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File GW samples

December 23, 2003

Mr. Julio Vazquez
USEPA Region II
Superfund Federal Facilities Section
CEHNC-FS-IS
290 Broadway, 18th Floor
New York, NY 10007-1866

00599

Subject: **Quarterly Groundwater Monitoring**
Ash Landfill, Seneca Army Depot Activity
Romulus, New York

Dear Mr. Vazquez:

This letter is in response to comments from the U.S. Environmental Protection Agency Region II (USEPA) dated October 10, 2003, regarding the 2003 First Quarterly Monitoring Report for the Ash Landfill at the Seneca Army Depot Activity in Romulus, New York. The comments and subsequent responses are presented below.

Comment 1:
What approvals were provided for suspension of well purging at five well volumes? This is in conflict with use of the March 1998 low-flow groundwater sampling protocols which provide a time guideline for pumping, not a fixed volume guideline for instances where indicator parameters do not stabilize.

Response:
Parsons acknowledges that the March 1998 low-flow groundwater sampling protocols provide a time guideline for stabilization of parameters, as opposed to volume guideline, and will ensure the time guideline is utilized in the field and denoted as such within monitoring reports. Of note, removal of five well volumes is generally not the limiting factor for sample collection at the Seneca Ash Landfill site. Stabilization of indicator parameters is generally achieved within removal of three well volumes; or, in some cases, wells do not have sufficient yield to achieve stabilization of indicator parameters. Under low recharge conditions, groundwater samples are collected when the wells recover sufficiently to allow collection of samples.

Comment 2:
The shallow aquifer well "outside the farmhouse" (page 3). Is this a residential drinking water well? What prevented sample collection via low flow protocols, since use of a bailer is not recommended.

Response:
The shallow aquifer well located outside the farmhouse is not the residential drinking water well. The shallow well is a dug well approximately 10 feet deep with a diameter of approximately 5 feet. Sample collection via low flow protocols is not appropriate for this type of well.

Comment 3:
It was disappointing to note the failure of both the colorimeter and Hach test kits (page3) for representative sample analyses. What was the basis for determining the equipment was not working properly which necessitated discarding the data?

Response:
The results of the alkalinity and ferrous iron field monitoring were considerably different from the ranges of alkalinity and ferrous iron observed at the site previously, and of that anticipated for the geology of the area. Given one of the two parameters for each instrument were erroneous, it is believed the instruments were not working properly and unwise to assume the other parameters accurate. Field personnel were made aware of the anticipated ranges for these parameters and the subsequent triggers for checking the accuracy of field equipment prior to continuing with sample collection. In the future, field personnel will provide field data to project engineer throughout performance of the sampling event to allow review and any modification to sampling procedures during the event.

Comment 4:
Concurrence with the statement that during low flow conditions, the groundwater may migrate laterally within the wall (page4). This also becomes more evident as the wall becomes fouled or plugged.

Response:
Although locally in the area of the wall the groundwater may migrate laterally, any lateral movement is minimal compared to the general east-west trend in the groundwater movement of the majority of the aquifer within the study area. It is anticipated that any affects from fouling of the wall will be insignificant for the majority of the 18-year design life of the wall.

As expected with shallow overburden aquifers, the direction of groundwater flow often mirrors the topography of the ground surface, which is often reflective of bedrock topography. At the Ash Landfill site the general east-west trend in the groundwater movement becomes northeast-southwest in the area of intersecting West Smith Farm and West Patrol Roads. This differing trend of groundwater movement mimics the change in bedrock and ground surface topographies in this area. Under low flow conditions, it appears the southeast movement of groundwater may have a greater impact on the flow of groundwater in the southern area of the wall, with a potential for localized groundwater flow laterally within the wall.

Under low flow summer/fall conditions when the northeast-southwest trend in groundwater movement is more prevalent, groundwater within the wall may migrate laterally to the south. Under winter/spring conditions when groundwater elevations are higher, groundwater monitoring indicates a potential for groundwater movement within the wall laterally to the north.

Although these slight changes may occur throughout the year as groundwater elevations rise and fall, the overall east-west trend in groundwater movement is most prevalent. Based on various groundwater monitoring events, the hydraulic gradient for the east-west trend may be two to four times hydraulic gradient laterally within the wall. Rather than movement laterally within the wall, it is more likely most of the groundwater flow through the wall is at a slight angle from perpendicular to the wall.

Secondary to the east-west trend, groundwater movement trends toward the section of wall between monitoring wells MWT-5 and MWT-8. This secondary trend appears to coincide with a dip in bedrock in this area of the wall. As noted previously, groundwater movement may be affected by bedrock topography. The slight bedrock depression in this area of the wall appears to extend and dip from the slight bedrock trough in the area of monitoring well PT-17, as illustrated in Figure 3-7, Competent Shale Topography Map, of the Remedial Investigation Report at the Ash Landfill (June 1994), a copy of which is attached for reference.

Of note, the contaminant plume also appears to follow the slight bedrock trough from PT-17 toward the section of wall between MWT-5 and MWT-8. The contaminant plume as a whole appears to follow the bedrock contours to a greater extent than it follows the direction of groundwater flow (see attached Figure L-1 illustrating bedrock contours with respect to revised March 2003 contaminant plume), which is reasonable for a contaminant heavier than water that may tend to travel more along the surface of competent bedrock than along groundwater flow.

Minor changes in the trend of groundwater movement in the area of the wall may account for some dispersion of the contaminant plume, but it is unlikely these slight gradients, primarily to the south, explain the apparent movement of the contamination plume laterally along the wall towards the north. The shape of the plume giving rise to the apparent lateral movement to the north along the wall is highly dependent on the sampling results of monitoring well MW-53. The historical results of sampling MW-53 appear anomalous to the expected shape of the plume, based on groundwater flow direction and bedrock contours. The lower contamination found at MW-53 may be the result of the slight elevation of competent bedrock in the area of MW-53, which may cause the more concentrated contamination plume to preferentially flow down and around the elevated bedrock where the weathered shale is thicker.

Although the slight trough extending from the area of PT-17 dipping toward the section of wall between MWT-5 and MWT-8, and the slightly elevated bedrock near MW-53, may account for the contaminant plume trending southeast-northwest as the contamination plume intersects the wall, it does not explain the apparent continued extension of the contaminant plume to the north laterally along the wall. It is possible and potentially very likely that the more concentrated contaminant plume may travel around the area of MW-53 to the south, as well as to the north. The current monitoring well network does not confirm the presence or absence of a branch of more concentrated plume traveling to the north of MW-53.

Comment 5:
Reviewer is uncomfortable with the statement that the slight rebound in TCE and DCE in the downgradient wells may be indicative of some residual contamination present downgradient of the wall. I would need to see data concerning the full groundwater gradient profile. For this monitoring quarter, only the upper aquifer or surficial water table was sampled and mapped. Figure 3-1 does not include reference ground elevations and has an incorrect color legend for actual groundwater elevation contours, but no key for the reactive wall. It should be noted as indicating the upper water zone only. I would need to see data showing all of the monitored aquifer layers, particularly "nested" pairs or triplets so that an assessment can be made if upwelling of deeper, contaminated water is occurring downgradient of the reactive wall.

Response:
Parsons acknowledges comments regarding legend and will modify appropriately for future reports.

The affect of residual contamination present downgradient of the wall is not a function of upwelling from deeper contaminated water. As evaluated in the Feasibility Memorandum for Groundwater Remediation Alternatives Using Zero Valence Iron Continuous Reactive Wall at the Ash Landfill (Draft, August 2000), "TCE and DCE concentrations were higher in wells located downgradient from the reactive wall than in wells located in the wall. The reactive iron within the wall reduced the level of chlorinated solvents as evidenced by the decrease in chlorinated compound concentrations within the wall. However, chlorinated compound concentrations increased once the groundwater exited the reactive wall as observed in the downgradient well data. This observation is likely due to the presence of residual chlorinated compounds in the aquifer material downgradient of the reactive wall. Over time, as groundwater passes through the wall and enters the downgradient side of the aquifer, TCE and DCE that are present within the pore water of the silt and clay particles in the aquifer at the toe of the plume will be reduced as the clean water mixes with the residual groundwater."

Additional comments on this phenomenon were provided by Environmental Technologies, Inc. (ETI), the developer of the in-situ reactive iron wall technology, and included in Appendix D to the August 2000 report. ETI stated that the occurrence of "initial decreases in contamination within the iron wall, followed by concentration increases in the down gradient wells, has been commonly observed in the initial stages of iron wall operation at other sites. The cause of the elevated concentrations in the downgradient wells is most likely desorption and/or incomplete flushing in the silty/clayey material."

In 1999, contaminant concentrations above 100 ug/L were indicated downgradient of the wall. For example, during a sampling event in September 1999, the concentrations of TCE in transect monitoring wells MWT-7, MWT-8, and MWT-9 were 480, <1, and 56, respectively; and, the concentrations of DCE were 25, 7 and 38, respectively. These wells transect the wall as follows: MWT-7 is upgradient, MWT-8 is within the wall, and MWT-9 is downgradient. These data indicate degradation within the wall followed by an apparent increase in downgradient wells. In September 1999, the total chlorinated ethenes in MWT-9 were 107.5 ug/L (using TCE equivalents calculation).

If desorption and/or incomplete flushing continue to be factors, which is plausible since desorption from and flushing of silty/clayey material can be very slow processes, it is possible detections at this level may still occur downgradient of the well.

In some instances degradation of DCE does not occur effectively within the existing wall. This occurrence will be taken into account during construction of the proposed additional walls. Addition of carbon source downgradient of the existing Pilot Wall may be considered to augment degradation of DCE prior to the compliance boundary.

Comment 6:
I disagree with the conclusion (page7) suggesting that shorter walls may be sufficient in order to remove the remaining chlorinated solvents in a timely manner.

Response:
Based on the narrowing of the plume and keeping the design parameter of the wall extending 100 feet beyond the 100 ug/L contour of the contamination plume, the northern extent of the Source Wall could be proposed approximately 170 feet shorter to the south, and the northern extent of the Middle Wall could be proposed approximately 200 feet shorter to the south (see Attached Figure L-2). It is not anticipated that shortening of the Compliance Wall would be proposed, and the existing wall would remain unchanged. Although shortening of the walls by these amounts may seem insignificant, the cost savings during construction will maintain a favorable cost:benefit ratio.

Comment 7:
The comparison between October 1999 and March 2003 via figures of the extent of the total voc plume is appreciated, and helps assessment. It is noted that the outer contour in March 2003 is the 1 ug/l detection, while the October 1999 figure was necessarily limited to 10 ug/l. Based on groundwater flow in the upper aquifer, it is reasonable to assume that not all of the plume as delineated will intercept the reactive wall. This was also shown to be occurring in October 1999. The results for MWT-9 are not correctly depicted in the contours. The figures appear to have some generalizations that may not be reflective of actual sampling results. There also appears to be a significant seasonal fluctuation in constituents. Please clarify if use of October results is appropriate for comparison with March results.

Response:
The approximation of the 10 ug/L contour for the March 2003 monitoring event was incorrectly illustrated as extending beyond the existing wall. Please see attached revised Figure 3-3 for the March 2003 monitoring event.

The lengths of the reactive walls are based on capturing the portion of the contamination plume greater than 100 ug/L.

Care needs to be taken when comparing October 1999 results to March 2003 results. Comparisons can be made, for example, a comparison confirms the seasonal fluctuation of constituents. However, it is not appropriate to surmise about the changes in contamination plume using these two monitoring events since the groundwater elevations during these two rounds are appreciably different.

Disagree that the results for MWT-9, as presented in Figure 3-3, are not correctly depicted in the contours. The results for MWT-10 however are incorrectly depicted. Please see attached revised March 2003 Figure 3-3.

Agree that the March 2003 Figure 3-3 may have generalizations not reflective of actual sampling results. The presented plume was skewed narrow because monitoring wells MW-46 and MW(PT)-22 were not sampled and these were assumed non-detect when the figure was created. To properly illustrate the plume when these wells are not sampled, an assumption needs to be made about the contaminant concentrations at these locations based on the results of historical monitoring of these wells. The attached revised Figure 3-3 uses historical data for MW-46 and MW-22.

We concur there are various seasonal fluctuations in constituents at the site. This is evidenced by plotting contaminant concentration versus groundwater elevation at various monitoring wells around the site. For example, the attached Figure L-3 illustrates an extreme fluctuation of TCE concentration with groundwater elevation at monitoring well PT-18 and moderate fluctuations of DCE with groundwater elevations at PT-12A and PT-18.

Comment 8:
Many of the well depths appear to be only on the order of 10 feet deep. The deeper ones are just as important. It is not unreasonable to request that the synoptic water level measurements be made of all monitoring wells, whether or not they are on the analytical sampling schedule.

Response:
Please note synoptic water level measurements include site-monitoring wells in addition to the analytical sampling schedule. Previous investigations have shown that the predominant direction of groundwater flow for both the shallow till/weathered shale aquifer and the competent shale aquifer is from east to west. Since it is not anticipated that the direction of groundwater flow within the competent shale

aquifer will change, and contamination has not been known to migrate into the competent shale aquifer, the groundwater flow of the shallow aquifer is the primary concern during the quarterly monitoring events.

Comment 9:
Overall, it appears the reactive wall has been primarily successful, and in association with natural attenuation, the plume is being diminished. The wall, however, may have been under designed to fully capture and treat the plume. It may be appropriate to consider extending the plume length or assessing the extent to which the plume may ultimately bypass the wall and migrate downgradient before attenuating. There may also be additional treatment options applicable.

Response:
The existing wall was installed for the purpose of conducting a full-scale, year-long demonstration evaluation. Treatment effectiveness and hydraulic performance measurements were utilized for providing recommendations for the proposed additional Source, Middle, and Compliance Walls, as well as evaluating the need for carbon source addition. Additional data since the time of the year-long demonstration will also be utilized to fine-tune the final design of the additional walls.

As indicated by a review of the data from the Pilot Wall study, the pilot wall is successfully degrading TCE, however it appears the DCE resulting from the TCE degradation is not fully degrading. DCE has a slower degradation rate when compared to TCE. The proposed additional walls will be designed to fully degrade DCE.

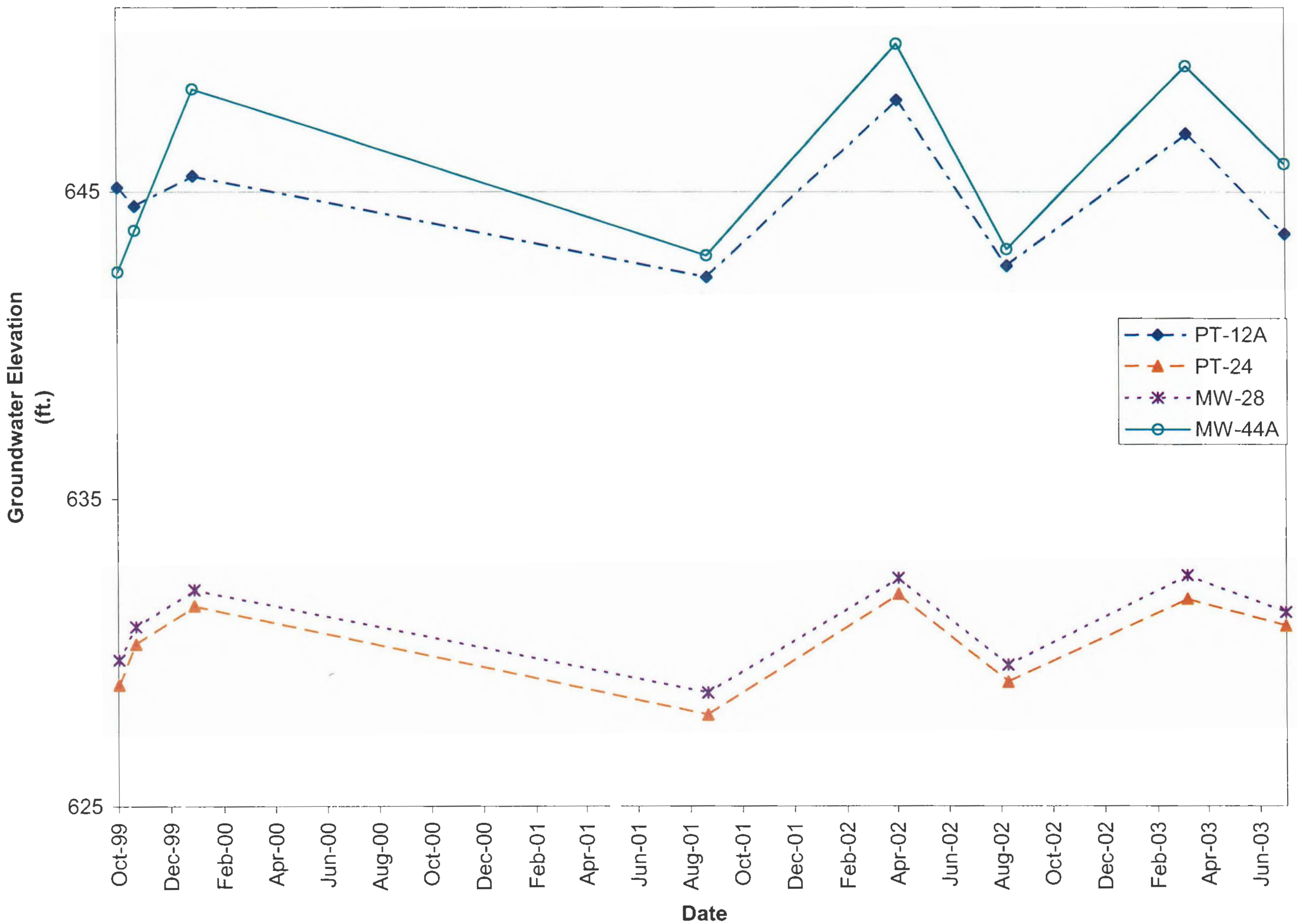
If you have any questions regarding the above, please do not hesitate to contact me at 617-457-7905.

Sincerely,

Todd Heino, P.E.
Program Manager

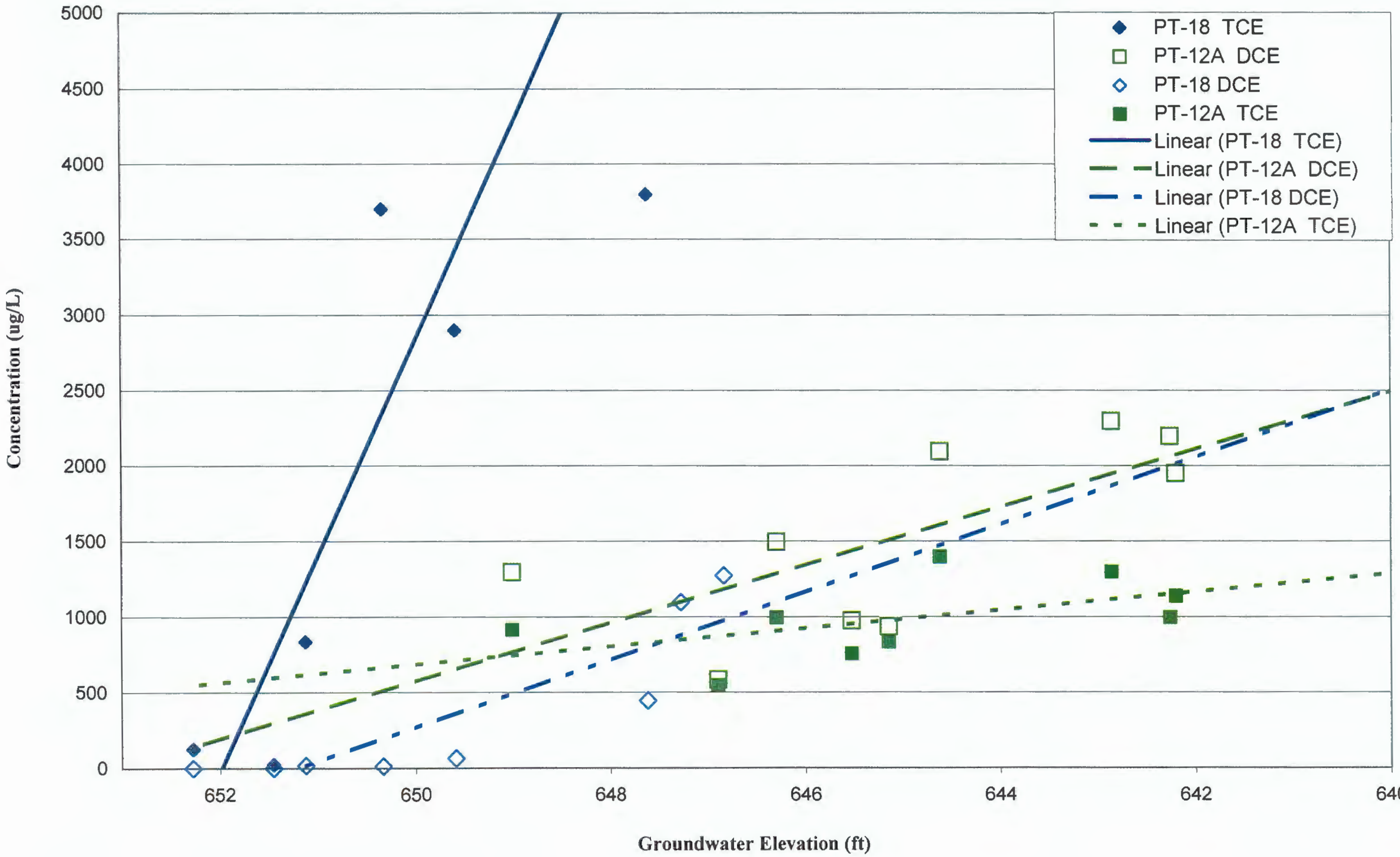
c: S. Absolom, SEDA
R. Battaglia, USACE - NY District
K. Hoddinott, USACHPPM

FIGURE 3-4
COMPARISON OF GROUNDWATER ELEVATION VERSUS TIME
GROUNDWATER MONITORING - ASH LANDFILL
SENECA ARMY DEPOT ACTIVITY

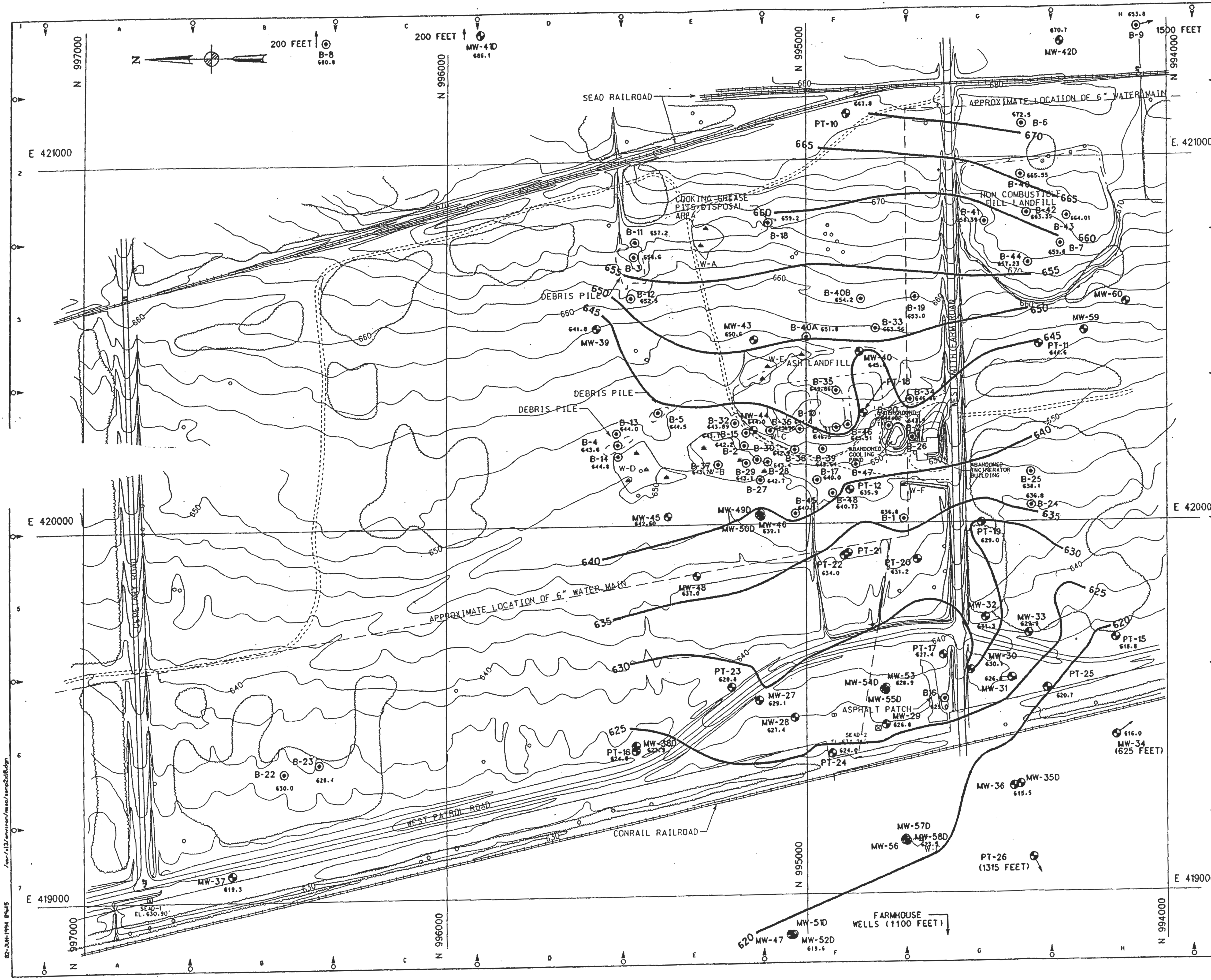


P:\PIT\HUNTSVILLE HTW\TO #10 Ash Landfill GW Monitoring\2Q2003\Repot\Tables\gw CALC.xls\Chart 1

Figure L-3
TCE AND DCE Variation With Groundwater Elevation
Groundwater Monitoring - Ash Landfill
Seneca Army Depot



P:\PIT\Projects\Huntsville HTW\TO#10 Ash Landfill Monitoring\Trends\Historical Trends.xls\TCE and DCE



LEGEND:

- PAVED ROAD
- DIRT ROAD
- GROUND CONTOUR AND ELEVATION
- TREE
- WETLAND & DESIGNATION
- APPROXIMATE EXTENT OF FILL
- OUTLINE OF FORMER REFUSE PITS (IDENTIFIED FROM AERIAL PHOTO)
- APPROXIMATE EXTENT OF DEBRIS PILE
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- FUEL OR UNDERGROUND STORAGE TANK
- SURVEY MONUMENT
- SOIL BORING, DESIGNATION AND TOP OF BEDROCK ELEVATION
- MONITORING WELL, DESIGNATION AND TOP OF BEDROCK ELEVATION
- SHALE DEPTH CONTOUR

REV	DATE	DESCRIPTION
C		DRAFT-FINAL RI REPORT
B		PREDRAFT PHASE II RI/FS
A		ISSUED WITH PRELIMINARY SITE CHARACTERIZATION REPORT

DRAWN BY G.A.KAELIN	CHECKED BY M.E.BAKER
DESIGN SUPV. G.A.KAELIN	RESP. ENGR. M.N.DUCHESNEAU
CHIEF DISC. ENGR. M.E.BAKER	MGR. OF ENGR. J.P.CHAPLICK
PROJECT MANAGER M.N.DUCHESNEAU	
MGR. OF PROJECTS J.P.CHAPLICK	
IN CHARGE W.D.PATTERSON	

ES

ENGINEERING-SCIENCE, INC.

CLIENT/PROJECT TITLE

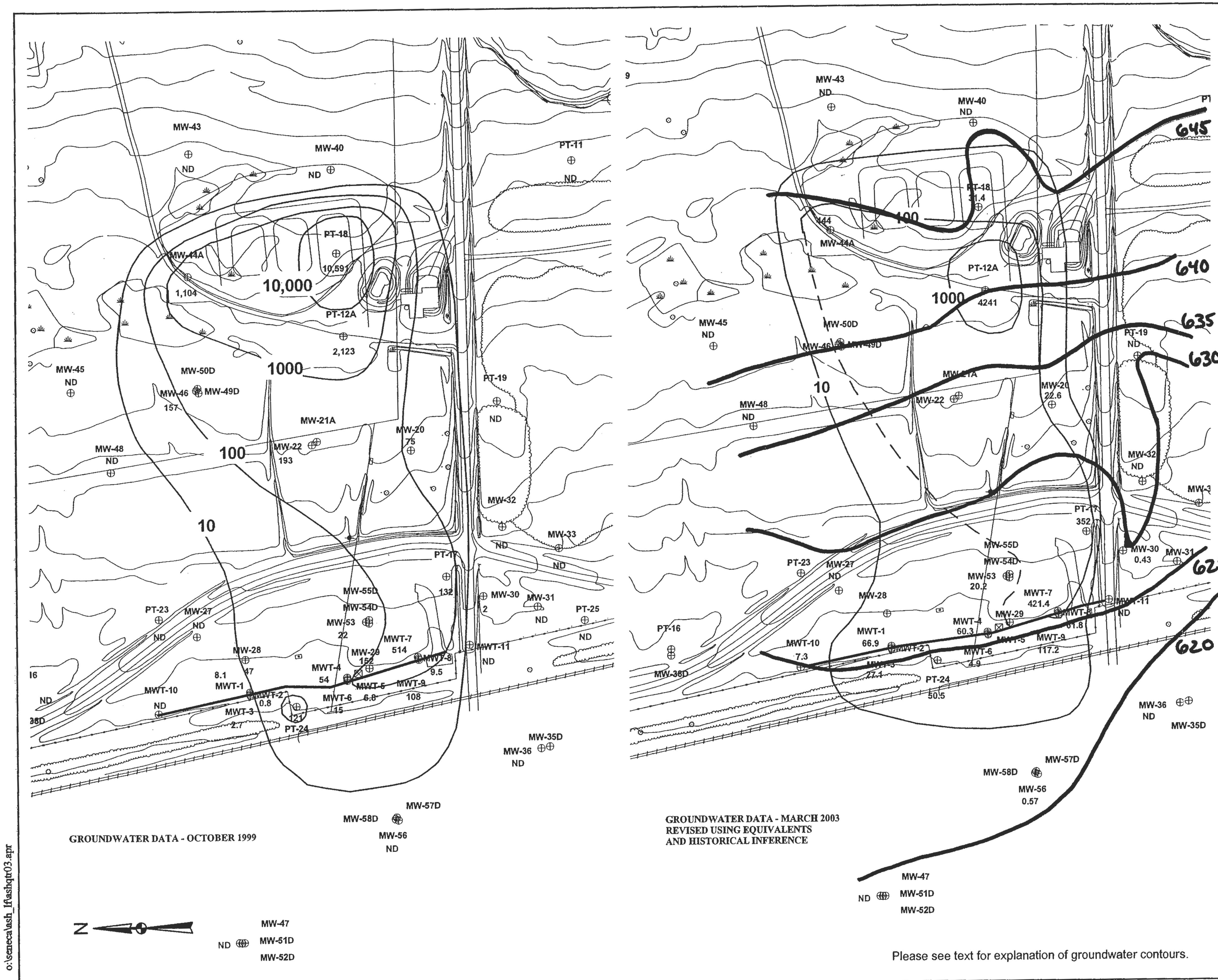
SENECA ARMY DEPOT
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
ASH LANDFILL

DEPT. ENVIRONMENTAL ENGINEERING

FIGURE 3-7
COMPETENT SHALE
TOPOGRAPHY MAP

SCALE 1" = 250'

ES DWG. NO. 720447-03000-3-1 REV C



LEGEND

PAVED ROAD

GROUND CONTOUR AND ELEVATION

WETLAND & DESIGNATION

OUTLINE OF FORMER TRASH PITS (IDENTIFIED FROM AERIAL PHOTO)

APPROXIMATE EXTENT OF DEBRIS PILE

BRUSH

CHAIN LINK FENCE

UTILITY POLE

APPROXIMATE LOCATION OF FIRE HYDRANT

RAILROAD

6" WATER MAIN

PERMEABLE REACTIVE BARRIER

PT-22 Total — MONITORING WELL W/ DESIGNATION TOTAL CHLORINATED ETHENES (UG/L) (CIS-1,2-DCE, TRANS-1,2 DCE, PCE, TCE AND VC)

ND — NO DETECTION

1,000 — Total Chlorinated Ethene Isocontour (ppb)

— Bedrock Topo Competent Shale

NOTES:
GROUNDWATER SAMPLES COLLECTED FOLLOWING EPA REGION II LOW-FLOW SAMPLING PROTOCOL.

GROUNDWATER ANALYTICAL DATA BASED ON CONDITIONS AT THE TIME OF SAMPLING. GROUNDWATER CONDITONS AT OTHER TIMES MAY VARY.

200' 0 200'

SCALE: 1" = 200'

PARSONS

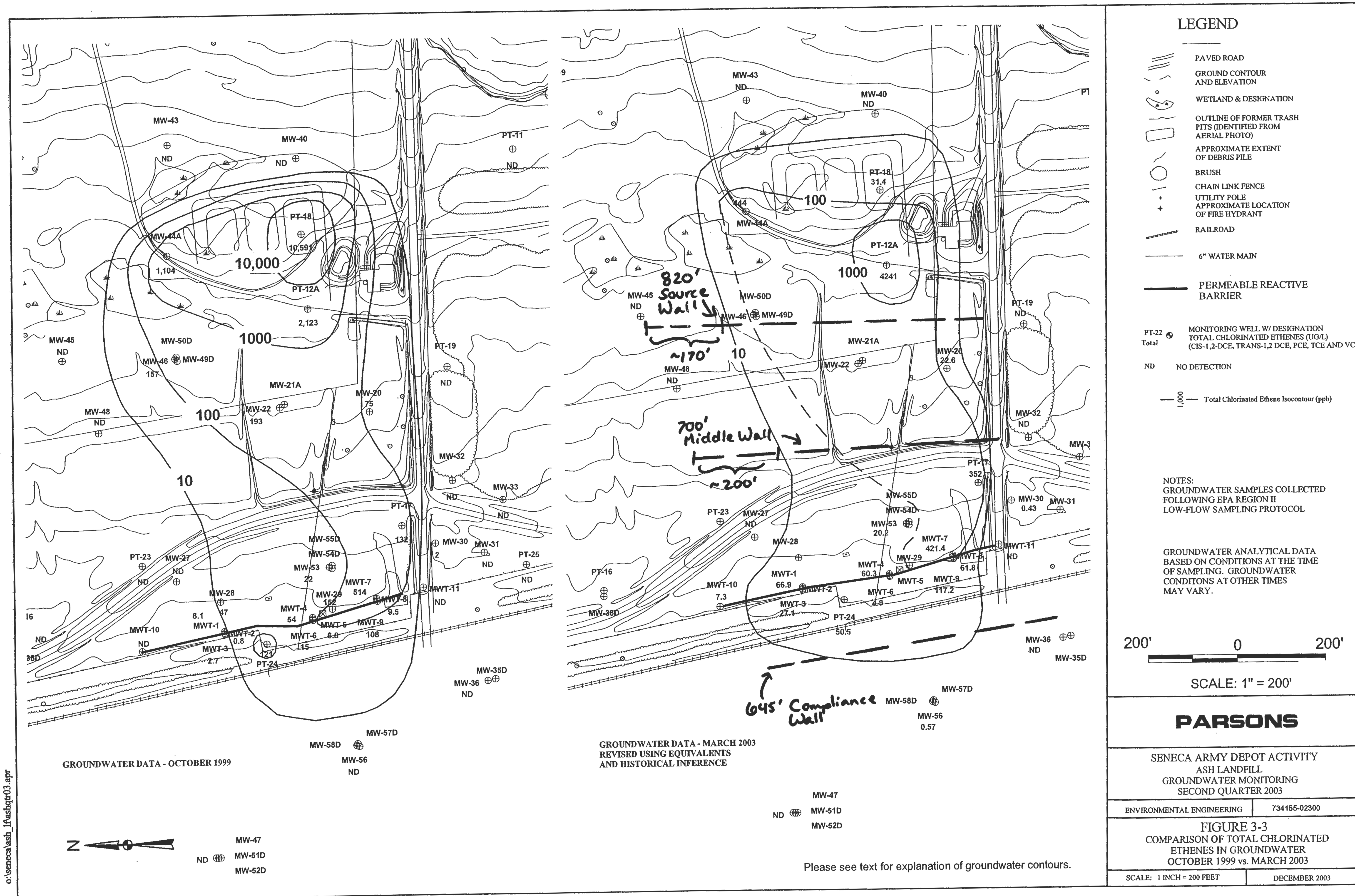
SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL
GROUNDWATER MONITORING
SECOND QUARTER 2003

ENVIRONMENTAL ENGINEERING	734155-02300

FIGURE 3-3
COMPARISON OF TOTAL CHLORINATED ETHENES IN GROUNDWATER
OCTOBER 1999 vs. MARCH 2003

SCALE: 1 INCH = 200 FEET	DECEMBER 2003

FIGURE L-1



GROUNDWATER DATA - OCTOBER 1999
10,000
1000
100
10
GROUNDWATER DATA - MARCH 2003
REVISED USING EQUIVALENTS
AND HISTORICAL INFERENCE
820' Source Wall
~170'
700' Middle Wall
~200'
645' Compliance Wall
Please see text for explanation of groundwater contours.
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LEGEND
PAVED ROAD
GROUND CONTOUR AND ELEVATION
WETLAND & DESIGNATION
OUTLINE OF FORMER TRASH PITS (IDENTIFIED FROM AERIAL PHOTO)
APPROXIMATE EXTENT OF DEBRIS PILE
BRUSH
CHAIN LINK FENCE
UTILITY POLE
APPROXIMATE LOCATION OF FIRE HYDRANT
RAILROAD
6" WATER MAIN
PERMEABLE REACTIVE BARRIER
PT-22 Total
MONITORING WELL W/ DESIGNATION TOTAL CHLORINATED ETHENES (UG/L) (CIS-1,2-DCE, TRANS-1,2 DCE, PCE, TCE AND VC)
ND NO DETECTION
1,000 Total Chlorinated Ethene Isocontour (ppb)
NOTES:
GROUNDWATER SAMPLES COLLECTED FOLLOWING EPA REGION II LOW-FLOW SAMPLING PROTOCOL
GROUNDWATER ANALYTICAL DATA BASED ON CONDITIONS AT THE TIME OF SAMPLING. GROUNDWATER CONDITONS AT OTHER TIMES MAY VARY.
200' 0 200'
SCALE: 1" = 200'
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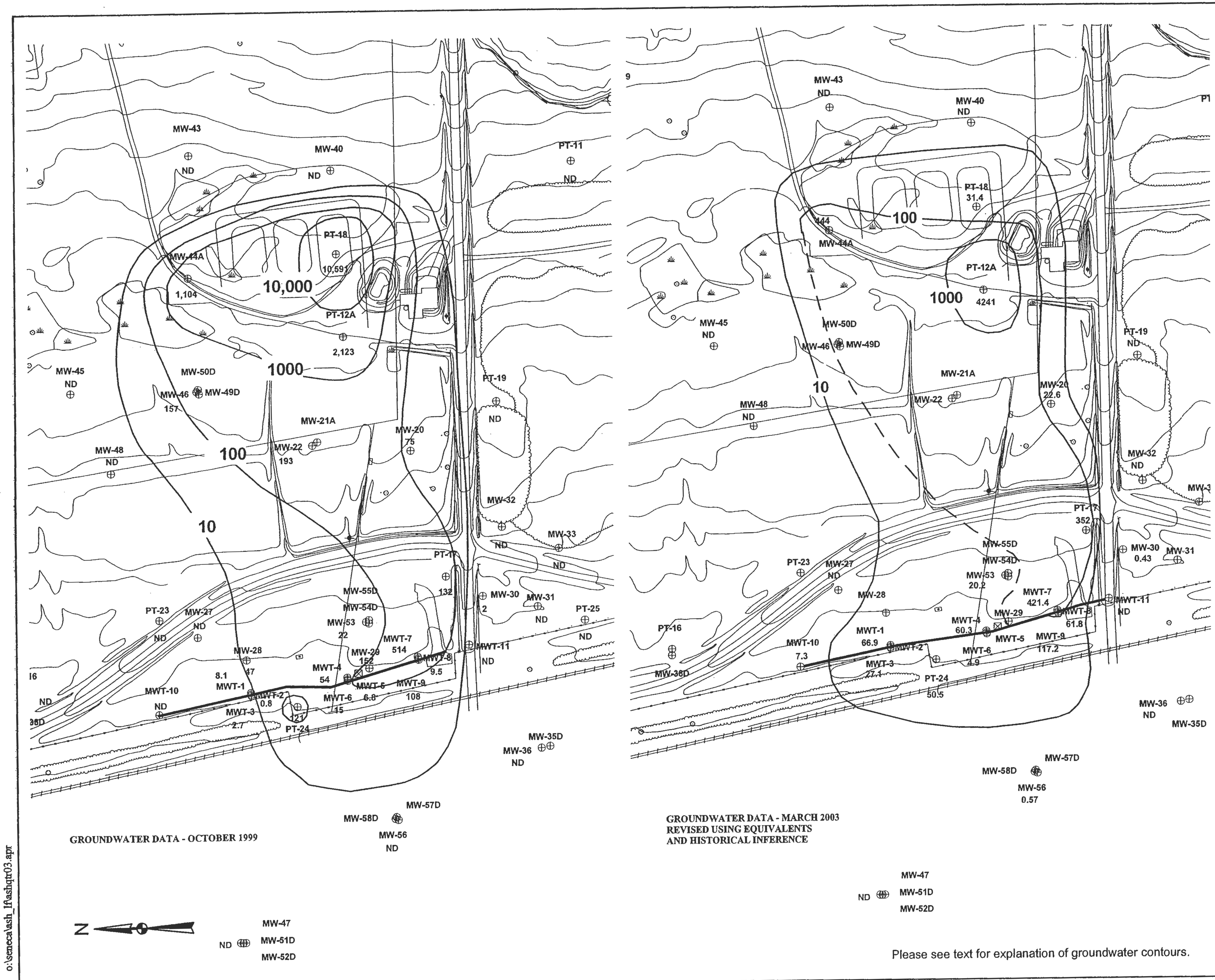
SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL
GROUNDWATER MONITORING
SECOND QUARTER 2003
ENVIRONMENTAL ENGINEERING
734155-02300
FIGURE 3-3
COMPARISON OF TOTAL CHLORINATED ETHENES IN GROUNDWATER OCTOBER 1999 vs. MARCH 2003
SCALE: 1 INCH = 200 FEET
DECEMBER 2003

FIGURE L-2



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LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND & DESIGNATION
- OUTLINE OF FORMER TRASH PITS (IDENTIFIED FROM AERIAL PHOTO)
- APPROXIMATE EXTENT OF DEBRIS PILE
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- 6" WATER MAIN
- PERMEABLE REACTIVE BARRIER
- PT-22 Total — MONITORING WELL W/ DESIGNATION TOTAL CHLORINATED ETHENES (UG/L) (CIS-1,2-DCE, TRANS-1,2 DCE, PCE, TCE AND VC)
- ND — NO DETECTION
- 1,000 — Total Chlorinated Ethene Isocontour (ppb)

NOTES:
GROUNDWATER SAMPLES COLLECTED FOLLOWING EPA REGION II LOW-FLOW SAMPLING PROTOCOL

GROUNDWATER ANALYTICAL DATA BASED ON CONDITIONS AT THE TIME OF SAMPLING. GROUNDWATER CONDITONS AT OTHER TIMES MAY VARY.

200' 0 200'

SCALE: 1" = 200'

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SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL
GROUNDWATER MONITORING
SECOND QUARTER 2003

ENVIRONMENTAL ENGINEERING	734155-02300

FIGURE 3-3
COMPARISON OF TOTAL CHLORINATED ETHENES IN GROUNDWATER
OCTOBER 1999 vs. MARCH 2003

SCALE: 1 INCH = 200 FEET	DECEMBER 2003