank (Gallons) | Cumulative Total (Gallons) |
|---|---|---|---|---|---|
| 3,069,545 | 886 | 3,070,431 | 81,634,110 | 60,685 | 81,694,795 |
| Last Calculated SVE Mass Removal (Pounds) | Date of Last Calculated SVE Mass Removal | Last Estimated Cumulative SVE Mass Removal (Pounds) | Date of Last Estimated Cumulative SVE Mass Removal | | |
| 2,182 | 08/31/98 | 2,378 | 10/15/98 | | |
| Possibly Monthly Operating Hours | Air Stripper Down Time Hours | Operating Time (%) | Down Time (%) | | |
| 720 | 122.33 | 83.01 | 16.99 | | |
| Last Calculated Cumulative Air Stripper Mass Removal (Pounds) | Date of Last Calculated Cumulative Air Stripper Mass Removal | Last Estimated Cumulative Air Stripper Mass Removal (Pounds) | Date of Last Estimated Cumulative Air Stripper Mass Removal | | |
| 19 | 08/12/98 | 18 | 10/14/98 | | |
| SVE Down Time Hours | SVE Operating Time (%) | SVE Down Time (%) | | | |
| 218.33 | 69.68 | 30.32 | | | |

U.S. DEPARTMENT OF ENERGY

MOUND PLANT

MIAMISBURG, OHIO

# ENVIRONMENTAL RESTORATION
# MONTHLY PROGRESS REPORT

MAY 1998

# 1. INTRODUCTION

Per a Federal Facility Agreement (FFA) between the U.S. Department of Energy (DOE), Miamisburg Area Office (MB), and the U.S. Environmental Protection Agency, Region V (US EPA), and the Ohio Environmental Protection Agency (OEPA) a Monthly Progress Report is submitted for the Remedial Investigation/Feasibility Study (RI/FS) at the DOE Mound Plant for the period May 1 through May 31, 1998. The purpose of this report is to inform the Agencies regarding progress achieved towards environmental remediation of the site. This monthly progress report contains:

- A description of actions that have been taken toward achieving compliance with the agreement during the previous month;
- All plans and procedures completed during the previous month;
- A description of all actions, data, and plans that are scheduled for the next month(s) and other information relating to the progress of construction as is customary in the industry;
- Information regarding progress toward completion unresolved delays encountered or anticipated that may affect the future schedule for implementation of any scope of work or work plan, and a description of efforts made to mitigate those delays or anticipated delays.

Other specific, minimum required contents are:

- Minutes of the monthly project managers' meeting (see Attachment A.1)
- Status of approved agreements, commitments, or changes
- Changes in key personnel (see Contact List, Attachment A.5)
- Actions taken pursuant to this agreement including percent completion
- Photographs illustrating actions taken during the RI/FS (see Attachment A.2)
- Results of sampling and tests and other data received or generated by DOE pursuant to this agreement
- All actions or activities completed during the month
- Actions or activities planned for the next two months
- Field changes made during the month (see Attachment A.4)
- A description of any delays or problems that arose during the execution of the work described in this agreement and any steps taken by DOE to alleviate such delays and problems.

## 2. RECENT AND UPCOMING ACTIVITIES

**Main Hill Tritium**

**Main Hill Rad**

C-Building
Comments on the Draft Final report were received and incorporated.

H-Building
Comments on the Action Memorandum for H-Building were received and incorporated. Comments were resolved and resubmitted.

**Main Hill Non-Rad**

DS Building
All equipment identified to be removed from DS Building has been removed. Lead lined panels used for x-ray shielding were removed without incident and were sent to Franklin Iron for recycling. Requirements for the final report are being identified and developed.

Building 48
A meeting was held to discuss disposition of the EM components in the Building 48 vault. Several options were discussed and are in the process of being studied. One likely method is to apply to the state EPA for a Temporary Authorization to allow the items to be dissolved into a solvent. A final determination remains to be achieved. The presence of these items in the building will delay the binning of the building.

PS (Paint Shop) Building

Magazines 7, 11 and 54

Building 91

**SM/PP Hill**

Building 21 soil removal
The PRS package is currently with DOE for review.

Guard Post 44
The final report is currently being prepared.

Magazine 53
The final report is being prepared.

PRS 266

Currently working with the GIS group to define the extent of contamination, defining the boundaries and requesting them to perform a topographic survey and boundary survey.

**Test Fire Valley**

Old SD Soils
The pit excavation was back-filled on April 1, which completes the remediation of this disposal site. CERCLA verification testing and final grading of the Old SD site will be completed with the closure of WD-Building project.

Explosive Magazines 8, 5, 10 & 20
MEMP comments were incorporated into the Work Plan/JSHA's , the documents were submitted to the Ohio Field Office for review during the week of April 16.

Buildings 35 & 59 Demolition
All the debris from building 35 has been removed, only the slab and foundation remain. These will be removed after Building 59's slab and foundation are removed.

Building 59 has been demolished and the removal of the non-rad debris is completed. The removal of low-level rad debris has begun. Once the remaining loose debris has been removed, size reduction of the donut will begin. This activity should be completed in early May.

**Soils Project**

Construction Spoils Area
Acceptance criteria was delivered to regulators through the April FFA Meeting. Responsibility was transferred for concrete staging to Waste Management Operations.

Miami-Erie Canal
Remedial work was completed. April work included hot spot removal where verification sample results exceeded the 150 pCilg criteria; removing the concrete spillway and scabbling the underlying thrust block; and removing the sandstone blocks of the 1895 bridge. Restoration of the North Canal continued and restoration of the South Canal started.

Building 29 Septic Tank (PRS 86)
USEPA comments have been resolved. OSC report will be revised and re-issued pending receipt of approval letter from USEPA.

OU-9 Monitoring
The Spring 1998 groundwater monitoring started on March 23 and was completed in early April.

Building 19 Soils/Tanks
The Limited Field Investigation Report has been reviewed. Final revisions of the draft are being completed prior to transmittal to the regulators.

OU-1 Soil Vapor Extraction, Air Sparge and ITRD
Breakthrough occurred on the second tank. Granular activated carbon has been ordered for a third change. Fourth treatment cycle will begin after the carbon change.

## Operable Unit 1 Performance

| Monthly Pump & Treat Wells (Gallons) | Monthly SVE Knockout Tank (Gallons) | Monthly Total Water Treated (Gallons) | Cumulative Pump & Treat Wells (Gallons) | Cumulative SVE Knockout Tank (Gallons) | Cumulative Total (Gallons) |
|---|---|---|---|---|---|
| 4,069,651 | 12,650 | 4,082,301 | 58,425,501 | 35,802 | 58,461,303 |
| Last Calculated SVE Mass Removal (Pounds) | Date of Last Calculated SVE Mass Removal | Last Estimated Cumulative SVE Mass Removal (Pounds) | Date of Last Estimated Cumulative SVE Mass Removal | | |
| 682 | 1/19/98 | 1,128 | 3/25/98 | | |
| Possibly Monthly Operating Hours | Air Stripper Down Time Hours | Operating Time (%) | Down Time (%) | | |
| 3,840 | 29.5 | 99.2% | 0.8% | | |

PRS 414

The PRS 414 package was given to the regulators for a 30-day review prior to the May binning session. It was revised to discuss the PCE/TCE degradation chain.

**Waste Management**

ATS - WD Replacement

Excavation of the site for preparation of pier installation and re-routing of the domestic water line was completed in April.

CWPF

A management walk-through of the facility (Readiness Review) was performed on April 6 in anticipation of start-up on April 9. A DOE walk-through (Readiness Review) was performed on April 7. A ribbon cutting ceremony for the start-up of the facility was held on April 8.

The first compactor operation resulted in more than a 3-1-reduction in volume. The miscellaneous contents of 2 1/2 wooden LSA boxes (approximately 282 cu.ft.) were compressed. The new volume will now fit into one half of a metal LSA box and three LSA drums (83 cu.ft.). More boxes to process are arriving daily.

Each waste stream will be processed in a manner that allows for the most expeditious and least costly disposal. For example, miscellaneous wood found in the boxes will be relocated to the rail staging area and combined with the next rail shipment.

The week of April 15, seven LSA boxes were processed which resulted in only one full LSA box and eight LSA drums being created. This is a 78% volume reduction from 766 cu.ft. to 169 cu.ft. Arrangements to move and receive additional boxes and drums to the facility are in progress. Six boxes of miscellaneous trash (tarps, plywood, plastic

trashcans, etc.) from the processed LSA boxes will be moved to the soil staging area for disposal.

# WASTE STREAM - APRIL 1998

Reporting period April 1, 1998 through April 30, 1998

| Waste Type | Units | Waste in Storage | Planned Ship-ments | Waste Shipped | Waste Shipped YTD FY 98 |
|---|---|---|---|---|---|
| Hazardous (SS) | LBS. | 10,459 | 0 | 0 | 58,039 |
| - ER | CU. FT. | 0 | | | |
| Solid Waste Disposition | | | | | |
| Construction | CU. YDS. | 0 | 350 | 350 | 2,070.0 |
| TRU | CU. FT. | 8,398 | 0 | 0 | 0 |
| Mixed | CU. FT. | 1,451 | 0 | 0 | 0 |
| **Low Level Radioactive** | **Total** | *256,208* | *67,403* | *67,403* | *689,648* |
| - SD | CU. FT. | 0 | 0 | 0 | 1,877 |
| - WD Alpha | CU. FT. | 1,976 | 0 | 0 | 0 |
| - WD Beta | CU. FT. | 512 | 0 | 0 | 1,943 |
| - Lab Trash | CU. FT. | 85,944 | 5,469 | 5,469 | 28,118 |
| - Classified | CU. FT. | 64 | 0 | 0 | 0 |
| - Soil/Debris | CU. FT. | 161,223 | 61,934 | 61,934 | 657,710 |
| - Solidified Trit Waste HAT | CU. FT. | 800 | 0 | 0 | 0 |
| - TERF | CU. FT. | 0 | 0 | 0 | 0 |
| - Stack Waste | CU. FT. | 45 | 0 | 0 | 0 |
| - Trit Steel Boxes | CU. FT. | 5644 | 0 | 0 | 0 |

| Recycle | Units | Waste Shipped | Shipped YTD |
|---|---|---|---|
| Metal | TONS | 32 | 126 |
| Glass | TONS | 0 | 4 |
| Paper | TONS | 0 | 32 |
| Tires | EACH | 0 | 78 |

Solid Waste Activities

A meeting was held with DOE, OEPA, ODH, B&W Waste Management and Rad Control to resolve the issue of individually surveying roll-offs from RMMA and Non-RMMA areas. The decision is that roll-offs will no longer need individual surveys before release. Based on statistical results, they will be surveyed on a random sample basis.

Temporary Authorization Packages

Three temporary authorization packages are currently under development to support the Legacy Waste Project. Temporary authorization is an OEPA regulatory mechanism by which a facility can initiate a process to address (i.e., treat) hazardous waste streams. BWO intends to use the temporary authorization mechanism to address the Director Findings and Orders (DF&O) and Site Treatment Plan mixed waste treatment requirements for mixed wastes stored in Building 23. The Temporary Authorization packages that are driven by the regulatory requirements for a RCRA Permit are similar to the RCRA part B Permit format.

Excess Chemicals/Idle Equipment

HH-Building - Gas Disposition Project - Disposition activities began during April for the 745 excess gas cylinders in HH-Building. Valves were removed from 175 cylinders known to be empty (those with open valves). External and internal rad surveys were conducted in preparation of cylinder disposition. Based upon the results of the rad surveys, the disposition of the cylinders will be either free release; re-sale or scrap metal or low level radioactive waste.

OEPA NOV

DOE notified BWO that a NOV (Notification of Violation) was received from the OEPA concerning "excess chemicals" in HH and R-Buildings. Waste Management is addressing the issue of these excess chemicals in the Chemical Management Plan.

PRS 266 Support

Review of the characterization data report and the draft Work Plan has raised concerns of the possible presence of RCRA volatiles and metals. Additional characterization of soils for chemical contaminants will be required prior to disposal.

## Table 1. Document Status

| DELIVERABLE | STATUS | PROJECTED DELIVERY | COMMENTS |
|---|---|---|---|
| **SOILS PROJECT** | | | |
| • Limited Field Investigation Report on VOCs in Groundwater | Draft | April 30 | |
| • PRS 86 Area 7 Verification/OSC Report<br>• Regulatory Comments<br>• Response to comments<br>• Final Report | Draft<br><br>Draft Final | <br><br>March 17, 1998<br><br>May 20 | Delivered 12/16/97<br><br>Received January 14, 1998<br>Delivered March 19<br><br>Responses accepted |
| • Operable Unit 1 ROD Implementation Report<br>• Regulatory comments | | | Delivered February 3<br><br>OEPA comments received March 25 |
| • Contingent Removal Work Plan | Conceptual | Not scheduled | Developing concepts and issues for discussion with regulatory agencies |
| • Release Block G Residual Risk Evaluation | Draft | Not scheduled | On hold pending B&W evaluation of risk assessment strategy |
| • Metals in GW proposal for work<br>• Regulatory comments<br>• Revised Draft | <br><br>Draft Final | <br>March 13<br>May 19 | Delivered January 27 |
| **MAIN HILL RAD** | | | |
| • H-Building Hot Laundry Action Memo | Draft<br>Final | March 17, 1998<br>April 6, 1998 | DOE comments received March 30 |
| • H-Building Hot Laundry Work Plan | Draft<br>Final | March 1, 1998<br>April 6, 1998 | Project anticipates start of fieldwork June 1998. Received comments from DOE on March 19 |
| • C-Building Final Report | Draft Final<br>Final | April 1<br>April 21 | Submitted to DOE |

| | | | |
|---|---|---|---|
| **SM/PP** | | | |
| • Building 33 Superstructure Closure Report | Draft to DOE | May 15<br>June 15 | Final to regulators |
| • Building 21 and associated PRS Data Package | Draft | April 20<br><br>May 1 | To DOE for review for information<br>To Core Team |
| • Guardpost 44 Closure Report<br><br>• Magazine 53 Closure Report | Draft to DOE<br>Final<br><br>Draft | May 30, 1998<br>June 30, 1998<br><br>May 30, 1998 | |
| **MAIN HILL NON-RAD** | | | |
| • Magazine 7,11 & 54 Final Report | Final | April 30, 1998 | |
| • DS Building BDP | Final | March 17, 1998 | Submitted to Core Team. Building binned NFA on April 16. Available in Public Reading Room June 15. |
| • Work Plan Transite Work Plan | Draft | March 31, 1998 | Submitted to DOE incorporating comments |
| • Building 91 Work Plan | Draft to DOE | March 25, 1998<br><br>June 1 | Fieldwork started April 13, 1998<br>Submit to EPA |
| • Building 48 BDP | Draft | | Delivery is dependant on resolution of EM issues |
| **TEST FIRE VALLEY** | | | |
| • Buildings 35 & 59 Action Memo | Draft<br><br>Public Review Draft<br><br>Final | February 18, 1998<br><br>March 6, 1998<br><br>April 8 | Public Review March 6 - April 6, 1998 |
| • Buildings 35 & 59 Work Plan | Draft<br><br>Final | March 9, 1998<br><br>April 17 | Demolition started on April 13, 1998 |
| • Magazine 8 Building Data Package and Work Plan | Final | April 21, 1998 | Submitted to regulators for information |
| **SITE WIDE** | | | |
| • Mound 2000 Work Plan | Draft | April 27, 1998 | Delivered to DOE for review |

**Table 2. Remediation Field Work Status (May through June)**

| DELIVERABLE | STATUS | PROJECTED START OR FINISH | COMMENTS | AFFECTED PRS |
|---|---|---|---|---|
| **SOILS PROJECT** | | | | |
| • AS/SVE System installation | O&M in progress | | | 8,9,11,12 |
| • Miami-Erie Canal Removal Action | In progress | | | |
| - Excavation | Completed | April 21, 1998 | Restoration in progress | 1-6 |
| - Verification sampling | Completed | May 7, 1998 | Pending last analysis | 1-6 |
| • OU-9 Groundwater Monitoring | Complete | March/April 1998 | Completed | None |
| **TEST FIRE VALLEY PROJECT** | | | | |
| • Old SD Plant D&D | Complete | April 1, 1998 | Complete backfill | 174 |
| • Buildings 35 & 59 | In progress | April 1998 | Demolition started on April 13 | None |
| • Magazine 5,8,10 & 20 | Start | June 1 | DOE authorization requested April 30 | None |
| **MAIN HILL RAD** | | | | |
| • H-Building Hot Laundry<br>• C-Building demolition | | June 1<br>Complete | | 337,210 |
| **MAIN HILL NON-RAD** | | | | |
| • Paint Shop demolition | Start | July 1 | Transite removal | 411,368,112,254 |
| **TRITIUM PROJECT** | | | No ER remedial activities scheduled | |
| **LEGACY WASTE PROJECT** | In progress | | No ER remedial activities scheduled | |

| SM/PP HILL PROJECT | | | | |
|---|---|---|---|---|
| • BD-21 Removal | | | | 407,280,281,283,284 |
| - Excavation | Complete | | Worked as weather permits | |
| - Confirmation Sampling | Complete | January 23, 1998 | Analytical results pending | |
| • Guardpost 44 Removal | Superstructure foundation complete | April 9, 1998 | | |
| • Magazine 53 Removal | Foundation complete | April 2, 1998 | | |
| • PRS 266 | Soil Characterization start | June 1, 1998 | Characterization required for organics and metals | 395 |

# PRS/BDP PACKAGES

| PRS/BDP ACTIVITY | CURRENT STATUS | PROJECTED DELIVERY | COMMENTS |
|---|---|---|---|
| PRS 107/108/109 | NFA | Document Final 05/01/98 | No comments |
| PRS 363 | RA | Document Final 05/01/98 | No comments |
| PRS 407 | To Binning | To Core Team 05/15/98 | Bin 06/16/98 |
| PRS 414 | To Binning | To Core Team 04/16/98 | Bin 05/19/98 |
| PRS 412 | NFA | To Public Review 04/15/98 | |
| BDP DS Building | To Binning | To Core Team - 3/24/98 | Bin 4/15/98 |
| BDP Magazine 8 | | To Public Reading Room 04/29/98 | Demolish June 1998 |

**Community Relations Activities During May**

members of the public used the CERCLA Public Reading Room during May.

**Delays, Problems and Remedies**

There were no delays or problems to report during the month of May.

# ATTACHMENT A.1

# MINUTES OF THE MONTHLY PROJECT MANAGERS MEETING

# DOCUMENT ADDITIONS FOR MAY 1998

**Documents Added to the Administrative Record**

The following Building Data Package Revision 1 is now available in the CERCLA Public Reading Room.

BDP GP-44

Action Memorandum Engineering Evaluation/Cost Analysis Removal Action Buildings 35 and 59, Final Revision 0, April 1998 is now available in the CERCLA Public Reading Room.

Updated press clippings for May 1998

**Documents Added to the Information Repository**

## ATTACHMENT A.2

## PHOTOGRAPHS TAKEN DURING THE MONTH OF MAY

1. Building 53, magazine restoration
2. GP-44 restoration
3. GP-44 restoration
4. ATS construction
5. ATS construction
6. ATS construction
7. ATS construction
8. Canal restoration looking North
9. Canal restoration, concrete pour
10. Canal restoration, bridge construction
11. Canal restoration, bridge construction
12. Canal restoration, hydro-seeding
13. Canal restoration, hydro-seeding
14. Canal restoration, hydro-seeding
15. Wetland area East of CWPF

# ATTACHMENT A.3

## NEWSPAPER ARTICLES GENERATED AS A RESULT OF COMMUNITY RELATIONS ACTIVITIES UNDER THIS AGREEMENT

# ATTACHMENT A.4

# FIELD CHANGE LOG FOR MAY

## FIELD CHANGE LOG FOR MAY

| ADS | Summary of Change (description) | Contractor | Contractor Change Control No | Cost Impact[1] (Y/N) | Schedule Impact[2] (Y/N) |
|---|---|---|---|---|---|
| | No changes for May | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

1 Cost Impact - yes if a contractual change is required
2 Schedule Impact - yes if a deviation from approved schedules will occur
Note: In general, a change will be logged here when it is significant enough to invoke the contractor's QA change control process

# ATTACHMENT A.5

# B&W OF OHIO/CERCLA CONTACT LIST

# B&W OF OHIO/CERCLA CONTACT LIST

| Contact | Phone | FAX |
|---|---|---|
| **BWO Mound Contacts** | | |
| B&W of Ohio<br>P.O. Box 3030<br>Miamisburg, Ohio 45343-3030 | Page:<br>937-865-4020 | 937-865-3835 |
| Jim Powers<br>Deputy Site Manager | 937-865-3865<br>E-Mail Address<br>Powersj@doe-md.gov | 937-865-4554 |
| Linda Laidley<br>Clerk | 937-865-5175<br>E-Mail Address<br>Laidlk@doe-md.gov | |
| Dick Alire<br>Main Hill Tritium Project Manager | 937-865-4159<br>E-Mail Address<br>Alirerm@doe-md.gov | |
| Bud Thompson<br>Main Hill Non-Rad Project Manager | 937-865-4071<br>E-Mail Address<br>Thomcd@doe-md.gov | |
| Scott Hood<br>Main Hill Rad Project Manager | 937-865-4852<br>E-Mail Address<br>Hoodws@doe-md.gov | |
| Felix Spitler<br>SM-PP Hill Project Manager | 937-865-3981<br>E-Mail Address<br>Spitfj@doe-md.gov | |
| Joe Bartee<br>Test Fire Valley Project Manager | 937-865-4812<br>E-Mail Address<br>Bartjd@doe-md.gov | |
| John Price<br>Soils Project Manager | 937-865-3954<br>E-Mail Address<br>Pricjb@doe-md.gov | |
| John Krueger<br>Legacy Waste Project Manager | 937-865-4801<br>E-Mail Address<br>Kruejw@doe-md.gov | |
| Mark Becker<br>Communication Director | 937-865-4450<br>E-Mail Address<br>Beckmc@doe-md.gov | 937-865-3952 |
| Monte Williams<br>Chief Engineer | 937-865-4543<br>E-Mail Address<br>Willma@doe-md.gov | 937-865-4554 |

| Contact | Phone | FAX |
|---|---|---|
| **DOE Contacts** | | |
| Art Kleinrath<br>OSC/RPM Soils Project<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3597<br><br>E-Mail Address<br>Arthur.kleinrath@em.<br>Doe.gov | 937-865-4219 |
| Alan Spesard<br>Main Hill Rad<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3859<br><br>E-Mail Address<br>Alan.spesard@em.doe.<br>Gov | 937-865-4219 |
| Ron Church<br>Test Fire<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3548<br><br>E-Mail Address<br>Ronald.church@em.<br>Doe.gov | 937-865-4219 |
| Debbie White<br>Temporarily detailed to Real Estate<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-5197<br><br>E-Mail Address<br>Debra.white@em.doe.<br>Gov | 937-865-4219 |
| Jane Greenwalt<br>Public Affairs<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3116<br><br>E-Mail Address<br>Jane.greenwalt@em.<br>Doe.gov | 937-865-4489 |
| Sam Cheng<br>Tritium Complex<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-4778<br><br>E-Mail Address<br>Sam.cheng@em.<br>Doe.gov | 937-865-4489 |
| Paul Lucas<br>Building Transition<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-4578<br><br>E-Mail Address<br>Paul.lucas@em.doe.<br>Gov | 937-865-4489 |
| Kevin Donovan<br>Main Hill Non-Rad<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-4661<br><br>E-Mail Address<br>Kevin.donovan@em.<br>Doe.gov | 937-865-4489 |

| Contact | Phone | FAX |
|---|---|---|
| James Johnson<br>SM/PP<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-5234<br><br>E-Mail Address<br>James.o.johnson<br>@em.doe.gov | |
| Rob Rothman<br>WM/Legacy Waste<br>US DOE, Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3823<br><br>E-Mail Address<br>Robert.rothman<br>@em.doe.gov. | |
| Dick Neff<br>Sandia National Lab<br>Miamisburg Area Office<br>P.O. Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3616<br><br>E-Mail Address<br>Richard.neff@em.doe.<br>Gov | 937-865-4219 |
| Dan Carfagno<br>Sandia National Lab<br>Miamisburg Area Office<br>PO Box 66<br>1 Mound Road<br>Miamisburg, Ohio 45343-0066 | 937-865-3931<br><br>E-Mail Address<br>daniel.carfagno@em.<br>doe.gov | 937-865-4219 |
| Terrence Tracy<br>U.S. Department of Energy<br>19901 Germantown Road<br>Room 1018 - Cloverleaf<br>Germantown, Maryland 20874 | 301-903-2173<br><br>E-Mail Address<br>Terrence.tracy@em.<br>doe.gov | 301-903-2202 |
| **EPA Contacts** | | |
| Tim Fischer<br>US EPA<br>SRF-5J<br>77 W. Jackson<br>Chicago, Illinois 60604 | 312-886-5787<br><br>E-Mail Address<br>fischer.timothy@epa<br>mail.epa.gov | 312-353-8426 |
| Leo Rosales<br>P-19J<br>77 W. Jackson Blvd.<br>Chicago, Illinois 60604-3590 | 312-353-6198<br><br>E-Mail Address<br>Rosales.leo@epamail. | 312-353-6198<br>1-800-621-8431<br><br>FAX<br>312-353-1155 |
| Jeffery Raines<br>TechLaw, Inc.<br>20 N. Wacker Drive, Suite 1260<br>Chicago, Ilinois 60606 | 312-578-8900<br>E-Mail Address<br>Jraines@techlawinc.<br>Com | |

| Ohio EPA Contact | | |
|---|---|---|
| Brian Nickel<br>Ohio EPA<br>401 E. Fifth Street<br>Dayton, Ohio 45402-2911 | 937-285-6468<br><br>E-Mail Address<br>Brian.nickel@epa.state.oh.us | 937-285-6404 |
| Lisa Anderson<br>Ohio EPA<br>401 E. Fifth Street<br>Dayton, Ohio 45402-2911 | 937-285-6599<br><br>E-Mail Address<br>Lisa.Anderson@epa.state.oh.us | 937-285-6404 |
| Ray Beaumier<br>Ohio EPA<br>1800 Watermark Drive<br>Columbus, Ohio 43215 | 614-644-2304<br><br>E-Mail Address<br>ray.beaumier@epa.state.oh.us | 614-644-3146 |
| Kathy Lee Fox<br>Ohio EPA<br>401 E. Fifth Street<br>Dayton, Ohio 45402-2911 | 937-285-6441<br><br>E-Mail Address<br>Kathy.Fox@epa.state.oh.us | 937-285-6404 |
| **ODH Contact** | | |
| Ruth Vandegrift<br>Ohio Department of Health, 7th Floor<br>35 E. Chestnut Street, P.O. Box 118<br>Columbus, Ohio 43215 | 614-644-2727<br><br>E-Mail Address<br>rvandegrift@gov.odh.state.ohio.us | 614-644-1909 |
| **ATSDR Contact** | | |
| Bill Taylor<br>Agency for Toxic Substances and Disease Registry<br>1600 Clifton Road, NE<br>Mail Stop E-56<br>Atlanta, GA 30333 | 404-639-6035 | 404-639-6075 |

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

Internal Lab Batch No. _____ SAR/WR No. _____ (Call 294-5514 for ARCOC and Sample Numbers.) AR/COC-600323

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: ITRD Mound OU-1
Record Center Code:
Logbook Ref No:
Service Order No.: CE-01646

Lab Contact: Diana Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi 505-844-3110
Send Report to SMO: Doug Salmi

Contract No.: AT-2480
Case No.: 7433.700
SMO Authorization
Bill to: Sandia National Laboratories, Supplies Services Department, P.O. Box 5800 MS 0154

Parameter & Method Requested: TDH

135351

| Location: Tech Area | Building | Room | Sample No. - Fraction | ER Sample ID or Sample Location Detail | Beginning Depth in Ft. | ER Site No. | Date/Time Collected | Sample Matrix | Container Type | Container Volume | Preservative | Sample Collection Method | Sample Type | TDH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mound OU-1 | 301 | 1 | 043707-001 | Bldg. 301 Zone 2 | NA | NA | 11/18/98 09:15 | G | SG | 4l | None | G | SA | X |

Reference LOV (available at SMO)

RMMA ☐ Yes ☒ No Ref. No. _____

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date _____

Special Instructions/QC Requirements
EDD ☐ Yes ☐ No
Raw data package ☐ Yes ☐ No

Please list as separate report.

| Sample Team Members | Name | Signature | Init | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | | BWO/Sciks/(337)8653707 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Relinquished by | Mark Spivey | Org. Sciks | Date 11/24/98 | Time 8:00 | 4. Relinquished by | Org. | Date | Time |
| 1. Received by | Mark Spivey | Org. Quanterra | Date 11/24/98 | Time 08:45 | 4. Received by | Org. | Date | Time |
| 2. Relinquished by | | Org. | Date | Time | 5. Relinquished by | Org. | Date | Time |
| 2. Received by | | Org. | Date | Time | 5. Received by | Org. | Date | Time |
| 3. Relinquished by | | Org. | Date | Time | 6. Relinquished by | Org. | Date | Time |
| 3. Received by | | Org. | Date | Time | 6. Received by | Org. | Date | Time |

WHITE - To Accompany Samples, Laboratory Copy  BLUE - To Accompany Samples, Return to SMO  YELLOW - SMO Suspense Copy  PINK - Field Copy

Shipped on 11/23/98

JAN -17.99 11:01 12:57 12/09/98 09:24 5058443128 SNL SMO P.003
DEC 9'98 09:14 FR 7142588610 TD 15058443128 P.02/04

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE ____ OF ____

Internal Lab Batch No. _____ SAR/WR No. _____ (Call 294-5514 for AR/COC and Sample Numbers) AR/COC- 601217

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: TTRD Mound OU-1
Record Center Code:
Logbook Ref No.:
Service Order No.: CF-01646

Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi (505) 844-3110
Send Report to SMO: Doug Salmi

Contract No.: AJ-2480
Case No.: 7433.302
SMO Authorization
Bill to: Sandia National Laboratories, Supplier Services Department, P.O. Box 5800 MS 0159

Parameter & Method Requested: 135473

| Location: Tech Area / Building / Room | Sample No. - Fraction | ER Sample ID or Sample Location Detail | Beginning Depth in Ft. | ER Site No. | Date/Time Collected | Sample Matrix | Container Type | Container Volume | Preservative | Sample Collection Method | Sample Type | TDH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 043708-001 | Zone 2 | NA | NA | 11/25/98 14:30 | G | SG | 4l | None | G | SA | X |

RMMA ☐ Yes ☒ No Ref. No. _____

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date _____

Special Instructions/QC Requirements
EDD ☐ Yes ☐ No
Raw data package ☐ Yes ☐ No
Please list as separate report.

| Sample Team Members | Name | Signature | Initials | Company/Organization/Phone |
|---|---|---|---|---|
| | MARK GILLAT | [signature] | MG | |
| | Mark Spivey | Mark Spivey | MS | R&WO / Soils Projects |

| | Org. | Date | Time | | Org. | Date | Time |
|---|---|---|---|---|---|---|---|
| 1. Relinquished by [signature] | Soils Projects | 12/1/98 | 0530 | 4. Relinquished by | | | |
| 1. Received by Mark Spivey | Soils Projects | 12/1/98 | 0530 | 4. Received by | | | |
| 2. Relinquished by Mark Spivey | Soils Projects | 12/2/98 | 07:00 | 5. Relinquished by | | | |
| 2. Received by [signature] | Quanterra | 12/6/98 | 0900 | 5. Received by | | | |
| 3. Relinquished by | | | | 6. Relinquished by | | | |
| 3. Received by | | | | 6. Received by | | | |

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples YELLOW - SMO Supervisor Copy

DEC. -14' 98 (MON) 17:43 QUANTERRA-INDUSTR TEL:626 965 1003 P. 002
DEC-23-98 12:09 FROM:SNL DEPT. 0861 ☎5058443128 SNL SMO 12/15/98 08:43 ☎5058443128 P.003

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

Internal Lab Batch No. _____ SAR/WR No. _____ (Call 844-5516 for AR/COC and Sample Numbers.) AR/COC- 601218

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: JTRD Mound Cl-1
Record Center Code: _____
Logbook Ref No: _____
Service Order No.: CF -0646

Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi (505) 844-3110
Send Report to SMO: Doug Salmi

Control No.: AT-248
Case No.: 7133.32
SMO Authorization: _____
Bill to: Sandia National Laboratories, Supplier Services Department, P.O. Box 5800 MS 0154

Parameter & Method Requested: 135724

| Sample No. - Fraction | ER Sample ID or Sample Location Detail | Beginning Depth in Ft. | ER Site No. | Date/Time Collected | Sample Matrix | Container Type | Container Volume | Preservative | Sample Collection Method | Sample Type | TOH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0437 09 - 001 | Bldg. 301 Zone 2 | NA | NA | 12-9-98 10:15 | G | SG | 4l | None | G | SA | X |
| 0437 10 - 001 | Bldg. 301 Zone 2 | NA | NA | 12-18-98 14:55 | G | SG | 4l | None | G | SA | X |

Location: Tech Area _____ Building _____ Room _____

RMMA ☐ Yes ☒ No Ref. No. _____

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date _____

Special Instructions/QC Requirements: EDD ☐ Yes ☐ No; Raw data package ☐ Yes ☐ No

Please list as separate report.

| Sample Team Members | Name | Signature | Initials | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | MS | B&W Soils |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Relinquished by | Mark Spivey | Org. Soils | Date 12/21/98 | Time 17:00 | 4. Relinquished by | Org. | Date | Time |
| 1. Received by | [illegible] | Org. Quanterra | Date 12/22/98 | Time 1000 | 4. Received by | Org. | Date | Time |
| 2. Relinquished by | | Org. | Date | Time | 5. Relinquished by | Org. | Date | Time |
| 2. Received by | | Org. | Date | Time | 5. Received by | Org. | Date | Time |
| 3. Relinquished by | | Org. | Date | Time | 6. Relinquished by | Org. | Date | Time |
| 3. Received by | | Org. | Date | Time | 6. Received by | Org. | Date | Time |

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples YELLOW - SMO Copy

JAN-05-99 13:41 FROM:SNL DEPT. 0021 01/05/99 11:42 ☒5058443128 SNL SMO T00864005 1-306 P.03/01 JOB-CUC ☒003

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043707-001
LAB ID: 135351-0001-SA
Matrix: AIR — Sampled: 18 NOV 98 — Received: 24 NOV 98
Authorized: 24 NOV 98 — Prepared: N/A — Analyzed: 30 NOV 98
Instrument: GC/MS-A — Dilution: 42

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 84 | 21 | ppb (v/v) |
| Chloromethane | ND | | 170 | 42 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 84 | 34 | ppb (v/v) |
| Vinyl chloride | ND | | 84 | 34 | ppb (v/v) |
| Bromomethane | ND | | 84 | 42 | ppb (v/v) |
| Chloroethane | ND | | 170 | 34 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 84 | 21 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 84 | 21 | ppb (v/v) |
| Carbon disulfide | ND | | 420 | 84 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 88 | | 84 | 21 | ppb (v/v) |
| Acetone | ND | | 420 | 84 | ppb (v/v) |
| Methylene chloride | 48 | J | 84 | 34 | ppb (v/v) |
| trans-1,2-Dichloroethene | 22 | J | 84 | 21 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 84 | 21 | ppb (v/v) |
| Vinyl acetate | ND | | 420 | 84 | ppb (v/v) |
| cis-1,2-Dichloroethene | 1800 | | 84 | 34 | ppb (v/v) |
| 2-Butanone | ND | | 420 | 84 | ppb (v/v) |
| Chloroform | 160 | | 84 | 34 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 84 | 21 | ppb (v/v) |
| Carbon tetrachloride | ND | | 84 | 21 | ppb (v/v) |
| Benzene | ND | | 84 | 34 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 84 | 34 | ppb (v/v) |
| Trichloroethene | 8400 | | 84 | 21 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 84 | 34 | ppb (v/v) |
| Bromodichloromethane | ND | | 84 | 34 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 84 | 21 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 420 | 84 | ppb (v/v) |
| Toluene | 3600 | | 84 | 21 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 84 | 34 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 84 | 21 | ppb (v/v) |
| Tetrachloroethene | 580 | | 84 | 21 | ppb (v/v) |
| 2-Hexanone | ND | | 1300 | 130 | ppb (v/v) |
| Dibromochloromethane | ND | | 84 | 21 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 84 | 21 | ppb (v/v) |
| Chlorobenzene | ND | | 84 | 21 | ppb (v/v) |
| Ethylbenzene | ND | | 84 | 21 | ppb (v/v) |
| Xylenes (total) | 64 | J | 84 | 34 | ppb (v/v) |
| Styrene | ND | | 84 | 21 | ppb (v/v) |
| Bromoform | ND | | 84 | 21 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 84 | 21 | ppb (v/v) |
| Benzyl chloride | ND | | 420 | 34 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 84 | 21 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 84 | 34 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

** TOTAL PAGE.004 **

Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 043707-001
LAB ID: 135351-0001-SA
Matrix: AIR
Authorized: 24 NOV 98
Instrument: GC/MS-A

Sampled: 18 NOV 98
Prepared: N/A
Dilution: 42

Received: 24 NOV 98
Analyzed: 30 NOV 98

| Parameter | Result | Qualifier | RT | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 84 | 21 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 84 | 21 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 84 | 34 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 84 | 34 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 840 | 130 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 170 | 42 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043708-001
LAB ID: 135473-0001-SA
Matrix: AIR
Authorized: 03 DEC 98
Instrument: GC/MS-A

Sampled: 25 NOV 98
Prepared: N/A
Dilution: 43

Received: 03 DEC 98
Analyzed: 07 DEC 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 86 | 21 | ppb (v/v) |
| Chloromethane | ND | | 170 | 43 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 86 | 34 | ppb (v/v) |
| Vinyl chloride | 72 | J | 86 | 34 | ppb (v/v) |
| Bromomethane | ND | | 86 | 43 | ppb (v/v) |
| Chloroethane | ND | | 170 | 34 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 86 | 21 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 86 | 21 | ppb (v/v) |
| Carbon disulfide | ND | | 430 | 86 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 91 | | 86 | 21 | ppb (v/v) |
| Acetone | ND | | 430 | 86 | ppb (v/v) |
| Methylene chloride | 48 | J | 86 | 34 | ppb (v/v) |
| trans-1,2-Dichloroethene | 25 | J | 86 | 21 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 86 | 21 | ppb (v/v) |
| Vinyl acetate | ND | | 430 | 86 | ppb (v/v) |
| cis-1,2-Dichloroethene | 1900 | | 86 | 34 | ppb (v/v) |
| 2-Butanone | ND | | 430 | 86 | ppb (v/v) |
| Chloroform | 150 | | 86 | 34 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 86 | 21 | ppb (v/v) |
| Carbon tetrachloride | ND | | 86 | 21 | ppb (v/v) |
| Benzene | ND | | 86 | 34 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 86 | 34 | ppb (v/v) |
| Trichloroethene | 8200 | | 86 | 21 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 86 | 34 | ppb (v/v) |
| Bromodichloromethane | ND | | 86 | 34 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 86 | 21 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 430 | 86 | ppb (v/v) |
| Toluene | 3700 | | 86 | 21 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 86 | 34 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 86 | 21 | ppb (v/v) |
| Tetrachloroethene | 560 | | 86 | 21 | ppb (v/v) |
| 2-Hexanone | ND | | 1300 | 130 | ppb (v/v) |
| Dibromochloromethane | ND | | 86 | 21 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 86 | 21 | ppb (v/v) |
| Chlorobenzene | ND | | 86 | 21 | ppb (v/v) |
| Ethylbenzene | ND | | 86 | 21 | ppb (v/v) |
| Xylenes (total) | 64 | J | 86 | 34 | ppb (v/v) |
| Styrene | ND | | 86 | 21 | ppb (v/v) |
| Bromoform | ND | | 86 | 21 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 86 | 21 | ppb (v/v) |
| Benzyl chloride | ND | | 430 | 34 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 86 | 21 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 86 | 34 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 043708-001
LAB ID: 135473-0001-SA
Matrix: AIR
Authorized: 03 DEC 98
Instrument: GC/MS-A

Sampled: 25 NOV 98
Prepared: N/A
Dilution: 43

Received: 03 DEC 98
Analyzed: 07 DEC 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 86 | 21 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 86 | 21 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 86 | 34 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 86 | 34 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 860 | 130 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 170 | 43 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043709-001
LAB ID: 135724-0001-SA
Matrix: AIR
Authorized: 22 DEC 98
Instrument: GC/MS-A

Sampled: 09 DEC 98
Prepared: N/A
Dilution: 5.6

Received: 22 DEC 98
Analyzed: 23 DEC 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 11 | 2.8 | ppb (v/v) |
| Chloromethane | ND | | 22 | 5.6 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 11 | 4.5 | ppb (v/v) |
| Vinyl chloride | 100 | | 11 | 4.5 | ppb (v/v) |
| Bromomethane | ND | | 11 | 5.6 | ppb (v/v) |
| Chloroethane | ND | | 22 | 4.5 | ppb (v/v) |
| Trichlorofluoromethane | 7.1 | J | 11 | 2.8 | ppb (v/v) |
| 1,1-Dichloroethane | 7.9 | J | 11 | 2.8 | ppb (v/v) |
| Carbon disulfide | ND | | 56 | 11 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 96 | | 11 | 2.8 | ppb (v/v) |
| Acetone | ND | | 56 | 11 | ppb (v/v) |
| Methylene chloride | 43 | | 11 | 4.5 | ppb (v/v) |
| trans-1,2-Dichloroethane | 28 | | 11 | 2.8 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 11 | 2.8 | ppb (v/v) |
| Vinyl acetate | ND | | 56 | 11 | ppb (v/v) |
| cis-1,2-Dichloroethene | 1900 | | 11 | 4.5 | ppb (v/v) |
| 2-Butanone | ND | | 56 | 11 | ppb (v/v) |
| Chloroform | 130 | | 11 | 4.5 | ppb (v/v) |
| 1,1,1-Trichloroethane | 3.1 | J | 11 | 2.8 | ppb (v/v) |
| Carbon tetrachloride | 4.6 | J | 11 | 2.8 | ppb (v/v) |
| Benzene | 22 | | 11 | 4.5 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 11 | 4.5 | ppb (v/v) |
| Trichloroethene | 6900 | D | 170 | 42 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 11 | 4.5 | ppb (v/v) |
| Bromodichloromethane | ND | | 11 | 4.5 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 11 | 2.8 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 56 | 11 | ppb (v/v) |
| Toluene | 2600 | D | 170 | 42 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 11 | 4.5 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 11 | 2.8 | ppb (v/v) |
| Tetrachloroethene | 430 | | 11 | 2.8 | ppb (v/v) |
| 2-Hexanone | ND | | 170 | 17 | ppb (v/v) |
| Dibromochloromethane | ND | | 11 | 2.8 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 11 | 2.8 | ppb (v/v) |
| Chlorobenzene | ND | | 11 | 2.8 | ppb (v/v) |
| Ethylbenzene | 11 | J | 11 | 2.8 | ppb (v/v) |
| Xylenes (total) | 47 | | 11 | 4.5 | ppb (v/v) |
| Styrene | ND | | 11 | 2.8 | ppb (v/v) |
| Bromoform | ND | | 11 | 2.8 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 11 | 2.8 | ppb (v/v) |
| Benzyl chloride | ND | | 56 | 4.5 | ppb (v/v) |
| 4-Ethyltoluene | 3.2 | J | 11 | 2.8 | ppb (v/v) |

D = Compound quantitated using a secondary dilution.
J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 043709-001
LAB ID: 135724-0001-SA
Matrix: AIR
Sampled: 09 DEC 98
Received: 22 DEC 98
Authorized: 22 DEC 98
Prepared: N/A
Analyzed: 23 DEC 98
Instrument: GC/MS-A
Dilution: 5.6

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,3,5-Trimethylbenzene | ND | | 11 | 4.5 | ppb (v/v) |
| 1,2,4-Trimethylbenzene | ND | | 11 | 2.8 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 11 | 2.8 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 11 | 4.5 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 11 | 4.5 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 110 | 17 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 22 | 5.6 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043710-001
LAB ID: 135724-0002-SA
Matrix: AIR — Sampled: 18 DEC 98 — Received: 22 DEC 98
Authorized: 22 DEC 98 — Prepared: N/A — Analyzed: 23 DEC 98
Instrument: GC/MS-A — Dilution: 69

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 140 | 34 | ppb (v/v) |
| Chloromethane | ND | | 270 | 69 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 140 | 55 | ppb (v/v) |
| Vinyl chloride | ND | | 140 | 55 | ppb (v/v) |
| Bromomethane | ND | | 140 | 69 | ppb (v/v) |
| Chloroethane | ND | | 270 | 55 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 140 | 34 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 140 | 34 | ppb (v/v) |
| Carbon disulfide | ND | | 690 | 140 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 95 | J | 140 | 34 | ppb (v/v) |
| Acetone | ND | | 690 | 140 | ppb (v/v) |
| Methylene chloride | ND | | 140 | 55 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 140 | 34 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 140 | 34 | ppb (v/v) |
| Vinyl acetate | ND | | 690 | 140 | ppb (v/v) |
| cis-1,2-Dichloroethene | 1700 | | 140 | 55 | ppb (v/v) |
| 2-Butanone | ND | | 690 | 140 | ppb (v/v) |
| Chloroform | 240 | | 140 | 55 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 140 | 34 | ppb (v/v) |
| Carbon tetrachloride | ND | | 140 | 34 | ppb (v/v) |
| Benzene | ND | | 140 | 55 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 140 | 55 | ppb (v/v) |
| Trichloroethene | 7100 | | 140 | 34 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 140 | 55 | ppb (v/v) |
| Bromodichloromethane | ND | | 140 | 55 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 140 | 34 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 690 | 140 | ppb (v/v) |
| Toluene | 2600 | | 140 | 34 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 140 | 55 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 140 | 34 | ppb (v/v) |
| Tetrachloroethene | 460 | | 140 | 34 | ppb (v/v) |
| 2-Hexanone | ND | | 2100 | 210 | ppb (v/v) |
| Dibromochloromethane | ND | | 140 | 34 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 140 | 34 | ppb (v/v) |
| Chlorobenzene | ND | | 140 | 34 | ppb (v/v) |
| Ethylbenzene | ND | | 140 | 34 | ppb (v/v) |
| Xylenes (total) | ND | | 140 | 55 | ppb (v/v) |
| Styrene | ND | | 140 | 34 | ppb (v/v) |
| Bromoform | ND | | 140 | 34 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 140 | 34 | ppb (v/v) |
| Benzyl chloride | ND | | 690 | 55 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 140 | 34 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 140 | 55 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 043710-001
LAB ID: 135724-0002-SA
Matrix: AIR Sampled: 18 DEC 98 Received: 22 DEC 98
Authorized: 22 DEC 98 Prepared: N/A Analyzed: 23 DEC 98
Instrument: GC/MS-A Dilution: 69

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 140 | 34 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 140 | 34 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 140 | 55 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 140 | 55 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1400 | 210 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 270 | 69 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043252-001
LAB ID: 134687-0001-8A Zone2
Matrix: AIR Sampled: 12 OCT 98 Received: 21 OCT 98
Authorized: 21 OCT 98 Prepared: N/A Analyzed: 23 OCT 98
Instrument: GC/MS-A Dilution: 56

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 110 | 25 | ppb (v/v) |
| Chloromethane | ND | | 220 | 79 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 110 | 20 | ppb (v/v) |
| Vinyl chloride | ND | | 110 | 90 | ppb (v/v) |
| Bromomethane | ND | | 110 | 38 | ppb (v/v) |
| Chloroethane | ND | | 220 | 84 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 110 | 16 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 110 | 49 | ppb (v/v) |
| Carbon disulfide | ND | | 560 | 41 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 88 | J | 110 | 29 | ppb (v/v) |
| Acetone | ND | | 560 | 130 | ppb (v/v) |
| Methylene chloride | 63 | J | 110 | 25 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 110 | 50 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 110 | 44 | ppb (v/v) |
| Vinyl acetate | ND | | 560 | 67 | ppb (v/v) |
| cis-1,2-Dichloroethene | 2000 | | 110 | 30 | ppb (v/v) |
| 2-Butanone | ND | | 560 | 200 | ppb (v/v) |
| Chloroform | 180 | | 110 | 22 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 110 | 28 | ppb (v/v) |
| Carbon tetrachloride | ND | | 110 | 24 | ppb (v/v) |
| Benzene | 31 | J | 110 | 24 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 110 | 43 | ppb (v/v) |
| Trichloroethene | 9700 | | 110 | 16 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 110 | 58 | ppb (v/v) |
| Bromodichloromethane | ND | | 110 | 15 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 110 | 47 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 560 | 21 | ppb (v/v) |
| Toluene | 4900 | | 110 | 19 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 110 | 62 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 110 | 90 | ppb (v/v) |
| Tetrachloroethene | 580 | | 110 | 33 | ppb (v/v) |
| 2-Hexanone | ND | | 1700 | 220 | ppb (v/v) |
| Dibromochloromethane | ND | | 110 | 13 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 110 | 21 | ppb (v/v) |
| Chlorobenzene | ND | | 110 | 34 | ppb (v/v) |
| Ethylbenzene | 22 | J | 110 | 18 | ppb (v/v) |
| Xylenes (total) | 82 | J | 110 | 32 | ppb (v/v) |
| Styrene | ND | | 110 | 36 | ppb (v/v) |
| Bromoform | ND | | 110 | 12 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 110 | 23 | ppb (v/v) |
| Benzyl chloride | ND | | 560 | 79 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 110 | 14 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 110 | 16 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND - Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 043252-001
LAB ID: 134687-0001-SA
Matrix: AIR
Authorized: 21 OCT 98
Instrument: GC/MS-A

Sampled: 12 OCT 98
Prepared: N/A
Dilution: 56

Received: 21 OCT 98
Analyzed: 23 OCT 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 110 | 18 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 110 | 27 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 110 | 38 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 110 | 39 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1100 | 190 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 220 | 32 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043253-001
LAB ID: 134867-0002-SA Zone1
Matrix: AIR
Authorized: 21 OCT 98
Instrument: GC/MS-A

Sampled: 15 OCT 98
Prepared: N/A
Dilution: 3.4

Received: 21 OCT 98
Analyzed: 23 OCT 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 6.7 | 1.5 | ppb (v/v) |
| Chloromethane | ND | | 13 | 4.7 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 6.7 | 1.2 | ppb (v/v) |
| Vinyl chloride | 21 | | 6.7 | 5.4 | ppb (v/v) |
| Bromomethane | ND | | 6.7 | 2.3 | ppb (v/v) |
| Chloroethane | ND | | 13 | 5.1 | ppb (v/v) |
| Trichlorofluoromethane | 2.0 | J | 6.7 | 0.91 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 6.7 | 2.9 | ppb (v/v) |
| Carbon disulfide | ND | | 34 | 2.5 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 15 | | 6.7 | 1.8 | ppb (v/v) |
| Acetone | 11 | J | 34 | 8.1 | ppb (v/v) |
| Methylene chloride | ND | | 6.7 | 1.5 | ppb (v/v) |
| trans-1,2-Dichloroethene | 4.6 | J | 6.7 | 3.0 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 6.7 | 2.7 | ppb (v/v) |
| Vinyl acetate | ND | | 34 | 4.0 | ppb (v/v) |
| cis-1,2-Dichloroethene | 200 | | 6.7 | 1.8 | ppb (v/v) |
| 2-Butanone | ND | | 34 | 12 | ppb (v/v) |
| Chloroform | 13 | | 6.7 | 1.3 | ppb (v/v) |
| 1,1,1-Trichloroethane | 8.4 | | 6.7 | 1.7 | ppb (v/v) |
| Carbon tetrachloride | 13 | | 6.7 | 1.4 | ppb (v/v) |
| Benzene | 2.6 | J | 6.7 | 1.4 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 6.7 | 2.6 | ppb (v/v) |
| Trichloroethene | 430 | | 6.7 | 0.94 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 6.7 | 3.4 | ppb (v/v) |
| Bromodichloromethane | ND | | 6.7 | 0.91 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 6.7 | 2.8 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 34 | 1.3 | ppb (v/v) |
| Toluene | 44 | | 6.7 | 1.1 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 6.7 | 3.7 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 6.7 | 5.4 | ppb (v/v) |
| Tetrachloroethene | 320 | | 6.7 | 2.0 | ppb (v/v) |
| 2-Hexanone | ND | | 100 | 13 | ppb (v/v) |
| Dibromochloromethane | ND | | 6.7 | 0.78 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 6.7 | 1.2 | ppb (v/v) |
| Chlorobenzene | ND | | 6.7 | 2.1 | ppb (v/v) |
| Ethylbenzene | ND | | 6.7 | 1.1 | ppb (v/v) |
| Xylenes (total) | 2.1 | J | 6.7 | 1.9 | ppb (v/v) |
| Styrene | ND | | 6.7 | 2.2 | ppb (v/v) |
| Bromoform | ND | | 6.7 | 0.74 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 6.7 | 1.4 | ppb (v/v) |
| Benzyl chloride | ND | | 34 | 4.7 | ppb (v/v) |
| 4-Ethyltoluene | 1.8 | J | 6.7 | 0.84 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | 2.3 | J | 6.7 | 0.98 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 043253-001
LAB ID: 134687-0002-SA
Matrix: AIR Sampled: 15 OCT 98 Received: 21 OCT 98
Authorized: 21 OCT 98 Prepared: N/A Analyzed: 23 OCT 98
Instrument: GC/MS-A Dilution: 3.4

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 1.8 | J | 6.7 | 1.1 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 6.7 | 1.6 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 6.7 | 2.3 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 6.7 | 2.3 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 67 | 11 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 13 | 1.9 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

SF 2001 COC (10-97)

Internal Lab Batch No.

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.



AR/COC- 600322

134687

Dept. No./Mail Stop: 6131 / 0719
Project/Task Manager: Jim Phelan
Project Name: Mound OU-1 Soil Gas Survey
Record Center Code: —
Logbook Ref. No.: —
Service Order No.: CF0555

Date Samples Shipped: [redacted]
Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi 505-844-3110
Send Report to SMO: Doug Salmi

Contract No.: AJ-2480
Case No.: 7433.300
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept. _____
P.O. Box 5800 MS 0154

Location: Tech Area _____ Building _____ Room _____

| Sample No. - Fraction | ER Sample ID or Sample Location Detail | | | Date/Time Collected | Samp. Matrix | Container Type | Container Volume | Preservative | Sample Loc. Code | Sample Type | Parameter & Method Requested | Lab Sample # (Lab Use) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 043252-001 | BD.301 Zone 2 | | | 10/12/98 07:38 | G | SG | 4l | None | G | SA | TO14 | |
| 043253-001 | BD.301 Zone 1 | | | 10/15/98 09:35 | G | SG | 4l | None | G | SA | TO14 | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |

RMMA Yes No Ref. No.
Sample Disposal Return to Client Disposal by lab

Sample Tracking: Date Entered (mm/dd/yy) [redacted] Entered By: [redacted]

Special Instructions/QC Requirements
EDD Yes No
Raw data package Yes No

Turnaround Time Normal Rush Required Report Date

| Sample Team Members | Name | Signature | Init | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | MS | R&D/Soils/937-865-3709 |
| | | | | |

Please list as separate report.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Relinquished by | Mark Spivey | Org. Soils | Date 10/20/98 | Time 07:00 | 4. Relinquished by | Org. | Date |
| 1. Received by | [illegible] | Org. Quanterra | Date 10/21/98 | Time 0915 | 4. Received by | Org. | Date |
| 2. Relinquished by | | Org. | Date | Time | 5. Relinquished by | Org. | Date |
| 2. Received by | | Org. | Date | Time | 5. Received by | Org. | Date |
| 3. Relinquished by | | Org. | Date | Time | 6. Relinquished by | Org. | Date |
| 3. Received by | | Org. | Date | Time | 6. Received by | Org. | Date |

Original: To Accompany Samples, Laboratory Copy (White)
1st Copy: To Accompany Samples, Return to SMO (Blue)
2nd Copy: SMO Suspense Copy (Yellow)
3rd Copy: Field Copy (Pink)

(FedEx)

This transmission consists of 7 pages excluding this cover page

# Environmental Restoration Technologies Department

## FAX

Date: 11/9/98
From: Jim Phelan
Sender's tel #: 505-845-9892
Sender's Fax #: 505-844-0543

To: Mark Spivey
Company: B&W/Ohio
Phone #: 937-865-3709

FACSIMILE #: 937-865-4455

MESSAGE:

More summa data

Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0719

Date: 11/5/98

No. of Pages: 7
(Including Cover)

Fax to: Jim Phelan

From: Suzi Jensen

Org/Company:

Org: SMO

Phone: 845-9892

Phone: (505) 844-3184

Fax: 844-0543

Fax: (505) 844-3128

Note:

Rush results for COC 600322

**Sandia National Laboratories**
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-0854

Quanterra City of Industry
18301 East Gale Ave., Suite 130
City of Industry, California 91748

Quanterra Environmental Services

# Facsimile Transmission

Phone: (626) 965-1006
Fax: (626) 965-1003

| To: | From: | Date: 11-5-98 |
|---|---|---|
| Suzi Jensen | MARIA JONES<br>Project Manager | Number of Pages: (Including Cover Page) 6 |

(505) 844-3128

## PRELIMINARY RESULTS

**Quanterra Project:** 134687-0001/0002

**Client Project No.:** CF0555

**Client Project Name:** Mound OU1 Soil Gas Survey

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# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 043251-001
LAB ID: 134186-0002-SA
Matrix: AIR
Authorized: 25 SEP 98
Instrument: GC/MS-A

Sampled: 16 SEP 98
Prepared: N/A
Dilution: 84

Received: 28 SEP 98
Analyzed: 29 SEP 98

Zone 2 influent

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 170 | 28 | ppb (v/v) |
| Chloromethane | ND | | 340 | 120 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 170 | 30 | ppb (v/v) |
| Vinyl chloride | ND | | 170 | 130 | ppb (v/v) |
| Bromomethane | ND | | 170 | 57 | ppb (v/v) |
| Chloroethane | ND | | 340 | 130 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 170 | 23 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 170 | 73 | ppb (v/v) |
| Carbon disulfide | ND | | 840 | 62 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 100 | J | 170 | 44 | ppb (v/v) |
| Acetone | ND | | 840 | 200 | ppb (v/v) |
| Methylene chloride | 60 | J | 170 | 37 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 170 | 75 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 170 | 67 | ppb (v/v) |
| Vinyl acetate | ND | | 840 | 100 | ppb (v/v) |
| cis-1,2-Dichloroethene | 2300 | | 170 | 45 | ppb (v/v) |
| 2-Butanone | ND | | 840 | 290 | ppb (v/v) |
| Chloroform | 200 | | 170 | 33 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 170 | 41 | ppb (v/v) |
| Carbon tetrachloride | ND | | 170 | 35 | ppb (v/v) |
| Benzene | ND | | 170 | 35 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 170 | 64 | ppb (v/v) |
| Trichloroethene | 11000 | | 170 | 24 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 170 | 84 | ppb (v/v) |
| Bromodichloromethane | ND | | 170 | 23 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 170 | 71 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 840 | 32 | ppb (v/v) |
| Toluene | 6500 | | 170 | 28 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 170 | 93 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 170 | 130 | ppb (v/v) |
| Tetrachloroethene | 590 | | 170 | 50 | ppb (v/v) |
| 2-Hexanone | ND | | 2500 | 330 | ppb (v/v) |
| Dibromochloromethane | ND | | 170 | 19 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 170 | 31 | ppb (v/v) |
| Chlorobenzene | ND | | 170 | 51 | ppb (v/v) |
| Ethylbenzene | 28 | J | 170 | 27 | ppb (v/v) |
| Xylenes (total) | 95 | J | 170 | 48 | ppb (v/v) |
| Styrene | ND | | 170 | 54 | ppb (v/v) |
| Bromoform | ND | | 170 | 19 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 170 | 35 | ppb (v/v) |
| Benzyl chloride | ND | | 840 | 120 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 170 | 21 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 170 | 24 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14

(cont.

Client Name: Sandia National Laboratories
Client ID: 043251-001
LAB ID: 134186-0002-SA
Matrix: AIR
Sampled: 16 SEP 98
Received: 25 SEP 98
Authorized: 25 SEP 98
Prepared: N/A
Analyzed: 29 SEP 98
Instrument: GC/MS-A
Dilution: 84

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 170 | 27 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 170 | 40 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 170 | 57 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 170 | 58 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1700 | 280 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 340 | 48 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041050-001
LAB ID: 134186-0001-SA
Matrix: AIR — Sampled: 16 SEP 98 — Received: 25 SEP 98
Authorized: 25 SEP 98 — Prepared: N/A — Analyzed: 29 SEP 98
Instrument: GC/MS-A — Dilution: 84

Zone 4 Effluent

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 170 | 38 | ppb (v/v) |
| Chloromethane | ND | | 340 | 120 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 170 | 30 | ppb (v/v) |
| Vinyl chloride | ND | | 170 | 110 | ppb (v/v) |
| Bromomethane | ND | | 170 | 57 | ppb (v/v) |
| Chloroethane | ND | | 340 | 130 | ppb (v/v) |
| Trichlorofluoromethane | 32 | J | 170 | 23 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 170 | 73 | ppb (v/v) |
| Carbon disulfide | ND | | 840 | 62 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 140 | J | 170 | 44 | ppb (v/v) |
| Acetone | ND | | 840 | 200 | ppb (v/v) |
| Methylene chloride | 78 | J | 170 | 37 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 170 | 75 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 170 | 67 | ppb (v/v) |
| Vinyl acetate | ND | | 840 | 100 | ppb (v/v) |
| cis-1,2-Dichloroethene | 2600 | | 170 | 45 | ppb (v/v) |
| 2-Butanone | ND | | 840 | 290 | ppb (v/v) |
| Chloroform | 470 | | 170 | 33 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 170 | 41 | ppb (v/v) |
| Carbon tetrachloride | ND | | 170 | 35 | ppb (v/v) |
| Benzene | ND | | 170 | 35 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 170 | 64 | ppb (v/v) |
| Trichloroethene | 14000 | | 170 | 24 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 170 | 84 | ppb (v/v) |
| Bromodichloromethane | ND | | 170 | 23 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 170 | 71 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 840 | 32 | ppb (v/v) |
| Toluene | 7900 | | 170 | 28 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 170 | 93 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 170 | 130 | ppb (v/v) |
| Tetrachloroethene | 720 | | 170 | 50 | ppb (v/v) |
| 2-Hexanone | ND | | 2500 | 330 | ppb (v/v) |
| Dibromochloromethane | ND | | 170 | 19 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 170 | 31 | ppb (v/v) |
| Chlorobenzene | ND | | 170 | 51 | ppb (v/v) |
| Ethylbenzene | 33 | J | 170 | 27 | ppb (v/v) |
| Xylenes (total) | 150 | J | 170 | 48 | ppb (v/v) |
| Styrene | ND | | 170 | 54 | ppb (v/v) |
| Bromoform | ND | | 170 | 19 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 170 | 35 | ppb (v/v) |
| Benzyl chloride | ND | | 840 | 120 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 170 | 21 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 170 | 24 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041050-001
LAB ID: 134186-0001-SA
Matrix: AIR Sampled: 16 SEP 98 Received: 25 SEP 98
Authorized: 25 SEP 98 Prepared: N/A Analyzed: 29 SEP 98
Instrument: GC/MS-A Dilution: 84

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 170 | 27 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 170 | 40 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 170 | 57 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 170 | 58 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1700 | 280 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 340 | 48 | ppb (v/v) |

ND = Not Detected

134186

SF 2001-COC (1-97)

Internal Lab Batch No.

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Please F1 for instructions for each field.

AR/COC- 600321

Page 1 of

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: Mound OU-1 Soil Gas Sur
Record Center Code: —
Logbook Ref. No.: —
Service Order No.: CF0555

[redacted]
Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi (505) 844-3118
Send Report to SMO: Doug Salmi

Contract No.: AJ-2480
Case No.: 7433.300
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Building — Tech Area — Room

| Sample No. - Fraction | ER Sample ID or Sample Location Detail | | | Date/Time Collected | Matrix | Container Type | Container Volume | Preservative | Collect Meth. | Samp. Type | Parameter & Method Requested |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0141050-001 | SP-301 Zone 4 Effluent | | | 09/16/98 0800 | G | SG | 4l | None | G | SA | TO14 |
| 0143251-001 | SP-301 Zone 2 Influent | | | 09/16/98 08:31 | G | SC | 4l | None | G | SA | TO14 |

Reference LOV (available at SMO)

RMMA Yes No Ref. No.
Sample Disposal Return to Client Disposal by lab

Sample Tracking [redacted]

Special Instructions/QC Requirements
EDD Yes No
Raw data package Yes No

Turnaround Time Normal Rush Required Report Date

| Sample Team Members | Name | Signature | Initials | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | [illegible] | BWD Mound/Soils/937-865-3709 |

Please list as separate report.

| | Org. | Date | Time | | Org. | Date |
|---|---|---|---|---|---|---|
| 1. Relinquished by Mark Spivey | Soils | 9-24-98 | 8:00 AM | 4. Relinquished by | | |
| 1. Received by [illegible] | Quanterra | 9-25-98 | 0900 | 4. Received by | | |
| 2. Relinquished by | | | | 5. Relinquished by | | |
| 2. Received by | | | | 5. Received by | | |
| 2. Relinquished by | | | | 6. Relinquished by | | |
| 3. Received by | | | | 6. Received by | | |

Original To Accompany Samples, Laboratory Copy (White) — 1st Copy To Accompany Samples, Return to SMO (Blue) — 2nd Copy SMO Suspense Copy (Yellow) — 3rd Copy Field Copy (Pink)

(Pink)

This transmission consists of 6 pages excluding this cover page

# Environmental Restoration Technologies Department

## FAX

Date: 10/13/98
From: Jim Phelan
Sender's tel #: 505-845-9892
Sender's Fax #: 505-844-0543

To: Mark Spivey
Company: B&W/Ohio
Phone #: 937-865-3709

FACSIMILE #: 937-865-4455

MESSAGE:

More summa data

Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0719

TO: JIM PHELAN FAX 8440543

Quanterra City of Industry
18501 East Gale Ave., Suite 130
City of Industry, California 91748

Quanterra Environmental Services

Facsimile Transmission

Phone: (626) 965-1006
Fax: (626) 965-1003

| To: | From: | Date: 10/12/98 |
|---|---|---|
| SUZI M. JENSEN<br>SANDIA NAT'L. LABS<br>(505) 844-3128 | MARIA JONES<br>Project Manager | Number of Pages: 6<br>(Including Cover Page) |

# PRELIMINARY RESULTS

**Quanterra Project:** 134186-0001/0002

**Client Project :** MOUND OU-1 SOIL GAS SURVEY

**Faxed by:** MARITA LORENZO

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This transmission consists of 5 pages excluding this cover page

# Environmental Restoration Technologies Department

## FAX

Date: 9/21/98
From: Jim Phelan
Sender's tel #: 505-845-9892
Sender's Fax #: 505-844-0543

To: Mark Spivey
Company: B&W/Ohio
Phone #: 937-865-~~[illegible]~~ 3709

FACSIMILE #: 937-865-4455

MESSAGE:

July summa results

Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0719

SF 7001-COC (10-97)
Supersedes (5-97) Issue

Internal Lab Batch No.

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No 8/11/98, as per Doug Salmi

*Press F1 for instructions for each field.*



AR/COC- 600320

133260

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: Mound OU-1 Soil Gas Survey
Record Center Code:
Logbook Ref. No.:
Service Order No.: CF0555

Date Samples Shipped: 7/27/98
Carrier Waybill No.:
Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi/505-844-3110
Send Report to SMO: Doug Salmi

Contract No.: AJ-2480
Case No.: 7433.300
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

**Location** Tech Area
Building Room

**Reference LOV (available at SMO)**

| Sample No. - Fraction | ER Sample ID or Sample Location Detail | | | Date/Time Collected | Samp. Matrix | Container Type | Container Volume | Preservative | Collection Method | Sample Type | Parameter & Method Requested | Lab Sample ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 041048-001 | BD.301 Zone 1 | | | 7/21/98/15:00 | G | SC | 4l | None | G | SA | TO14 | |
| 041049-001 | BD 301 Zone 2 | | | 7/23/98/9:44 | G | SC | 4l | None | G | SA | TO14 | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |
| - | | | | | | | | | | | | |

LAB USE

RMMA Yes (No) Ref. No.
Sample Disposal Return to Client (Disposal by lab)
Turnaround Time (Normal) Rush Required Report Date

Sample Tracking
Date/Time (mm/dd/yy)
Entered by
Loc Info

Special Instructions/QC Requirements
EDD Yes No
Raw data package Yes No
Please list as separate report.

Abnormal Condition on Receipt (Cooler)

| Sample Team Members | Name | Signature | Init | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | MS | BEWO/Soils/937-865-3709 |
| | | | | |
| | | | | |

8/14/98, as per Doug Salmi

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Relinquished by Mark Spivey | Org. Soils | Date 7/28/98 | Time 0700 | 4. Relinquished by | Org. | Date |
| 1. Received by | Org. QUANTERRA | Date 7/28/98 | Time 0910 | 4. Received by | Org. | Date |
| 2. Relinquished by | Org. | Date | Time | 5. Relinquished by | Org. | Date |
| 2. Received by | Org. | Date | Time | 5. Received by | Org. | Date |
| 3. Relinquished by | Org. | Date | Time | 6. Relinquished by | Org. | Date |
| 3. Received by | Org. | Date | Time | 6. Received by | Org. | Date |

Original To Accompany Samples, Laboratory Copy (White) (Fed-Ex)
1st Copy To Accompany Samples, Return to SMO ~~(Blue)~~ MMS
2nd Copy SMO Suspense Copy ~~(Yellow)~~ MMS
3rd Copy Field Copy ~~(Pink)~~ MMS

SEP-21-98 11:34 FROM:SNL DEPT. 0861 TO:00440343 1-044 P.06/06 JOB-318

Quanterra Environmental Services

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041048-001
LAB ID: 133260-0001-SA
Matrix: AIR
Authorized: 28 JUL 98
Instrument: GC/MS-B

Sampled: 21 JUL 98
Prepared: N/A
Dilution: 1.0

Received: 28 JUL 98
Analyzed: 29 JUL 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 2.0 | 0.45 | ppb (v/v) |
| Chloromethane | ND | | 4.0 | 1.4 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 2.0 | 0.36 | ppb (v/v) |
| Vinyl chloride | 17 | | 2.0 | 1.6 | ppb (v/v) |
| Bromomethane | ND | | 2.0 | 0.68 | ppb (v/v) |
| Chloroethane | ND | | 4.0 | 1.5 | ppb (v/v) |
| Trichlorofluoromethane | 0.97 | J | 2.0 | 0.27 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 2.0 | 0.87 | ppb (v/v) |
| Carbon disulfide | 2.4 | J | 10 | 0.73 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10 | | 2.0 | 0.52 | ppb (v/v) |
| Acetone | 55 | | 10 | 2.4 | ppb (v/v) |
| Methylene chloride | ND | | 2.0 | 0.44 | ppb (v/v) |
| trans-1,2-Dichloroethene | 3.6 | | 2.0 | 0.89 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 2.0 | 0.79 | ppb (v/v) |
| Vinyl acetate | ND | | 10 | 1.2 | ppb (v/v) |
| cis-1,2-Dichloroethene | 120 | | 2.0 | 0.54 | ppb (v/v) |
| 2-Butanone | 140 | | 10 | 3.5 | ppb (v/v) |
| Chloroform | 9.1 | | 2.0 | 0.39 | ppb (v/v) |
| 1,1,1-Trichloroethane | 5.3 | | 2.0 | 0.49 | ppb (v/v) |
| Carbon tetrachloride | 7.1 | | 2.0 | 0.42 | ppb (v/v) |
| Benzene | 2.1 | | 2.0 | 0.42 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 2.0 | 0.76 | ppb (v/v) |
| Trichloroethene | 270 | | 2.0 | 0.28 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 2.0 | 1.0 | ppb (v/v) |
| Bromodichloromethane | ND | | 2.0 | 0.27 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 2.0 | 0.84 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 10 | 0.38 | ppb (v/v) |
| Toluene | 36 | | 2.0 | 0.33 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 2.0 | 1.1 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 2.0 | 1.6 | ppb (v/v) |
| Tetrachloroethene | 180 | | 2.0 | 0.59 | ppb (v/v) |
| 2-Hexanone | ND | | 30 | 3.9 | ppb (v/v) |
| Dibromochloromethane | ND | | 2.0 | 0.23 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 2.0 | 0.37 | ppb (v/v) |
| Chlorobenzene | ND | | 2.0 | 0.61 | ppb (v/v) |
| Ethylbenzene | 0.87 | J | 2.0 | 0.32 | ppb (v/v) |
| Xylenes (total) | 5.2 | | 2.0 | 0.57 | ppb (v/v) |
| Styrene | ND | | 2.0 | 0.64 | ppb (v/v) |
| Bromoform | ND | | 2.0 | 0.22 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 2.0 | 0.41 | ppb (v/v) |
| Benzyl chloride | ND | | 10 | 1.4 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 2.0 | 0.25 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | 2.3 | | 2.0 | 0.29 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Quanterra Environmental Services

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041048-001
LAB ID: 133260-0001-SA
Matrix: AIR
Sampled: 21 JUL 98
Received: 28 JUL 98
Authorized: 28 JUL 98
Prepared: N/A
Analyzed: 29 JUL 98
Instrument: GC/MS-B
Dilution: 1.0

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 2.0 | 0.32 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 2.0 | 0.48 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 2.0 | 0.68 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 2.0 | 0.69 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 20 | 3.3 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 4.0 | 0.57 | ppb (v/v) |

ND = Not Detected

Quanterra Environmental Services

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041049-001
LAB ID: 133260-0002-SA
Matrix: AIR
Authorized: 28 JUL 98
Instrument: GC/MS-B

Sampled: 23 JUL 98
Prepared: N/A
Dilution: 35

Received: 28 JUL 98
Analyzed: 30 JUL 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 70 | 16 | ppb (v/v) |
| Chloromethane | ND | | 140 | 49 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 70 | 13 | ppb (v/v) |
| Vinyl chloride | ND | | 70 | 56 | ppb (v/v) |
| Bromomethane | ND | | 70 | 24 | ppb (v/v) |
| Chloroethane | ND | | 140 | 52 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 70 | 9.4 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 70 | 30 | ppb (v/v) |
| Carbon disulfide | ND | | 350 | 25 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 76 | | 70 | 18 | ppb (v/v) |
| Acetone | ND | | 350 | 84 | ppb (v/v) |
| Methylene chloride | 27 | J | 70 | 15 | ppb (v/v) |
| trans-1,2-Dichloroethene | 40 | J | 70 | 31 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 70 | 28 | ppb (v/v) |
| Vinyl acetate | ND | | 350 | 42 | ppb (v/v) |
| cis-1,2-Dichloroethene | 2600 | | 70 | 19 | ppb (v/v) |
| 2-Butanone | ND | | 350 | 120 | ppb (v/v) |
| Chloroform | 190 | | 70 | 14 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 70 | 17 | ppb (v/v) |
| Carbon tetrachloride | ND | | 70 | 15 | ppb (v/v) |
| Benzene | 37 | J | 70 | 15 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 70 | 27 | ppb (v/v) |
| Trichloroethene | 9500 | | 70 | 9.8 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 70 | 35 | ppb (v/v) |
| Bromodichloromethane | ND | | 70 | 9.4 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 70 | 29 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 350 | 13 | ppb (v/v) |
| Toluene | 8200 | | 70 | 12 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 70 | 38 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 70 | 56 | ppb (v/v) |
| Tetrachloroethene | 580 | | 70 | 21 | ppb (v/v) |
| 2-Hexanone | ND | | 1000 | 140 | ppb (v/v) |
| Dibromochloromethane | ND | | 70 | 8.0 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 70 | 13 | ppb (v/v) |
| Chlorobenzene | ND | | 70 | 21 | ppb (v/v) |
| Ethylbenzene | 55 | J | 70 | 11 | ppb (v/v) |
| Xylenes (total) | 210 | | 70 | 20 | ppb (v/v) |
| Styrene | ND | | 70 | 22 | ppb (v/v) |
| Bromoform | ND | | 70 | 7.7 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 70 | 14 | ppb (v/v) |
| Benzyl chloride | ND | | 350 | 49 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 70 | 8.7 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 70 | 10 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Quanterra Environmental Services

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041049-001
LAB ID: 133260-0002-SA
Matrix: AIR
Authorized: 28 JUL 98
Instrument: GC/MS-B

Sampled: 23 JUL 98
Prepared: N/A
Dilution: 35

Received: 28 JUL 98
Analyzed: 30 JUL 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 70 | 11 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 70 | 17 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 70 | 24 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 70 | 24 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 700 | 120 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 140 | 20 | ppb (v/v) |

ND = Not Detected

This transmission consists of 7 pages excluding this cover page

# Environmental Restoration Technologies Department

## FAX

Date: 7/27/98
From: Jim Phelan
Sender's tel #: 505-845-9892
Sender's Fax #: 505-844-0543

To: Mark Spivey
Company: B&W
Phone #: 937/865-3709

FACSIMILE #: 937/865-4455

MESSAGE:

Summa data

Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0719

**Sandia National Laboratories**

Albuquerque, New Mexico 87185-0854

date: July 1, 1998

to: Jim Phelan, MS-0719 (6131)

6 pages

Suzi Montano

from: Suzi Montano, MS-0854 (7578)

subject: PRELIMINARY RESULTS COC 510160

A copy of the results report package from Quanterra for the above referenced COC is enclosed for your review. The SMO is performing the Contract Verification Review (CVR) and will send a copy of the results to you to attach to the report. Until you receive the CVR results the report is considered PRELIMINARY.

If you need information about the results on this COC, please call Doug Salmi at 844-3110.

Enclosure
/sm

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No. 132749 SAR/WR No. _____

AR/COC- 510160

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: Mound OU-1 Soil GASSurvey
Record Center Code: _____
Logbook Ref No.: _____
Service Order No.: CF0555

Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi/505 844-3110
Send Report to SMO: Doug Salmi

Contract No.: AJ-3480
Case No.: 7433.300
SMO Authorization: _____
Ship to: Sandia National Laboratories, Supplies Services Department, P.O. Box 5800 MS 0154

Parameter & Method Requested: TCLP

Location: Tech Area _____ Building _____ Room _____

| Sample No. - Fraction | ER Sample ID or Sample Location Detail | Beginning Depth in Ft. | ER Site No. | Date/Time Collected | Sample Matrix | Container Type | Container Volume | Preservative | Sample Collection Method | Sample Type | TCLP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 041046-001 | 301-A Matheson 10 psi | NA | NA | 6/24/98 0815 | G | SC | 4 l. | None | G | SA | X |
| 041047-001 | 301 Zone 2 | NA | NA | 6/24/98 0855 | G | SC | 4 l. | None | G | SA | X |

RMMA ☐ Yes ☒ No Ref. No. _____

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☐ Normal ☒ Rush Required Report Date 7 Day

Special Instructions/QC Requirements: Summa under 10 psig press.

Abnormal Conditions on Receipt

LAB USE

| Sample Team Members | Name | Signature | Init. | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | MS | DEWO/Soils/977-9725 3707 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Relinquished by | Mark Spivey | Org. Soils | Date 6/24/98 | Time 1100 | 4. Relinquished by | Org. | Date | Time |
| 1. Received by | Denise | Org. QES | Date 6/25/98 | Time 0900 | 4. Received by | Org. | Date | Time |
| 2. Relinquished by | | Org. | Date | Time | 5. Relinquished by | Org. | Date | Time |
| 2. Received by | | Org. | Date | Time | 5. Received by | Org. | Date | Time |
| 3. Relinquished by | | Org. | Date | Time | 6. Relinquished by | Org. | Date | Time |
| 3. Received by | | Org. | Date | Time | 6. Received by | Org. | Date | Time |

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041046-001
LAB ID: 132749-0001-SA
Matrix: AIR
Authorized: 25 JUN 98
Instrument: GC/MS-B

Sampled: 24 JUN 98
Prepared: N/A
Dilution: 50

Received: 25 JUN 98
Analyzed: 29 JUN 98

| Parameter | Result | Qualifier | RL | Units |
|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 100 | ppb (v/v) |
| Chloromethane | ND | | 200 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 100 | ppb (v/v) |
| Vinyl chloride | ND | | 100 | ppb (v/v) |
| Bromomethane | ND | | 100 | ppb (v/v) |
| Chloroethane | ND | | 200 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 100 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 100 | ppb (v/v) |
| Carbon disulfide | ND | | 500 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 100 | ppb (v/v) |
| Acetone | ND | | 500 | ppb (v/v) |
| Methylene chloride | 8500 | | 100 | ppb (v/v) |
| trans-1,2-Dichloroethene | 190 | | 100 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 100 | ppb (v/v) |
| Vinyl acetate | ND | | 500 | ppb (v/v) |
| cis-1,2-Dichloroethene | 8800 | | 100 | ppb (v/v) |
| 2-Butanone | ND | | 500 | ppb (v/v) |
| Chloroform | ND | | 100 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 100 | ppb (v/v) |
| Carbon tetrachloride | ND | | 100 | ppb (v/v) |
| Benzene | 9300 | | 100 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 100 | ppb (v/v) |
| Trichloroethene | 8400 | | 100 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 100 | ppb (v/v) |
| Bromodichloromethane | ND | | 100 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 100 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 500 | ppb (v/v) |
| Toluene | 8500 | | 100 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 100 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 100 | ppb (v/v) |
| Tetrachloroethene | 9000 | | 100 | ppb (v/v) |
| 2-Hexanone | ND | | 1500 | ppb (v/v) |
| Dibromochloromethane | ND | | 100 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 100 | ppb (v/v) |
| Chlorobenzene | ND | | 100 | ppb (v/v) |
| Ethylbenzene | 9400 | | 100 | ppb (v/v) |
| Xylenes (total) | 8700 | | 100 | ppb (v/v) |
| Styrene | ND | | 100 | ppb (v/v) |
| Bromoform | ND | | 100 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 100 | ppb (v/v) |
| Benzyl chloride | ND | | 500 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 100 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 100 | ppb (v/v) |
| 1,2,4-Trimethylbenzene | ND | | 100 | ppb (v/v) |

ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041048-001
LAB ID: 132749-0001-SA
Matrix: AIR Sampled: 24 JUN 98 Received: 25 JUN 98
Authorized: 25 JUN 98 Prepared: N/A Analyzed: 29 JUN 98
Instrument: GC/MS-B Dilution: 50

| Parameter | Result | Qualifier | RL | Units |
|---|---|---|---|---|
| 1,3-Dichlorobenzene | ND | | 100 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 100 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 100 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1000 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 200 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041047-001
LAB ID: 132749-0002-8A
Matrix: AIR — Sampled: 24 JUN 98 — Received: 25 JUN 98
Authorized: 25 JUN 98 — Prepared: N/A — Analyzed: 29 JUN 98
Instrument: GC/MS-B — Dilution: 84

| Parameter | Result | Qualifier | RL | Units |
|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 170 | ppb (v/v) |
| Chloromethane | ND | | 340 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 170 | ppb (v/v) |
| Vinyl chloride | ND | | 170 | ppb (v/v) |
| Bromomethane | ND | | 170 | ppb (v/v) |
| Chloroethane | ND | | 340 | ppb (v/v) |
| Trichlorofluoromethane | 28 | J | 170 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 170 | ppb (v/v) |
| Carbon disulfide | ND | | 840 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 140 | J | 170 | ppb (v/v) |
| Acetone | ND | | 840 | ppb (v/v) |
| Methylene chloride | 160 | J | 170 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 170 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 170 | ppb (v/v) |
| Vinyl acetate | ND | | 840 | ppb (v/v) |
| cis-1,2-Dichloroethane | 4000 | | 170 | ppb (v/v) |
| 2-Butanone | ND | | 840 | ppb (v/v) |
| Chloroform | 470 | | 170 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 170 | ppb (v/v) |
| Carbon tetrachloride | ND | | 170 | ppb (v/v) |
| Benzene | 120 | J | 170 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 170 | ppb (v/v) |
| Trichloroethene | 15000 | | 170 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 170 | ppb (v/v) |
| Bromodichloromethane | ND | | 170 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 170 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 840 | ppb (v/v) |
| Toluene | 12000 | | 170 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 170 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 170 | ppb (v/v) |
| Tetrachloroethene | 700 | | 170 | ppb (v/v) |
| 2-Hexanone | ND | | 2500 | ppb (v/v) |
| Dibromochloromethane | ND | | 170 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 170 | ppb (v/v) |
| Chlorobenzene | ND | | 170 | ppb (v/v) |
| Ethylbenzene | 250 | | 170 | ppb (v/v) |
| Xylenes (total) | 500 | | 170 | ppb (v/v) |
| Styrene | ND | | 170 | ppb (v/v) |
| Bromoform | ND | | 170 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 170 | ppb (v/v) |
| Benzyl chloride | ND | | 840 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 170 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 170 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041047-001
LAB ID: 132749-0002-8A
Matrix: AIR Sampled: 24 JUN 98 Received: 25 JUN 98
Authorized: 25 JUN 98 Prepared: N/A Analyzed: 29 JUN 98
Instrument: GC/MS-B Dilution: 84

| Parameter | Result | Qualifier | RL | Units |
|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 170 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 170 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 170 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 170 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1700 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 340 | ppb (v/v) |

ND - Not Detected

**Sandia National Laboratories**

Albuquerque, New Mexico 87185-0854

date: July 1, 1998

to: Jim Phelan, MS-0719 (6131)

6 pages

Suzi Montano

from: Suzi Montano, MS-0854 (7578)

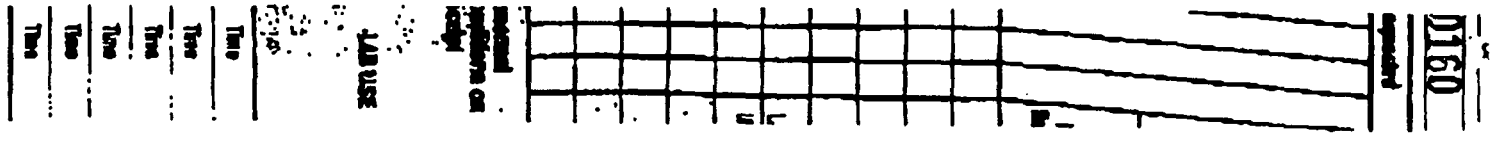
subject: PRELIMINARY RESULTS COC 510160

A copy of the results report package from Quanterra for the above referenced COC is enclosed for your review. The SMO is performing the Contract Verification Review (CVR) and will send a copy of the results to you to attach to the report. Until you receive the CVR results the report is considered PRELIMINARY.

If you need information about the results on this COC, please call Doug Salmi at 844-3110.

Enclosure
/sm

*Exceptional Service in the National Interest*



ND = Not Detected

This transmission consists of 11 pages excluding this cover page

# Environmental Restoration Technologies Department

## FAX

Date: 6/16/98
From: J. Phelan
Sender's tel #: 505-845-9892
Sender's Fax #: 505-844-0543

To: Mark Spivey
Company: B&W/Ohio
Phone #: 937-865-3709

FACSIMILE #: 937-865-4455

MESSAGE:

Summa data

Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0719

Date: 6/15/98

No. of Pages: (Including Cover) 11

| | | | |
|---|---|---|---|
| Fax to: | Jim Phelan | From: | Leslie Scarbrough |
| Org/Company: | Org. 6131 MS0719 | Org: | 7578 |
| Phone: | 845-9892 | Phone: | (505) 844-3199 |
| Fax: | 844-0543 | Fax: | (505) 844-3128 |

**Note:**
**Preliminary results for COC # 510159**


**Sandia National Laboratories**
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-0854

# Sandia National Laboratories

Albuquerque, New Mexico 87185-0854

date: June 15, 1998

to: Jim Phelan, MS 0719

from: Leslie Scarborough, MS-0854 (7578)

Leslie Scarborough

subject: PRELIMINARY RESULTS COC #510159

A copy of the results report package from Quanterra for the above referenced COC is enclosed for your review. The SMO is performing the Contract Verification Review (CVR) and will send a copy of the results to you to attach to the report. Until you receive the CVR results the report is considered PRELIMINARY.

If you need information about the results on this COC, please call Doug Salmi at 844-3110.

Quanterra City of Industry
18501 East Gale Ave., Suite 130
City of Industry, California 91748

Quanterra Environmental Services

Facsimile Transmission

Phone: (626) 965-1006
Fax: (626) 965-1003

| To: | From: | Date: 6/12/98 |
|---|---|---|
| ANGELA MILES<br>SANDIA NAT'L LAB<br>(505) 844-3128 | MARIA JONES<br>Project Manager | Number of Pages: 10<br>(Including Cover Page) |

# PRELIMINARY RESULTS

**Quanterra Project:** 132402-0001/0004

**Client Project No.:** CF0555

**Client Project Name:** Mound OU-1 Soil Gas Survey

Faxed by: NOEL CRUISE

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# ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No. 132402 SAR/WR No. _____ PAGE ____ OF ____

AR/COC- 510159

Dept. No./Mail Stop: 6131/0719
Project/Task Manager: Jim Phelan
Project Name: Mound OU-1 Soil Gas Survey
Record Center Code: —
Logbook Ref No: —
Service Order No.: CE0555

Date Sample Shipped: 5/26/98 SMO USE
Carrier/Waybill No.: 76939
Lab Contact: Maria Jones
Lab Destination: Quanterra
SMO Contact/Phone: Doug Salmi 505-844-3110
Send Report to SMO Doug Salmi

Contract No. AT-3480B
Case No.: 7433.300
SMO Authorization
Bill to: Sandia National Laboratories, Supplier Services Department, P.O. Box 5800 MS 0154

Location: Tech Area _____ Building _____ Room _____

Reference LOV (available at SMO)

| Sample No. - Fraction | ER Sample ID or Sample Location Detail | Beginning Depth in Ft. | ER Site No. | Date/Time Collected | Sample Matrix | Container Type | Container Volume | Preservative | Sample Collection Method | Sample Type | TOX |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 041042-001 | BD 301-A Matheson 1ppm | NA | NA | 5/22/98 11:30 | G | SC | 4l | None | G | SA | X |
| 041043-001 | BD-301-A Matheson 10ppm | NA | NA | 5/22/98 12:00 | G | SC | 4l | None | G | SA | X |
| 041044-001 | BD 301 Zone 2 | NA | NA | 5/22/98 12:50 | G | SC | 4l | None | G | SA | X |
| 041045-001 | BD 301 Zone 1 | NA | NA | 5/22/98 13:30 | G | SC | 4l | None | G | SA | X |

RMMA ☐ Yes ☒ No Rel. No. _____

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date _____

Sample Tracking SMO USE
Date Entered (mm/dd/yy) _____
Entered by: _____
QC Inits. _____

Special Instructions/QC Requirements: 041042 & 041043 are under approx 5psi press.

Abnormal Conditions on Receipt

LAB USE

| Sample Team Members | Name | Signature | Init. | Company/Organization/Phone |
|---|---|---|---|---|
| | Mark Spivey | Mark Spivey | MS | B&W0/Soils/937-865-3709 |

| | Relinquished by | Received by | Date | Time |
|---|---|---|---|---|
| 1. | Mark Spivey (Org. Soils) | Lee | 5/26/98 | 800 |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW (WPS) SMO Suspense Copy PINK- Field Copy

# Volatile Organics by GCMS - EPA TO14

**Client Name:** Sandia National Laboratories
**Client ID:** 041042-001
**LAB ID:** 132402-0001-SA
**Matrix:** AIR — **Sampled:** 22 MAY 98 — **Received:** 03 JUN 98
**Authorized:** 03 JUN 98 — **Prepared:** N/A — **Analyzed:** 04 JUN 98
**Instrument:** GC/MS-B — **Dilution:** 5.0

| Parameter | | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|---|
| Dichlorodifluoromethane | | ND | | 10 | 2.2 | ppb (v/v) |
| Chloromethane | | ND | | 20 | 7.0 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | | ND | | 10 | 1.8 | ppb (v/v) |
| Vinyl chloride | | ND | | 10 | 8.0 | ppb (v/v) |
| Bromomethane | | ND | | 10 | 3.4 | ppb (v/v) |
| Chloroethane | | ND | | 20 | 7.5 | ppb (v/v) |
| Trichlorofluoromethane | | ND | | 10 | 1.4 | ppb (v/v) |
| 1,1-Dichloroethene | | ND | | 10 | 4.4 | ppb (v/v) |
| Carbon disulfide | | ND | | 50 | 3.6 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | | ND | | 10 | 2.6 | ppb (v/v) |
| Acetone | | ND | | 50 | 12 | ppb (v/v) |
| Methylene chloride | 925 | 850 | .999 ppm 14% | 10 | 2.2 | ppb (v/v) |
| trans-1,2-Dichloroethene | | ND | | 10 | 4.4 | ppb (v/v) |
| 1,1-Dichloroethane | | ND | | 10 | 4.0 | ppb (v/v) |
| Vinyl acetate | | ND | | 50 | 6.0 | ppb (v/v) |
| cis-1,2-Dichloroethene | 931 | 860 | 1.002 15% | 10 | 2.7 | ppb (v/v) |
| 2-Butanone | | ND | | 50 | 18 | ppb (v/v) |
| Chloroform | | 3.6 | J | 10 | 2.0 | ppb (v/v) |
| 1,1,1-Trichloroethane | | ND | | 10 | 2.4 | ppb (v/v) |
| Carbon tetrachloride | | ND | | 10 | 2.1 | ppb (v/v) |
| Benzene | 987 | 970 | 1.003 3% | 10 | 2.1 | ppb (v/v) |
| 1,2-Dichloroethane | | ND | | 10 | 3.8 | ppb (v/v) |
| Trichloroethene | 952 | 900 | 1.003 10% | 10 | 1.4 | ppb (v/v) |
| 1,2-Dichloropropane | | ND | | 10 | 5.0 | ppb (v/v) |
| Bromodichloromethane | | ND | | 10 | 1.4 | ppb (v/v) |
| cis-1,3-Dichloropropene | | ND | | 10 | 4.2 | ppb (v/v) |
| 4-Methyl-2-pentanone | | ND | | 50 | 1.9 | ppb (v/v) |
| Toluene | 956 | 910 | 1.001 9% | 10 | 1.6 | ppb (v/v) |
| trans-1,3-Dichloropropene | | ND | | 10 | 5.5 | ppb (v/v) |
| 1,1,2-Trichloroethane | | ND | | 10 | 8.0 | ppb (v/v) |
| Tetrachloroethene | 947 | 890 | 1.003 11% | 10 | 3.0 | ppb (v/v) |
| 2-Hexanone | | ND | | 150 | 20 | ppb (v/v) |
| Dibromochloromethane | | ND | | 10 | 1.2 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | | ND | | 10 | 1.8 | ppb (v/v) |
| Chlorobenzene | | ND | | 10 | 3.0 | ppb (v/v) |
| Ethylbenzene | 981 | 960 | 1.002 4% | 10 | 1.6 | ppb (v/v) |
| Xylenes (total) | 961 | 920 | 1.002 8% | 10 | 2.8 | ppb (v/v) |
| Styrene | | ND | | 10 | 3.2 | ppb (v/v) |
| Bromoform | | ND | | 10 | 1.1 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | | ND | | 10 | 2.0 | ppb (v/v) |
| Benzyl chloride | | ND | | 50 | 7.0 | ppb (v/v) |
| 4-Ethyltoluene | | ND | | 10 | 1.2 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | | ND | | 10 | 1.4 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041042-001
LAB ID: 132402-0001-SA
Matrix: AIR — Sampled: 22 MAY 98 — Received: 03 JUN 98
Authorized: 03 JUN 98 — Prepared: N/A — Analyzed: 04 JUN 98
Instrument: GC/MS-B — Dilution: 5.0

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 10 | 1.6 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 10 | 2.4 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 10 | 3.4 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 10 | 3.4 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 100 | 16 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 20 | 2.8 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041043-001
LAB ID: 132402-0002-SA
Matrix: AIR — Sampled: 22 MAY 98 — Received: 03 JUN 98
Authorized: 03 JUN 98 — Prepared: N/A — Analyzed: 04 JUN 98
Instrument: GC/MS-B — Dilution: 50

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 100 | 22 | ppb (v/v) |
| Chloromethane | ND | | 200 | 70 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 100 | 18 | ppb (v/v) |
| Vinyl chloride | ND | | 100 | 80 | ppb (v/v) |
| Bromomethane | ND | | 100 | 34 | ppb (v/v) |
| Chloroethane | ND | | 200 | 75 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 100 | 14 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 100 | 44 | ppb (v/v) |
| Carbon disulfide | ND | | 900 | 36 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 100 | 26 | ppb (v/v) |
| Acetone | ND | | 500 | 120 | ppb (v/v) |
| Methylene chloride | 7000 | | 100 | 22 | ppb (v/v) |
| trans-1,2-Dichloroethene | 150 | | 100 | 44 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 100 | 40 | ppb (v/v) |
| Vinyl acetate | ND | | 500 | 60 | ppb (v/v) |
| cis-1,2-Dichloroethene | 7300 | | 100 | 27 | ppb (v/v) |
| 2-Butanone | ND | | 500 | 180 | ppb (v/v) |
| Chloroform | ND | | 100 | 20 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 100 | 24 | ppb (v/v) |
| Carbon tetrachloride | ND | | 100 | 21 | ppb (v/v) |
| Benzene | 7900 | | 100 | 21 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 100 | 38 | ppb (v/v) |
| Trichloroethene | 7100 | | 100 | 14 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 100 | 50 | ppb (v/v) |
| Bromodichloromethane | ND | | 100 | 14 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 100 | 42 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 500 | 19 | ppb (v/v) |
| Toluene | 7200 | | 100 | 16 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 100 | 55 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 100 | 80 | ppb (v/v) |
| Tetrachloroethene | 6900 | | 100 | 30 | ppb (v/v) |
| 2-Hexanone | ND | | 1500 | 200 | ppb (v/v) |
| Dibromochloromethane | ND | | 100 | 12 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 100 | 18 | ppb (v/v) |
| Chlorobenzene | ND | | 100 | 30 | ppb (v/v) |
| Ethylbenzene | 7200 | | 100 | 16 | ppb (v/v) |
| Xylenes (total) | 6700 | | 100 | 28 | ppb (v/v) |
| Styrene | ND | | 100 | 32 | ppb (v/v) |
| Bromoform | ND | | 100 | 11 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 100 | 20 | ppb (v/v) |
| Benzyl chloride | ND | | 500 | 70 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 100 | 12 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 100 | 14 | ppb (v/v) |
| 1,2,4-Trimethylbenzene | ND | | 100 | 16 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041043-001
LAB ID: 133402-0002-SA
Matrix: AIR — Sampled: 22 MAY 98 — Received: 03 JUN 98
Authorized: 03 JUN 98 — Prepared: N/A — Analyzed: 04 JUN 98
Instrument: GC/MS-B — Dilution: 50

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | ND | | 100 | 24 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 100 | 34 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 100 | 34 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 1000 | 160 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 200 | 28 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories Zone 2
Client ID: 041044-001
LAB ID: 132402-0003-SA
Matrix: AIR Sampled: 22 MAY 98 Received: 03 JUN 98
Authorized: 03 JUN 98 Prepared: N/A Analyzed: 04 JUN 98
Instrument: GC/MS-B Dilution: 120

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 240 | 54 | ppb (v/v) |
| Chloromethane | ND | | 480 | 170 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 240 | 43 | ppb (v/v) |
| Vinyl chloride | ND | | 240 | 190 | ppb (v/v) |
| Bromomethane | ND | | 240 | 82 | ppb (v/v) |
| Chloroethane | ND | | 480 | 180 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 240 | 32 | ppb (v/v) |
| 1,1-Dichloroethene | ND | | 240 | 100 | ppb (v/v) |
| Carbon disulfide | ND | | 1200 | 88 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 100 | J | 240 | 63 | ppb (v/v) |
| Acetone | ND | | 1200 | 290 | ppb (v/v) |
| Methylene chloride | ND | | 240 | 53 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 240 | 110 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 240 | 95 | ppb (v/v) |
| Vinyl acetate | ND | | 1200 | 140 | ppb (v/v) |
| cis-1,2-Dichloroethene | 2200 | | 240 | 65 | ppb (v/v) |
| 2-Butanone | ND | | 1200 | 420 | ppb (v/v) |
| Chloroform | 300 | | 240 | 47 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 240 | 59 | ppb (v/v) |
| Carbon tetrachloride | ND | | 240 | 51 | ppb (v/v) |
| Benzene | ND | | 240 | 51 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 240 | 91 | ppb (v/v) |
| Trichloroethene | 13000 | | 240 | 34 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 240 | 120 | ppb (v/v) |
| Bromodichloromethane | ND | | 240 | 32 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 240 | 100 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 1200 | 46 | ppb (v/v) |
| Toluene | 9900 | | 240 | 40 | ppb (v/v) |
| trans-1,3-Dichloropropene | ND | | 240 | 130 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 240 | 190 | ppb (v/v) |
| Tetrachloroethene | 680 | | 240 | 71 | ppb (v/v) |
| 2-Hexanone | ND | | 3600 | 470 | ppb (v/v) |
| Dibromochloromethane | ND | | 240 | 28 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 240 | 45 | ppb (v/v) |
| Chlorobenzene | ND | | 240 | 73 | ppb (v/v) |
| Ethylbenzene | 240 | | 240 | 38 | ppb (v/v) |
| Xylenes (total) | 590 | | 240 | 69 | ppb (v/v) |
| Styrene | ND | | 240 | 77 | ppb (v/v) |
| Bromoform | ND | | 240 | 26 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 240 | 49 | ppb (v/v) |
| Benzyl chloride | ND | | 1200 | 170 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 240 | 30 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 240 | 35 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

## Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041044-001
LAB ID: 132402-0003-SA
Matrix: AIR
Sampled: 22 MAY 98
Received: 03 JUN 98
Authorized: 03 JUN 98
Prepared: N/A
Analyzed: 04 JUN 98
Instrument: GC/MS-B
Dilution: 120

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 240 | 38 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 240 | 58 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 240 | 82 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 240 | 83 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 2400 | 400 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 480 | 69 | ppb (v/v) |

ND = Not Detected

# Volatile Organics by GCMS - EPA TO14

Client Name: Sandia National Laboratories
Client ID: 041045-001
LAB ID: 132402-0004-SA
Matrix: AIR
Authorized: 03 JUN 98
Instrument: GC/MS-B

Zone 1

Sampled: 22 MAY 98
Prepared: N/A
Dilution: 8.4

Received: 03 JUN 98
Analyzed: 04 JUN 98

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| Dichlorodifluoromethane | ND | | 17 | 3.8 | ppb (v/v) |
| Chloromethane | ND | | 34 | 12 | ppb (v/v) |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 17 | 3.0 | ppb (v/v) |
| Vinyl chloride | 23 | | 17 | 13 | ppb (v/v) |
| Bromomethane | ND | | 17 | 5.7 | ppb (v/v) |
| Chloroethane | ND | | 34 | 13 | ppb (v/v) |
| Trichlorofluoromethane | ND | | 17 | 2.3 | ppb (v/v) |
| 1,1-Dichloroethene | ND | Drop | 17 | 7.3 | ppb (v/v) |
| Carbon disulfide | 6.7 | J | 84 | 6.2 | ppb (v/v) |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 17 | | 17 | 4.4 | ppb (v/v) |
| Acetone | 690 | | 84 | 20 | ppb (v/v) |
| Methylene chloride | ND | | 17 | 3.7 | ppb (v/v) |
| trans-1,2-Dichloroethene | ND | | 17 | 7.5 | ppb (v/v) |
| 1,1-Dichloroethane | ND | | 17 | 6.7 | ppb (v/v) |
| Vinyl acetate | ND | | 84 | 10 | ppb (v/v) |
| cis-1,2-Dichloroethene | 160 | | 17 | 4.5 | ppb (v/v) |
| 2-Butanone | 1300 | | 84 | 29 | ppb (v/v) |
| Chloroform | 7.0 | J | 17 | 3.3 | ppb (v/v) |
| 1,1,1-Trichloroethane | ND | | 17 | 4.1 | ppb (v/v) |
| Carbon tetrachloride | 12 | J | 17 | 3.5 | ppb (v/v) |
| Benzene | ND | | 17 | 3.5 | ppb (v/v) |
| 1,2-Dichloroethane | ND | | 17 | 6.4 | ppb (v/v) |
| Trichloroethene | 300 | | 17 | 2.4 | ppb (v/v) |
| 1,2-Dichloropropane | ND | | 17 | 8.4 | ppb (v/v) |
| Bromodichloromethane | ND | | 17 | 2.3 | ppb (v/v) |
| cis-1,3-Dichloropropene | ND | | 17 | 7.1 | ppb (v/v) |
| 4-Methyl-2-pentanone | ND | | 84 | 3.2 | ppb (v/v) |
| Toluene | 48 | | 17 | 2.8 | ppb (v/v) |
| trans-1,3-Dichloropropane | ND | | 17 | 9.3 | ppb (v/v) |
| 1,1,2-Trichloroethane | ND | | 17 | 13 | ppb (v/v) |
| Tetrachloroethene | 260 | | 17 | 5.0 | ppb (v/v) |
| 2-Hexanone | ND | | 250 | 33 | ppb (v/v) |
| Dibromochloromethane | ND | | 17 | 1.9 | ppb (v/v) |
| 1,2-Dibromoethane (EDB) | ND | | 17 | 3.1 | ppb (v/v) |
| Chlorobenzene | ND | | 17 | 5.1 | ppb (v/v) |
| Ethylbenzene | 4.1 | J | 17 | 2.7 | ppb (v/v) |
| Xylenes (total) | 4.7 | J | 17 | 4.8 | ppb (v/v) |
| Styrene | ND | Drop | 17 | 5.4 | ppb (v/v) |
| Bromoform | ND | | 17 | 1.9 | ppb (v/v) |
| 1,1,2,2-Tetrachloroethane | ND | | 17 | 3.5 | ppb (v/v) |
| Benzyl chloride | ND | | 84 | 12 | ppb (v/v) |
| 4-Ethyltoluene | ND | | 17 | 2.1 | ppb (v/v) |
| 1,3,5-Trimethylbenzene | ND | | 17 | 2.4 | ppb (v/v) |

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

# Volatile Organics by GCMS - EPA TO14 (cont.)

Client Name: Sandia National Laboratories
Client ID: 041045-001
LAB ID: 132402-0004-SA
Matrix: AIR Sampled: 22 MAY 98 Received: 03 JUN 98
Authorized: 03 JUN 98 Prepared: N/A Analyzed: 04 JUN 98
Instrument: GC/MS-B Dilution: 8.4

| Parameter | Result | Qualifier | RL | MDL | Units |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | ND | | 17 | 2.7 | ppb (v/v) |
| 1,3-Dichlorobenzene | ND | | 17 | 4.0 | ppb (v/v) |
| 1,4-Dichlorobenzene | ND | | 17 | 5.7 | ppb (v/v) |
| 1,2-Dichlorobenzene | ND | | 17 | 5.8 | ppb (v/v) |
| 1,2,4-Trichlorobenzene | ND | | 170 | 28 | ppb (v/v) |
| Hexachlorobutadiene | ND | | 34 | 4.8 | ppb (v/v) |

ND = Not Detected

Z1tc26.xls

| Hours | VC | F113 | ACE | DCM | cis-DCE | 2-BUT | TCM | CTET | BEN | TCE | TOL | PCE | EBZ | XYL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 8.000 | 0.330 | 3.300 | 0.250 | 33.000 | 5.900 | 0.150 | | 0.580 | 16.000 | 42.000 | 8.300 | | 0.230 |
| 56.5 | 1.400 | 0.130 | | 0.240 | 11.000 | | | | 0.220 | 8.600 | 28.000 | 6.100 | | 0.130 |
| 137.5 | 0.490 | 0.100 | 0.440 | 0.160 | 4.300 | | 0.050 | | 0.091 | 4.600 | 19.000 | 5.400 | 0.046 | 0.180 |
| 172.5 | 0.400 | 0.100 | 0.950 | 0.130 | 3.200 | 0.640 | 0.051 | | 0.056 | 3.900 | 17.000 | 5.200 | 0.044 | 0.160 |
| 255.5 | 0.230 | 0.092 | 0.590 | 0.064 | 2.400 | | 0.055 | | 0.026 | 2.200 | 8.800 | 3.500 | 0.028 | 0.083 |
| 333.5 | 0.140 | 0.047 | 0.590 | 0.015 | 1.300 | 0.280 | 0.055 | | 0.017 | 1.600 | 3.200 | 1.800 | 0.016 | 0.074 |
| 786.25 | 0.130 | 0.050 | 0.063 | | 0.770 | 0.053 | 0.037 | 0.023 | 0.0056 | 0.930 | 0.062 | 0.430 | | |
| 795.8 | | | | | | | | | | | 5.160 | | | |
| 808.3 | | | | | | | | | | 3.980 | 4.960 | | | |
| 863.75 | 0.130 | 0.042 | | | 0.750 | | 0.031 | 0.022 | 0.0067 | 0.930 | 0.053 | 0.410 | 0.000 | |
| 953.8 | | | | | | | | | | 2.570 | | | | |
| 1095.8 | 0.023 | 0.017 | 0.69 | | 0.16 | 1.3 | 0.007 | 0.012 | | 0.3 | 0.048 | 0.26 | 0.004 | |
| 1109.82 | | | | | 0.158 | | | | | 0.366 | 0.016 | 0.216 | | |
| 1109.82 | 0.017 | | 0.055 | | 0.12 | 0.14 | 0.005 | | 0.002 | 0.27 | 0.036 | 0.18 | 0.001 | 0.005 |
| 1194.75 | | | | 0.012 | 0.161 | | | | 0.006 | 0.385 | 0.057 | 0.27 | 0.056 | |

Dec 97 - Oct 15, '98

33840

Zone 1 148.266 lbs VOCs

EOCY = 1195.45 on hours

| Date | Source | Running Hours | Average CFM | VC Vinyl Chloride | lbs./cu. Ft. | lbs./hour removed | F113 1,1,2-Trichloro-1,2,2-trifluoroethane | lbs./cu. Ft. | lbs./hour removed | ACE Acetone | lbs./cu. Ft. | lbs./hour removed | DCM Methylene chloride | lbs./cu. Ft. | lbs./hour removed | CIS DCE cis-1,2-Dichloroethene | lbs./cu. Ft. | lbs./hour removed | 2-BUT 2-Butanone | lbs./cu. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Dec-97 | Summa | 13 | 571 | 8.000 | 1.274E-06 | 0.04 | 0.330 | 1.576E-07 | 0.01 | 3.300 | 4.884E-07 | 0.02 | 0.250 | 5.410E-08 | 0.00 | 33.000 | 8.151E-06 | 0.28 | 5.900 | 1.084E-06 |
| 22-Dec-97 | Summa | 56.5 | 571 | 1.400 | 2.230E-07 | 0.01 | 0.130 | 6.207E-08 | 0.00 | | | | 0.240 | 5.194E-08 | 0.00 | 11.000 | 2.717E-06 | 0.09 | | |
| 29-Dec-97 | Summa | 137.5 | 545 | 0.490 | 7.804E-08 | 0.00 | 0.100 | 4.775E-08 | 0.00 | 0.440 | 6.512E-08 | 0.00 | 0.160 | 3.463E-08 | 0.00 | 4.300 | 1.062E-06 | 0.03 | | |
| 5-Jan-98 | Summa | 172.5 | 545 | 0.400 | 6.370E-08 | 0.00 | 0.100 | 4.775E-08 | 0.00 | 0.950 | 1.406E-07 | 0.00 | 0.130 | 2.813E-08 | 0.00 | 3.200 | 7.904E-07 | 0.03 | 0.640 | 1.176E-07 |
| 12-Jan-98 | Summa | 255.5 | 555 | 0.230 | 3.663E-08 | 0.00 | 0.092 | 4.393E-08 | 0.00 | 0.590 | 8.732E-08 | 0.00 | 0.064 | 1.385E-08 | 0.00 | 2.400 | 5.928E-07 | 0.02 | | |
| 19-Jan-98 | Summa | 333.5 | 555 | 0.140 | 2.230E-08 | 0.00 | 0.047 | 2.244E-08 | 0.00 | 0.590 | 8.732E-08 | 0.00 | 0.015 | 3.246E-09 | 0.00 | 1.300 | 3.211E-07 | 0.01 | 0.280 | 5.145E-08 |
| 12-Mar-98 | Summa | 786.25 | 578 | 0.130 | 2.070E-08 | 0.00 | 0.050 | 2.387E-08 | 0.00 | 0.063 | 9.324E-09 | 0.00 | | | | 0.770 | 1.902E-07 | 0.01 | 0.053 | 9.738E-09 |
| 19-Mar-98 | GC | 795.8 | 556 | | | | | | | | | | | | | | | | | |
| 20-Mar-98 | GC | 808.3 | 556 | | | | | | | | | | | | | | | | | |
| 25-Mar-98 | Summa | 863.75 | 555 | 0.130 | 2.070E-08 | 0.00 | 0.042 | 2.005E-08 | 0.00 | | | | | | | 0.750 | 1.853E-07 | 0.01 | | |
| 13-Apr-98 | GC | 953.8 | 539 | | | | | | | | | | | | | | | | | |
| 22-May-98 | Summa | 1095.8 | 541 | 0.023 | 3.663E-09 | 0.00 | 0.017 | 8.117E-09 | 0.00 | 0.69 | 1.021E-07 | 0.00 | | | | 0.16 | 3.952E-08 | 0.00 | 1.3 | 2.389E-07 |
| 21-Jul-98 | GC | 1109.82 | 540 | | | | | | | | | | | | | 0.158 | 3.903E-08 | 0.00 | | |
| 21-Jul-98 | Summa | 1109.82 | 540 | 0.017 | 2.707E-09 | 0.00 | | | | 0.055 | 8.140E-09 | 0.00 | | | | 0.12 | 2.964E-08 | 0.00 | 0.14 | 2.572E-08 |
| 15-Oct-98 | GC | 1194.75 | 564 | | | | | | | | | | 0.012 | 2.597E-09 | 0.00 | 0.161 | 3.977E-08 | 0.00 | | |

| lbs./hour removed | TCM Chloroform | lbs./cu. Ft. | lbs./hour removed | CTET Carbon tetrachloride | lbs./cu. Ft. | lbs./hour removed | BEN Benzene | lbs./cu. Ft. | lbs./hour removed | TCE Trichloroethene | lbs./cu. Ft. | lbs./hour removed | TOL Toluene | lbs./cu. Ft. | lbs./hour removed | PCE Tetrachloroethene | lbs./cu. Ft. | lbs./hour removed | EBZ Ethylbenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.04 | 0.150 | 4.563E-08 | 0.00 | | | | 0.580 | 1.155E-07 | 0.00 | 16.000 | 5.357E-06 | 0.18 | 42.000 | 9.862E-06 | 0.34 | 8.300 | 3.507E-06 | 0.12 | |
| 0.00 | | | 0.00 | | | | 0.220 | 4.379E-08 | 0.00 | 8.600 | 2.879E-06 | 0.10 | 28.000 | 6.575E-06 | 0.23 | 6.100 | 2.578E-06 | 0.09 | |
| 0.00 | 0.050 | 1.521E-08 | 0.00 | | | | 0.091 | 1.811E-08 | 0.00 | 4.600 | 1.540E-06 | 0.05 | 19.000 | 4.461E-06 | 0.15 | 5.400 | 2.282E-06 | 0.07 | 0.046 |
| 0.00 | 0.051 | 1.551E-08 | 0.00 | | | | 0.056 | 1.115E-08 | 0.00 | 3.900 | 1.306E-06 | 0.04 | 17.000 | 3.992E-06 | 0.13 | 5.200 | 2.197E-06 | 0.07 | 0.044 |
| 0.00 | 0.055 | 1.673E-08 | 0.00 | | | | 0.026 | 5.175E-09 | 0.00 | 2.200 | 7.365E-07 | 0.02 | 8.800 | 2.066E-06 | 0.07 | 3.500 | 1.479E-06 | 0.05 | 0.028 |
| 0.00 | 0.055 | 1.673E-08 | 0.00 | | | | 0.017 | 3.384E-09 | 0.00 | 1.600 | 5.357E-07 | 0.02 | 3.200 | 7.514E-07 | 0.03 | 1.800 | 7.606E-07 | 0.03 | 0.016 |
| 0.00 | 0.037 | 1.126E-08 | 0.00 | 0.023 | 9.016E-09 | 0.00 | 0.0056 | 1.115E-09 | 0.00 | 0.930 | 3.114E-07 | 0.01 | 0.062 | 1.456E-08 | 0.00 | 0.430 | 1.817E-07 | 0.01 | |
| | | | | | | | | | | | | | 5.160 | 1.212E-06 | 0.04 | | | | |
| | | | | | | | | | | 3.980 | 1.332E-06 | 0.04 | 4.960 | 1.165E-06 | 0.04 | | | | |
| | 0.031 | 9.430E-09 | 0.00 | 0.022 | 8.624E-09 | 0.00 | 0.0067 | 1.334E-09 | 0.00 | 0.930 | 3.114E-07 | 0.01 | 0.053 | 1.244E-08 | 0.00 | 0.410 | 1.732E-07 | 0.01 | 0.000 |
| | | | | | | | | | | 2.570 | 8.604E-07 | 0.03 | | | | | | | |
| 0.01 | 0.007 | 2.129E-09 | 0.00 | 0.012 | 4.704E-09 | 0.00 | | | | 0.3 | 1.004E-07 | 0.00 | 0.048 | 1.127E-08 | 0.00 | 0.26 | 1.099E-07 | 0.00 | 0.004 |
| | | | | | | | | | | 0.366 | 1.225E-07 | 0.00 | 0.016 | 3.757E-09 | 0.00 | 0.216 | 9.127E-08 | 0.00 | |
| 0.00 | 0.005 | 1.521E-09 | 0.00 | | | | 0.002 | 3.981E-10 | 0.00 | 0.27 | 9.039E-08 | 0.00 | 0.036 | 8.453E-09 | 0.00 | 0.18 | 7.606E-08 | 0.00 | 0.001 |
| | | | | | | | 0.006 | 1.194E-09 | 0.00 | 0.385 | 1.289E-07 | 0.00 | 0.057 | 1.338E-08 | 0.00 | 0.27 | 1.141E-07 | 0.00 | 0.056 |

| lbs./cu. Ft. | lbs./hour removed | Xylenes (total) | lbs./cu. Ft. | lbs./hour removed | total lbs./hr. removed | step est. lbs removed | low est. lbs removed | high est. lbs. removed | high/low average |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.230 | 6.222E-08 | 0.00 | 1.03 | 22.4727548 | 0 | 44.9455096 | 22.4727548 |
| | | 0.130 | 3.517E-08 | 0.00 | 0.52 | 32.34082 | 22.5996091 | 42.0820308 | 32.34082 |
| 1.244E-08 | 0.00 | 0.180 | 4.870E-08 | 0.00 | 0.32 | 18.3311114 | 25.6003452 | 11.0618776 | 18.3311114 |
| 1.190E-08 | 0.00 | 0.160 | 4.328E-08 | 0.00 | 0.29 | 16.9097215 | 10.0311907 | 23.7882523 | 16.9097215 |
| 7.575E-09 | 0.00 | 0.083 | 2.245E-08 | 0.00 | 0.17 | 13.6933901 | 14.1186507 | 13.2681295 | 13.6933901 |
| 4.328E-09 | 0.00 | 0.074 | 2.002E-08 | 0.00 | 0.09 | 22.9779397 | 6.75312469 | 39.1984257 | 22.9757752 |
| | | | | | 0.03 | 7.11555819 | 12.1499867 | 2.07978789 | 7.11488729 |
| | | | | | 0.04 | | | | |
| | | | | | 0.08 | | | | |
| 0.000E+00 | 0.00 | | | | 0.02 | 3.7815277 | 1.8938184 | 5.67045882 | 3.78213861 |
| | | | | | 0.03 | | | | |
| 1.082E-09 | 0.00 | | | | 0.02 | 2.32346651 | 4.64793452 | 0 | 2.32396726 |
| | | | | | 0.01 | 0.96436455 | 1.29707032 | 0 | 0.64853516 |
| 2.705E-10 | 0.00 | 0.005 | 1.353E-09 | 0.00 | 0.01 | 0.91953041 | 0.11113635 | 0 | 0.05556817 |
| 1.515E-08 | 0.00 | | | | 0.01 | 1.23681494 | 0.90554046 | 1 | 0.95277023 |
| | | | | | SUM= | 143.067 | 100.108407 | 183.094472 | 141.60144 |

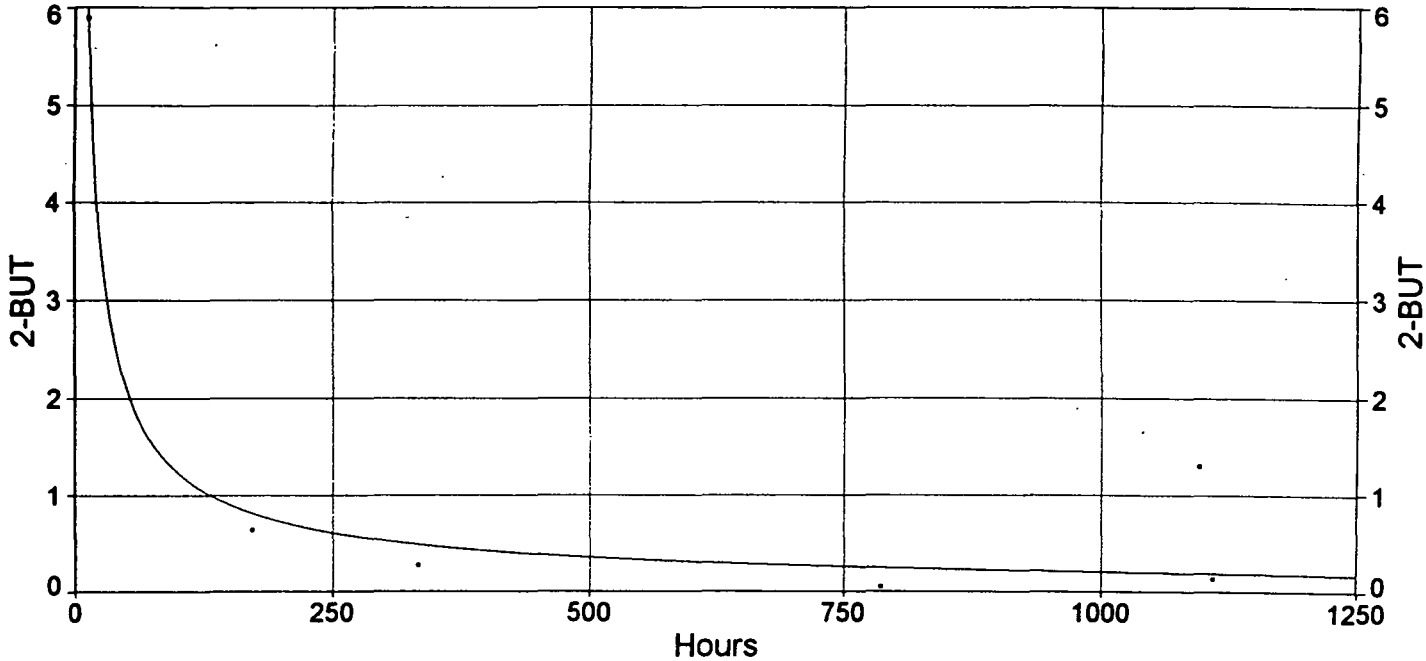
# Zone 1

Rank 7 Eqn 8156 [Power_] $y=ax^b$

$r^2$=0.94767177 DF Adj $r^2$=0.91278629 FitStdErr=0.57749248 Fstat=72.440582

a=41.837518

b=-0.76472164




Rank 7 Eqn 8156 [Power_] $y=ax^b$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9476717746 | 0.9127862910 | 0.5774924754 | 72.440581940 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 41.83751765 | 21.34641719 | 1.959931603 | -17.4296378 | 101.1046731 |
| b | -0.76472164 | 0.188886169 | -4.04858461 | -1.28915372 | -0.24028956 |

| Date | Time | File Source |
|---|---|---|
| Oct 30, 1998 | 10:56:23 AM | C:\TCWIN4\CLIPBRD.WK1 |

Zone 1 2-Butanone

$$a := \left[\left(\int_{13}^{56.5} 41.83751765 \cdot x^{-0.76472164} dx\right) \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\left(\int_{56.5}^{172.5} 41.83751765 \cdot x^{-0.76472164} dx\right) \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} 41.83751765 \cdot x^{-0.76472164} dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} 41.83751765 \cdot x^{-0.76472164} dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} 41.83751765 \cdot x^{-0.76472164} dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} 41.83751765 \cdot x^{-0.76472164} dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} 41.83751765 \cdot x^{-0.76472164} dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right]$$

$$h := \int_{1127.4}^{1194.75} 41.83751765 \cdot x^{-0.76472164} dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840$$

$a = 0.845$ $d = 0.559$ $g = 0.037$

$b = 0.829$ $e = 0.271$ $h = 0.079$

$c = 0.886$ $f = 0.302$

$a + b + c + d + e + f + g + h = 3.809$

3.81

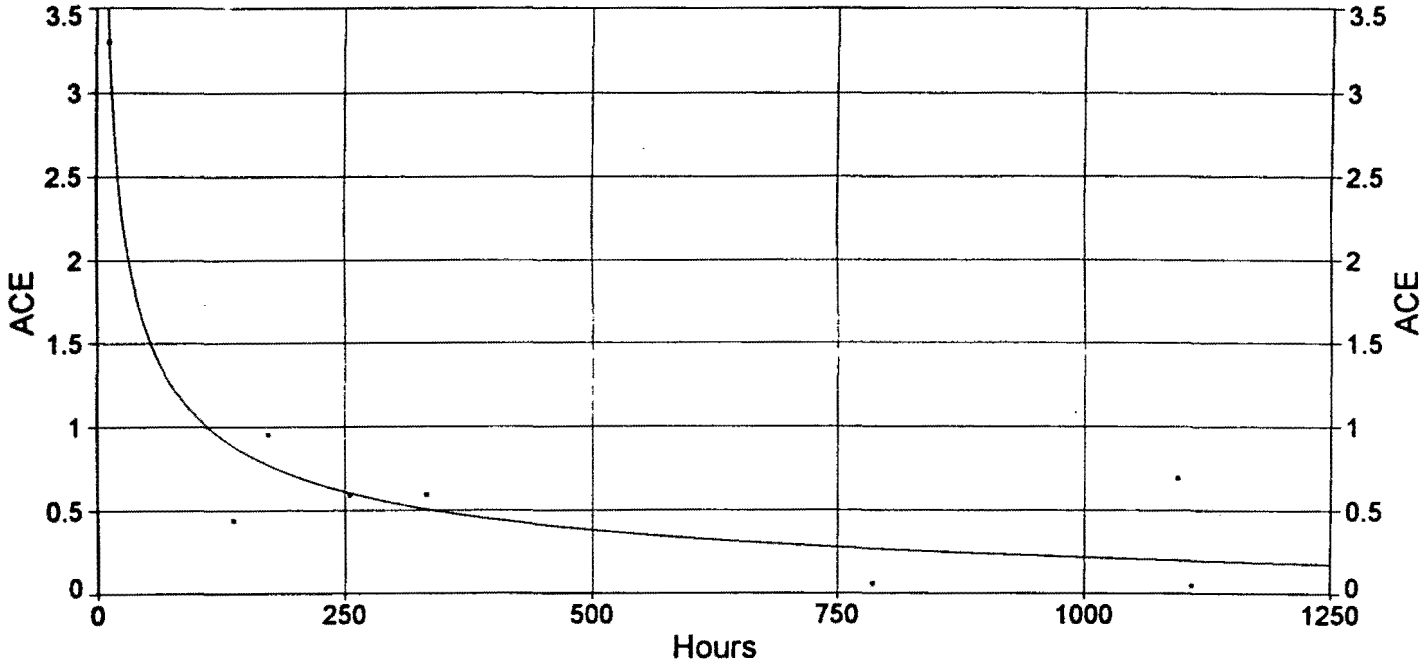
# Zone 1

Rank 4 Eqn 15 $y=a+b/x^{0.5}$

$r^2$=0.92900593 DF Adj $r^2$=0.90060831 FitStdErr=0.29969741 Fstat=78.514105

a=-0.16505615

b=12.26797




Rank 4 Eqn 15 $y=a+b/x^{0.5}$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9290059335 | 0.9006083070 | 0.2996974134 | 78.514105176 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -0.16505615 | 0.154786772 | -1.06634530 | -0.54380573 | 0.213693440 |
| b | 12.26796971 | 1.384518784 | 8.860818539 | 8.880174292 | 15.65576513 |

| Date | Time | File Source |
|---|---|---|
| Oct 30, 1998 | 10:53:06 AM | C:\TCWIN4\CLIPBRD.WK1 |

**Zone 1 Acetone**

$$a := \int_{13}^{56.5} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \qquad a = 0.45$$

$$b := \int_{56.5}^{172.5} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \qquad b = 0.574$$

$$c := \int_{172.5}^{434} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \qquad c = 0.718$$

$$d := \int_{434}^{692.25} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \qquad d = 0.479$$

$$e := \int_{692.25}^{863.75} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \qquad e = 0.233$$

$$f := \int_{863.75}^{1095.8} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729 \qquad f = 0.256$$

$$g := \int_{1095.8}^{1127.4} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520 \qquad g = 0.031$$

$$h := \int_{1127.4}^{1194.75} -0.16505615 + \frac{12.26796971}{x^{0.5}} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840 \qquad h = 0.066$$

$$a + b + c + d + e + f + g + h = 2.807$$

2.81

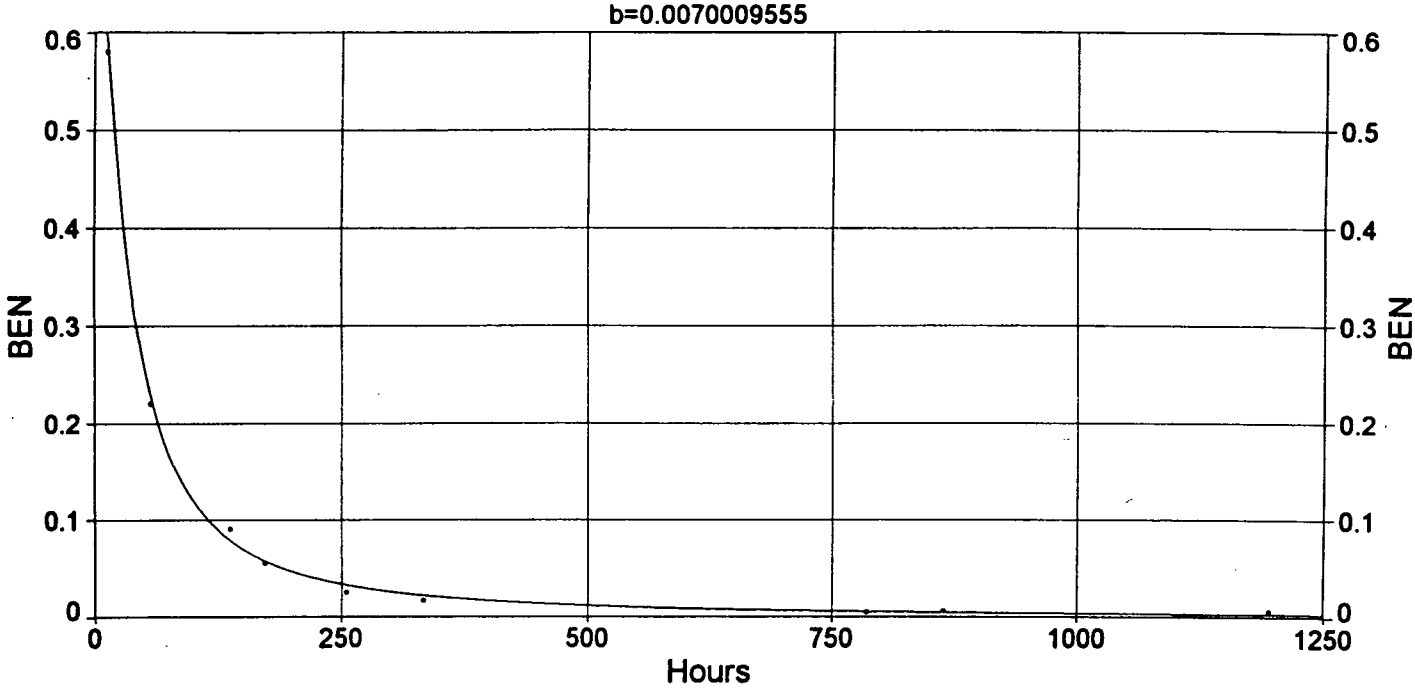
# Zone 1

Rank 2 Eqn 45 $y^{-1}=a+bx^{1.5}$

$r^2$=0.9988908 DF Adj $r^2$=0.99857389 FitStdErr=0.0063979141 Fstat=7204.4066

a=1.3986475

b=0.0070009555




Rank 2 Eqn 45 $y^{-1}=a+bx^{1.5}$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9988908002 | 0.9985738860 | 0.0063979141 | 7204.4066490 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 1.398647542 | 0.024127065 | 57.97006539 | 1.343010430 | 1.454284654 |
| b | 0.007000956 | 0.000271232 | 25.81172983 | 0.006375494 | 0.007626417 |

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**Zone 1 Benzene**

$$a := \left[\int_{13}^{56.5} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right]$$

$$h := \left[\int_{1127.4}^{1194.75} \frac{1}{1.398647542 + 0.007000956 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840\right]$$

$a = 0.11$ $\quad d = 0.02$ $\quad g = 7.842 \cdot 10^{-4}$

$b = 0.086$ $\quad e = 7.47 \cdot 10^{-3}$ $\quad h = 1.631 \cdot 10^{-3}$

$c = 0.051$ $\quad f = 7.057 \cdot 10^{-3}$

$a + b + c + d + e + f + g + h = 0.283$

0.28

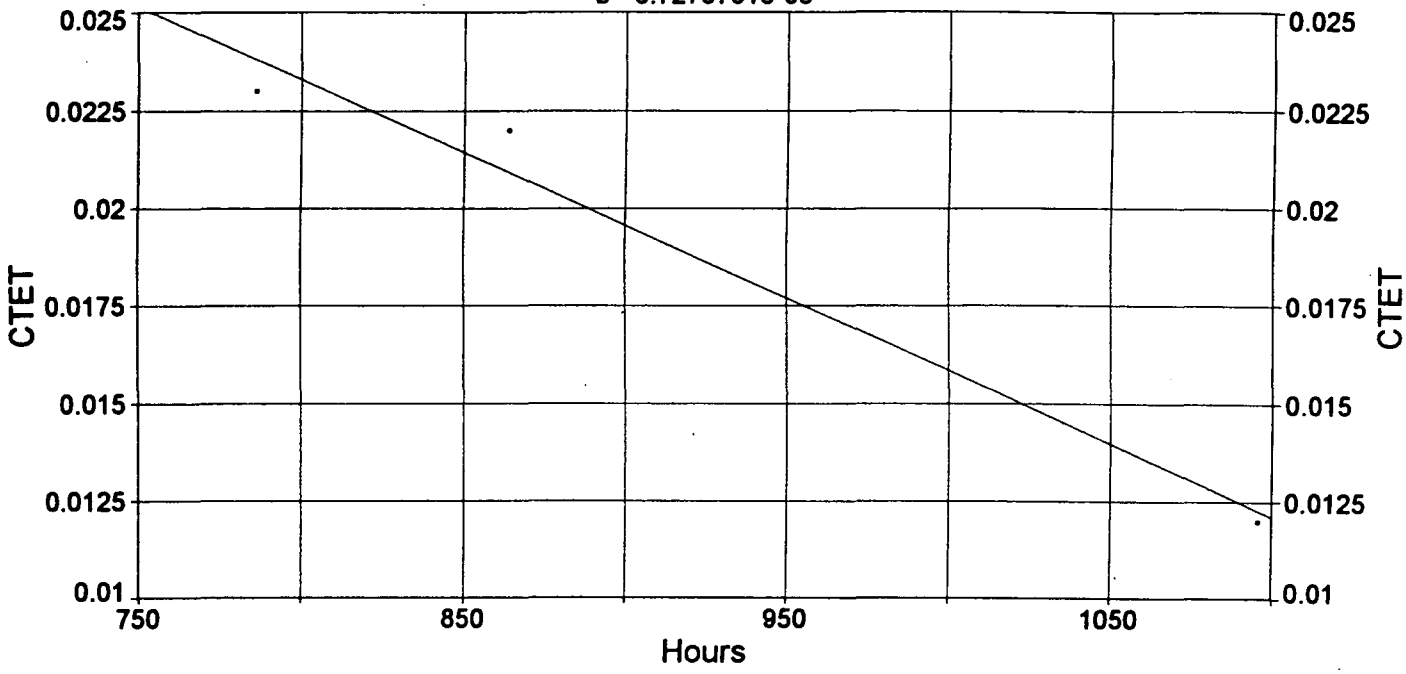
# Zone 1

## Rank 26 Eqn 1 y=a+bx

$r^2$=0.97441001 DF Adj $r^2$=0.94882003 FitStdErr=0.0013761028 Fstat=38.077787

a=0.053118195

b=-3.7276781e-05




Rank 26 Eqn 1 y=a+bx

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9744100143 | 0.9488200286 | 0.0013761028 | 38.077786583 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.053118195 | 0.005585836 | 9.509443313 | -0.01785659 | 0.124092976 |
| b | -3.7277e-05 | 6.04091e-06 | -6.17072010 | -0.00011403 | 3.94803e-05 |

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**Zone 1 Carbon tetrachloride**

$$a := \left[ \int_{786.25}^{863.75} \left(0.053118195 + -3.7276781 \cdot 10^{-5} \cdot x\right) dx \cdot \left(\frac{153.84}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$b := \left[ \int_{863.75}^{1095.8} \left(0.053118195 + -3.7276781 \cdot 10^{-5} \cdot x\right) dx \cdot \left(\frac{153.84}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729 \right]$$

$a = 0.023$

$b = 0.049$

0.07

$a + b = 0.072$

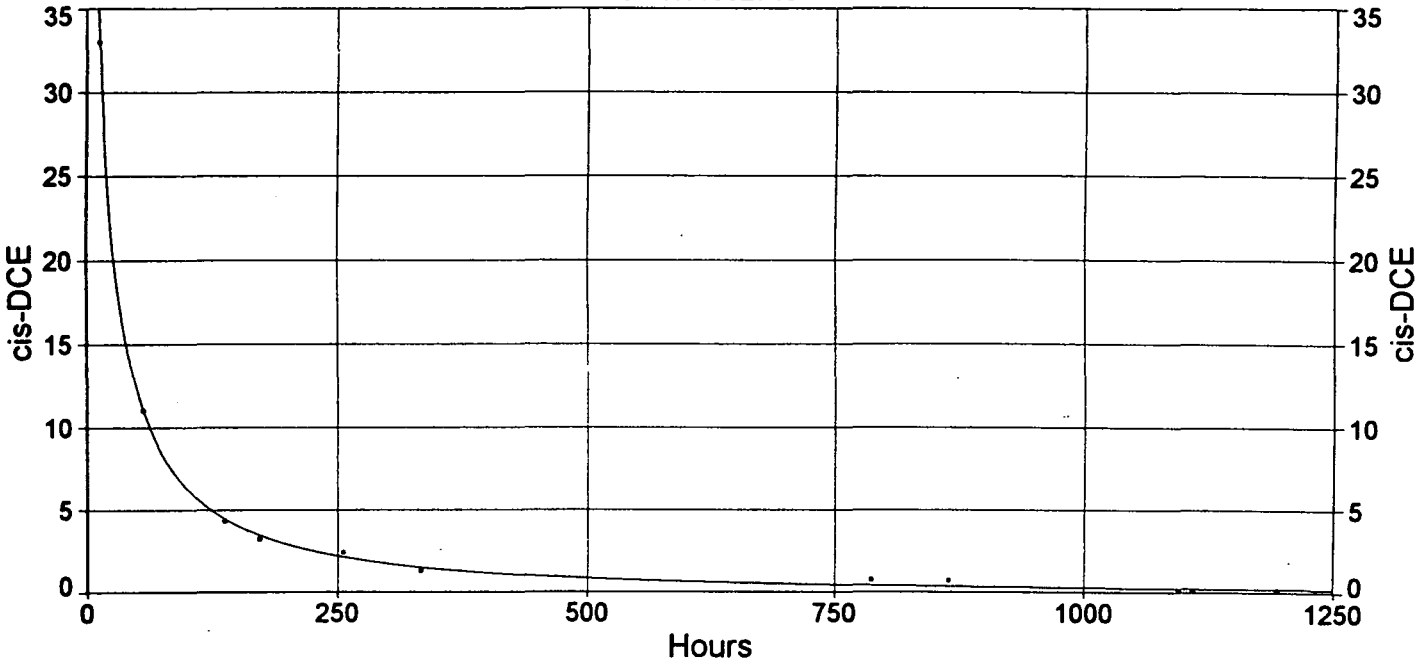
# Zone 1

Rank 1 Eqn 31 $\ln y = a + b(\ln x)^2$

$r^2$=0.99949563 DF Adj $r^2$=0.99938355 FitStdErr=0.22160096 Fstat=19816.86

a=4.2393679

b=-0.11302749




Rank 1 Eqn 31 $\ln y = a + b(\ln x)^2$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9994956337 | 0.9993835523 | 0.2216009588 | 19816.859781 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 4.239367865 | 0.013071738 | 324.3155484 | 4.210242218 | 4.268493512 |
| b | -0.11302749 | 0.001410147 | -80.1529877 | -0.11616949 | -0.10988548 |

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**Zone 1 cis-1,2-Dichloroethene**

$$a := \left[\int_{13}^{56.5} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right]$$

$$h := \left[\int_{1127.4}^{1194.75} e^{4.239367865 + -0.11302749 \cdot \ln(x)^2} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840\right]$$

$a = 6.73$ $d = 1.726$ $g = 0.441$

$b = 5.627$ $e = 0.658$ $h = 1.006$

$c = 4.076$ $f = 2.997$

$a + b + c + d + e + f + g + h = 23.262$

23.26

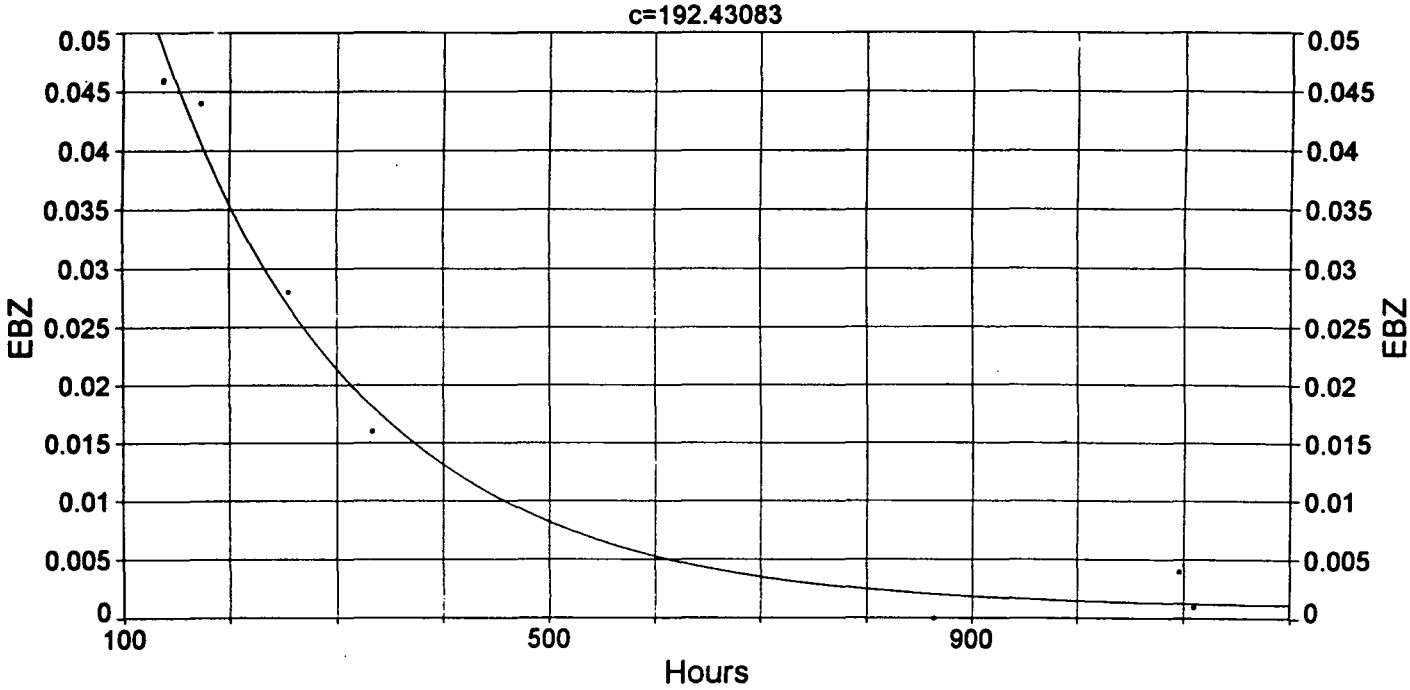
# Zone 1

Rank 1 Eqn 8002 [Exponential] y=a+bexp(-x/c)

$r^2$=0.98482188 DF Adj $r^2$=0.96964376 FitStdErr=0.0029854329 Fstat=129.76861

a=0.0010054063 b=0.097246931

c=192.43083




Rank 1 Eqn 8002 [Exponential] y=a+bexp(-x/c)

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9848218788 | 0.9696437577 | 0.0029854329 | 129.76861471 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.001005406 | 0.001929611 | 0.521040947 | -0.00435205 | 0.006362865 |
| b | 0.097246931 | 0.014063654 | 6.914769952 | 0.058199968 | 0.136293893 |
| c | 192.4308268 | 33.19396125 | 5.797163688 | 100.2696157 | 284.5920380 |

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**Zone 1 Ethylbenzene**

$$a := \left[\int_{13}^{56.5} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right]$$

$$h := \left[\int_{1127.4}^{1194.75} 0.001005406 + 0.097246931 \cdot \exp\left(\frac{-x}{192.4308268}\right) dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840\right]$$

$a = 0.037 \quad d = 0.018 \quad g = 4.086 \cdot 10^{-4}$

$b = 0.064 \quad e = 4.81 \cdot 10^{-3} \quad h = 8.594 \cdot 10^{-4}$

$c = 0.06 \quad f = 3.789 \cdot 10^{-3}$

$a + b + c + d + e + f + g + h = 0.19$

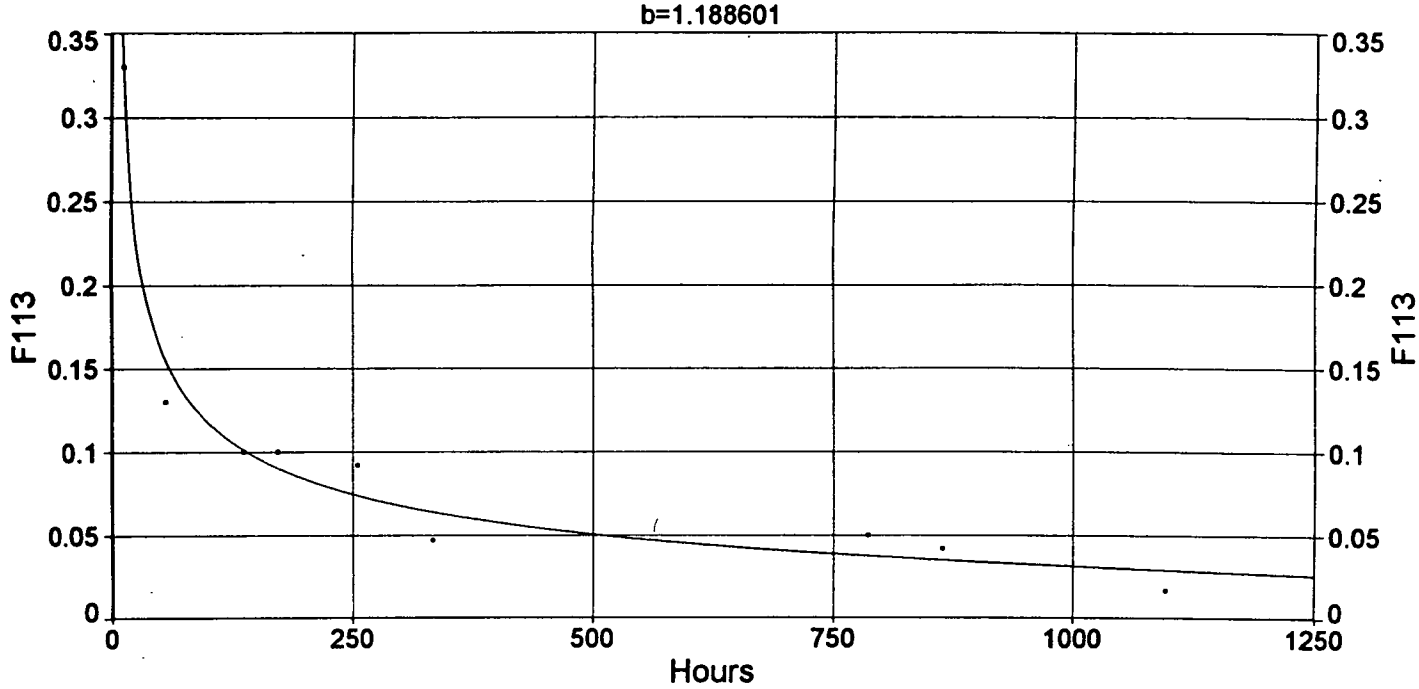
# Zone 1

## Rank 1 Eqn 14 y=a+b/lnx

$r^2$=0.97561373 DF Adj $r^2$=0.96748497 FitStdErr=0.015551151 Fstat=280.04672

a=-0.14056875

b=1.188601




Rank 1 Eqn 14 y=a+b/lnx

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9756137258 | 0.9674849677 | 0.0155511509 | 280.04671902 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -0.14056875 | 0.015331565 | -9.16858494 | -0.17682214 | -0.10431536 |
| b | 1.188601035 | 0.071026573 | 16.73459647 | 1.020649879 | 1.356552191 |

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**Zone 1 1,1,2-Trichloro-1,2,2-trifluoroethane**

$$a := \left[\int_{13}^{56.5} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right] \qquad a = 0.109$$

$$b := \left[\int_{56.5}^{172.5} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right] \qquad b = 0.152$$

$$c := \left[\int_{172.5}^{434} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad c = 0.212$$

$$d := \left[\int_{434}^{692.25} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right] \qquad d = 0.152$$

$$e := \left[\int_{692.25}^{863.75} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad e = 0.077$$

$$f := \left[\int_{863.75}^{1095.8} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right] \qquad f = 0.086$$

$$g := \left[\int_{1095.8}^{1127.4} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right] \qquad g = 0.01$$

$$h := \left[\int_{1127.4}^{1194.75} -0.14056875 + \frac{1.188601035}{\ln(x)}dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 38400\right] \qquad h = 0.025$$

$$a + b + c + d + e + f + g + h = 0.824$$

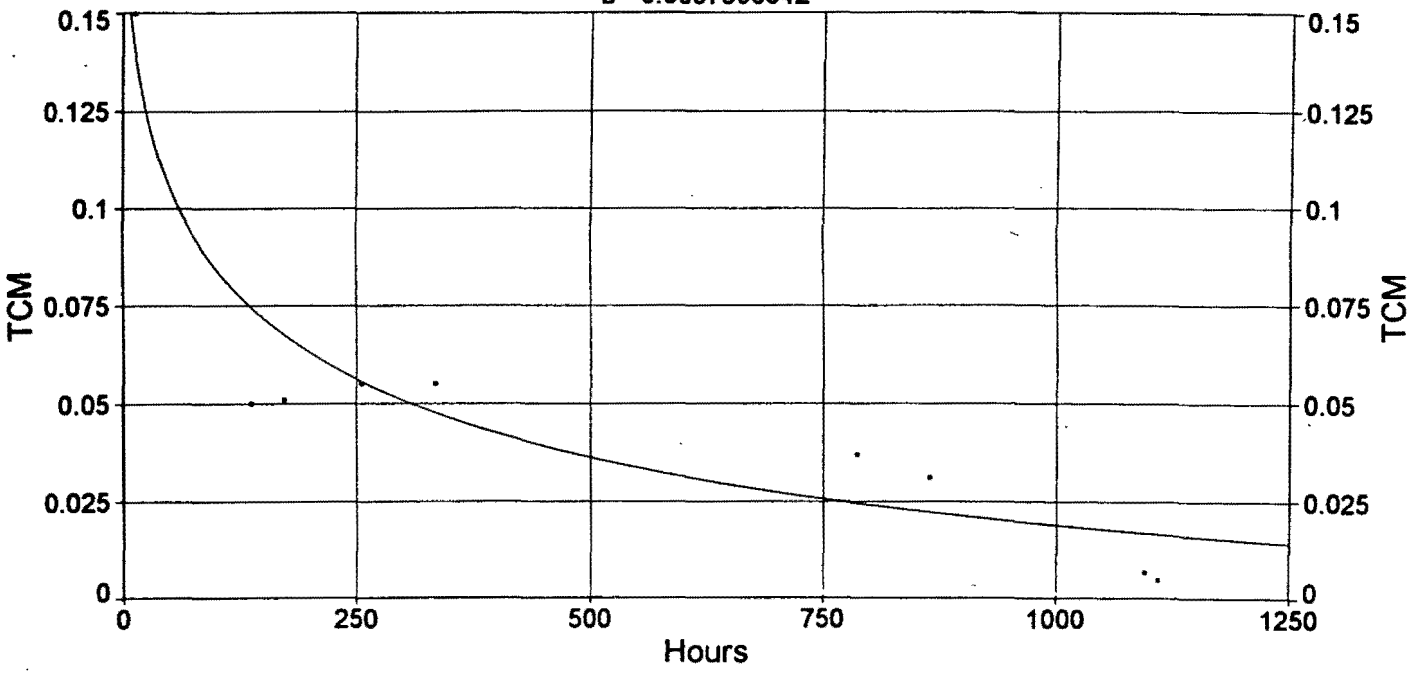
# Zone 1

Rank 10 Eqn 73 $y^{0.5}=a+b(\ln x)^2$

$r^2$=0.89663894 DF Adj $r^2$=0.86218526 FitStdErr=0.014605057 Fstat=60.723766

a=0.41273529

b=-0.0057598842




Rank 10 Eqn 73 $y^{0.5}=a+b(\ln x)^2$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.8966389436 | 0.8621852581 | 0.0146050570 | 60.723766031 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.412735294 | 0.043290232 | 9.534143707 | 0.310370161 | 0.515100426 |
| b | -0.00575988 | 0.001529818 | -3.76507801 | -0.00937733 | -0.00214244 |

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**Zone 1 Chloroform**

$$a := \left[\int_{13}^{56.5} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 32520\right]$$

$$h := \int_{1127.4}^{1194.75} \sqrt{0.412735294 + -0.00575988\cdot(\ln(x))^2}\,dx\cdot\left(\frac{119.38}{24.5}\right)\cdot 6.2428\cdot 10^{-8}\cdot 38400$$

$a = 0.265$ $d = 1.183$ $g = 0.112$

$b = 0.616$ $e = 0.69$ $h = 0.279$

$c = 1.26$ $f = 0.863$

$a + b + c + d + e + f + g + h = 5.268$

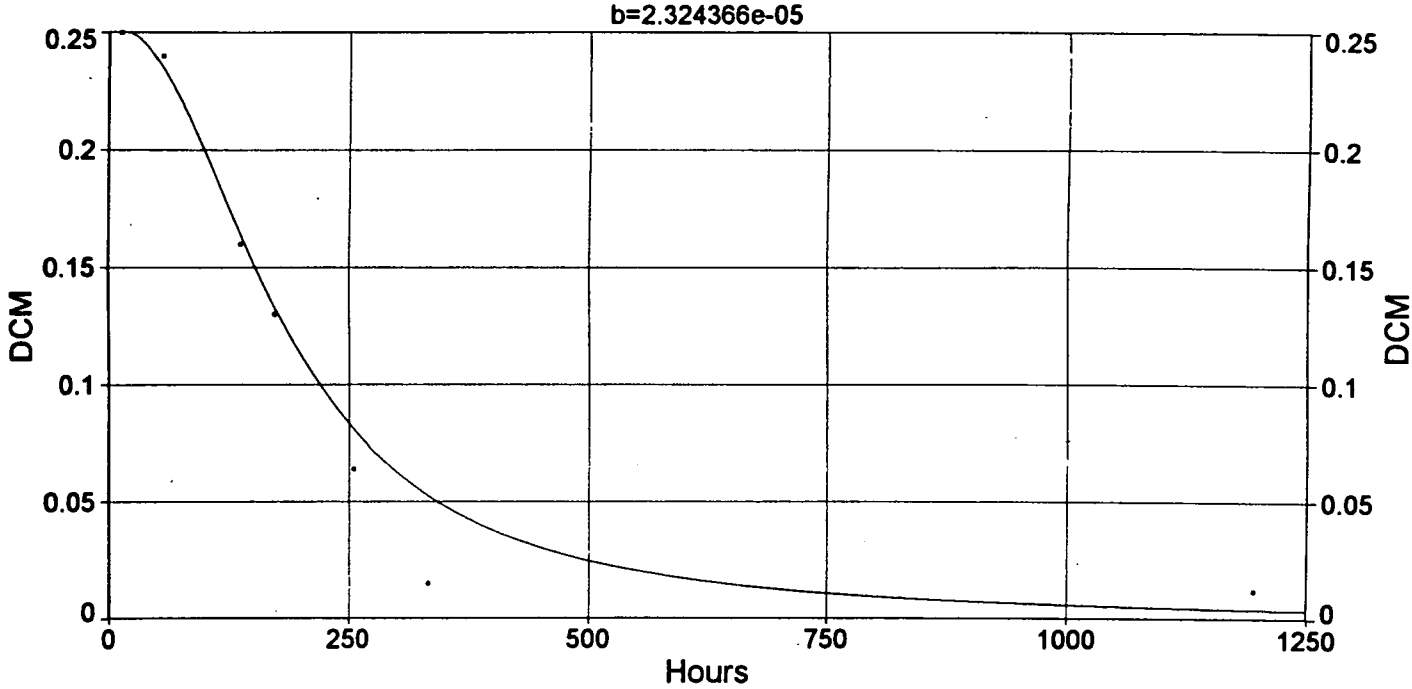
# Zone 1

Rank 1 Eqn 47 $y^{-1}=a+bx^2\ln x$

$r^2$=0.96906376 DF Adj $r^2$=0.95359564 FitStdErr=0.019055589 Fstat=156.62273

a=3.9593348

b=2.324366e-05




Rank 1 Eqn 47 $y^{-1}=a+bx^2\ln x$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9690637582 | 0.9535956373 | 0.0190555888 | 156.62273457 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 3.959334823 | 0.231387718 | 17.11125753 | 3.364533758 | 4.554135888 |
| b | 2.32437e-05 | 5.03531e-06 | 4.616135128 | 1.03e-05 | 3.61873e-05 |

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Zone 1 Methylene chloride

$$a := \left[ \int_{13}^{56.5} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{434} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{434}^{692.25} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$e := \left[ \int_{692.25}^{863.75} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$f := \left[ \int_{863.75}^{1095.8} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729 \right]$$

$$g := \left[ \int_{1095.8}^{1127.4} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520 \right]$$

$$h := \int_{1127.4}^{1194.75} \frac{1}{3.959334823 + 2.32437 \cdot 10^{-5} \cdot x^2 \cdot \ln(x)} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 38400$$

$a = 0.079 \quad d = 0.041 \quad g = 1.083 \cdot 10^{-3}$

$b = 0.152 \quad e = 0.013 \quad h = 2.489 \cdot 10^{-3}$

$c = 0.13 \quad f = 0.011$

$a + b + c + d + e + f + g + h = 0.428$

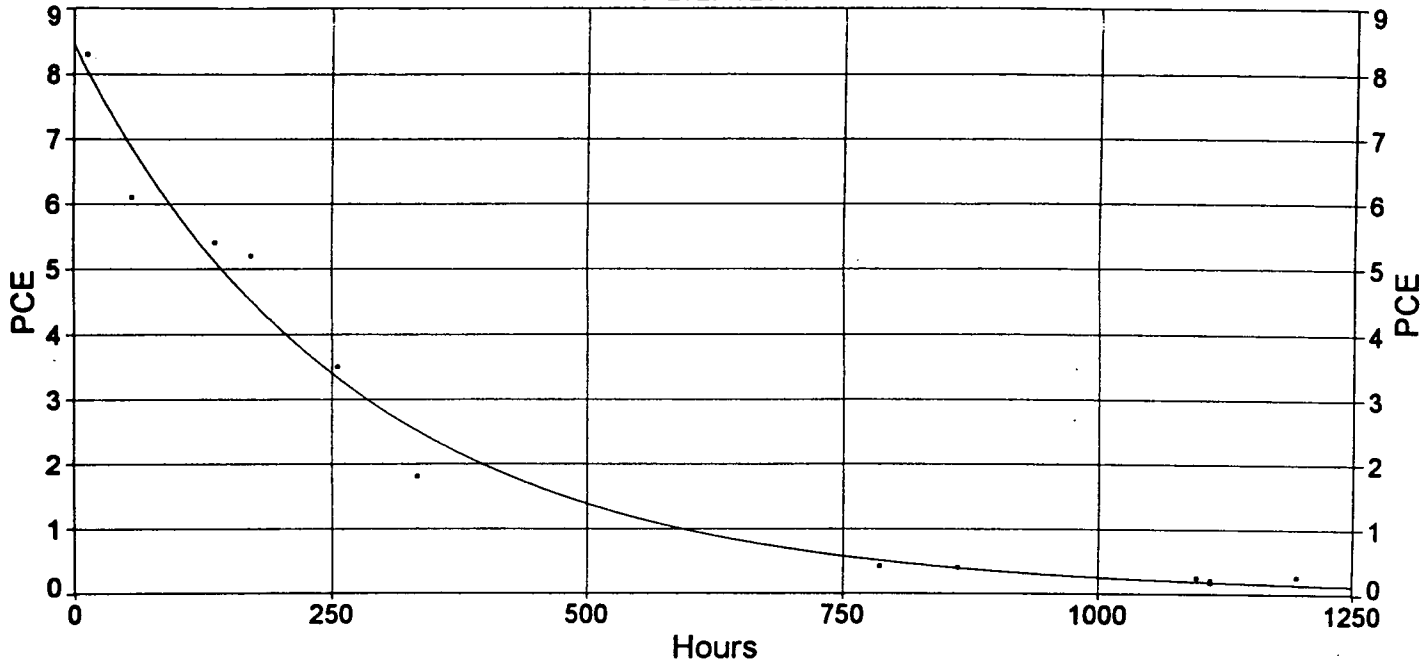
# Zone 1

Rank 1 Eqn 8002 [Exponential] y=a+bexp(-x/c)

$r^2$=0.98073364 DF Adj $r^2$=0.97350876 FitStdErr=0.44541433 Fstat=229.06779

a=0.050581073 b=8.3920948

c=272.47288




Rank 1 Eqn 8002 [Exponential] y=a+bexp(-x/c)

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9807336444 | 0.9735087611 | 0.4454143306 | 229.06778506 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.050581073 | 0.237893014 | 0.212621094 | -0.48757031 | 0.588732459 |
| b | 8.392094841 | 0.410369750 | 20.45008152 | 7.463773973 | 9.320415710 |
| c | 272.4728812 | 35.68551615 | 7.635391346 | 191.7466353 | 353.1991272 |

| Date | Time | File Source |
|---|---|---|
| Oct 30, 1998 | 11:10:42 AM | C:\TCWIN4\CLIPBRD.WK1 |

**Zone 1 Tetrachloroethene**

$$a := \left[\int_{13}^{56.5} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right]$$

$$h := \left[\int_{1127.4}^{1194.75} 0.050581073 + 8.392094841 \cdot \exp\left(\frac{-x}{272.4728812}\right) dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840\right]$$

$a = 4.689$ $d = 4.44$ $g = 0.084$

$b = 8.984$ $e = 1.307$ $h = 0.163$

$c = 10.726$ $f = 0.924$

$a + b + c + d + e + f + g + h = 31.316$

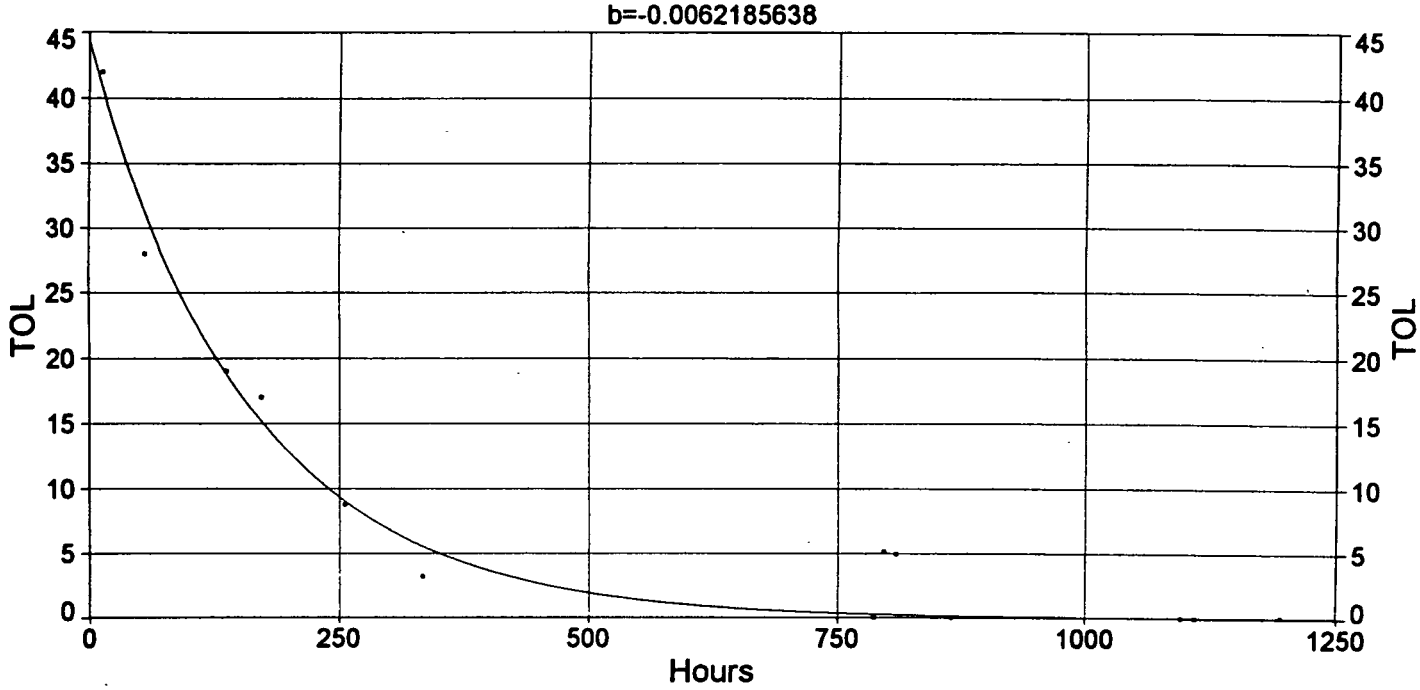
# Zone 1

Rank 3 Eqn 22 lny=a+bx

$r^2$=0.99035871 DF Adj $r^2$=0.9882162 FitStdErr=1.4296708 Fstat=1027.2055

a=3.7887977

b=-0.0062185638




Rank 3 Eqn 22 lny=a+bx

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9903587088 | 0.9882161996 | 1.4296707603 | 1027.2054735 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 3.788797746 | 0.033611256 | 112.7240737 | 3.713907200 | 3.863688293 |
| b | -0.00621856 | 0.000389767 | -15.9545725 | -0.00708702 | -0.00535011 |

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**Zone 1**
**Toluene**

$$a := \int_{863.75}^{1095.8} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729$$

$$b := \int_{1095.8}^{1127.4} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520$$

$$c := \int_{1127.4}^{1194.75} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840$$

$a = 0.194$

$b = 0.011$

$c = 0.017$

$51.171 + a + b + c = 51.393$

Zone 1 Toluene

$$a := \int_{13}^{56.5} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260$$

$$b := \int_{56.5}^{172.5} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700$$

$$c := \int_{172.5}^{434} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300$$

$$d := \int_{434}^{692.25} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280$$

$$e := \int_{692.25}^{863.75} e^{3.788797746 + -0.00621856 \cdot x} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300$$

$a = 12.5$

$b = 19.739$

$c = 15.273$

$d = 3.167$

$e = 0.492$

$a + b + c + d + e = 51.171$

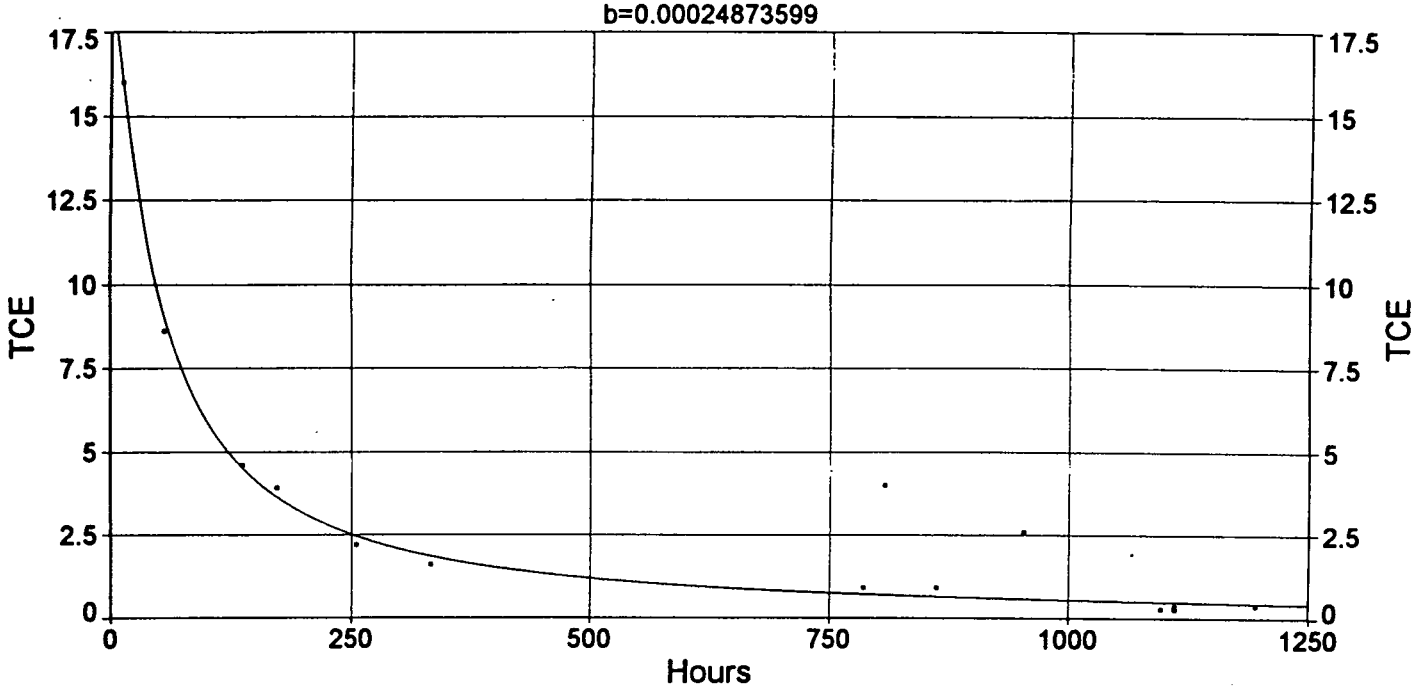
# Zone 1

Rank 1 Eqn 44 $y^{-1}=a+bx\ln x$

$r^2$=0.99746655 DF Adj $r^2$=0.99690356 FitStdErr=0.24762357 Fstat=3937.1808

a=0.054540077

b=0.00024873599




Rank 1 Eqn 44 $y^{-1}=a+bx\ln x$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9974665462 | 0.9969035565 | 0.2476235750 | 3937.1807876 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.054540077 | 0.001072737 | 50.84199122 | 0.052149870 | 0.056930284 |
| b | 0.000248736 | 9.76212e-06 | 25.47970987 | 0.000226985 | 0.000270487 |

| Date | Time | File Source |
|---|---|---|
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**Zone 1 Trichloroethene**

$$a := \left[\int_{13}^{56.5} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$f := \left[\int_{863.75}^{1095.8} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right]$$

$$g := \left[\int_{1095.8}^{1127.4} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right]$$

$$h := \left[\int_{1127.4}^{1194.75} \frac{1}{0.054540077 + 0.00024873599 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840\right]$$

$a = 5.977$ $d = 3.305$ $g = 0.173$

$b = 7.115$ $e = 1.431$ $h = 0.365$

$c = 6.42$ $f = 1.475$

$a + b + c + d + e + f + g + h = 26.26$

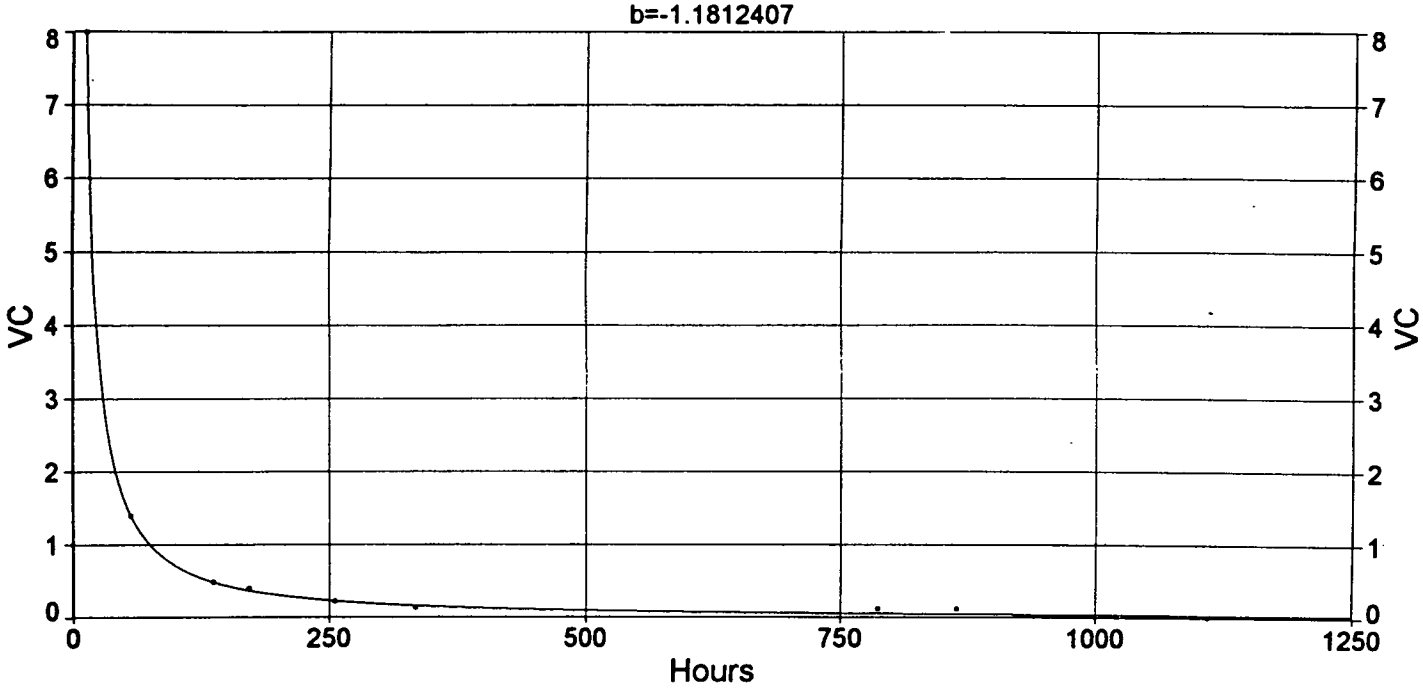
# Zone 1

Rank 1 Eqn 8156 [Power_] $y=ax^b$

$r^2$=0.99976639 DF Adj $r^2$=0.99969964 FitStdErr=0.039877057 Fstat=34236.594

a=165.52692

b=-1.1812407




Rank 1 Eqn 8156 [Power_] $y=ax^b$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9997663865 | 0.9996996398 | 0.0398770574 | 34236.593643 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 165.5269153 | 6.451868062 | 25.65565720 | 150.6488809 | 180.4049497 |
| b | -1.18124070 | 0.014715813 | -80.2701620 | -1.21517542 | -1.14730597 |

| Date | Time | File Source |
|---|---|---|
| Oct 30, 1998 | 10:47:07 AM | C:\TCWIN4\CLIPBRD.WK1 |

**Zone 1 Vinyl Chloride**

$$a := \left[\int_{13}^{56.5} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right] \qquad a = 0.732$$

$$b := \left[\int_{56.5}^{172.5} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right] \qquad b = 0.419$$

$$c := \left[\int_{172.5}^{434} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad c = 0.293$$

$$d := \left[\int_{434}^{692.25} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right] \qquad d = 0.139$$

$$e := \left[\int_{692.25}^{863.75} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad e = 0.058$$

$$f := \left[\int_{863.75}^{1095.8} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729\right] \qquad f = 0.059$$

$$g := \left[\int_{1095.8}^{1127.4} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520\right] \qquad g = 6.837 \cdot 10^{-3}$$

$$h := \left[\int_{1127.4}^{1194.75} 165.5269153 \cdot x^{-1.18124070} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840\right] \qquad h = 0.014$$

$$a + b + c + d + e + f + g + h = 1.721$$

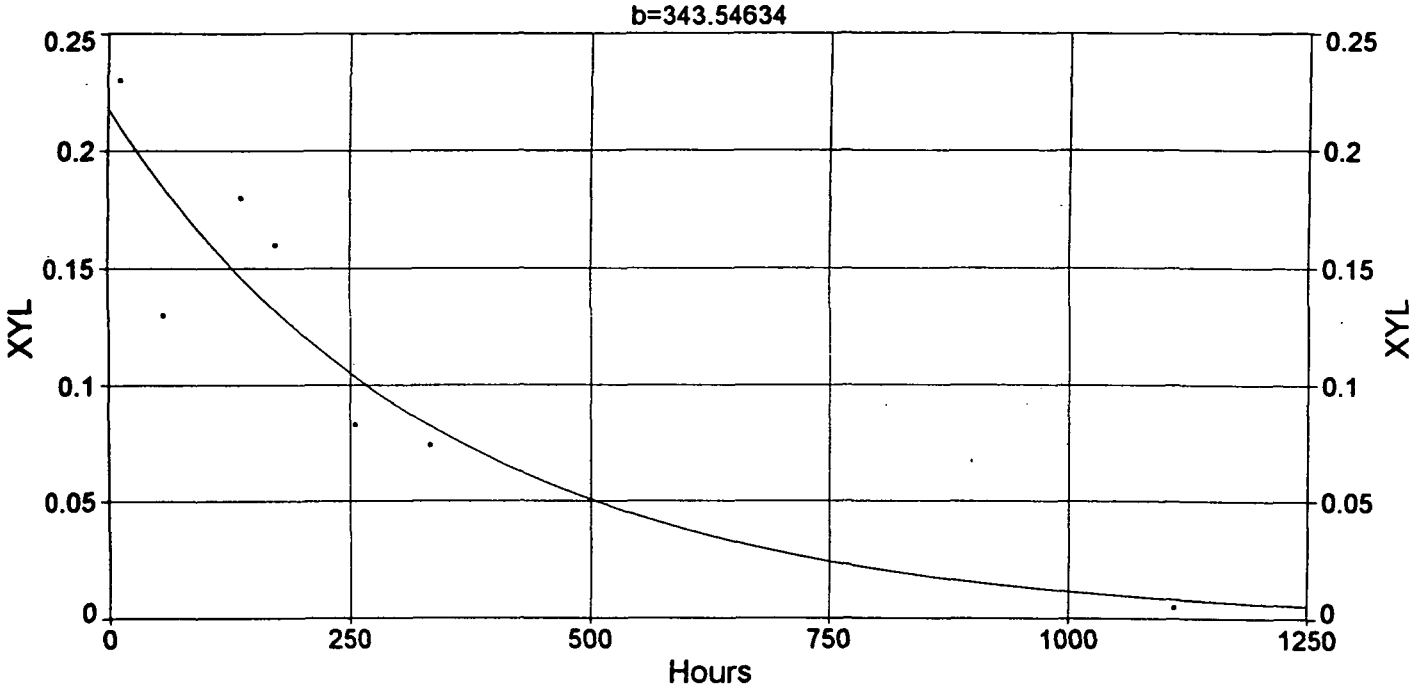
# Zone 1

Rank 2 Eqn 8157 [Exponential_] y=aexp(-x/b)

$r^2$=0.82753626 DF Adj $r^2$=0.74130439 FitStdErr=0.034266058 Fstat=23.991601

a=0.21773393

b=343.54634




Rank 2 Eqn 8157 [Exponential_] y=aexp(-x/b)

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.8275362570 | 0.7413043855 | 0.0342660580 | 23.991600862 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.217733933 | 0.029572980 | 7.362597024 | 0.141714168 | 0.293753697 |
| b | 343.5463437 | 115.6011869 | 2.971823671 | 46.38403169 | 640.7086558 |

| Date | Time | File Source |
|---|---|---|
| Oct 30, 1998 | 11:14:17 AM | C:\TCWIN4\CLIPBRD.WK1 |

**Zone 1 Xylenes (total)**

$$a := \left[ \int_{863.75}^{1095.8} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32729 \right]$$

$$b := \left[ \int_{1095.8}^{1127.4} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32520 \right]$$

$$c := \left[ \int_{1127.4}^{1194.75} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33840 \right]$$

$a = 0.026$

$b = 2.382 \cdot 10^{-3}$

$c = 4.58 \cdot 10^{-3}$

$0.6 + a + b + c = 0.633$

**Zone 1 Xylenes (total)**

$$a := \left[\int_{13}^{56.5} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{434} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{434}^{692.25} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$e := \left[\int_{692.25}^{863.75} 0.217733933 \cdot \exp\left(\frac{-x}{343.5463437}\right) dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$a = 0.079$ $\quad d = 0.107$

$b = 0.161$ $\quad e = 0.035$

$c = 0.217$

$a + b + c + d + e = 0.6$

Zone 2 Summa + GC

| Running Hours | Vinyl Chloride | Trichlorofluoro-methane | 1,1,2-Trichloro-1,2,2-trifluoroethane | Acetone |
|---|---|---|---|---|
| 28.00 | 10 | 1.7 | 2.5 | |
| 73.00 | 6.2 | 1.5 | 1.6 | |
| 156.00 | 2.9 | 1.4 | 1.5 | |
| 191.00 | 2 | 0.81 | 0.88 | 0.87 |
| 275.75 | 1.7 | 1.1 | 1.1 | 0.69 |
| 351.00 | 1.1 | 0.59 | 0.67 | |
| 808.25 | 0.27 | 0.11 | 0.31 | |
| 886.25 | | | | |
| 886.25 | | 0.12 | 0.4 | |
| 970.25 | | | | |
| 1030.25 | | | | |
| 1155.25 | | | | |
| 1296.25 | | | | |
| 1910.22 | | | 0.1 | |
| 2687.81 | | | 0.14 | |
| 2829.30 | | | | |
| 3327.36 | | | 0.076 | |
| 3477.69 | | | | |
| 3620.84 | | | | |
| 3811.67 | | | | |
| 3974.59 | | | | |
| 4161.74 | | | | |
| 4186.95 | | | | |
| 4539.33 | | | 0.1 | |
| 4658.53 | | | | |
| 4682.46 | | | | |
| 4706.64 | | | | |
| 4730.07 | | | | |
| 4822.00 | | | | |
| 4845.68 | | | | |
| 4871.11 | | | | |
| 4894.79 | | | | |
| 4989.97 | | | | |
| 5013.40 | | | | |
| 5037.33 | | | | |
| 5137.26 | | | | |
| 5292.37 | | | | |
| 5304.55 | | | | |
| 5590.02 | | | | |
| 5755.03 | | | | |
| 6086.21 | 0.100 | 0.007 | 0.096 | |
| 6305.46 | | | | |
| 6575.44 | | | | |

6575.44 = 30-Dec-1998 @ 08:30

| Methylene chloride | trans-1,2-Dichloroethene | cis-1,2-Dichloroethene | Chloroform | Benzene | Trichloroethene |
|---|---|---|---|---|---|
| 1.6 | | 130 | 1.2 | 2.3 | 130 |
| 1.9 | | 64 | 0.52 | 1.6 | 83 |
| 1.6 | 0.5 | 39 | 0.77 | 1.2 | 65 |
| 0.92 | 0.29 | 24 | 0.51 | 0.73 | 42 |
| 0.69 | 0.33 | 21 | 0.7 | 0.68 | 42 |
| 0.68 | | 17 | 0.63 | 0.54 | 50 |
| 0.2 | | 7.7 | 0.34 | 0.2 | 28 |
| 0.94 | | 16.5 | | | 37.3 |
| | | 8.7 | 0.37 | 0.17 | 36 |
| | | 15.42 | | | 37.33 |
| | | 12.93 | | | 37.88 |
| | | 16.42 | | | 23.69 |
| | | 7.12 | | | 25.06 |
| | | 3.3 | 0.3 | | 13 |
| 0.160 | | 4.000 | 0.470 | 0.120 | 15.000 |
| | | 2.027 | | | 10.144 |
| 0.027 | 0.04 | 2.600 | 0.190 | 0.037 | 9.500 |
| | | 2.384 | | | 8.767 |
| | | 2.212 | | | 7.425 |
| | | 2.010 | | | 7.280 |
| | | 1.777 | | | 7.509 |
| | | 2.304 | | | 7.437 |
| | | 2.307 | | | 8.235 |
| 0.06 | | 2.300 | 0.200 | | 11.000 |
| | | 1.888 | | | 6.327 |
| | | 1.628 | | | 6.713 |
| | | 1.927 | | | 7.715 |
| | | 2.268 | | | 8.733 |
| | | 1.745 | | | 6.747 |
| | | 1.758 | | | 7.283 |
| | | 1.536 | | | 6.514 |
| | | 1.741 | | | 7.278 |
| | | 1.713 | | | 6.567 |
| | | 1.261 | | | 6.057 |
| | | 1.579 | | | 5.309 |
| 0.063 | | 2.000 | 0.180 | | 9.700 |
| | | 0.933 | | | 6.548 |
| | | 2.078 | | | 6.015 |
| 0.048 | 0.022 | 1.800 | 0.160 | | 8.400 |
| | | 1.900 | 0.150 | | 8.200 |
| 0.043 | 0.028 | 1.900 | 0.130 | 0.022 | 6.900 |
| | | 1.700 | 0.240 | | 7.100 |
| | | 1.857 | | | 1.145 |

| Toluene | Tetrachloroethene | Ethylbenzene | Xylenes (total) |
|---|---|---|---|
| 220 | 10 | 1.4 | 7.4 |
| 130 | 6.1 | 0.9 | 5.3 |
| 75 | 5.2 | 0.58 | 3.7 |
| 46 | 3.6 | 0.38 | 2.4 |
| 35 | 3.6 | 0.28 | 2.2 |
| 41 | 3.3 | 0.19 | 1.5 |
| 22 | 1.8 | | 0.89 |
| 28.51 | | | |
| 26 | 2 | | 0.76 |
| 26.57 | 3.43 | | |
| 28.33 | 1.19 | | |
| 19.74 | | | |
| 11.05 | | | |
| 9.9 | 0.68 | 0.24 | 0.59 |
| 12.000 | 0.700 | 0.250 | 0.500 |
| 5.816 | | | |
| 8.200 | 0.580 | 0.055 | 0.210 |
| 6.800 | 0.051 | | |
| 5.292 | 0.112 | 0.881 | |
| 5.223 | | 0.174 | |
| 3.365 | | | |
| 4.062 | 0.197 | | |
| 5.144 | 0.127 | | |
| 6.600 | 0.590 | 0.028 | 0.095 |
| 5.068 | | | |
| 7.780 | | | |
| 7.124 | | | |
| 6.031 | 0.12 | | |
| 4.851 | 0.596 | | |
| 5.145 | | | |
| 4.691 | 0.238 | | |
| 6.355 | | | |
| 3.927 | | | |
| 3.648 | | | |
| 5.34 | | | |
| 4.900 | 0.580 | | |
| 1.800 | 0.306 | | |
| 1.902 | 0.212 | | |
| 3.600 | 0.580 | | 0.064 |
| 3.700 | 0.560 | | 0.064 |
| 2.600 | 0.430 | 0.011 | 0.047 |
| 2.600 | 0.460 | | |
| 2.348 | 0.194 | | |

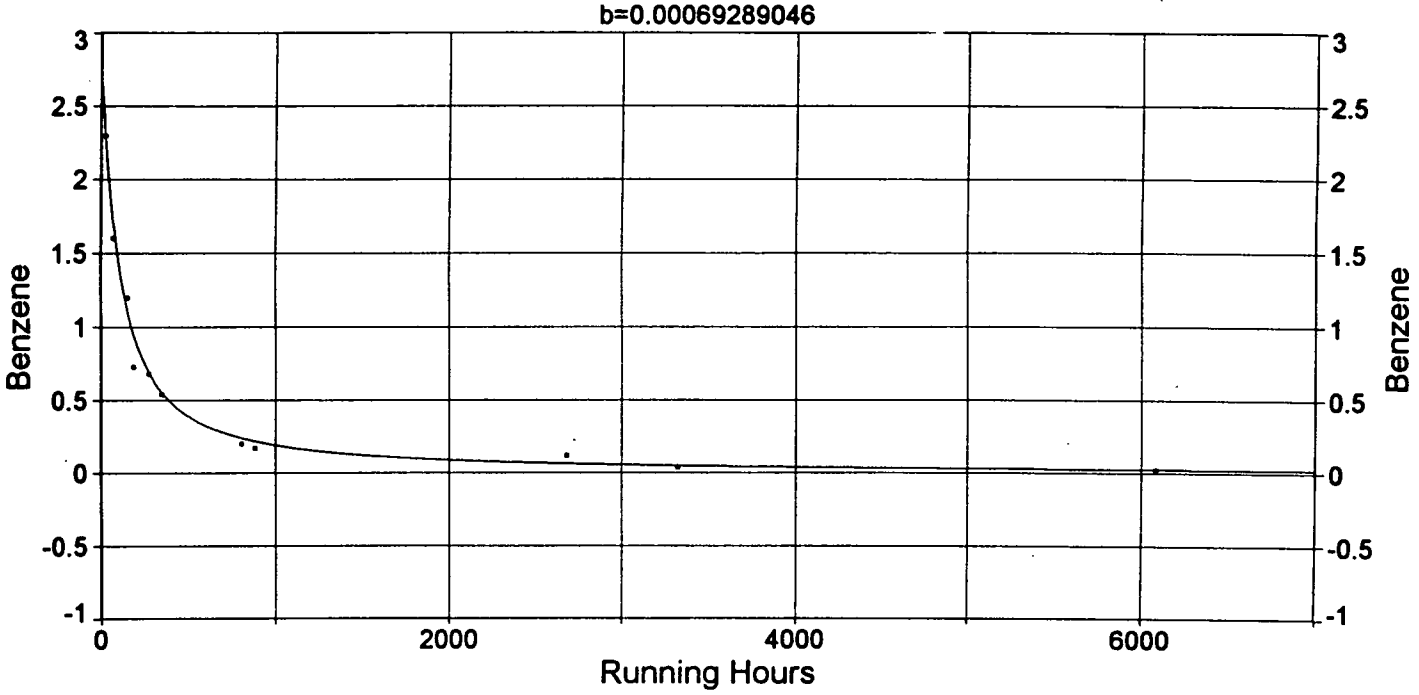
# Zone 2

Rank 1 Eqn 44 $y^{-1}=a+bx\ln x$

$r^2$=0.98682977 DF Adj $r^2$=0.98353722 FitStdErr=0.088996999 Fstat=674.35951

a=0.37483549

b=0.00069289046




Rank 1 Eqn 44 $y^{-1}=a+bx\ln x$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9868297729 | 0.9835372161 | 0.0889969987 | 674.35951275 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.374835491 | 0.018643226 | 20.10572060 | 0.332661584 | 0.417009398 |
| b | 0.000692890 | 6.07347e-05 | 11.40848406 | 0.000555499 | 0.000830282 |

| Date | Time | File Source |
|---|---|---|
| Jan 20, 1999 | 4:27:18 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ x = 4950 < MDL (34ppb)

ACE = 5.554 lbs

Zone 2 = 2345.316

**Zone 2 Benzene**

$$a := \left[ \int_{886.25}^{1910.22} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$b := \left[ \int_{1910.22}^{2687.813} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$c := \left[ \int_{2687.813}^{4161.74} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280 \right]$$

$$d := \left[ \int_{4161.74}^{5292.37} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780 \right]$$

$$e := \left[ \int_{5292.37}^{5731.7} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$f := \left[ \int_{5731.7}^{6614.12} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

$a = 0.95$

$b = 0.395$

$c = 0.49$

$d = 0.272$

$e = 0.084$

$f = 0.144$

$3.734 + a + b + c + d + e + f = 6.069$

**Zone 2 Benzene**

$$a := \left[ \int_{28}^{73} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} \frac{1}{0.3748435491 + 0.000692890 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$a = 0.619$

$b = 0.996$

$c = 1.19$

$d = 0.663$

$e = 0.266$

$a + b + c + d + e = 3.734$

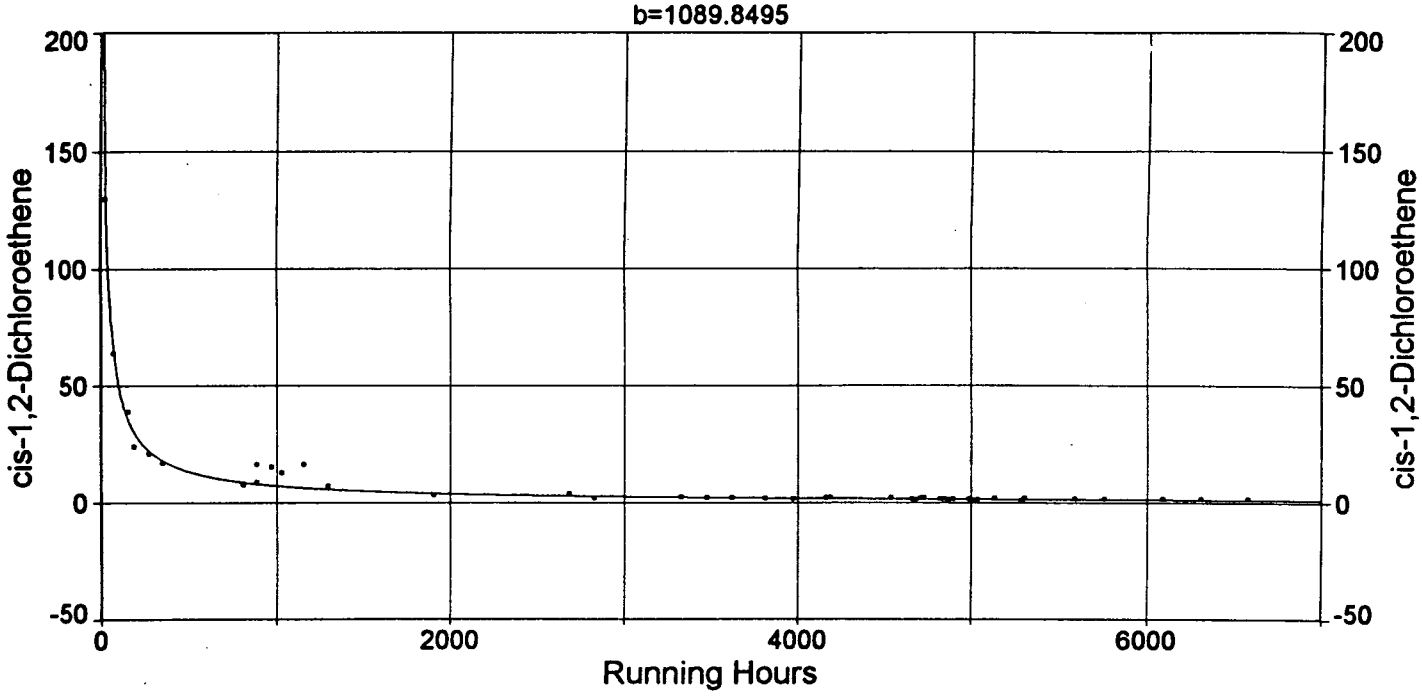
# Zone 2

Rank 1 Eqn 16 y=a+blnx/x

$r^2$=0.99708797 DF Adj $r^2$=0.99692619 FitStdErr=1.2688905 Fstat=12668.892

a=-0.18795633

b=1089.8495




Rank 1 Eqn 16 y=a+blnx/x

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9970879651 | 0.9969261854 | 1.2688904968 | 12668.891876 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -0.18795633 | 0.221422225 | -0.84885936 | -0.63660037 | 0.260687714 |
| b | 1089.849497 | 9.682716430 | 112.5561721 | 1070.230450 | 1109.468544 |

| Date | Time | File Source |
|---|---|---|
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@ x = ~~17550 < RL (0.420 ppm)~~
42750 < RL (0.084 ppm)

Zone 2 cis-1,2-Dichloroethene

$$a := \left[ \int_{28}^{73} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$f := \left[ \int_{886.25}^{1910.22} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$g := \left[ \int_{1910.22}^{2687.813} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$h := \left[ \int_{2687.813}^{4161.74} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280 \right]$$

$$i := \left[ \int_{4161.74}^{5292.37} -0.18795633 + 1089.849497 \cdot \left(\frac{\ln(x)}{x}\right) dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780 \right]$$

Zone 2 cis-1,2-Dichloroethene

$$j := \left[ \int_{5292.37}^{5731.7} -0.18795633 + 1089.849497 \cdot \left( \frac{\ln(x)}{x} \right) dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$k := \left[ \int_{5731.7}^{6614.12} -0.18795633 + 1089.849497 \cdot \left( \frac{\ln(x)}{x} \right) dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

| | | | |
|---|---|---|---|
| $a = 34.555$ | $d = 28.408$ | $g = 21.641$ | $j = 5.252$ |
| $b = 41.769$ | $e = 12.005$ | $h = 28.623$ | $k = 9.11$ |
| $c = 47.588$ | $f = 46.926$ | $i = 16.703$ | |

$$a + b + c + d + e + f + g + h + i + j + k = 292.578$$

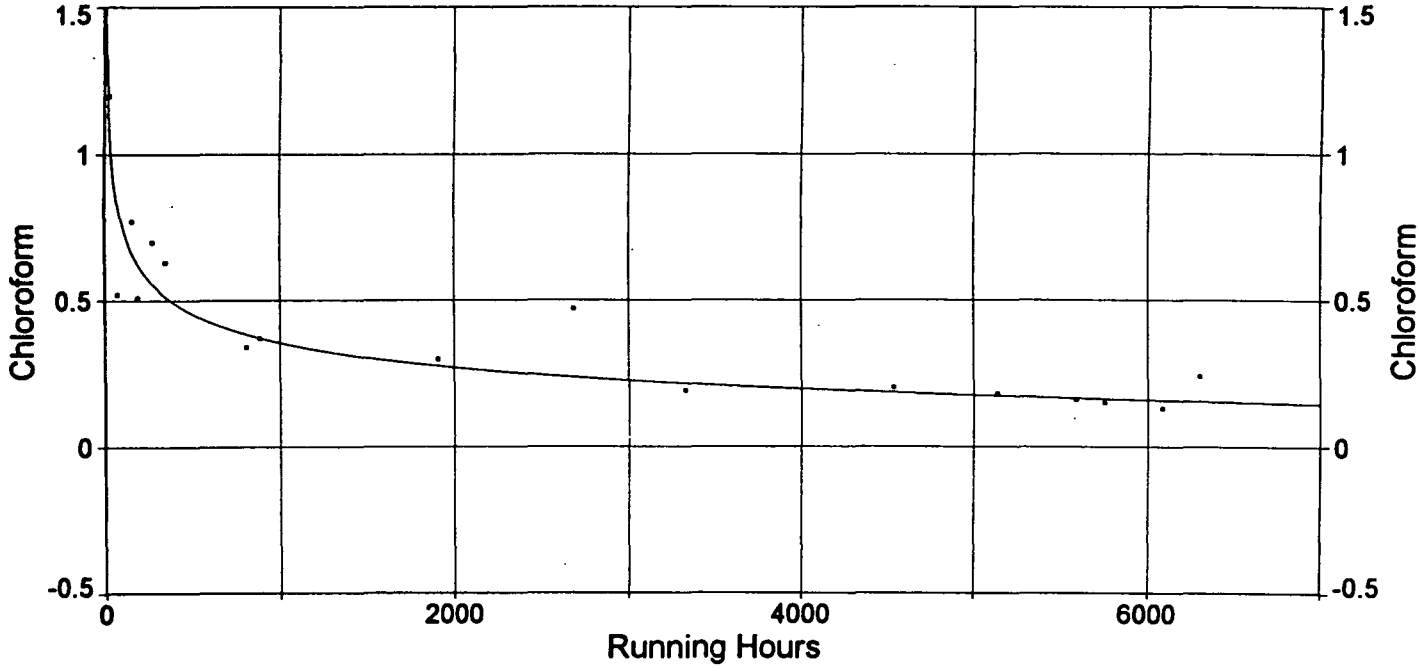
# Zone 2

Rank 1 Eqn 8010 [Power] $y=a+bx^c$

$r^2$=0.86499245 DF Adj $r^2$=0.82817221 FitStdErr=0.11991582 Fstat=38.441958

a=-0.24770396 b=2.7619059

c=-0.22008819




Rank 1 Eqn 8010 [Power] $y=a+bx^c$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.8649924483 | 0.8281722070 | 0.1199158219 | 38.441958435 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -0.24770396 | 0.459469268 | -0.53910887 | -1.24880149 | 0.753393579 |
| b | 2.761905895 | 0.601349989 | 4.592842679 | 1.451676823 | 4.072134968 |
| c | -0.22008819 | 0.141256616 | -1.55807352 | -0.52785992 | 0.087683535 |

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|---|---|---|
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@ x = 15150 < RL (0.084 ppm)

@ x = 32000 < MDL (0.034 ppm)

Zone 2 Chloroform (TCM)

$$a := \left[\int_{28}^{73} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{457.75} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{457.75}^{726.25} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$e := \left[\int_{726.25}^{886.25} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$f := \left[\int_{886.25}^{1910.22} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701\right]$$

$$g := \left[\int_{1910.22}^{2687.813} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100\right]$$

$$h := \left[\int_{2687.813}^{4161.74} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280\right]$$

$$i := \left[\int_{4161.74}^{5292.37} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780\right]$$

$$j := \left[\int_{5292.37}^{5731.7} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920\right]$$

**Zone 2 Chloroform**

$$k := \left[ \int_{5731.7}^{6614.12} -0.24770396 + 2.761905895 \cdot x^{-0.22008819} dx \cdot \left( \frac{119.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

| | | | |
|---|---|---|---|
| $a = 0.448$ | $d = 1.288$ | $g = 1.942$ | $j = 0.713$ |
| $b = 0.859$ | $e = 0.642$ | $h = 3.095$ | $k = 1.299$ |
| $c = 1.549$ | $f = 3.226$ | $i = 2.11$ | |

$a + b + c + d + e + f + g + h + i + j + k = 17.17$

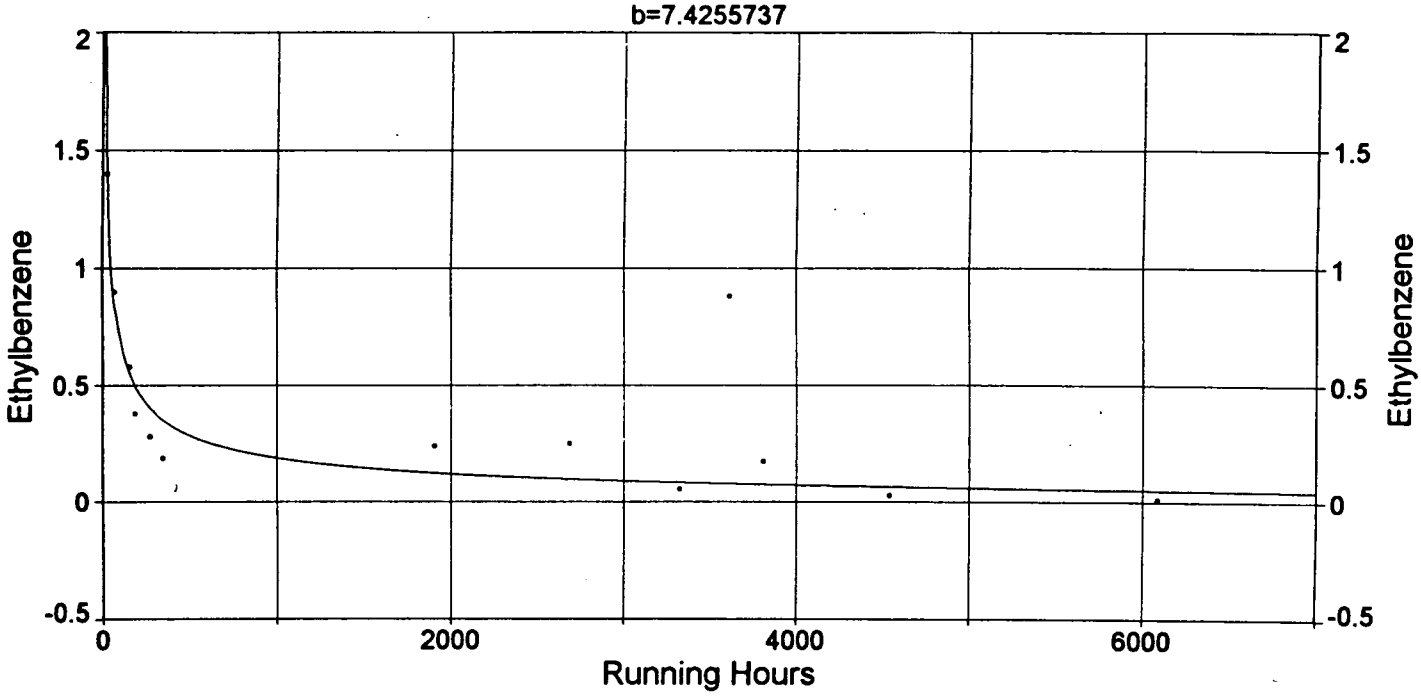
# Zone 2

Rank 2 Eqn 15 $y=a+b/x^{0.5}$

$r^2$=0.93929728 DF Adj $r^2$=0.92580779 FitStdErr=0.10571632 Fstat=154.73727

a=-0.0439384

b=7.4255737




Rank 2 Eqn 15 $y=a+b/x^{0.5}$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9392972805 | 0.9258077873 | 0.1057163245 | 154.73726515 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -0.04393840 | 0.045389000 | -0.96804072 | -0.14507139 | 0.057194593 |
| b | 7.425573728 | 0.596942577 | 12.43934344 | 6.095502779 | 8.755644676 |

| Date | Time | File Source |
|---|---|---|
| Jan 20, 1999 | 4:40:15 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ x = 3400 < RL of 84 ppb

@ x = 13100 < MDL of 21 ppb

Zone 2 Ethylbenzene

$$a := \left[ \int_{28}^{73} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$f := \left[ \int_{886.25}^{1910.22} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$g := \left[ \int_{1910.22}^{2687.813} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$h := \left[ \int_{2687.813}^{4161.74} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280 \right]$$

$$i := \left[ \int_{4161.74}^{5292.37} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780 \right]$$

**Zone 2 Ethylbenzene**

$$j := \left[ \int_{5292.37}^{5731.7} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$k := \left[ \int_{5731.7}^{6614.12} -0.04393840 + \frac{7.425573728}{x^{0.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

$a = 0.441$ $d = 0.699$ $g = 0.753$ $j = 0.213$

$b = 0.672$ $e = 0.323$ $h = 1.077$ $k = 0.373$

$c = 0.978$ $f = 1.433$ $i = 0.664$

$a + b + c + d + e + f + g + h + i + j + k = 7.626$

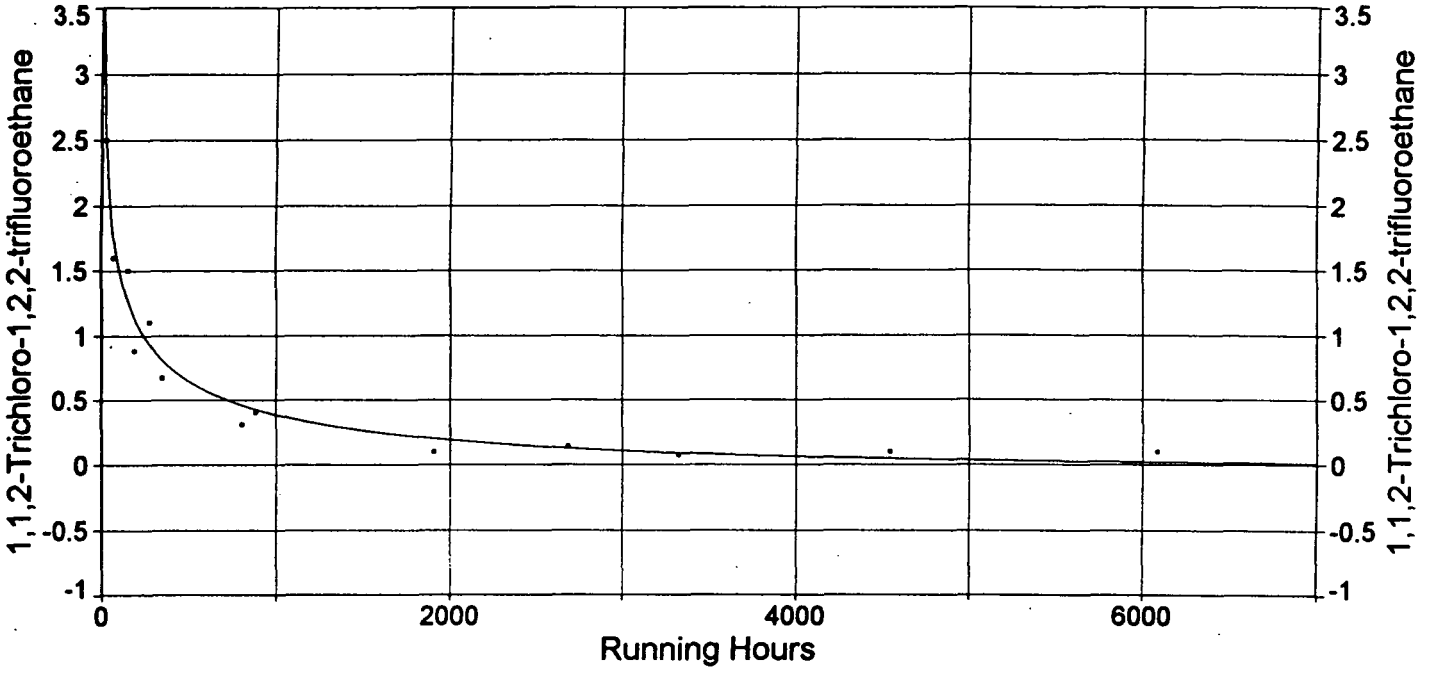
# Zone 2

Rank 1 Eqn 76 $y^{0.5}=a+b\ln x$

$r^2=0.96577787$ DF Adj $r^2=0.95893344$ FitStdErr=0.14654192 Fstat=310.4294

a=2.4598418

b=-0.26624849




Rank 1 Eqn 76 $y^{0.5}=a+b\ln x$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9657778664 | 0.9589334397 | 0.1465419233 | 310.42940415 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 2.459841813 | 0.186535386 | 13.18699830 | 2.049280197 | 2.870403429 |
| b | -0.26624849 | 0.036780763 | -7.23879734 | -0.34720240 | -0.18529458 |

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|---|---|---|
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@x=6010 <MDL

**Zone 2 1,1,2-Trichloro-1,2,2-trifluoroethane (F113)**

$$a := \left[\int_{28}^{73} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{457.75} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{457.75}^{726.25} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$e := \left[\int_{726.25}^{886.25} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$f := \left[\int_{886.25}^{1910.22} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701\right]$$

$$g := \left[\int_{1910.22}^{2687.813} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100\right]$$

$$h := \left[\int_{2687.813}^{4161.74} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280\right]$$

$$i := \left[\int_{4161.74}^{5292.37} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780\right]$$

$$j := \left[\int_{5292.37}^{5731.7} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920\right]$$

**Zone 2 1,1,2-Trichloro-1,2,2-trifluoroethane (F113)**

$$k := \left[ \int_{5731.7}^{6614.12} \sqrt{2.459841813 + -0.26624849 \cdot \ln(x)}\, dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

| | | | |
|---|---|---|---|
| $a = 0.903$ | $d = 4.09$ | $g = 7.536$ | $j = 2.73$ |
| $b = 2.068$ | $e = 2.152$ | $h = 12.318$ | $k = 4.793$ |
| $c = 4.4$ | $f = 11.706$ | $i = 8.303$ | |

$a + b + c + d + e + f + g + h + i + j + k = 60.998$

# Zone 2

Rank 3 Eqn 45 $y^{-1}=a+bx^{1.5}$

$r^2$=0.89853711 DF Adj $r^2$=0.87824453 FitStdErr=0.22891148 Fstat=97.414017

a=0.5221191

b=8.4733941e-05

Rank 3 Eqn 45 $y^{-1}=a+bx^{1.5}$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.8985371053 | 0.8782445263 | 0.2289114757 | 97.414017075 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.522119102 | 0.055438915 | 9.417917003 | 0.400098872 | 0.644139331 |
| b | 8.47339e-05 | 3.51985e-05 | 2.407314453 | 7.26249e-06 | 0.000162205 |

| Date | Time | File Source |
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| Jan 20, 1999 | 3:58:53 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ x = 4900 < MDL

Zone 2 Methylene chloride (DCM)

$$a := \left[ \int_{886.25}^{1910.22} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$b := \left[ \int_{1910.22}^{2687.813} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$c := \left[ \int_{2687.813}^{4161.74} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280 \right]$$

$$d := \left[ \int_{4161.74}^{5292.37} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780 \right]$$

$$e := \left[ \int_{5292.37}^{5731.7} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$f := \left[ \int_{5731.7}^{6614.12} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

$a = 1.788$ $e = 0.099$

$b = 0.635$ $f = 0.162$

$c = 0.69$

$d = 0.339$

$6.562 + a + b + c + d + e + f = 10.275$

Zone 2 Methylene chloride (DCM)

$$a := \left[ \int_{28}^{73} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} \frac{1}{0.522119102 + \left(8.4733941 \cdot 10^{-5}\right) \cdot x^{1.5}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$a = 0.708 \quad d = 1.411$

$b = 1.523 \quad e = 0.551$

$c = 2.37$

$a + b + c + d + e = 6.562$

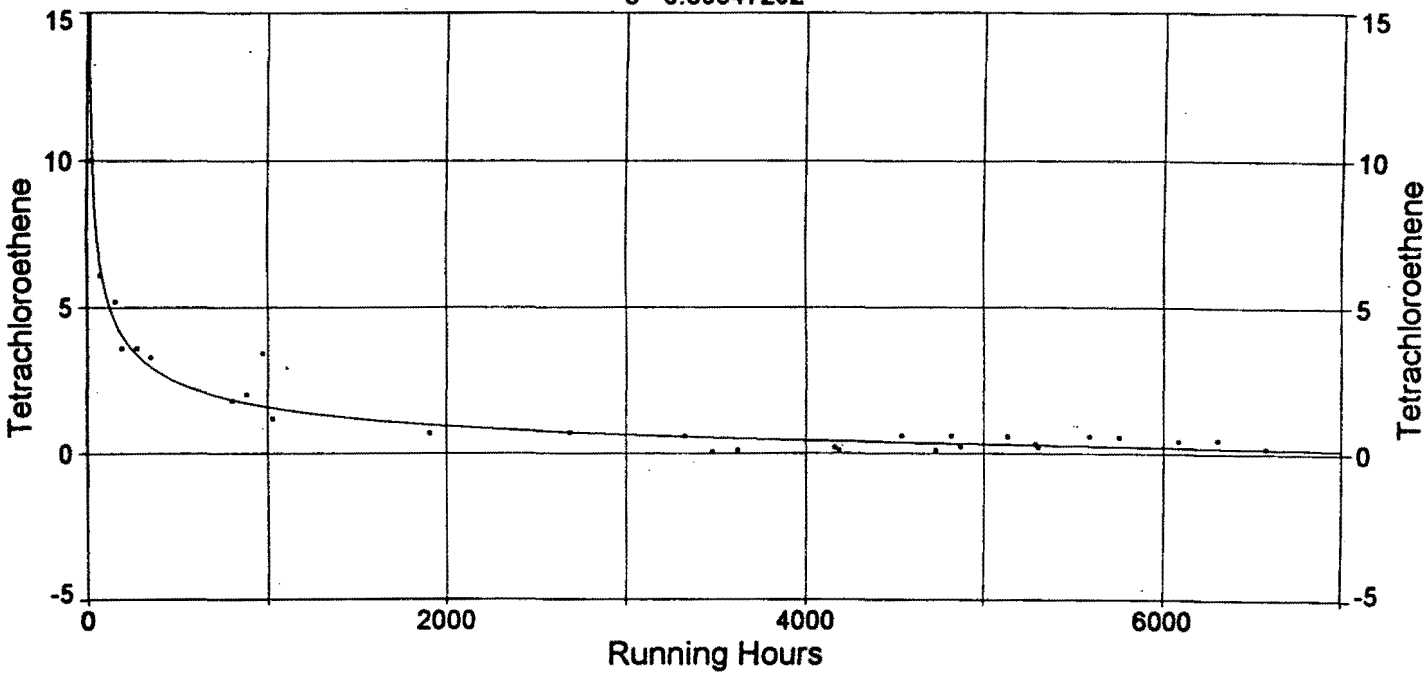
# Zone 2

Rank 1 Eqn 8010 [Power] $y=a+bx^c$

$r^2$=0.9831284 DF Adj $r^2$=0.98101945 FitStdErr=0.31167442 Fstat=728.39003

a=-1.1170832 b=41.08203

c=-0.39347292




Rank 1 Eqn 8010 [Power] $y=a+bx^c$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9831284002 | 0.9810194502 | 0.3116744152 | 728.39002585 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -1.11708320 | 0.308864231 | -3.61674512 | -1.75320099 | -0.48096541 |
| b | 41.08203022 | 4.337877690 | 9.470536780 | 32.14800388 | 50.01605655 |
| c | -0.39347292 | 0.033744401 | -11.6603912 | -0.46297081 | -0.32397502 |

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@ x = 7950 < RL ( 84 ppb)

@ x = 9100 < MDL ( 21 ppb)

Zone 2 Tetrachloroethene (PCE)

$$a := \left[\int_{28}^{73} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{457.75} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{457.75}^{726.25} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$e := \left[\int_{726.25}^{886.25} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$f := \left[\int_{886.25}^{1910.22} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701\right]$$

$$g := \left[\int_{1910.22}^{2687.813} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100\right]$$

$$h := \left[\int_{2687.813}^{4161.74} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280\right]$$

$$i := \left[\int_{4161.74}^{5292.37} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left(\frac{165.83}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780\right]$$

**Zone 2 Tetrachloroethene (PCE)**

$$j := \left[ \int_{5292.37}^{5731.7} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$k := \left[ \int_{5731.7}^{6614.12} -1.11708320 + 41.08203022 \cdot x^{-0.39347292} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

| | | | |
|---|---|---|---|
| $a = 5.248$ | $d = 9.252$ | $g = 8.884$ | $j = 1.591$ |
| $b = 8.497$ | $e = 4.248$ | $h = 11.273$ | $k = 2.397$ |
| $c = 12.845$ | $f = 18.257$ | $i = 5.753$ | |

$a + b + c + d + e + f + g + h + i + j + k = 88.244$

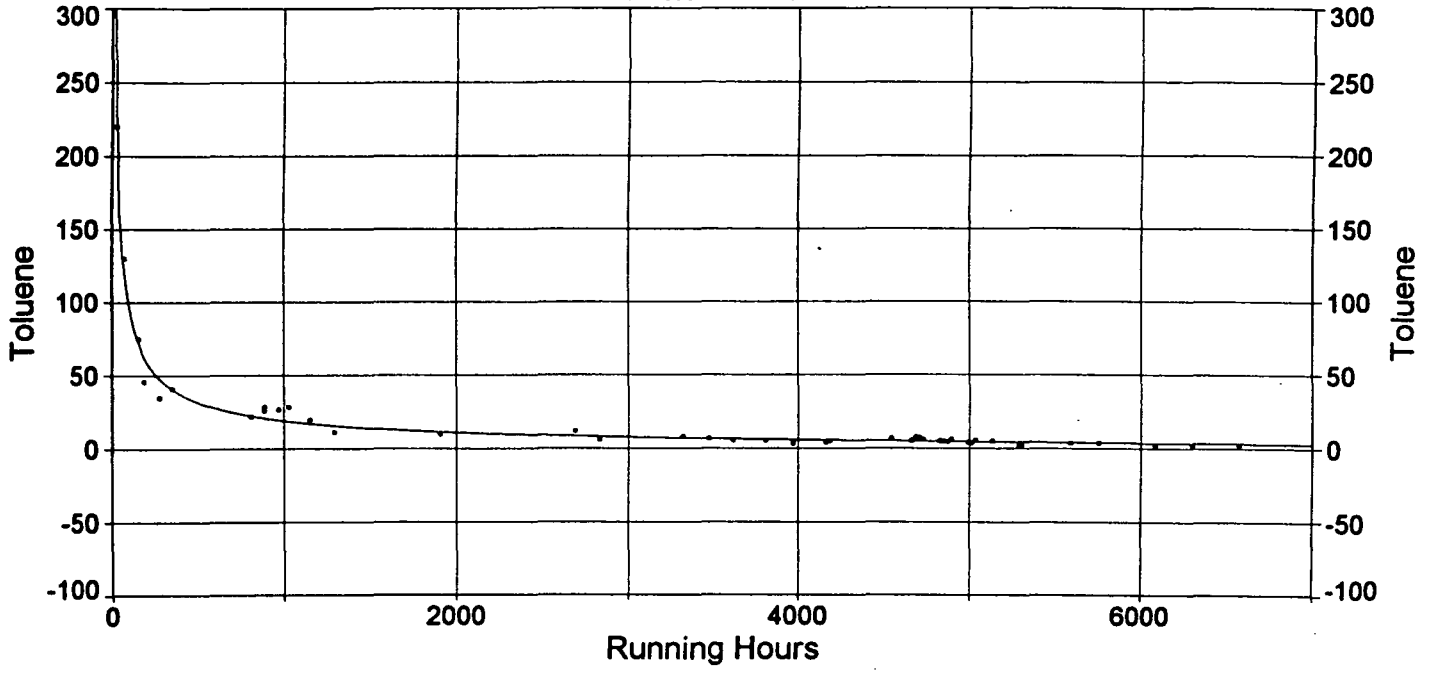
# Zone 2

Rank 1 Eqn 8010 [Power] $y=a+bx^c$

$r^2$=0.98564619 DF Adj $r^2$=0.98454205 FitStdErr=4.7735786 Fstat=1373.3582

a=-3.1371652 b=1939.1211

c=-0.64586343




Rank 1 Eqn 8010 [Power] $y=a+bx^c$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9856461890 | 0.9845420497 | 4.7735785769 | 1373.3581865 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -3.13716523 | 1.670837342 | -1.87760062 | -6.51405346 | 0.239723002 |
| b | 1939.121125 | 184.7256396 | 10.49730362 | 1565.776681 | 2312.465569 |
| c | -0.64586343 | 0.026757684 | -24.1374940 | -0.69994273 | -0.59178414 |

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| Jan 20, 1999 | 4:35:06 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ X = 20150 < RL ( 84 ppb )

@ X = 20750 < MDL ( 21 ppb )

**Zone 2 Toluene**

$$a := \left[\int_{28}^{73} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{457.75} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{457.75}^{726.25} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$e := \left[\int_{726.25}^{886.25} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$f := \left[\int_{886.25}^{1910.22} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701\right]$$

$$g := \left[\int_{1910.22}^{2687.813} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100\right]$$

$$h := \left[\int_{2687.813}^{4161.74} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280\right]$$

$$i := \left[\int_{4161.74}^{5292.37} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780\right]$$

$$j := \left[\int_{5292.37}^{5731.7} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920\right]$$

$$k := \left[\int_{5731.7}^{6614.12} -3.13716523 + 1939.121125 \cdot x^{-0.64586343} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840\right]$$

**Zone 2 Toluene**

| | | | |
|---|---|---|---|
| a = 58.378 | d = 65.807 | g = 58.65 | j = 14.156 |
| b = 78.014 | e = 29.085 | h = 78.837 | k = 24.147 |
| c = 100.459 | f = 120.697 | i = 45.677 | |

a + b + c + d + e + f + g + h + i + j + k = 673.907

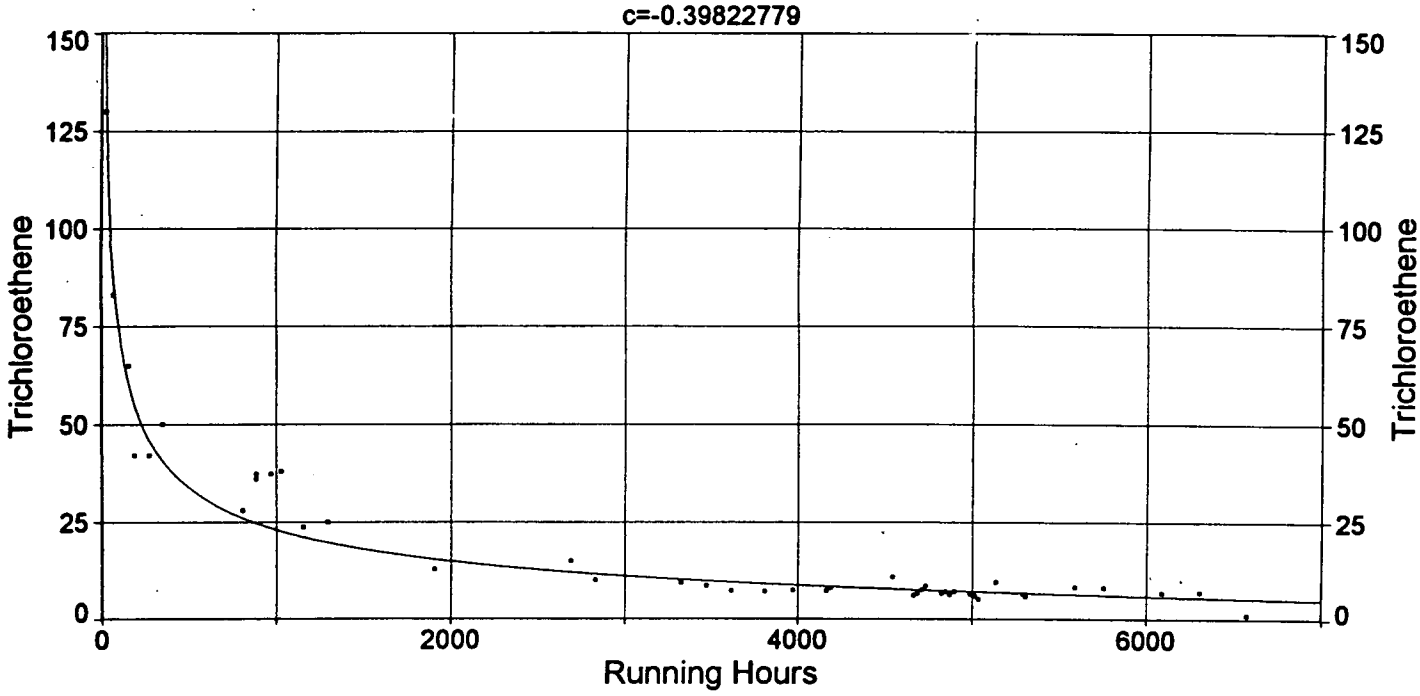
# Zone 2

Rank 2 Eqn 8010 [Power] $y=a+bx^c$

$r^2$=0.9837265 DF Adj $r^2$=0.9822906 FitStdErr=3.3610325 Fstat=1057.8677

a=-10.340583 b=524.0986

c=-0.39822779




Rank 2 Eqn 8010 [Power] $y=a+bx^c$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9837264960 | 0.9822905986 | 3.3610324991 | 1057.8676661 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -10.3405829 | 3.126437246 | -3.30746535 | -16.6875879 | -3.99357783 |
| b | 524.0986026 | 48.02747256 | 10.91247519 | 426.5976498 | 621.5995554 |
| c | -0.39822779 | 0.028937308 | -13.7617431 | -0.45697365 | -0.33948194 |

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@ x = 18750 < RL

@ x = 19050 < MDL

**Zone 2 Trichloroethene**

$$a := \left[\int_{28}^{73} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{457.75} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{457.75}^{726.25} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$e := \left[\int_{726.25}^{886.25} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$f := \left[\int_{886.25}^{1910.22} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701\right]$$

$$g := \left[\int_{1910.22}^{2687.813} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100\right]$$

$$h := \left[\int_{2687.813}^{4161.74} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280\right]$$

$$i := \left[\int_{4161.74}^{5292.37} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780\right]$$

$$j := \left[\int_{5292.37}^{5731.7} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920\right]$$

$$k := \left[\int_{5731.7}^{6614.12} -10.3405829 + 524.0986026 \cdot x^{-0.39822779} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840\right]$$

**Zone 2 Trichloroethene**

| | | | |
|---|---|---|---|
| $a = 54.016$ | $d = 102.179$ | $g = 114.937$ | $j = 31.106$ |
| $b = 88.756$ | $e = 47.936$ | $h = 163.312$ | $k = 53.598$ |
| $c = 137.651$ | $f = 216.787$ | $i = 98.679$ | |

$$a + b + c + d + e + f + g + h + i + j + k = 1.109 \cdot 10^{3}$$

# Zone 2

Rank 2 Eqn 8157 [Exponential_] y=aexp(-x/b)

$r^2$=0.94199332 DF Adj $r^2$=0.92265776 FitStdErr=0.16684952 Fstat=113.67575

a=1.8741213

b=347.97141

Rank 2 Eqn 8157 [Exponential_] y=aexp(-x/b)

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9419933180 | 0.9226577573 | 0.1668495192 | 113.67575239 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 1.874121288 | 0.154419090 | 12.13659071 | 1.508978165 | 2.239264412 |
| b | 347.9714072 | 61.14169636 | 5.691229192 | 203.3942694 | 492.5485449 |

| Date | Time | File Source |
|---|---|---|
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@ x = 1626 < MDL

**Zone 2 Trichlorofluoromethane**

$$a := \left[ \int_{28}^{73} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$a = 0.906$

$b = 1.821$

$c = 2.551$

$d = 1.212$

$e = 0.36$

$a + b + c + d + e = 6.85$

**Zone 2 Trichlorofluoromethane**

$$a := \left[ \int_{886.25}^{1910.22} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$b := \left[ \int_{1910.22}^{2687.813} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$c := \left[ \int_{2687.813}^{6614.12} 1.874121288 \cdot e^{\frac{-x}{347.9714072}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32205 \right]$$

$a = 0.558$

$b = 0.027$

$c = 3.273 \cdot 10^{-3}$

$6.85 + a + b + c = 7.438$

$a + b + c + d + e =$

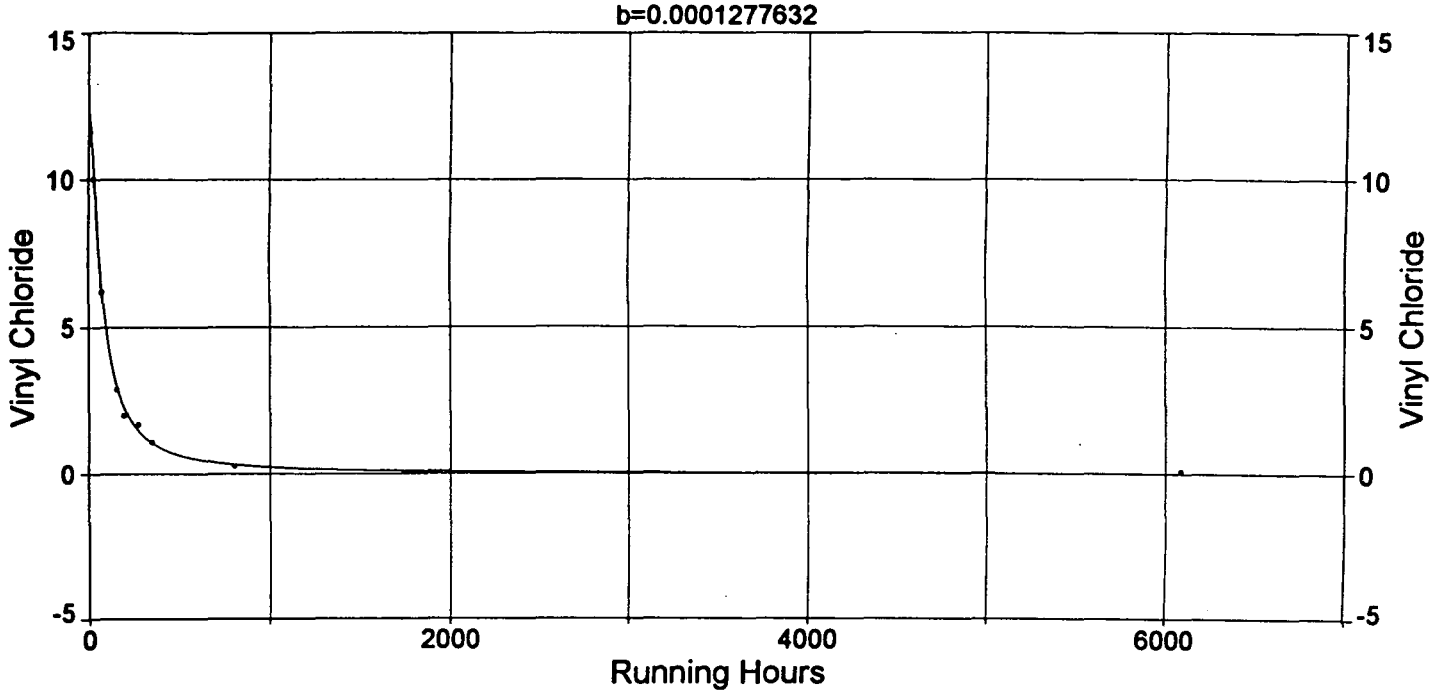
# Zone 2

Rank 1 Eqn 45 $y^{-1}=a+bx^{1.5}$

$r^2$=0.99730667 DF Adj $r^2$=0.99622934 FitStdErr=0.19115744 Fstat=2221.7283

a=0.081283936

b=0.0001277632




Rank 1 Eqn 45 $y^{-1}=a+bx^{1.5}$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9973066733 | 0.9962293427 | 0.1911574356 | 2221.7282908 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.081283936 | 0.002325027 | 34.96043286 | 0.075594801 | 0.086973071 |
| b | 0.000127763 | 6.5959e-06 | 19.37009364 | 0.000111624 | 0.000143903 |

| Date | Time | File Source |
|---|---|---|
| Jan 20, 1999 | 3:42:36 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ x = 3818 VC < MDL

**Zone 2 Vinyl Chloride**

$$a := \left[ \int_{28}^{73} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$f := \left[ \int_{886.25}^{1910.22} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$g := \left[ \int_{1910.22}^{2687.813} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$h := \left[ \int_{2687.813}^{4161.74} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280 \right]$$

$$i := \left[ \int_{4161.74}^{5292.37} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780 \right]$$

Zone 2 Vinyl Chloride

$$j := \left[ \int_{5292.37}^{5731.7} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$k := \left[ \int_{5731.7}^{6614.12} \frac{1}{0.081283936 + 0.000127763 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

| | | |
|---|---|---|
| $a = 2.005$ | $f = 0.86$ | $k = 0.07$ |
| $b = 2.458$ | $g = 0.286$ | |
| $c = 2.013$ | $h = 0.304$ | |
| $d = 0.838$ | $i = 0.148$ | |
| $e = 0.292$ | $j = 0.043$ | |

$a + b + c + d + e + f + g + h + i + j + k = 9.316$

# Zone 2

Rank 1 Eqn 43 $y^{-1}=a+bx$

$r^2$=0.98930182 DF Adj $r^2$=0.98751879 FitStdErr=0.23537247 Fstat=1202.1598

a=0.10120779

b=0.001208128

Rank 1 Eqn 43 $y^{-1}=a+bx$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9893018190 | 0.9875187888 | 0.2353724724 | 1202.1598439 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | 0.101207789 | 0.005392646 | 18.76774131 | 0.089557685 | 0.112857893 |
| b | 0.001208128 | 8.48191e-05 | 14.24358786 | 0.001024888 | 0.001391368 |

| Date | Time | File Source |
|---|---|---|
| Jan 20, 1999 | 4:45:30 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ x = 9800 < RL (84 ppb)

@ x = 34450 < MDL (24 ppb)

**Zone 2 Xylenes (total)**

$$a := \left[\int_{28}^{73} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{457.75} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{457.75}^{726.25} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$e := \left[\int_{726.25}^{886.25} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$f := \left[\int_{886.25}^{1910.22} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701\right]$$

$$g := \left[\int_{1910.22}^{2687.813} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100\right]$$

$$h := \left[\int_{2687.813}^{4161.74} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280\right]$$

$$i := \left[\int_{4161.74}^{5292.37} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780\right]$$

$$j := \left[\int_{5292.37}^{5731.7} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920\right]$$

$$k := \left[\int_{5731.7}^{6614.12} \frac{1}{0.101207789 + 0.001208128 \cdot x} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840\right]$$

| | | | |
|---|---|---|---|
| a = 2.668 | d = 3.295 | g = 2.367 | j = 0.561 |
| b = 4.267 | e = 1.38 | h = 3.082 | k = 0.976 |
| c = 5.451 | f = 5.276 | i = 1.786 | |

a + b + c + d + e + f + g + h + i + j + k = 31.11

# Zone 2

Rank 5 Eqn 77 $y^{0.5}=a+b/lnx$

$r^2$=0.93352659 DF Adj $r^2$=0.88921098 FitStdErr=0.057917499 Fstat=56.174436

a=-0.57395478

b=6.3033822

Rank 5 Eqn 77 $y^{0.5}=a+b/lnx$

| $r^2$ Coef Det | DF Adj $r^2$ | Fit Std Err | F-value |
|---|---|---|---|
| 0.9335265890 | 0.8892109816 | 0.0579174987 | 56.174435743 |

| Parm | Value | Std Error | t-value | 95% Confidence Limits | |
|---|---|---|---|---|---|
| a | -0.57395478 | 0.479226664 | -1.19766870 | -1.90450130 | 0.756591750 |
| b | 6.303382195 | 2.577078480 | 2.445941109 | -0.85173473 | 13.45849912 |

| Date | Time | File Source |
|---|---|---|
| Jan 20, 1999 | 4:02:56 PM | C:\TCWIN4\CLIPBRD.WK1 |

@ X = 6450 <MDL

**Zone 2 trans-1,2-Dichloroethene**

$$a := \left[ \int_{28}^{73} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{457.75} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{457.75}^{726.25} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$e := \left[ \int_{726.25}^{886.25} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$f := \left[ \int_{886.25}^{1910.22} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32701 \right]$$

$$g := \left[ \int_{1910.22}^{2687.813} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32100 \right]$$

$$h := \left[ \int_{2687.813}^{4161.74} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32280 \right]$$

$$i := \left[ \int_{4161.74}^{5292.37} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33780 \right]$$

**Zone 2 trans-1,2-Dichloroethene**

$$j := \left[ \int_{5292.37}^{5731.7} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 31920 \right]$$

$$k := \left[ \int_{5731.7}^{6614.12} \sqrt{-0.57395478 + \frac{6.303382195}{\ln(x)}}\, dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 30840 \right]$$

| | | | |
|---|---|---|---|
| $a = 0.402$ | $d = 1.561$ | $g = 3.026$ | $j = 1.376$ |
| $b = 0.845$ | $e = 0.82$ | $h = 5.273$ | $k = 2.589$ |
| $c = 1.709$ | $f = 4.525$ | $i = 3.904$ | |

$a + b + c + d + e + f + g + h + i + j + k = 26.031$

# DETERMINATION OF THE OU1 SOIL VAPOR EXTRACTION SYSTEM EFFLUENT VOC CONCENTRATION

## 1.0 INTRODUCTION

The OU 1 Soil Vapor Extraction System (SVE) has been in continuous operation since December, 1997. The system operates by inducing a vacuum in the subsurface which in turn causes airflow towards the vacuum extraction wells. Subsurface contaminants sorbed to sediments will partition into the vapor phase and be swept towards the vacuum extraction wells. The vacuum extraction wells are connected via a common header that runs through a granular activated carbon bed. Vapor phase contaminants partition (sorb) back onto the carbon and are captured prior to venting the effluent to the atmosphere. The carbon beds have a variable efficiency rate that is a function of temperature, moisture content and type of contaminant. The efficiency of the Mound OU1 SVE carbon beds has been estimated based on 6 months of operational data during which the carbon has been recharged on three occasions, (the carbon beds must be recharged each time there is an indication that they have become saturated with VOCs).

Mound has monitored the concentration of the SVE influent using two measurement techniques. In the early stages of operation, Suma canisters were utilized exclusively. A Suma canister is an evacuated vessel that is fitted into the SVE system influent header and allowed to infill to atmospheric pressure. The canister is sealed and delivered to an offsite lab for gas chromatograph (gc) analysis. In late January, an online gas chromatograph system was installed. This system allows "real time" analysis off system influent gas. There have been some operational difficulties with the online GC system, and to this date, suma canisters continue to be periodically utilized to verify contaminant concentrations.

The system was brought online 12/17/97. During the first month of operation, the inline GC system was not available to monitor the system influent. As a result only Suma canister data was obtained. Initial analytical results from the Suma canisters were not received until several weeks of continuous SVE operation has occurred. The initial Suma canisters revealed that the system influent VOC concentrations were considerably higher than anticipated. As a result, the carbon beds had become saturated with VOCs and the efficiency essentially reduced to zero. During this time frame influent VOCs were vented to the atmosphere without any concentration reduction. This paper provides an estimate of the total mass of VOCs vented to the atmosphere during this period of time.

## 2.0 METHODOLOGY

Based upon summa canister analytical results, plots showing contaminant concentration over time can be constructed. Figure 1 shows an example plot for toluene from Zone 2. Mathematical equations can be generated to fit the data. These mathematical expressions can then be integrated over time to give an estimate of the mass of contaminant removed. In this manner, the mass of each contaminant can be estimated, and a total mass of VOCs removed can be determined.

The carbon efficiency has been estimated utilizing total mass removed estimates in between carbon changeouts. The system utilizes two activated carbon beds in series. Each bed is hooked in line to the system GC. This allows influent to be monitored after it exits each individual bed. This configuration allows the system operator to monitor the individual carbon beds for contaminant breakthrough (e.g. saturation). When breakthrough occurs on the second bed, it is time to recharge the carbon. Knowing the

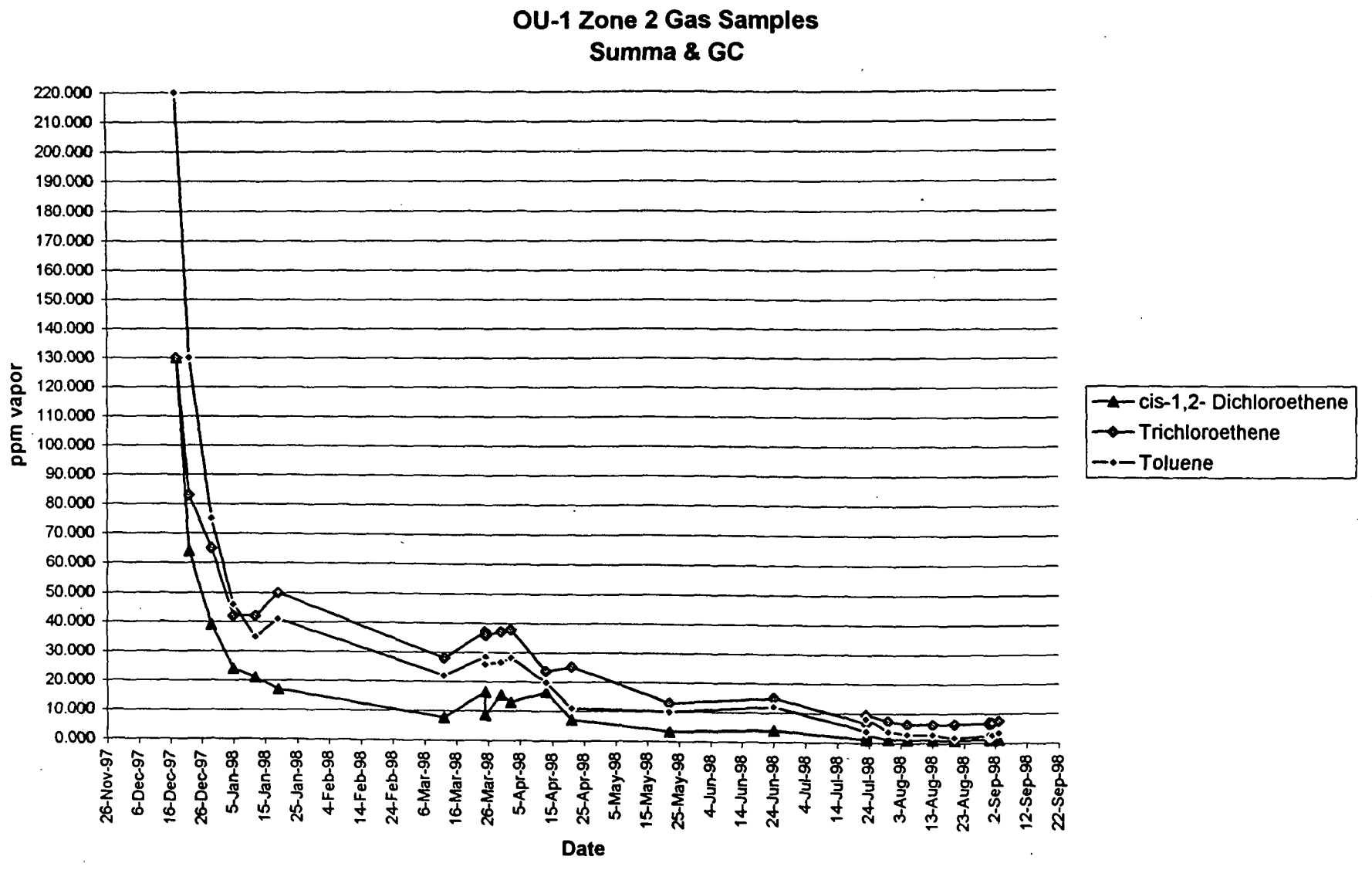
total mass removed from the system between changeouts allows an estimation of the total mass of contaminants captured by the carbon (i.e. carbon efficiency). Based on data from three carbon changeouts the carbon efficiency is estimated to be approximately 8 %. Therefore given the 4000 pound capacity of the two carbon beds, approximately 300 pounds of VOCs can be captured before the beds are saturated.

Based on the analysis described above it is possible to calculate an estimate of the VOC mass that was vented to the atmosphere during the time frame 12/17/97 through 2/4/98.

It is estimated, based on the methodology described above, that approximately 900 pounds of VOCs were removed from the subsurface via the SVE during the time period 12/17/97 through 2/4/98. As noted above, the 4000 pounds of activated carbon could capture approximately 300 pounds of those VOCs. This results in approximately 600 pounds of VOCs being vented to the atmosphere during this time frame. This equates to an average of approximately 14 pounds of VOCs released to the atmosphere per day.

## 3.0 CURRENT SYSTEM STATUS

The online GC is currently being utilized to provide an indication of contaminant breakthrough on the carbon beds. In this manner, at the first sign of contaminant breakthrough, a carbon changeout can be immediately scheduled. As a result, it is not anticipated that the system will yield VOC effluent concentrations in excess of the 10 pound per day RAPCA standard. Recent results indicate that the total VOC mass removed from the system is less than 10 pounds per day. As remediation continues it is anticipated that the carbon beds will no longer be required and can be removed from the system.


OU-1 Zone 2 Gas Samples
Summa & GC
ppm vapor
220.000
210.000
200.000
190.000
180.000
170.000
160.000
150.000
140.000
130.000
120.000
110.000
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
26-Nov-97
6-Dec-97
16-Dec-97
26-Dec-97
5-Jan-98
15-Jan-98
25-Jan-98
4-Feb-98
14-Feb-98
24-Feb-98
6-Mar-98
16-Mar-98
26-Mar-98
5-Apr-98
15-Apr-98
25-Apr-98
5-May-98
15-May-98
25-May-98
4-Jun-98
14-Jun-98
24-Jun-98
4-Jul-98
14-Jul-98
24-Jul-98
3-Aug-98
13-Aug-98
23-Aug-98
2-Sep-98
12-Sep-98
22-Sep-98
Date
cis-1,2- Dichloroethene
Trichloroethene
Toluene

Zone 2: $\int_{351}^{457.75}$ @ 35880 $\int_{457.75}^{523.75}$ @ 36540

12/18/97 → 1/19/98

Carbon 4000 lbs

Kelchner Mass Removal = 700.114 lbs - 289.65 = 410.6

410.64 lbs VOCs Stacked From Approx 12/25/97 @ 01:00 Am to 1/19/98 @ 1200 noon (Avg Z1+Z2) (26 days)

NOON 1/19/98 → 2/4/98 12:00 pm (Noon)

Mound Mass Removal = 186 lbs - 0 (carbon Sat)

186 lbs VOCs Stacked from 1/19/98 to 2/4/98 (16 days)

TOTAL VOCs Stacked = 596.64 lbs

1/19/98 Zone1 333.5
Zone2 351

| | | | | |
|---|---|---|---|---|
| Carbon Change on 2/12/98. | $T_0$ | | Zone1 | 496 |
| | | | Zone2 | 523.75 |
| Carbon Change on 3/23/98 | $T_1$ | Run time | Zone1 | 859.75 |
| | | | Zone2 | 887.75 |
| " " " 4/28/98 | $T_2$ | Run time | Zone1 | 1036.5 |
| | | | Zone2 | 1423.75 |
| " " " 5/21/98 | $T_3$ | Run time | Zone1 | 1088.5 |
| | | | Zone2 | 1892.22 |

Zone 1: $\int_{496}^{859.75}$ $\int_{859.75}^{1036.5}$ $\int_{1036.5}^{1088.5}$

563.75

Zone2: $\int_{523.75}^{887.75}$ $\int_{887.75}^{1423.75}$ $\int_{1423.75}^{1892.22}$

| | 3/23-4/28 | 4/28-5/21 |
|---|---|---|
| Zone 1 | 545 | 543 |
| Zone 2 | 548 | 541 scfm |

Zone1 $\int_{496}^{692.25}$ @ 35280, $\int_{692.25}^{859.75}$ @ 33300, $\int_{859.75}^{1036.5}$ @ 32700

$\int_{1036.5}^{1088.5}$ @ 32580

---

Zone 2 $\int_{523.75}^{726.25}$ @ 36540, $\int_{726.25}^{887.75}$ @ 31200, $\int_{887.75}^{1423.75}$ @ 32880

$\int_{1423.75}^{1892.22}$ @ 32460

Calculated
BreakThrough
12/24/98 @ 1400 hrs

3/5
4/29
5-29

~~541 = X~~
~~540 Dev 8~~

Calculation of Carbon eff.

**Zone 2 Benzene**

$$a := \left[\int_{523.75}^{726.25} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$b := \left[\int_{726.25}^{887.75} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$c := \left[\int_{887.75}^{1423.75} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880\right]$$

$$d := \left[\int_{1423.75}^{1892.22} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460\right]$$

Escape
AS of 1/19/98

682.43
− 289.65
392.78

$Z_1$ run $\Delta T$ 333.5 hrs
$Z_2$ run $\Delta T$ 351 hrs

2/4/98
$Z_1$ run $\Delta T$ =
$Z_2$ run $\Delta T$ =

a = 0.416

b + a = 0.63

c = 0.388

d = 0.16

Z1 Contribution

CT 1 = 274.059

CT 2 = 288.835

CT 3 = 209.643

TOTAL: CT1 = 287.49
CT2 = 291.815
CT3 = ~~210.343~~ Premature

$\overline{X}$ = 289.65 lbs (rounded 290)

**Zone 2 cis-1,2-Dichloroethene**

$$a := \left[ \int_{523.75}^{726.25} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 18.783$

$b + a = 29.71$

$c = 24.659$

$d = 14.25$

**Zone 2 Chloroform**

$$a := \left[ \int_{523.75}^{726.25} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\, dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\, dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\, dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\, dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 1.822$

$b + a = 3.132$

$c = 3.937$

$d = 3.155$

**Zone 2 Ethylbenzene**

$$a := \left[ \int_{523.75}^{726.25} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 0.134$

$b + a = 0.187$

$c = 0.064$

$d = 0.014$

Zone 2 1,1,2-Trichloro-1,2,2-trifluoroethane

$$a := \left[ \int_{523.75}^{726.25} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left( \frac{187.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left( \frac{187.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left( \frac{187.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left( \frac{187.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 1.768$

$b + a = 2.78$

$c = 1.973$

$d = 0.642$

**Zone 2 Methylene chloride**

$$a := \left[ \int_{523.75}^{726.25} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 0.462$

$b + a = 0.812$

$c = 1.124$

$d = 0.974$

**Zone 2 Tetrachloroethene**

$$a := \left[ \int_{523.75}^{726.25} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 7.283$

$b + a = 11.981$

$c = 12.089$

$d = 8.048$

**Zone 2 Toluene**

$$a := \left[ \int_{523.75}^{726.25} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 44.809$

$b + a = 71.809$

$c = 64.559$

$d = 40.677$

**Zone 2 Trichloroethene**

$$a := \left[\int_{523.75}^{726.25} 17.82523545 + 838.9909405 \cdot x^{-0.60242103}\, dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$$b := \left[\int_{726.25}^{887.75} 17.82523545 + 838.9909405 \cdot x^{-0.60242103}\, dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200\right]$$

$$c := \left[\int_{887.75}^{1423.75} 17.82523545 + 838.9909405 \cdot x^{-0.60242103}\, dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880\right]$$

$$d := \left[\int_{1423.75}^{1892.22} 17.82523545 + 838.9909405 \cdot x^{-0.60242103}\, dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460\right]$$

$a = 87.337$

$b + a = 147.859$

$c = 176.514$

$d = 140.001$

**Zone 2 Trichlorofluoromethane**

$$a := \left[ \int_{523.75}^{726.25} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{41423.75}^{1892.22} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 0.823$

$b + a = 1.185$

$c = 0.463$

$d = -0.032$

**Zone 2 Vinyl Chloride**

$$a := \left[ \int_{523.75}^{726.25} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 0.564$

$b + a = 0.851$

$c = 0.556$

$d = 0.275$

**Zone 2 Xylenes (total)**

$$a := \left[ \int_{523.75}^{726.25} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$$b := \left[ \int_{726.25}^{887.75} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34200 \right]$$

$$c := \left[ \int_{887.75}^{1423.75} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32880 \right]$$

$$d := \left[ \int_{1423.75}^{1892.22} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32460 \right]$$

$a = 1.99$

$b + a = 3.123$

$c = 2.509$

$d = 1.447$

Calculation of Carbon eff.

**Zone 1 2-Butanone**

$$a := \left[\int_{496}^{692.25} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$$b := \left[\int_{692.25}^{859.75} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$c := \left[\int_{859.75}^{1036.5} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$d := \left[\int_{1036.5}^{1088.5} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580\right]$$

$a = 0.143$

$b + a = 0.193$

$c = 0.011$

$d = -2.977 \cdot 10^{-3}$

Z1 Contribution:

Carbon # 1 = 13.43 lbs

Carbon # 2 = 2.98 lbs

Carbon # 3 = 0.70 lbs

**Zone 1 Acetone**

$$a := \left[ \int_{496}^{692.25} -1.8230566 + \frac{13.082129}{\ln(x)} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right] \qquad a = 0.233$$

$$b := \left[ \int_{692.25}^{859.75} -1.8230566 + \frac{13.082129}{\ln(x)} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right] \qquad b = 0.119$$

$$a + b = 0.351$$

$$c := \left[ \int_{859.75}^{1036.5} -1.8230566 + \frac{13.082129}{\ln(x)} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right] \qquad c = 0.074$$

$$d := \left[ \int_{1036.5}^{1088.5} -1.8230566 + \frac{13.082129}{\ln(x)} dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right] \qquad d = 0.014$$

**Zone 1 Benzene**

$$a := \left[ \int_{496}^{692.25} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left( \frac{78.12}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 0.014$

$b + a = 0.021$

$c = 5.612 \cdot 10^{-3}$

$d = 1.381 \cdot 10^{-3}$

**Zone 1 cis-1,2-Dichloroethene**

$$a := \left[ \int_{496}^{692.25} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 1.444$

$b + a = 2.298$

$c = 0.704$

$d = 0.181$

Zone 1 Chloroform

$$a := \left[ \int_{496}^{692.25} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left( \frac{119.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.5}^{859.75} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left( \frac{119.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left( \frac{119.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left( \frac{119.38}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 0.077$

$b + a = 0.133$

$c = 0.054$

$d = 0.015$

**Zone 1 Ethylbenzene**

$$a := \left[ \int_{496}^{692.25} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 9.832 \cdot 10^{-4}$

$b + a = 9.915 \cdot 10^{-4}$

$c = 2.577 \cdot 10^{-8}$

$d = 7.743 \cdot 10^{-12}$

**Zone 1 1,1,2-Trichloro-1,2,2-trifluoroethane**

$$a := \left[ \int_{496}^{692.25} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 a = 0.121 \right]$$

$$b := \left[ \int_{692.25}^{859.75} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 b + a = 0.206 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 c = 0.08 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left( \frac{138.37}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 d = 0.022 \right]$$

**Zone 1 Methylene chloride**

$$a := \left[ \int_{496}^{692.25} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{84.93}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right] \quad a = 3.307 \cdot 10^{-4}$$

$$b := \left[ \int_{692.25}^{859.75} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{84.93}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right] \quad b + a = 3.32 \cdot 10^{-4}$$

**Zone 1 Tetrachloroethene**

$$a := \left[ \int_{496}^{692.25} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 2.909$

$b + a = 4.112$

$c = 0.668$

$d = 0.127$

Zone 1 Toluene

$$a := \left[ \int_{496}^{692.25} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 1.71$

$b + a = 2.132$

$c = 0.146$

$d = 0.02$

**Zone 1 Trichloroethene**

$$a := \left[ \int_{496}^{692.25} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$d := \left[ \int_{1036.5}^{1088.5} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right]$$

$a = 2.35$

$b + a = 3.754$

$c = 1.164$

$d = 0.3$

**Zone 1 Vinyl Chloride**

$$a := \left[ \int_{496}^{692.25} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right] = 0.137$$

$$b := \left[ \int_{692.25}^{859.75} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right] - a = 0.221$$

$$c := \left[ \int_{859.75}^{1036.5} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right] = 0.071$$

$$d := \left[ \int_{1036.5}^{1088.5} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32580 \right] = 0.019$$

**Zone 1 Xylenes (total)**

$$a := \left[ \int_{496}^{692.25} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$$b := \left[ \int_{692.25}^{859.75} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$c := \left[ \int_{859.75}^{1036.5} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$a = 8.702 \cdot 10^{-3}$

$b + a = 9.11 \cdot 10^{-3}$

$c = 1.61 \cdot 10^{-5}$

**Zone 2 Benzene**

$$a := \left[\int_{28}^{73} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{351} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{351}^{457.75} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$e := \left[\int_{457.75}^{523.75} e^{1.399775301 + -0.10703637 \cdot x^{0.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$a = 0.605$

$b = 0.968$

$c = 0.81$

$d = 0.361$

$e = 0.182$

$a + b + c = 2.383$ $\qquad$ $d + e = 0.543$

Zone 2 Kelchner = 595.76

Zone 2 Mound = 171.679

**Zone 2 cis-1,2-Dichloroethene**

$$a := \left[ \int_{28}^{73} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{351} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{351}^{457.75} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$e := \left[ \int_{457.75}^{523.75} -1.16651169 + 1103.430932 \cdot \frac{\ln(x)}{x} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$a = 34.603$

$b = 41.323$

$c = 31.412$

$d = 14.46$

$e = 7.614$

$a + b + c = 107.339$ $\qquad$ $d + e = 22.074$

**Zone 2 Chloroform**

$$a := \left[\int_{28}^{73} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\,dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\,dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{351} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\,dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{351}^{457.75} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\,dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$e := \left[\int_{457.75}^{523.75} \sqrt{\left[1.237718055 + -0.01406703 \cdot (\ln(x))^2\right]}\,dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$a = 0.488$

$b = 1.16$

$c = 1.56$

$d = 0.996$

$e = 0.613$

$a + b + c = 3.208$ $\qquad$ $d + e = 1.609$

**Zone 2 Ethylbenzene**

$$a := \left[\int_{28}^{73} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{351} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{351}^{457.75} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$e := \left[\int_{457.75}^{523.75} e^{\left(0.707997432 + -0.021366877 \cdot x^{0.5} \cdot \ln(x)\right)} dx \cdot \left(\frac{106.17}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$a = 0.486$

$b = 0.687$

$c = 0.454$

$d = 0.161$

$e = 0.071$

$a + b + c = 1.627$ $\qquad$ $d + e = 0.232$

**Zone 2 1,1,2-Trichloro-1,2,2-trifluoroethane**

$$a := \left[\int_{28}^{73} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{351} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{351}^{457.75} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$e := \left[\int_{457.75}^{523.75} -1.88949218 + 8.311038202 \cdot x^{-0.19375033} dx \cdot \left(\frac{187.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$a = 1.536$

$b = 2.61$

$c = 2.542$

$d = 1.298$

$e = 0.706$

$a + b + c = 6.688$ $\qquad$ $d + e = 2.004$

**Zone 2 Methylene chloride**

$$a := \left[ \int_{28}^{73} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{351} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{351}^{457.75} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$e := \left[ \int_{457.75}^{523.75} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left(\frac{96.94}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$a = 0.019$

$b = 0.15$

$c = 0.317$

$d = 0.23$

$e = 0.148$

$a + b + c = 0.486$ $\qquad$ $d + e = 0.378$

**Zone 2 trans-1,2-Dichloroethene**

$$b := \left[ \int_{156}^{191} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{275.75} \frac{1}{3.839087580 + \frac{43624.5278}{x^2}} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$b = 0.055$

$c = 0.161$

$b + c = 0.217$

**Zone 2 Tetrachloroethene**

$$a := \left[ \int_{28}^{73} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{351} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{351}^{457.75} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$e := \left[ \int_{457.75}^{523.75} -5.83473929 + \frac{52.51059357}{\ln(x)} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$a = 5.186$

$b = 8.522$

$c = 8.667$

$d = 4.725$

$e = 2.692$

$a + b + c = 22.375$ $\qquad$ $d + e = 7.417$

**Zone 2 Toluene**

$$a := \left[ \int_{28}^{73} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{351} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{351}^{457.75} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$e := \left[ \int_{457.75}^{523.75} \frac{1}{\left(0.0012693276 + 0.00038885636 \cdot \frac{x}{\ln(x)}\right)} dx \cdot \left(\frac{92.15}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$a = 60.985$

$b = 83.103$

$c = 68.443$

$d = 32.875$

$e = 17.677$

$a + b + c = 212.531$ $\qquad$ $d + e = 50.552$

**Zone 2 Trichloroethene**

$$a := \left[\int_{28}^{73} 17.82523545 + 838.9909405 \cdot x^{-0.60242103} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} 17.82523545 + 838.9909405 \cdot x^{-0.60242103} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{351} 17.82523545 + 838.9909405 \cdot x^{-0.60242103} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{351}^{457.75} 17.82523545 + 838.9909405 \cdot x^{-0.60242103} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$e := \left[\int_{457.75}^{523.75} 17.82523545 + 838.9909405 \cdot x^{-0.60242103} dx \cdot \left(\frac{131.39}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$a = 52.861$

$b = 85.445$

$c = 90.253$

$d = 51.871$

$e = 30.615$

$a + b + c = 228.559$ $\qquad$ $d + e = 82.486$

**Zone 2 Trichlorofluoromethane**

$$a := \left[\int_{28}^{73} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220\right]$$

$$b := \left[\int_{73}^{191} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960\right]$$

$$c := \left[\int_{191}^{351} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$d := \left[\int_{351}^{457.75} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880\right]$$

$$e := \left[\int_{457.75}^{523.75} 1.874121293 \cdot e^{\frac{-x}{347.9714049}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540\right]$$

$a = 0.906$

$b = 1.821$

$c = 1.756$

$d = 0.795$

$e = 0.39$

$a + b + c = 4.483$ $\qquad$ $d + e = 1.184$

Zone 2 Vinyl Chloride

$$a := \left[ \int_{28}^{73} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{351} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{351}^{457.75} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$e := \left[ \int_{457.75}^{523.75} \frac{1}{0.080614568 + 0.00013070947 \cdot x^{1.5}} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$a = 2$

$b = 2.428$

$c = 1.436$

$d = 0.538$

$e = 0.256$

$a + b + c = 5.864$ $\qquad$ $d + e = 0.795$

**Zone 2 Xylenes (total)**

$$a := \left[ \int_{28}^{73} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35220 \right]$$

$$b := \left[ \int_{73}^{191} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33960 \right]$$

$$c := \left[ \int_{191}^{351} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$d := \left[ \int_{351}^{457.75} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35880 \right]$$

$$e := \left[ \int_{457.75}^{523.75} \frac{1}{(0.114854791 + 0.00022368488 \cdot x \cdot \ln(x))} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 36540 \right]$$

$a = 2.709$

$b = 4.298$

$c = 3.49$

$d = 1.583$

$e = 0.822$

$a + b + c = 10.497$ $\qquad$ $d + e = 2.405$

Mass Removal :o 2/4/9

a+b+c = Kelchner

d+e = Mound

**Zone 1 2-Butanone**

$$a := \left[\int_{13}^{56.5} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{333.5} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{333.5}^{434} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$e := \left[\int_{434}^{500} -0.22468315 + 43.083008 \cdot x^{-0.7605534}\,dx \cdot \left(\frac{72.11}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$a = 0.821$

$b = 0.714$

$c = 0.425$

$d = 0.15$

$e = 0.076$

$a + b + c = 1.96$

$d + e = 0.226$

Zone 1 Kelchner = 104.354

Zone 1 Mound = 14.321

**Zone 1 Acetone**

$$a := \left[\int_{13}^{56.5} -1.8230566 + \frac{13.082129}{\ln(x)}dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right] \qquad a = 0.441$$

$$b := \left[\int_{56.5}^{172.5} -1.8230566 + \frac{13.082129}{\ln(x)}dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right] \qquad b = 0.548$$

$$c := \left[\int_{172.5}^{333.5} -1.8230566 + \frac{13.082129}{\ln(x)}dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad c = 0.438$$

$$d := \left[\int_{333.5}^{434} -1.8230566 + \frac{13.082129}{\ln(x)}dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad d = 0.187$$

$$e := \left[\int_{434}^{500} -1.8230566 + \frac{13.082129}{\ln(x)}dx \cdot \left(\frac{58.08}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right] \qquad e = 0.105$$

$a + b + c = 1.427$

$d + e = 0.292$

**Zone 1 Benzene**

$$a := \left[\int_{13}^{56.5} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{333.5} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{333.5}^{434} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$e := \left[\int_{434}^{500} \frac{1}{1.3979982 + 0.0070126445 \cdot x^{1.5}} dx \cdot \left(\frac{78.12}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$a = 0.11$

$b = 0.085$

$c = 0.038$

$d = 0.012$

$e = 6.442 \cdot 10^{-3}$

$a + b + c = 0.234$

$d + e = 0.019$

**Zone 1 cis-1,2-Dichloroethene**

$$a := \left[ \int_{13}^{56.5} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} \frac{1}{0.019960753 + 0.00031028326 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{96.94}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a = 6.883$

$b = 5.507$

$c = 3.039$

$d = 1.143$

$e = 0.633$

$a + b + c = 15.429$

$d + e = 1.776$

**Zone 1 Chloroform**

$$a := \left[\int_{13}^{56.5} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right]$$

$$b := \left[\int_{56.5}^{172.5} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right]$$

$$c := \left[\int_{172.5}^{333.5} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$d := \left[\int_{333.5}^{434} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right]$$

$$e := \left[\int_{434}^{500} 0.37972849 \cdot x^{-0.36723321} dx \cdot \left(\frac{119.38}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right]$$

$a = 0.049$

$b = 0.079$

$c = 0.082$

$d = 0.044$

$e = 0.028$

$a + b + c = 0.209$

$d + e = 0.072$

**Zone 1 Ethylbenzene**

$$b := \left[ \int_{137.5}^{172.5} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} e^{-2.9223179 + -6.0224466 \cdot 10^{-7} \cdot x^{2.5}} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a =$

$b = 0.014$

$c = 0.042$

$d = 8.872 \cdot 10^{-3}$

$e = 2.049 \cdot 10^{-3}$

$b + c = 0.056$

$d + e = 0.011$

Zone 1 1,1,2-Trichloro-1,2,2-trifluoroethane

$$a := \left[\int_{13}^{56.5} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right] \quad a = 0.11$$

$$b := \left[\int_{56.5}^{172.5} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right] \quad b = 0.152$$

$$c := \left[\int_{172.5}^{333.5} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \quad c = 0.143$$

$$d := \left[\int_{333.5}^{434} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \quad d = 0.072$$

$$e := \left[\int_{434}^{500} 0.0019309179 + \frac{1.1538412}{x^{0.5}} dx \cdot \left(\frac{138.37}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right] \quad e = 0.045$$

$a + b + c = 0.405$

$d + e = 0.117$

**Zone 1 Methylene chloride**

$$a := \left[\int_{13}^{56.5} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260\right] \qquad a = 0.079$$

$$b := \left[\int_{56.5}^{172.5} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700\right] \qquad b = 0.153$$

$$c := \left[\int_{172.5}^{333.5} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad c = 0.076$$

$$d := \left[\int_{333.5}^{434} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300\right] \qquad d = 7.552 \cdot 10^{-3}$$

$$e := \left[\int_{434}^{500} e^{-1.3751036 + -2.2330941 \cdot 10^{-5} \cdot x^2} dx \cdot \left(\frac{84.93}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280\right] \qquad e = 1.047 \cdot 10^{-3}$$

$$a + b + c = 0.309$$

$$d + e = 8.599 \cdot 10^{-3}$$

**Zone 1 Tetrachloroethene**

$$a := \left[ \int_{13}^{56.5} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} 8.440404629 \cdot e^{\frac{-x}{275.0835775}} dx \cdot \left( \frac{165.83}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a = 4.689$

$b = 8.989$

$c = 7.731$

$d = 2.974$

$e = 1.524$

$a + b + c = 21.409$

$d + e = 4.499$

**Zone 1 Toluene**

$$a := \left[ \int_{13}^{56.5} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} 44.28960603 \cdot e^{\frac{-x}{156.1312829}} dx \cdot \left( \frac{92.15}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a = 12.446$

$b = 19.385$

$c = 11.524$

$d = 3.031$

$e = 1.225$

$a + b + c = 43.355$

$d + e = 4.257$

**Zone 1 Trichloroethene**

$$a := \left[ \int_{13}^{56.5} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} \frac{1}{0.054568943 + 0.00024820698 \cdot x \cdot \ln(x)} dx \cdot \left( \frac{131.39}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a = 5.979$

$b = 7.124$

$c = 4.617$

$d = 1.814$

$e = 1.018$

$a + b + c = 17.72$

$d + e = 2.833$

**Zone 1 Vinyl Chloride**

$$a := \left[ \int_{13}^{56.5} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} \frac{1}{(-0.053717534 + 0.01374721 \cdot x)} dx \cdot \left(\frac{62.5}{24.5}\right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a = 0.697$

$b = 0.441$

$c = 0.259$

$d = 0.103$

$e = 0.058$

$a + b + c = 1.396$

$d + e = 0.161$

**Zone 1 Xylenes (total)**

$$a := \left[ \int_{13}^{56.5} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 34260 \right]$$

$$b := \left[ \int_{56.5}^{172.5} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 32700 \right]$$

$$c := \left[ \int_{172.5}^{333.5} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$d := \left[ \int_{333.5}^{434} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 33300 \right]$$

$$e := \left[ \int_{434}^{500} e^{-1.48469254 + -1.1717 \cdot 10^{-5} \cdot x^2} dx \cdot \left( \frac{106.17}{24.5} \right) \cdot 6.2428 \cdot 10^{-8} \cdot 35280 \right]$$

$a = 0.09$

$b = 0.198$

$c = 0.157$

$d = 0.037$

$e = 0.011$

$a + b + c = 0.445$

$d + e = 0.049$

# Mound OU-1 Air Sparging/High Vacuum Soil Vapor Extraction Innovative Technology Remediation Demonstration Project

## Air Sparging and Soil Vapor Extraction Air Sparge Well Treatment Report #1

### INTRODUCTION

The Air Sparge (AS) system was installed with PVC well points designed to include micro porous sparge points (advertised to produce 50 micron size bubbles). The AS system was operational for about six weeks when the flow rate dropped in half and the applied pressure had doubled. This indicated significant AS well point or aquifer plugging. Aquifer tests for soluble ferrous iron showed low concentrations at the limits of detection of the measurement method (Hach colorimetric test kit). This is consistent with the knowledge of the aquifer as it is thought to be an oxidizing aquifer, with low organic carbon, indicating that any iron in the system would be oxidized and present as ferric, and not available to produce any significant fouling.. Carbonate fouling is thought to be a principal foulant for the AS system by analogy to the treatment required on the air stripper for the pump and treat system. The air stripper requires frequent treatment. The carbonate levels in the aquifer are 200 to 300 ppm and air sparging will tend to drive the equilibrium to produce insoluble carbonate salts. Biofouling is also thought to be a small contributor to the AS system performance decline. A treatment regime was designed to mitigate the carbonate, iron or bio fouling that was thought to have caused the decrease in AS system performance.

### TREATMENT METHOD

Commercial chemical treatment materials were selected due to their previous history in commerce and acceptability to Ohio State regulatory agencies. A granular acid (NW-110, US Filter Corporation, Johnson Screens) is advertised to remove carbonate, sulfate, barium and light iron-scale deposits. A concentrated liquid polymeric acid-enhancer (NW-310, US Filter Corporation, Johnson Screens) is advertised to dissolve the biofilm (a polysaccharide slime secreted by the bacteria for attachment and protection), disperse mineral salts and retain the mineral salts in suspension even at high pH.

Air sparge wells AS-N19, AS-N20 and AS-N21 were selected for treatment. Mobilization began on August 25, 1998. The air sparge well heads were modified to allow development with a bailer. Initial water levels were obtained and then each sparge well was evacuated. About 2 gallons of water was removed from each well and recovery was relatively slow. The pH of the recovered water averaged 6.5 initially. Following the manufacturer instructions, 0.1 gallons of acid enhancer was poured down each well. Next 2.8 pounds of granular acid was added. These were mixed with the bailer motion for about 10 minutes. The water levels were just above the screened interval when chemicals were added. An additional 0.4 gallons of distilled water was added and agitated. The wells set for 24 hours. The wells were then re-agitated and sampled for measurement of pH. The values were found to be in the 0.15 to 0.30 range. A decision was made to let the wells set for another 35 hours. On August 29, 1998, the well points were evacuated and the development water stored in a poly tank. The pH readings averaged 0.50. Water was added and evaluated several times until it raised the pH to 3.00 or above. The development water was neutralized by the addition of a lime slurry to a pH of 5.8 and disposed of at the Mound wastewater treatment facility.

### RESULTS

Table 1 shows the changes in air flow for each air sparge well treated.

Table 1. Air Sparge Treatment Results

| Date | AS-N19 | AS-N20 | AS-N21 |
|---|---|---|---|
| Initial Conditions (12/23/97) | 13 cfm | 11 cfm | 33 cfm |
| Pretreatment (8/3/98) | 0 | 0 | 12 |
| Post Treatment (~8/31/98) | 47 | 27 | 39 |

## DISCUSSION

Due to the success of this treatment regime, all of the remainder of the air sparge wells on Zone 2 will be treated. Since Zone 1 is not being used because of the low concentrations of contaminants being extracted, decisions to treat Zone 1 will be made if the decision to restart Zone 1 is made.

## REFERENCES

1. http://www.johnsonscreens.com, Innovative cleaning chemicals for the water industry.

# MATERIAL SAFETY DATA SHEET

## SECTION I - GENERAL INFORMATION

| | | | |
|---|---|---|---|
| **Product Name:** | NW-310 Acid Enhancer | | |
| **Date:** | 06/01/97 | | |
| **Product Use:** | Acidic dispersant properties used to enhance acid cleaning activity. | | |
| **Formula:** | Polymeric Acid solution | | |
| **DOT Class:** | Not regulated as a hazardous material by DOT or IMO | | |
| **Manufacturer:** | US FILTER/ Johnson Screens<br>P.O. Box 64118<br>St. Paul, Minnesota 55164 | For Emergencies phone:<br><br>For Information phone: | 800-228-5635<br><br>612 636 3900 |

## SECTION II - COMPONENT INFORMATION

**COMPONENTS:** The components of this product are not listed or considered hazardous in 29CFR 1910.1200 or other pertinent sections of OSHA Regulations and comprise proprietary information.

## SECTION III - EMERGENCY RESPONSE INFORMATION

**First Aid Procedures:** This product is an acid. Causes eye burns. Immediately flush eyes with water for at least 15 minutes and get medical attention. Causes skin irritation or burns. Wash skin surface with mild soap and water.

**Fire Fighting Information:**
Use self-contained breathing apparatus.
As with any acid, contact with metals may produce flammable hydrogen gas.
Use extinguishing media appropriate for surrounding fire.

**Spill or Leak Handling Information:**
Personal Protection: must be appropriate to handle a spill. See Personal Protection Measures Section. Neutralize spills with lime or soda ash; flush spill area with plenty of water. Procedures: Keep spectators away. Treat as an acid material Contain spill with inert material (e.g.. sand, earth, absorbable material). Transfer diking material to suitable container for recovery or disposal. Material may be diluted and rinsed down a sanitary sewer system to a municipal wastewater plant. If quantities in excess of 500 gallons are rinsed to a sewer, the district should be notified of possible pH upset to the wastewater plant.

## SECTION IV - HAZARD INFORMATION

**Health Effects:** The formulation is corrosive to skin and eyes and is not known to be a skin sensitizer, Toxic effects described in animals from exposure by inhalation or ingestion include corrosion of mucosal surfaces, kidneys effects, liver effects, and increased oxylate production. Tests of individual constituents in bacterial or mammalian cell cultures gave no mutagenic activity.

Human health effects of overexposure by skin or eye contact may initially include: skin irritation with discomfort or rash; or eye irritation with discomfort, tearing, or blurring of vision Higher exposures may lead to these effects: skin burns or ulceration, or eye corrosion with corneal or conjunctival ulceration

Human health effects of overexposure by inhalation may include irritation or corrosion of mucous membranes with upper and lower respiratory irritation. Human health effects of overexposure by ingestion may include corrosion of mucous membranes with stomach discomfort, nausea, and prostration Significant skin permeation after contacts appears unlikely. There are no reports of human sensitization.

**Reactivity Information:**

| | |
|---|---|
| Stability: | Stable [X] Unstable [ ] |
| Incompatibility: | Metals, oxidizing agents such as nitric acid, cyanide, sulfides. |
| Hazardous Decomposition Products: | Carbon monoxide, carbon dioxide, phosphorus oxides (extremely small) |
| Hazardous Polymerization: | May occur [ ] Will not occur [X] |

## SECTION V - ACCIDENT PREVENTION INFORMATION

**Personal Protective Measures:**

| | |
|---|---|
| Eye Protection: | Wear chemical splash goggles (ANSI Z871) or approved equivalent. |
| Hand Protection: | Wear neoprene gloves or approved chemical protective gloves suitable for use in acid material. |

**Facility Control Measures:**

| | |
|---|---|
| Ventilation: | Keep in well ventilated area. Keep package tightly closed. Store above 32°F. (0°C.) |
| Storage: | Product should not be stored with or near strong caustic or oxidizing agents. |
| Other Protective Equipment: | Eye wash facility should be present where product is stored or utilized. |

## SECTION VI - SUPPLEMENTAL INFORMATION

**Physical Properties:**

| | | | |
|---|---|---|---|
| Appearance | Clear | Color: | Yellow |
| State: | Liquid | Vapor Pressure: | Vapor is water |
| Vapor Density: | 1.0 (vapor is water) | Solubility in Water | Complete |
| Evaporation Rate: | N/A | pH: | 2.3 |
| Specific Gravity: | 1.19 | Boiling Point: | 250°F |
| Freezing Point: | 32°F | | |

**Waste Disposal:** Comply with Federal, State, and local regulations. If approved, may be neutralized and flushed to wastewater treatment plant.

## SECTION VII - REGULATORY INFORMATION

**DOT Proper Shipping:** Not regulated as a hazardous material by the US Dept. of Transportation (DOT) 49CFR 172.101 Hazardous Materials Table.

**RCRA Status:** Not a hazardous waste under RCRA 40 CFR 261. No reportable quantities.

**SARA/Title III-CERCLA List:** This product does not contain a "CERCLA" listed hazardous substance for emergency release notification under Sec. 304 (40CFR 302).

**SARA/Title III-Toxic Chemicals List:** This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Sec. 313 (40CFR 372).

**TSCA Inventory Status:** Chemical components listed on TSCA Inventory.

**California Proposition 65:** This product does not contain any chemicals currently on the California list of known carcinogens and reductive toxins.

US Filter/ Johnson Screens supplies this data sheet for your information, consideration and investigation. The information and recommendations contained herein have been compiled from sources believed to be reliable. No warranty, guarantee or representation is made by US Filter/ Johnson Screens as to the absolute correctness or efficiency of any representation contained in this and other Safety Data Sheets nor assumes any responsibility in connection therewith; nor can it be assumed that all acceptable safety measures are contained in this and other Safety Data Sheets, or that other or additional measures may not be required under particular or exceptional conditions or circumstances. You should satisfy yourself that you have all current data relevant to your particular use.

# MATERIAL SAFETY DATA SHEET

## SECTION I - GENERAL INFORMATION

| | | |
|---|---|---|
| **Product Name:** | NW-110 Dry Acid | |
| **Date:** | 01/01/96 | |
| **Product Use:** | Dry acid cleaner for well systems. | |
| **Formulae:** | Granular acids with dispersant and inhibitor properties. | |
| **DOT Class:** | None | |
| **Manufacturer:** | U.S. Filter/ Johnson Screens<br>PO Box 64118<br>St. Paul, Minnesota 55164 | For Emergencies contact: 800-228-5635<br><br>For Information Phone: 612-636-3900 |

## SECTION II - COMPONENT INFORMATION

No constituents of the formulae are listed or considered hazardous under OSHA 29CFR 1910.1200

## SECTION III - EMERGENCY RESPONSE INFORMATION

**FIRST AID PROCEDURES**

*This product is a strong acid. If dust or granules get into the eyes, mouth, or lungs where moisture dissolves the material, severe burns may occur.*

| | |
|---|---|
| **Eyes:** | Flush with water for 15 minutes while holding eyelids open. Get medical attention. |
| **Skin:** | Flush with water while removing contaminated clothing and shoes. Follow by washing with soap and water. Do not reuse clothing or shoes until cleaned. If irritation persists, get medical attention. |
| **Inhalation:** | Get medical attention if persistent irritation of nose and throat occurs. |
| **Ingestion:** | If swallowed, give copious quantities of milk if available, or water to dilute stomach contents. DO NOT induce vomiting; call a physician or take to a medical facility. |

**FIRE FIGHTING INFORMATION**

Wear self-contained breathing apparatus.
Sulfur dioxide, sulfur trioxide and ammonia gas may be released in a fire.
Extinguishing Media: water, "alcohol" foam, carbon dioxide.

**SPILL OR LEAK HANDLING INFORMATION**

Recover salvageable product in bags or containers. Unsalvageable material may be shoveled or swept up for recovery or disposal. Avoid breathing dust. Dike and dissolve residue in water. Neutralize with alkali before flushing to sewer.

## SECTION IV - HAZARD INFORMATION

**HEALTH EFFECTS**

**Eyes:** can cause eye burns. **Skin:** causes skin irritation. **Inhalation:** causes irritation of nose and throat.
**Ingestion:** toxic by ingestion (oral LD 50 rat; 1600 mg/kg) Ref. (1) Accident Prevention Section.

**REACTIVITY INFORMATION**

**Stability:** Stable [ x ] Unstable [ ]
**Incompatibility:** Nitrates, nitrites, cyanides, sulfides, chlorates, chlorine, hypochlorous acid and sodium hypochlorite. At elevated temperatures, concentrated aqueous solution hydrolyzes rapidly generating heat and steam.
**Hazardous Decomposition Products:** Sulfur dioxide, sulfur trioxide, and ammonia.

## SECTION V - ACCIDENT PREVENTION INFORMATION

**PERSONAL PROTECTION MEASURES**
**Eye Protection:** goggles
**Hand Protection:** rubber gloves required
**Respiratory Protection:** dust respirator should be worn where possibility of inhalation of dust or mist exists. None required for normal use.

**FACILITY CONTROL MEASURES**
**Storage:** prevent absorption of moisture and possible caking. Should be stored in a cool and dry place. Do not store with cyanides, sulfides, chlorine, hypochlorous acid or hypochlorites. Bags and containers of this material may be hazardous when emptied. Empty containers retain product residues. Observe all hazard precautions outlined in this sheet.
**Other Precautions:** minimize skin contact. Wash with soap and water before eating, drinking, smoking, or using toilet facilities.
**References:** 1) Sax-Dangerous Properties of Industrial Material, 6th Edition, VanNostrand Reinhold.

| | | |
|---|---|---|
| **NPCA/HMIS Rating** | Health | 2 |
| | Flammability | 0 |
| | Reactivity | 1 |
| | Special Protection | E |

## SECTION VI - SUPPLEMENTAL INFORMATION

**PHYSICAL PROPERTIES**

| | |
|---|---|
| **Appearance:** | Small white crystalline powder |
| **State:** | Powder |
| **Solubility in Water:** | Approximately 24% by weight @ 20 C |
| **Density:** | Approximately 80 lbs/cubic ft |
| **Decomposes:** | @ 200 C |

**WASTE DISPOSAL**
Should be neutralized with alkalis. Neutralized liquid may be run to industrial sewer with solids dispatched to an approved waste disposal facility in conformance with local, state, and federal regulations. When working with solution and splashing possible, wear suitable eye, face and body protection.

## SECTION VII - REGULATORY INFORMATION

| | |
|---|---|
| **DOT Proper Shipping:** | Not regulated as a hazardous material by the U.S. Dept. of Transportation (DOT) 49CFR 172.101 Hazardous Materials Table |
| **RCRA Status:** | Not a hazardous waste under RCRA (40CFR 261). No reportable quantities. |
| **SARA/TITLE III-CERCLA List:** | This product does not contain a "CERCLA" listed hazardous substance for emergency release notification under Sec. 304 (40CFR 372). |
| **TSCA Inventory Status:** | Chemical components listed on TSCA inventory. |
| **California Proposition 65:** | This product does not contain any chemicals currently on the California list of known carcinogens and reproductive toxins. |

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# ITRD Mound OU-1
# AS/SVE Tracer Test Plan

## 1.0 Introduction

An air sparging (AS) and soil vapor extraction (SVE) system is being used at Mound OU-1 to accelerate contaminant mass removal to shorten the time needed to meet restoration goals. The subsurface geology is complicated by a long history of cut and fill operations, which preceded the current condition of a constructed industrial landfill. The AS/SVE system is placed along the west and south perimeters of the landfill. Questions have arisen regarding the pneumatic connection between the VOC vapors produced by the AS system and collection by the SVE system. Tracer test technology has the capability to evaluate this connectivity.

Previously, off-site (westerly under the Conrail tracks) migration of AS generated VOCs was a concern. However, monitoring of the vadose zone in monitoring wells 376, 377 and 388 (Figure 1) has shown the presence of VOCs, prior to the operation of the AS system.

Table 2. Individual Well Summary Analytical Data - Detected Compounds Only

| Location | Chemical | Result (ppb,v/v) | Qualifier |
|---|---|---|---|
| 0388 | Dichlorodifluoromethane | 0.8 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 340 | |
| | Methylene chloride | 2 | |
| | 1,1,1-Trichloroethane | 19 | |
| | Carbon tetrachloride | 2.1 | |
| | Trichloroethene | 3.5 | |
| | Tetrachloroethene | 2.7 | |
| 0376 | Dichlorodifluoromethane | 0.72 | J |
| | Trichlorofluoromethane | 6.6 | |
| | Carbon disulfide | 1.2 | J |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 360 | |
| | Methylene chloride | 1.9 | J |
| | 1,1,1-Trichloroethane | 19 | |
| | Trichloroethene | 3.2 | |
| | Tetrachloroethene | 6.3 | |
| 0377 | Trichlorofluoromethane | 17 | |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 110 | |
| | Methylene chloride | 5.4 | JB |
| | 1,1,1-Trichloroethane | 940 | |
| | Trichloroethene | 11 | |
| | Tetrachloroethene | 9.3 | |

The concentrations of VOCs currently in the groundwater at OU-1 are low, with upper ends typically about 45 ppb (ug/l) for TCE and 70 ppb (ug/l) for PCE. If one estimates equilibrium vapor concentrations from the aqueous phase concentrations with Henry's Law constant, one can get a feel for the potential additional mass contributed by the AS system.

Henry's Law constant is defined as

$$K_H = \frac{C_g}{C_l}$$

where $K_H$ is the Henry's Law constant (unitless) and $C_G$ is the concentration in gas phase (g/cm3 soil gas) and $C_L$ is the concentration in aqueous phase (g/cm$^3$ soil water). If one uses the following values,

| Compound | Vapor Pressure | Vapor Density | Water Solubility | Henry's Law Constant | |
|---|---|---|---|---|---|
| | mm Hg | ug/m3 | mg/l | L, water/L, air | Atm-m3/g-mol |
| TCE | 69 | 4.88E+08 | 1110 | 4.4E-01 | 1.07E-02 |
| PCE | 18.5 | 1.64E+08 | 1503 | 1.1E-01 | 2.69E-03 |

Estimates of TCE and PCE vapor phase concentrations can be estimated from the aquifer concentrations of 45 and 70 ppb (ug/l) noted above.

| Compound | $C_l$ (ug/l) | $K_H$ (l, water/l, air) | $C_g$ (ppmv) |
|---|---|---|---|
| TCE | 45 | 4.4E-01 | 4 |
| PCE | 70 | 1.1E-01 | 1 |

This indicates that, while the aquifer concentrations are low, the Henry's Law constant indicates a preference for the TCE and PCE to be in the vapor phase, which can be at about the same concentrations found in the SVE extraction manifold (assuming no dilution). See SVE System Monitoring Time Series #4 report.

Transfer of aquifer contaminants off-site (west under the Conrail) may be a concern if the geology provides the pathway. See Figure 2. Measurement of this may be indicated by increases in VOC vapor concentrations at monitoring wells 376, 377 and 388. Since the VOC concentrations at these locations were in the 3 – 10 ppm range for TCE/PCE (see Table 1), and dilution of AS generated vapors may be significant over the transport distance from AS wells to the off-site monitoring wells, there is great uncertainty whether this method can show off-site migration. However, if during the tracer test, soil gas measurements can be made in the off-site wells, then this may provide a more sensitive indication of off-site migration due to use of the AS system.

## 2.0 Test Objectives

The objective of this tracer test is to: 1) evaluate the collection efficiency of AS system generated vapors by the SVE system, and, 2) evaluate the off-site migration of AS system generated vapors.

## 3.0 Methods

Discussions have been held with Randy Golding, Tracer Research, Inc., Tucson, AZ, regarding the test objectives and the advantages/disadvantages of tracer test methods and are summarized below.

*Continuous vs pulsed tracer injection* – Continuous tracer injection seeks to establish a steady state extraction concentration by continuous injection of tracer gas. Mass injection rates are compared to mass removal rates and an efficiency can be estimated. Early time gas samples are not needed; however, this method will likely take much longer than the pulse method. The pulse method involves injection of a limited one-time pulse of tracer. This method limits the amount of chemical placed into the subsurface. However, monitoring of the appearance and disappearance of the tracer is critical. Collection efficiency is determined by a ratio of total mass removed to the total mass injected. The pulse method is favored due to the smaller amount of chemical to be injected, the shorter duration of the test and the availability of the on-site GC system.

*Tracer material* – Typical tracers used have included sulfur hexafluoride and halon compounds. Choice of tracer is based on low water solubility, absence in subsurface environment, and ease of monitoring. Halon compounds are favored due to the ease of monitoring with the existing gas sampling gas chromatograph/detector system. However, characterization of the halon retention time, detection limits, and potential for interference by coelution with existing VOCs is needed. Halon 1211 is proposed (bromochlorodifluoromethane). Properties of Halon 1211 are as follows:

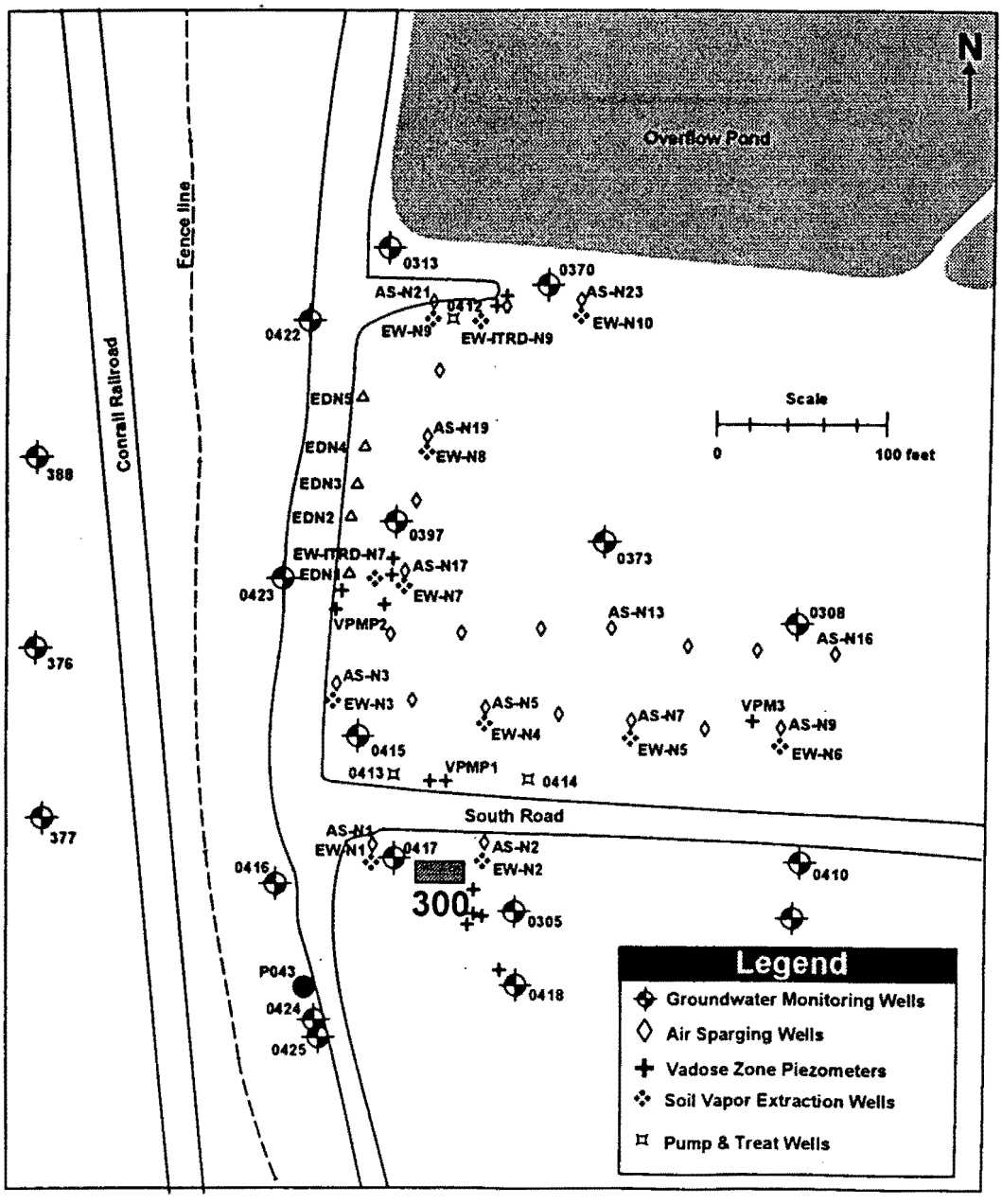
| Property | Value |
|---|---|
| Boiling Point | 24.8°F (-4°C) |
| Specific Gravity (water = 1) | 1.83 |
| Vapor Pressure (mm Hg) | 1770 at 68°F |
| Vapor Density | 5.8 at 68°F |
| Solubility in water | Insoluble |
| Appearance | Colorless gas |
| Odor | Sweet |

This compound is also used as a propellant for medicinal asthmatic inhalers. The total mass of a pulsed tracer injection would be about 5 to 20 lbs and the test duration would last 1-2 weeks.

*Injection/Extraction location* – The SVE radius of influence (ROI) tests have shown wide capture zones for well EW-N7, extending to the North up to EW-N9, EW-N10 and ITRD-N9 and to the South to EW-N2 and EW-N4. ROI tests completed on the French drain ED-N2 showed minimal capture outside the French drain, and on EW-N3 (screened in a low permeability location) showed no influence in adjacent monitoring wells. See ROI Report #1.

One can envision a range of capture zone characteristics for each of the SVE wells operating individually and as a group. The objective of this tracer test is to evaluate the

capture effectiveness of the SVE system on AS generated vapors; however, it is unaffordable to evaluate the capture of vapors generated individually from each AS point. Therefore, it is proposed to perform one test evaluating the capture of tracer gas injected at one AS point, collected by one SVE zone. Groundwater concentrations of VOCs do not appear to vary widely across OU-1, so, selection of the Zone 2 SVE system area is proposed based on available ROI data that shows it seems to have a wide capture area. AS wells are located at each SVE well, and at the midpoint between two SVE wells. If one AS well is used for the tracer gas injection, it is proposed that an AS well located between two SVE wells be selected. AS-N18 is proposed.



*Measurement Methods* – The semi-automated GC will be evaluated to determine compatibility with Halon 1211. Manifold vapor samples can be collected at periodic intervals to assess mass removal rates of the tracer. Tedlar bag samples can be collected from the off-site wells to assess off-site migration (see Time Zero Soil Gas Report). The SVE system must be turned off during the sample collection period when using the GC system.