MARKS Environmental, Inc.
Quality Groundwater, Soils, Remediation and Waste Management Services
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June 15, 2012

Ms. Tran N. Tran
USEPA
RCRA Project Manager
PA Operations Branch
1650 Arch Street, 3WC22
Philadelphia, PA 19103-2029

RE: **Request for Technical Impracticability Determination for Groundwater Remediation, Accellent Inc., Montgomery County, Collegeville, PA**

Dear Ms. Tran:

As per you request, Accellent Inc. is formally requesting that the United States Environmental Protection Agency (USEPA) evaluate the UTI Holdings, LLC, dba Accellent site ("Site") located in Montgomery County, Pennsylvania for a Technical Impracticability (TI) Waiver. The TI Waiver is being considered for the remediation work being conducted under the Administrative Order on Consent (AOC) between the USEPA and UTI Corporation (now UTI Holdings, LLC), dated 31 March 1992.

1.0 SUMMARY

The purpose of this TI Waiver request is to allow the USEPA to develop more realistic clean up goals for the site that better reflect site characteristics and continue to be protective of human health and the environment. Accellent, Marks Environmental, Inc. (MEI) and the USEPA extensively discussed options before developing the *Workplan for the Development of Alternate Point of Compliance Wells and Alternate Compliance Goals* (Workplan). This request summarizes the results of implementing the Workplan and includes a Site Conceptual Model, four quarters of attainment monitoring at the new compliance wells, updated plume maps, updated fate and transport modeling results, conclusions drawn from these new evaluations, and recommendations for a TI Waiver.

The AOC established cleanup goals and compliance points for concentrations of contaminants at the Site, including trichloroethylene (TCE), and 1,1,1 trichloroethane (TCA) . Accellent has conducted remedial actions at the Site over many years, and has determined that the cleanup goals and compliance points identified in the AOC are not consistent with the level of cleanup that can feasibly be achieved. Specifically, a TI waiver is necessary because the cleanup goals identified in the AOC are based on attainment of USEPA Maximum Contaminant Levels (MCLs) in the source area, and other areas of the site. The presence of dense, non-aqueous phase liquid (DNAPL) in source areas at the Site inhibit the treatment of groundwater in these areas to the originally conceived cleanup goals. The corrective action Soil Vapor Extraction (SVE) system specifically targeted DNAPL beneath the Plant 1 source area, but recovery rates were low and quickly leveled off. After five years of operation, EPA agreed that the system should be shut down. This SVE experience shows that the presence of the DNAPL in low permeability weathered and fractured bedrock, below the water table and under a building, poses a critical limitation to this and other innovative technologies. The presence of the building makes more aggressive techniques like hydro-fracturing and in-situ oxidation infeasible.

The model projections and updated data confirm that continued operation of the pump and treat system serves to prevent any impact to receptors. Fate and transport modeling was used to develop alternative cleanup goals and compliance points, based on:

- Continued operation of the pump and treat system.
- Concentrations projected into the future by modeling until they peaked and stabilized.
- Source concentrations that were artificially increased until the future maximum downgradient concentrations reached the drinking water USEPA MCL at the nearest potential receptor (water supply well CT-8).

Concentrations at the proposed point of compliance wells corresponding to the above basis are proposed as alternative cleanup goals. These alternative compliance goals provide an opportunity to responsibly close the AOC within a reasonable period of time, based on the significant amount of progress that has been made in remediating soil and groundwater at the site over the last 30 years and the groundwater pump and treat protective measures that will remain in place.

2.0 WORKPLAN ACCOMPLISHMENTS

The Workplan developed by Accellent, MEI, and the USEPA (approved by USEPA 10 October 2010) provided for the collection of data necessary to develop new compliance points and goals for the site. The Workplan was implemented over the last year and accomplishments include:

1. Installation of three additional monitoring wells in the northeast portion of the site.
2. Establishment of new quarterly and annual monitoring points for the site.
3. Completion of four quarterly rounds of groundwater sampling and analysis from the new points of compliance wells.
4. Completion of an expanded annual groundwater sampling round which included the compliance wells and the "plume monitoring wells".
5. Revision of the groundwater Fate and Transport (F&T) Model to include the new wells and groundwater quality data collected at the new well locations.

3.0 SITE CONCEPTUAL MODEL

There are site characteristics that have been documented as part of the remedial investigation, five-year evaluation of the long-term operation of the remedial system, and recent expansion of the site monitoring system that strongly indicate that residual dense non-aqueous phase liquid DNAPL TCE and TCA exist in two areas of the site. The first and original source is historic leakage from the former underground storage tanks (USTs) under Plant 1. DNAPL from this area traveled into the aquifer soil and bedrock until the tanks were cleaned and closed in the 1970s. At the time of the discovery of the Plant 1 UST release, a sump pump located in the basement of Plant 1 transferred water from the basement to a stormwater swale adjacent to lined lagoons approximately 800 feet east of Plant 1. This discharge point for the Plant 1 sump was terminated as part of the initial remedial measures and the flow was routed to a groundwater treatment system. Based on high shallow groundwater concentrations in the swale area, DNAPL potentially also exists in this area.

With time, DNAPL trapped below the water table in a fractured porous aquifer will dissolve and diffuse into the bedrock matrix porosity that is typically at least an order of magnitude greater porosity than the fracture porosity. Diffusion of DNAPL into bedrock matrix has been documented by at least two credible studies (Parker, et al., 1997, Pankow & Cherry, 1996). It is also possible for pure phase DNAPL to migrate into the matrix porosity from fractures. TCE/TCA that is stored in bedrock matrix pores can persist long after the more permeable bedrock fractures have been cleaned up. The mass of contaminant stored in the matrix porosity will diffuse back out of the matrix when clean water begins to flush the fractures. The rate of this diffusion from matrix to fracture porosity is related to the difference between the concentrations of the groundwater in the two types of pore spaces and the transmissivity of the aquifer. In a fractured flow aquifer such as the Brunswick Formation, contaminant transport from matrix to fractures can be very slow. Therefore it can take a very long time to remediate the bedrock mass in the source areas. This is the primary feature of the Accellent site that has caused cleanup of these source areas to be technically impracticable. A more detailed discussion of site/contaminant characteristics pertinent to technical impracticability of meeting the current compliance levels is presented in the Five Year Assessment Report (MEI, 2008).

The corrective action SVE system specifically targeted DNAPL beneath the Plant 1 source area, but recovery rates were low and quickly leveled off. The Five Year Assessment Report (MEI, 2008) estimated that approximately 4770 gallons of TCE and TCA had been recovered since the initiation of remediation in 1978. This estimate includes recovery via groundwater pumping and SVE. The estimated volume of TCE/TCA recovered and the extended “tailing” of TCE removal by SVE over more than 5 years of operation indicates that the DNAPL beneath the Plant 1 source area is technically impracticable to remove because it had penetrated into the low permeability weathered and fractured bedrock below the water table. After five years of operation, EPA agreed that the system should be shut down.

The presence of DNAPL under the building makes applying more aggressive techniques, like hydro-fracturing and in-situ oxidation, infeasible without risk of damage to the building, underground infrastructure and building occupants. The site SVE experience shows that the presence of the DNAPL poses a critical limitation to SVE and would likely pose a critical limitation to other innovative technologies as well, even if they could be safely applied.

Nonetheless, through continued pumping and treating, Accellent has mitigated plume impacts and has achieved constituent levels at proposed points of compliance that demonstrate adequate containment of off-site impacts. Figure 1 shows the location of the proposed two new point of compliance wells (UTM-20 and 21), three retained original point of compliance wells (UTM-4, -10, -14) and all other groundwater monitoring wells at the Accellent site. Figure 2 shows the potential DNAPL zones and potential DNAPL entry points based on the historic records for the site activities and the site characterization data.

A receptor survey completed as part of the Remedial Investigation of the site (Weston, 1990) identified a limited number of residential supply wells and a municipal supply well (Collegeville-Trappe Public Works Department production well CT-8) in the site area. An intermittent stream that flows to the southeast from the site was incorporated into the site Fate & Transport Model to evaluate the potential impact of the plume to this surface water body. The ephemeral nature of the stream (and the elevation of the stream near the site) indicated that this stream is a losing stream and is not a discharge point for groundwater.

During the initial response to the release Accellent replaced potentially impacted residential wells with municipal water supply where available. In impacted areas where supply wells could not be connected to the municipal water supply, Accellent provided bottled drinking water for residents. In one case (Toner residence) a granular activated carbon system was installed on a private well water supply that was impacted with TCA. The quarterly monitoring of residential wells has demonstrated that the off-site wells are no longer at risk of being impacted by the Site plume.

4.0 UPDATED PLUME MAPS

MEI performed the annual plume groundwater sampling round during November 2011 by collecting samples from the five point of compliance wells, including proposed new points of compliance (UTM-4, -10, -14, -20, -21) and the six plume monitoring wells (UTM-1, -11, -16, -17, -22, RCRA-2). Figure 1 shows the locations of the wells sampled during the annual sampling event. Figures 3 through 7 show the TCE and TCA plume maps for 2007 and 2011. Figure 5 shows the new wells while, for historical comparison purposes, the other figures do not.

The results of the Five-year Assessment, and the last 10 years of groundwater monitoring, have demonstrated that the groundwater plume has been largely contained within the Accellent property boundaries, and continues to shrink in size. This is illustrated by the concentrations at

UTM-10 and UTM-14 dropping below the MCL between 2007 (Figure 3) and 2011 (Figure 4). Note that the concentrations in some wells do not appear to change between these figures because the 2011 plume maps incorporate the most recent available data (from 2007 or 2010) for wells that were not sampled during 2011.

5.0 UPDATED FATE & TRANSPORT MODEL

The additional water level and concentration data collected in accordance with the Workplan were incorporated into the revised F&T Model (Attachment 1) and used to:

- calibrate the model to the new data,
- simulate projections of current conditions/remediation rates into the future, and
- develop site-specific compliance levels for the groundwater at the at five proposed point of compliance wells (UTM-4, -10, -14, -20, -21) that would continue to be protective of all receptors.

The projection of current conditions and extending current remediation pumping rates indicated a gradual reduction in the size of the plume 30 years in the future. The TI Zone is shown on Figure 6 of the revised F&T Model (Attachment 1). The 30 year TCE plume under current pumping conditions) shown in this figure represents the TI Zone within which remediation to the MCL is technically impracticable.

TCE is used to develop the site specific compliance levels because it provides a more conservative and protective compliance level than TCA would provide. Concentrations at the point of compliance wells that result in off-site contaminant levels approximating the MCL at the nearest known human and ecological receptor were obtained through trial and error methods by modeling cases with increasing starting concentrations of TCE (vs. current conditions).

The concentrations within the modeled TCE plume were hypothetically increased for modeling purposes until the peak long-term concentration at the nearest potential receptor (Collegeville-Trappe Public Works Department production well CT-8) reached a TCE concentration at the 5 micrograms per liter (ug/L) (the USEPA MCL).

The F&T Model evaluated the potential impact to well CT-8 under two pumping scenarios: 1) with well UTM-1 and UTM-11 pumping, and; 2) with well UTM-1 only pumping. The pumping rates used were 45 gallons per minute (GPM) for UTM-1 and 10 GPM for UTM-11 (for scenario 1). These pumping rates are based on recent historic averages of the pumping rates at these two wells. The site-specific compliance levels derived from these two cases are shown in Table 1 below. The revised F&T Model, used to develop the site-specific groundwater compliance levels, is included as Attachment 1 to this letter.

Table 1 – Site Specific Groundwater Compliance Levels Developed using the Site Fate and Transport Model

Compliance Well ID	Simulation Compliance Level for TCE (UTM-1 & UTM-11 pumping) (ug/L)	Simulation Compliance Level for TCE (UTM-1 pumping)* (ug/L)	Maximum TCE Concentration 2011 through February 2012) (ug/L)
UTM-4	290	290	1.1
UTM-10	2300	2300	4.1
UTM-14	230	185	6.1
UTM-20	178	156	11
UTM-21	1150	1110	0.55

- Proposed as Site Specific Compliance Level at Points of Compliance.

The site-specific groundwater compliance levels are recommended to be set at the modeled TCE compliance level concentrations with UTM-1 only pumping which the model indicates will be protective of well CT-8. It should be noted that well CT-8 is connected to an air stripper that is believed to have been conservatively designed for concentrations of TCE well above those found in the groundwater recovered on-site.

Figure 1 shows the location of the point of compliance wells, and all groundwater monitoring wells at the Accellent site.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Accellent requests that EPA grant a TI waiver for the Site, based on the presence of DNAPL in source areas, and the inability to treat the source areas through originally designed treatment methods. Accellent proposes revised cleanup goals and compliance points, as identified herein, based on continued operation of the pump and treat system.

The revised F&T Model and the updated plume maps demonstrate that all potential receptors in the site area are protected due to the continued operation of the pump and treat system. The model further indicates that the operation of well UTM-1, and the discontinuance of UTM-11, adequately contains the site contaminants and is protective of potential human and ecological receptors.

Attainment of the current groundwater cleanup goals set forth in the current AOC is technically impracticable.

6.2 Recommendations

Based on the information presented herein MEI makes the following recommendations for the Site remediation system.

1. Incorporate the proposed new compliance points and site-specific compliance levels identified herein into the AOC as the site-specific compliance levels for the Site.

2. As currently approved in the Workplan, establish monitoring wells UTM-4, UTM-10, UTM-14, UTM-20, and UTM-21 as the point of compliance wells for the site.

3. Establish site-specific groundwater cleanup goals based on the revised F&T Model as the Site-Specific Compliance Level shown in Table 1 for UTM-1 only pumping.

4. Eliminate off-site groundwater sampling requirements (residential and public supply wells) and the requirement to perform periodic searches for wells installed in the site area.

5. Eliminate the requirement to provide bottled water to previously affected residents (Accellent may choose to voluntarily continue with this provision).

6. Remove the water treatment system at the Toner residence (RES-2). Accellent may offer to leave the system in place, if the current resident (Mr. Toner) wishes to pay for the operation and maintenance.

7. Retain UTM-11 as an optional recovery well to be used as needed.

8. Confirm that soil remediation at the site via vapor extraction or other techniques may be permanently discontinued, based on the presence of DNAPL and technical impracticability of such remediation.

9. Require continued operation of the groundwater pump and treat system at the Accellent site as necessary to contain the groundwater plume. Recovery well UTM-1 would continue to operate until it can be demonstrated that the operation of this recovery point is not longer necessary to maintain compliance with the MCLs at receptor locations.

10. Establish post-attainment groundwater monitoring as annual sampling of the Plume Monitoring Wells shown on Figure 1. Analyze samples for TCE only.

11. Quality Assurance trip blanks will be included in each annual sampling round at a frequency of one per shipment containing volatile organic compound samples.

12. Annual groundwater progress reports will be prepared by Accellent summarizing the results of the annual groundwater sampling and noting any significant changes in concentrations, and any operational changes or issues.

Thank you for your consideration of this TI Waiver request and the information we have provided. If you have any questions regarding this request please contact me at 610-286-0802.

Very Truly Yours,
MARKS ENVIRONMENTAL, INC.

Thomas R. Marks

Thomas R. Marks, P.G.
Principal Hydrogeologist

Cc.: H. Smith (Accellent)
J. Farina (Accellent)
D. Hilbert (Accellent)
R. Deist (Accellent)
P. Puglionesi (Applied EHS)
C. McCabe, Esquire (MGKF)

References Cited

Marks Environmental, Inc., May 2008 Corrective Measures Five Year Assessment Report, Accellent Inc. (formerly UTI Corporation) Facility, Montgomery County, Collegeville, PA.

Parker, B.L., McWhorter, D.B., and Cherry, J.A. 1997. Diffusive loss of non-aqueous phase organic solvents from idealized fracture networks in geologic media. Ground Water 35 (6): 1077 - 1088.

Pankow, James F., Cherry, John A., and Cherry, J.A. 1996. Dense Chlorinated Solvents and other DNAPLs in Groundwater, Waterloo Press, 522 p.

FIGURES

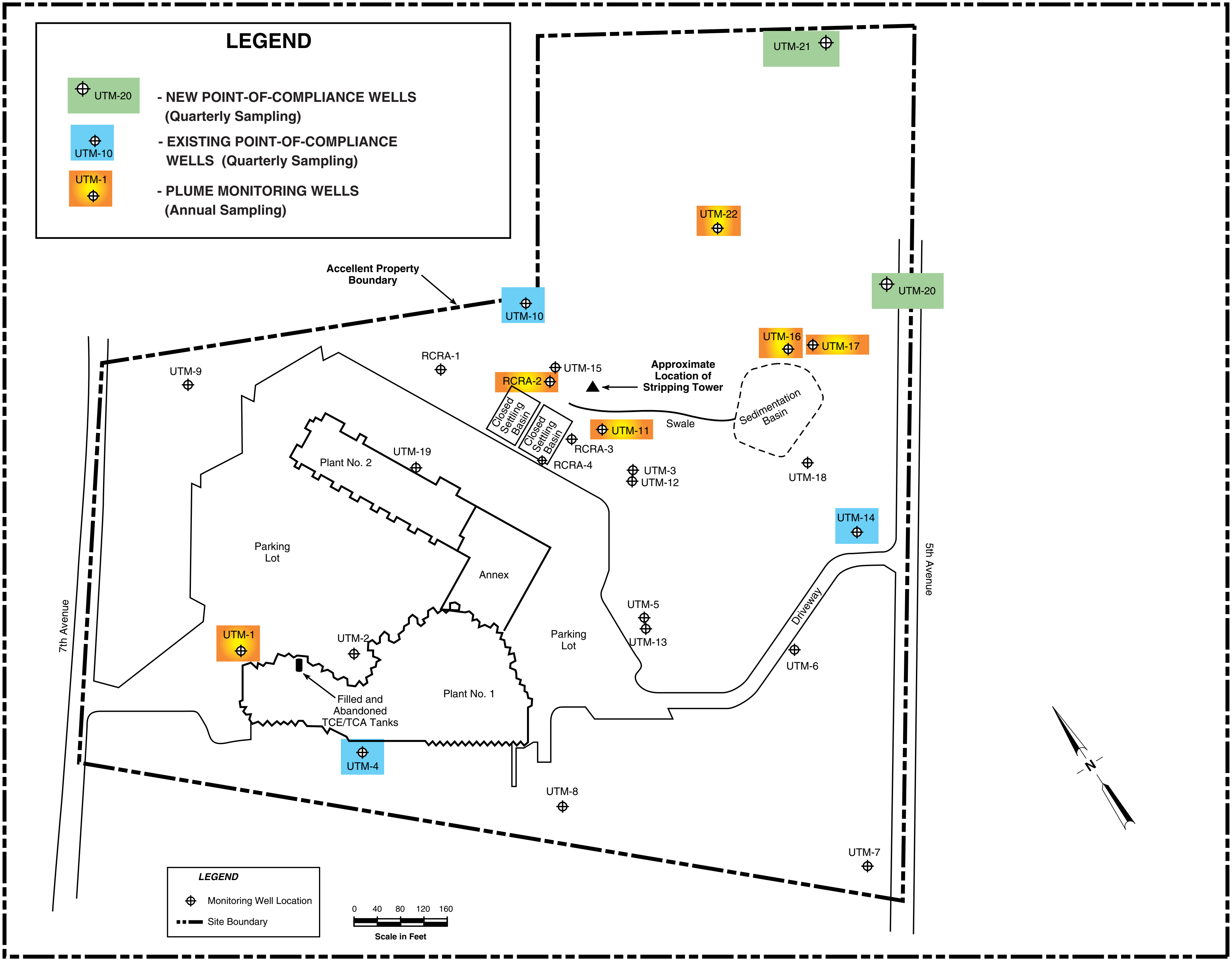


FIGURE 1 ACCELLENT GROUNDWATER MONITORING POINTS, COLLEGEVILLE, PA

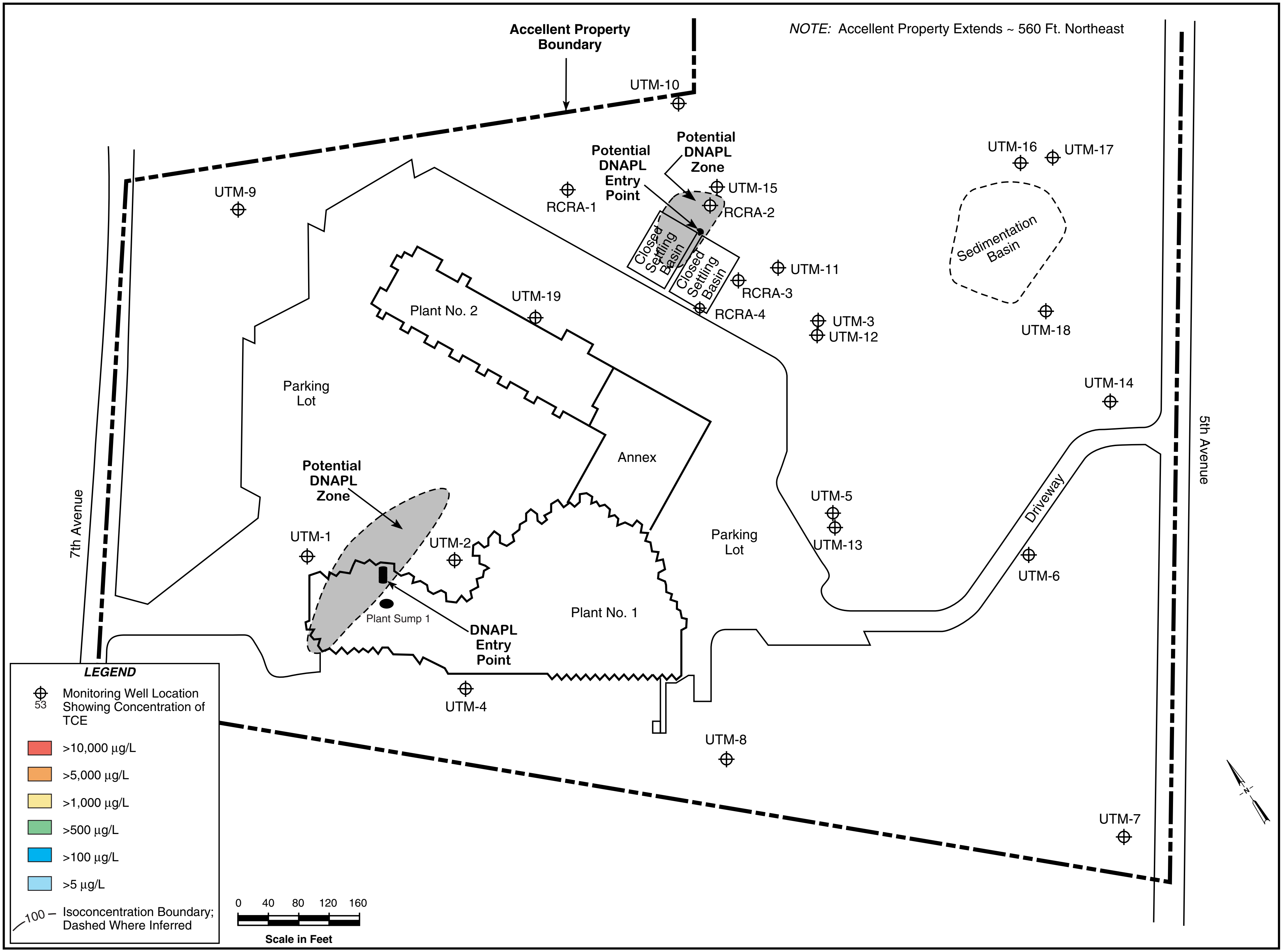


FIGURE 2 MAP SHOWING POTENTIAL DNAPL ENTRY LOCATIONS AND APPROXIMATE DNAPL ZONES

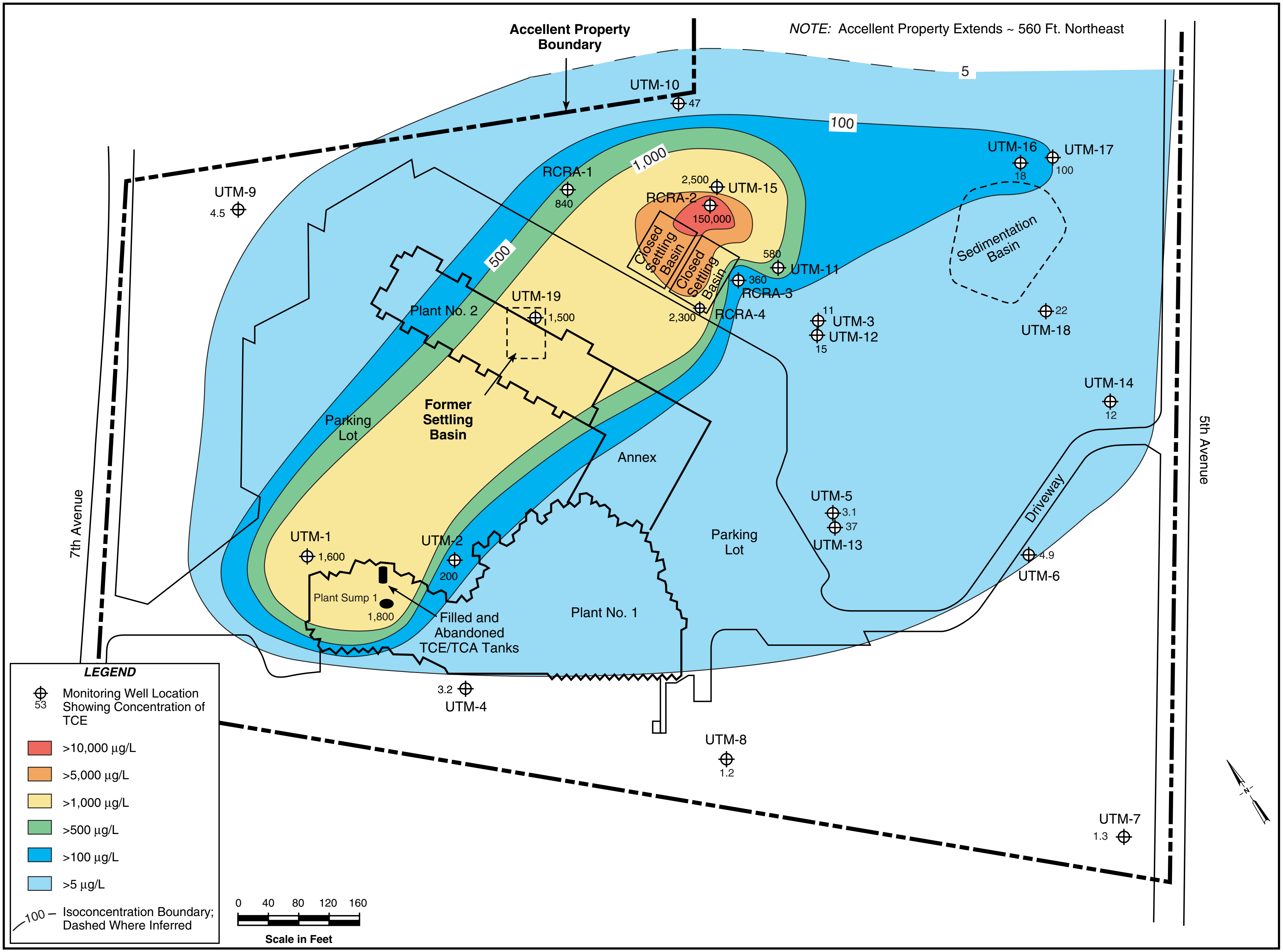


FIGURE 3 TRICHLOROETHENE ISOCONCENTRATION MAP; NOVEMBER 2007

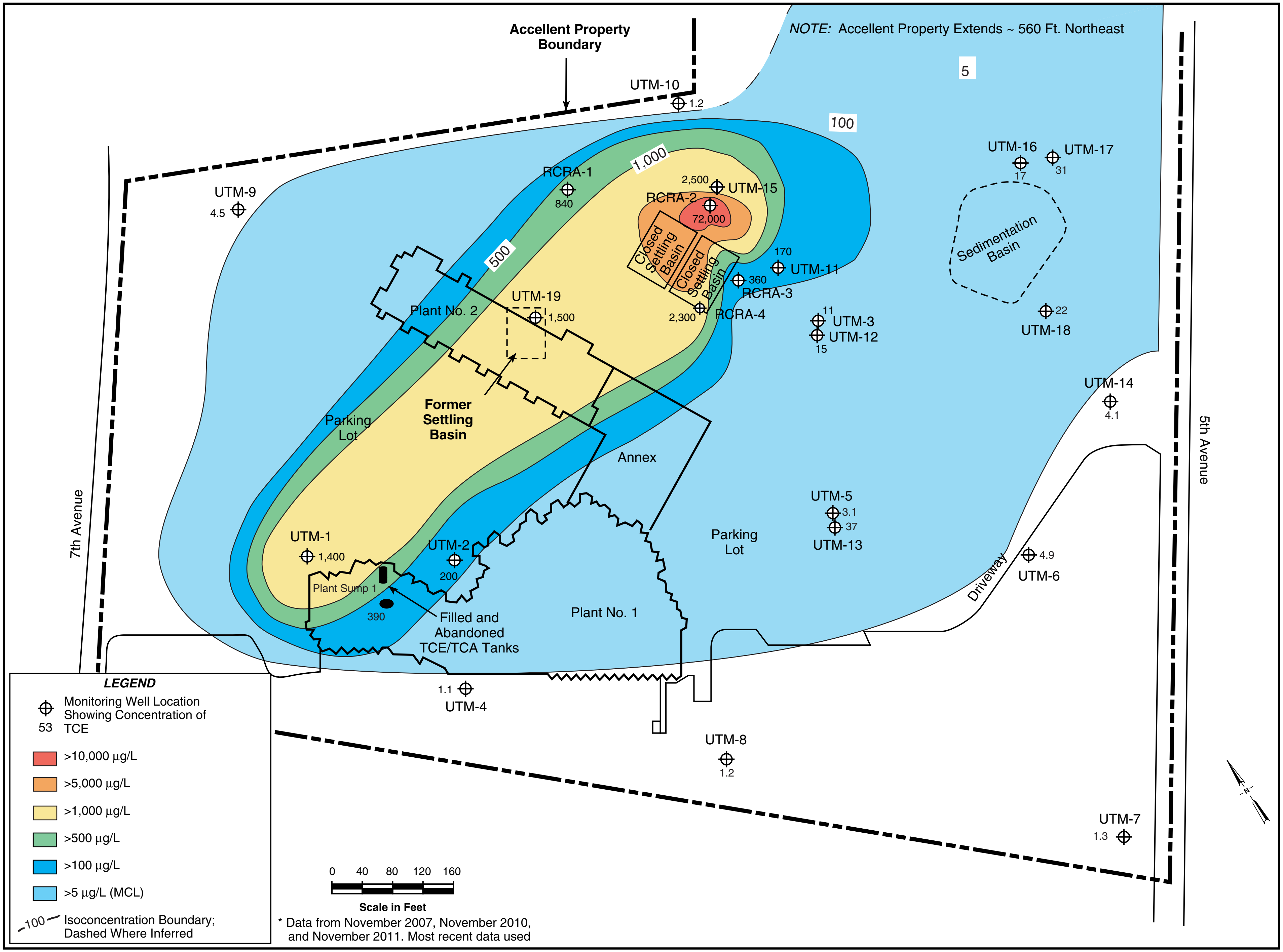


FIGURE 4 TRICHLOROETHENE ISOCONCENTRATION MAP - 2011

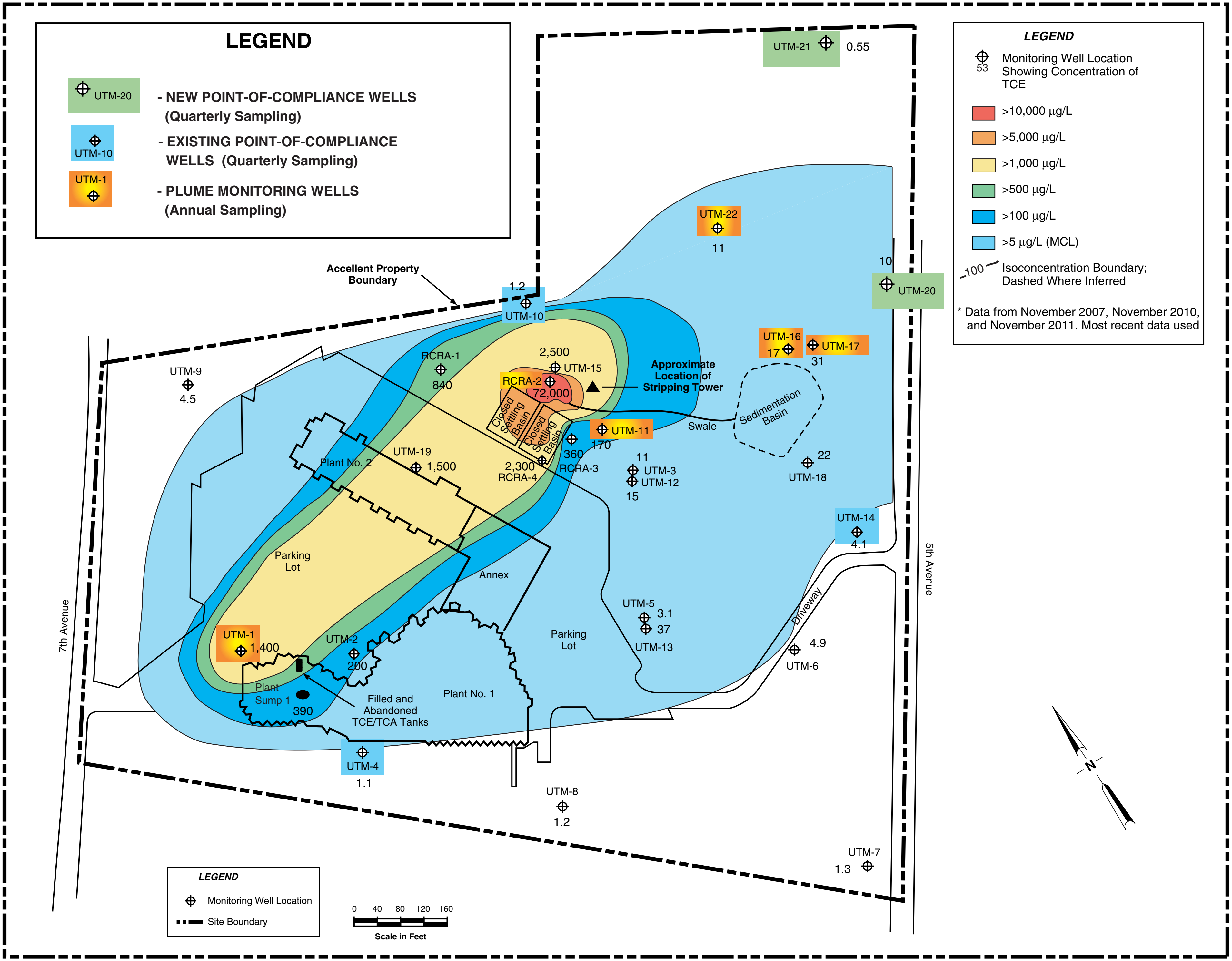


FIGURE 5 TRICHLOROETHENE ISOCONCENTRATION MAP - 2011

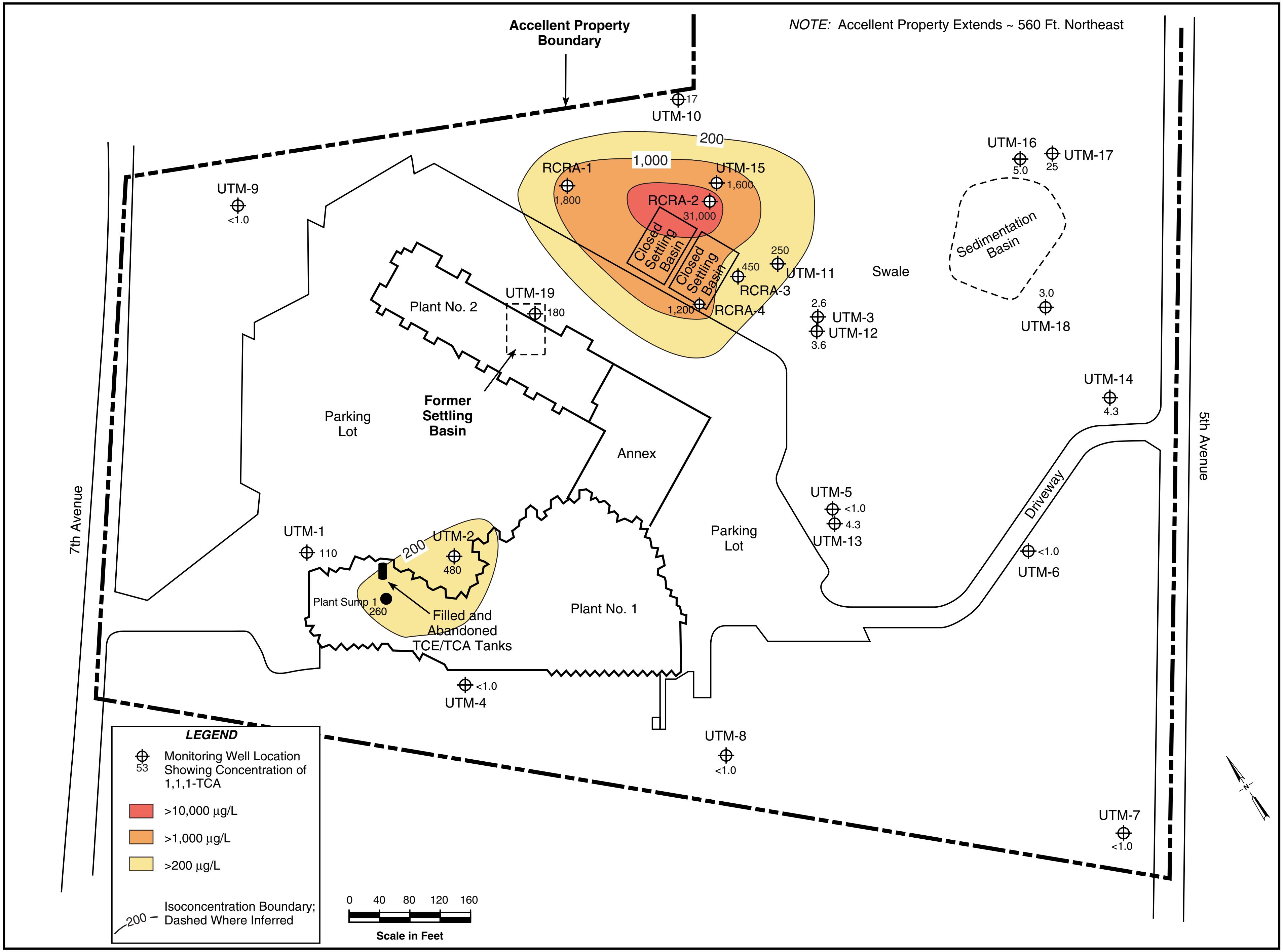


FIGURE 6 1,1,1-TRICHLOROETHANE ISOCONCENTRATION MAP; NOVEMBER 2007

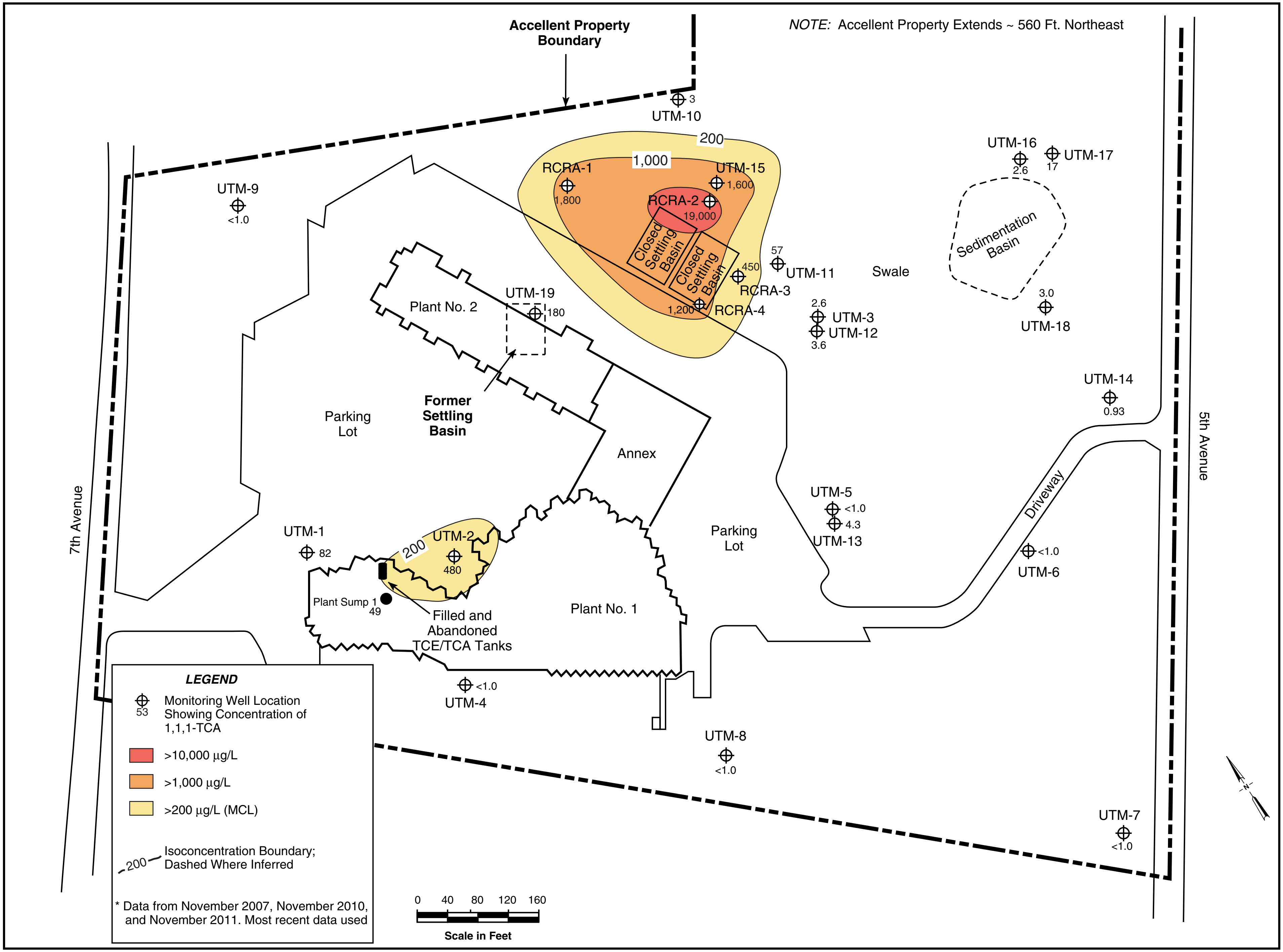


FIGURE 7 1,1,1-TRICHLOROETHANE ISOCONCENTRATION MAP - 2011

ATTACHMENT 1

Revised Fate & Transport Model Report

April 29, 2011

Mr. Thomas Marks, P.G.
Marks Environmental, Inc.
140 Bollinger Road
Elverson, PA 19520

RE: Fate and Transport Evaluation for Point of Compliance Concentrations
Accellent, Inc.
Collegeville, Pennsylvania

Dear Tom:

I am pleased to provide this report to Marks Environmental, Inc. (MEI) relative to the evaluation of the point of compliance concentrations of key wells on the Accellent property located on 7th Avenue in Trappe, Pennsylvania (site). This report has been prepared in accordance to the proposal provided to you dated February 25, 2011.

BACKGROUND

Three groundwater model documents have been provided as part of the groundwater modeling project for the subject site. In 2006, a capture zone analysis of the pumping well UTM-11 and a fate and transport model were provided. A revision to the fate and transport model (provided in a letter report dated June 9, 2010) was completed to better simulate the present pumping conditions and contaminant plume configuration. Some minor modifications of the model parameters were made to achieve a better simulation. These changes were discussed in the June 26, 2010 letter from MEI to the United States Environmental Protection Agency (USEPA). Based on review of the June 26, 2010 letter, the USEPA required additional documentation to better understand the model construction and site characteristics. These requests were formalized by the EPA in a September 26, 2010 letter. The September 26, 2010 letter was evaluated and a response was provided in a document (Addendum 1 - attached) dated October 28, 2010.

It is the intention of the client to establish site specific TCE compliance concentrations at the point of compliance wells based on a fate and transport evaluation. The point of compliance wells includes UTM-4, UTM-7, UTM-10, UTM-14, UTM-20, and UTM-21. These wells are located along the site boundaries. The point of compliance wells were chosen to act a sentinel wells for off-site sensitive receptors that include residential wells, a municipal well (CT-8), and surface water bodies. The TCE concentrations identified in the simulated fate and transport analyses discussed in this report provide the maximum TCE concentration that can be observed in the compliance well before a complete pathway exists in the groundwater to a sensitive receptor.

The tasks included in this project included a re-calibration of the model based on corrected groundwater elevation data (resulting from corrected casing elevation survey data). In addition, three new wells (UTM-20, UTM-21, and UTM-22) were installed on the property and were included in the calibration process.

Recent groundwater quality data collected from UTM-20 through UTM-22 was also incorporated into the model calibration.

Once the model was calibrated with the available data, a fate and transport simulation was run to evaluate the existing plume configuration in the deep water-bearing zone. It should be noted that based on existing site characterization data, it is the deep water-bearing zone that contaminant migration is occurring. The upper shallow zone appears more as a perched condition. A semi-confining zone appears to be separating the upper and lower water-bearing zone.

UPDATED CALIBRATION

The original groundwater model and all subsequent model simulations were constructed from the base groundwater model domain and boundary conditions provided on Figure 1. The Groundwater Modeling Systems (GMS) software (Version 3.1 to 6.5) was used during the modeling process and portions of the base model domain were extracted as part of the model presentations for the other model reports.

It is the intent of this model to evaluate the fate and transport of TCE under the existing site conditions. These conditions include the active pumping of UTM-1 (average pumping rate of 45 gallons per minute-gpm) and UTM-11 (average pumping rate of 10 gpm). In addition, a proximate municipal supply well (CT-8) was assigned an average pumping rate of 54 gpm based on 2010 pumping records provided by the Collegeville-Trappe Joint Public Works (CTJPW).

Corrected Casing Elevation Data

All previous groundwater models were calibrated to groundwater elevation data that was based on an arbitrary elevation point. The arbitrary elevation point resulted in groundwater elevations that were below the actual elevation by a length of approximately 65 feet. The casing elevation data was corrected and the groundwater elevations were re-calculated and incorporated into the model. Table 1 provides the corrected groundwater elevation data. In addition, Table 1 provides the recent groundwater elevation data from the newly installed monitoring wells UTM-20 through UTM-22. It should be noted that because of the existing hydrogeologic characteristics, the general groundwater flow configuration did not change as a result of the corrected casing elevation data. In addition, the relationship between the ground surface and the water table did not change since all elevations changes were relative to each other. The general flow direction and drawdown zones remained similar to the earlier models.

Model Calibration

The revised groundwater model was calibrated to mean groundwater elevation data collected over a period of one-year (2009) during active pumping conditions and the data recently collected from UTM-20 through UTM-22. Table 1 provides a summary of this data. During this time the mean pumping rate of UTM- 1 was 45 gallons per minute (gpm) and UTM-11 was 10 gpm. Figure 1 presents the mean pumping conditions and the associated groundwater elevation contours over the domain of the model. Figure 2 provides the local groundwater elevation contours in the area of the site and the quantitative calibration statistics.

To achieve the calibration, the hydraulic conductivity of the geologic material, the recharge values, and the model boundary conditions were modified by trial and error to obtain the best calibration. It should be noted that calibration was difficult due to what appeared as a problem with several of the deep wells which appeared to be connected to both the shallow water-bearing zone and the deep water-bearing zone resulting in a "hybrid" groundwater elevation. The best available fit was obtained based on the available data. Table 2 provides the tabulation of the residual errors. Table 3 provides the hydraulic parameters that were used in the model.

FATE AND TRANSPORT SIMULATION UNDER PUMPING CONDITIONS

The simulated pumping wells used in the fate and transport model included UTM-1 (45 gpm) UTM-11 (10 gpm) and CT-8 (54 gpm). The CT-8 pumping rate was based on information provided by Mr. Joseph Hastings from the CTJWA. The configuration of the simulated groundwater elevation contours in the general area of the site is provided on Figure 3.

To simulate the migration of TCE in the model, the conceptual understanding of the site hydrogeologic characteristics were applied to the model. Figure 4 provides a schematic cross-section of the conceptual understanding of the migration of contaminants on the site. Based on data provided to me, it is my understanding that chlorinated solvent (TCE and TCA) leakage from the former underground storage tanks (USTs) under Plant 1 migrated downward and perched on the semi-confining layer. DNAPL from this area traveled into the aquifer soil and bedrock until the tanks were cleaned and closed in the 1970s. At the time of the discovery of the Plant 1 UST release a sump pump located in the basement of Plant 1 transferred water from the basement to a storm water swale adjacent to lined lagoons approximately 800 feet east of Plant 1. This discharge point for the Plant 1 sump was eliminated as part of the initial remedial measures. Based on shallow groundwater concentrations in the swale area, DNAPL potentially also exists in this area. Because a downward vertical gradient is evident on the site, the chlorinated solvents migrated through the semi-confining layer and into the deep water bearing zone where the contaminants migrated with the groundwater movement. Based on available site data, very little lateral migration is evident in the shallow unconfined zone.

The TCE concentrations and the aerial distribution of the concentrations released in the model are presented on Figure 5. The concentrations were based on groundwater quality data collected during November 2007 by MEI. The simulated TCE concentrations were released in layer 1 of the model in polygons as constant sources. The model allowed the concentrations to migrate downward through the semi-confining layer and into the deep water-bearing zone. The hydraulic

conductivity (horizontal and vertical) of layer 2 and layer 3 in the model (semi-confining zone) was adjusted to get the simulated 30-year migration distribution of TCE in layer 3 of the model to match the concentrations observed in the monitoring wells. Figure 6 presents the simulated existing TCE concentrations in layer 3 of the model after a period of 30-years. Table 4 presents a comparison of the observed TCE concentrations in the monitoring wells compared to the simulated concentrations after 30-years. It should be noted that the simulated TCE plume reached a steady state (no further outward migration) after a period of approximately 18 years.

Sorption and decay parameters were used for the TCE migration simulation. Table 5 provides the parameters used in the model for TCE.

It should be noted that TCA has similar concentrations and migration characteristics (sorption and decay) as TCE and, therefore, the simulations provided for TCE is likely to be very similar to TCA. Therefore, TCA was not included in the fate and transport simulation.

EVALUATION OF COMPLIANCE WELL CONCENTRATIONS

Several off-site sensitive receptors exist that include a municipal supply well (CT-8) located approximately 800 feet south southeast of the site. In addition, a surface water body (surface stream) exists east of the site approximately 1000 feet, along with several down-gradient residential wells. It should be noted that statements in the June 1991 Weston report indicated that residential wells in the area have been connected to municipal water supplies. This was confirmed by MEI during the re-evaluation of the Remedial Design (MEI, 2000).

As part of a long term monitoring program, five point of compliance wells (UTM-4, UTM-10, UTM-14, UTM-20, and UTM-21) have been established for monitoring purposes to protect the sensitive receptors. Table 4 presents the most recent TCE concentrations identified in the compliance wells. Based on the existing TCE concentrations in the compliance wells and the associated fate and transport analyses (Figure 6), none of the sensitive receptors have been impacted and no complete pathway for contaminant migration exists.

To develop site-specific compliance levels that would continue to be protective of human health and ecological receptors, a fate and transport evaluation was conducted to simulate the TCE concentrations in the compliance wells that would result in a complete pathway to a sensitive receptor. This simulation was completed by increasing the simulated concentration of TCE in the source area. The source area, as discussed above, consists of the TCE area released in layer 1 of the model within the yellow shaded area (TCE concentration of 1000 to 10,000 ug/l) shown on Figure 5. The TCE concentration was increased incrementally in the model simulation until a pathway was completed to a sensitive receptor. The first sensitive receptor that was impacted with a TCE concentration at the PADEP MSC of 5.0 ug/l was the municipal well CT-8. This simulation is provided on Figure 7. The TCE concentrations in the point of compliance wells

based on the complete pathway simulated plume configuration were recorded and are provided on Figure 7.

Based on the fate and transport simulation, compliance well UTM-4 should not exceed a TCE concentration of 290 ug/l, well UTM-10 should not exceed a TCE concentration of 2300 ug/l, well UTM-14 should not exceed a TCE concentration of 230 ug/l, well UTM-20 should not exceed a TCE concentration of 178 ug/l, and well UTM-21 should not exceed a TCE concentration of 1150 ug/l.

In order to determine the effect of well UTM-11 on the capture of the TCE plume, a simulation with only UTM-1 pumping was completed. This simulation is shown in Figure 8 (groundwater elevation contours) and Figure 9 (30-year TCE fate and transport). Based on the simulation, it is apparent that UTM-11 has a limited effect on the horizontal capture of the TCE plume.

LIMITATONS

The modeling in this report was performed using a commercially available software package (Groundwater Modeling System-GMS, Version 6.5 developed by the United States Department of Defense) designed to simulate groundwater flow and the migration of contaminants. Where available, actual data from the site was utilized to calibrate the models and develop the graphical representations presented in this document. In other instances, assumptions were necessary to complete the model and limitations associated with the site data result in a level of uncertainty in the model predictions. Therefore, the results of the model predictions should be independently evaluated using actual site monitoring data.

The results of the model may differ from actual site conditions because of unknown subsurface conditions. The results of the models presented in this document shall not be construed to create any warranty or representation with regard to the site. The conclusions presented in this report were based on the services described, and not on scientific tasks or procedures beyond the described scope of services.

Should you need any additional explanation or discussion, please do not hesitate to contact me.

Regards,

Val F. Britton, P.G.

Enclosures

Val F. Britton, P.G. 326 Conestoga Road Wayne, PA 19087 610-964-1462   610-230-5123 fax
val@vbritton.com   www.vbritton.com

TABLE 1

Calculation of Mean Groundwater Elevations-2009 Pumping Conditions
Accellent, Inc.
Collegeville, Pennsylvania

Well ID	Casing Elevation (ft-msl)	1/30/2009 DTW (ft-msl)	2/19/2009 DTW (ft-msl)	3/30/2009 DTW (ft-msl)	4/10/2009 DTW (ft-msl)	5/28/2009 DTW (ft-msl)	6/30/2009 DTW (ft-msl)	7/29/2009 DTW (ft-msl)	8/18/2009 DTW (ft-msl)	9/16/2009 DTW (ft-msl)	10/9/2009 DTW (ft-msl)	11/10/2009 DTW (ft-msl)	1/24/2011 DTW (ft-msl)	Mean Depth To Water (ft)	Mean Groundwater Elevation (ft/msl)
UTM-1	311.78	>108.83	108.83	108.86	108.83	103.37	>108.95	109	107.28	97	109	100.32	No Data	105.83	205.95
UTM-4	307.96	94.95	95.56	95.81	62.74	87.86	93.25	96.03	89.09	86.9	89.31	84.97	No Data	88.77	219.19
UTM-7	285.89	29.93	29.31	31.67	27.95	29.06	30.02	32.46	28.14	27.0	27.93	28.08	No Data	29.23	256.66
UTM-8	304.49	42.32	40.81	45.45	38.2	40.85	43.01	47.00	38.35	37.0	38.46	38.99	No Data	40.95	263.54
UTM-9	322.07	32.3	31.32	34.16	33.2	30.86	31.85	34.48	31.04	28.67	30.97	28.26	No Data	31.56	290.51
UTM-10	302.9	44.93	43.45	44.94	42.5	42.52	45.47	45.71	43.03	29.00	42.22	41.28	No Data	42.28	260.62
UTM-11	293.65	89.31	89.60	89.22	81.76	76.37	81.70	91.43	78.78	81.50	81.22	73.79	No Data	83.15	210.50
UTM-14	273.21	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
UTM-16	283.35	13.41	13.09	13.23	12.83	13.09	12.92	13.00	12.64	12.11	12.4	12.73	No Data	12.86	270.49
UTM-17	284.01	36.31	36.97	36.71	35.2	36.25	36.67	37.53	35.44	37.10	34.77	35.94	No Data	36.26	247.75
UTM-20	288.93	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	244.35	44.58	244.35
UTM-21	306.93	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	251.24	55.69	251.24
UTM-22	302.53	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	245.28	57.25	245.28

DTW - Depth To Water from top of casing elevation
ft-msl - Feet Mean Sea Level

TABLE 2

Calibration - Residual Error (3/17/1989 Data)
Accellent, Inc.
Collegeville, Pennsylvania

Well ID	2009 Mean Observed Groundwater Elevation (Feet-MSL)	Simulated Groundwater Elevation (Feet-MSL)	Residual Error (Feet)
UTM-1	205.95	199.00	-6.95
UTM-4	219.19	244.25	25.06
UTM-7	256.66	248.79	-7.87
UTM-8	263.54	251.05	-12.49
UTM-9	290.51	256.44	-34.07
UTM-10	260.62	243.81	-16.81
UTM-11	210.50	240.78	30.28
UTM-17	247.75	241.99	-5.76
UTM-20*	244.35	240.41	-3.94
UTM-21*	251.24	241.38	-9.86
UTM-22*	245.28	241.59	-3.69

* DATA FROM JANUARY 24, 2011

Mean Residual Error:	-3.729
Absolute Mean Residual Error:	14.702
Root Mean Square Error:	18.313
Normilization	5.10%

Note:
Calibration was based on deep wells, many of which were actually open to model layer 1 and model layer 2 resulting in "hybrid" groundwater elevation measurements. It was evident where well pairs in close proximity to one another: one reprsenting the upper zone and the other the deeper zone - both with simlilar head elevations, yet were apparently screened in different hydrolgic units. This had an impact on the calibration of the deep zone (model layer 3). Calibration points were fit as close as possible through a trial and error method of adjustment of the hydraulic conductivity, recharge and model boundaries.

TABLE 3

Hydrogeologic Parameters
Accellent, Inc.
Borough of Trappe

	Layer 1 Unconfined Zone	Layer 2 Confining Transitional Zone	Layer 3 Confined Zone	Fracture Zone
Horizontal Hydraulic Conductivity (ft/day)	2	1	3	40
Horizontal Anisotropy Ratio (Kx/Ky)	1	1	1	0.5
Vertical Anisotropy Ratio (Kx/Kz)	1	1	1	1
Effective Porosity (Decimal %)	0.03	0.03	0.03	0.05

TABLE 4

Comparison of Observed TCE Concentrations and Simulated TCE Concentrations
Accellent, Inc.
Borough of Trappe

	Observed TCE Concentration (ug/l)	Simulated TCE Concentration (ug/l)	Difference in Concentration (ug/l)
UTM-1	1600	235	1365
UTM-4	3.2	0	3.2
UTM-7	1.3	0	1.3
UTM-8	1.2	0	1.2
UTM-9	4.5	0	4.5
UTM-10	47	110	-63
UTM-11	580	480	100
UTM-14	12	0	12
UTM-16	18	12	6
UTM-17	100	64	36
UTM-20	11	8	3
UTM-21	0	2.2	-2.2
UTM-22	7.2	8.9	-1.7

Observed TCE concentrations are based on November 2007 Analytical Data - except for UTM-20 through UTM-22 which is based on February 10, 2011 sampling.

TABLE 5

MT3DMS Parameter Estimations for TCE
Accellent, Inc.
Borough of Trappe

Sorption

Solution: Linear Isotherm

Contaminant	Partition Coefficient (1) Koc ml/g	Partition Coefficient (1) Koc ft3/mg	Total Organic Carbon (2) foc mg/kg	Total Organic Carbon (2) foc %	Distribution Coefficient (3) Kd ml/g	Distribution Coefficient (3) Kd ft3/mg	Effective Porosity (4) n %	Aquifer Dry Bulk Density (5) rB lbs/ft3	Aquifer Dry Bulk Density (5) rB g/ml	Aquifer Dry Bulk Density (5) rB mg/ft3
TCE	93.0000	0.00000325500	NA	0.0050	0.4650	0.0000000163	0.0500	125.0000	2.0000	5670.0000
	0.0000	0.00000000000	0.0000	0.0000	0.0000	0.0000000000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.00000000000	0.0000	0.0000	0.0000	0.0000000000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.00000000000	0.0000	0.0000	0.0000	0.0000000000	0.0000	0.0000	0.0000	0.0000
x	0.0000	0.00000000000	0.0000	0.0000	0.0000	0.0000000000	0.0000	0.0000	0.0000	0.0000

Decay (Biodegradation)

Solution: First-Order Irreversible Kinetic Reaction

Contaminant	Half Life (6) t^.5 days		Half Life (6) t^.5 years	Rate Constant (Dissolved) 1/d	Rate Constant (Sorbed) 1/d
TCE	665.0000		1.8219	0.0015	0.0015
0	0.0000		0.0000	#DIV/0!	#DIV/0!
0	0.0000		0.0000	#DIV/0!	#DIV/0!
0	0.0000		0.0000	#DIV/0!	#DIV/0!
	0.0000		0.0000	#DIV/0!	#DIV/0!

GMS Chemical Reaction Package Input Parameters

Contaminant	Bulk Density (mg/ft3)	1st Sorption Constant (ft3/mg)	Rate Constant (Dissolved)	Rate Constant (Sorbed)
TCE	**5670.0000**	**0.00000001628**	**0.0015**	**0.0015**

References

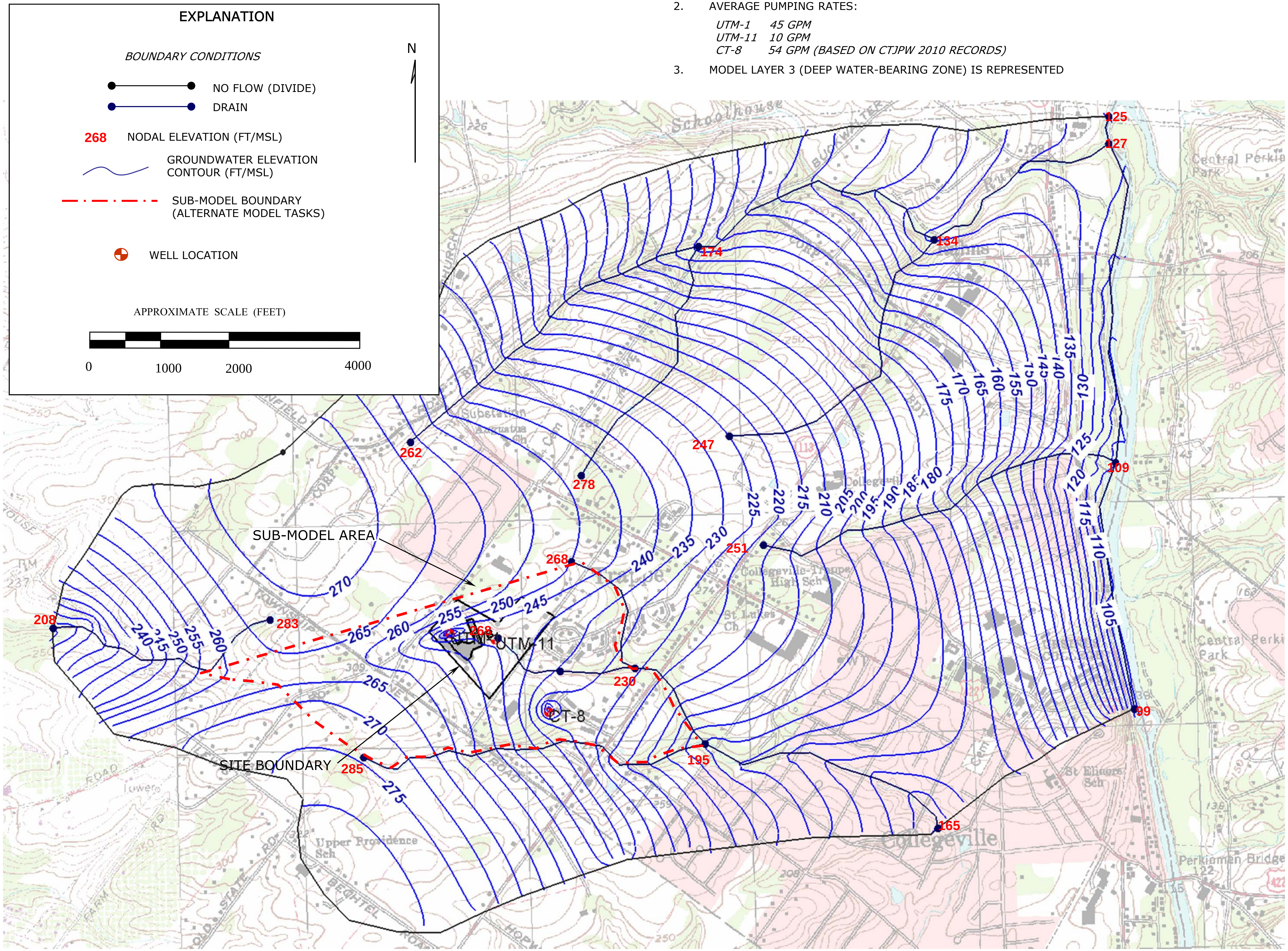
1 *Technical Guidance Manual, Pennsylvania's Land Recycling Program, 1997, PADEP, Appendix A, Table 5*
2 *Based on assumption of average organic carbon content of rock material*
3 *Howard, P.H. et al, 1991, Handbook of Environmental Degradation Rates, Lewis Publishers,*
4 *Freeze, R.A. and Cherry, J.A., 1979, Groundwater, Prentice-Hall, Inc., p 604*
5 *Nielsen, D.M.,1991, Practical Handbook of Ground-Water Monitoring, Lewis Publishers, p 400-401.*
6 *Howard, P.H. et al, 1991, Handbook of Environmental Degradation Rates, Lewis Publishers, p.653*

NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. AVERAGE PUMPING RATES:

   UTM-1 45 GPM
   UTM-11 10 GPM
   CT-8 54 GPM (BASED ON CTJPW 2010 RECORDS)

3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED



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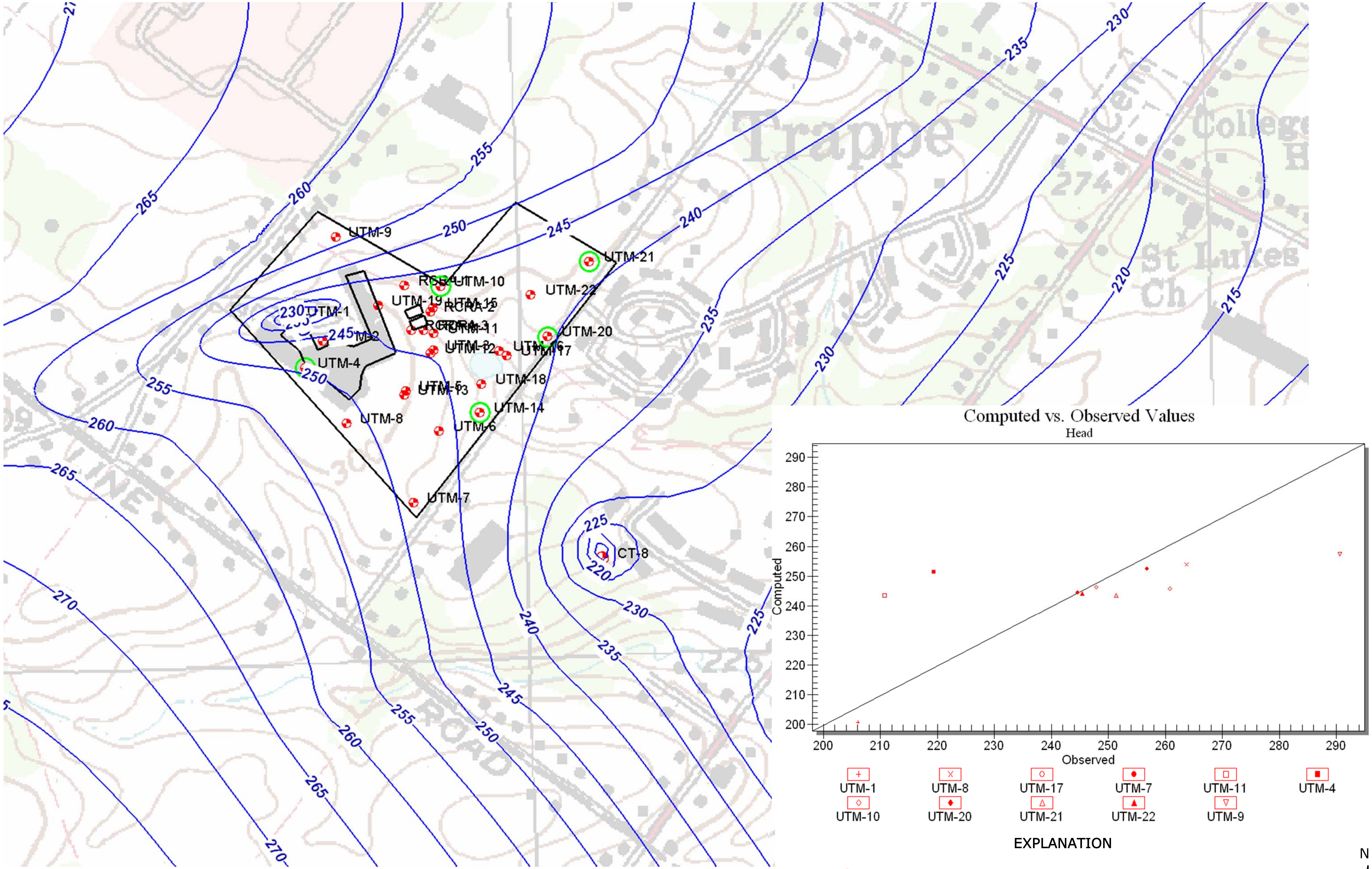
GENERAL MODEL CONSTRUCTION
BASE MODEL BOUNDARY CONDITIONS
GROUNDWATER ELEVATION CONTOURS BASED ON MEAN 2009 WATER LEVEL DATA
ACTIVE PUMPING CONDITIONS

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	1



NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. AVERAGE PUMPING RATES:

   UTM-1 45 GPM
   UTM-11 10 GPM
   CT-8 54 GPM (BASED CTJPW 2010 RECORDS)

3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED

EXPLANATION

WELL LOCATION

COMPLIANCE WELL

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

MEAN ERROR:	-3.729
MEAN ABS. ERROR:	14.702
ROOT MEAN SQUARED:	18.313

APPROXIMATE SCALE (FEET)

0 300 600 1200

N

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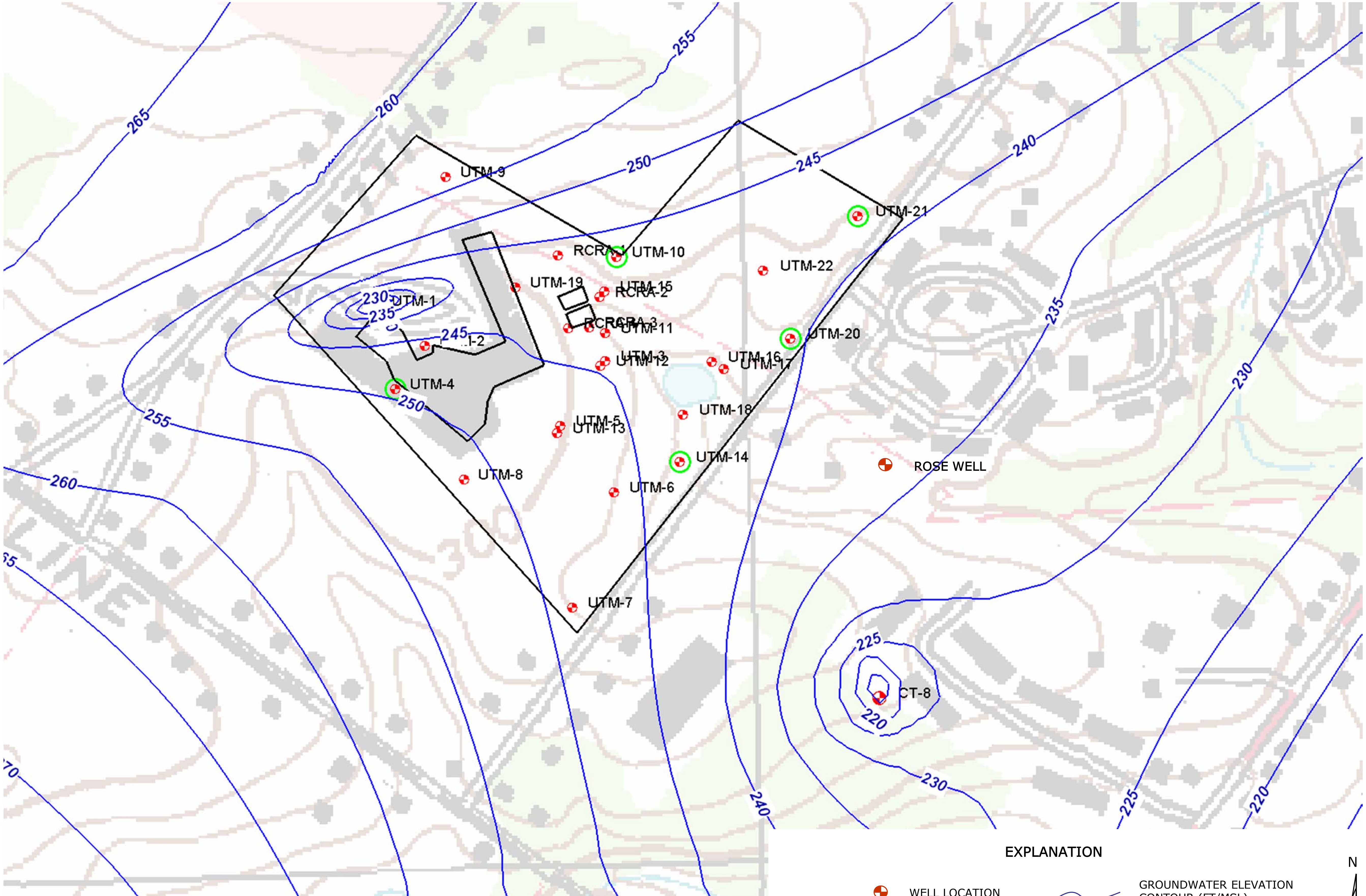
MODEL CALIBRATION
PUMPING CONDITIONS
GROUNDWATER ELEVATION CONTOURS (FT/MSL)
BASED ON 2009 MEAN GROUNDWATER ELEVATION DATA

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	2



NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. AVERAGE PUMPING RATES:

   UTM-1 45 GPM
   UTM-11 10 GPM
   CT-8 54 GPM (BASED CTJPW 2010 RECORDS)

3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED

EXPLANATION

WELL LOCATION

COMPLIANCE WELL

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

APPROXIMATE SCALE (FEET)

0 250 500 1000

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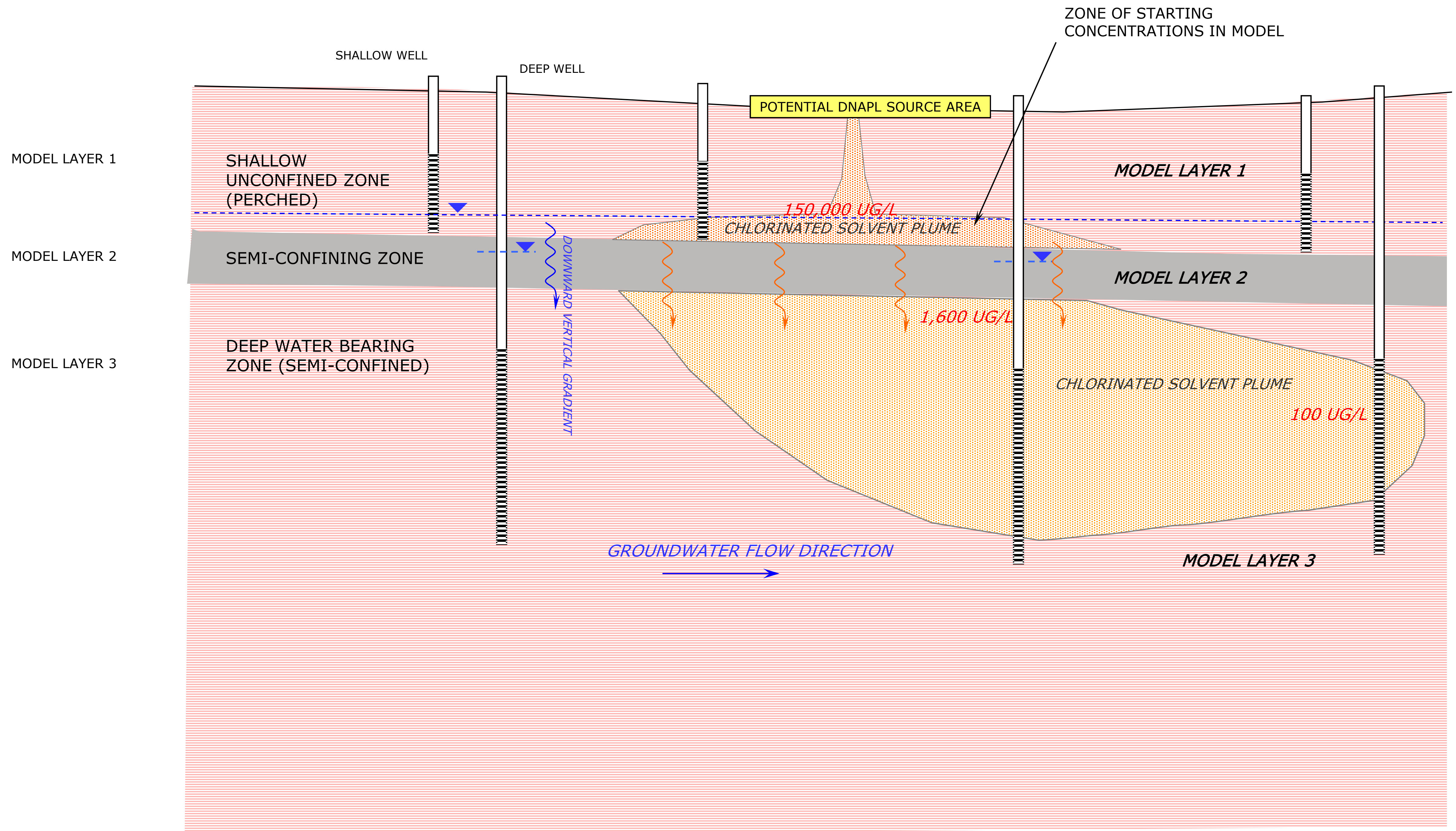
MODEL CALIBRATION
PUMPING CONDITIONS (UTM-1 AT 45 GPM/ UTM-11 AT 10 GPM)
GROUNDWATER ELEVATION CONTOURS (FT/MSL)
BASED ON MEAN GROUNDWATER ELEVATION DATA

DATE 04-16-12

DRAWN BY VFB

PROJECT LOCATION
ACCELENT, INC.
COLLEGEVILLE, PENNSYLVANIA

FIGURE NUMBER 3



NOT TO SCALE

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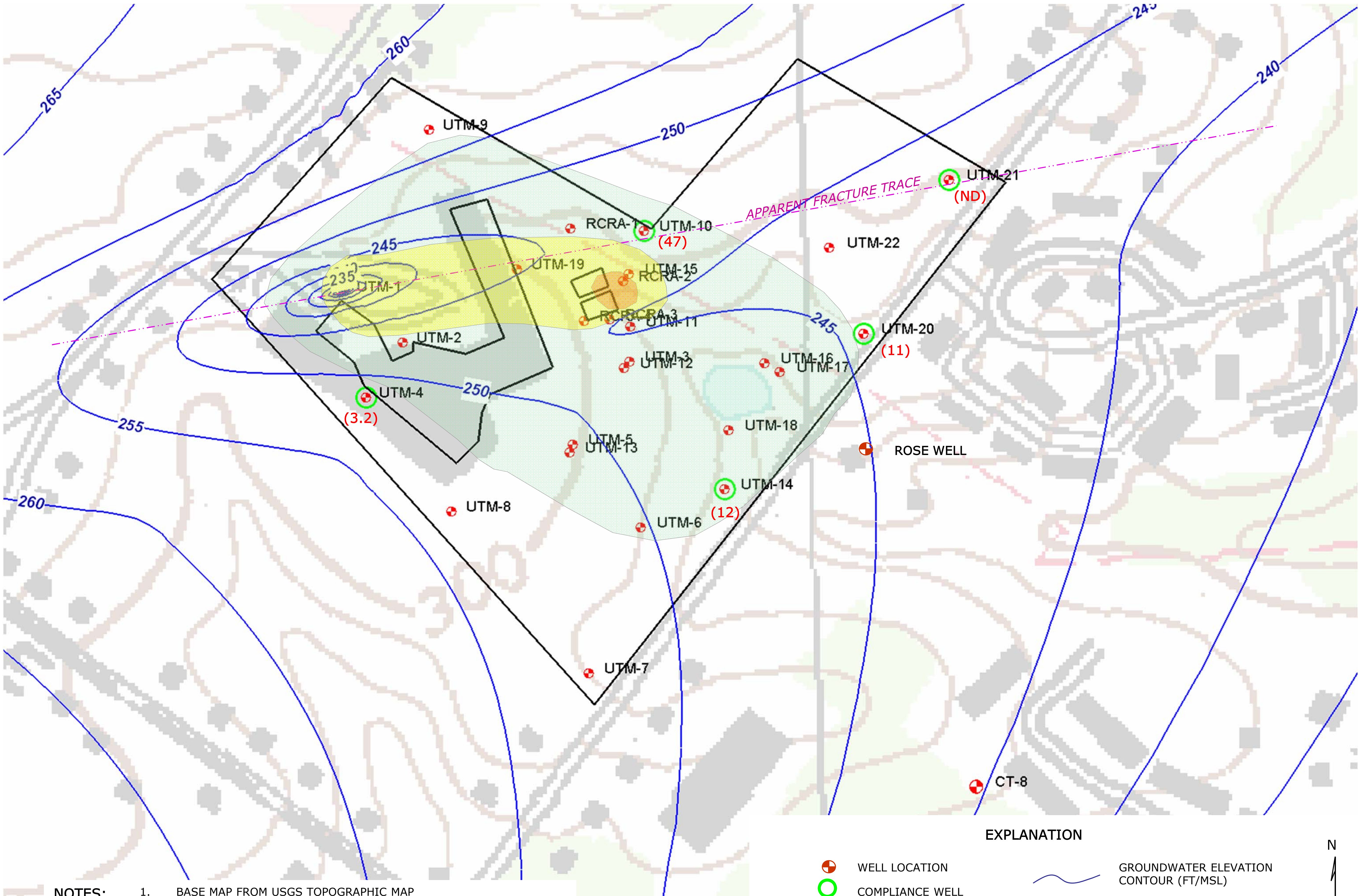
SCHEMATIC CROSS SECTION
CONCEPTUAL UNDERSTANDING OF CONTAMINANT MIGRATION
USED IN MODEL SIMULATION

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	4



NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. STARTING TCE CONCENTRATIONS BASED ON NOVEMBER 2007 CONCENTRATIONS (MEI REPORT FIGURE 4). CONCENTRATIONS RELEASED IN LAYER 1 OF MODEL IN SOURCE SINK POLYGON AS A CONSTANT SOURCE.
3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED BY GROUNDWATER ELEVATION CONTOURS.

APPROXIMATE SCALE (FEET)

0 150 300 600

EXPLANATION

WELL LOCATION

COMPLIANCE WELL

(12) TCE CONCENTRATION OBSERVED ON SITE (COMPOSITE DATES) – UG/L

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

STARTING TCE CONCENTRATIONS (LAYER 1)

- >10,000 UG/L
- 1,000 TO 10,000 UG/L
- 5.0 TO 1000 UG/L

N

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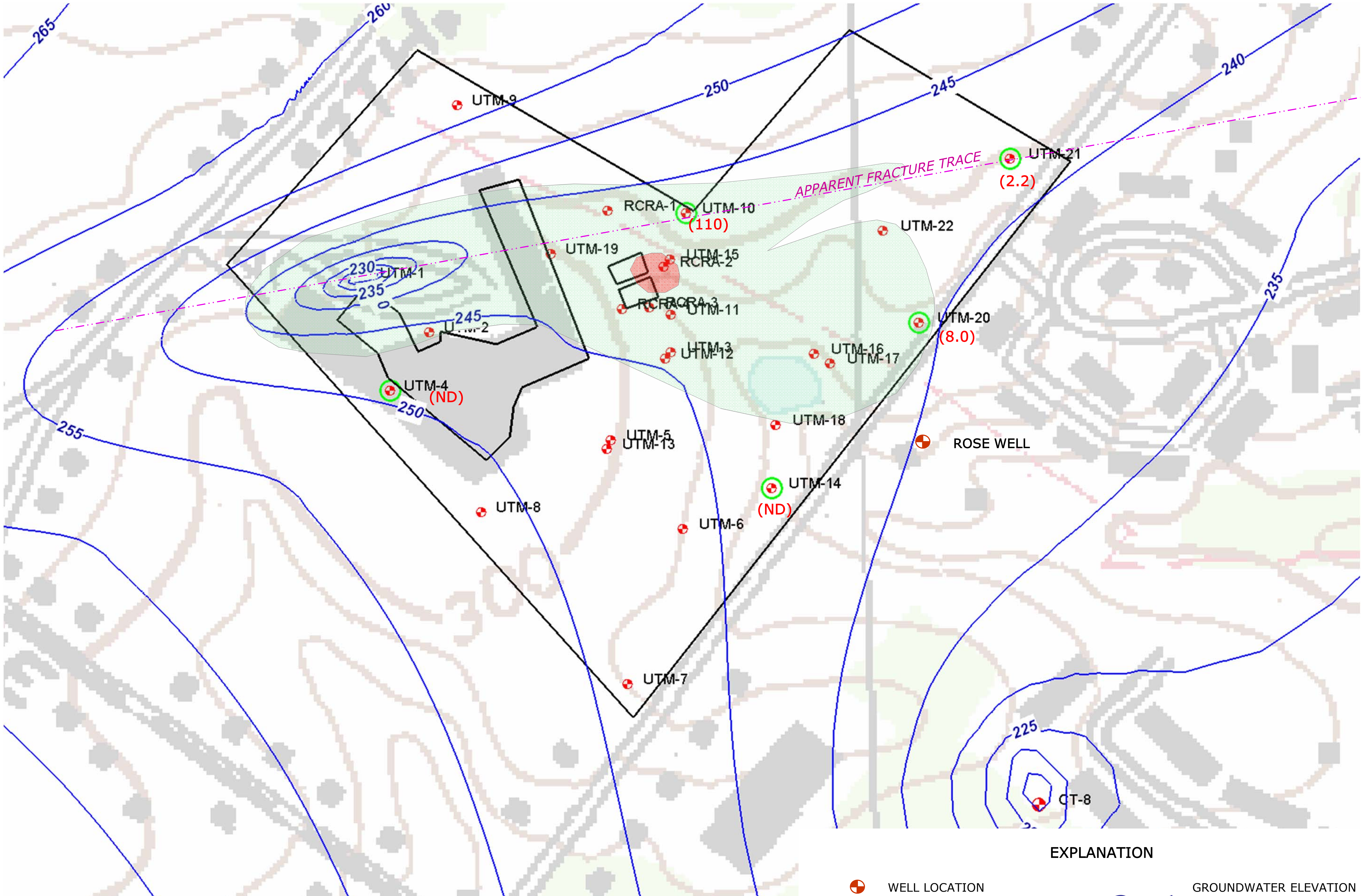
STARTING CONCENTRATIONS (CONSTANT) RELEASED IN LAYER 1(SHALLOW UNCONFINED ZONE-PERCHED) BASED ON EXISTING CONCENTRATIONS OBSERVED ON SITE

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	5



EXPLANATION

WELL LOCATION

COMPLIANCE WELL

(8.0) SIMULATED TCE CONCENTRATION (UG/L)

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

SIMULATED TCE CONCENTRATIONS (LAYER 3)

>1,000 UG/L

5.0 TO 1000 UG/L

N

NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. PLUME REPRESENTS SIMULATED TCE CONCENTRATION IN DEEP WATER BEARING ZONE (LAYER 3)
3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED BY GROUNDWATER ELEVATION CONTOURS.

APPROXIMATE SCALE (FEET)

0 150 300 600

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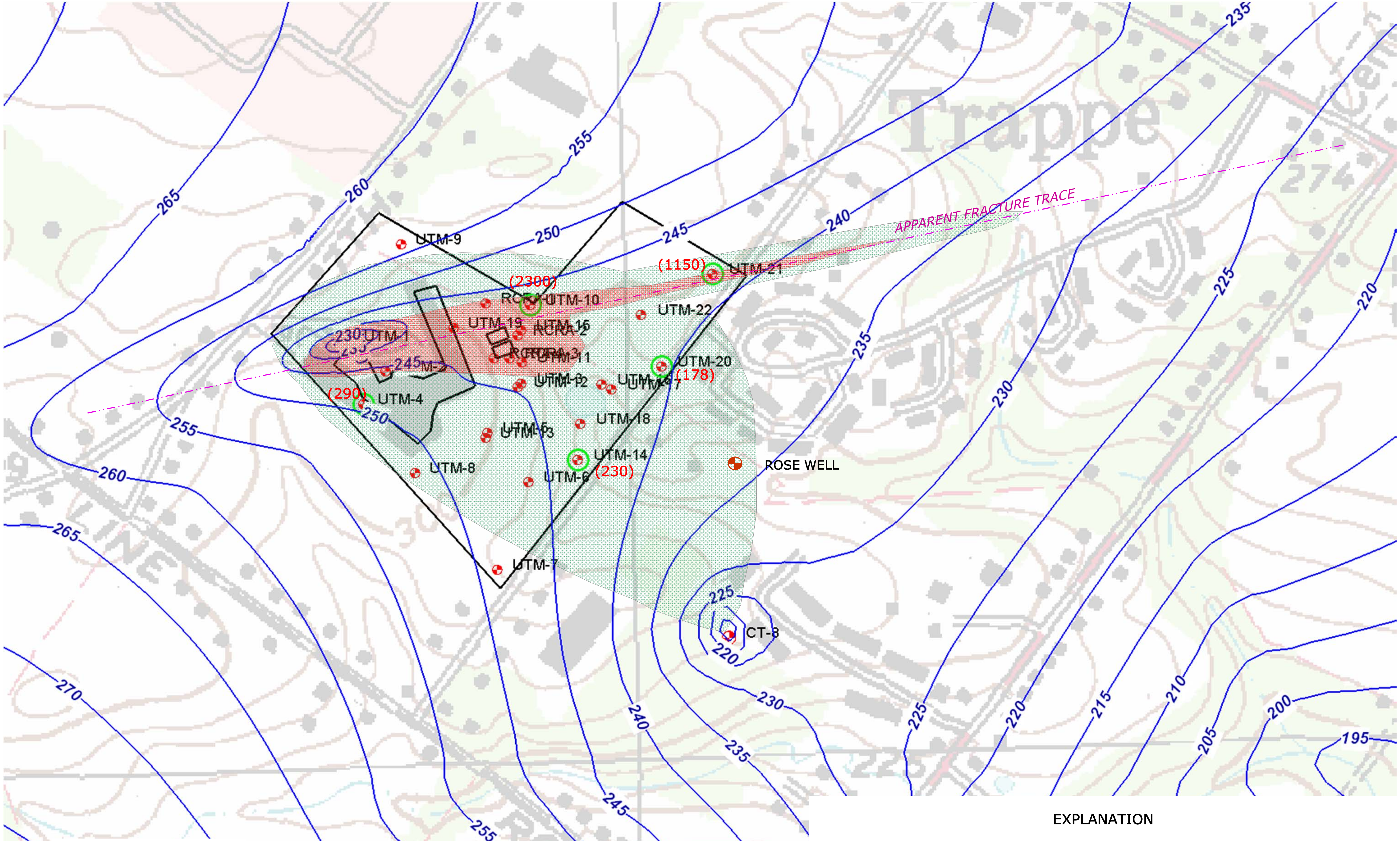
FATE AND TRANSPORT OF TCE
LAYER 3(DEEP WATER BEARING ZONE –SEMI-CONFINED)
30-YEAR MIGRATION TIME
BASED ON EXISTING CONCENTRATIONS RELEASED IN LAYER 1

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	6



NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. PLUME REPRESENTS SIMULATED TCE CONCENTRATION IN DEEP WATER BEARING ZONE (LAYER 3)
3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED BY GROUNDWATER ELEVATION CONTOURS.
4. CONCENTRATION IN LAYER 1 WAS INCREASED UNTIL RECEPTOR CT-8 WAS IMPACTED.

APPROXIMATE SCALE (FEET)

0 300 600 1200

EXPLANATION

WELL LOCATION

COMPLIANCE WELL

(230) SIMULATED TCE CONCENTRATION (UG/L) IN COMPLIANCE WELL COMPLETING CONTAMINANT PATHWAY

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

SIMULATED TCE CONCENTRATIONS (LAYER 3)

>1,000 UG/L

5.0 TO 1000 UG/L

N

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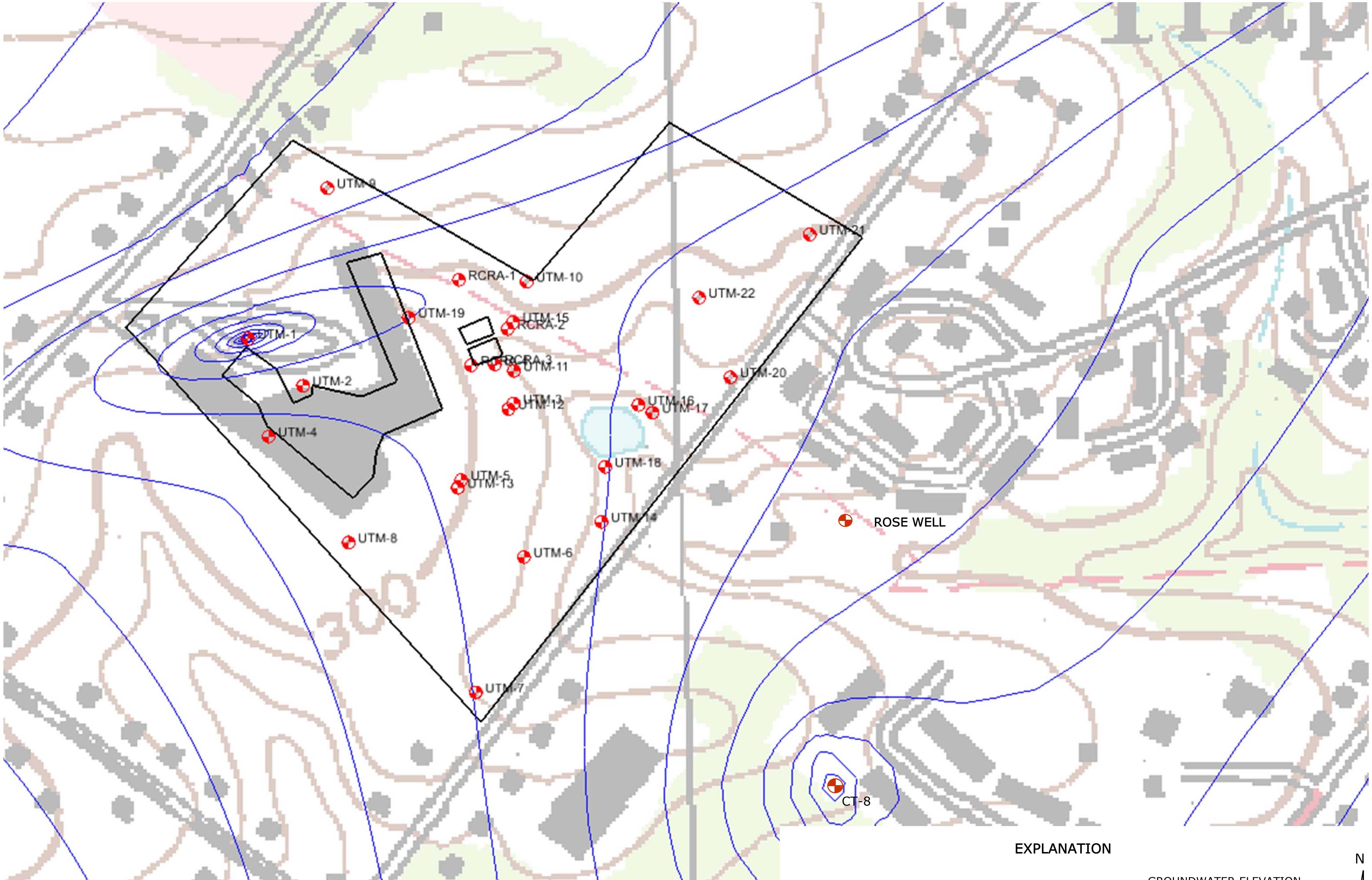
FATE AND TRANSPORT ANALYSES - SIMULATED TCE CONCETRATIONS BASED ON INCREASE OF CONCENTRATION IN LAYER 1 SOURCE AREA (AREA OF >1000 -YELLOW AREA - SEE FIGURE 5) UTM-1 AT 45 GPM AND UTM-11 AT 10 GPM

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	7



EXPLANATION

WELL LOCATION

COMPLIANCE WELL

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

APPROXIMATE SCALE (FEET)

0 250 500 1000

N

NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. AVERAGE PUMPING RATES:

UTM-1	*45 GPM*
UTM-11	*10 GPM*
CT-8	*54 GPM (BASED CTJPW 2010 RECORDS)*

3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED

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MODEL CALIBRATION
PUMPING CONDITIONS (UTM-1 AT 45 GPM)
GROUNDWATER ELEVATION CONTOURS (FT/MSL)
BASED ON MEAN GROUNDWATER ELEVATION DATA

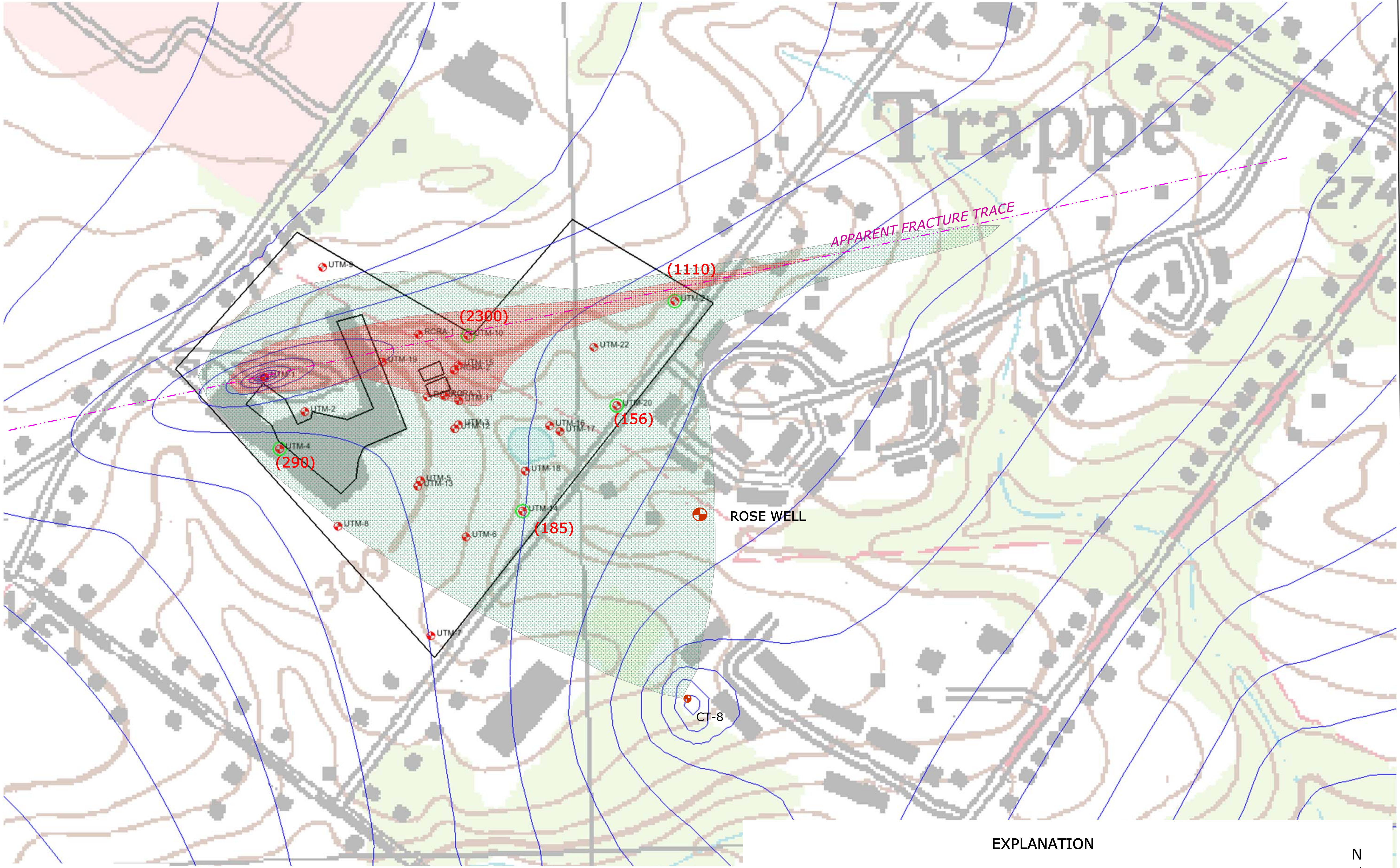
DATE 04-16-12

DRAWN BY VFB

PROJECT LOCATION

ACCELENT, INC.
COLLEGEVILLE, PENNSYLVANIA

FIGURE NUMBER **8**



NOTES:

1. BASE MAP FROM USGS TOPOGRAPHIC MAP
2. PLUME REPRESENTS SIMULATED TCE CONCENTRATION IN DEEP WATER BEARING ZONE (LAYER 3)
3. MODEL LAYER 3 (DEEP WATER-BEARING ZONE) IS REPRESENTED BY GROUNDWATER ELEVATION CONTOURS.
4. CONCENTRATION IN LAYER 1 WAS INCREASED UNTIL RECEPTOR CT-8 WAS IMPACTED.

APPROXIMATE SCALE (FEET)

0 300 600 1200

EXPLANATION

WELL LOCATION

COMPLIANCE WELL

(230) SIMULATED TCE CONCENTRATION (UG/L) IN COMPLIANCE WELL COMPLETING CONTAMINANT PATHWAY

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

SIMULATED TCE CONCENTRATIONS (LAYER 3)

>1,000 UG/L

5.0 TO 1000 UG/L

N

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FATE AND TRANSPORT ANALYSES - SIMULATED TCE CONCETRATIONS BASED ON INCREASE OF CONCENTRATION IN LAYER 1 SOURCE AREA (AREA OF >1000 -YELLOW AREA - SEE FIGURE 5) UTM-1 PUMPING AT 45 GPM

DATE	04-16-12
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	9

October 28, 2010

Mr. Thomas Marks, P.G.
140 Bollinger Road
Elverson, PA 19520

RE: Addendum 1
Additional Documentation for Revised Groundwater Model Report (June 9, 2010)
Accellent, Inc.
Collegeville, Pennsylvania

Dear Tom:

Based on my conference call with Mr. Jack Wang of the USEPA on September 12, 2010 and the subsequent follow-up letter dated September 26, 2010, I have provided additional documentation that was requested relative to the revised groundwater model for the subject site.

Background

Three groundwater model documents have been provided as part of the groundwater modeling project for the subject site. In 2006, a capture zone analysis of the pumping well UTM-11 and a fate and transport model were provided. A revision to the fate and transport model (provided in a letter report dated June 9, 2010) was completed to better simulate the present pumping conditions and contaminant plume configuration. Some minor modifications of the model parameters were made to achieve a better simulation. These changes were discussed in the June 9, 2010 letter report. Based on review of the June 9, 2010 report, the USEPA required additional documentation to better understand the model construction and site characteristics. These requests were formalized in the September 26, 2010 letter. The documentation provided in this report address those requests.

UPDATED CALIBRATION

The original groundwater model and all subsequent model simulations were constructed from the base groundwater model domain and boundary conditions provided on Figure 1. The Groundwater Modeling Systems (GMS) software (Version 3.1 to 6.5) was used during the modeling process and portions of the base model domain were extracted as part of the model presentations for the model reports.

Static Groundwater Conditions

The revised groundwater model was calibrated to static groundwater conditions collected on March 17, 1989 during a time when all on-site pumping wells were turned off. Figure 2 presents the static groundwater conditions with the revised parameters presented in the June 9, 2010 model report. Table 1 presents the error summary of this calibration and Table 2 presents the sensitivity of the revised parameters.

Mean Pumping Conditions

The revised groundwater model was calibrated to mean groundwater elevation data collected over a period of one-year during active pumping conditions. Table 3 provides a summary of this data. During this time the mean pumping rate of UTM- 1 was 45 gallons per minute (gpm) and UTM-11 was 10 gpm. Figure 3 presents the mean pumping conditions and the associated groundwater elevation contours. Table 4 presents the error summary of this calibration and Table 5 presents the sensitivity of the revised parameters.

FATE AND TRANSPORT SIMULATION UNDER NON-PUMPING CONDITIONS

The simulated pumping wells used in the revised fate and transport model (June 9, 2010 report) were turned off and the model was allowed to run under non-pumping conditions to evaluate the migration of the existing TCE plume. All of the TCE concentrations and source areas provided in the June 9, 2010 revised report (Table 2) were maintained. Figure 4 presents the results of the simulation.

RE-EVALUATION OF CAPTURE ZONE ANALYSES

The revised groundwater model was run using a pumping rate of 45 gpm in well UTM-1 and 10 gpm in well UTM-11. Particle tracking was used to evaluate the zone of influence of the combined wells. Figure 5 presents the results of the particle tracking. Based on the results, it is apparent that a similar zone of influence is maintained in the revised model when compared to the original zone of influence analyses (documented in 2006 report). The existing pumping rates maintain hydraulic control of the existing TCE groundwater plume.

CONCEPTUAL MODEL DESIGN

Figure 6 presents a schematic cross section of the conceptual model design used to construct the groundwater model. Based on existing site-specific data (groundwater elevation measurements and a formal aquifer pumping test), it was determined that two water bearing zones existed at the site; an upper perched system and a deep semi-confined system. Based on groundwater elevation measurement comparisons between shallow and deep nested wells, it was apparent that a downward vertical gradient existed.

Based on the conceptual hydrogeologic model, TCE concentrations appeared significantly higher in the upper perched zone than in the deep semi-confined zone. It was apparent that the original release had moved downward until it reached the top of the semi-confining zone layer (Model Layer 2) at which point it migrated into the deep semi-confined zone (Model Layer 3) as a

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dissolved phase constituent ultimately migrating with the groundwater flow direction in the deep zone.

It is my opinion that the water in the shallow perched zone is not continuous and as a result does not exhibit strong horizontal movement. This has limited the horizontal migration of the highly concentrated TCE (150,000 ug/l) in the upper perched zone. It is apparent that vertical migration of TCE downward through the semi-confining layer does exist based on the vertical concentration distribution.

To simulate this condition in the revised fate and transport model, a simulated constant source of contamination was released both at the deep well locations and in the upper zone. The simulated source released in the deep wells simulated the mean dissolved concentrations observed in the deep wells. The concentrations and wells utilized for this type of constant source release is provided in the June 9, 2010 report (Table 2). The higher concentrations observed in the upper perched zone were released in the model as concentrations in two polygons as MODFLOW recharge. One polygon was assigned a concentration of 150,000 ug/l and the other was assigned a concentration of 1,000 ug/l. Figure 6 presets the configuration of the polygons. The polygon configuration was based on observed data. All of the revised fate and transport simulations were based on this model construction.

Should you need any additional explanation or discussion, please do not hesitate to contact me.

Regards,

Val F. Britton, P.G.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
VAL F. BRITTON
GEOLOGIST
NO. 001358

Enclosures

TABLE 1

Calculation of Mean Groundwater Elevations-2009 Pumping Conditions
Accellent, Inc.
Collegeville, Pennsylvania

Well ID	Casing Elevation (ft-msl)	1/30/2009 Elevation (ft-msl)	2/19/2009 Elevation (ft-msl)	3/30/2009 Elevation (ft-msl)	4/10/2009 Elevation (ft-msl)	5/28/2009 Elevation (ft-msl)	6/30/2009 Elevation (ft-msl)	7/29/2009 Elevation (ft-msl)	8/18/2009 Elevation (ft-msl)	9/16/2009 Elevation (ft-msl)	10/9/2009 Elevation (ft-msl)	11/10/2009 Elevation (ft-msl)	Mean Depth To Water (ft)	Mean Groundwater Elevation (ft/msl)
UTM-1	246	>108.83	108.83	108.86	108.83	103.37	>108.95	109	107.28	97	109	100.32	105.83	140.17
UTM-4	245	94.95	95.56	95.81	62.74	87.86	93.25	96.03	89.09	86.9	89.31	84.97	88.77	156.23
UTM-7	221.5	29.93	29.31	31.67	27.95	29.06	30.02	32.46	28.14	27.0	27.93	28.08	29.23	192.27
UTM-8	237	42.32	40.81	45.45	38.2	40.85	43.01	47.00	38.35	37.0	38.46	38.99	40.95	196.05
UTM-9	255	32.3	31.32	34.16	33.2	30.86	31.85	34.48	31.04	28.67	30.97	28.26	31.56	223.44
UTM-10	238	44.93	43.45	44.94	42.5	42.52	45.47	45.71	43.03	29.00	42.22	41.28	42.28	195.72
UTM-11	224	89.31	89.60	89.22	81.76	76.37	81.70	91.43	78.78	81.50	81.22	73.79	83.15	140.85
UTM-16	216	13.41	13.09	13.23	12.83	13.09	12.92	13.00	12.64	12.11	12.4	12.73	12.86	203.14
UTM-17	218	36.31	36.97	36.71	35.2	36.25	36.67	37.53	35.44	37.10	34.77	35.94	36.26	181.74

TABLE 2

Sensativity Analyses of Hydrogeologic Parameters - Static Conditions
Accelent, Inc.
Collegeville, Pennsylvania

Layer 1			Layer 2			Layer 3			Fracture Zone					Mean	Root Mean
Hk (ft/d)	Ha (ratio)	Va (ratio)	Hk (ft/d)	Ha (ratio)	Va (ratio)	Hk (ft/d)	Ha (ratio)	Va (ratio)	Hk (ft/d)	Ha (ratio)	Va (ratio)	Recharge (ft/day)	Mean Error (ft)	Absolute Error (ft)	Squared Error (ft)
5	1	1	0.1	1	1	10	1	1	100	0.5	1	0.0011	Non-Convergence		
3	1	1	0.5	1	1	5	1	1	50	0.5	1	0.0011	-88.68	88.68	88.68
3	1	1	0.5	1	1	4	1	1	25	0.5	1	0.0011	Non-Convergence		
3	1	1	0.5	1	1	4	1	1	30	0.5	1	0.0011	-31.37	31.37	31.37
2	1	1	0.5	1	1	4	1	1	50	0.5	1	0.0011	-21.61	21.61	21.61
2	1	1	0.5	1	1	4	1	1	40	0.5	1	0.0011	-8.75	5.97	7.61
2	1	1	1	1	1	3	1	1	30	0.5	1	0.0011	-15.61	16.61	16.61
2	1	1	1	1	1	3	1	1	40	0.5	1	0.0011	-0.574	1.182	1.405
2	1	1	1	1	1	3	1	1	20	0.5	1	0.0011	Non-Convergence		
2	1	1	1	1	1	3	1	1	39	0.5	1	0.0011	0.945	1.75	2.097
2	1	1	1	1	1	3	1	1	41	0.5	1	0.0011	-2.77	2.87	3.505
5	1	1	1	1	1	3	1	1	40	0.5	1	0.0011	-0.573	1.82	1.405
8	1	1	1	1	1	3	1	1	40	0.5	1	0.0011	-0.598	1.9	2.32
2	1	1	3	1	1	3	1	1	40	0.5	1	0.0011	-0.151	1.62	2.15

Hk - Horizontal conductivity Ha - Horizontal anisotropy ratio Va - Vertical anisotropy ratic

Shaded row represents parameters used in model.

TABLE 3

Calibration - Residual Error (3/17/1989 Data)
Accellent, Inc.
Collegeville, Pennsylvania

Well ID	3/17/1989 Observed Groundwater Elevation (Feet-MSL)	Simulated Groundwater Elevation (Feet-MSL)	Residual Error (Feet)
UTM-1	209.3	208.4	-0.9
UTM-2	209	208.07	-0.93
UTM-3	207.2	206.13	-1.07
UTM-4	209.2	208.54	-0.66
UTM-5	207.4	207.01	-0.39
UTM-6	206.5	206.79	0.29
UTM-7	206.2	207.79	1.59
UTM-8	207.1	208.26	1.16
UTM-11	207.8	205.98	-1.82
UTM-15	208.8	205.79	-3.01

Mean Residual Error:	-0.574
Absolute Mean Residual Error:	1.182
Root Mean Square Error:	1.405

TABLE 4

Sensativity Analyses of Hydrogeologic Parameters - Mean 2009 Pumping Conditions
Accelent, Inc.
Collegeville, Pennsylvania

Layer 1			Layer 2			Layer 3			Fracture Zone			Recharge	Mean	Mean Absolute	Root Mean Squared
Hk (ft/d)	Ha (ratio)	Va (ratio)	Hk (ft/d)	Ha (ratio)	Va (ratio)	Hk (ft/d)	Ha (ratio)	Va (ratio)	Hk (ft/d)	Ha (ratio)	Va (ratio)	(ft/day)	Error (ft)	Error (ft)	Error (ft)
2	1	1	1	1	1	3	1	1	40	0.5	1	0.0011	-0.574	1.182	1.405
2	1	1	1	1	1	3	1	1	50	0.5	1	0.0011	-78.76	78.76	78.76
2	1	1	1	1	1	3	1	1	30	0.5	1	0.0011	-38.21	38.21	38.21
2	1	1	1	1	1	3	1	1	41	0.5	1	0.0011	-8.65	12.43	14.76
2	1	1	1	1	1	3	1	1	39	0.5	1	0.0011	-7.52	14.74	18.93
2	1	1	1	1	1	3	1	1	40	1	1	0.0011	-4.76	12.54	23.91
2	1	1	1	1	1	3	1	1	40	0.1	1	0.0011	6.78	21.56	32.43
2	1	1	1	1	1	3	1	1	40	0.5	2	0.0011	-0.0557	1.169	1.511
2	1	1	1	1	1	5	1	1	40	0.5	1	0.0011	-67.77	67.77	67.77
2	1	1	1	1	1	3	2	1	40	0.5	1	0.0011	-0.0566	1.233	1.61

Hk - Horizontal conductivity   Ha - Horizontal anisotropy ratio   Va - Vertical anisotropy ratio

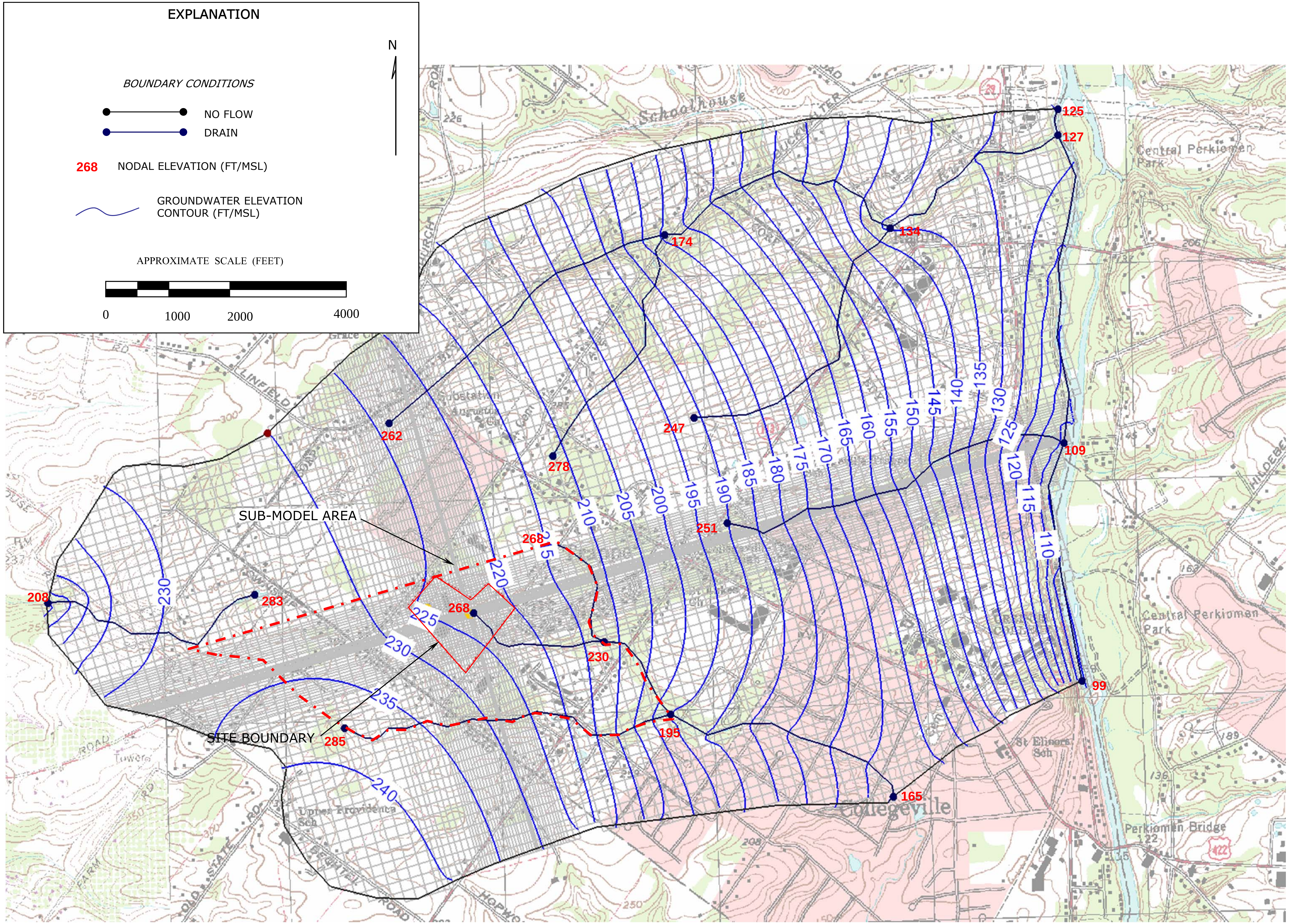
Shaded row represents parameters used in the model

TABLE 5

Calibration - Residual Error (Mean 2009 Groundwater Elevation Pumping Data)
Accellent, Inc.
Collegeville, Pennsylvania

Well ID	Mean Observed Groundwater Elevation (Feet-MSL)	Simulated Groundwater Elevation (Feet-MSL)	Residual Error (Feet)
UTM-1	140.17	142.14	1.97
UTM-4	156.23	183.23	27
UTM-7	192.27	187.77	-4.5
UTM-8	196.05	186.89	-9.16
UTM-11	140.95	180.54	39.59
UTM-15	208.8	180.64	-28.16
UTM-17	181.74	184.76	3.02

Mean Residual Error:	4.267
Absolute Mean Residual Error:	16.211
Root Mean Square Error:	21.426



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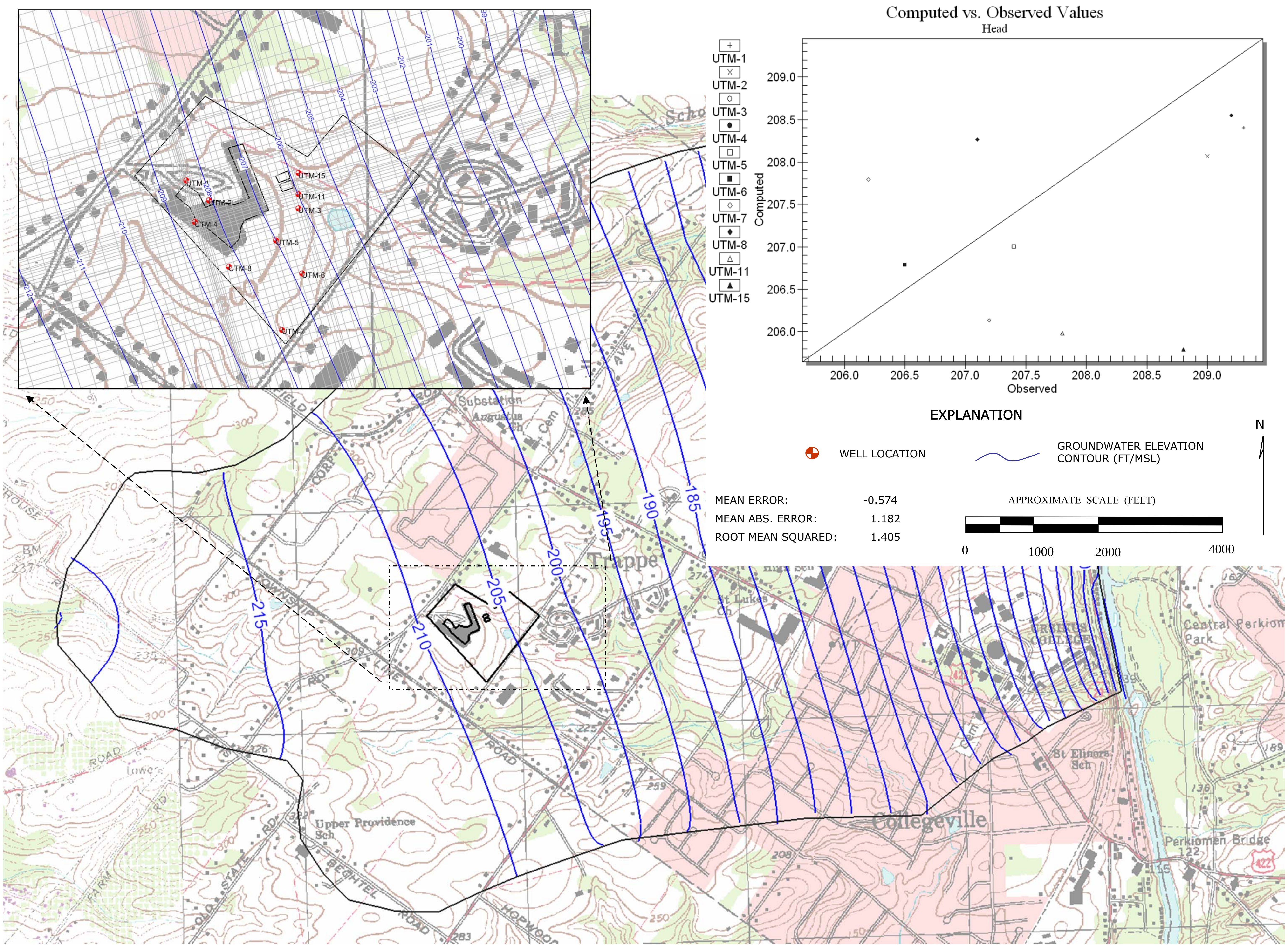
GENERAL MODEL CONSTRUCTION
BASE MODEL BOUNDARY CONDITIONS
GROUNDWATER ELEVATION CONTOURS BASED ON
MEAN 2009 WATER LEVEL DATA

DATE	10-28-10
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	1



EXPLANATION

WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

MEAN ERROR:	-0.574
MEAN ABS. ERROR:	1.182
ROOT MEAN SQUARED:	1.405

APPROXIMATE SCALE (FEET)

0 1000 2000 4000

N

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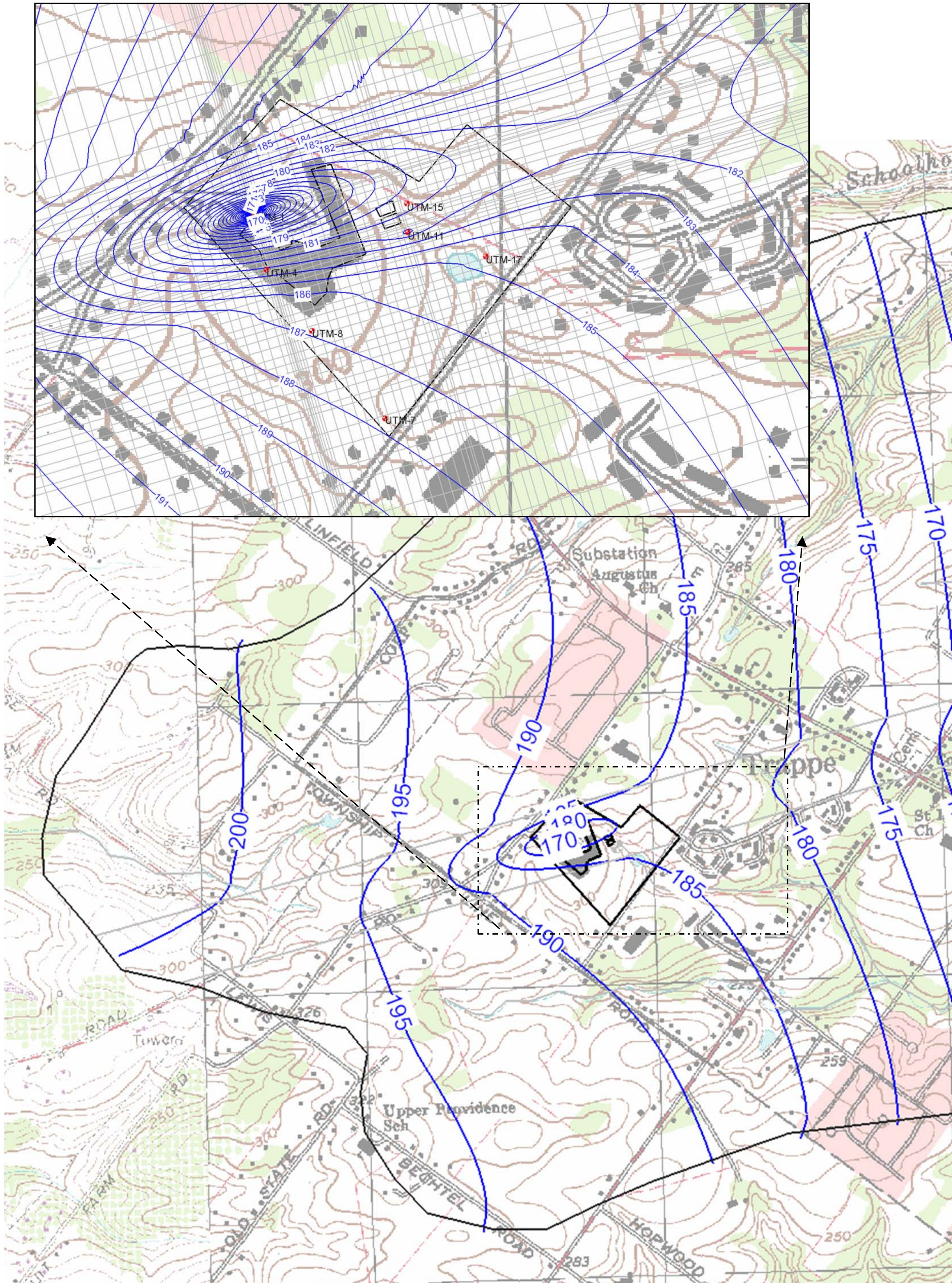
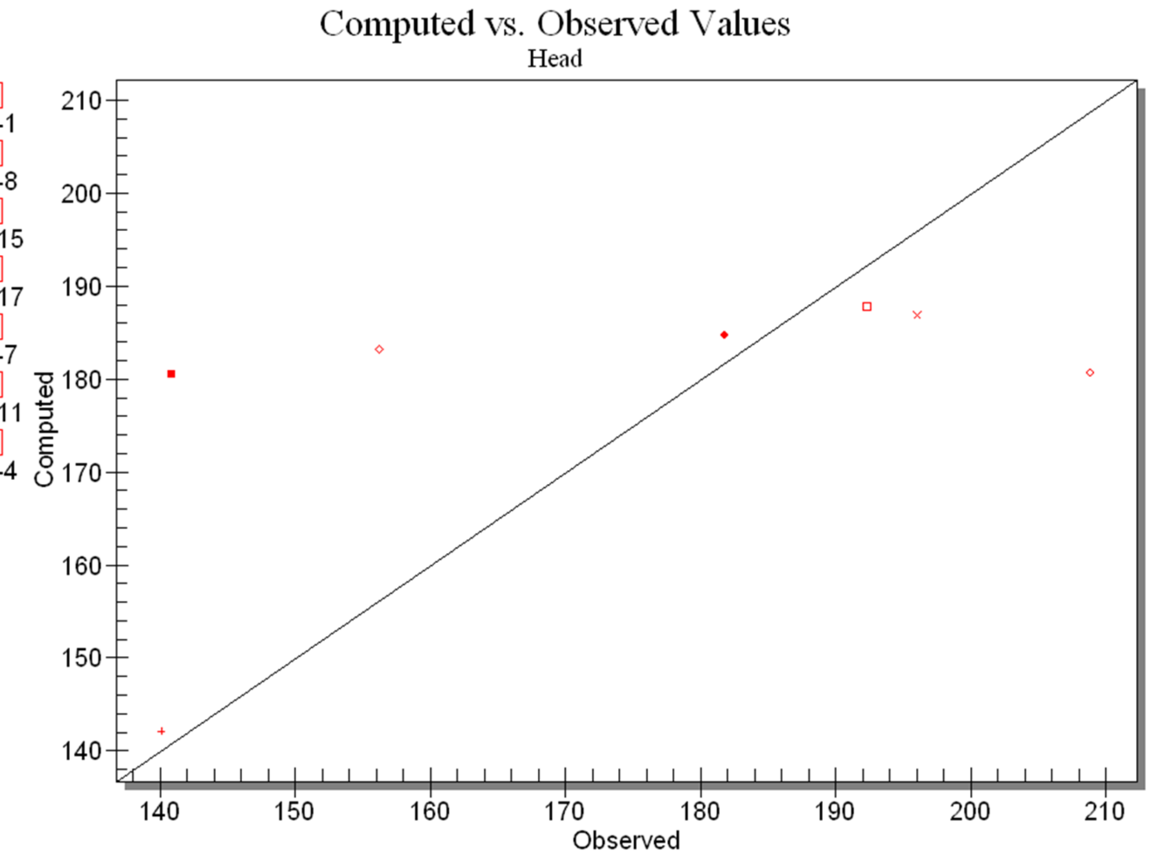
MODEL CALIBRATION
STATIC CONDITIONS (NO PUMPING)
GROUNDWATER ELEVATION CONTOURS (FT/MSL)
BASED ON MARCH 17, 1989 GROUNDWATER ELEVATION DATA

DATE	10-28-10
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	2





EXPLANATION

WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (FT/MSL)

MEAN ERROR:	4.267
MEAN ABS. ERROR:	16.211
ROOT MEAN SQUARED:	21.426

APPROXIMATE SCALE (FEET)

0 1000 2000 4000

N

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MODEL CALIBRATION
MEAN PUMPING CONDITIONS
GROUNDWATER ELEVATION CONTOURS (FT/MSL)
UTM-1 PUMPING AT 45 GPM AND UTM-11 AT 10 GPM

DATE 10-28-10

DRAWN BY VFB

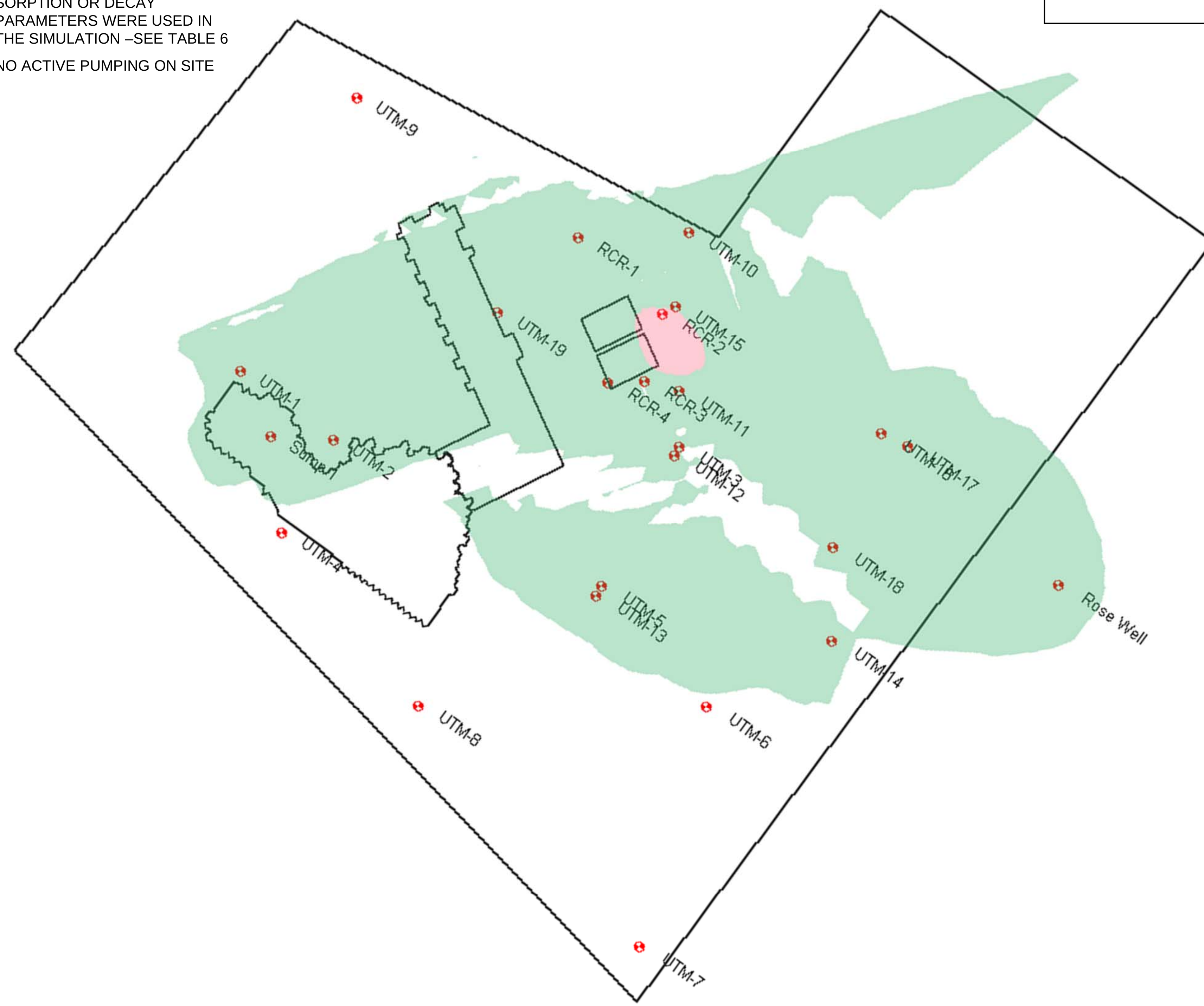
PROJECT LOCATION

ACCELENT, INC.
COLLEGEVILLE, PENNSYLVANIA

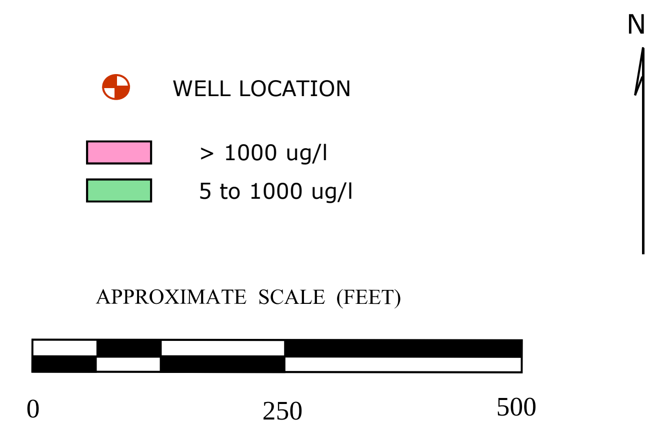
FIGURE NUMBER **3**

NOTES

1. PLUME REPRESENTS THE TCE CONFIGURATION AFTER 30 YEARS WITH A CONSTANT SOURCE DISCHARGE TO THE SATURATED ZONE.
2. SORPTION OR DECAY PARAMETERS WERE USED IN THE SIMULATION –SEE TABLE 6
3. NO ACTIVE PUMPING ON SITE



EXPLANATION



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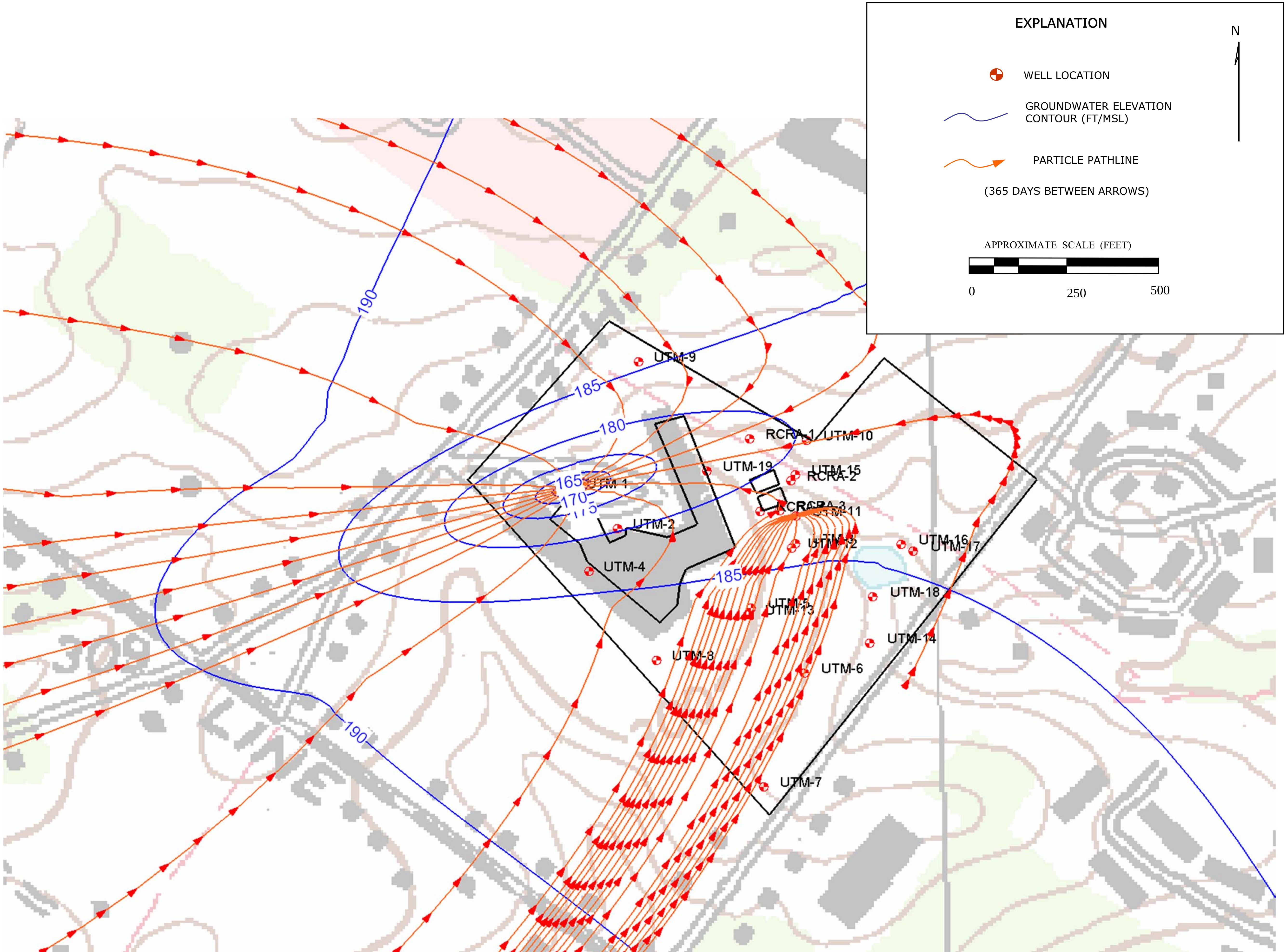
TCE FATE AND TRANSPORT SIMULATION
NO ACTIVE PUMPING ON SITE
30-YEAR SIMULATION

DATE	10-28-10
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	4



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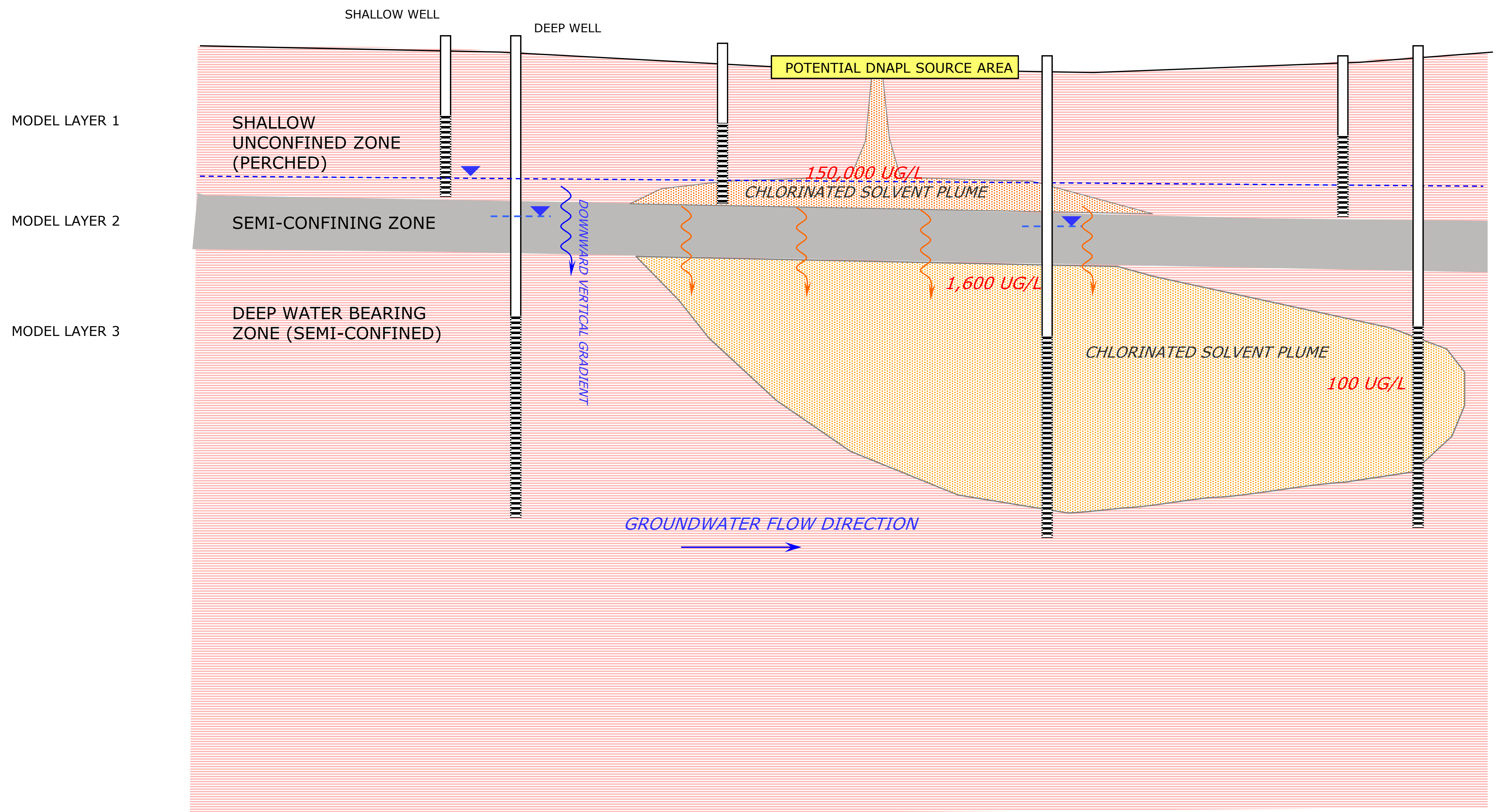
CAPTURE ZONE ANALYSES
GROUNDWATER ELEVATION CONTOURS (FT/MSL)
UTM-1 PUMPING AT 45 GPM AND UTM-11 AT 10 GPM

DATE 10-28-10

DRAWN BY VFB

PROJECT LOCATION
ACCELENT, INC.
COLLEGEVILLE, PENNSYLVANIA

FIGURE NUMBER 5



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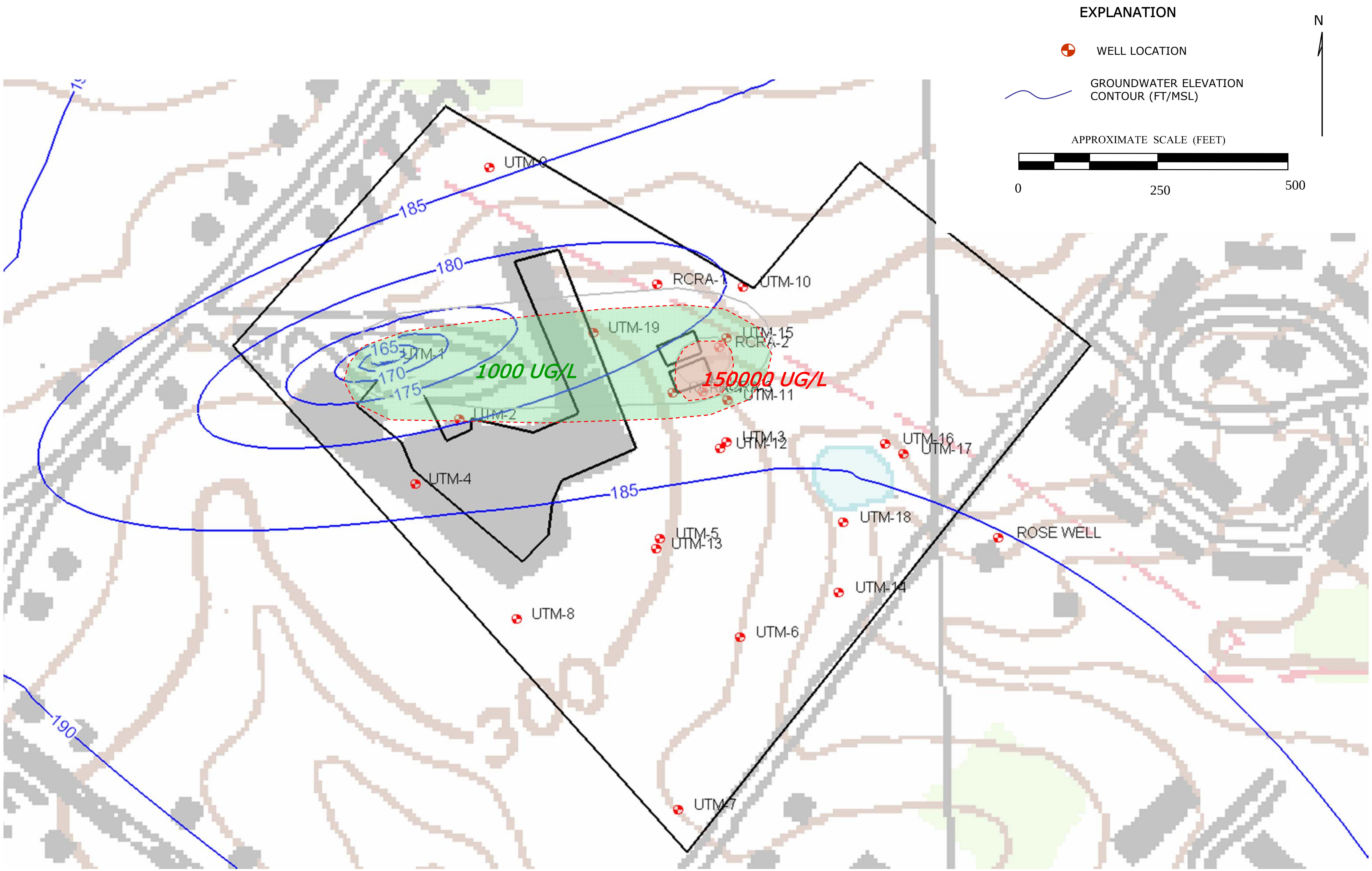
SCHEMATIC CROSS SECTION
CONCEPTUAL UNDERSTANDING OF CONTAMINANT MIGRATION USED IN MODEL SIMULATION

DATE	10-28-10
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	6



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CONSTANT TCE CONCENTRATION POLYGONS APPLIED TO LAYER 1 OF GROUNDWATER MODEL TO SIMULATE EXISTING CONTAMINATION

DATE	10-28-10
DRAWN BY	VFB
PROJECT LOCATION	ACCELENT, INC. COLLEGEVILLE, PENNSYLVANIA
FIGURE NUMBER	7