

May 9, 2018

Dr. Lisette A. Gold  
Environmental Remediation Coordinator  
City of Santa Monica  
1212 5th Street  
Santa Monica, CA 90405

**Re: Technical Memorandum  
Recommended Revised Groundwater Monitoring Schedule  
for the Charnock Regional Monitoring Wells  
Charnock Sub-Basin; Los Angeles, California  
Ramboll Project No. 1690007775-005**

Dear Dr. Gold:

This technical memorandum presents recommended modifications to the monitoring schedule for the Charnock regional groundwater monitoring wells. The sampling of the Charnock regional wells is now conducted in accordance with the modified schedule described in a letter issued by the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) dated March 5, 2007. This baseline groundwater monitoring program has been conducted by Ramboll US Corporation (formerly Ramboll Environ US Corporation and, previously, ENVIRON International Corporation) on behalf of the City of Santa Monica (the City). The Charnock Sub-Basin regional monitoring well and regional piezometer locations are shown on Figures 1a and 1b.

### **Executive Summary**

The City has been conducting a voluntary regional groundwater monitoring program in the Charnock Sub-Basin since 2007 to augment the monitoring and remediation activities at the individual PRP sites in the Sub-Basin. Design and construction of the Charnock treatment unit and the City's Arcadia water treatment plant began in 2008, and the City's Charnock Well Field began operating again in mid-December 2010. Groundwater flow in the area monitored by the regional monitoring wells is now radial, toward the Charnock Well Field, and the regional groundwater levels have been decreasing in response to pumping such that the majority of the Shallow Aquifer monitoring wells have become dry. In addition, the concentrations of fuel constituents in regional groundwater have been decreasing as a result of groundwater extraction and treatment at individual sites and by operation of the Charnock Well Field and treatment system.

Based on these current conditions, a recommendation is made to refocus the sampling frequency commencing in July 2018 as follows:

- Semiannual sampling (July): 11 wells, analyzed for fuel constituents
- Annual sampling (January): 18 wells, analyzed for fuel constituents and VOCs
- Every 3 years (beginning in January 2021): 20 wells and 3 piezometers (23 total), analyzed for fuel constituents and VOCs

This technical memorandum presents background information, a brief summary of the current regional groundwater monitoring program, a summary of current conditions based on the most recent 3-year comprehensive sampling results from January 2018, and the rationale for the recommended updated regional groundwater monitoring schedule.

## **Background**

In 1996, the City's Charnock Well Field was shut down due to the detection of methyl tert-butyl ether (MTBE), a gasoline fuel oxygenate. At that time, the sources of the MTBE in regional groundwater were suspected to be leaking underground fuel storage tanks associated with gasoline service stations located within the Charnock Sub-Basin. The LARWQCB and the United States Environmental Protection Agency (USEPA), Region IX, designated 32 sites as potentially responsible for the MTBE contamination. Between 1996 and 2006, multiple gas station investigations were conducted under LARWQCB oversight. Of the original 32 potentially responsible party (PRP) sites, all but four have been closed and were issued no further action (NFA) letters by the LARWQCB. The remaining four sites, located east and southeast of the Charnock Well Field, are in various stages of monitoring and remediation or in pre-closure.

Between 1997 and 2006, a total of 48 regional monitoring wells and piezometers were installed and sampled by several oil companies under LARWQCB oversight. In December 2006, the City reached an agreement with the oil company members of the Charnock Technical Advisory Group, whereby the restoration of the Charnock well field to operational status, including associated monitoring of the Charnock regional monitoring wells, would be conducted by the City. Since 2007, the City has been conducting a voluntary regional groundwater monitoring program in the Charnock Sub-Basin to augment the monitoring and remediation activities at the individual PRP sites. Design and construction of the Charnock treatment unit and the City's Arcadia water treatment plant began in 2008, and the Charnock Well Field and treatment system began operation in December 2010.

## **Groundwater Occurrence**

Perched groundwater zones are locally present above the regional aquifer in many parts of the Charnock Sub-Basin. Regional groundwater includes the Shallow Aquifer and the deeper Silverado Aquifer, which is the main water-producing zone in the Sub-Basin.

The Shallow Aquifer ranges from approximately 15 to 80 feet thick. It consists of predominantly fine to medium grained sands and silty sands of marine origin, with localized intervals of coarse sand and gravelly sand. This zone is an aquifer when and where saturated. However, during periods of relatively high groundwater extraction, the Shallow Aquifer becomes dewatered, particularly in the vicinity of the operating well fields.

The Shallow Aquifer is underlain by the Shallow Aquitard. Where present, the Shallow Aquitard consists of predominantly fine-grained sediment, but in some areas contains

interbeds of silty sand. At some locations, transitional silts and silty sands are present above or below the aquitard unit.

The deeper Silverado Aquifer is comprised of the Upper Silverado Aquifer and the Lower Silverado Aquifer. The Silverado Aquitard separates the Upper Silverado and the Lower Silverado Aquifers. The Silverado Aquifer ranges from about 70 to 270 feet thick and is offset by the Charnock and Overland Avenue Faults. It is generally the uppermost water-producing zone within the Charnock Sub-Basin during periods of groundwater extraction. Most deep water supply wells are screened in the Silverado Aquifer, and many wells are terminated at its base.

### **Charnock Regional Groundwater Monitoring Program**

The current sampling program for the Charnock regional wells was established in 2007 prior to the start-up of the Charnock Well Field and treatment unit in 2010. The initial focus of the monitoring at that time was to document baseline conditions prior to the planned restoration of pumping at the well field. The wells designated for annual, semiannual, or sampling every 3 years were selected based on the distributions of gasoline constituents in groundwater at that time, recognizing that conditions would change following start-up and operation of the Charnock production wells. The gasoline constituents detected most frequently in regional groundwater are the fuel oxygenates MTBE and tert-butyl alcohol (TBA).

The regional well and piezometer locations are shown on Figures 1a and 1b, and the well construction data is summarized in Table 1. The regional groundwater monitoring network consists of:

- Shallow Aquifer: 20 monitoring wells and 3 piezometers
- Upper Silverado Aquifer: 20 monitoring wells and 3 piezometers
- Lower Silverado Aquifer: 2 monitoring wells

In addition, four monitoring wells located at the Charnock Well Field (KMX-1 through KMX-4) are sampled annually concurrently with the regional monitoring wells.

The components of the baseline groundwater monitoring program include:

- Semiannual sampling (July): 17 wells, analyzed for fuel constituents
- Annual sampling (January): 37 wells, analyzed for fuel constituents and VOCs
- Every 3 years (January): 46 wells and 6 piezometers (52 total), analyzed for fuel constituents and VOCs
- Water levels are measured in all wells and piezometers on a semiannual basis to provide enough data points to construct representative groundwater elevation contour maps.

All 52 monitoring wells and piezometers have been sampled four times during this program (January 2009, January 2012, January 2015, and January 2018). This evaluation of needed modifications to the current regional monitoring schedule is based on a review of preliminary results from the most recent January 2018 three-year sampling event. The

complete results will be presented in the Annual Groundwater Monitoring report to be submitted to the LARWQCB on July 15, 2018.

### **Summary of Current Conditions**

This section presents a summary of current groundwater conditions based the most recent monitoring results available. For reference, historical groundwater elevation and concentration trend charts for the regional monitoring wells and piezometers are included in Attachment A.

### **Groundwater Elevation Trends**

Following shutdown of the Charnock Well Field in 1996, quarterly and semiannual water level data from the regional wells indicated rising regional groundwater elevations as the Charnock Sub-Basin refilled. In the absence of well field pumping, the overall direction of groundwater flow is to the southeast. The depth to regional groundwater in July 2010 ranged between approximately 28 and 93 feet below ground surface. The City's Charnock Well Field began operating again in mid-December 2010, and regional groundwater levels have been decreasing since that time. In January 2018, the depth to regional groundwater ranged between approximately 85 and 156 feet below ground surface. The general groundwater flow direction in the area monitored by the regional monitoring wells now ranges from southwest to northeast, flowing radially toward the Charnock Well Field.

Typical groundwater elevation trends between 1997-2018 are illustrated on Figures 2a and 2b. Figure 2a shows well cluster RMW-10 (Shallow Aquifer) and RMW-9 (Upper Silverado Aquifer) at a location approximately 800 feet southeast of the Charnock Well Field. Figure 2b illustrates groundwater response to well field pumping at piezometer cluster RPZ-4 (Shallow Aquifer) and RPZ-5 (Upper Silverado Aquifer) at a location approximately 3,200 feet east of the well field. These hydrographs show the decrease in groundwater levels since the start-up of the Charnock Well Field in 2010. Although the magnitude of the change in groundwater elevation is less at piezometer cluster RPZ-4/RPZ-5, the Shallow Aquifer has become dewatered at both locations. At the monitored regional well locations, 12 of the 24 Shallow Aquifer wells and piezometers have also become dewatered, and a thin zone of perched groundwater is now present in well RMW-53.

### **Current Distributions of MTBE and TBA**

Table 2 presents the groundwater analytical results for fuel constituents for samples collected during the January 2018 3-year sampling event.

Shallow Aquifer - MTBE and TBA results for the Shallow Aquifer wells are shown on Figure 3 along with the current Baseline Sampling Schedule. Wells scheduled for semiannual sampling are indicated by red symbols, annual sampling by gold symbols, and every three years by green symbols. As can be seen on Figure 3, nearly half of the Shallow Aquifer wells have become dewatered and are currently dry. The remaining wells that could be sampled have only a small amount saturated screen remaining. For these wells, MTBE was not detected at concentrations above the EQL of 1.0 micrograms per liter ( $\mu\text{g/L}$ ), or above the secondary MCL (based on taste and odor) of 5  $\mu\text{g/L}$ , or above the primary MCL of 13  $\mu\text{g/L}$  in any of the sampled wells.

TBA was not detected ( $ND < 4.6 \mu\text{g/L}$ ) in any of the Shallow Aquifer wells that could still be sampled. There is one available criterion for TBA, a California DPH Notification Level of  $12 \mu\text{g/L}$ .

Silverado Aquifer – The January 2018 MTBE and TBA results for the Silverado Aquifer wells are shown along with the current Baseline Sampling Schedule on Figures 4a and 4b, respectively. Wells scheduled for semiannual sampling are indicated by red symbols, annual sampling by gold symbols, and every three years by green symbols.

As indicated by the groundwater flow direction arrows on Figure 4a, the predominant groundwater flow direction in the area of the regional wells is northwest, toward the Charnock Well Field. MTBE was detected at concentrations above the secondary MCL (based on taste and odor) of  $5 \mu\text{g/L}$  in only two wells, and above the primary MCL of  $13 \mu\text{g/L}$  in only one well. The highest MTBE concentration was  $14 \mu\text{g/L}$  in well RMW-21.

The MTBE concentrations in the regional wells have decreased substantially since the baseline program began in 2007, and the area where groundwater impacts remain has migrated toward the northwest over time. As a result, the majority of the wells currently scheduled for semiannual sampling are now located south/southeast (upgradient) of the area of MTBE-impacted groundwater, and the wells scheduled for less frequent sampling (annual or 3-year sampling) are now located directly between the area of MTBE-impacted groundwater and the Charnock Well Field.

The January 2018 TBA results for the Silverado Aquifer wells are shown along with the current Baseline Sampling Schedule on Figure 4b. In contrast to MTBE, TBA concentrations have shown a recent increasing trend in wells RMW-52 ( $130 \mu\text{g/L}$ ) and RMW-30 ( $32 \mu\text{g/L}$ ), locations where TBA was historically not detected. Both wells are located northwest of the gasoline service stations east of the Sepulveda/Venice intersection, and it appears this area of TBA-impacted groundwater is migrating northwest toward the Charnock Well Field.

### **Recommended Refocused Regional Monitoring Program**

The recommended revised groundwater monitoring schedule for the Charnock regional monitoring wells is presented in Table 3a. No modifications are recommended for the analytical program, which is summarized in Table 3b.

#### Shallow Aquifer

Nearly half of the Shallow Aquifer wells have become dewatered and are currently dry, and the remaining wells that could be sampled in January 2018 have only a small amount saturated screen remaining. In these wells, MTBE and TBA were not detected, with the exception of two MTBE concentrations below  $1 \mu\text{g/L}$ . Based on the current dewatered conditions, we recommend that sampling be discontinued in the Shallow Aquifer regional wells and piezometers. Water levels will continue to be monitored semiannually in all the Shallow Aquifer wells and piezometers. For wells that have become dry, the street well boxes will be inspected for any well head maintenance needs, and the wells will be sounded to confirm they remain dry.

Two of the monitoring wells located at the Charnock Well Field (KMX-1 and KMX-2) will be sampled annually concurrently with the regional Silverado monitoring wells as described below. Monitoring wells KMX-3 and KMX-4 have become dry.

#### Silverado Aquifer

The recommended updated monitoring program for the Silverado Aquifer regional wells and piezometers is summarized in Table 3a. Figure 5 shows the current MTBE and TBA plumes along with recommended revised sampling schedule. Wells scheduled for semiannual sampling are indicated by red symbols, annual sampling by gold symbols, and every three years by green symbols.

As described in the preceding section, the majority of the Silverado regional wells currently scheduled for semiannual sampling are now located south/southeast (upgradient) of the areas of MTBE and TBA-impacted groundwater, and the wells scheduled for less frequent sampling (annual or 3-year sampling) are now located between the areas of MTBE and TBA-impacted groundwater and the Charnock Well Field. Since the impacted groundwater is expected to continue to migrate northwest toward the operating Charnock Well Field, the regional monitoring wells located within the current areas of impacted groundwater and between the impacted groundwater and the Charnock Well Field will be monitored on a semiannual basis to provide more timely information to the City. The Silverado monitoring wells located south of the current areas of impacted groundwater are recommended for less frequent sampling, and four wells are recommended to be discontinued. Water levels will continue to be monitored semiannually in all the Silverado Aquifer wells and piezometers.

The components of the revised groundwater monitoring program for the Silverado Aquifer regional wells include:

- Semiannual sampling (July): 11 wells, analyzed for fuel constituents
- Annual sampling (January): 18 wells, analyzed for fuel constituents and VOCs
- Every 3 years (beginning in January 2021): 20 wells and 3 piezometers (23 total), analyzed for fuel constituents and VOCs
- Water levels will continue to be measured in all 52 wells and piezometers on a semiannual basis to provide enough data points to construct representative groundwater elevation contour maps. For wells that have become dry, the street well boxes will be inspected for any well head maintenance needs, and the wells will be sounded to confirm they remain dry.

Semiannual monitoring reports will be due to the LARWQCB on January 15 every year, and annual monitoring reports will be due on July 15 every year.

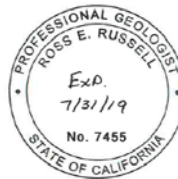
**Closure**

Please contact Lisette Gold at 310-458-8231 should you have any questions about this Technical Memorandum.

Sincerely,



Ross Russell, PG No. 7455  
Managing Consultant



Jessica E. Donovan, PG No. 3791  
Principal



## **Tables**

- Table 1 Summary of Well Construction Data for Regional Monitoring Wells and Piezometers
- Table 2 Summary of Groundwater Analytical Results, January 2018 – Fuel Constituents
- Table 3a Recommended Revised Groundwater Monitoring Schedule for Charnock Regional Monitoring Wells
- Table 3b Groundwater Analytical Testing Program for Regional Monitoring Wells

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- Figure 1a Charnock Sub-Basin
- Figure 1b Regional Monitoring Well Locations
- Figure 2a Groundwater Elevation Trends, Well Cluster RMW-10/RMW-9
- Figure 2b Groundwater Elevation Trends, Piezometer Cluster RPZ-4/RPZ-5
- Figure 3 MTBE and TBA – Shallow Aquifer, January 2018
- Figure 4a MTBE, Silverado Aquifer, January 2018
- Figure 4b TBA, Silverado Aquifer, January 2018
- Figure 5 Recommended Monitoring Program, Silverado Aquifer

## **Attachments**

- Attachment A – Hydrographs and Concentration Trends, 1997-2018

## **T A B L E S**

**TABLE 1. SUMMARY OF WELL CONSTRUCTION DATA FOR REGIONAL MONITORING WELLS AND PIEZOMETERS**  
**Charnock Sub-Basin; Los Angeles, California**

| Well Number                                 | Date Construction Completed | Depth of Well Elevation (ft msl) | Depth of Well* (ft bgs) | Screened Elevation (ft msl) | Screened Interval* (ft bgs) | Well Casing Nominal Diameter (inches) | Well Casing Material | Well Screen Material | Screen Slot Size (inches) | Filter Pack Elevation (ft msl) | Filter Pack Interval* (ft bgs) |
|---------------------------------------------|-----------------------------|----------------------------------|-------------------------|-----------------------------|-----------------------------|---------------------------------------|----------------------|----------------------|---------------------------|--------------------------------|--------------------------------|
| <u>Thrifty site (Sepulveda &amp; Palms)</u> |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-1                                       | 3/7/1997                    | -33.0                            | 158.5                   | -5.5 to -31.5               | 131.0 - 157.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.01                      | 0.5 to -33.0                   | 125.0 - 158.5                  |
| RMW-2A                                      | 3/26/1997                   | -130.2                           | 255.0                   | -110.2 to -130.2            | 235.0 - 255.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -105.2 to -130.2               | 230.0 - 255.0                  |
| <u>Mar Vista Park</u>                       |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-3                                       | 4/4/1997                    | -96.9                            | 202.0                   | -74.4 to -94.4              | 179.5 - 199.5               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -65.9 to -96.9                 | 171.0 - 202.0                  |
| RMW-4A                                      | 4/25/1997                   | -42.8                            | 148.5                   | -2.3 to -42.3               | 108.0 - 148.0               | 4                                     | Sch. 40 PVC          | Type 304 SS          | 0.02                      | 1.2 to -42.8                   | 104.5 - 148.5                  |
| PZ-1                                        | 4/10/1997                   | 50.8                             | 54.0                    | 66.8 to 51.8                | 38.0 - 53.0                 | 2                                     | Sch. 40 PVC          | Sch. 40 PVC          | 0.02                      | 68.8 to 50.8                   | 36.0 - 54.0                    |
| PZ-2                                        | 4/16/1997                   | 32.6                             | 72.0                    | 42.6 to 32.6                | 62.0 - 72.0                 | 2                                     | Sch. 40 PVC          | Sch. 40 PVC          | 0.02                      | 44.6 to 32.6                   | 60.0 - 72.0                    |
| PZ-3                                        | 4/22/1997                   | 15.5                             | 89.5                    | 26.0 to 16.0                | 79.0 - 89.0                 | 2                                     | Sch. 40 PVC          | Sch. 40 PVC          | 0.02                      | 29.0 to 15.5                   | 76.0 - 89.5                    |
| <u>Tuller Avenue north of Venice</u>        |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-5                                       | 4/11/1997                   | -87.1                            | 147.0                   | -74.1 to -84.1              | 134.0 - 144.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.01                      | -71.1 to -87.1                 | 131.0 - 147.0                  |
| RMW-6                                       | 4/18/1997                   | -64.3                            | 124.4                   | -52.4 to -61.9              | 112.5 - 122.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -49.9 to -64.3                 | 110.0 - 124.4                  |
| RMW-7                                       | 4/30/1997                   | -43.2                            | 103.0                   | -11.7 to -41.7              | 71.5 - 101.5                | 4                                     | Sch. 40 PVC          | Type 304 SS          | 0.02                      | -10.2 to -43.2                 | 70.0 - 103.0                   |
| <u>Corinth Avenue</u>                       |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-8                                       | 07/09/1997                  | -178.9                           | 271.5                   | -147.4 to -176.9            | 240.0 - 269.5               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -142.4 to -178.9               | 235.0 - 271.5                  |
| RMW-9                                       | 07/14/1997                  | -93.4                            | 186.0                   | -71.4 to -91.4              | 164.0 - 184.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.03                      | -66.4 to -93.4                 | 159.0 - 186.0                  |
| RMW-10                                      | 06/30/1997                  | -45.0                            | 137.5                   | -24.0 to -44.0              | 116.5 - 136.5               | 4                                     | Sch. 40 PVC          | Type 304 SS          | 0.01                      | -21.5 to -45.0                 | 114.0 - 137.5                  |
| <u>Globe &amp; Regent</u>                   |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-11                                      | 12/9/1997                   | -72.1                            | 181.5                   | -56.6 to -71.1              | 166.0 - 180.5               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -53.6 to -72.1                 | 163.0 - 181.5                  |
| RMW-12                                      | 12/18/1997                  | -36.9                            | 146.0                   | -5.9 to -35.4               | 115.0 - 144.5               | 4                                     | Sch. 40 PVC          | Type 304 SS          | 0.02                      | -2.9 to -36.9                  | 112.0 - 146.0                  |
| <u>Globe between Regent and Charnock</u>    |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-48                                      | 3/29/2001                   | -49.3                            | 157.5                   | -32.8 to -47.8              | 141.0 - 156.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -31.8 to -49.3                 | 140.0 - 157.5                  |
| RMW-49                                      | 3/27/2001                   | -71.2                            | 179.5                   | -54.7 to -69.7              | 163.0 - 178.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -54.2 to -71.2                 | 162.5 - 179.5                  |
| <u>Globe between Regent and Venice</u>      |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-19                                      | 10/4/2000                   | -69.1                            | 131.1                   | -53.0 to -68.0              | 115.0 - 130.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -50.4 to -69.1                 | 112.4 - 131.1                  |
| RMW-20                                      | 10/10/2000                  | -80.9                            | 111.2                   | -33.0 to -48.0              | 95.0 - 110.0                | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -30.8 to -49.2                 | 92.8 - 111.2                   |
| <u>Globe &amp; Charnock</u>                 |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-23                                      | 11/9/2000                   | -78.8                            | 186.5                   | -62.4 to -77.4              | 170.1 - 185.1               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -59.33 to -78.83               | 167.0 - 186.5                  |
| RMW-24                                      | 11/7/2000                   | -43.2                            | 151.0                   | -27.5 to -42.5              | 135.3 - 150.3               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -25.2 to -43.2                 | 133.0 - 151.0                  |

**TABLE 1. SUMMARY OF WELL CONSTRUCTION DATA FOR REGIONAL MONITORING WELLS AND PIEZOMETERS**  
**Charnock Sub-Basin; Los Angeles, California**

| Well Number                                             | Date Construction Completed | Depth of Well Elevation (ft msl) | Depth of Well* (ft bgs) | Screened Elevation (ft msl) | Screened Interval* (ft bgs) | Well Casing Nominal Diameter (inches) | Well Casing Material | Well Screen Material | Screen Slot Size (inches) | Filter Pack Elevation (ft msl) | Filter Pack Interval* (ft bgs) |
|---------------------------------------------------------|-----------------------------|----------------------------------|-------------------------|-----------------------------|-----------------------------|---------------------------------------|----------------------|----------------------|---------------------------|--------------------------------|--------------------------------|
| <u>Alleyway bordered by Sawtelle, Globe, and Regent</u> |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-25                                                  | 7/16/2001                   | -51.01                           | 113.6                   | -21.0 to -51.0              | 83.5 - 113.5                | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -19.0 to -51.0                 | 81.5 - 113.6                   |
| <u>Sawtelle between Tabor and Charnock</u>              |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-13                                                  | 5/13/1998                   | -86.3                            | 188.0                   | -63.3 to -82.3              | 165.0 - 184.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -60.3 to -86.3                 | 162.0 - 188.0                  |
| RMW-27                                                  | 1/23/2001                   | -56.5                            | 158.0                   | -40.0 to -55.0              | 141.5 - 156.5               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -37.6 to -56.5                 | 139.0 - 158.0                  |
| <u>Sawtelle between Charnock and Regent</u>             |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-21                                                  | 12/12/2000                  | -73.2                            | 179.0                   | -57.2 to -72.2              | 163.0 - 178.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -55.5 to -73.2                 | 161.3 - 179.0                  |
| RMW-22                                                  | 12/8/2000                   | -51.3                            | 157.0                   | -35.3 to -50.3              | 141.0 - 156.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -32.3 to -51.3                 | 138.0 - 157.0                  |
| <u>Sawtelle &amp; Tabor</u>                             |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-14                                                  | 7/7/1998                    | -73.6                            | 176.0                   | -60.6 to -70.6              | 163.0 - 173.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -58.6 to -73.6                 | 161.0 - 176.0                  |
| RMW-15                                                  | 7/30/1998                   | -149.6                           | 252.0                   | -133.6 to -148.1            | 236.0 - 250.5               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -129.6 to -149.6               | 232.0 - 252.0                  |
| RMW-16A                                                 | 8/10/1998                   | -51.7                            | 154.0                   | -35.7 to -50.7              | 138.0 - 153.0               | 4                                     | Sch. 40 PVC          | Type 304 SS          | 0.02                      | -33.2 to -51.7                 | 135.5 - 154.0                  |
| <u>Sawtelle &amp; Westminister</u>                      |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-17                                                  | 7/29/1999                   | -78.6                            | 182.0                   | -64.6 to -73.6              | 168.0 - 177.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -60.1 to -78.6                 | 163.5 - 182.0                  |
| RMW-18                                                  | 8/4/1999                    | -37.4                            | 141.0                   | -24.9 to -34.4              | 128.5 - 138.0               | 5                                     | Sch. 80 PVC          | Type 304 SS          | 0.02                      | -20.9 to -37.4                 | 124.5 - 141.0                  |
| <u>Sawtelle &amp; Tabor</u>                             |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-28                                                  | 12/15/2000                  | -71.2                            | 174.0                   | -54.3 to -69.3              | 157.0 - 172.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -52.2 to -71.2                 | 155.0 - 174.0                  |
| RMW-29                                                  | 12/20/2000                  | -49.6                            | 152.0                   | -33.4 to -48.4              | 136.0 - 151.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -31.2 to -49.6                 | 134.0 - 152.0                  |
| <u>Charnock &amp; Tuller</u>                            |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-30                                                  | 7/6/2001                    | -73.9                            | 185.0                   | -56.9 to -71.9              | 168.0 - 183.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -53.9 to -73.9                 | 165.0 - 185.0                  |
| RMW-31                                                  | 7/3/2001                    | -21.9                            | 133.0                   | -4.4 to -14.4               | 115.0 - 125.5               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -1.4 to -21.9                  | 112.5 - 133.0                  |
| <u>Butler between Charnock and Westminister</u>         |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-32                                                  | 4/3/2001                    | -107.7                           | 200.0                   | -90.7 to -105.7             | 183.0 - 198.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -89.7 to -107.7                | 182.0 - 200.0                  |
| RMW-33                                                  | 4/5/2001                    | -62.2                            | 154.5                   | -45.7 to -60.7              | 138.0 - 153.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -44.2 to -62.2                 | 136.5 - 154.5                  |
| <u>Tuller between Charnock and Regent</u>               |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-50                                                  | 4/10/2001                   | -81.3                            | 193.0                   | -63.8 to -78.3              | 175.5 - 190.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -61.1 to -81.3                 | 173.0 - 193.0                  |
| RMW-51                                                  | 4/12/2001                   | -33.8                            | 145.5                   | -16.8 to -31.3              | 128.5 - 143.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -14.3 to -33.8                 | 126.0 - 145.5                  |
| <u>Sepulveda between Venice &amp; Regent</u>            |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-52                                                  | 7/27/2001                   | -52.8                            | 121.5                   | -36.3 to -51.3              | 105.0 - 120.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -35.3 to -52.8                 | 104.0 - 121.5                  |
| RMW-53                                                  | 7/26/2001                   | -27.9                            | 96.0                    | 3.1 to -26.9                | 65.0 - 95.0                 | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | 6.1 to -27.9                   | 62.0 - 96.0                    |

**TABLE 1. SUMMARY OF WELL CONSTRUCTION DATA FOR REGIONAL MONITORING WELLS AND PIEZOMETERS**  
**Charnock Sub-Basin; Los Angeles, California**

| Well Number                                  | Date Construction Completed | Depth of Well Elevation (ft msl) | Depth of Well* (ft bgs) | Screened Elevation (ft msl) | Screened Interval* (ft bgs) | Well Casing Nominal Diameter (inches) | Well Casing Material | Well Screen Material | Screen Slot Size (inches) | Filter Pack Elevation (ft msl) | Filter Pack Interval* (ft bgs) |
|----------------------------------------------|-----------------------------|----------------------------------|-------------------------|-----------------------------|-----------------------------|---------------------------------------|----------------------|----------------------|---------------------------|--------------------------------|--------------------------------|
| <u>Corinth between Charnock and Victoria</u> |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-54                                       | 2/1/2006                    | -71.2                            | 169.0                   | -56.2 to -70.7              | 154.0 - 168.5               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -54.2 to -74.2                 | 152.0 - 172.0                  |
| RMW-55                                       | 2/3/2006                    | -47.7                            | 145.5                   | -32.2 to -47.2              | 130.0 - 145.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -30.2 to -48.2                 | 128.0 - 146.0                  |
| <u>Victoria between Purdue and Corinth</u>   |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-56                                       | 4/10/2006                   | -74.7                            | 168.5                   | -59.2 to -74.2              | 153.0 - 168.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -56.7 to -76.2                 | 150.5 - 170.0                  |
| RMW-57                                       | 4/12/2006                   | -51.5                            | 143.5                   | -36.0 to -51.0              | 130.0 - 145.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -34.0 to -54.0                 | 128.0 - 148.0                  |
| <u>Purdue Avenue near Regent</u>             |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RMW-58                                       | 2/17/2006                   | -79.8                            | 168.5                   | -64.3 to -79.3              | 153.0 - 168.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -61.3 to -81.3                 | 150.0 - 170.0                  |
| RMW-59                                       | 2/22/2006                   | -54.8                            | 143.5                   | -39.3 to -54.3              | 128.0 - 143.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -37.3 to -56.3                 | 126.0 - 145.0                  |
| <u>Venice &amp; Sepulveda</u>                |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| MWM-1                                        | 1/12/2000                   | -55.9                            | 114.0                   | -44.9 to -54.9              | 103.0 - 113.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -41.9 to -55.9                 | 100.0 - 114.0                  |
| MWM-2                                        | 1/20/2000                   | -62.0                            | 123.0                   | -48.0 to -58.0              | 109.0 - 119.0               | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -46.0 to -62.0                 | 107.0 - 123.0                  |
| MWM-3                                        | 2/9/2000                    | -52.0                            | 111.0                   | -41.0 to -51.0              | 100.0 to 110.0              | 5                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -39.0 to -52.0                 | 98.0 - 111.0                   |
| <u>Regent</u>                                |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RPZ-4                                        | 11/9/2000                   | -9.4                             | 79.0                    | 6.6 to -8.4                 | 63.0 - 78.0                 | 4                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | 9.6 to -9.4                    | 60.0 - 79.0                    |
| RPZ-5                                        | 11/21/2000                  | -41.1                            | 110.5                   | -24.6 to -39.6              | 94.0 - 109.0                | 4                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -22.4 to -41.1                 | 92.0 - 110.5                   |
| <u>Queensland &amp; Veteran</u>              |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RPZ-6                                        | 12/19/2000                  | -61.3                            | 212.0                   | -45.3 to -60.3              | 196.0 - 211.0               | 4                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -43.3 to -61.3                 | 194.0 - 212.0                  |
| RPZ-7                                        | 1/18/2001                   | -25.3                            | 176.0                   | -8.8 to -24.8               | 159.5 - 175.5               | 4                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -6.8 to -25.3                  | 157.5 - 176.0                  |
| <u>Bently between Charnock and Venice</u>    |                             |                                  |                         |                             |                             |                                       |                      |                      |                           |                                |                                |
| RPZ-8                                        | 5/23/2001                   | -54.0                            | 113.0                   | -36.0 to -51.0              | 95.0 - 110.0                | 4                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | -33.5 to -54.0                 | 92.5 - 113.0                   |
| RPZ-9                                        | 5/24/2001                   | -12.9                            | 72.0                    | 4.1 to -10.9                | 55.0 - 70.0                 | 4                                     | Sch. 80 PVC          | Sch. 80 PVC          | 0.02                      | 6.6 to -12.9                   | 52.5 - 72.0                    |

**Notes:**

ft bgs = feet below ground surface

ft msl = feet, mean sea level

PVC = polyvinyl chloride

SS = stainless steel

\* Depths rounded to nearest 0.5 foot.

**TABLE 2. SUMMARY OF GROUNDWATER ANALYTICAL RESULTS, January 2018 - Fuel Constituents**  
**Charnock Sub-Basin; Los Angeles, California**

| Well No.          | Aquifer         | Sample Date | MTBE                              | TBA  | TAME  | DIPE    | ETBE  | 1,2,4-TMB | 1,3,5-TMB | Ethanol | Benzene | Ethylbenzene | Toluene | m,p-Xylenes | o-Xylene | Volatile Fuel Hydrocarbons |        |
|-------------------|-----------------|-------------|-----------------------------------|------|-------|---------|-------|-----------|-----------|---------|---------|--------------|---------|-------------|----------|----------------------------|--------|
|                   |                 |             | EPA Method 8260B                  |      |       |         |       |           |           |         |         |              |         |             |          |                            | C6-C12 |
| EQL (µg/L):       |                 |             | 1.0                               | 10   | 2.0   | 2.0     | 2.0   | 1.0       | 1.0       | 100     | 0.50    | 1.0          | 1.0     | 1.0         | 1.0      | 50                         | 50     |
| SHALLOW AQUIFER   |                 |             |                                   |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-4A            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-7             | Shallow         | 1/29/18     | 0.45 J                            | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-10            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-12            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-16A           | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-18            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-20            | Shallow         | 1/22/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-22            | Shallow         | 1/24/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-24            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-25            | Shallow         | 1/30/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | 50 UJ   | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-27            | Shallow         | 1/26/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-29            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-31            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-33            | Shallow         | 1/15/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | 0.14 J  | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-48            | Shallow         | 1/19/18     | <0.31                             | <4.6 | <0.22 | 0.33 UJ | <0.44 | <0.36     | <0.28     | 50 UJ   | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-51            | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-53            | Perched water   | 1/23/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-55            | Shallow         | 1/23/18     | 0.62 J                            | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-57            | Shallow         | 1/24/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-59            | Shallow         | 1/26/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RPZ-4             | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RPZ-7             | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RPZ-9             | Shallow - DRY   | 1/17/18     | DRY; insufficient water to sample |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| SILVERADO AQUIFER |                 |             |                                   |      |       |         |       |           |           |         |         |              |         |             |          |                            |        |
| RMW-3             | Upper Silverado | 1/25/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-3 fd          |                 | 1/25/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-5             | Upper Silverado | 1/29/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-6             | Upper Silverado | 1/29/18     | 0.42 J                            | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-6 fd          |                 | 1/29/18     | 0.44 J                            | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-8             | Lower Silverado | 1/18/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-8 fd          |                 | 1/18/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| RMW-9             | Upper Silverado | 1/18/18     | <0.31                             | <4.6 | <0.22 | <0.33   | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14        | <0.24   | <0.30       | <0.23    | <48                        | <48    |

**TABLE 2. SUMMARY OF GROUNDWATER ANALYTICAL RESULTS, January 2018 - Fuel Constituents**  
**Charnock Sub-Basin; Los Angeles, California**

| Well No.  | Aquifer         | Sample Date | MTBE             | TBA   | TAME  | DIPE  | ETBE  | 1,2,4-TMB | 1,3,5-TMB | Ethanol | Benzene | Ethyl-benzene | Toluene | m,p-Xylenes | o-Xylene | Volatile Fuel Hydrocarbons |        |        |
|-----------|-----------------|-------------|------------------|-------|-------|-------|-------|-----------|-----------|---------|---------|---------------|---------|-------------|----------|----------------------------|--------|--------|
|           |                 |             | EPA Method 8260B |       |       |       |       |           |           |         |         |               |         |             |          |                            | C6-C12 | C4-C12 |
|           |                 |             | EQL (µg/L):      |       |       | 1.0   | 10    | 2.0       | 2.0       | 2.0     | 1.0     | 1.0           | 100     | 0.50        | 1.0      | 1.0                        | 1.0    | 1.0    |
| RMW-11    | Upper Silverado | 1/22/18     | 0.78 J           | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-11 fd |                 | 1/22/18     | 0.47 J           | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-13    | Upper Silverado | 1/26/18     | 1.5              | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-13 fd |                 | 1/26/18     | 1.3              | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-14    | Upper Silverado | 2/1/18      | 0.56 J           | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-15    | Lower Silverado | 1/25/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-15 fd |                 | 1/25/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-17    | Upper Silverado | 1/31/18     | <0.31            | 7.2 J | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | 0.31 J  | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-19    | Upper Silverado | 1/22/18     | 0.68 J           | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-21    | Upper Silverado | 1/24/18     | 14               | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-21 fd |                 | 1/24/18     | 14               | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-23    | Upper Silverado | 1/19/18     | 11               | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-23 fd |                 | 1/19/18     | 12               | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-28    | Upper Silverado | 1/31/18     | 1.0              | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-30    | Upper Silverado | 1/16/18     | 1.7              | 32    | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-30 fd |                 | 1/16/18     | 1.9              | 37    | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-32    | Upper Silverado | 1/15/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-49    | Upper Silverado | 1/19/18     | 6.4              | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-49 fd |                 | 1/19/18     | 1.7              | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-50    | Upper Silverado | 1/16/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | 50 UJ   | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-52    | Upper Silverado | 1/23/18     | 0.74 J           | 130   | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-52 fd |                 | 1/23/18     | 0.64 J           | 140   | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-54    | Upper Silverado | 1/23/18     | 0.78 J           | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-56    | Upper Silverado | 1/24/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | 50 UJ   | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RMW-58    | Upper Silverado | 1/26/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RPZ-5     | Upper Silverado | 1/30/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RPZ-6     | Upper Silverado | 1/17/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |
| RPZ-8     | Upper Silverado | 1/17/18     | <0.31            | <4.6  | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |        |

**TABLE 2. SUMMARY OF GROUNDWATER ANALYTICAL RESULTS, January 2018 - Fuel Constituents  
Charnock Sub-Basin; Los Angeles, California**

| Well No.                                        | Aquifer         | Sample Date | MTBE                              | TBA  | TAME  | DIPE  | ETBE  | 1,2,4-TMB | 1,3,5-TMB | Ethanol | Benzene | Ethyl-benzene | Toluene | m,p-Xylenes | o-Xylene | Volatile Fuel Hydrocarbons |        |
|-------------------------------------------------|-----------------|-------------|-----------------------------------|------|-------|-------|-------|-----------|-----------|---------|---------|---------------|---------|-------------|----------|----------------------------|--------|
|                                                 |                 |             | EPA Method 8260B                  |      |       |       |       |           |           |         |         |               |         |             |          |                            | C6-C12 |
| EQL (µg/L):                                     |                 |             | 1.0                               | 10   | 2.0   | 2.0   | 2.0   | 1.0       | 1.0       | 100     | 0.50    | 1.0           | 1.0     | 1.0         | 1.0      | 50                         | 50     |
| Monitoring Wells Located at Charnock Well Field |                 |             |                                   |      |       |       |       |           |           |         |         |               |         |             |          |                            |        |
| EQL (µg/L):                                     |                 |             | 1.0                               | 10   | 2.0   | 2.0   | 2.0   | 1.0       | 1.0       | 100     | 0.50    | 1.0           | 1.0     | 1.0         | 1.0      | 50                         | 50     |
| KMX-1                                           | Shallow and USA | 2/1/18      | <0.31                             | <4.6 | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| KMX-2                                           | Shallow and USA | 2/1/18      | <0.31                             | <4.6 | <0.22 | <0.33 | <0.44 | <0.36     | <0.28     | <50     | <0.14   | <0.14         | <0.24   | <0.30       | <0.23    | <48                        | <48    |
| KMX-3                                           | Shallow and USA | 1/17/18     | DRY; insufficient water to sample |      |       |       |       |           |           |         |         |               |         |             |          |                            |        |
| KMX-4                                           | Shallow and USA | 1/17/18     | DRY; insufficient water to sample |      |       |       |       |           |           |         |         |               |         |             |          |                            |        |

**Notes:**

All units are in micrograms per liter (µg/L), or parts per billion

EQL = Estimated Quantitation Limit

fd = duplicate sample

<xx = Analyte not detected above the indicated detection limit

J = Estimated value

UJ = The analyte was analyzed for, but it was not detected and the sample detection limit is an estimated quantity.

Volatile fuel hydrocarbons were analyzed using EPA Method 8015B (M).

**TABLE 3a. RECOMMENDED REVISED GROUNDWATER MONITORING SCHEDULE  
FOR CHARNOCK REGIONAL MONITORING WELLS**  
Charnock Sub-Basin; Los Angeles, California

| Regional Well or Piezometer                   | Water Levels   | Current Baseline Sampling Frequency | Revised Sampling Frequency | Rationale                                                                            |
|-----------------------------------------------|----------------|-------------------------------------|----------------------------|--------------------------------------------------------------------------------------|
| <b>Shallow Aquifer Wells</b>                  |                |                                     |                            |                                                                                      |
| RMW-1 (a)                                     | Discontinue    | Every 3 years (a)                   | Discontinue                | Located at the former Thrifty site; not part of the regional well monitoring program |
| RMW-4A                                        | Semiannual (b) | Annual                              | Discontinue                | Well is dry                                                                          |
| RMW-7                                         | Semiannual     | Every 3 years                       | Discontinue                | MTBE <1 µg/L; TBA non-detect                                                         |
| RMW-10                                        | Semiannual (b) | Semiannual                          | Discontinue                | Well is dry                                                                          |
| RMW-12                                        | Semiannual (b) | Semiannual                          | Discontinue                | Well is dry                                                                          |
| RMW-16A                                       | Semiannual (b) | Annual                              | Discontinue                | Well is dry                                                                          |
| RMW-18                                        | Semiannual (b) | Annual                              | Discontinue                | Well is dry                                                                          |
| RMW-20                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-22                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-24                                        | Semiannual (b) | Annual                              | Discontinue                | Well is dry                                                                          |
| RMW-25                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-27                                        | Semiannual     | Every 3 years                       | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-29                                        | Semiannual (b) | Every 3 years                       | Discontinue                | Well is dry                                                                          |
| RMW-31                                        | Semiannual (b) | Every 3 years                       | Discontinue                | Well is dry                                                                          |
| RMW-33                                        | Semiannual     | Every 3 years                       | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-48                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-51                                        | Semiannual (b) | Annual                              | Discontinue                | Well is dry                                                                          |
| RMW-53                                        | Semiannual     | Annual                              | Discontinue                | Groundwater is now perched; MTBE and TBA both non-detect                             |
| RMW-55                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE <1 µg/L; TBA non-detect                                                         |
| RMW-57                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE and TBA both non-detect                                                         |
| RMW-59                                        | Semiannual     | Semiannual                          | Discontinue                | MTBE and TBA both non-detect                                                         |
| RPZ-4                                         | Semiannual (b) | Every 3 years                       | Discontinue                | Piezometer is dry                                                                    |
| RPZ-7                                         | Semiannual (b) | Every 3 years                       | Discontinue                | Piezometer is dry                                                                    |
| RPZ-9                                         | Semiannual (b) | Every 3 years                       | Discontinue                | Piezometer is dry                                                                    |
| <b>Shallow/ Upper Silverado Aquifer Wells</b> |                |                                     |                            |                                                                                      |
| KMX-1                                         | Semiannual     | Annual                              | Annual                     | No change; located at the Charnock Well Field                                        |
| KMX-2                                         | Semiannual     | Annual                              | Annual                     | No change; located at the Charnock Well Field                                        |
| KMX-3                                         | Semiannual (b) | Annual                              | Discontinue                | Well is dry.                                                                         |
| KMX-4                                         | Semiannual (b) | Annual                              | Discontinue                | Well is dry.                                                                         |

**TABLE 3a. RECOMMENDED REVISED GROUNDWATER MONITORING SCHEDULE  
FOR CHARNOCK REGIONAL MONITORING WELLS  
Charnock Sub-Basin; Los Angeles, California**

| Regional Well or Piezometer               | Water Levels | Current Baseline Sampling Frequency | Revised Sampling Frequency | Rationale                                                                            |
|-------------------------------------------|--------------|-------------------------------------|----------------------------|--------------------------------------------------------------------------------------|
| <b>Upper Silverado Aquifer Wells</b>      |              |                                     |                            |                                                                                      |
| RMW-3                                     | Semiannual   | Annual                              | Annual                     | No change; north side of Well Field                                                  |
| RMW-5                                     | Semiannual   | Every 3 years                       | Discontinue                | Deeper well adjacent to RMW-6; MTBE and TBA consistently non-detect                  |
| RMW-6                                     | Semiannual   | Semiannual                          | Annual                     | North of Sepulveda/Venice                                                            |
| RMW-9                                     | Semiannual   | Annual                              | Semiannual                 | Between current MTBE and Well Field                                                  |
| RMW-11                                    | Semiannual   | Semiannual                          | Annual                     | Defines eastern extent of MTBE                                                       |
| RMW-13                                    | Semiannual   | Every 3 years                       | Semiannual                 | Between current MTBE and Well Field                                                  |
| RMW-14                                    | Semiannual   | Annual                              | Semiannual                 | Between current MTBE and Well Field                                                  |
| RMW-17                                    | Semiannual   | Annual                              | Annual                     | No change                                                                            |
| RMW-19                                    | Semiannual   | Semiannual                          | Annual                     | Defines southern extent of MTBE                                                      |
| RMW-21                                    | Semiannual   | Annual                              | Semiannual                 | Defines current MTBE concentrations                                                  |
| RMW-23                                    | Semiannual   | Annual                              | Semiannual                 | Defines current MTBE concentrations                                                  |
| RMW-28                                    | Semiannual   | Every 3 years                       | Semiannual                 | Between MTBE/TBA and Well Field                                                      |
| RMW-30                                    | Semiannual   | Annual                              | Semiannual                 | Recent increasing TBA                                                                |
| RMW-32                                    | Semiannual   | Every 3 years                       | Discontinue                | ~1,000 ft west of impacted groundwater                                               |
| RMW-49                                    | Semiannual   | Semiannual                          | Semiannual                 | No change; defines current MTBE concentrations                                       |
| RMW-50                                    | Semiannual   | Annual                              | Semiannual                 | Defines current extent of MTBE and TBA                                               |
| RMW-52                                    | Semiannual   | Semiannual                          | Semiannual                 | No change; recent increasing TBA                                                     |
| RMW-54                                    | Semiannual   | Semiannual                          | Semiannual                 | No change; defines current western extent of MTBE                                    |
| RMW-56                                    | Semiannual   | Semiannual                          | Discontinue                | Redundant with RMW-54                                                                |
| RMW-58                                    | Semiannual   | Semiannual                          | Discontinue                | Redundant with RMW-54                                                                |
| RPZ-5                                     | Semiannual   | Every 3 years                       | Every 3 years              | No change                                                                            |
| RPZ-6                                     | Semiannual   | Every 3 years                       | Every 3 years              | No change                                                                            |
| RPZ-8                                     | Semiannual   | Every 3 years                       | Every 3 years              | No change                                                                            |
| <b>Lower Silverado Aquifer Wells</b>      |              |                                     |                            |                                                                                      |
| RMW-2A (a)                                | Discontinue  | Every 3 years (a)                   | Discontinue                | Located at the former Thrifty site; not part of the regional well monitoring program |
| RMW-8                                     | Semiannual   | Annual                              | Every 3 years              | MTBE <1 µg/L or non-detect since 2013; TBA non-detect                                |
| RMW-15                                    | Semiannual   | Annual                              | Every 3 years              | MTBE and TBA consistently non-detect                                                 |
| <b>Total Semiannual Event Wells:</b>      |              | <b>17</b>                           | <b>11</b>                  |                                                                                      |
| <b>Total Annual Event Wells:</b>          |              | <b>37</b>                           | <b>18</b>                  |                                                                                      |
| <b>Total Wells Sampled Every 3 years:</b> |              | <b>52</b>                           | <b>23</b>                  |                                                                                      |

**TABLE 3a. RECOMMENDED REVISED GROUNDWATER MONITORING SCHEDULE  
FOR CHARNOCK REGIONAL MONITORING WELLS  
Charnock Sub-Basin; Los Angeles, California**

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**Notes:**

1. Semiannual sampling (July): VOCs (including fuel parameters) by EPA Method 8260B, and volatile fuel hydrocarbons (C4-C12 and C6-C12) by DHS LUFT Method or EPA 8015B(M).
2. Annual sampling (January): Fuel constituents and oxygenates by EPA Method 8260B, and volatile fuel hydrocarbons (C4-C12 and C6-C12) by DHS LUFT Method or EPA 8015B(M). Depending on DPH requirements, the full suite of VOCs may be tested for during a July sampling event.
3. Annual monitoring reports are due to the LARWQCB on July 15 every year.
4. Semiannual monitoring reports are due to the LARWQCB on January 15 every year.
  - (a) Monitoring wells RMW-1 and RMW -2A are located at the former Thrifty site. These two wells are not sampled as part of the regional monitoring program, and they are not included in the total wells sampled counts.
  - (b) Inspect well head condition; confirm well remains dry.

**TABLE 3b. GROUNDWATER ANALYTICAL TESTING PROGRAM FOR REGIONAL MONITORING WELLS**

**Charnock Sub-Basin; Los Angeles, California**

| <b>Analytical Parameters</b>                   | <b>Analytical Method</b>        |
|------------------------------------------------|---------------------------------|
| <b>Annual Monitoring Parameters</b>            |                                 |
| Volatile Organic Compounds (VOCs)              | EPA Method 8260B (see note 1)   |
| TPH-gasoline (C4-C12)                          | DHS LUFT Method or EPA 8015B(M) |
| TPH-gasoline (C6-C12)                          | DHS LUFT Method or EPA 8015B(M) |
| <b>Semiannual Monitoring - Fuel Parameters</b> |                                 |
| MTBE                                           | EPA Method 8260B                |
| TBA                                            | EPA Method 8260B                |
| TAME                                           | EPA Method 8260B                |
| DIPE                                           | EPA Method 8260B                |
| ETBE                                           | EPA Method 8260B                |
| 1,2,4-Trimethylbenzene                         | EPA Method 8260B                |
| 1,3,5-Trimethylbenzene                         | EPA Method 8260B                |
| Ethanol                                        | EPA Method 8260B                |
| Benzene                                        | EPA Method 8260B                |
| Ethylbenzene                                   | EPA Method 8260B                |
| Toluene                                        | EPA Method 8260B                |
| m,p-Xylenes                                    | EPA Method 8260B                |
| o-Xylenes                                      | EPA Method 8260B                |
| Total Xylenes                                  | EPA Method 8260B                |
| TPH-gasoline (C4-C12)                          | DHS LUFT Method or EPA 8015B(M) |
| TPH-gasoline (C6-C12)                          | DHS LUFT Method or EPA 8015B(M) |

**Notes:**

TPH = Total Petroleum Hydrocarbons

EPA = United States Environmental Protection Agency

- (1) VOC analyte list to include all EPA Method 8260B fuel parameters;  
Tentatively Identified Compounds (TICs) to be reported.

## FIGURES

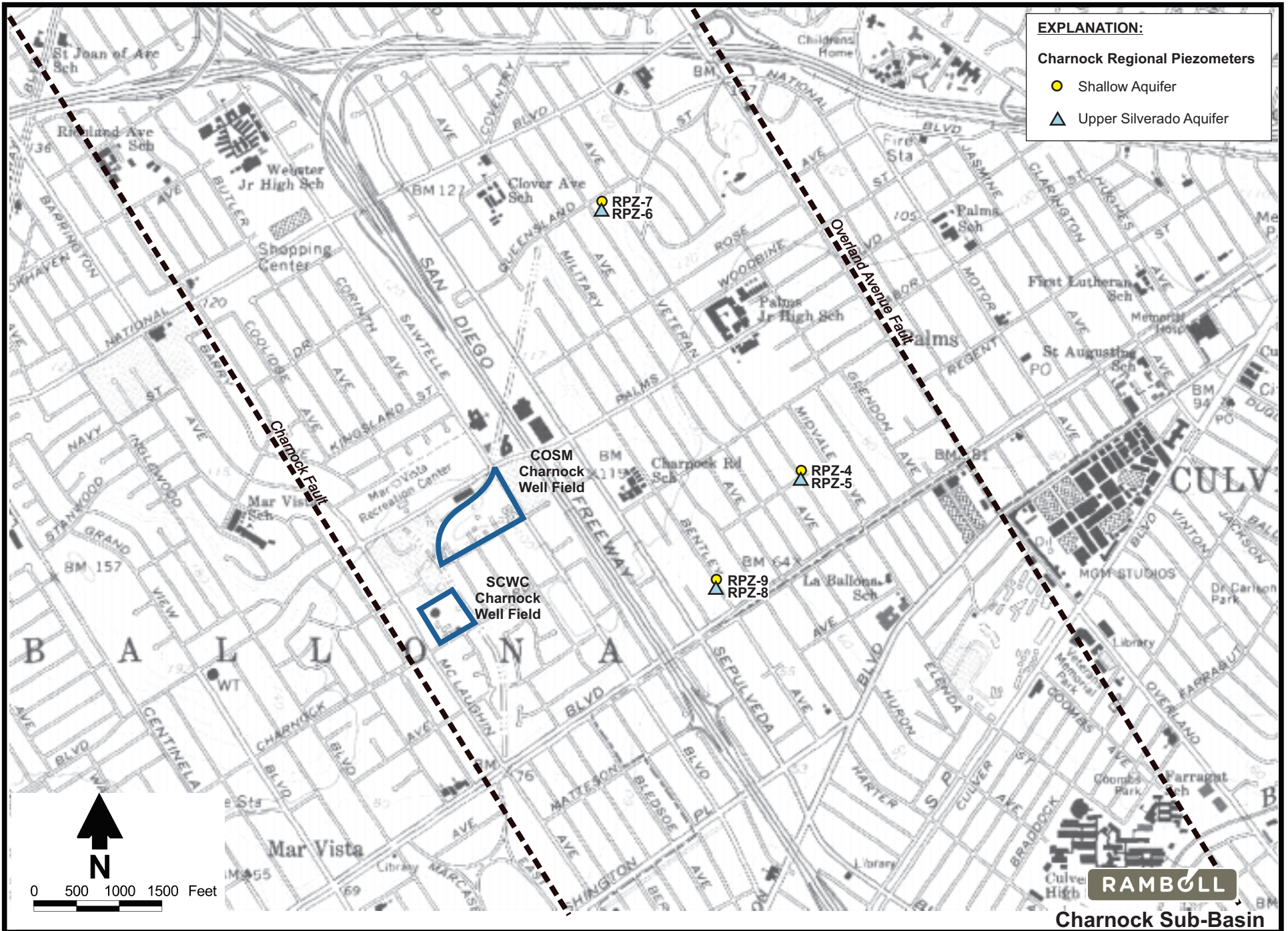
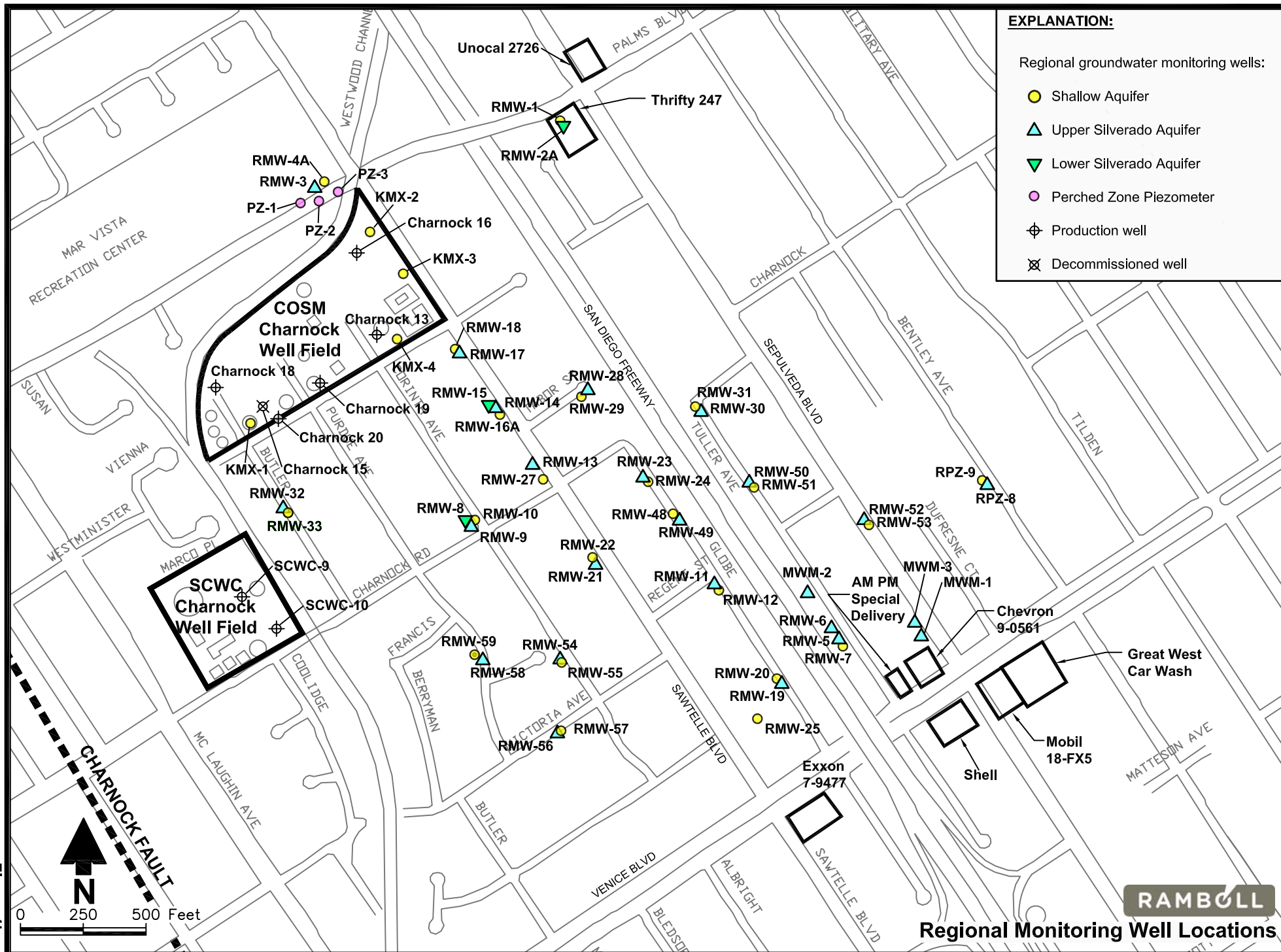


Figure 1a

Charnock Sub-Basin

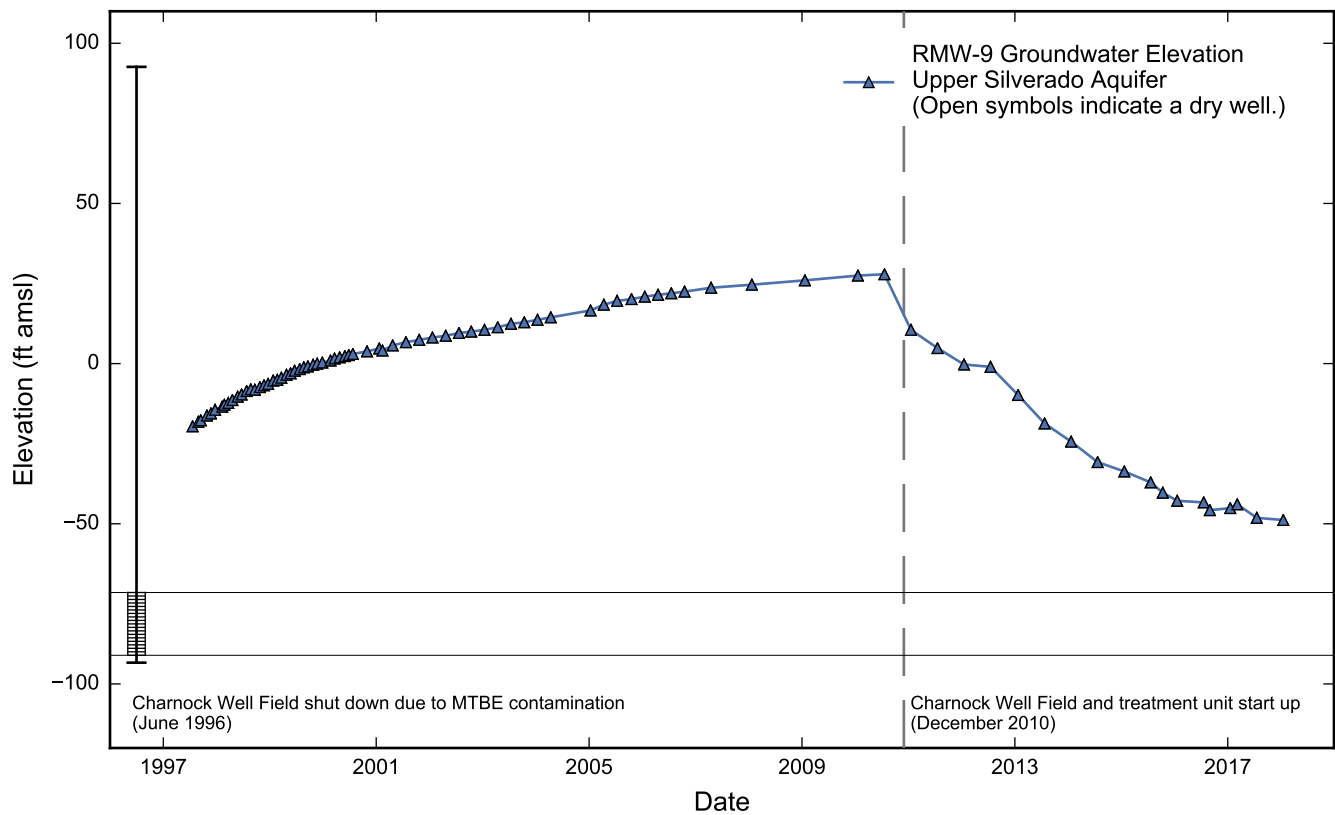
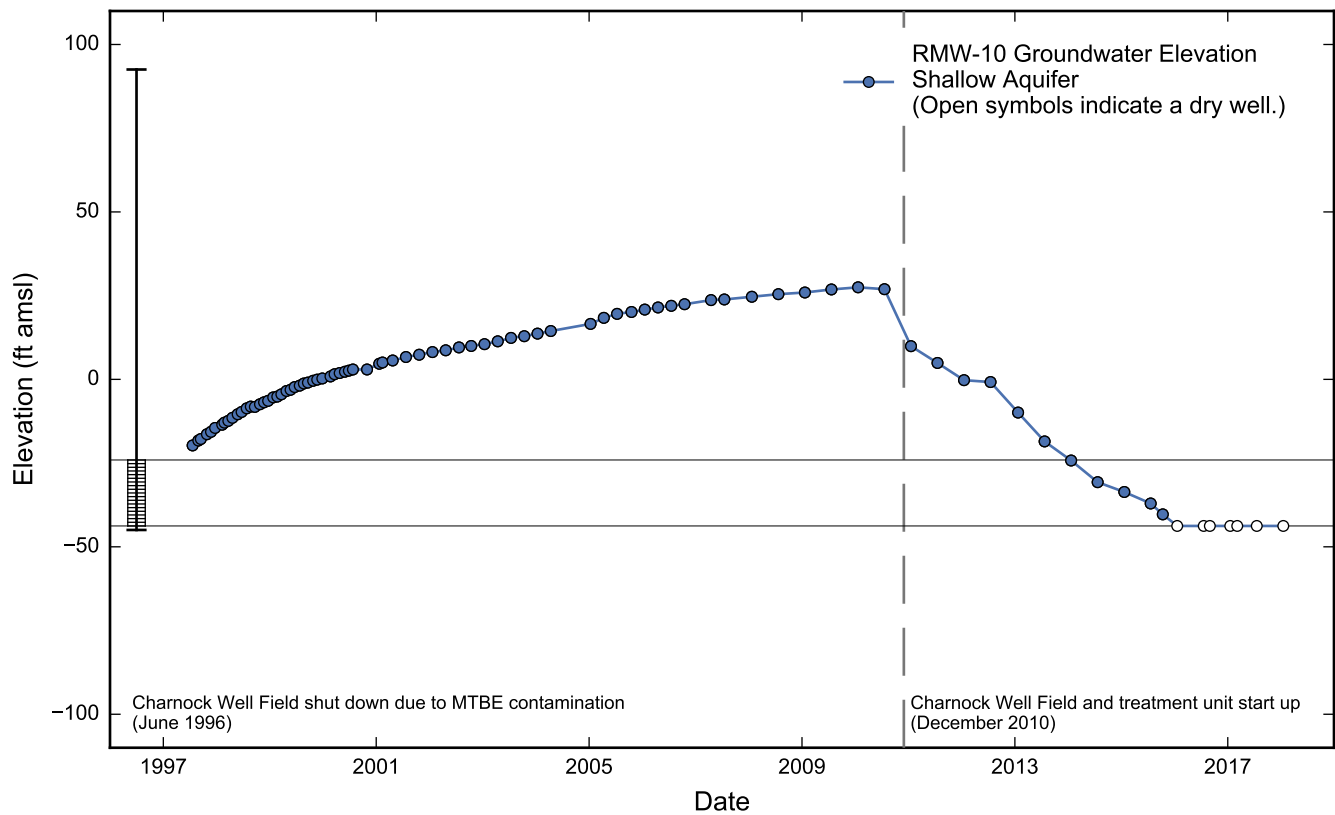
Figure 1a



RAMBOLL

Regional Monitoring Well Locations

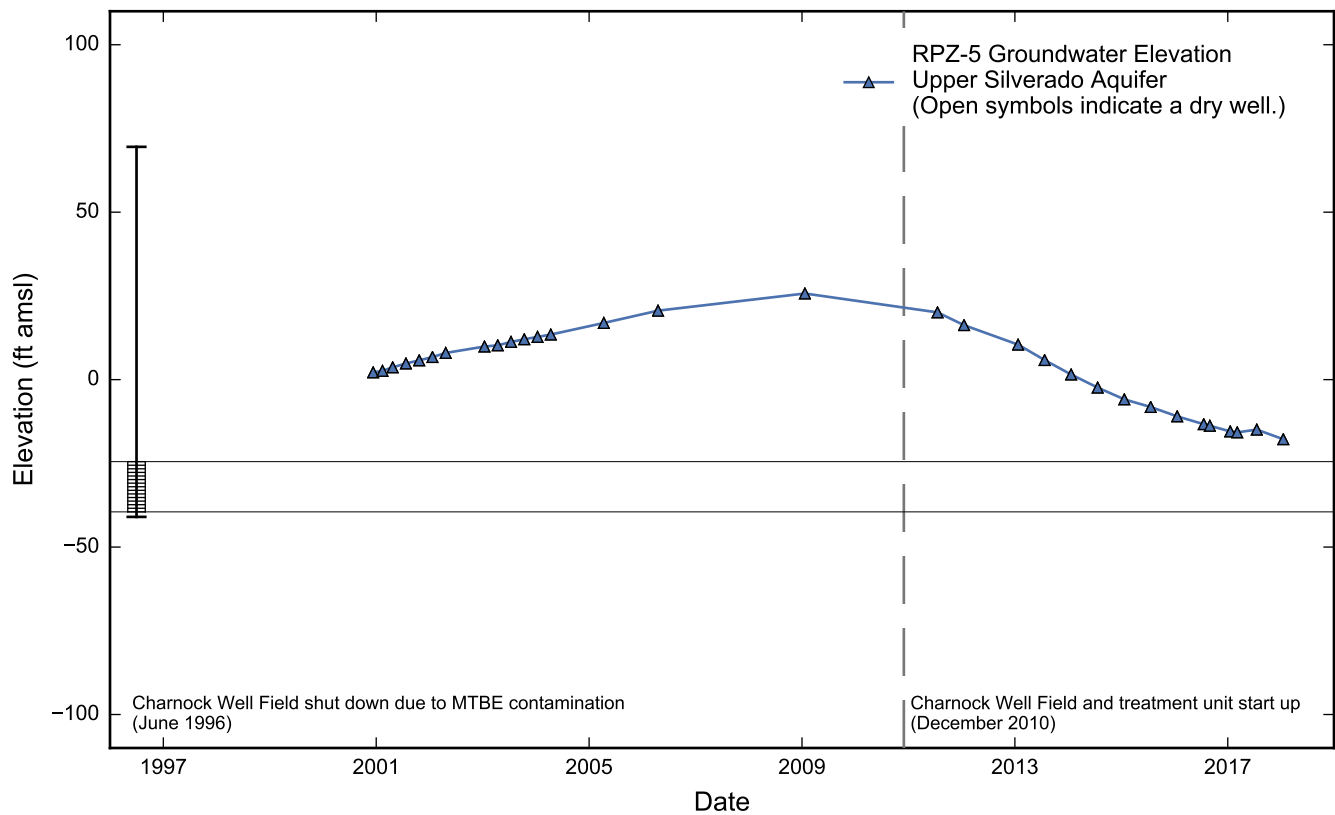
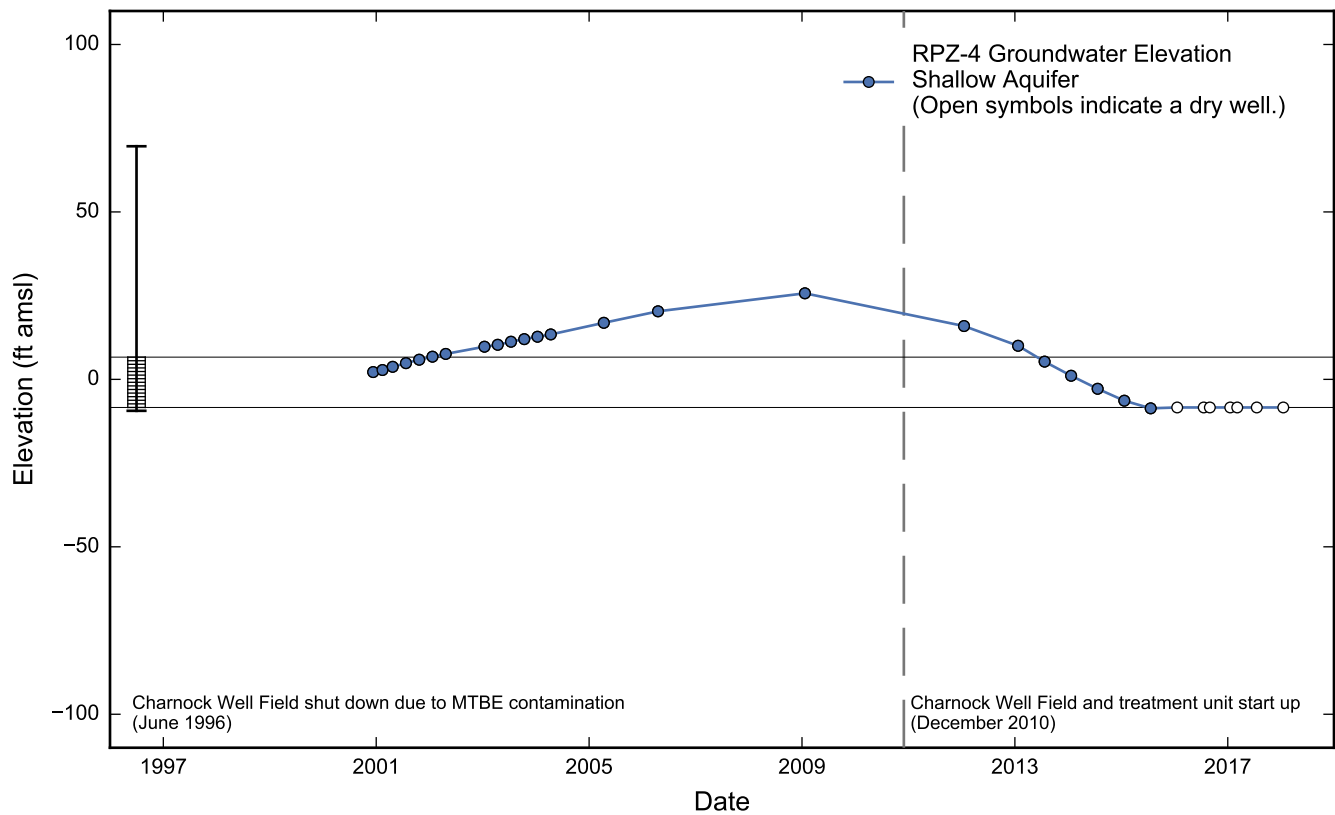
Figure 1b



**Groundwater Elevation Trends, Well Cluster RMW-10/RMW-9**  
Charnock Sub-Basin  
Los Angeles, California

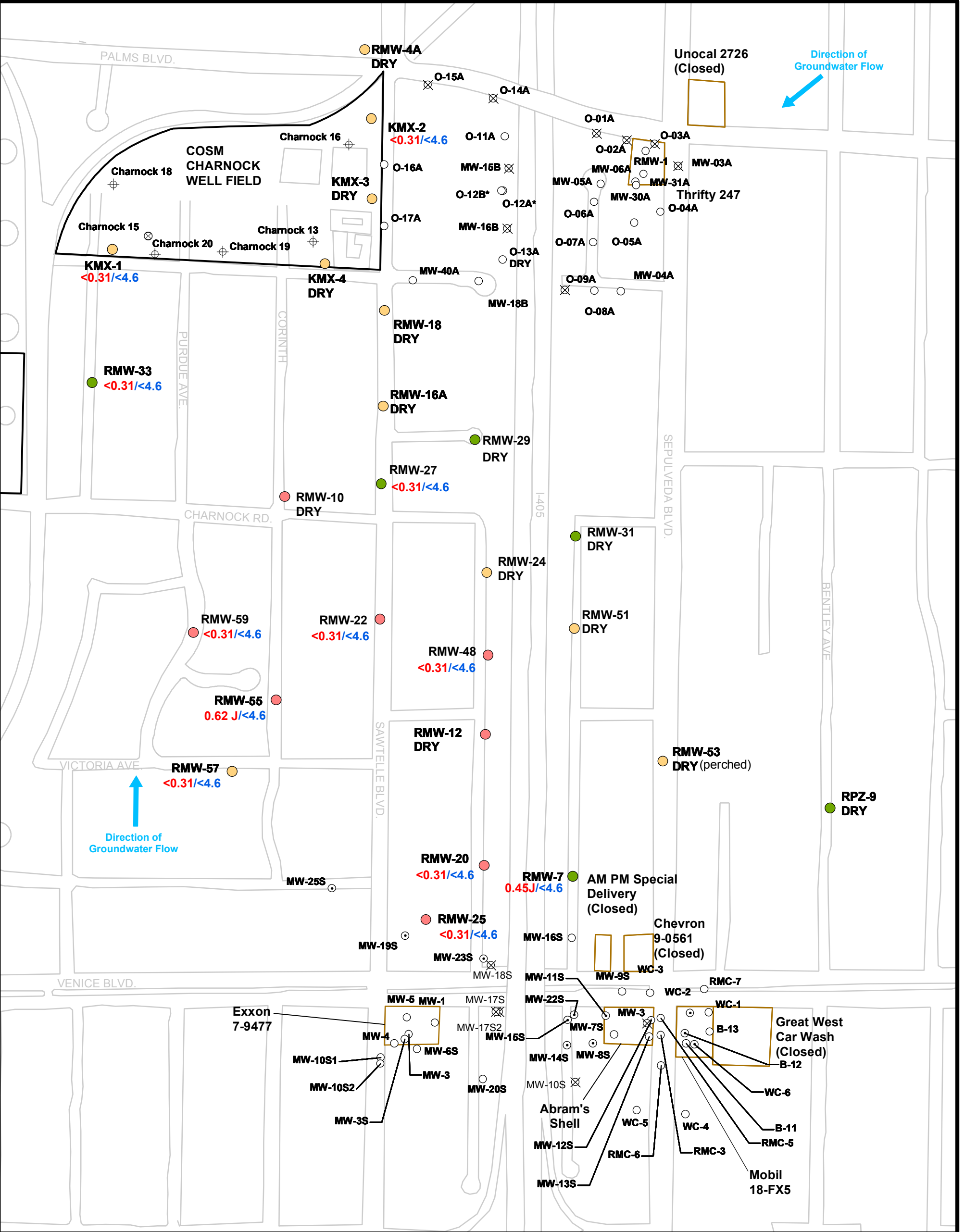
Figure

**2a**



**Groundwater Elevation Trends, Piezometer Cluster RPZ-4/RPZ-5**  
Charnock Sub-Basin  
Los Angeles, California

Figure  
**2b**



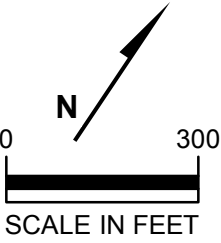
EXPLANATION

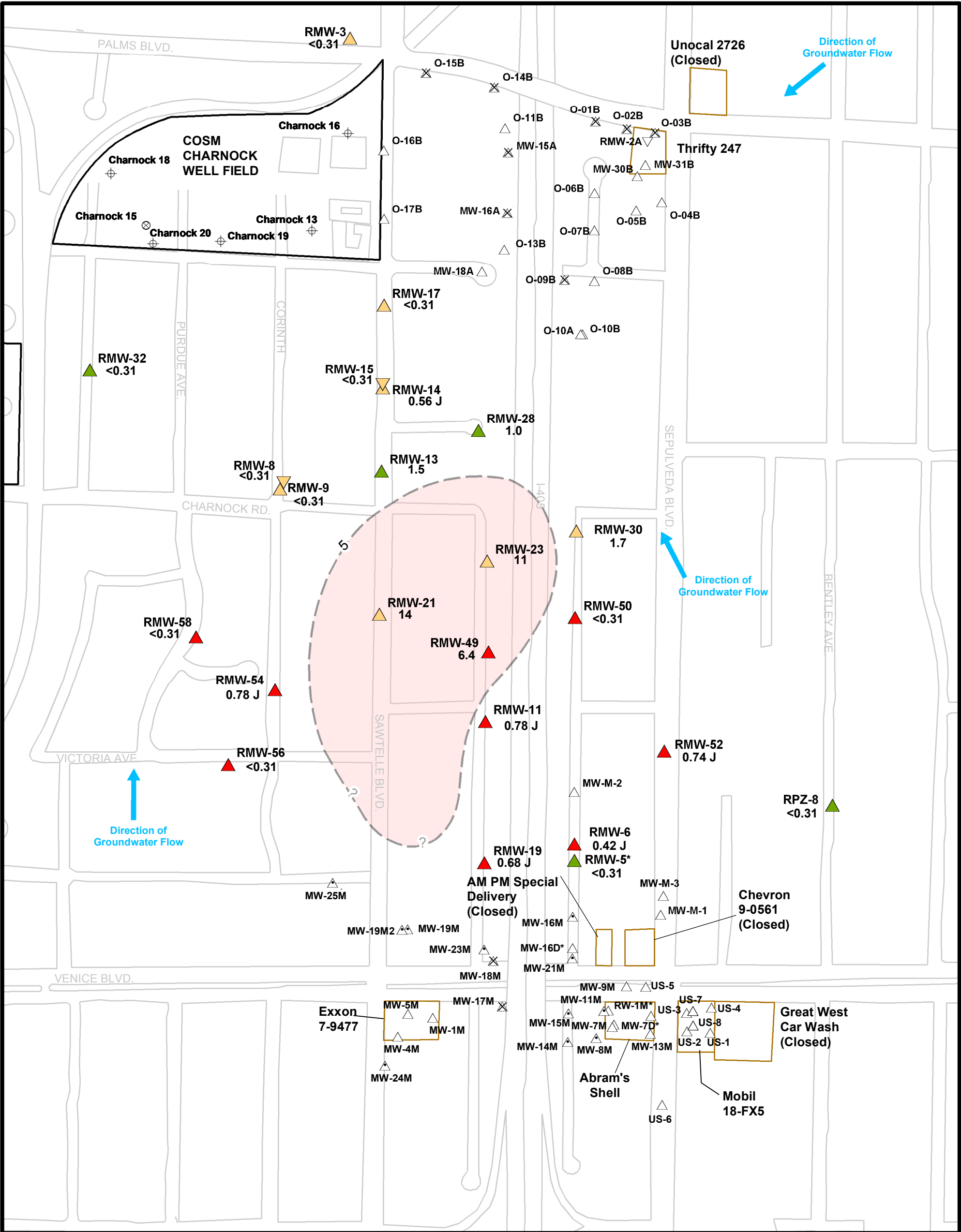
- Shallow Aquifer Monitoring Well
- Shallow Aquifer Extraction Well
- Destroyed
- Site
- <0.31 MTBE, µg/L
- <4.6 TBA, µg/L

- Baseline Sampling Schedule
- Semiannual
  - Annual
  - Every 3 Years
  - Concentration not available
  - Active Production Well
  - Destroyed Production Well

- <2 Not detected at or above the detection limit shown
- U, V, or X Less than the value shown
- J Estimated value
- N/A Concentration for this quarter not available
- \* Well O-12A is screened from 100.9 feet to 110.9 feet bgs. Well O-12B is screened at the base of the Shallow Aquifer from 155.7 feet to 165.7 feet bgs.
- DRY Insufficient water to sample

SOURCE: Charnock Database, January 2018





EXPLANATION

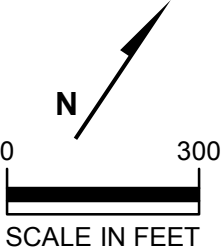
- ▲ Upper Silverado Aquifer Monitoring Well
- ▲ Upper Silverado Aquifer Extraction Well
- ▼ Lower Silverado Aquifer Monitoring Well
- ✕ Destroyed
- - - 5 MTBE Concentration Contour in µg/L
- Site

Baseline Sampling Schedule

- ▲ Semiannual
- ▲ Annual
- ▲ Every 3 Years
- △ Concentration not available
- ⊕ Active Production Well
- ⊗ Destroyed Production Well

- <2 Not detected at or above the detection limit shown
- U, V, or X Less than the value shown
- J Estimated value
- N/A Concentration for this quarter not available
- \* Well is screened in a deeper interval of the Upper Silverado Aquifer

SOURCE: Charnock Database, January 2018



MTBE - Silverado Aquifer, January 2018  
Charnock Sub-Basin; Los Angeles, California

Figure  
4a

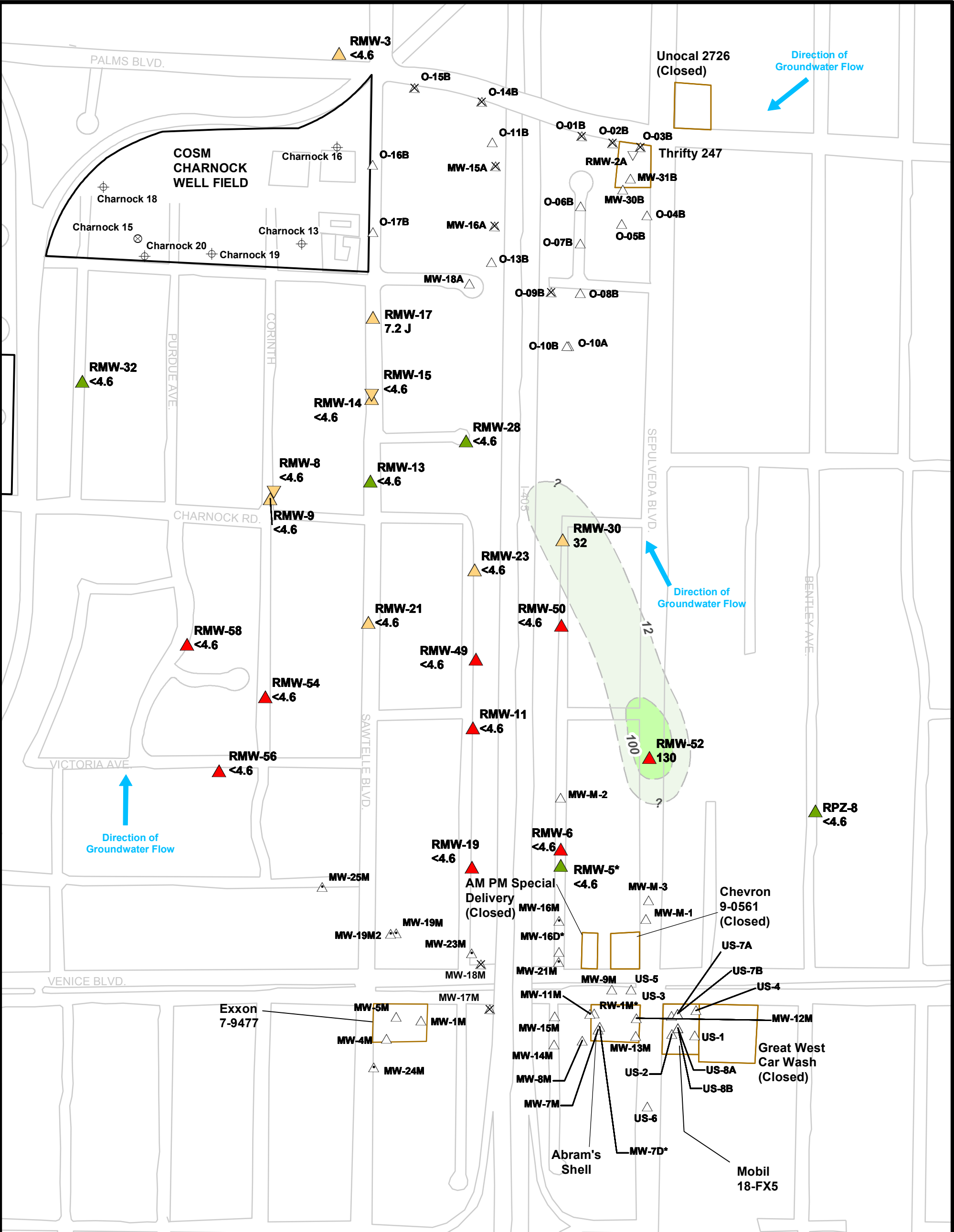
Drafter: AR

Date: 01/15/18

Contract Number: 169000 7775-005

Approved:

Revised:



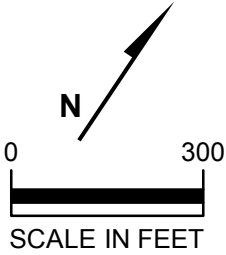
EXPLANATION

- ▲ Upper Silverado Aquifer Monitoring Well
- ▲ Upper Silverado Aquifer Extraction Well
- ▼ Lower Silverado Aquifer Monitoring Well
- ✕ Destroyed
- 12 TBA Concentration Contour in µg/L
- Site

Baseline Sampling Schedule

- ▲ Semiannual
- ▲ Annual
- ▲ Every 3 Years
- △ Concentration not available
- ⊕ Active Production Well
- ⊗ Destroyed Production Well

- <2 Not detected at or above the detection limit shown
- U, V, or X Less than the value shown
- J Estimated value
- N/A Concentration for this quarter not available
- (a) Raised detection limit (above the EQL)
- \* Well is screened in a deeper interval of the Upper Silverado Aquifer



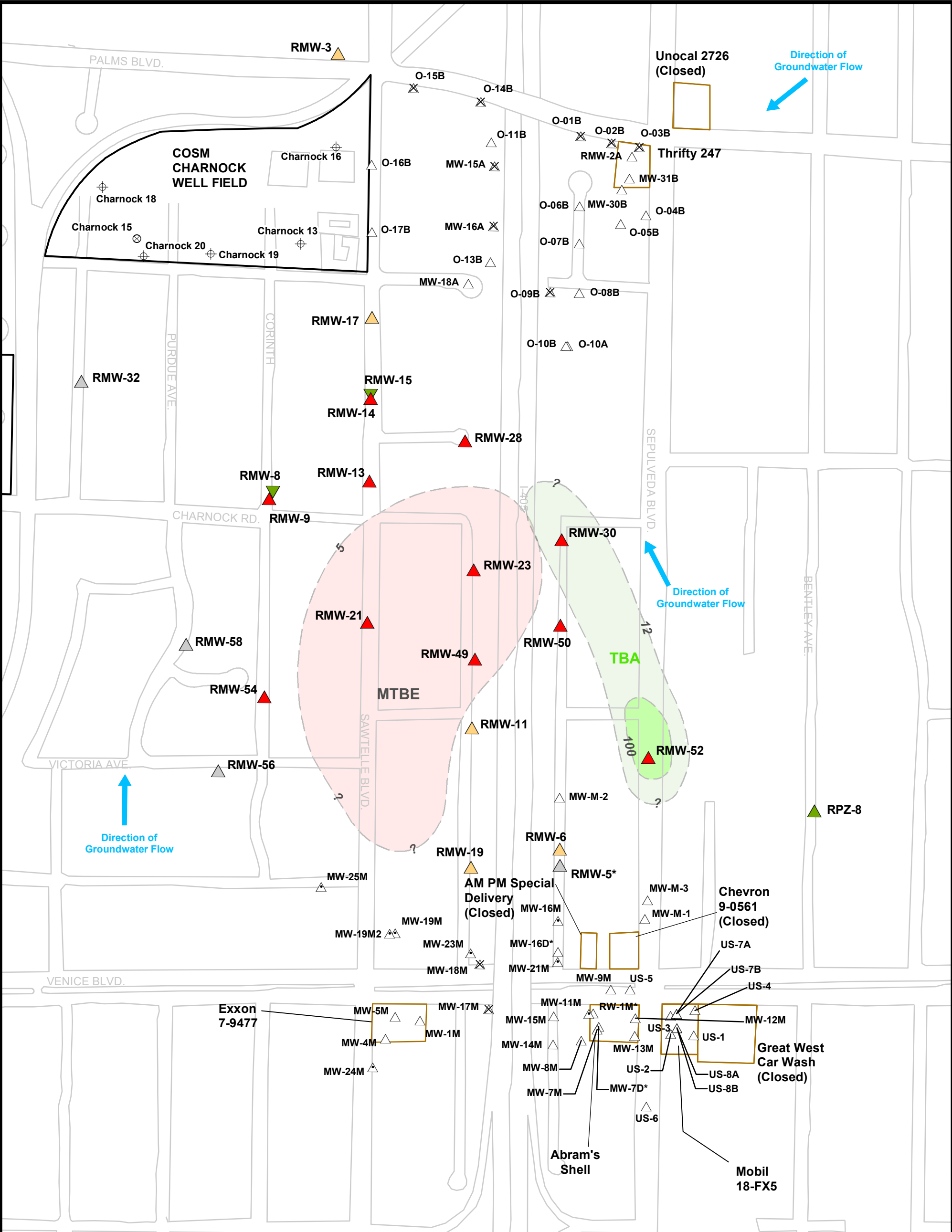
SOURCE: Charnock Database, January 2018.



TBA - Silverado Aquifer, January 2018  
Charnock Sub-Basin; Los Angeles, California

Figure  
4b

Drafter: AR Date: 07/15/17 Contract Number: 169000 7775-005 Approved: Revised:



EXPLANATION

- △ Upper Silverado Aquifer Monitoring Well
- △ Upper Silverado Aquifer Extraction Well
- ▽ Lower Silverado Aquifer Monitoring Well
- ✕ Destroyed
- ⊕ Active Production Well
- ⊗ Destroyed Production Well

Revised Sampling Schedule

- ▲ Semiannual
- ▲ Annual
- ▲ Every 3 Years
- △ Discontinue



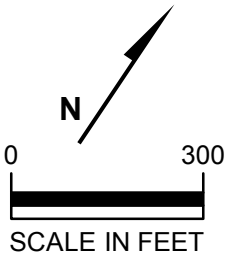
Site



Concentration Contour in µg/L,  
January 2018

\*

Well is screened in a deeper interval  
of the Upper Silverado Aquifer



SOURCE: Charnock Database, January 2018.

RAMBOLL

Recommended Monitoring Program, Silverado Aquifer  
Charnock Sub-Basin; Los Angeles, California

Figure  
5

Drafter: RS

Date: 07/15/17

Contract Number: 169000 7775-005

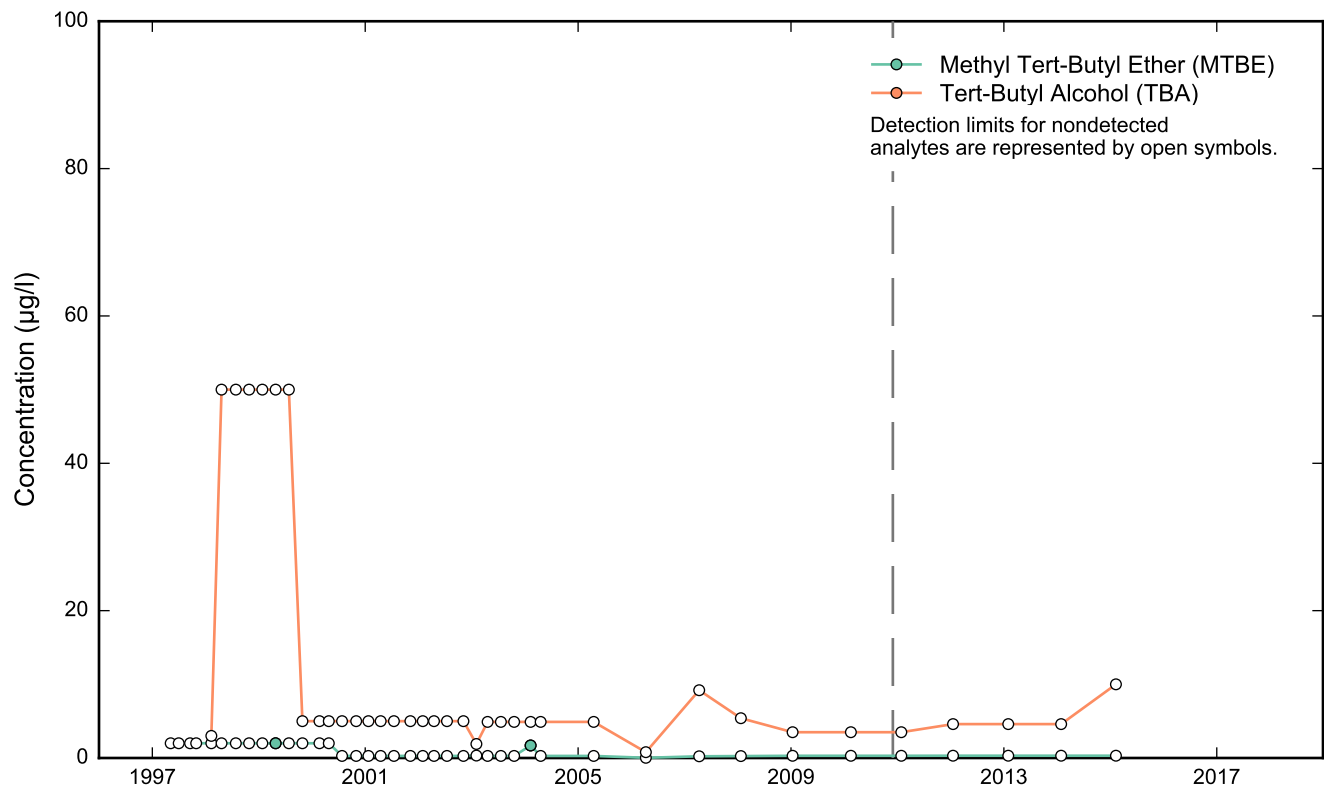
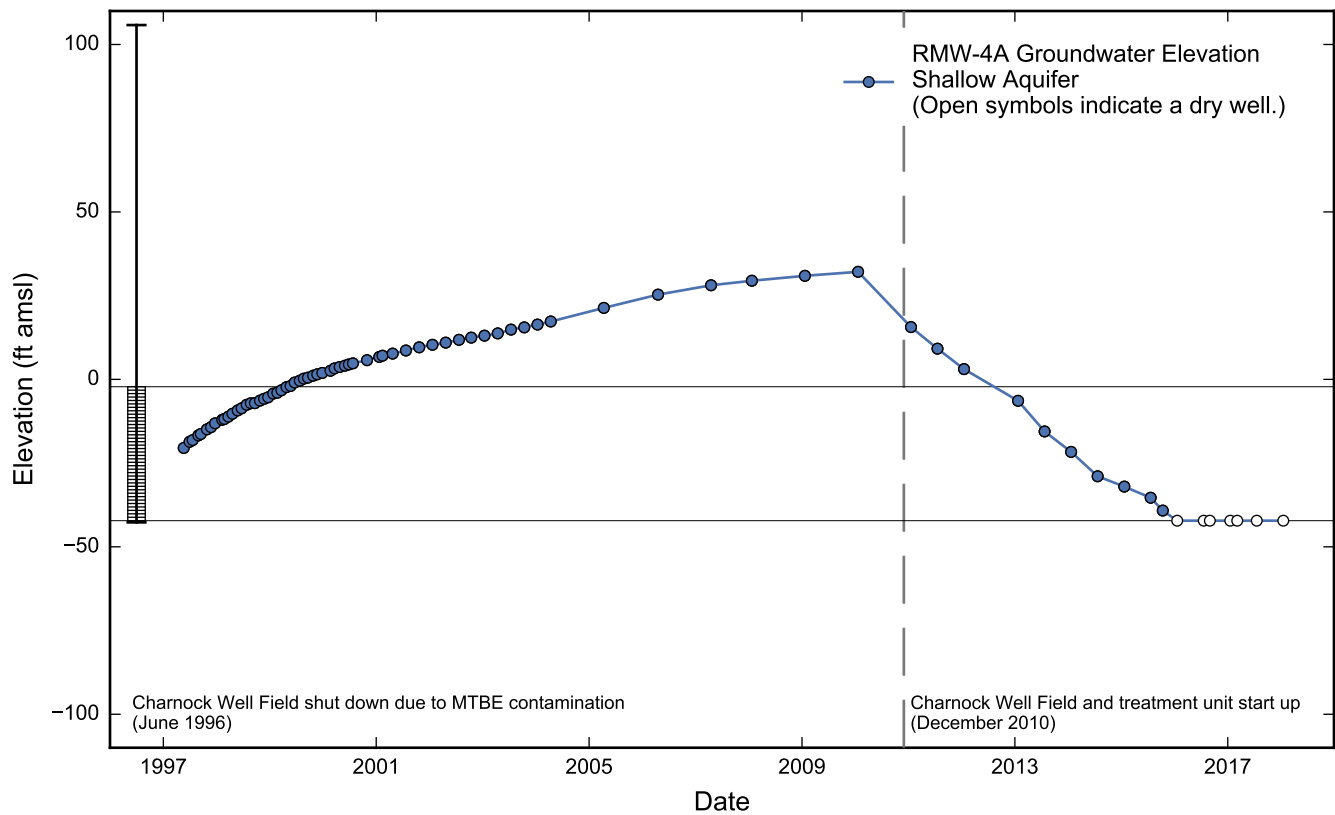
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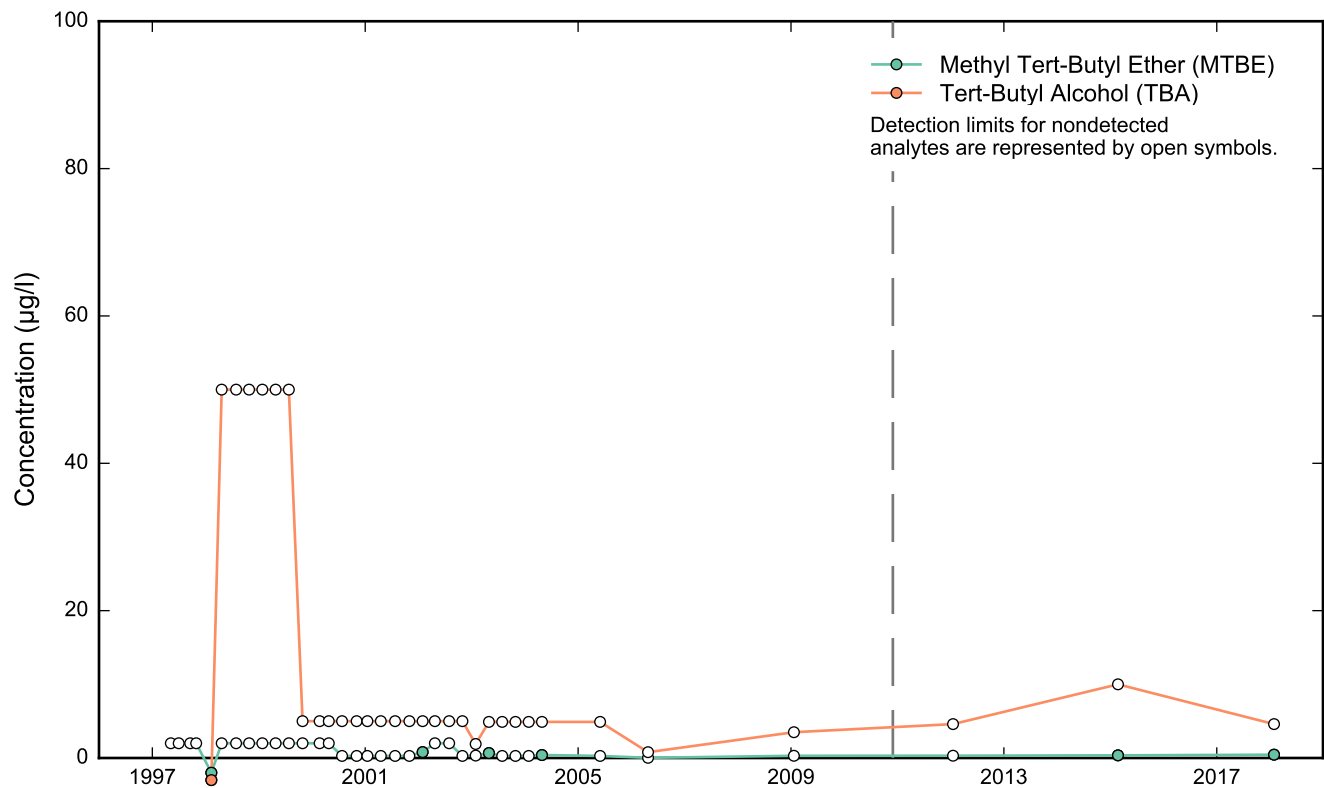
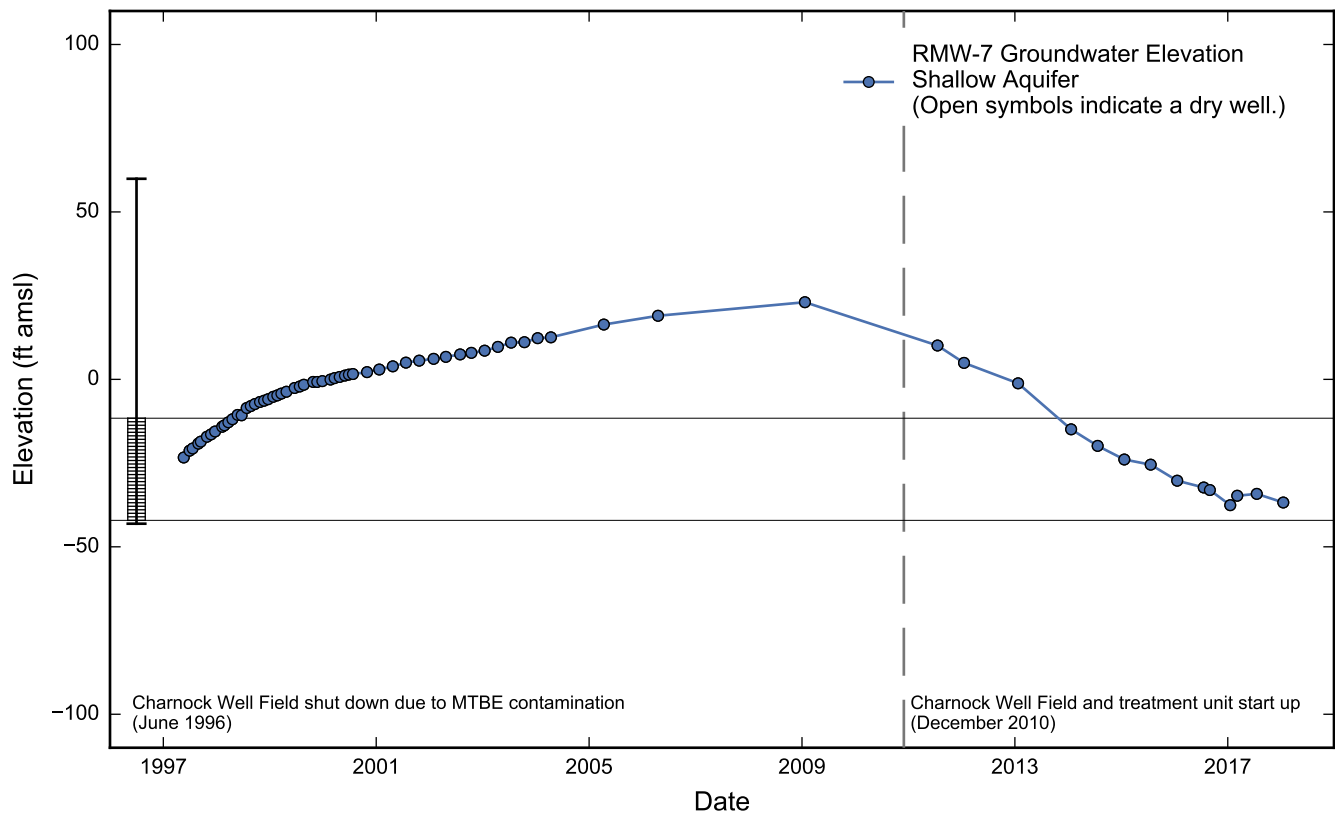
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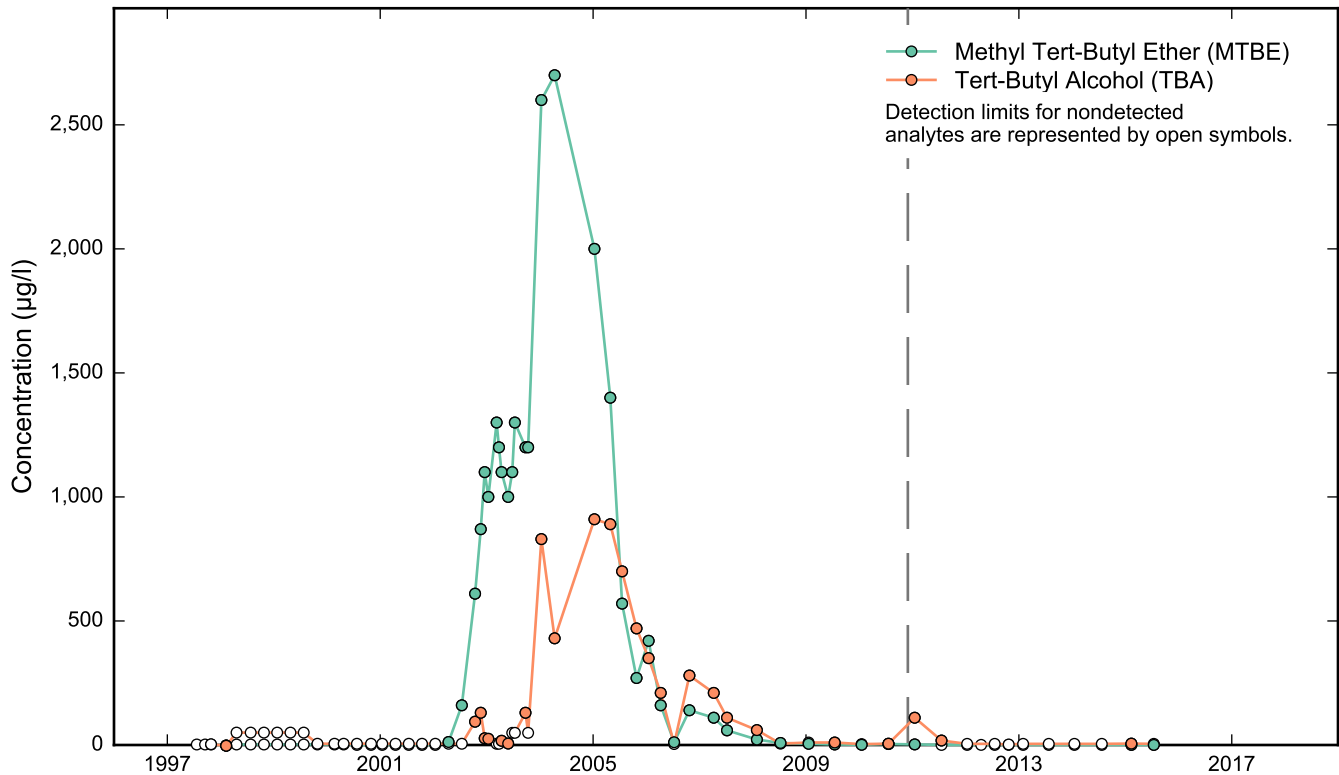
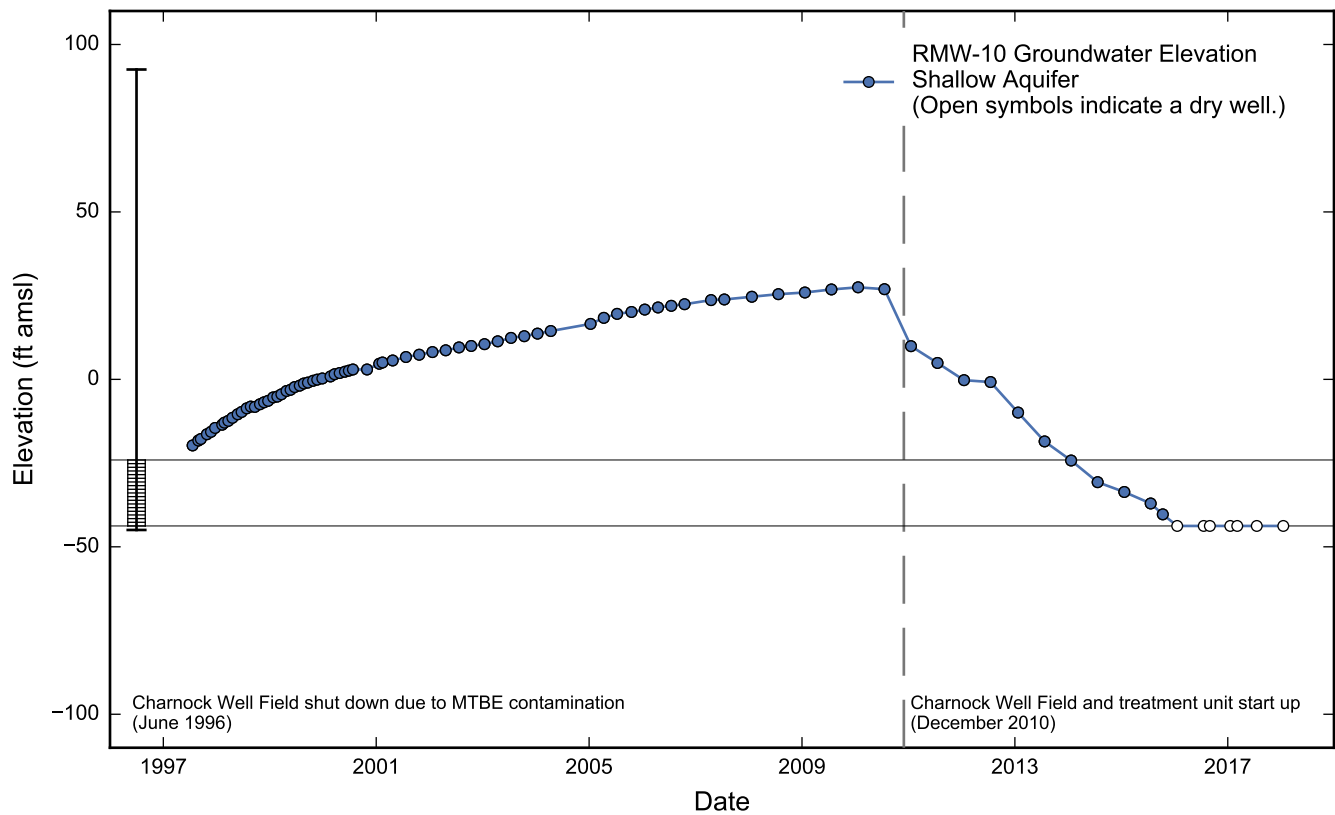
**ATTACHMENT A**

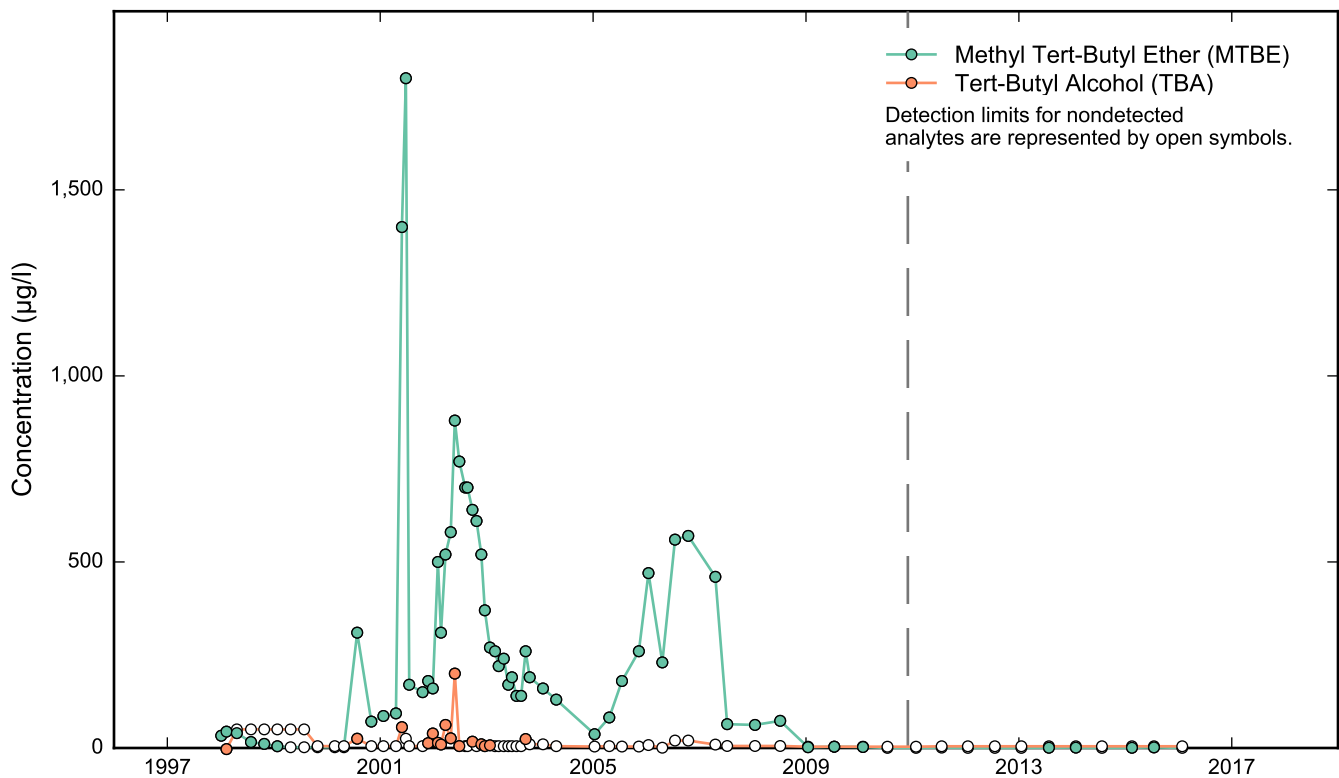
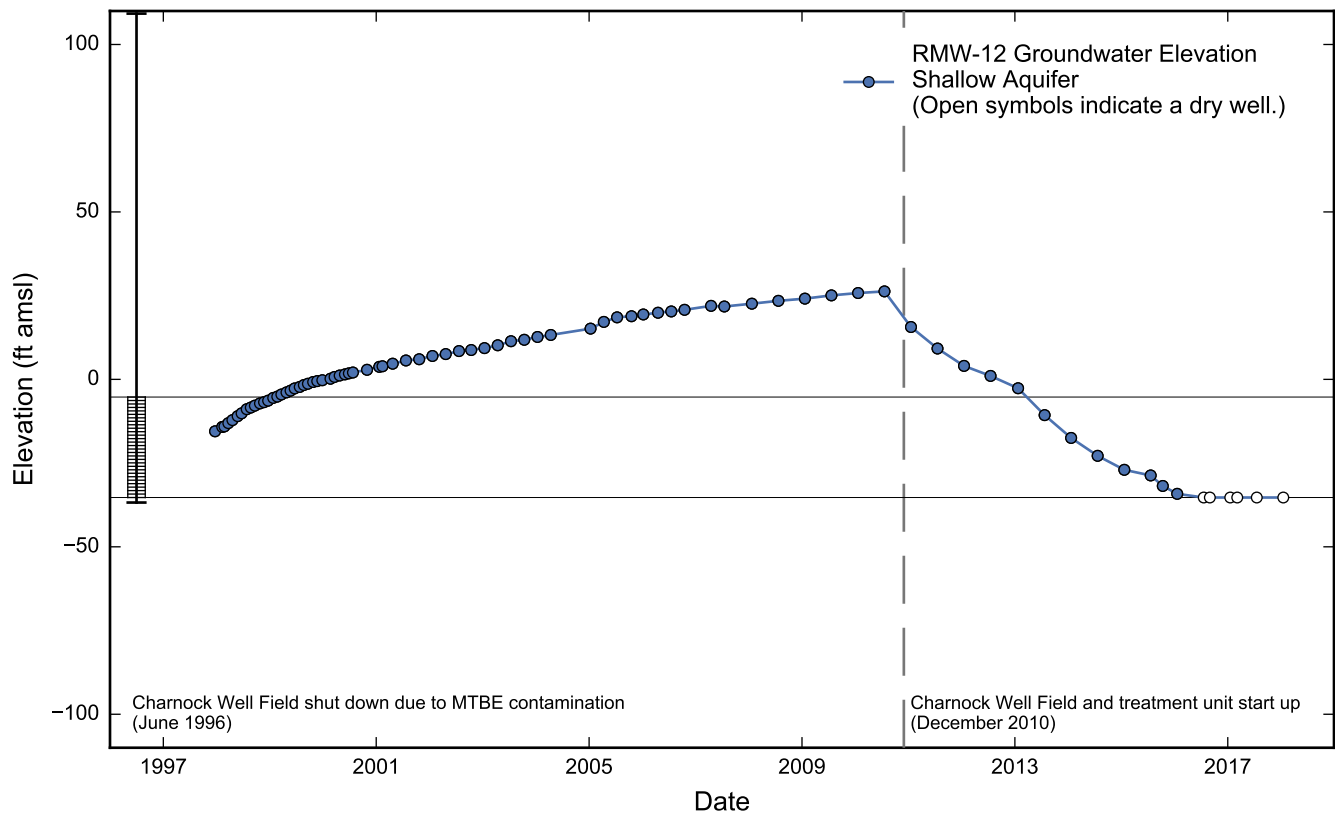
**Hydrographs and Concentration Trends,  
1997-2018**

## **Shallow Aquifer Wells**





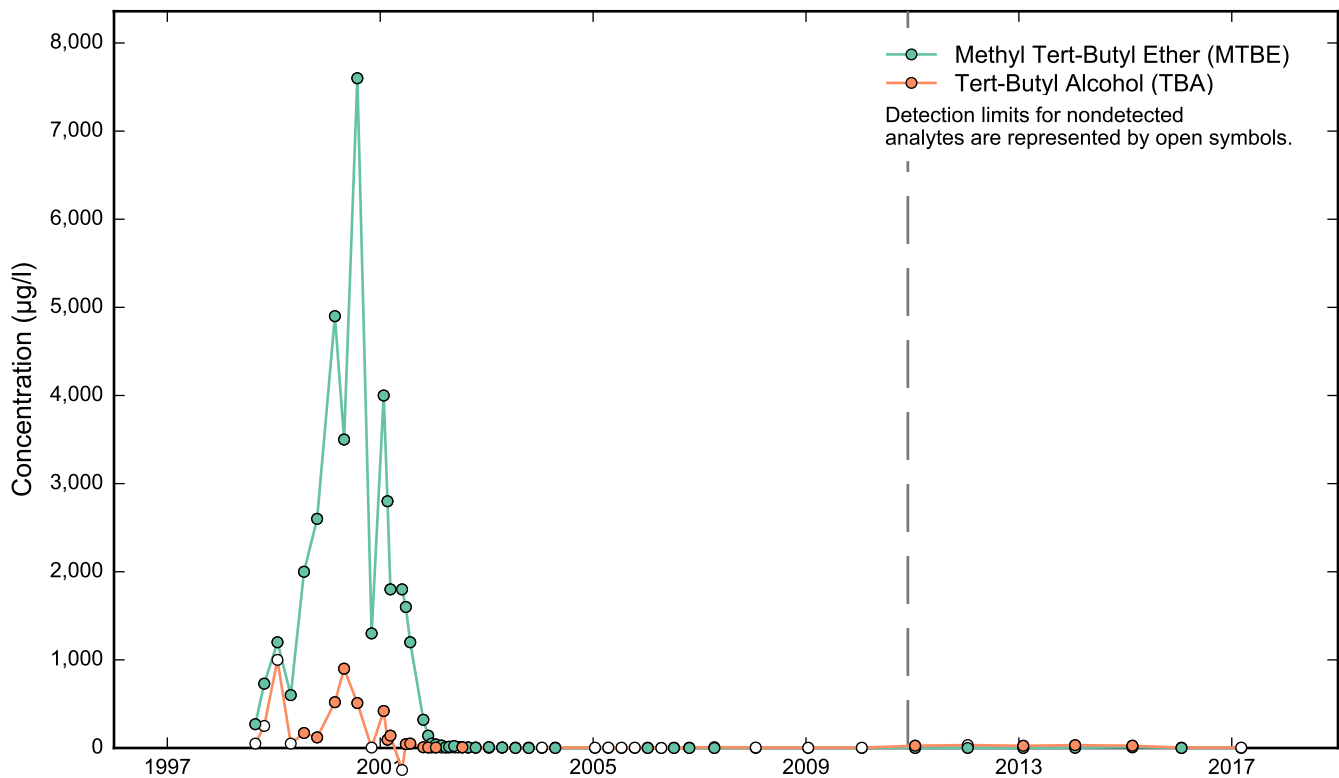
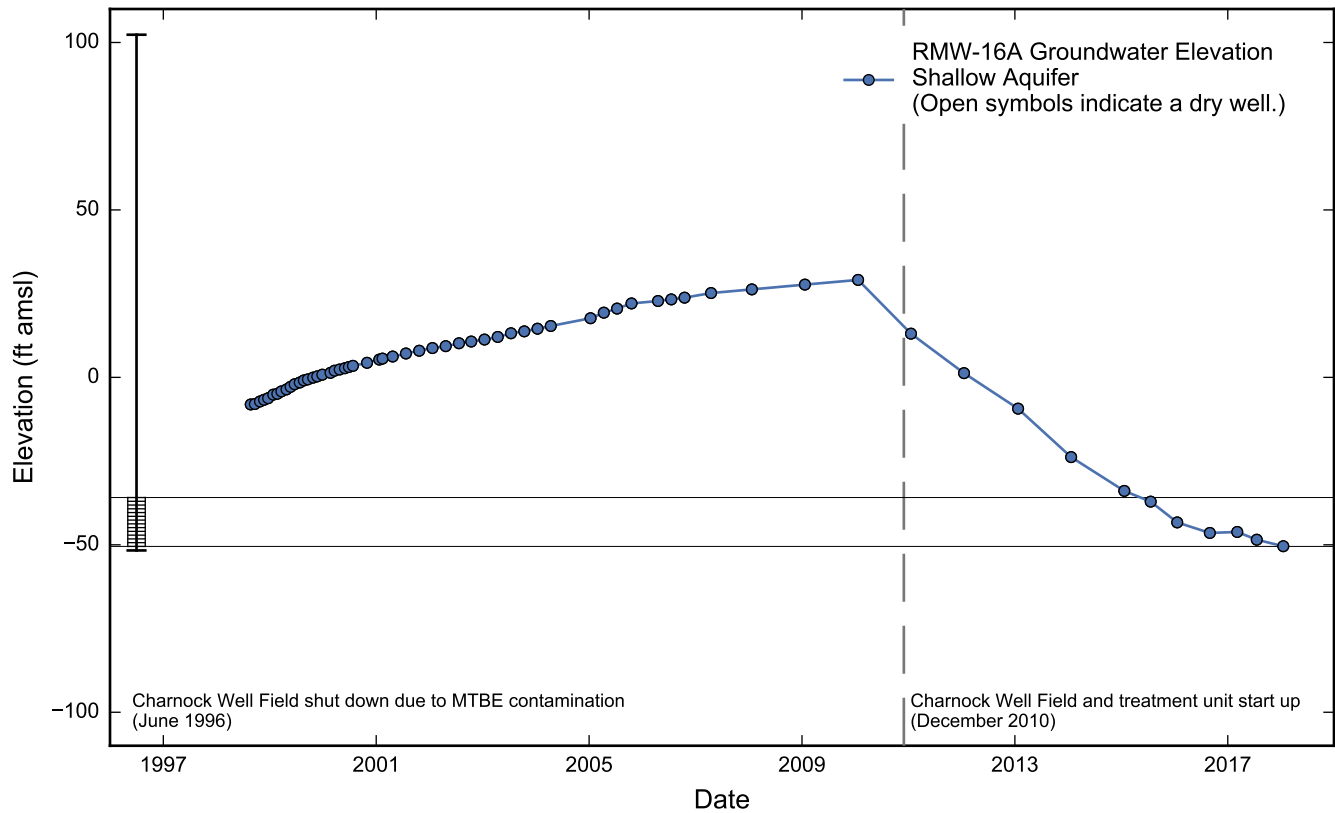


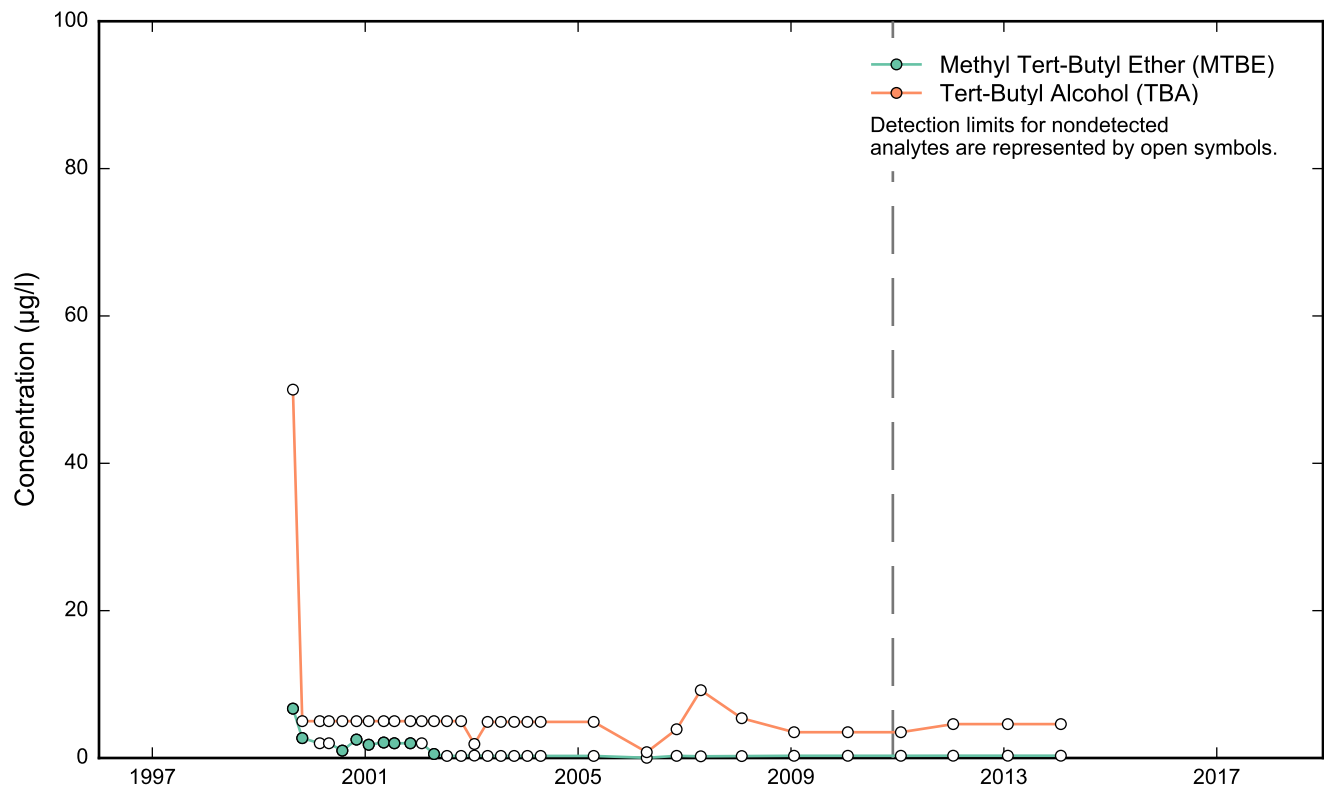
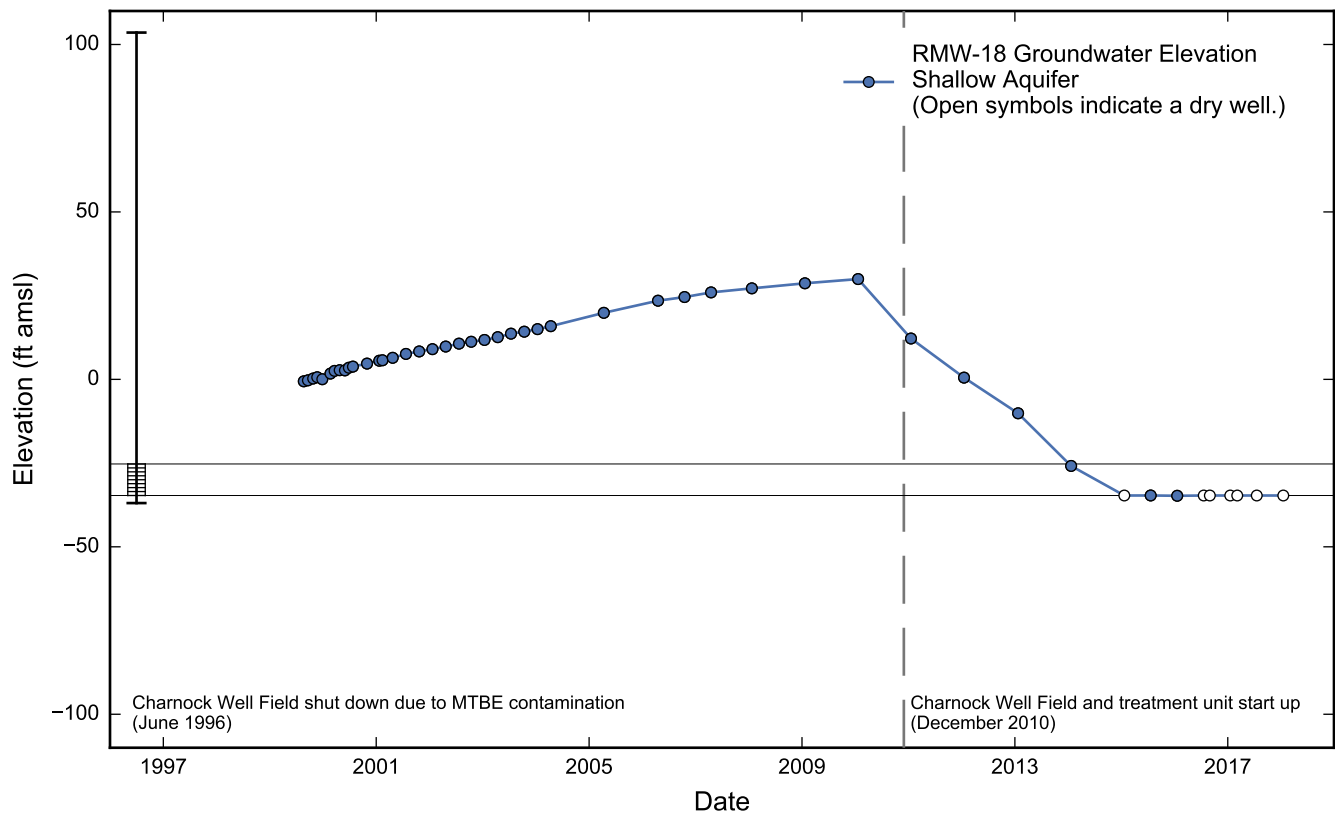


**Groundwater Elevation and Concentration Trends, RMW-12**  
Charnock Sub-Basin  
Los Angeles, California

Figure

**1-4**

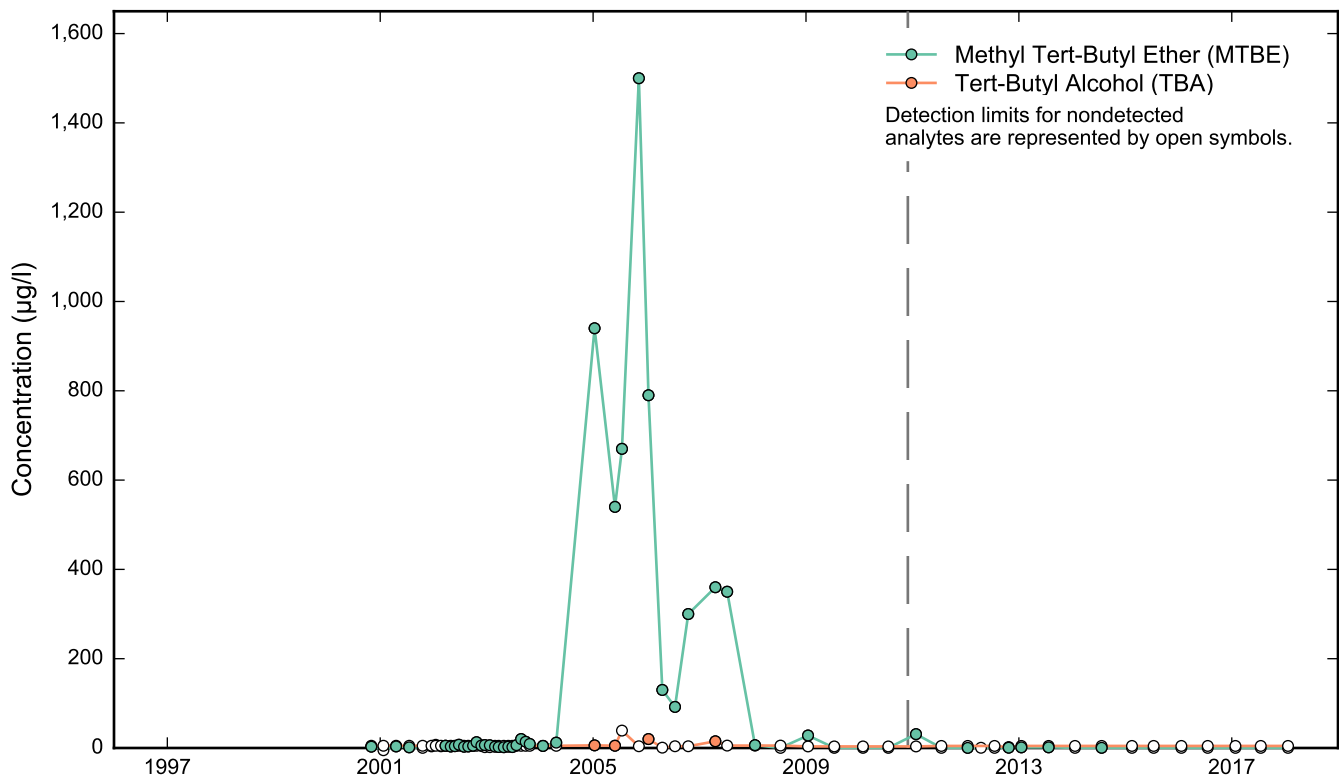
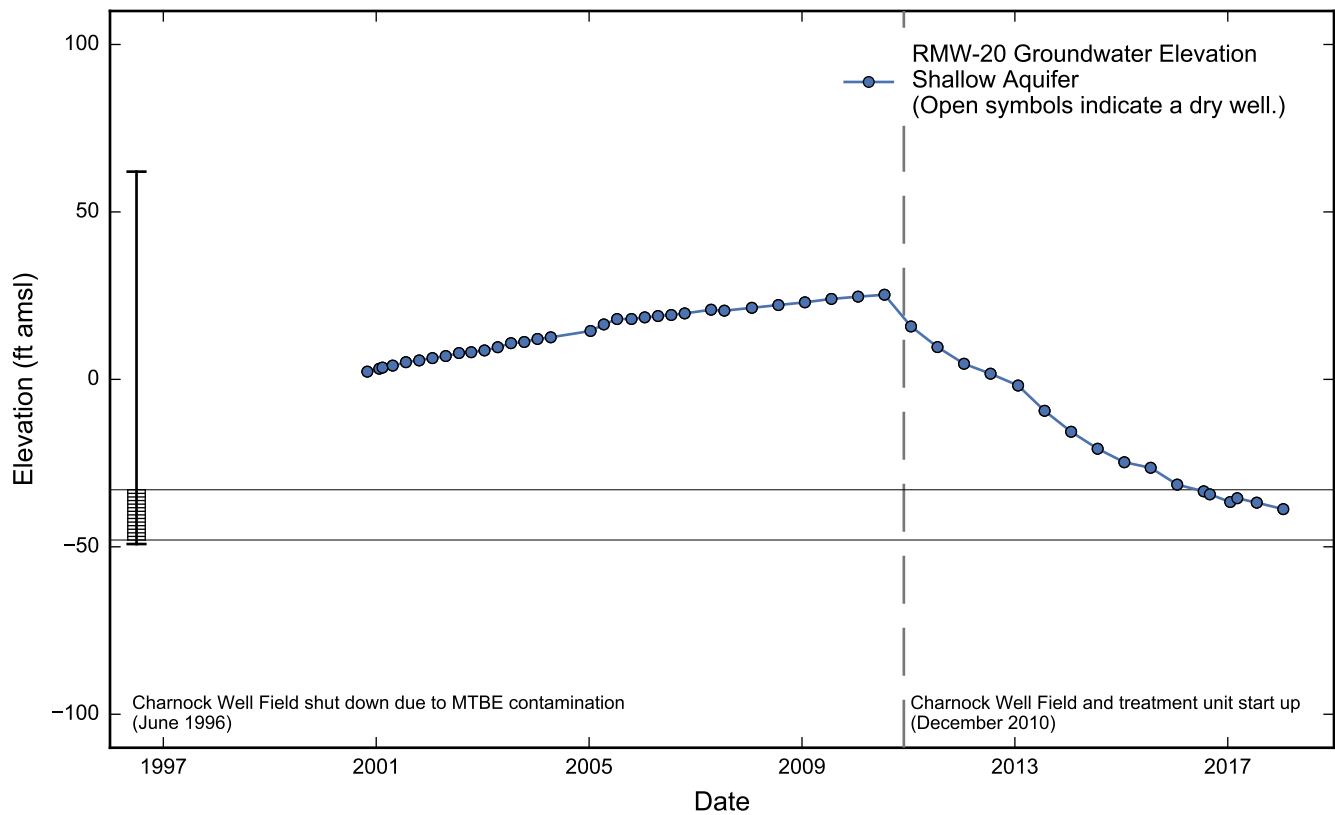


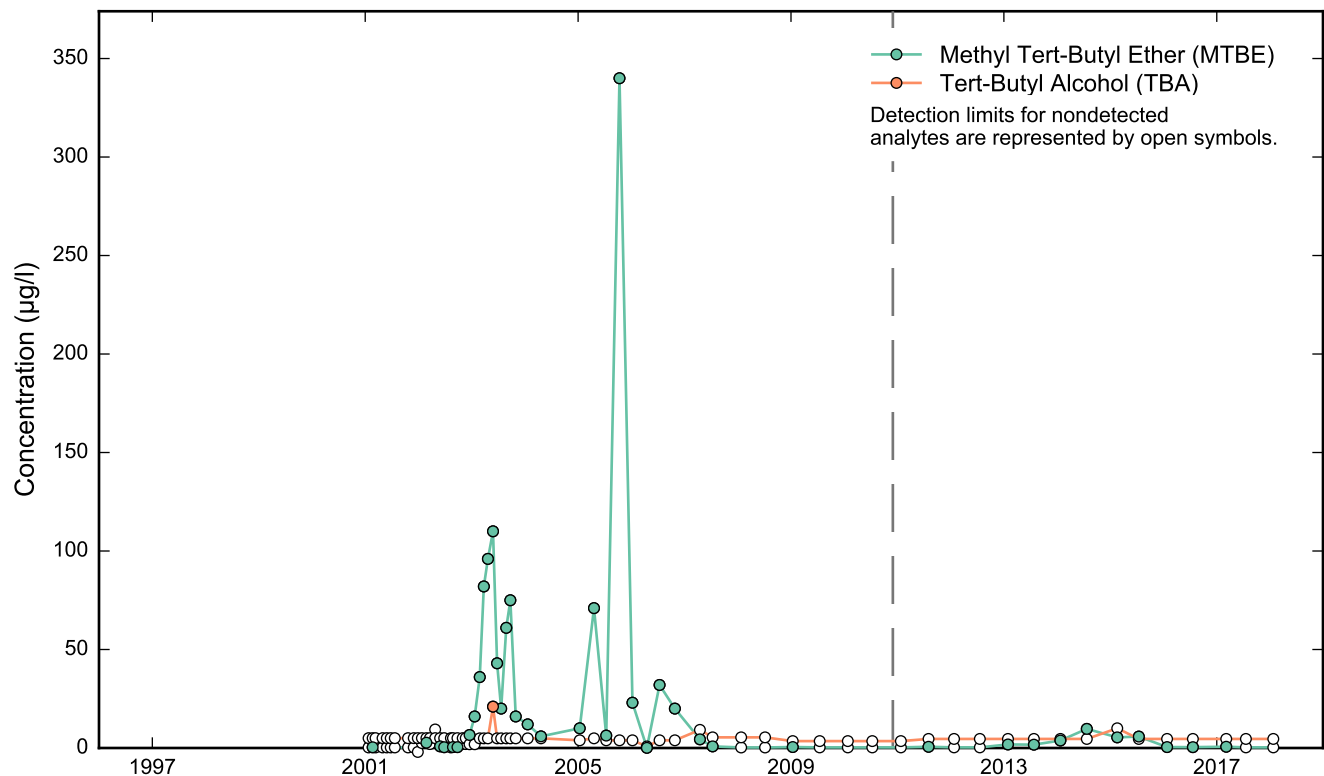
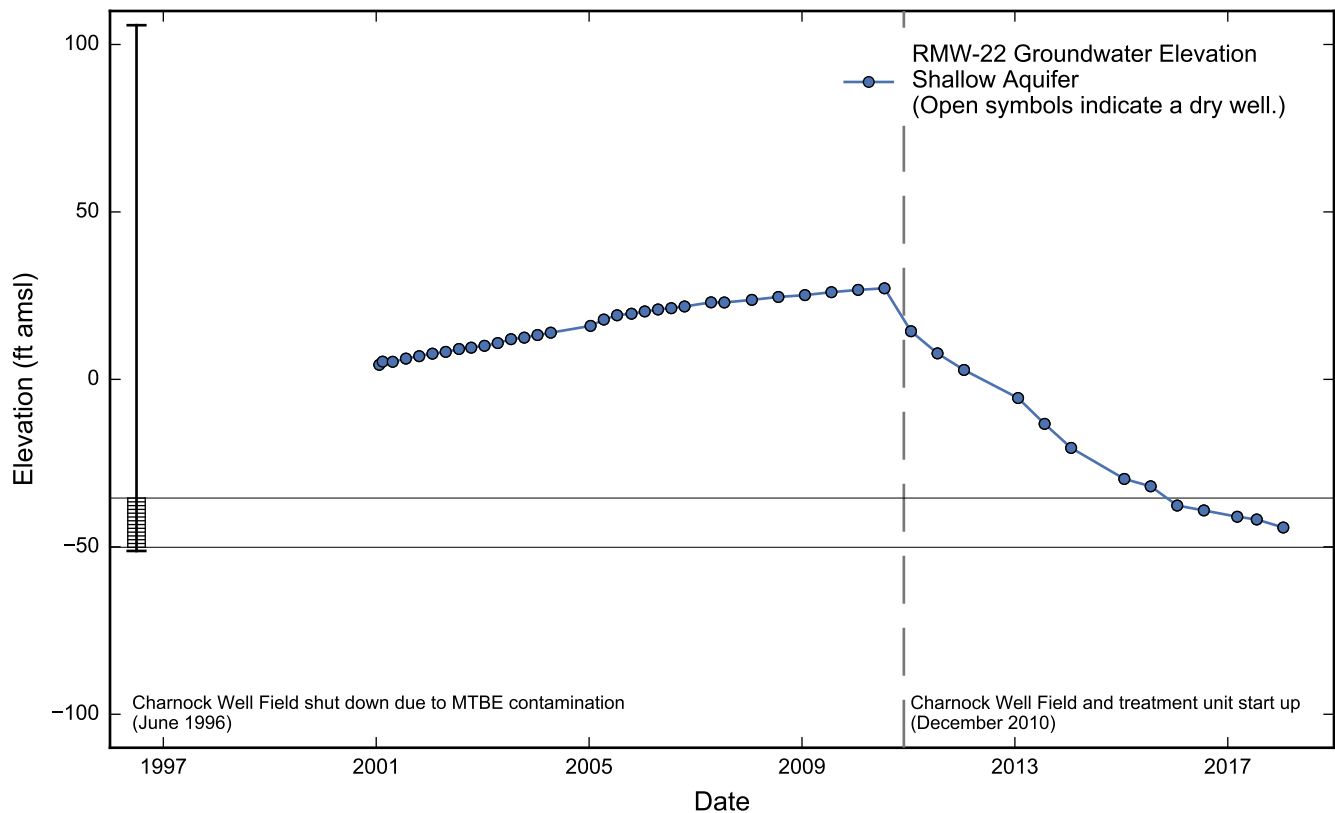


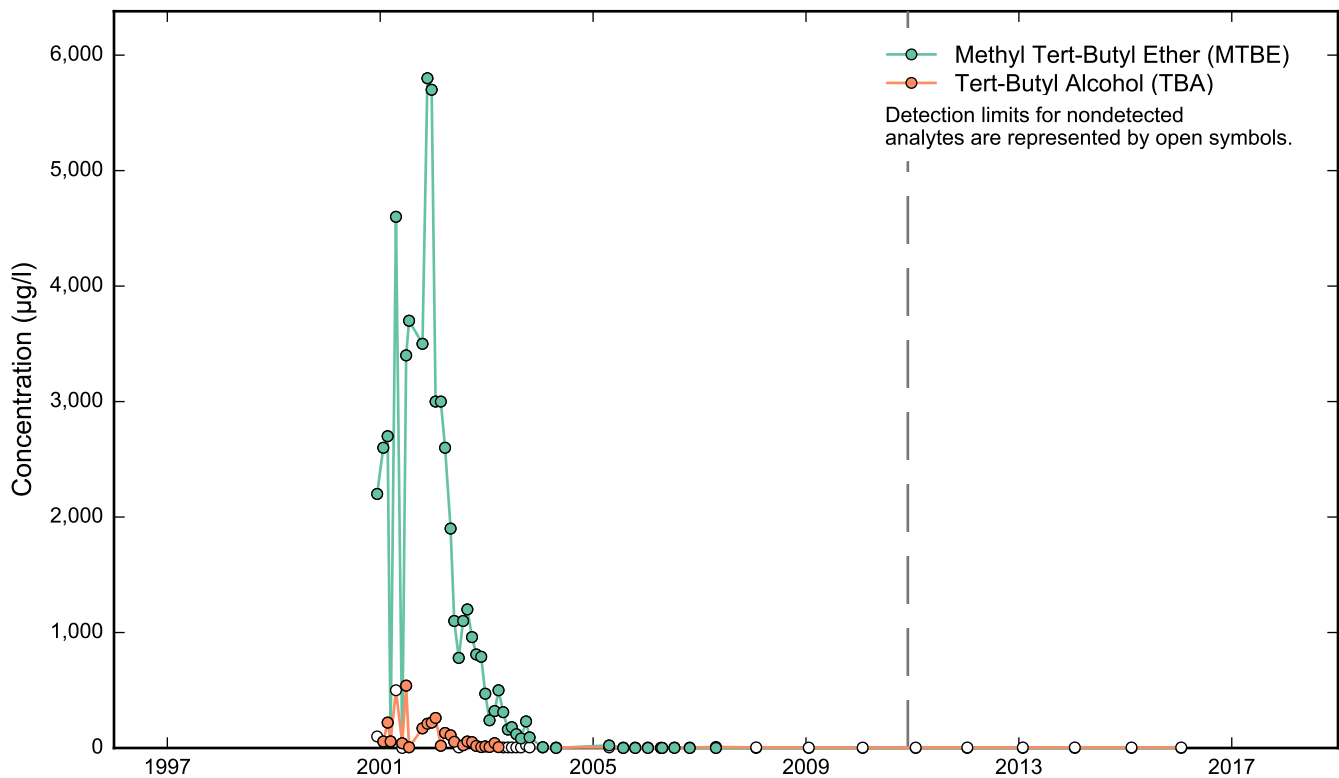
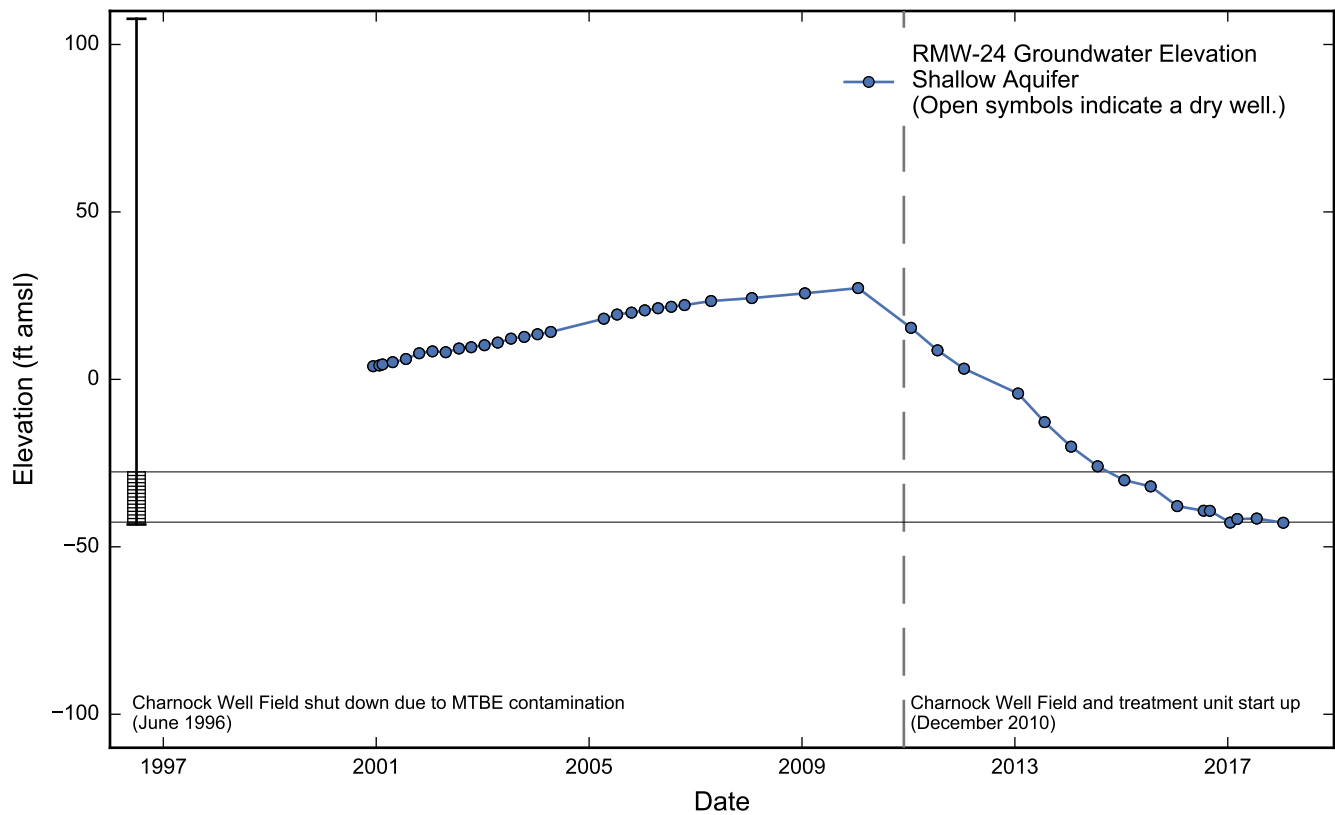
**Groundwater Elevation and Concentration Trends, RMW-18**  
Charnock Sub-Basin  
Los Angeles, California

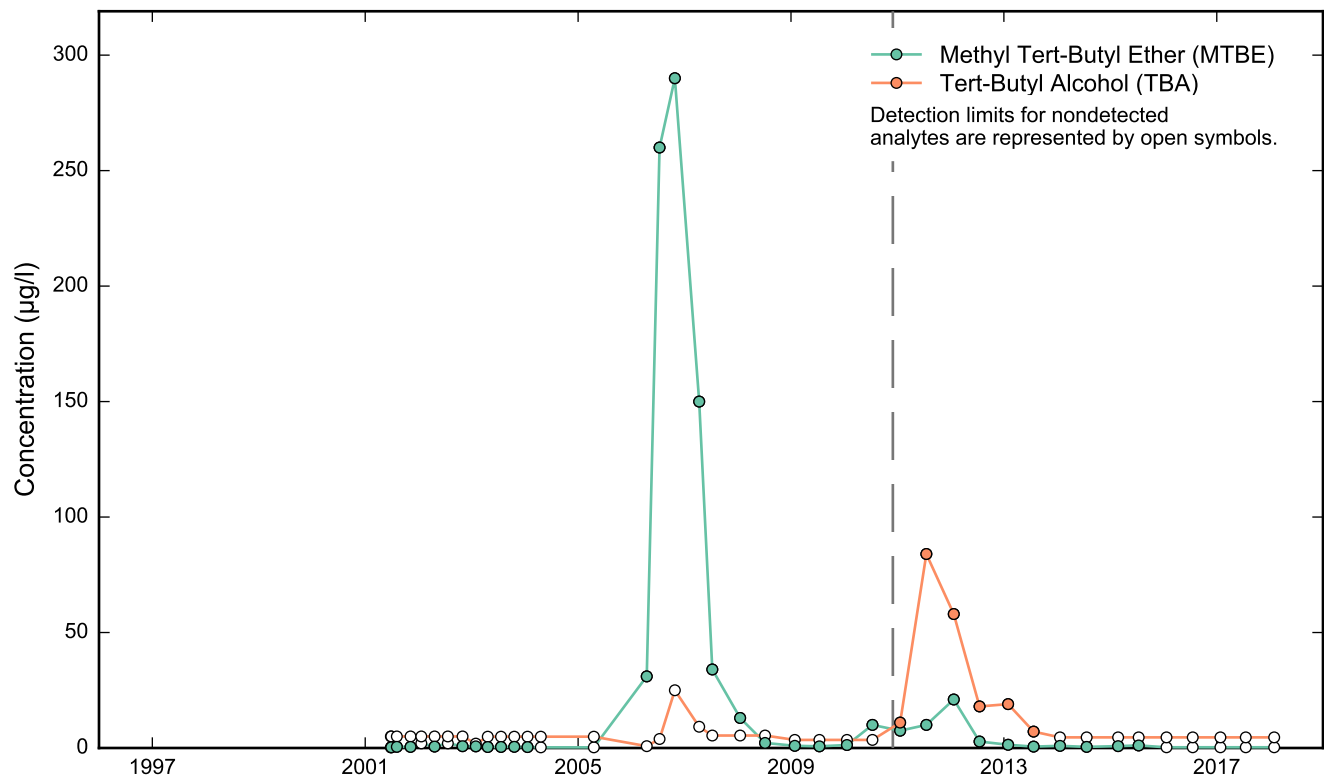
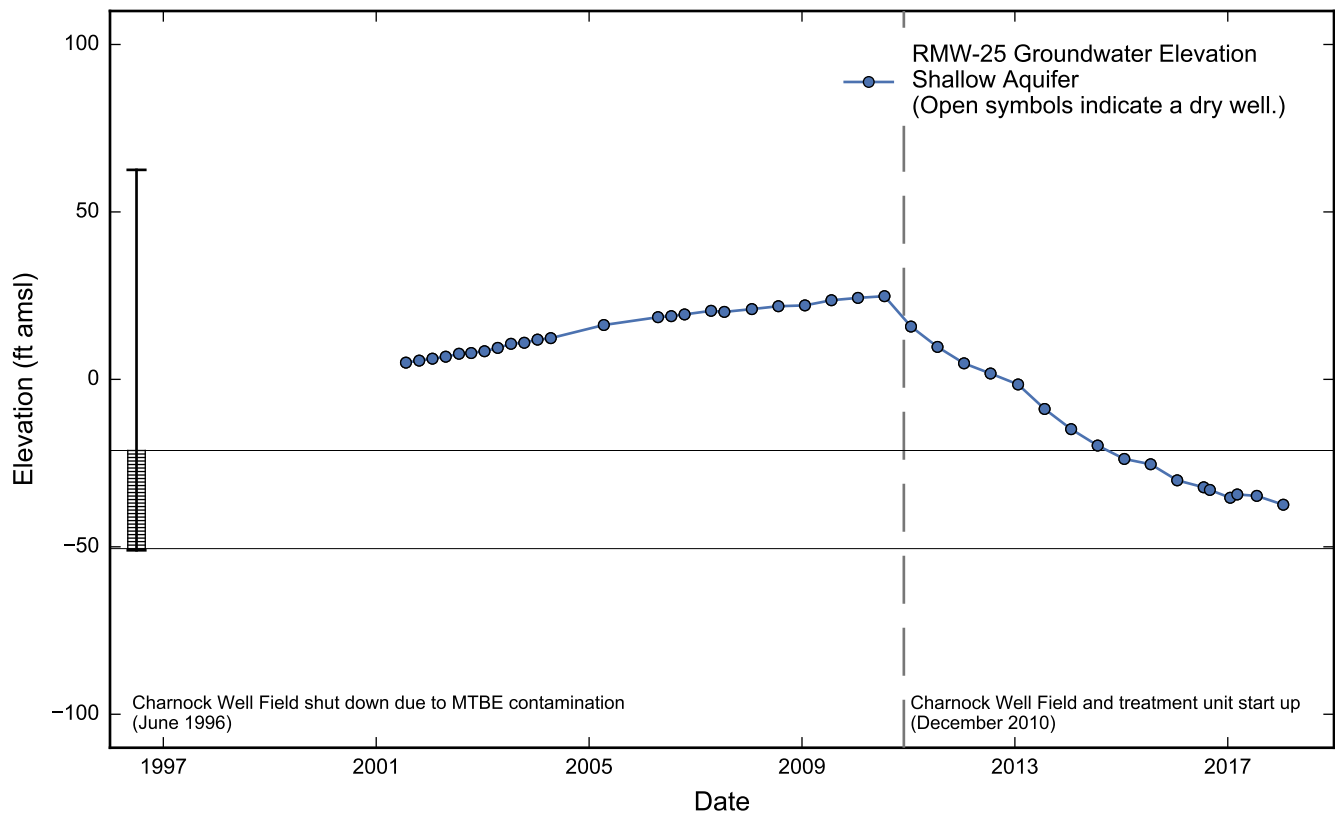
Figure

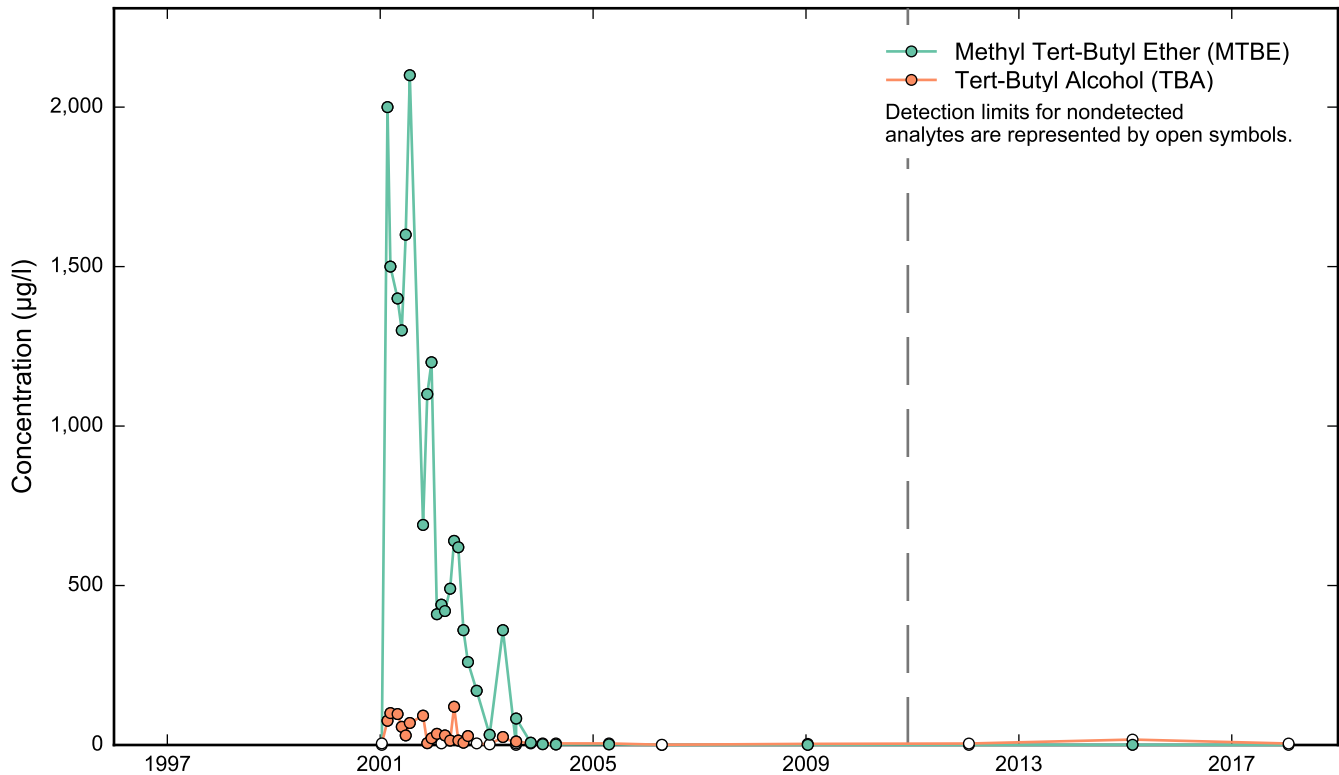
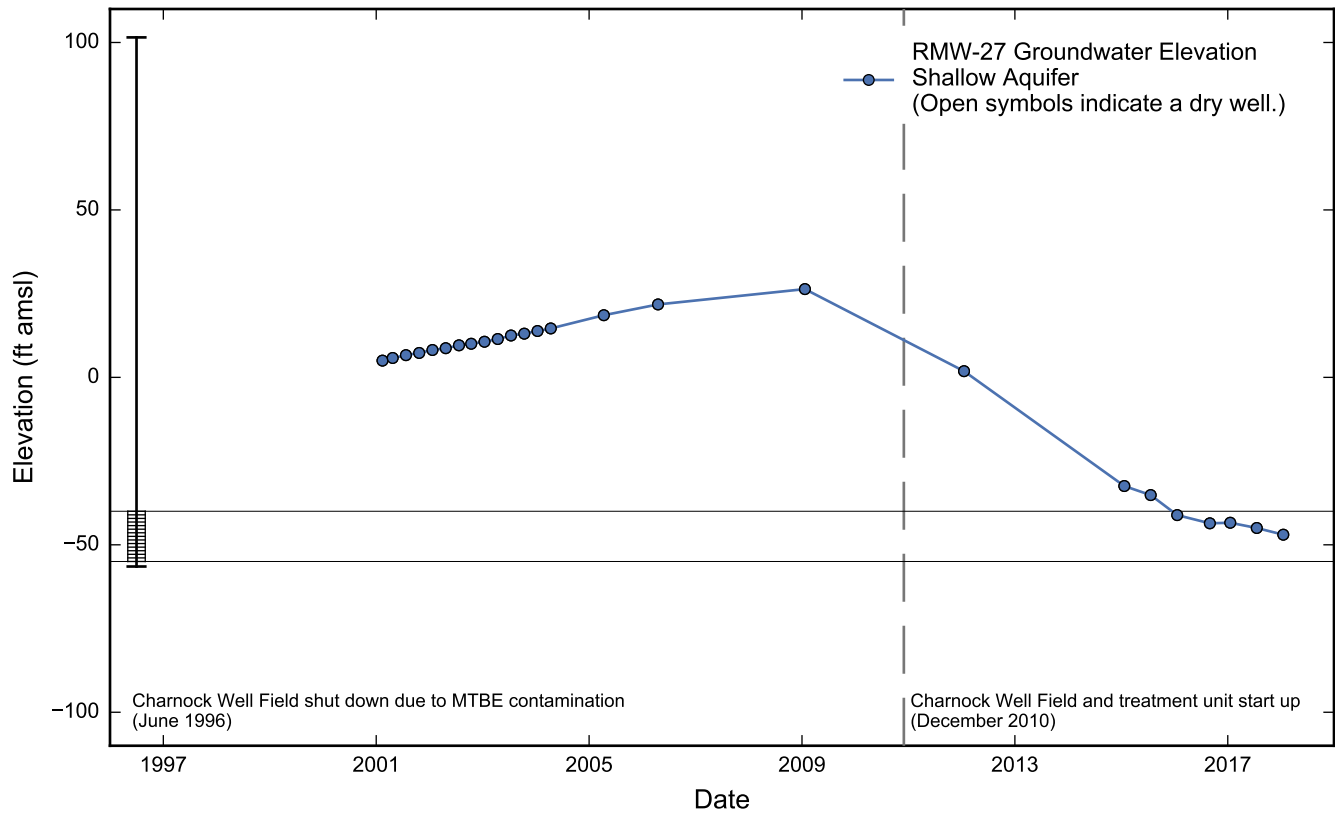
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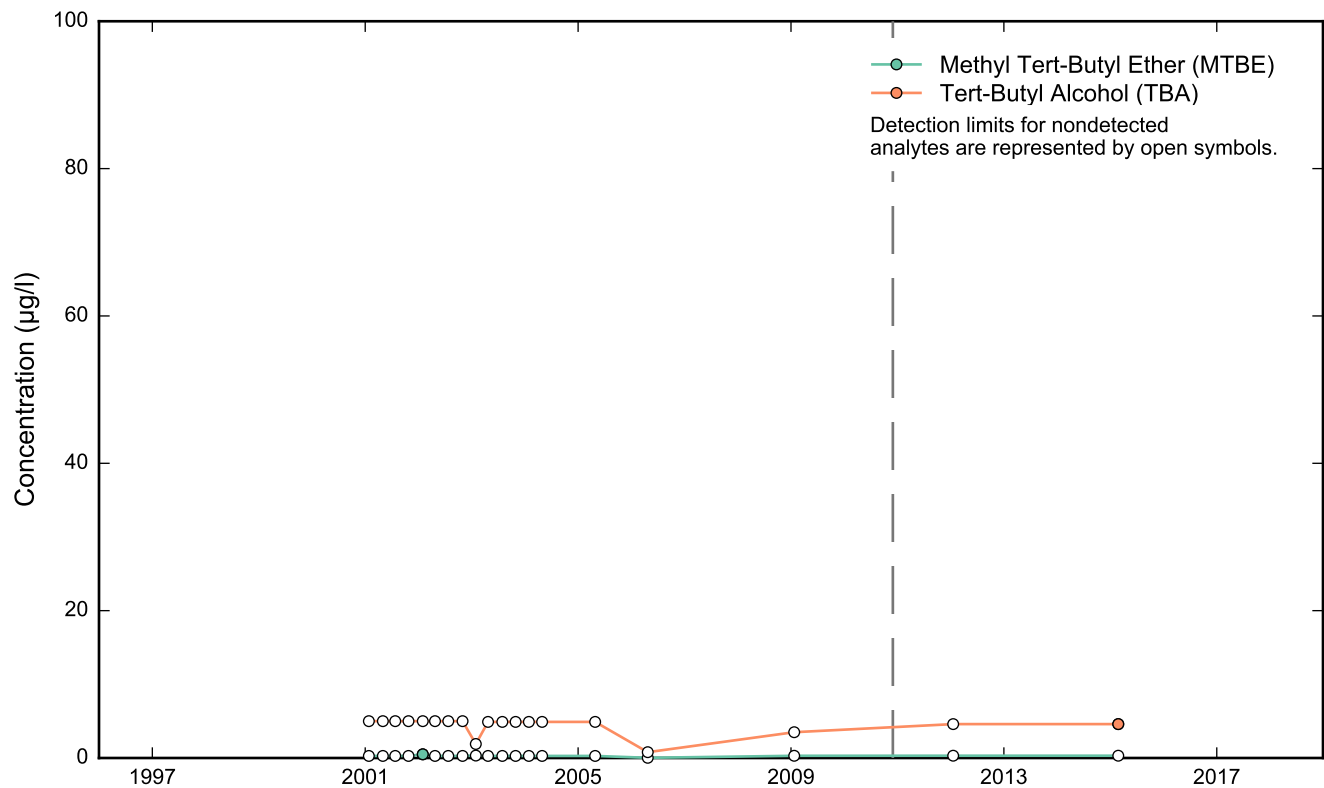
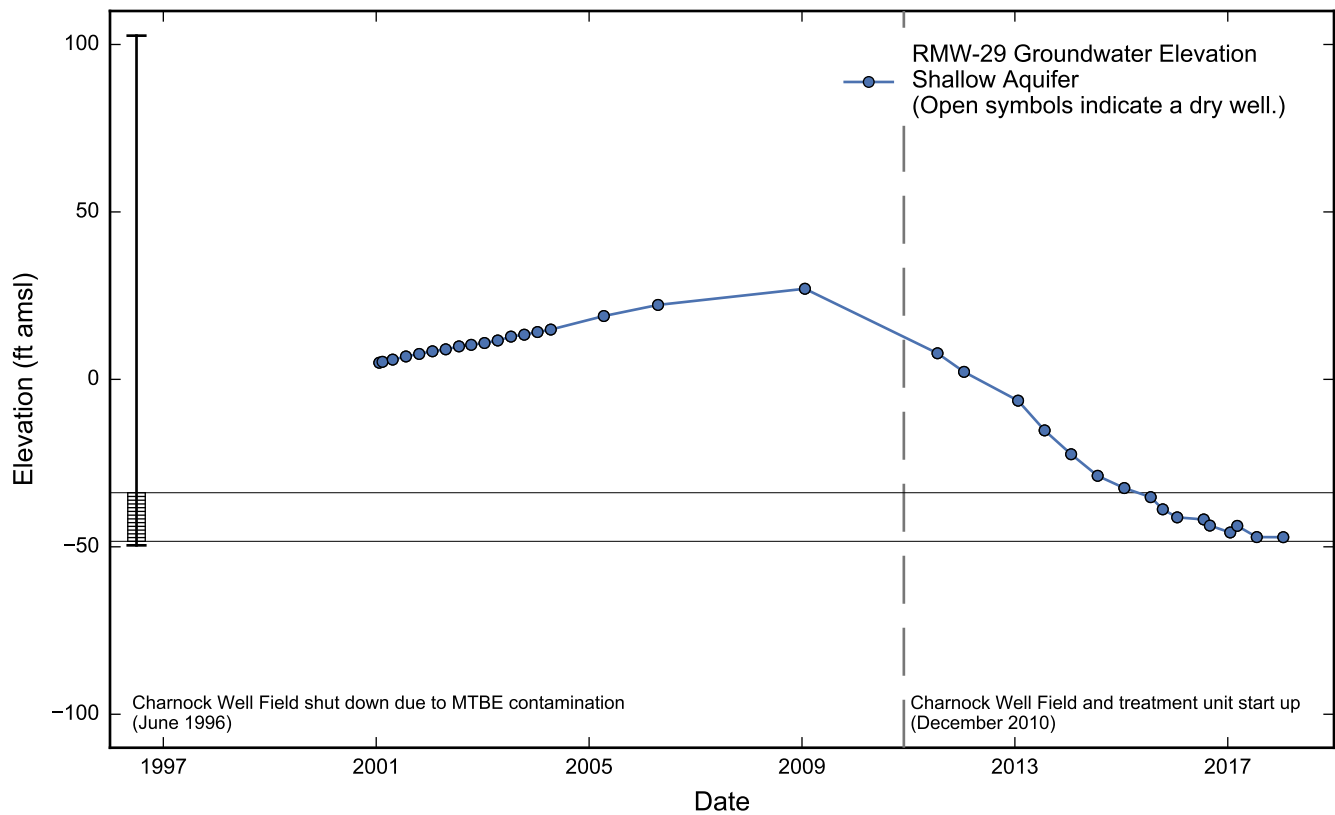


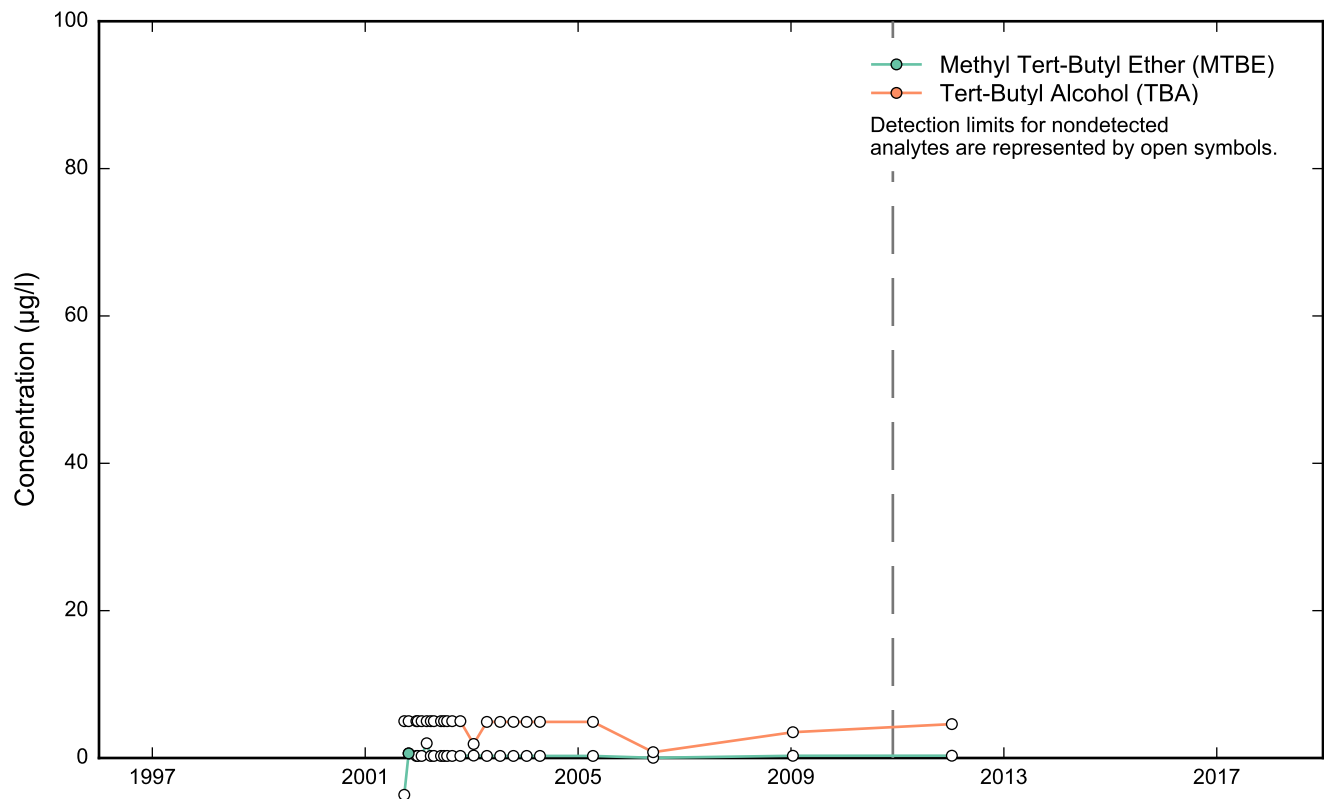
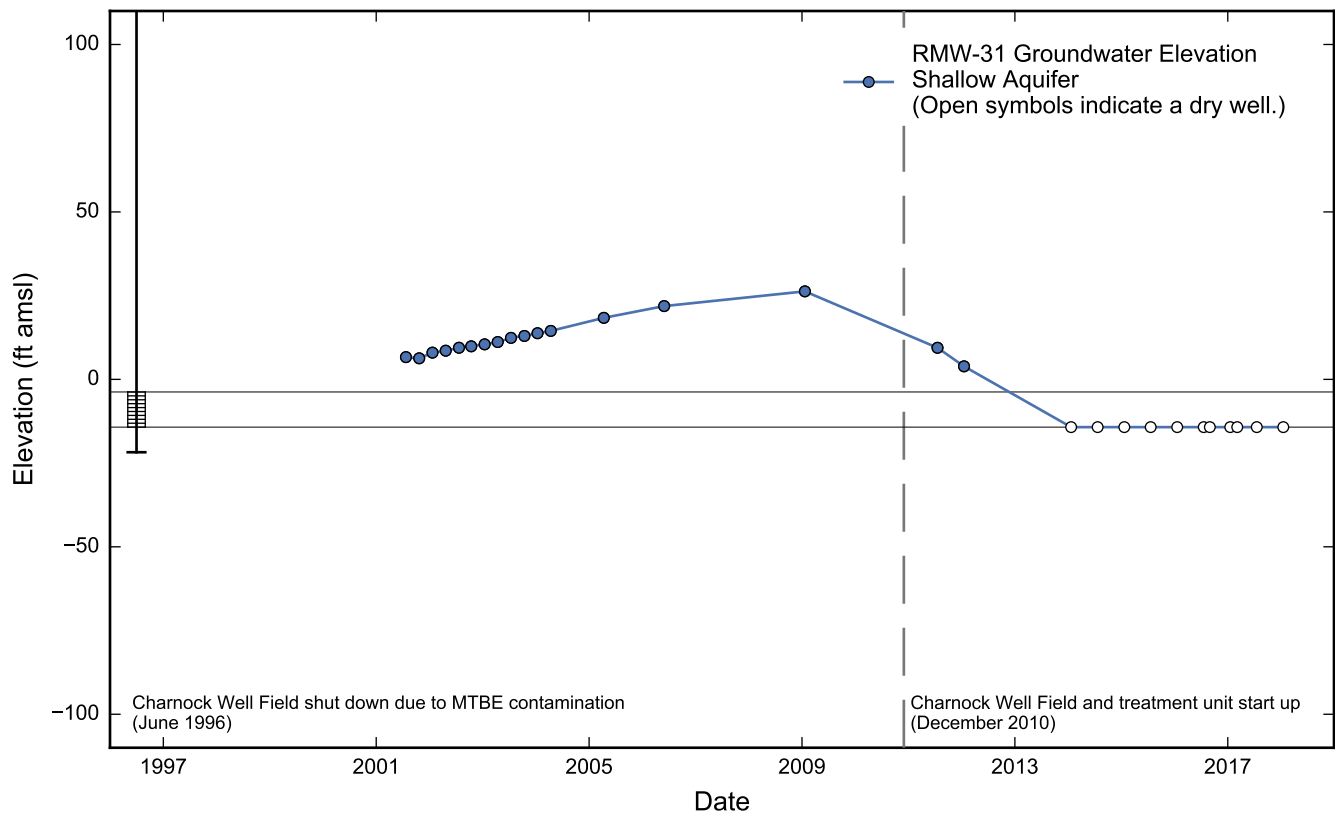


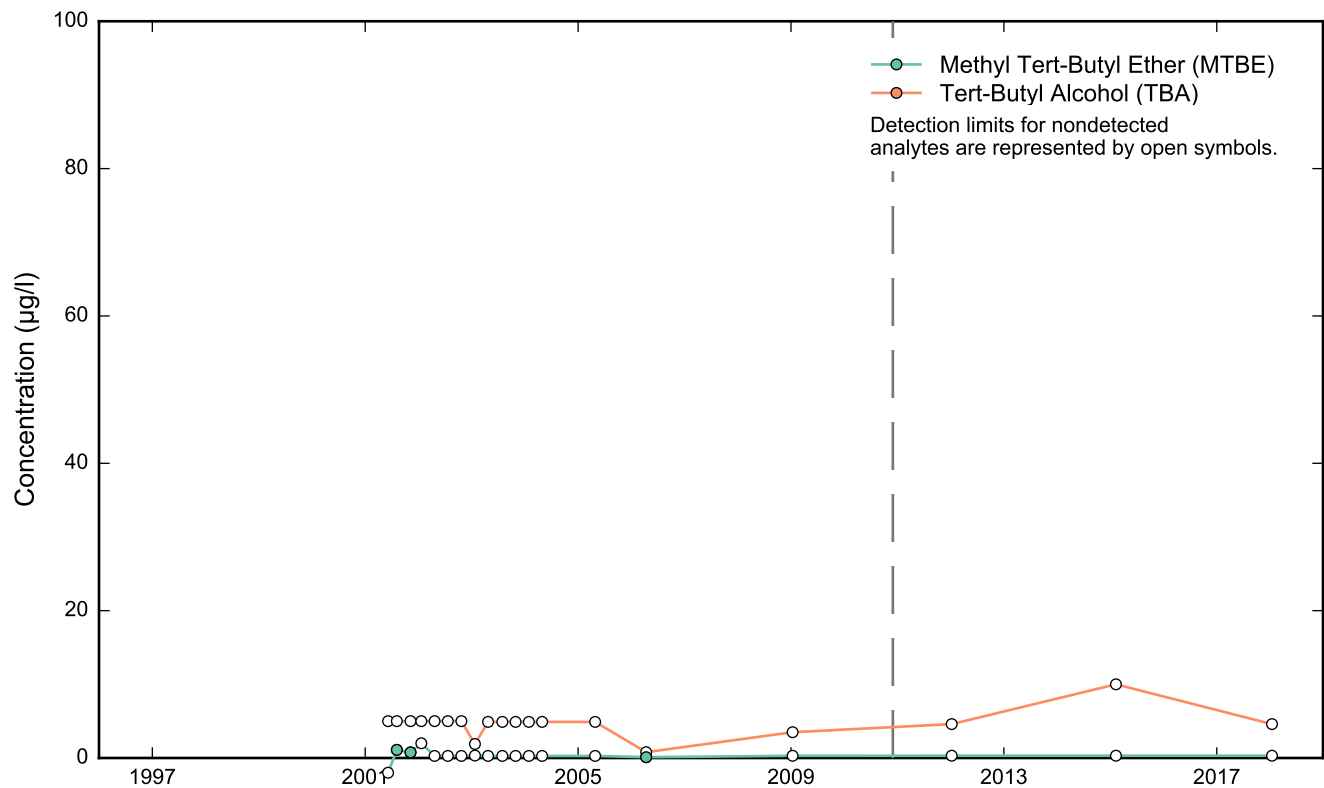
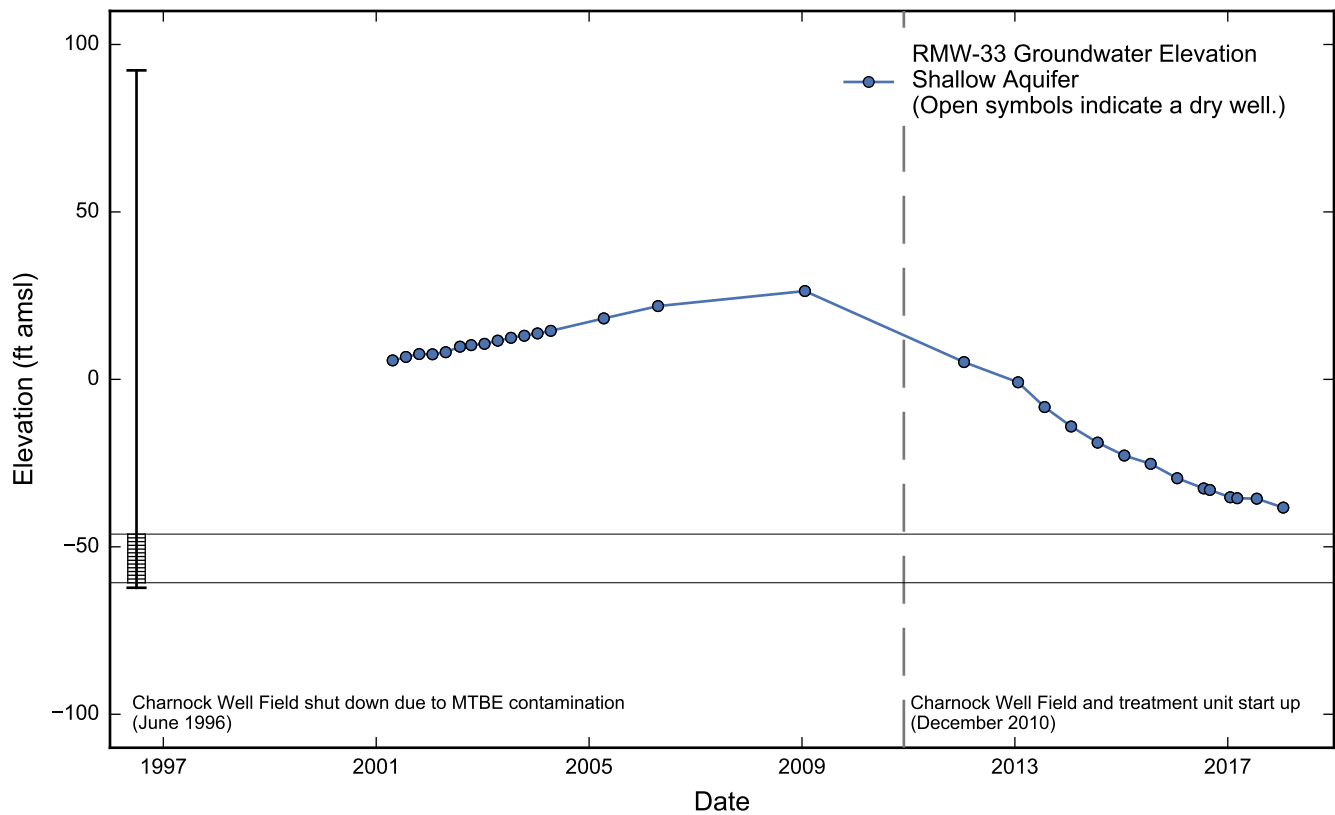


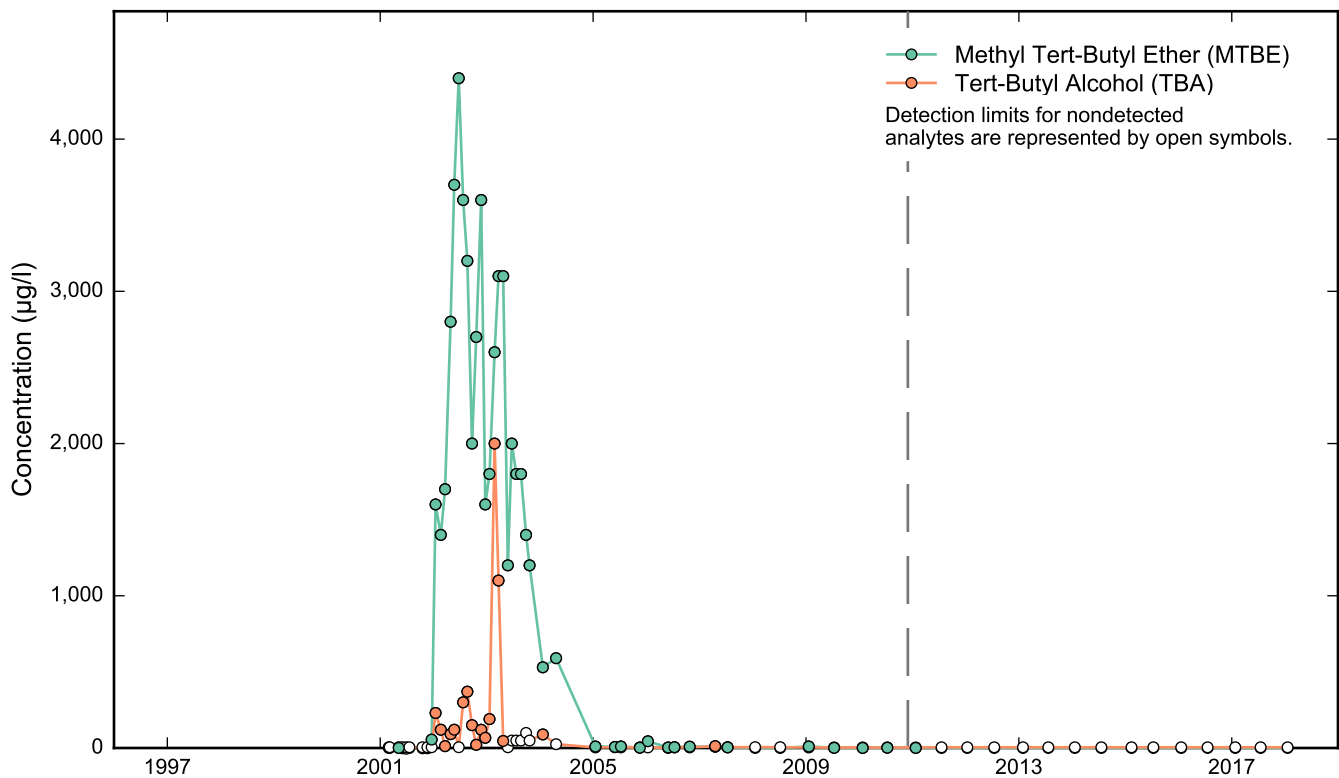
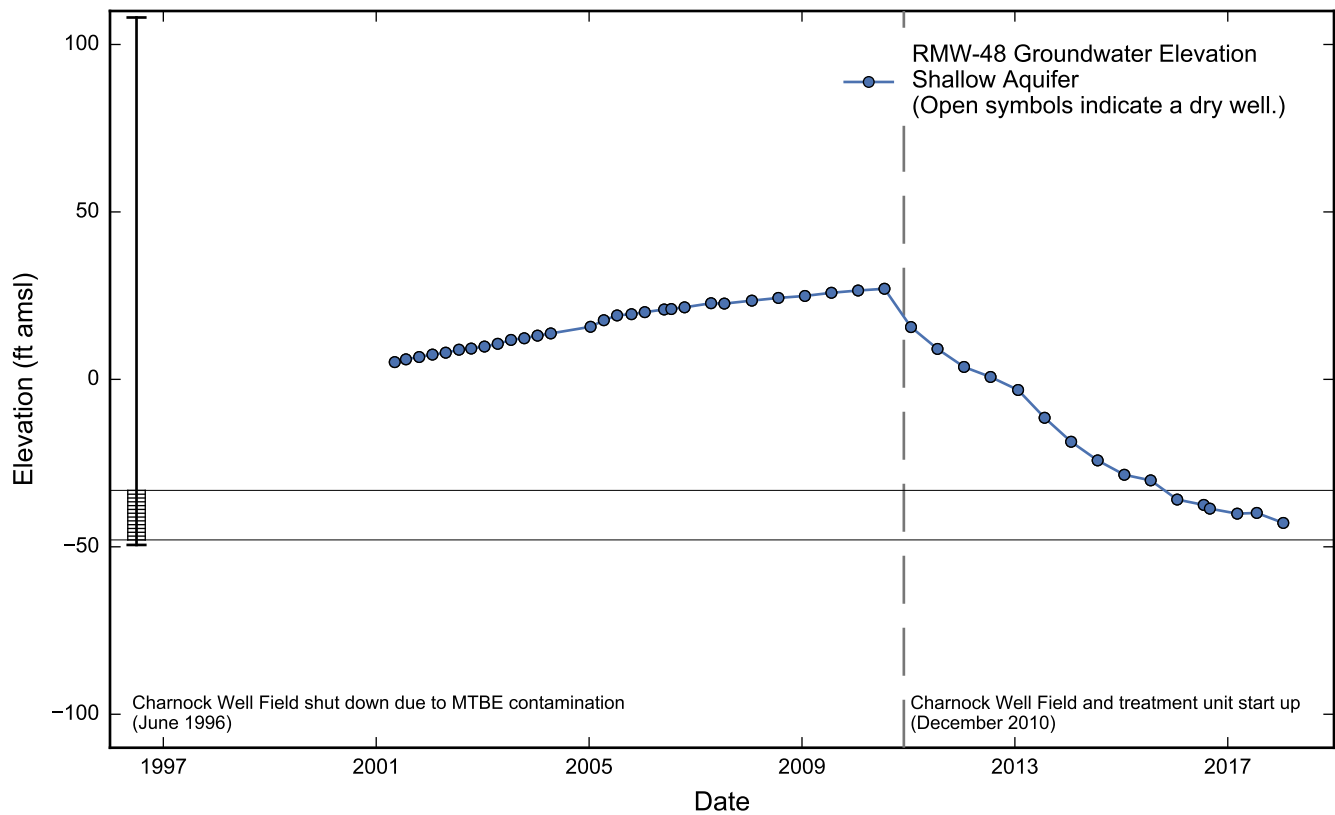








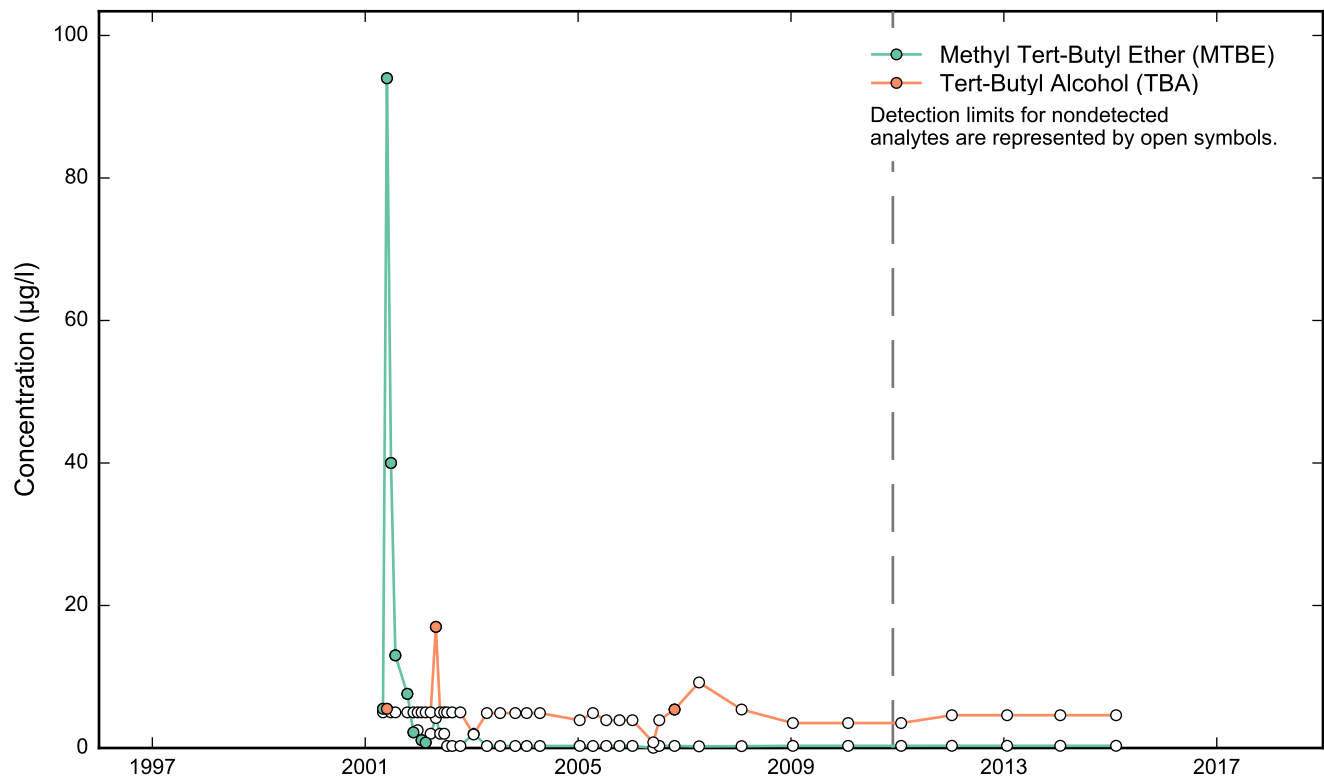
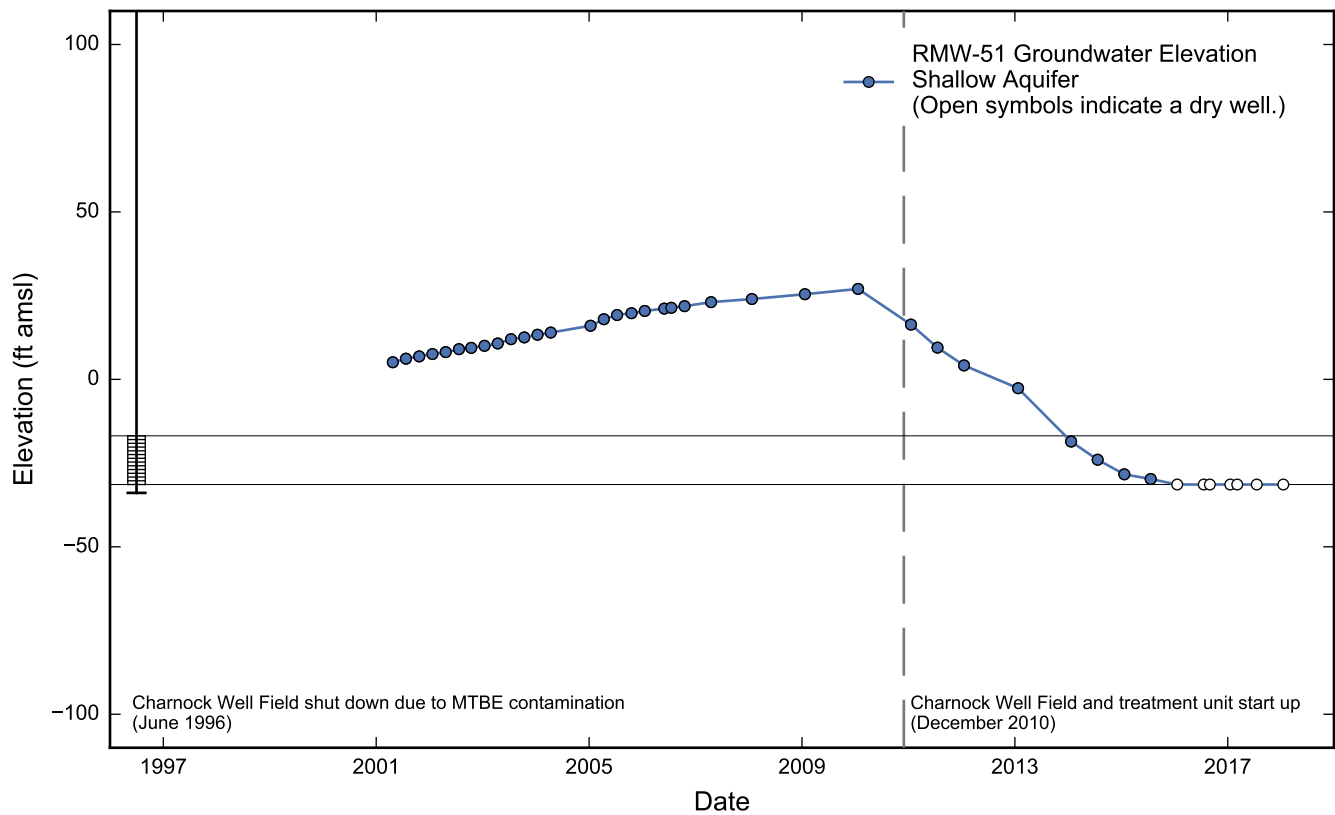


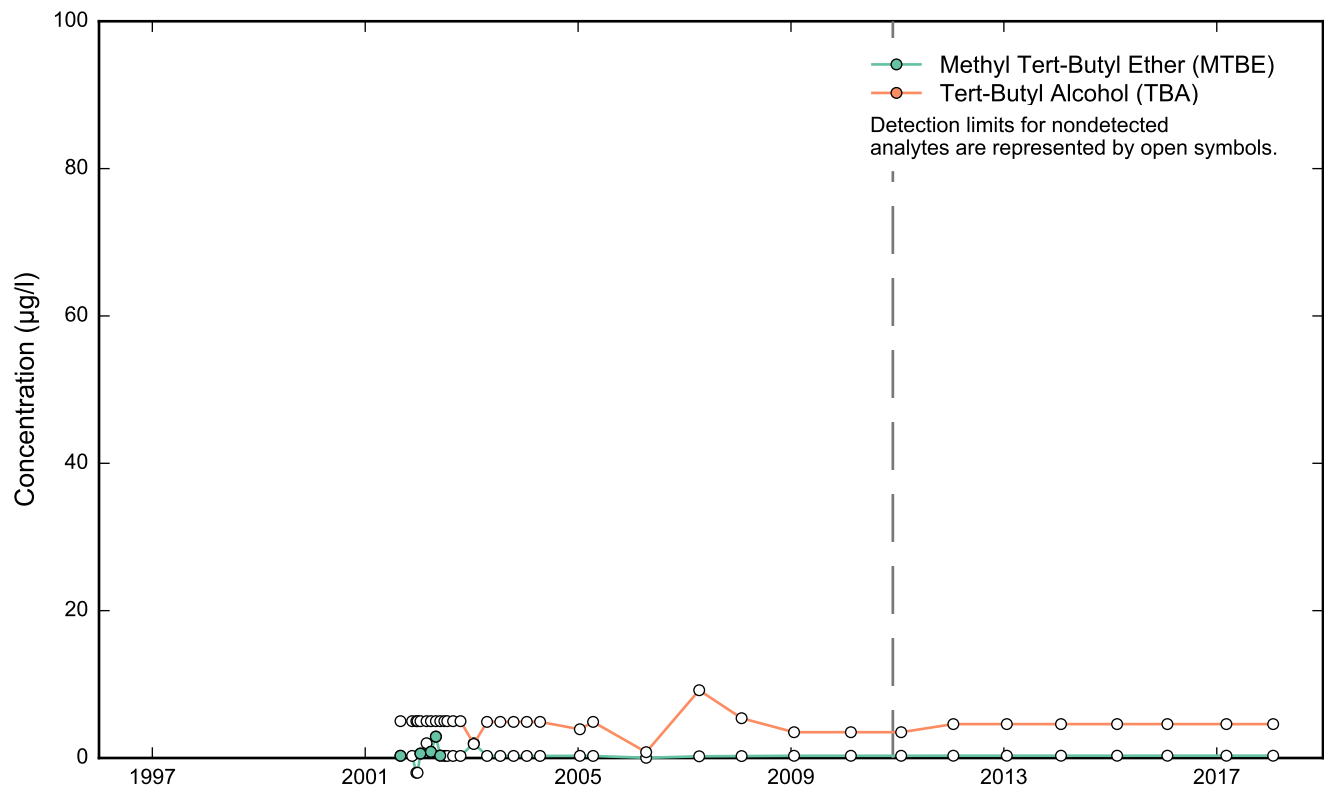
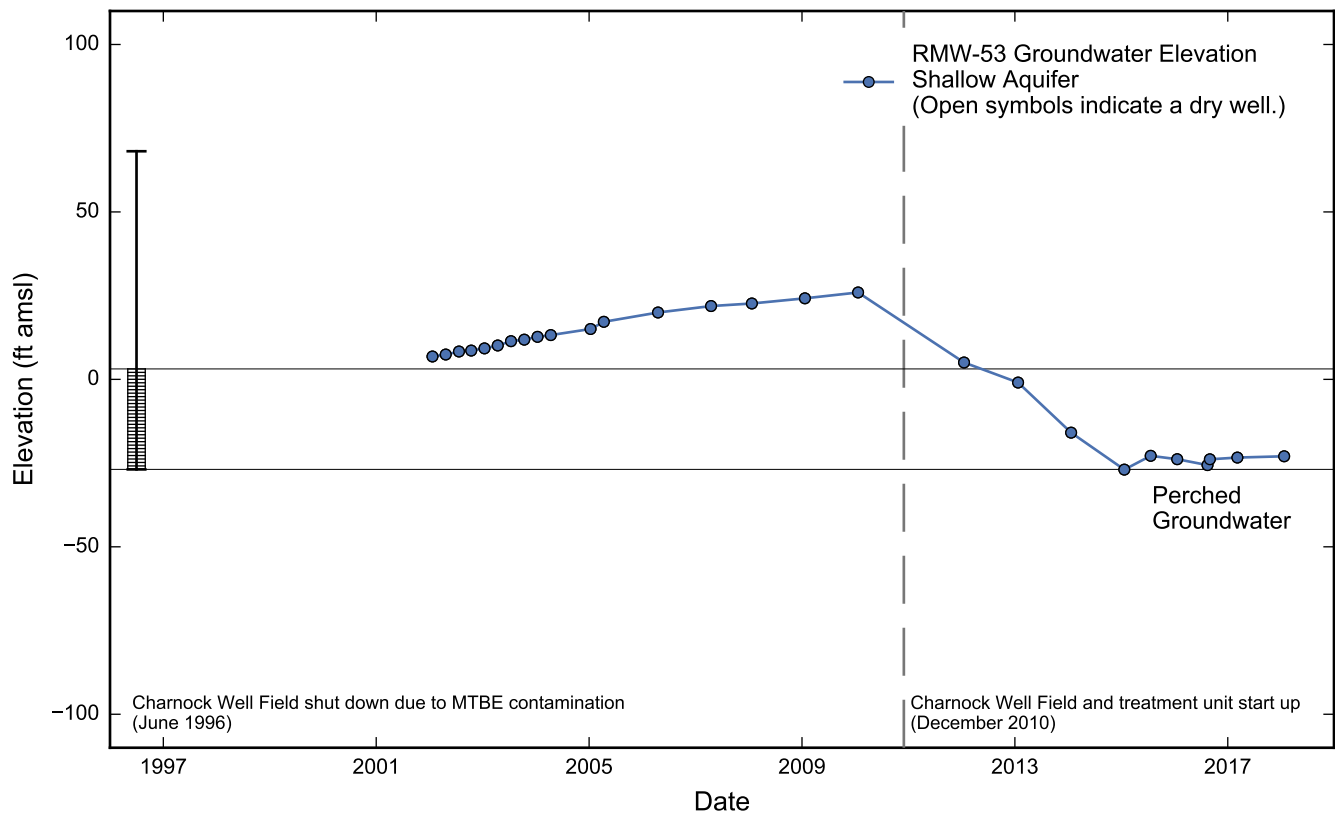


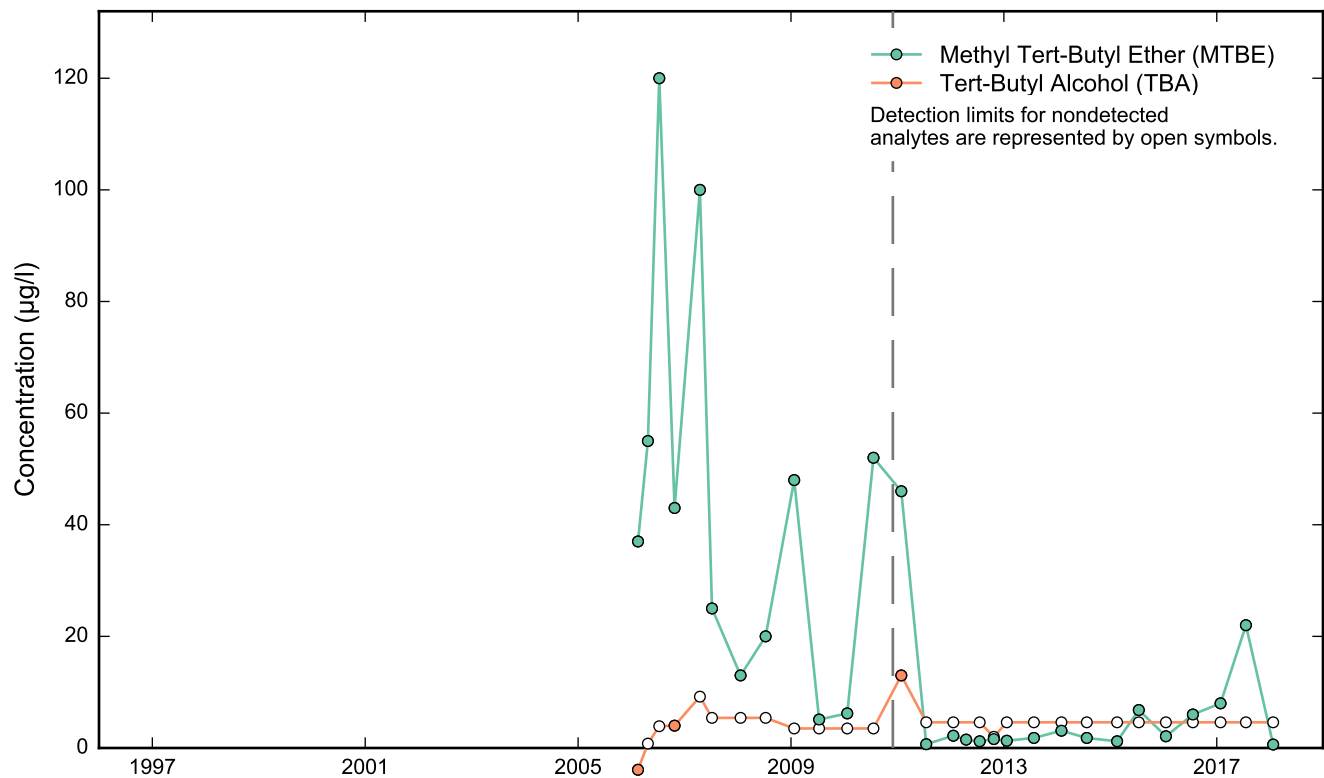
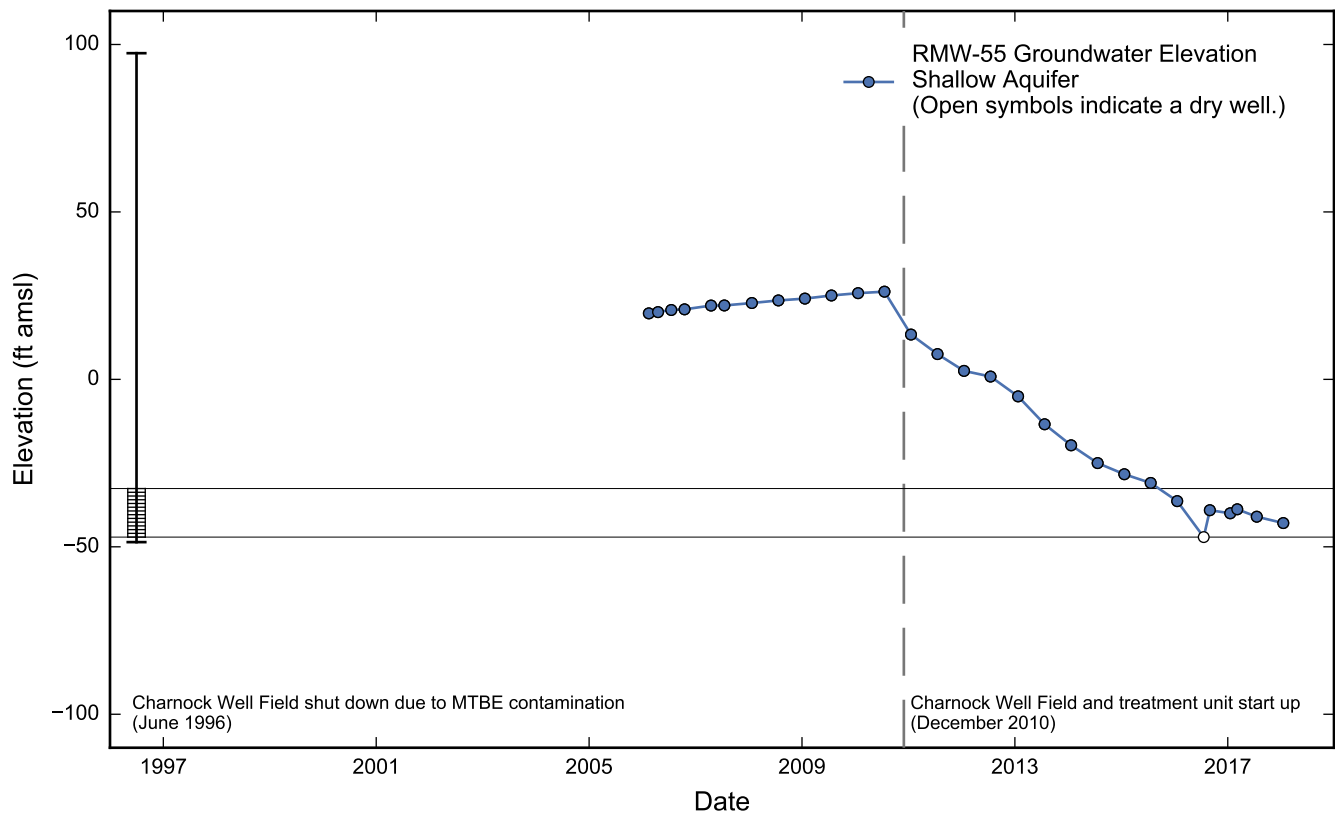
**Groundwater Elevation and Concentration Trends, RMW-48**  
Charnock Sub-Basin  
Los Angeles, California

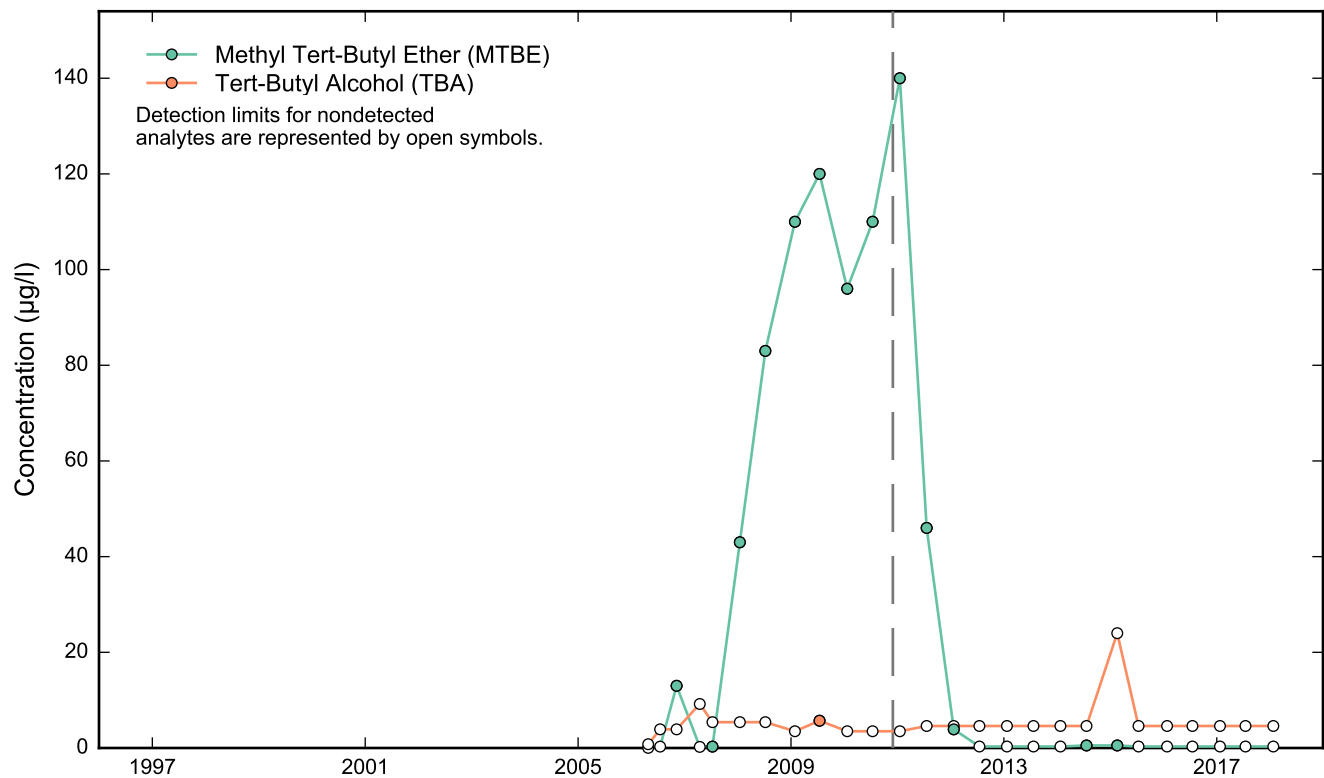
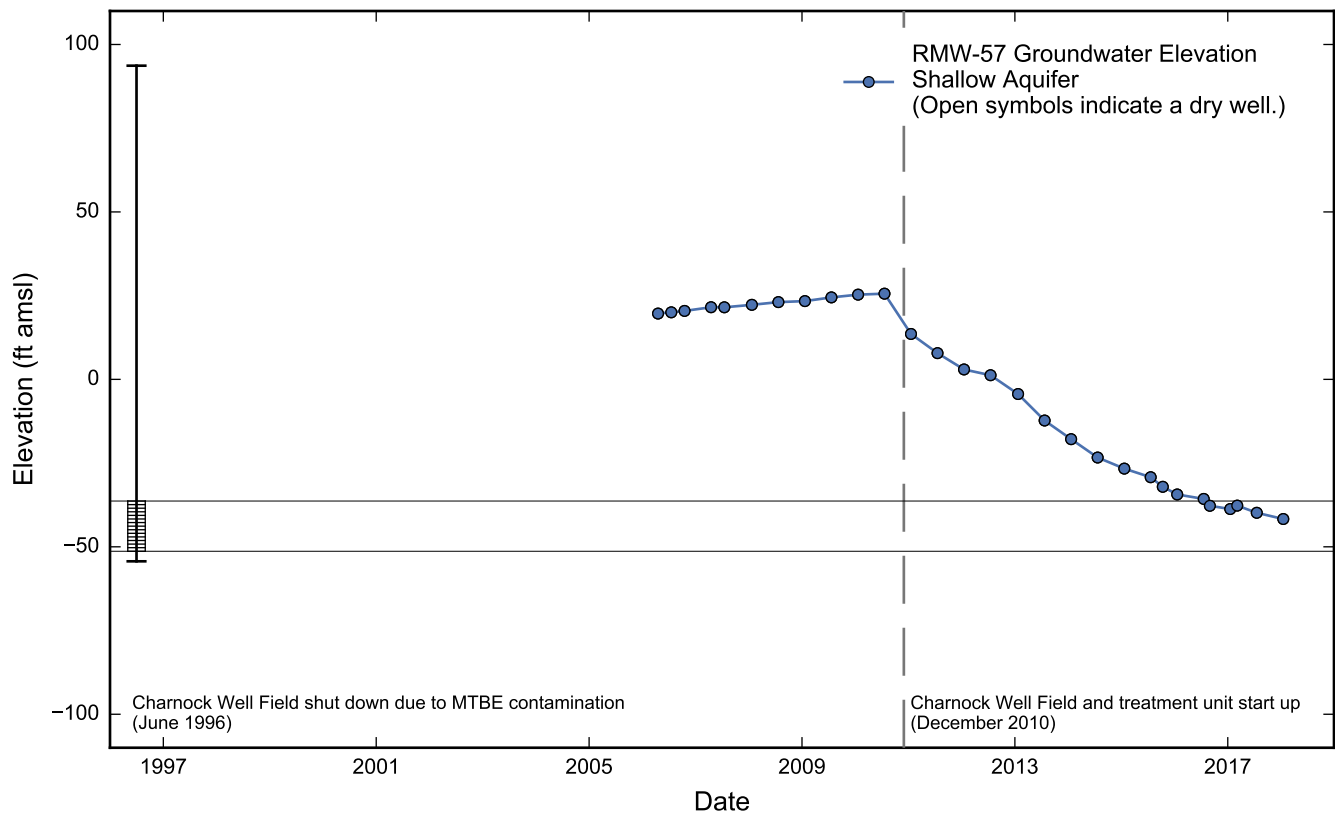
Figure

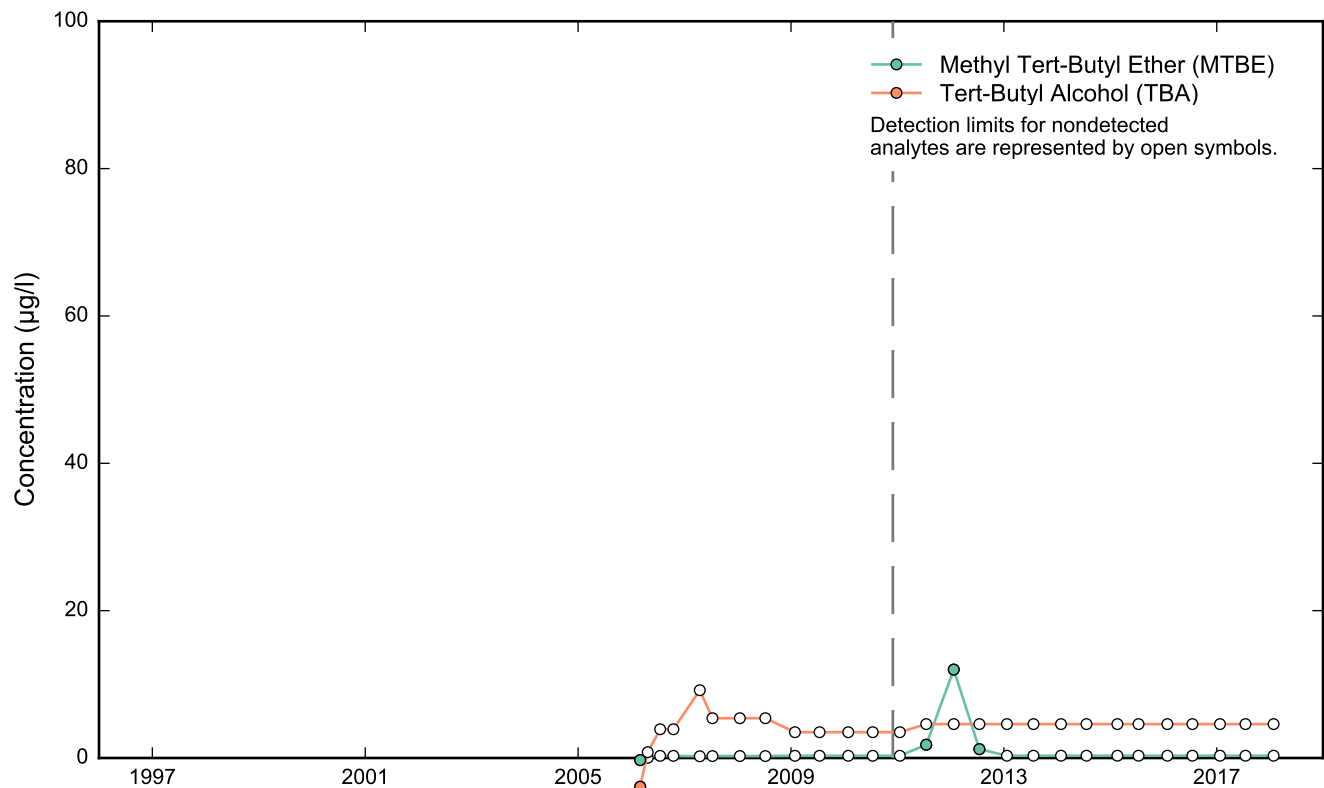
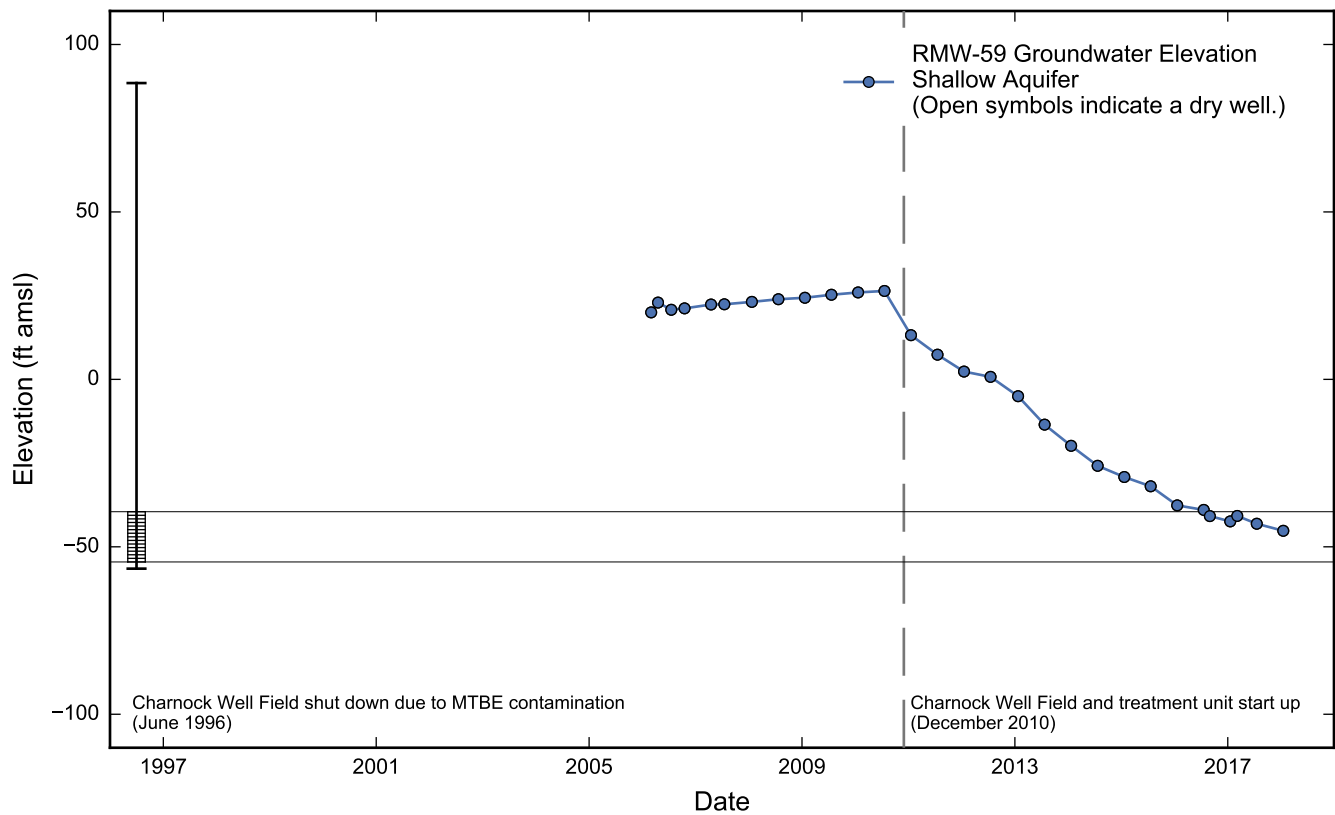
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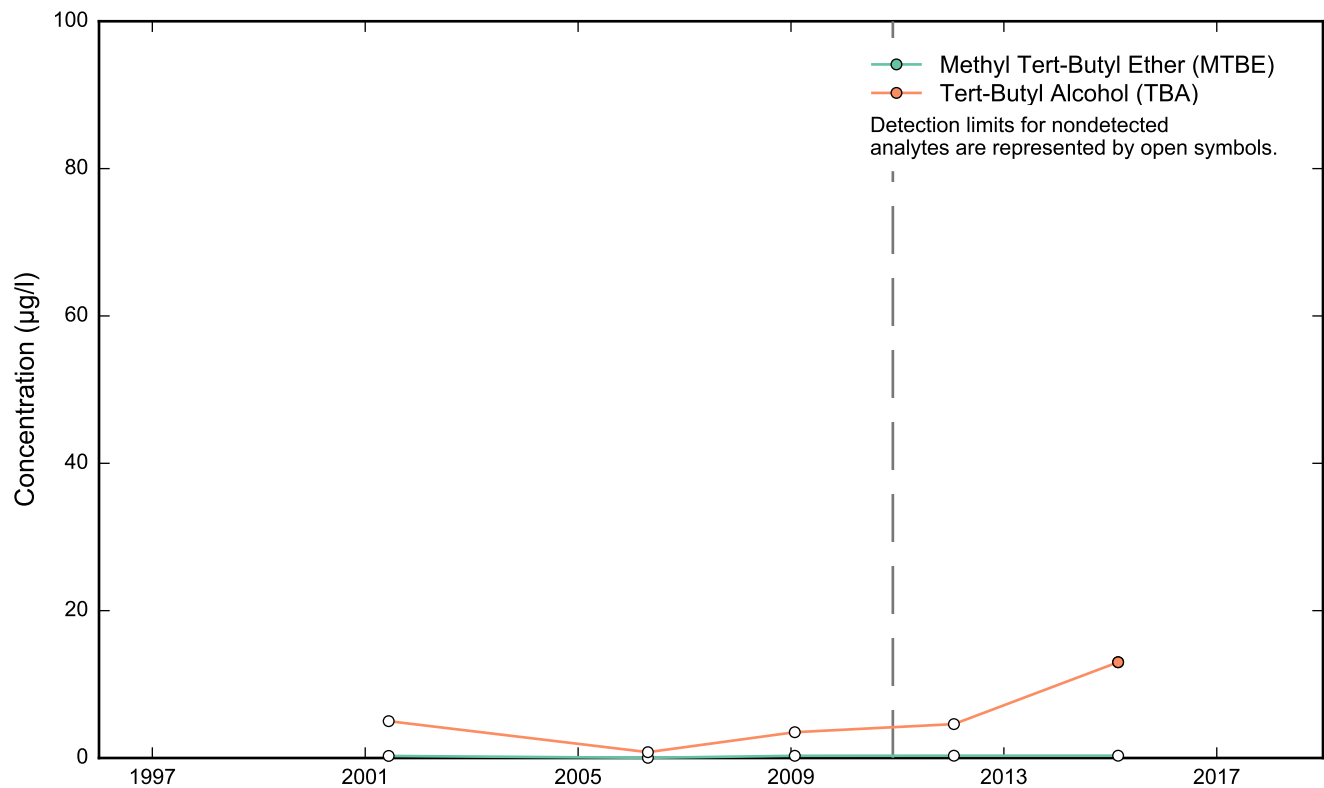
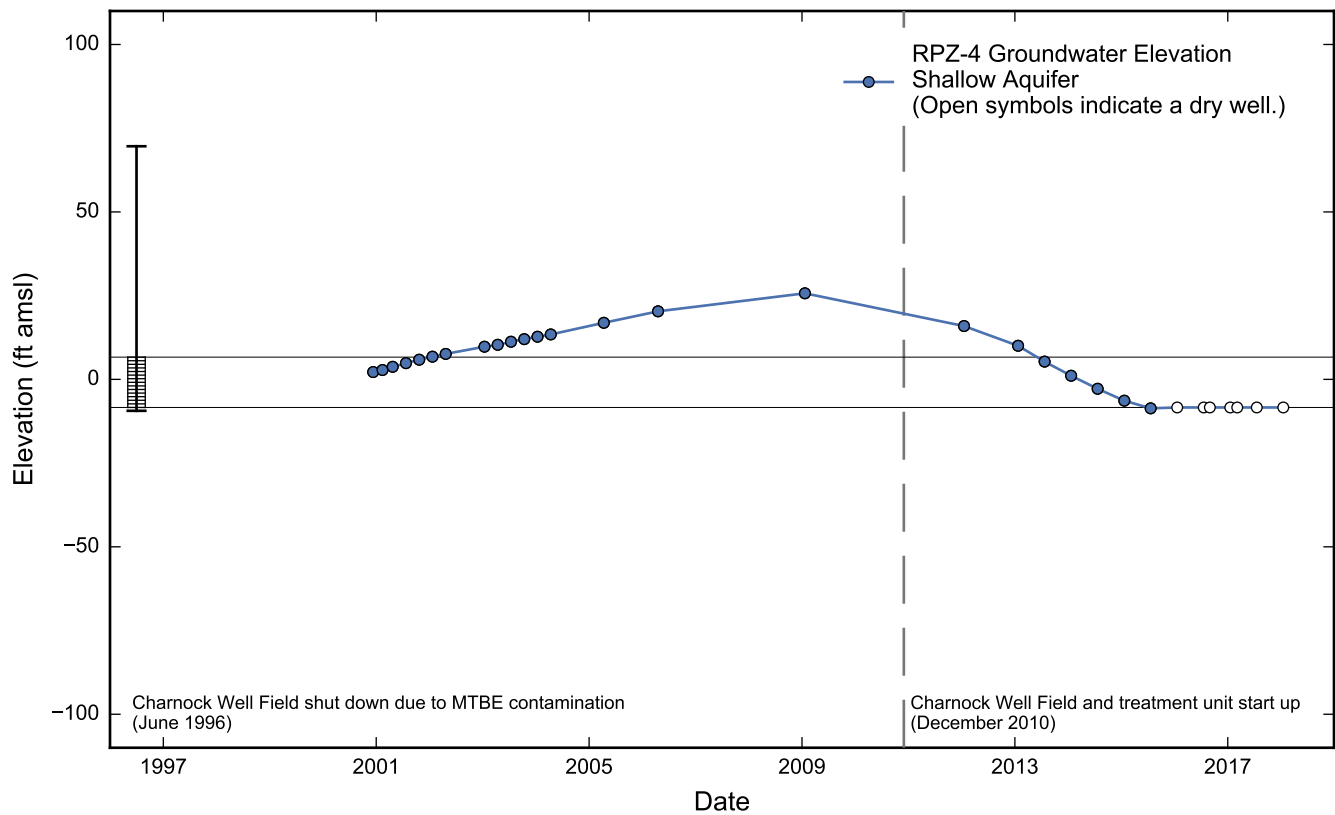




**Groundwater Elevation and Concentration Trends, RMW-59**  
Charnock Sub-Basin  
Los Angeles, California

Figure

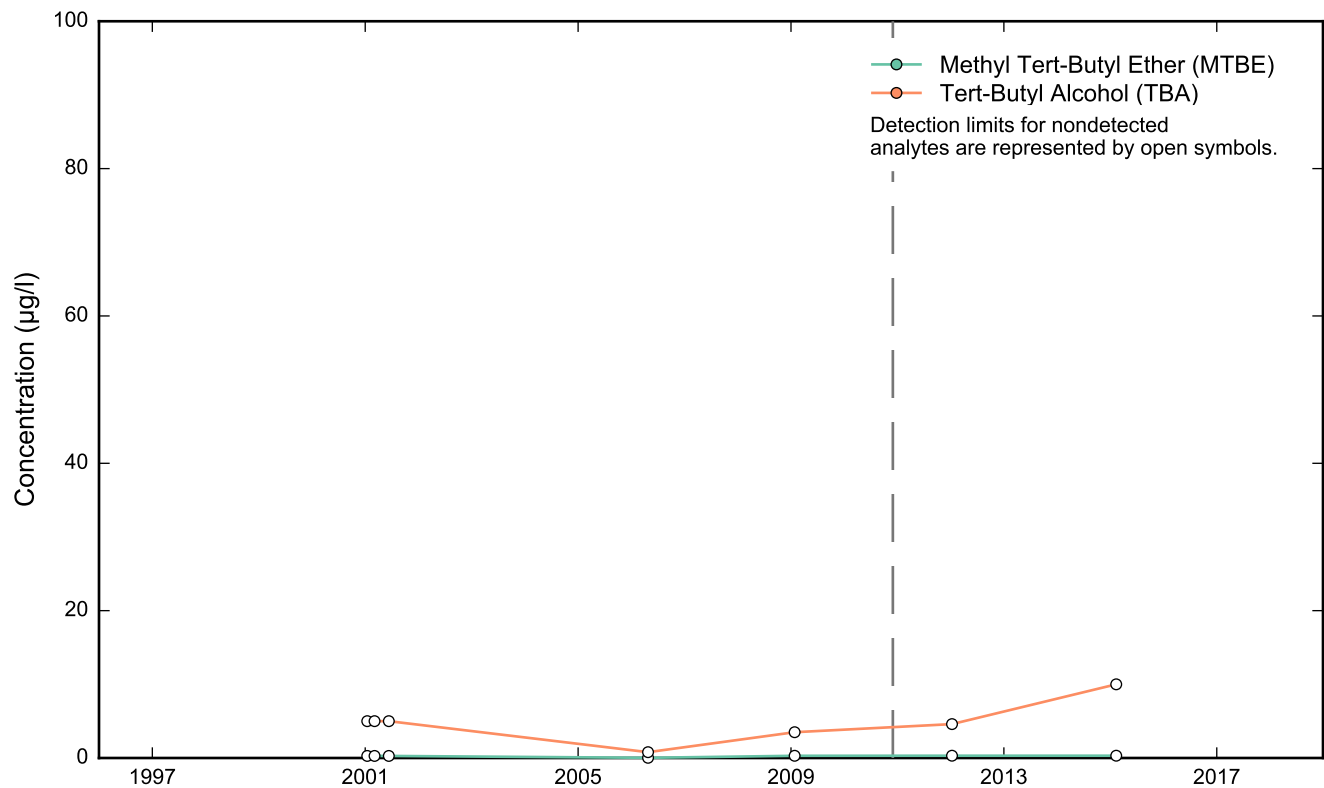
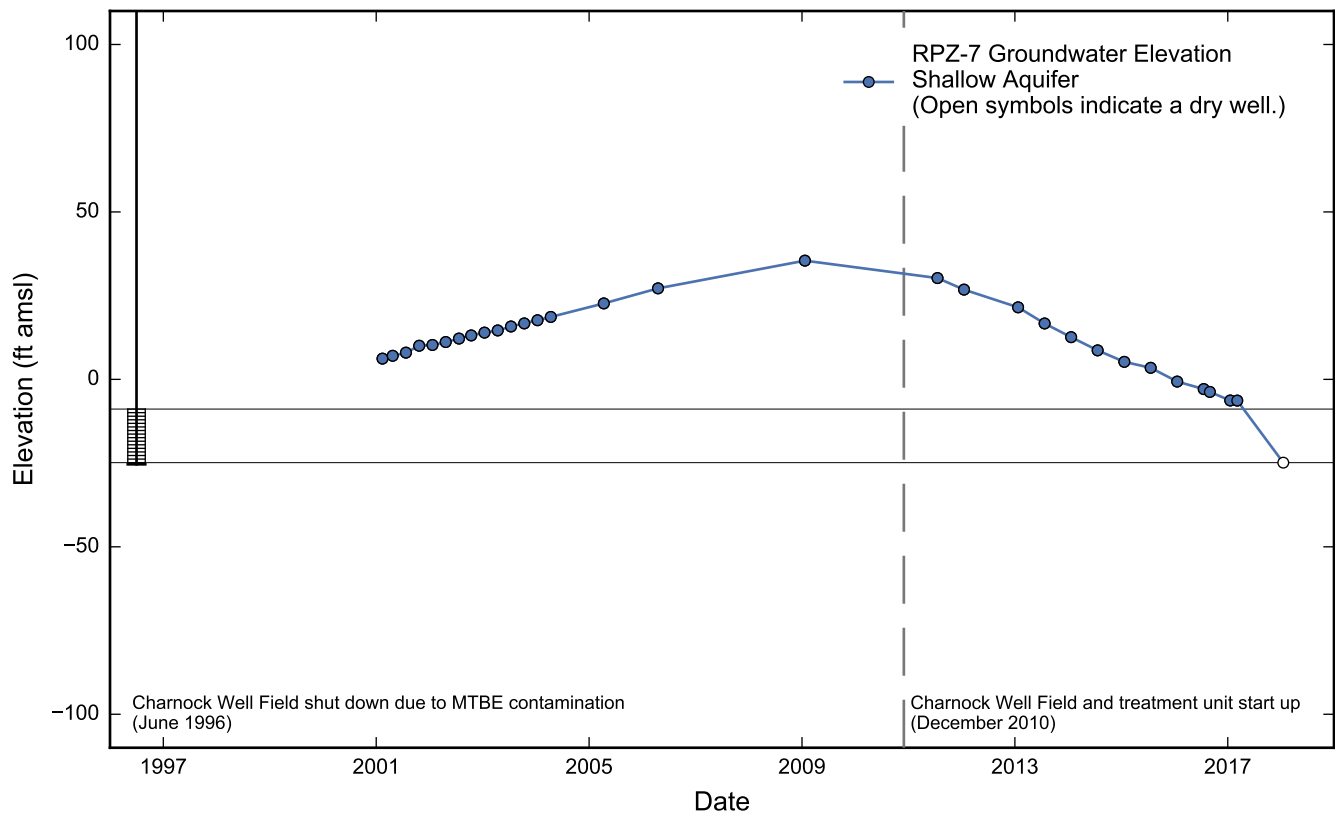
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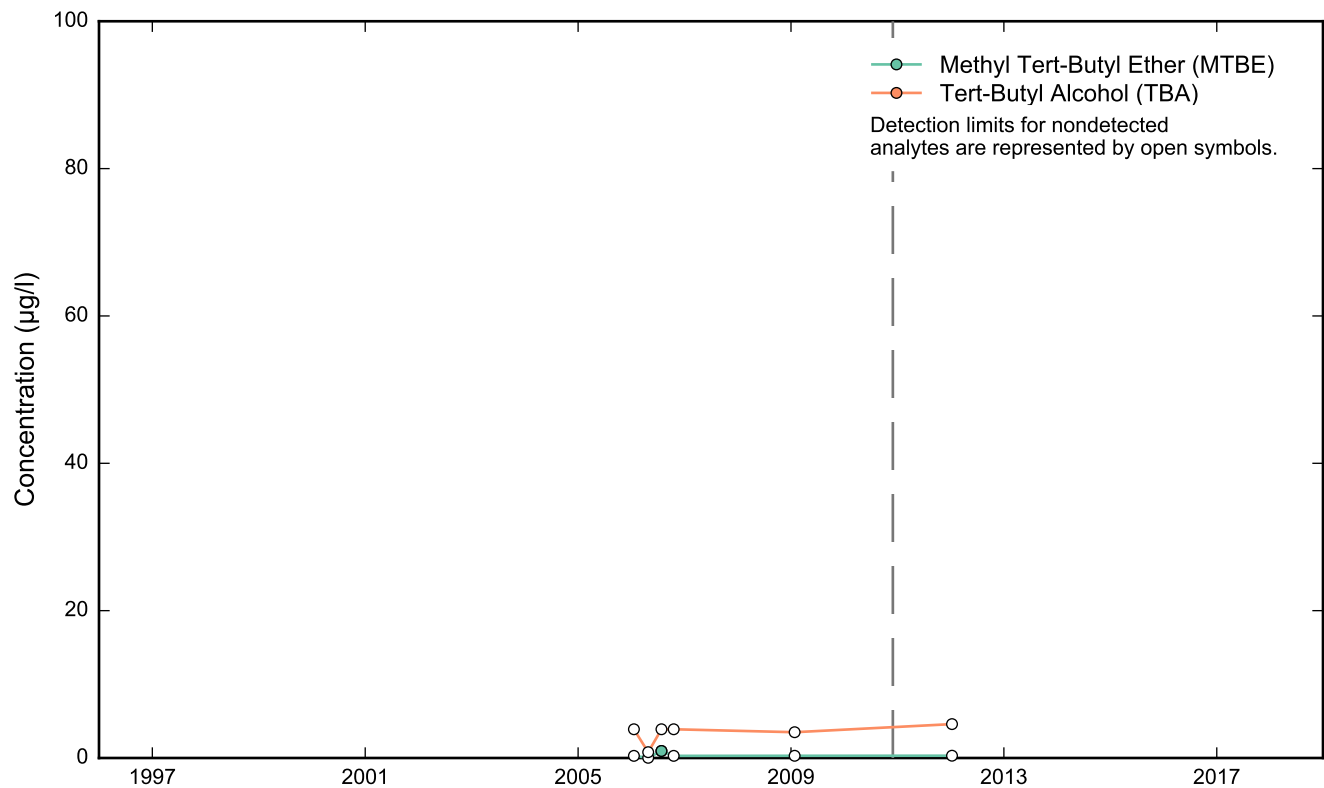
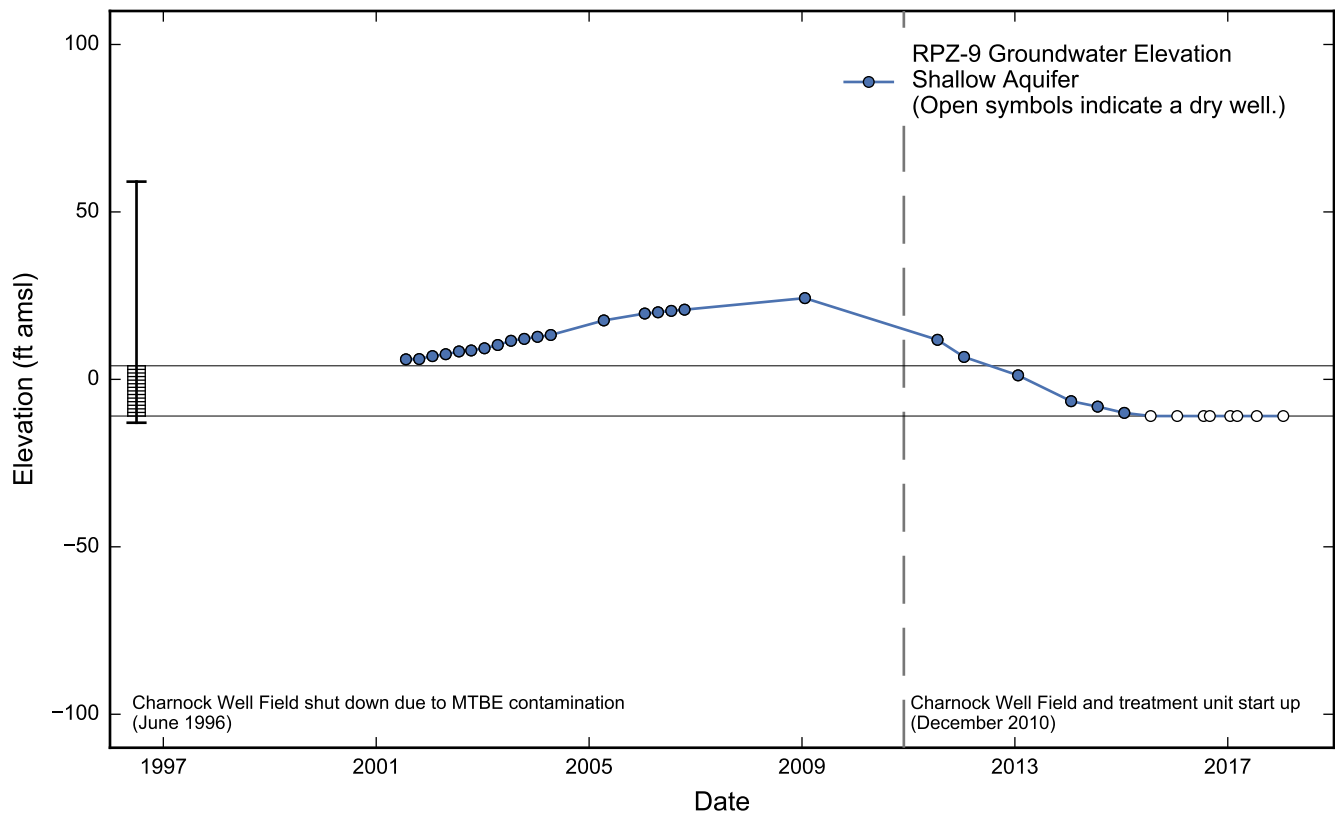


**Groundwater Elevation and Concentration Trends, RPZ-4**  
Charnock Sub-Basin  
Los Angeles, California

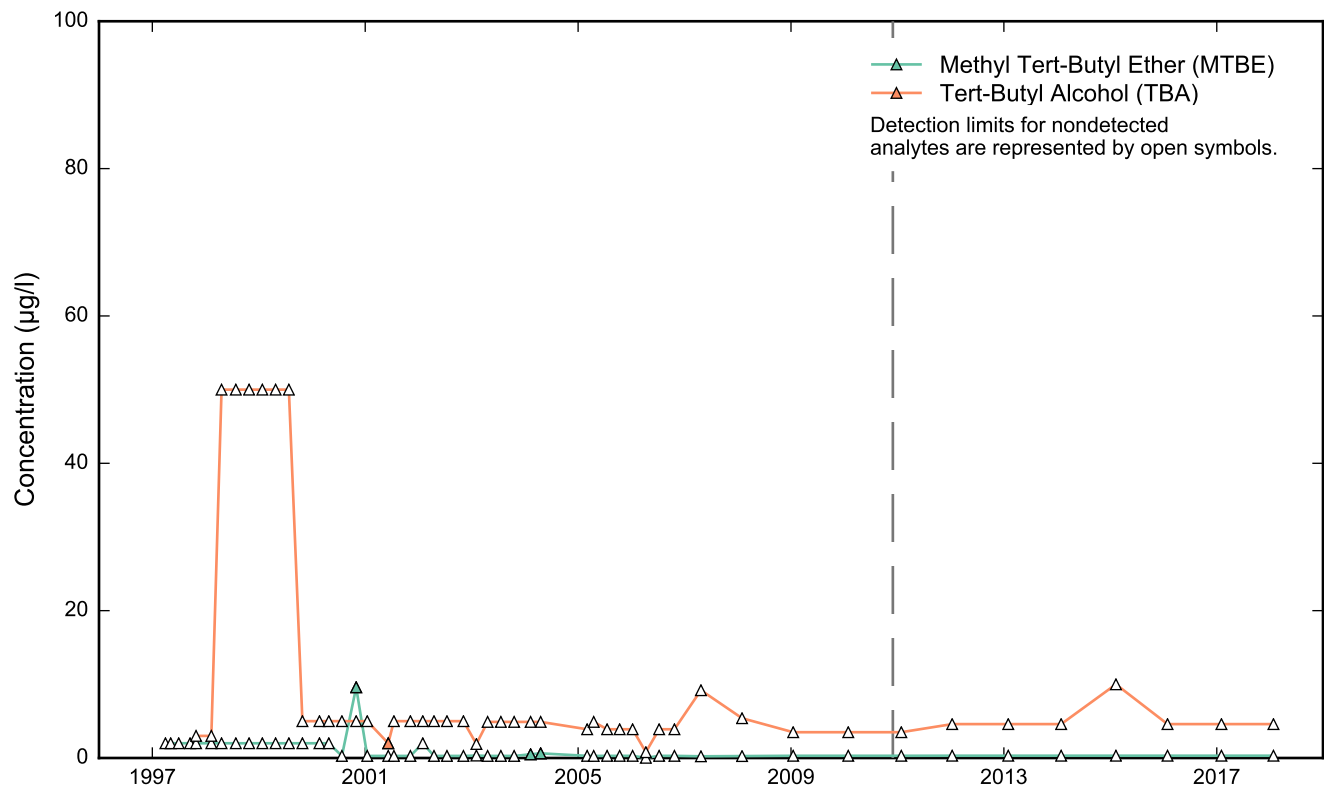
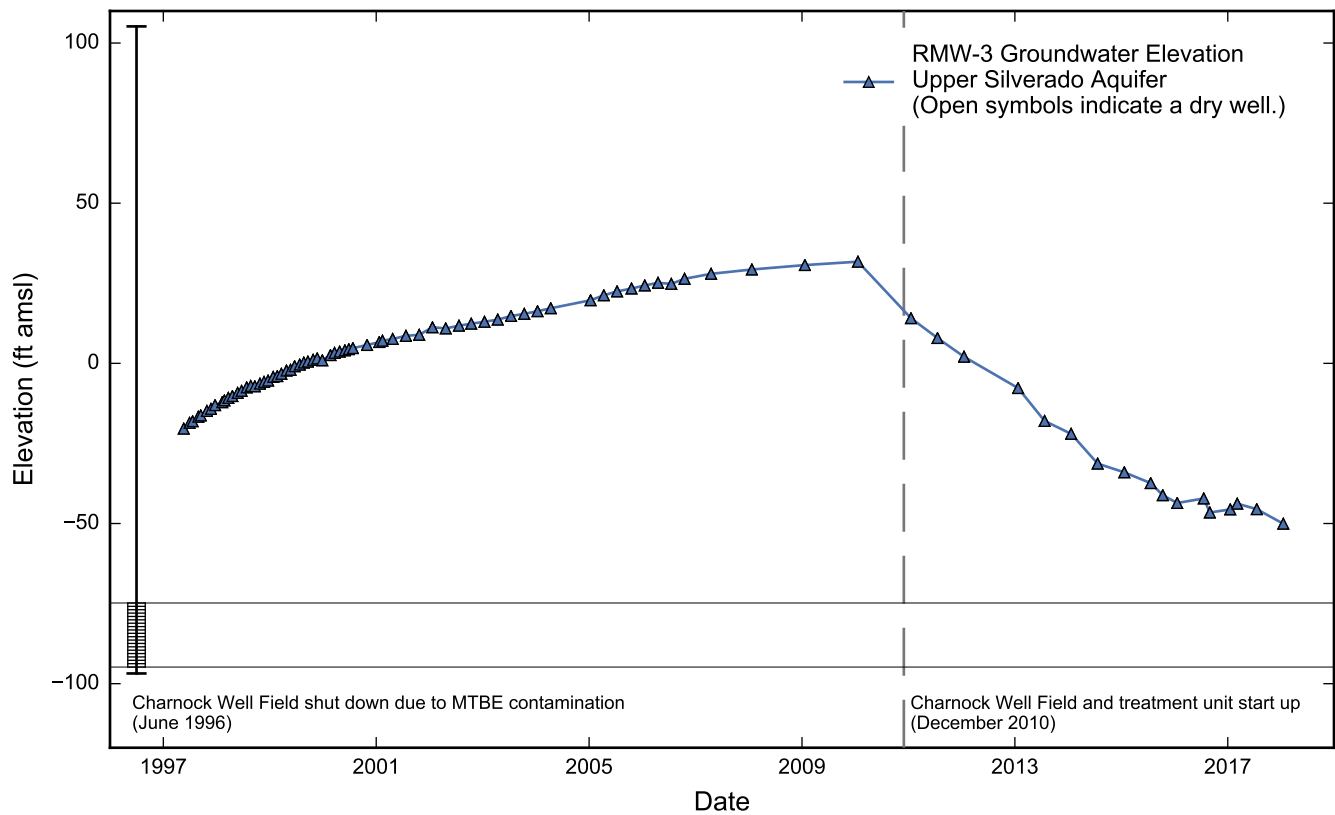
Figure

**1-21**





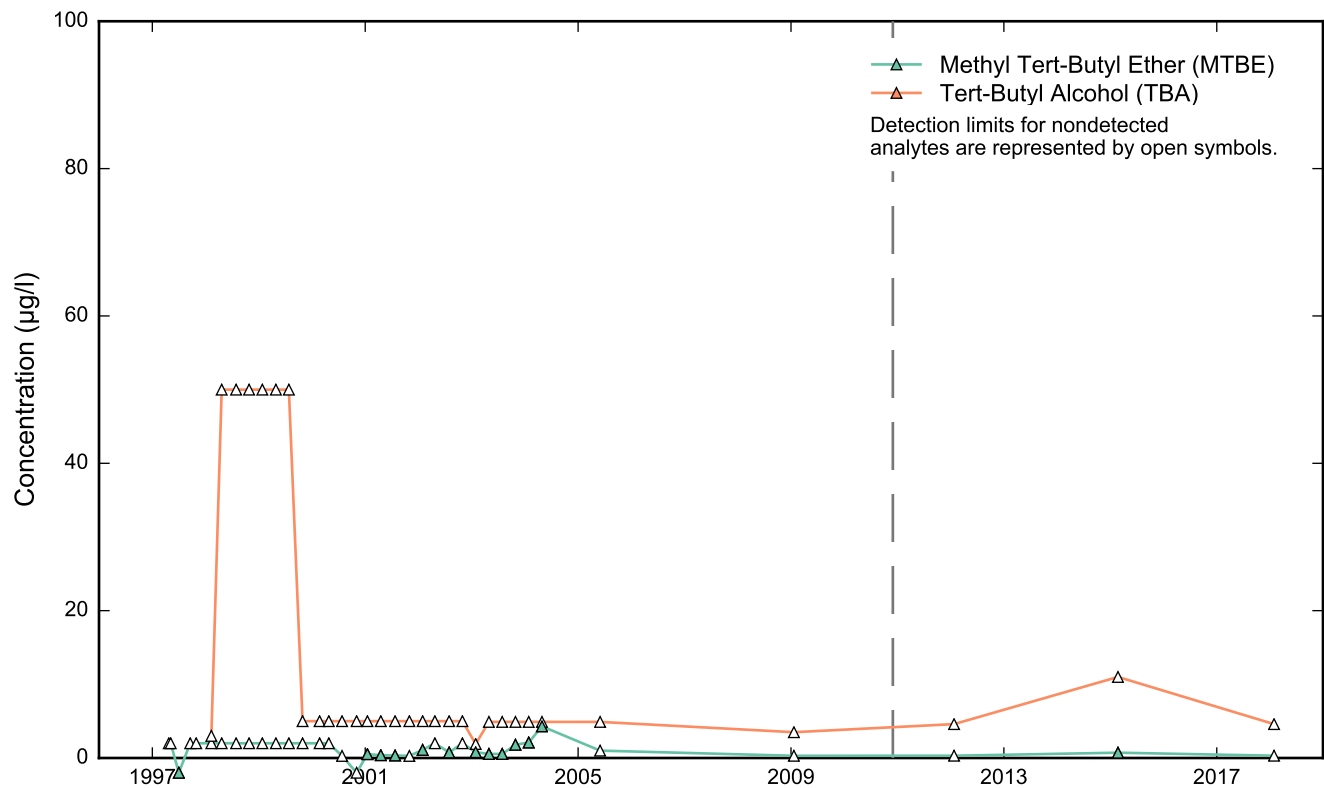
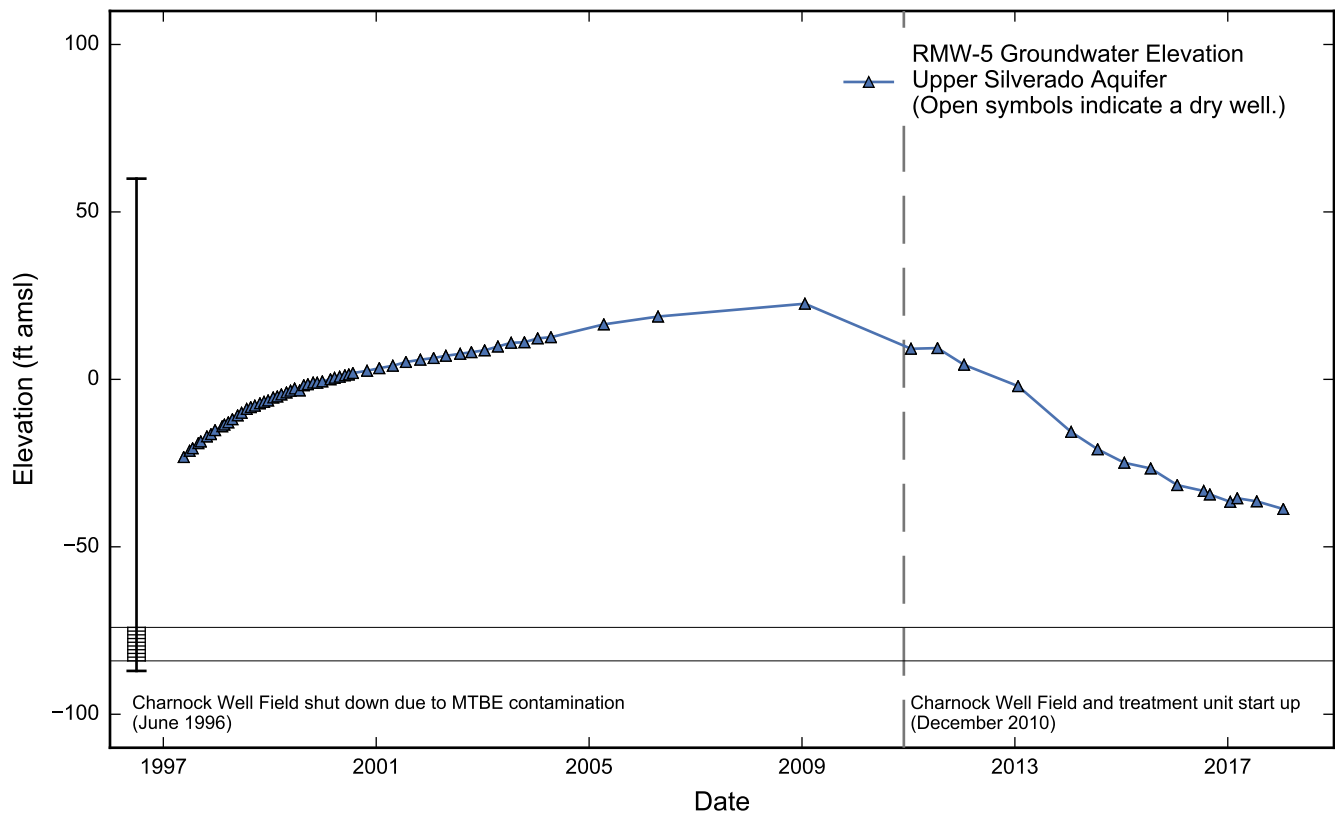
## **Upper Silverado Aquifer Wells**

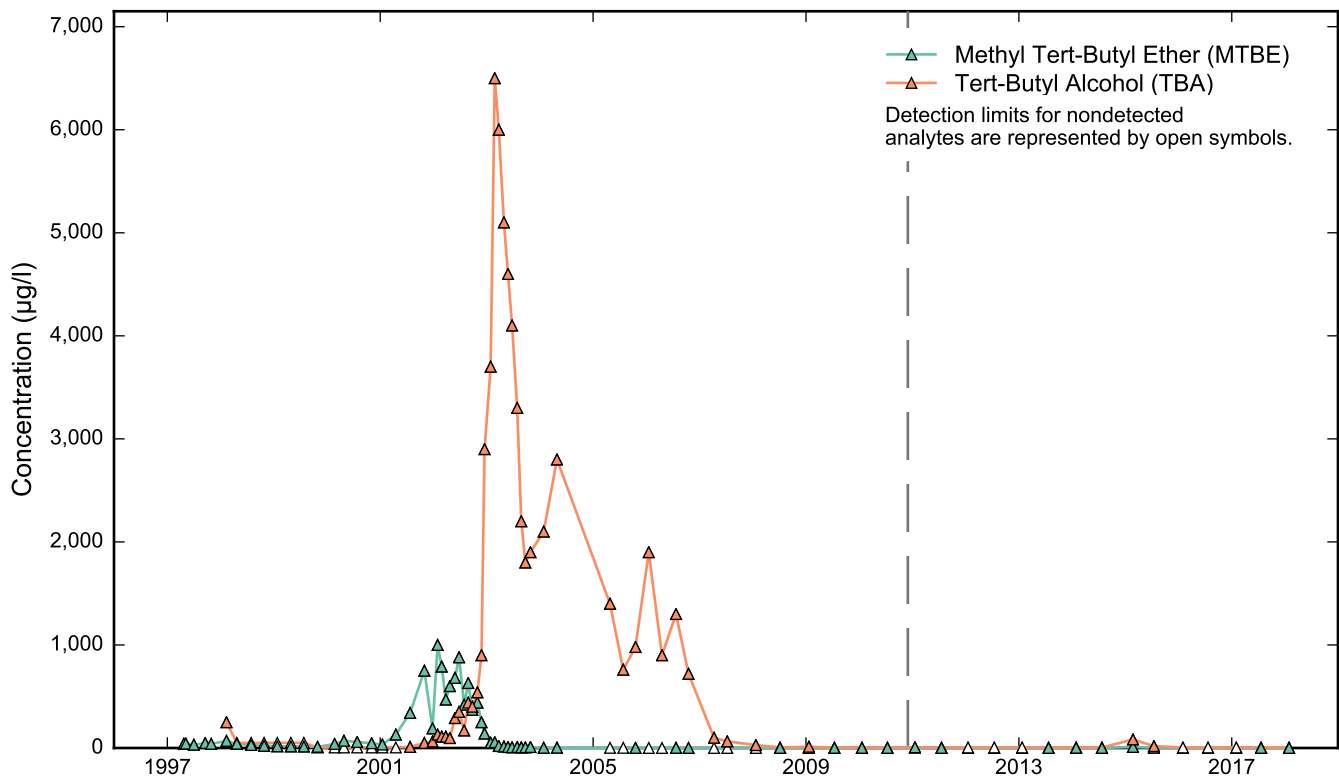
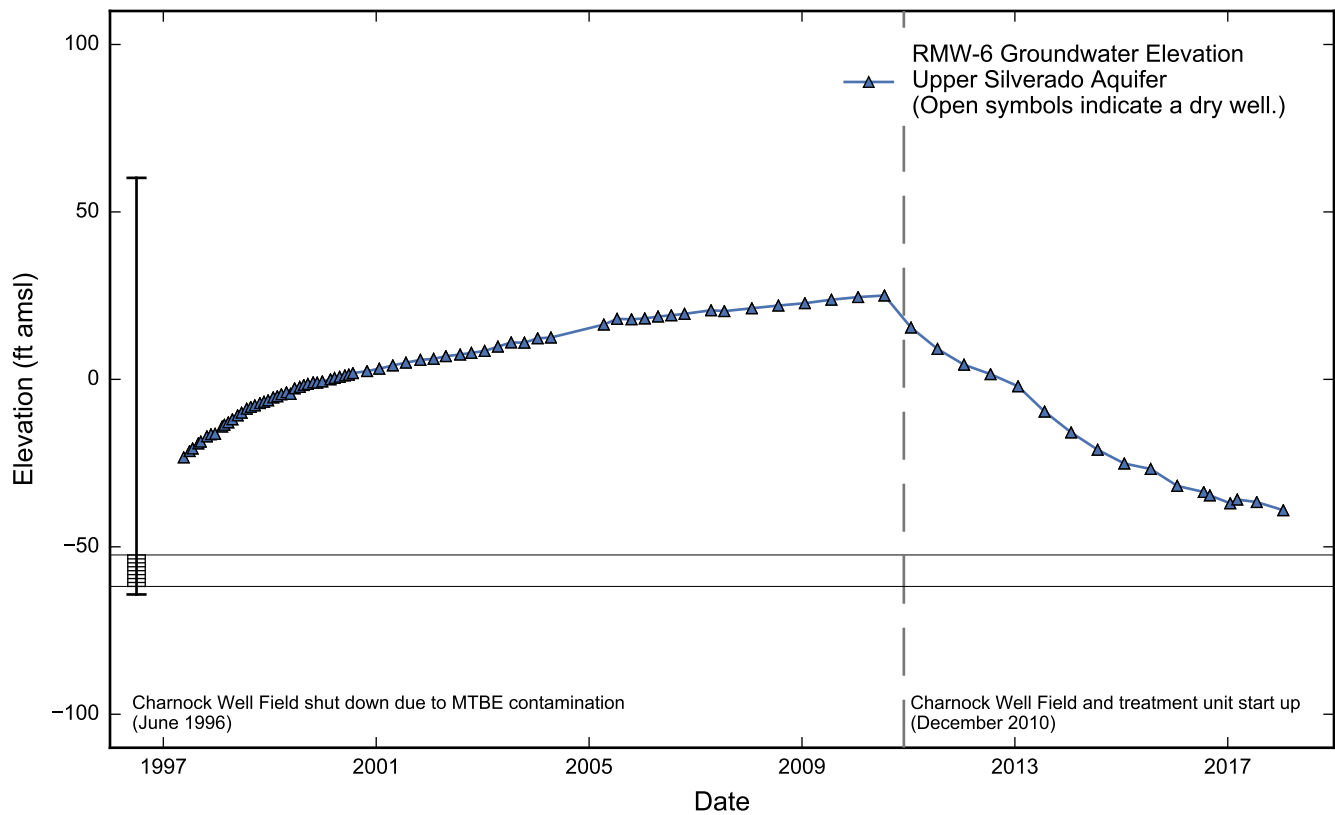


**Groundwater Elevation and Concentration Trends, RMW-3**  
Charnock Sub-Basin  
Los Angeles, California

Figure

**2-1**

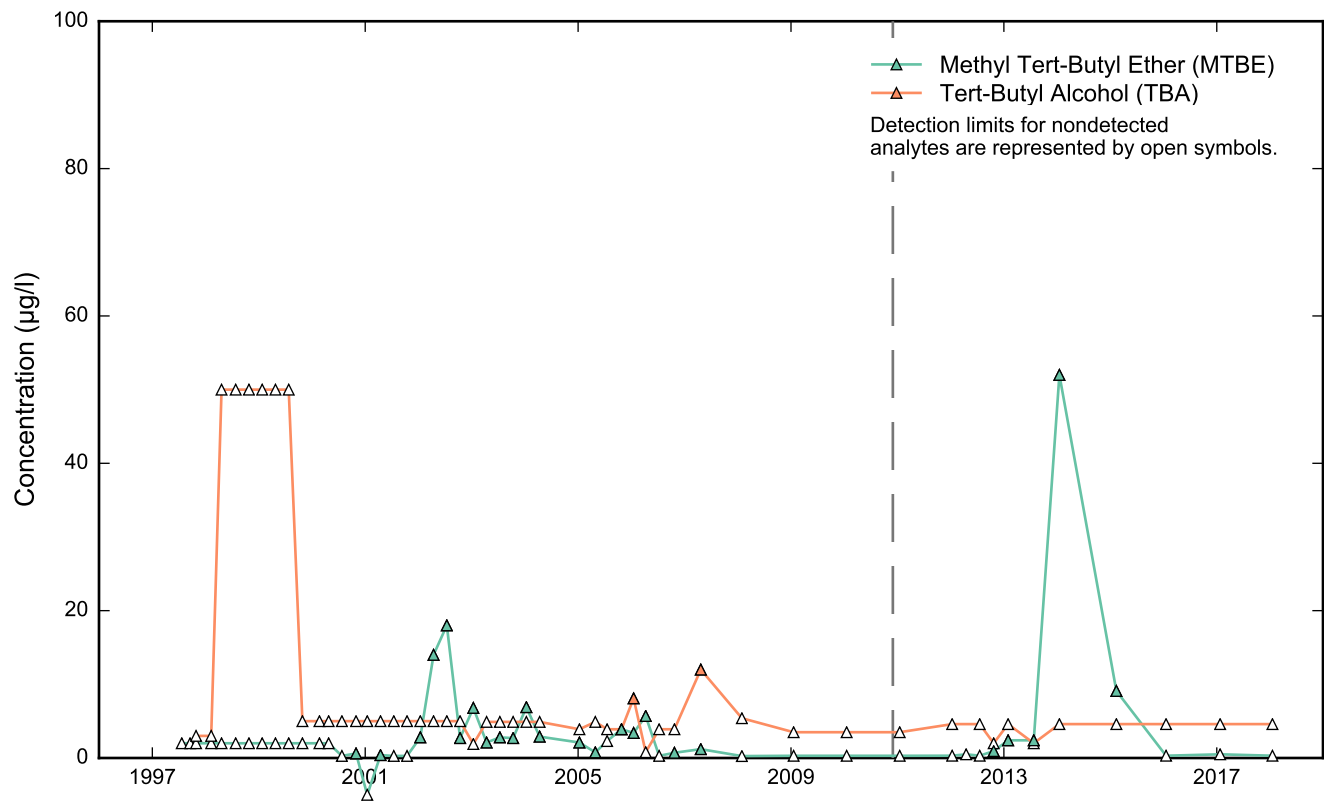
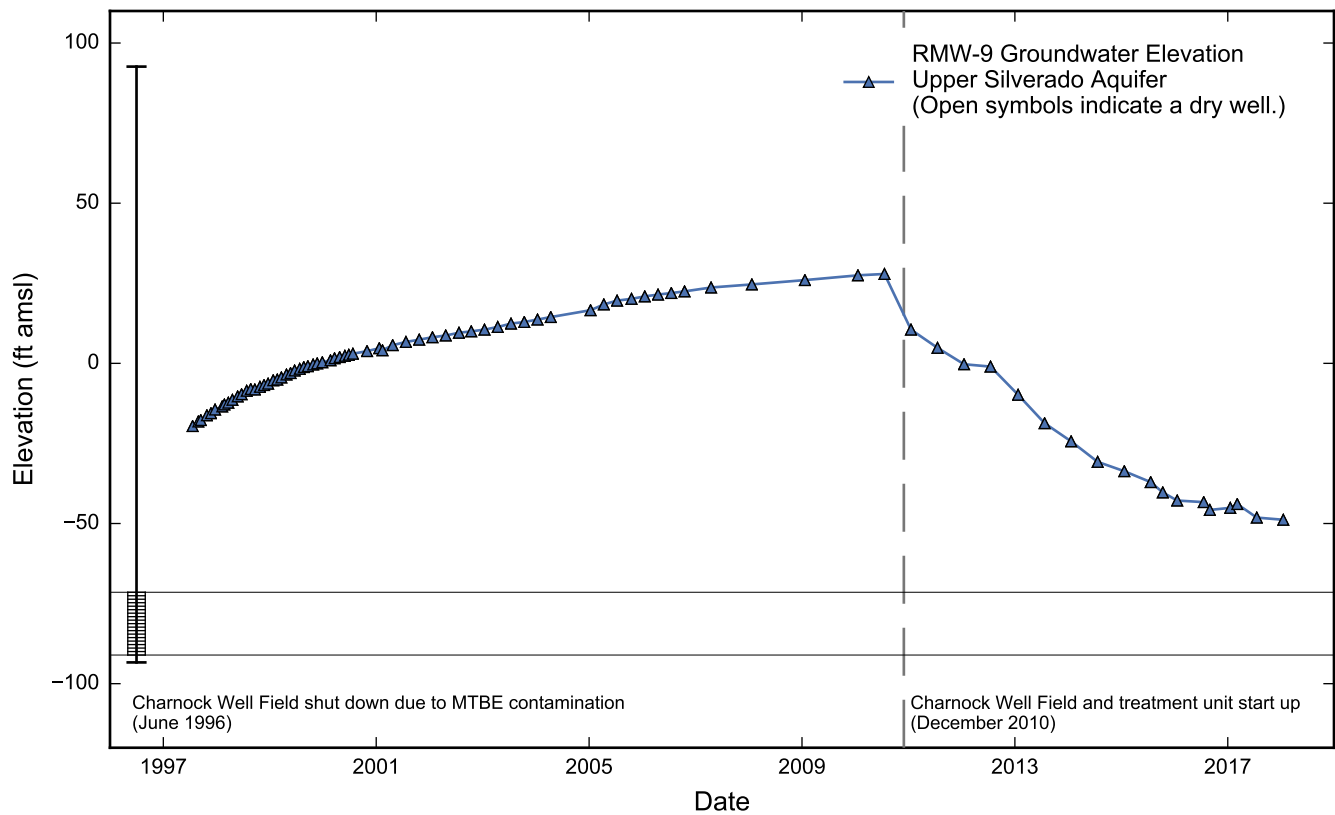




**Groundwater Elevation and Concentration Trends, RMW-6**  
Charnock Sub-Basin  
Los Angeles, California

Figure

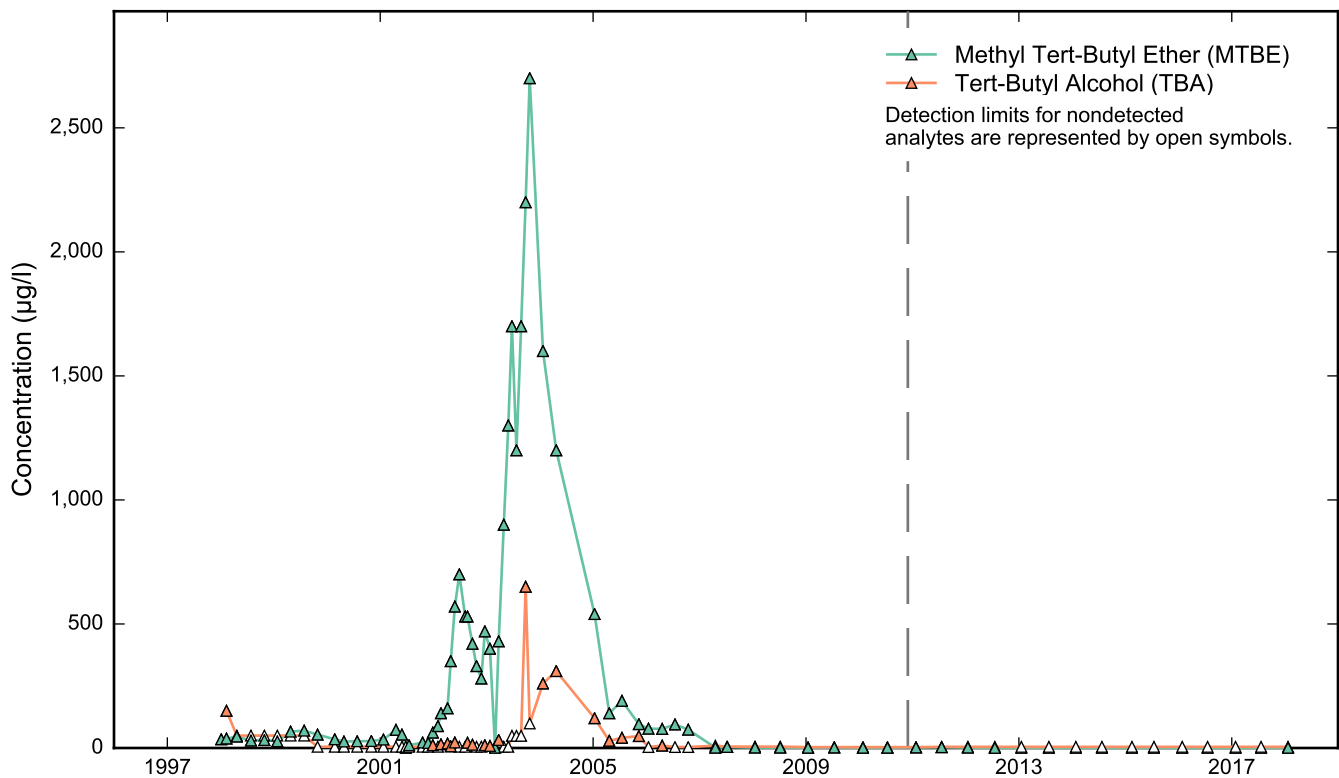
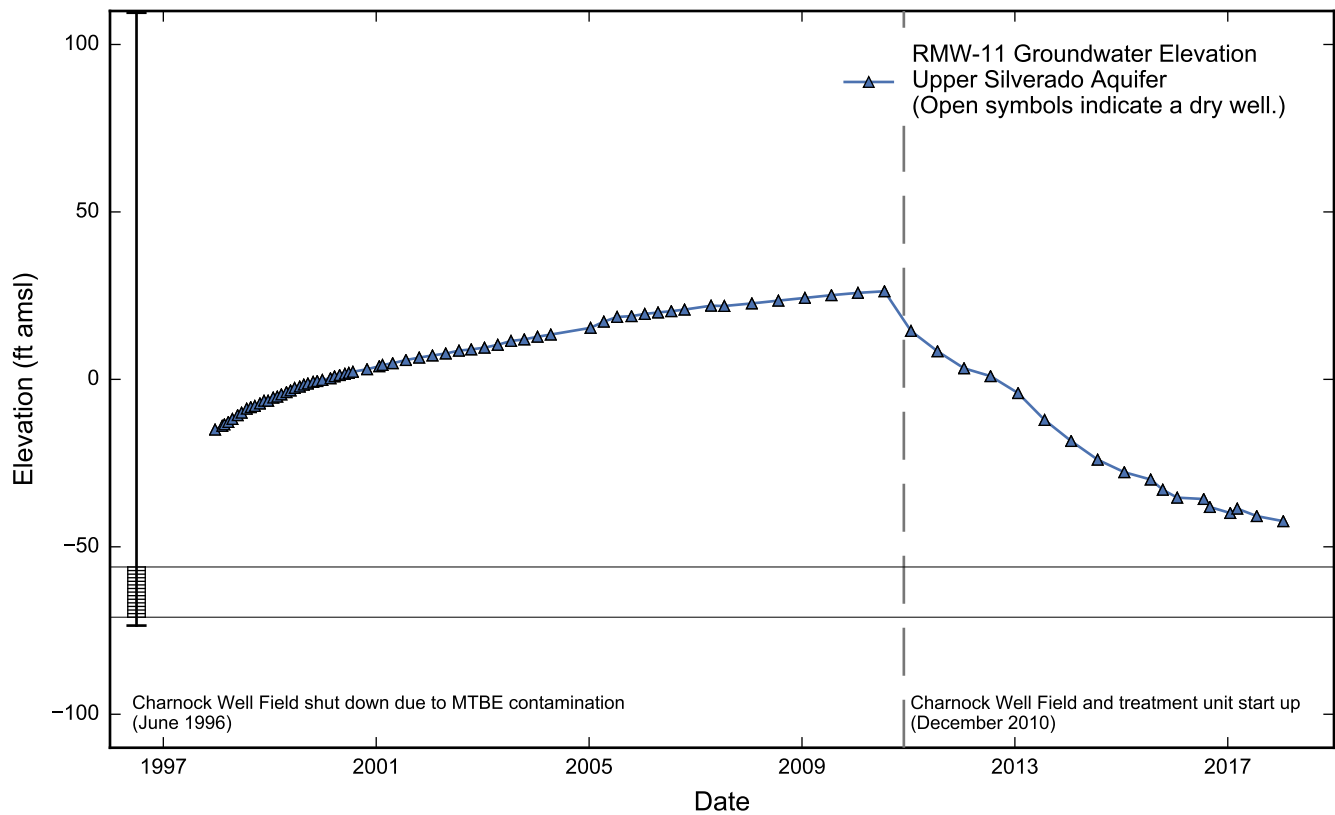
**2-3**



**Groundwater Elevation and Concentration Trends, RMW-9**  
Charnock Sub-Basin  
Los Angeles, California

Figure

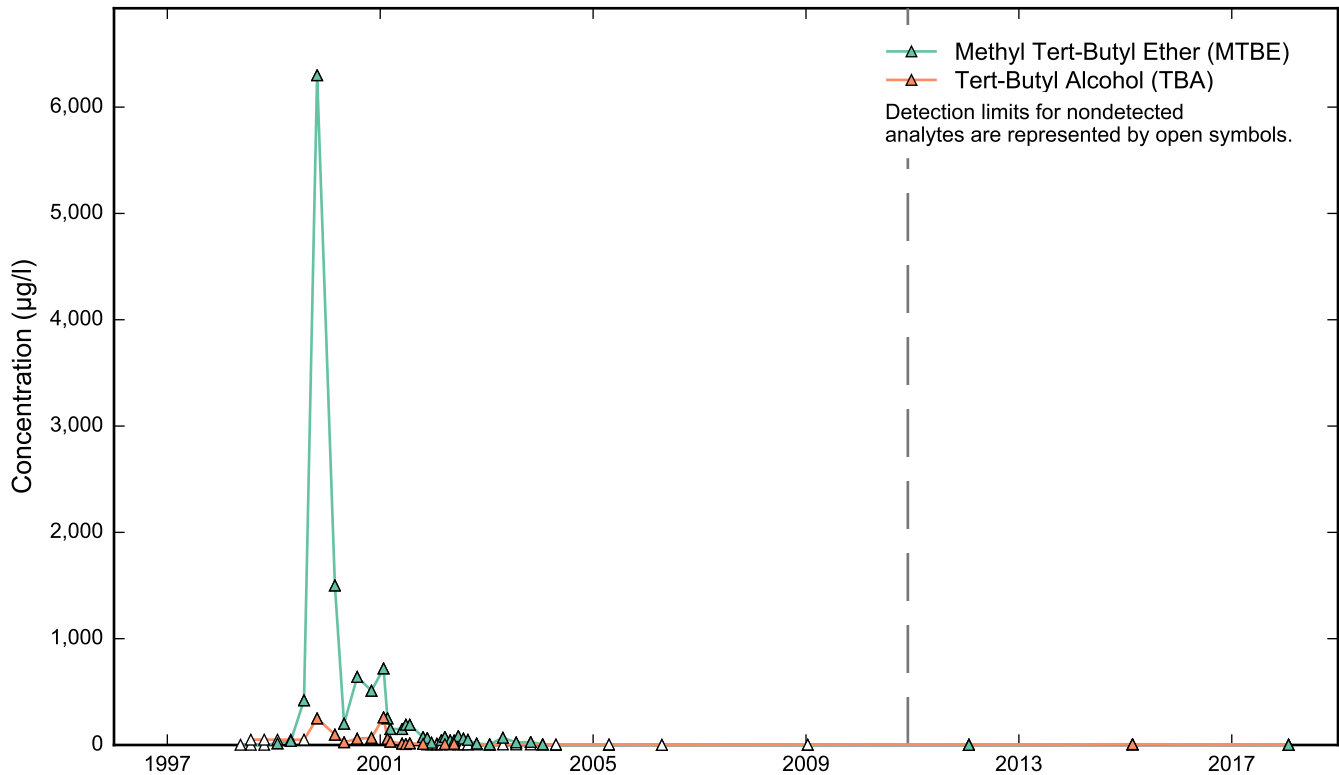
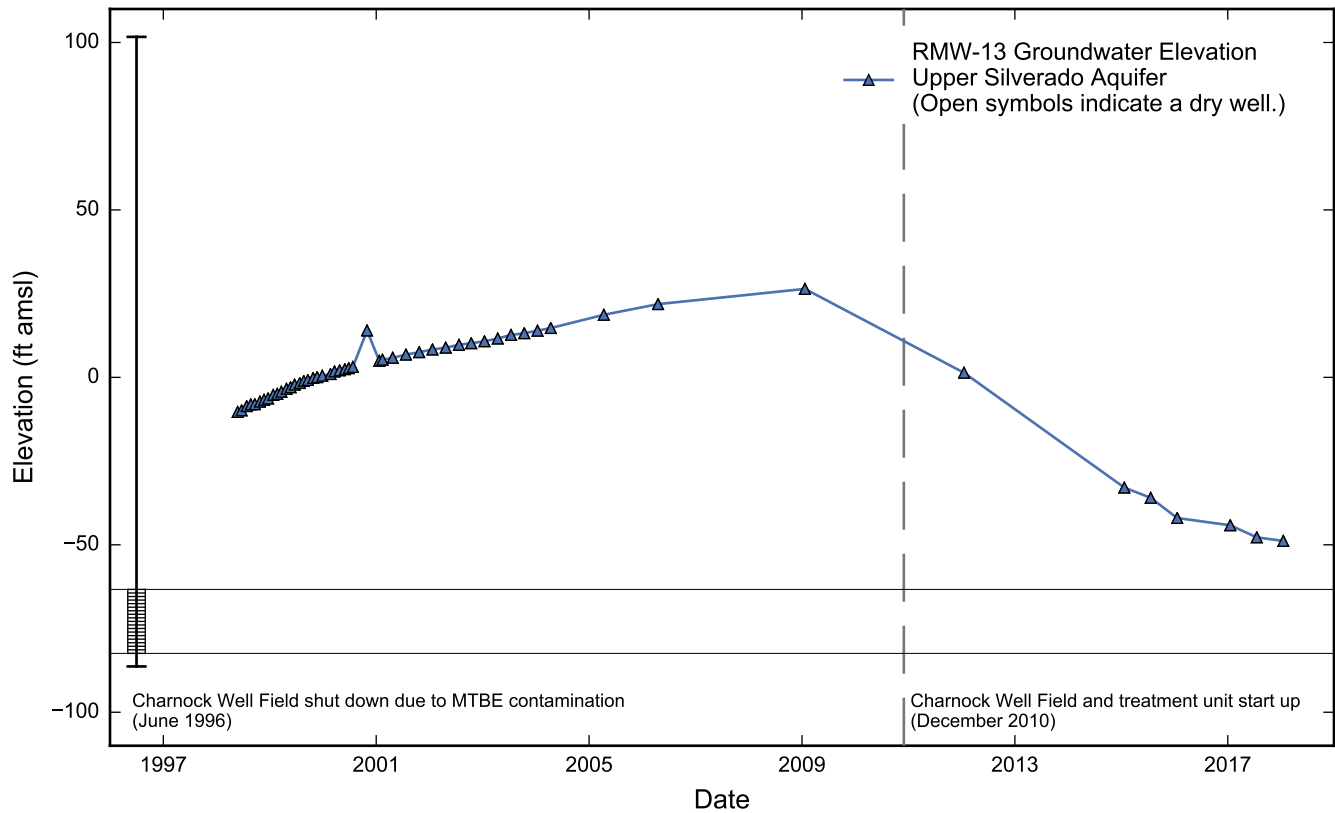
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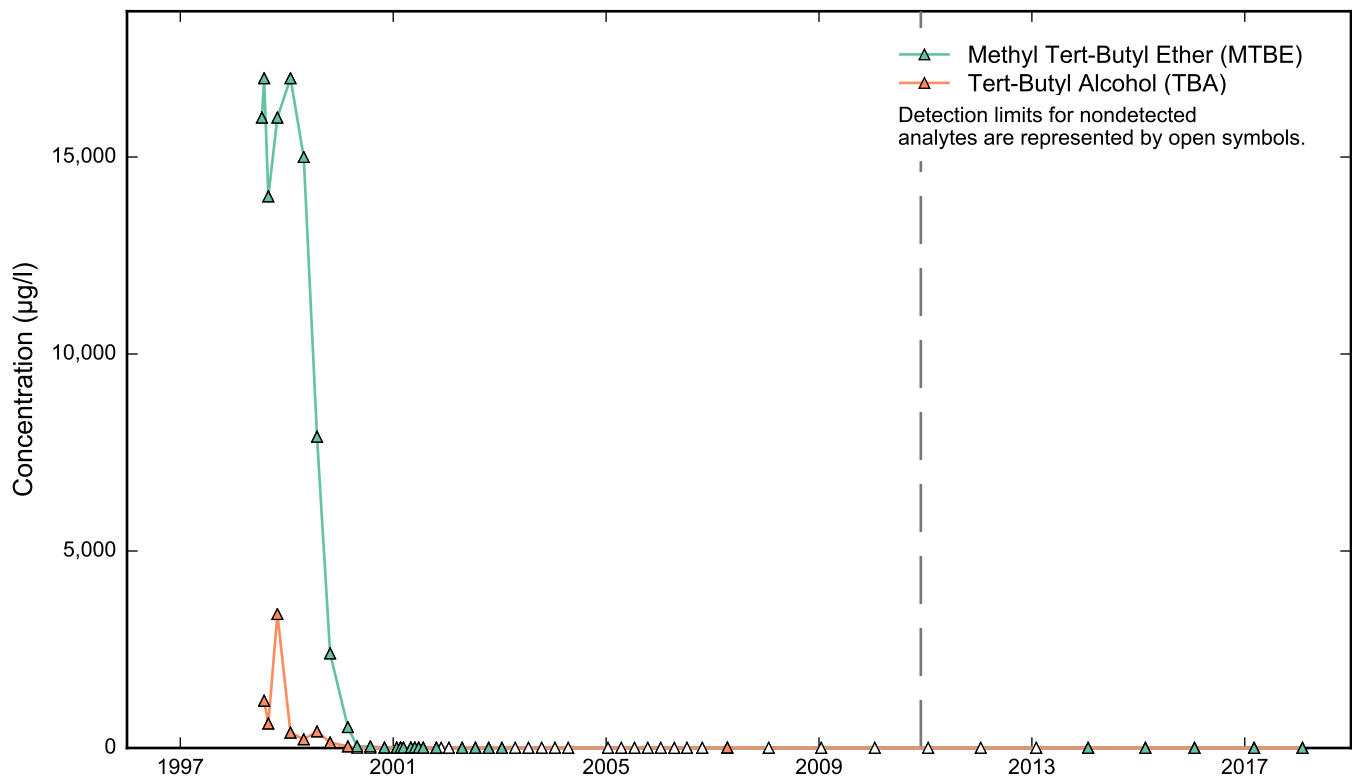
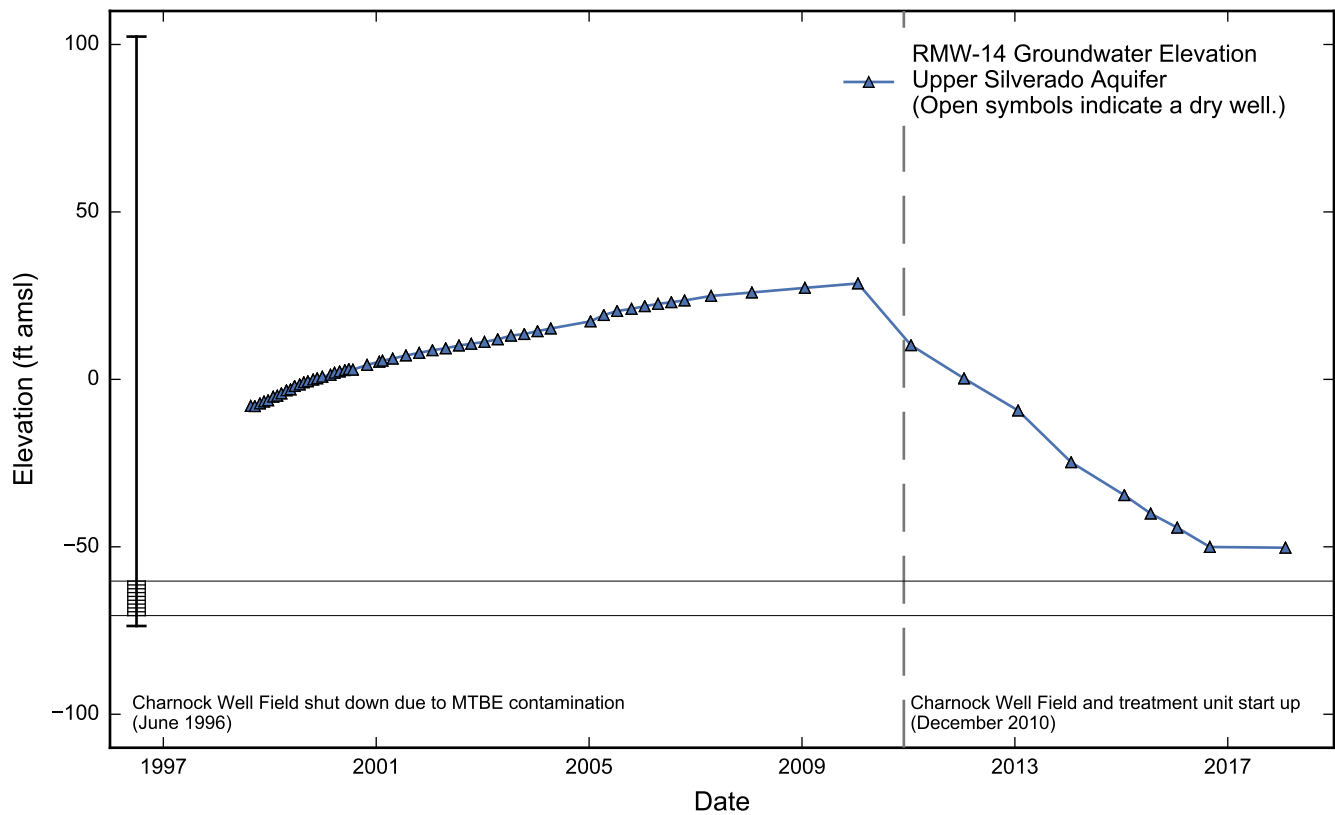


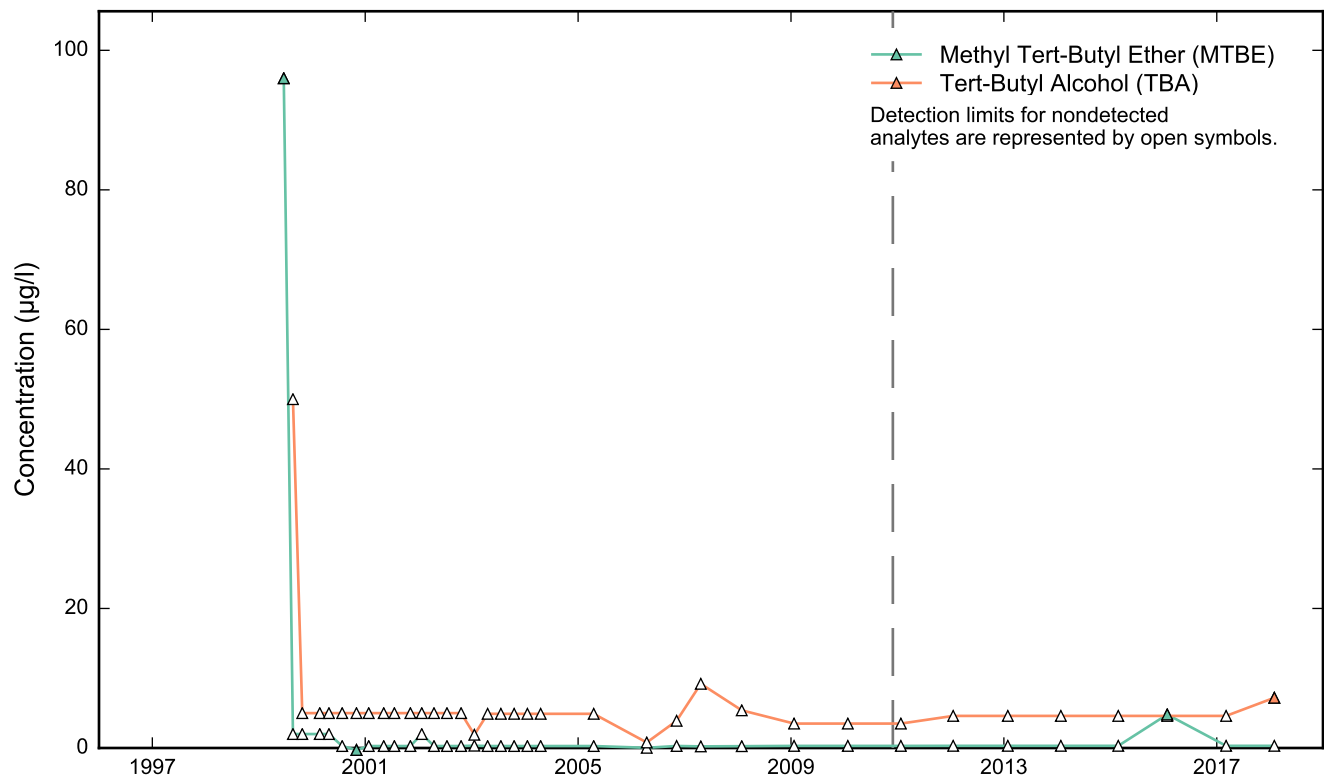
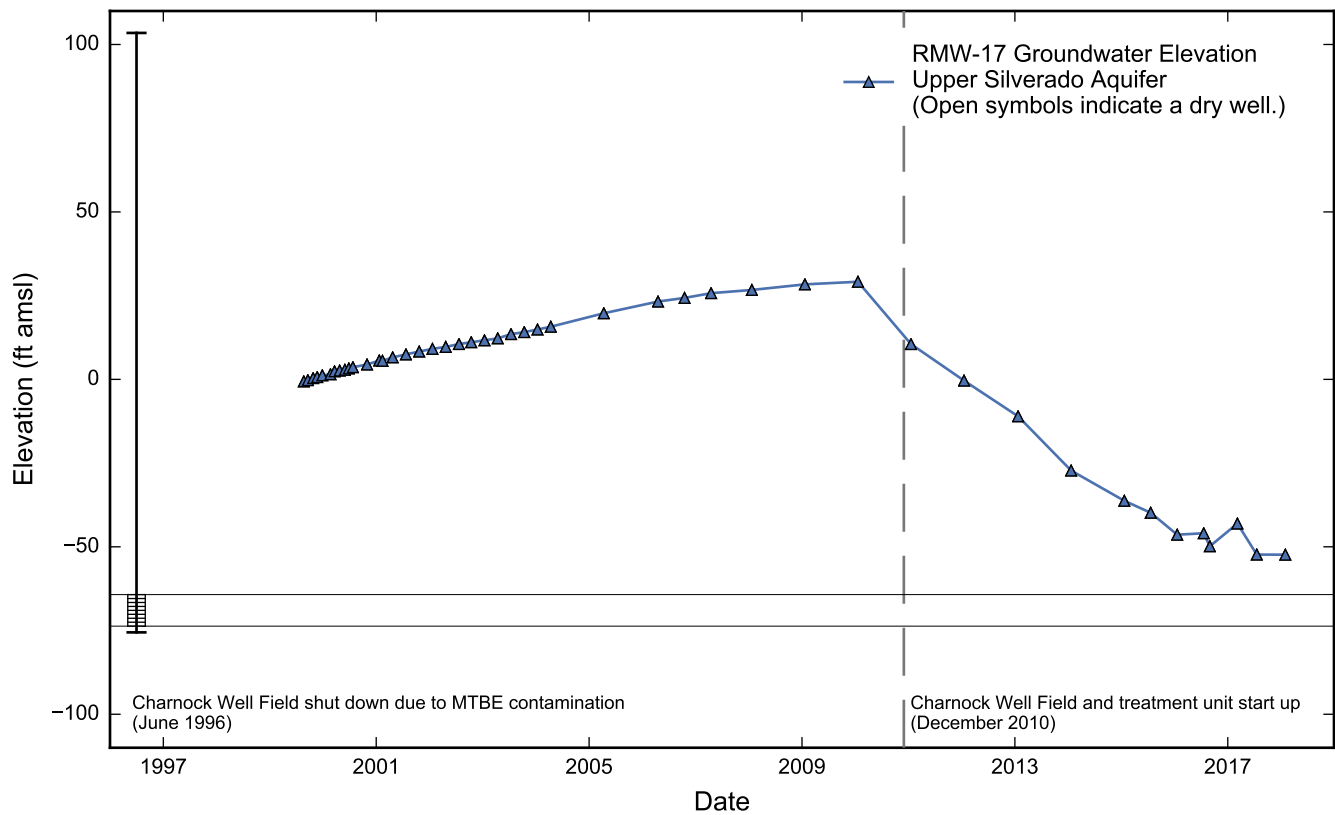
**Groundwater Elevation and Concentration Trends, RMW-11**  
Charnock Sub-Basin  
Los Angeles, California

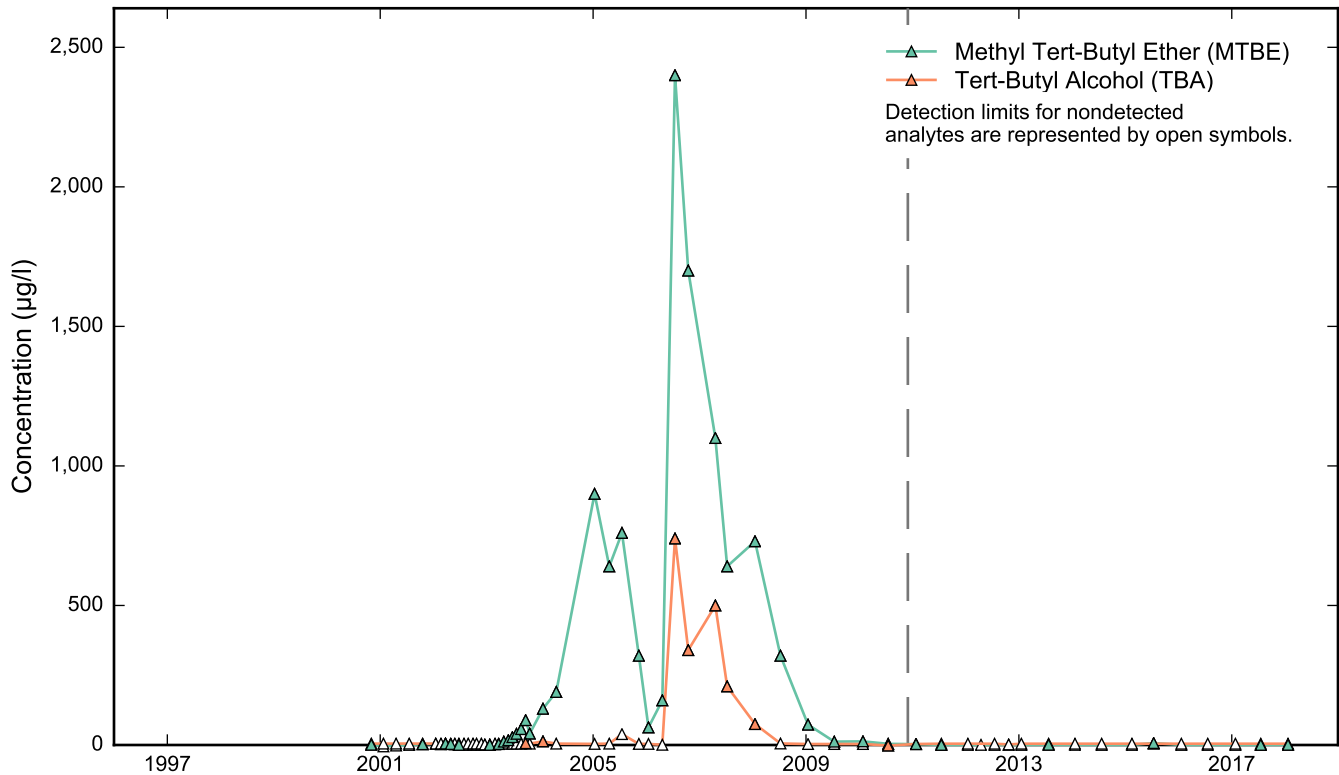
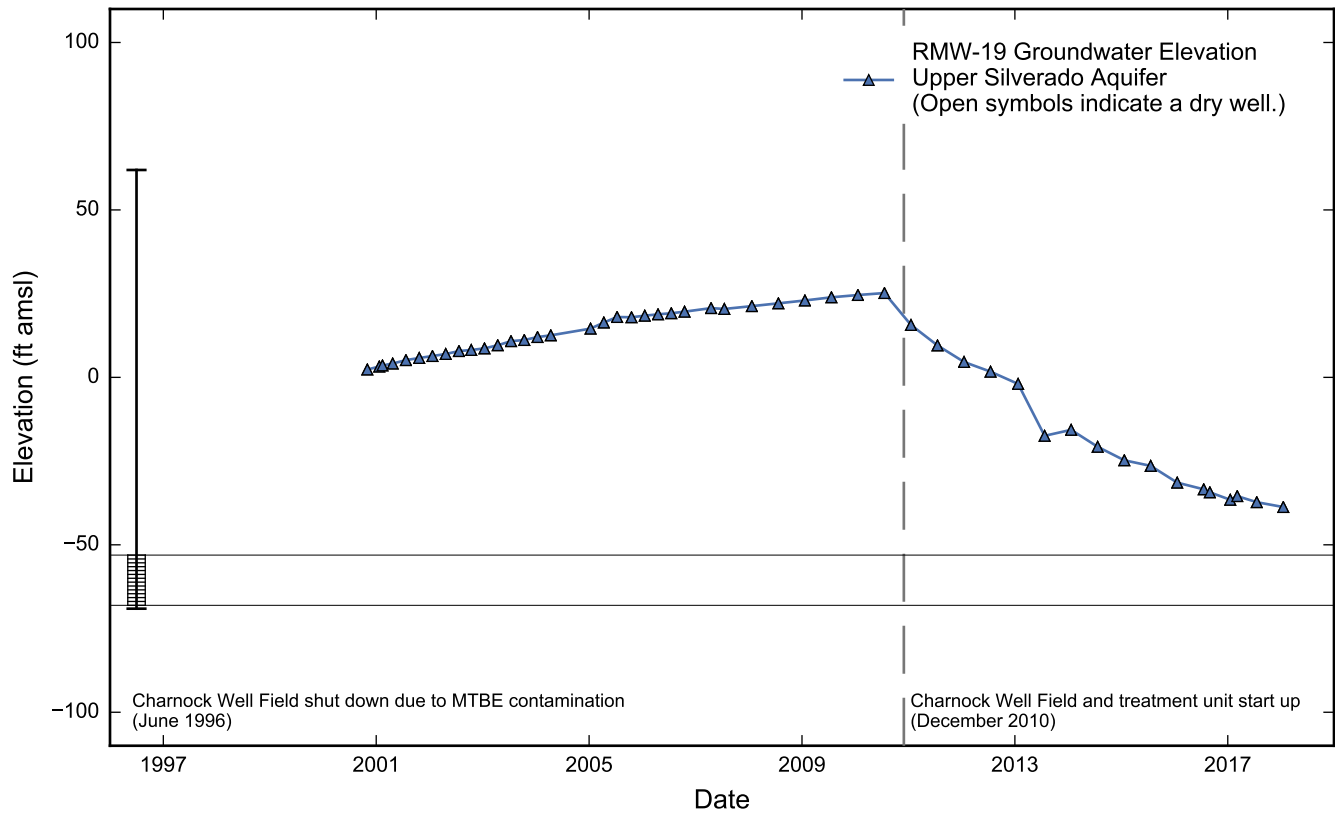
Figure

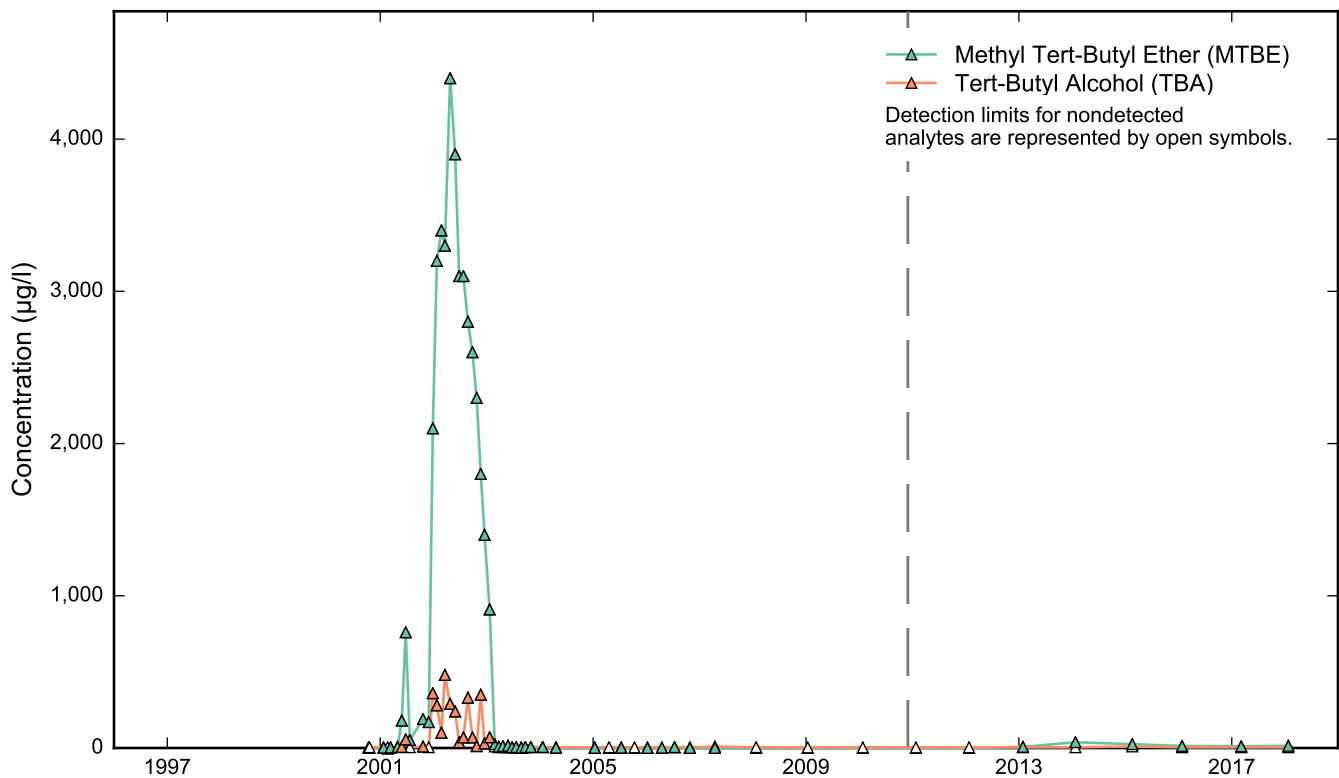
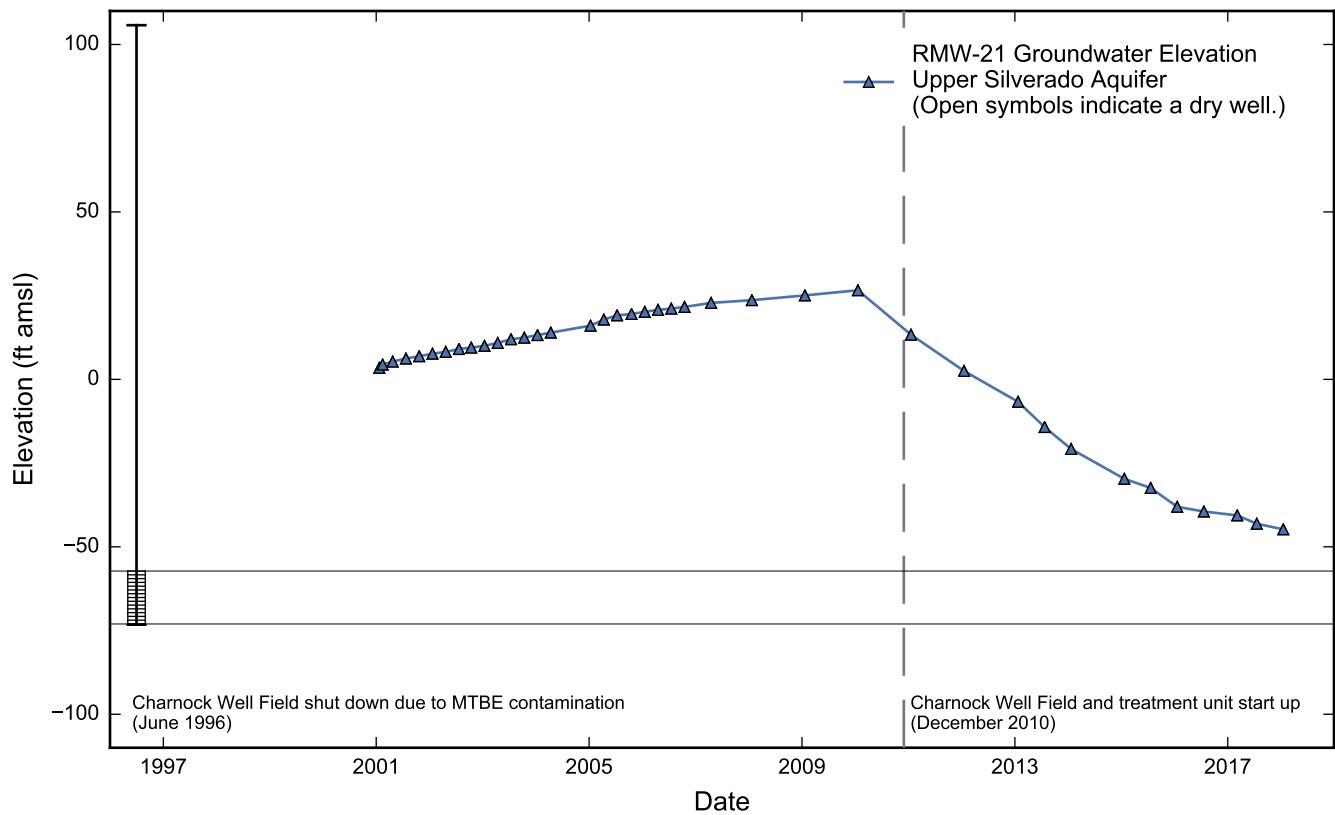
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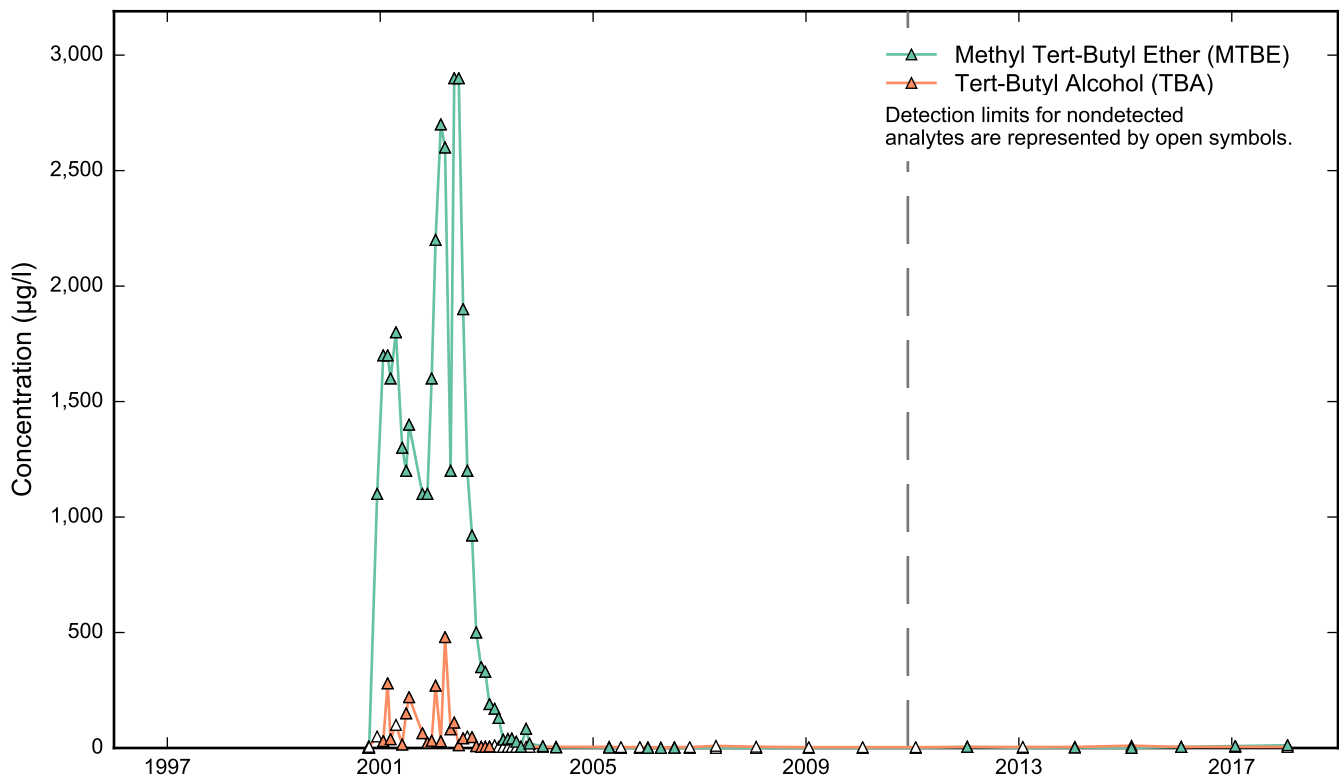
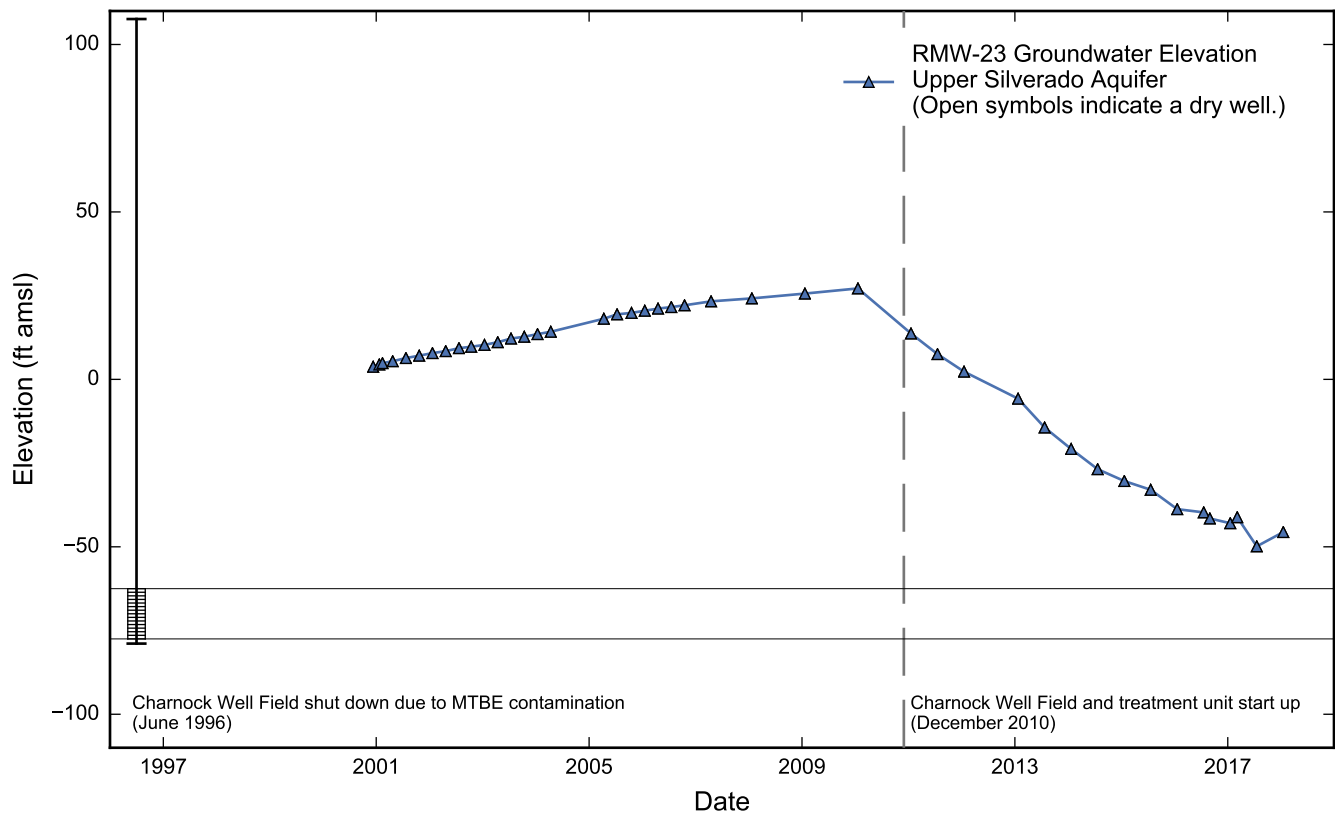


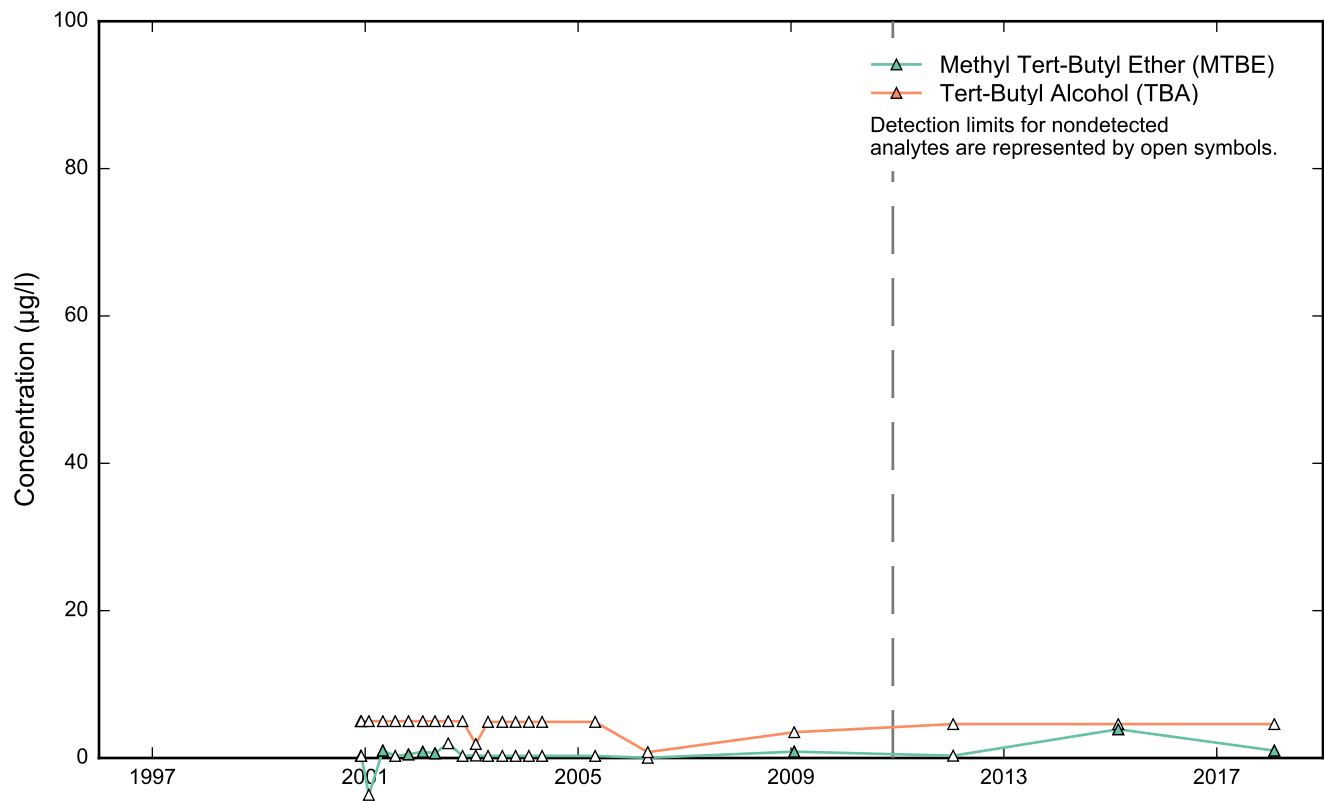
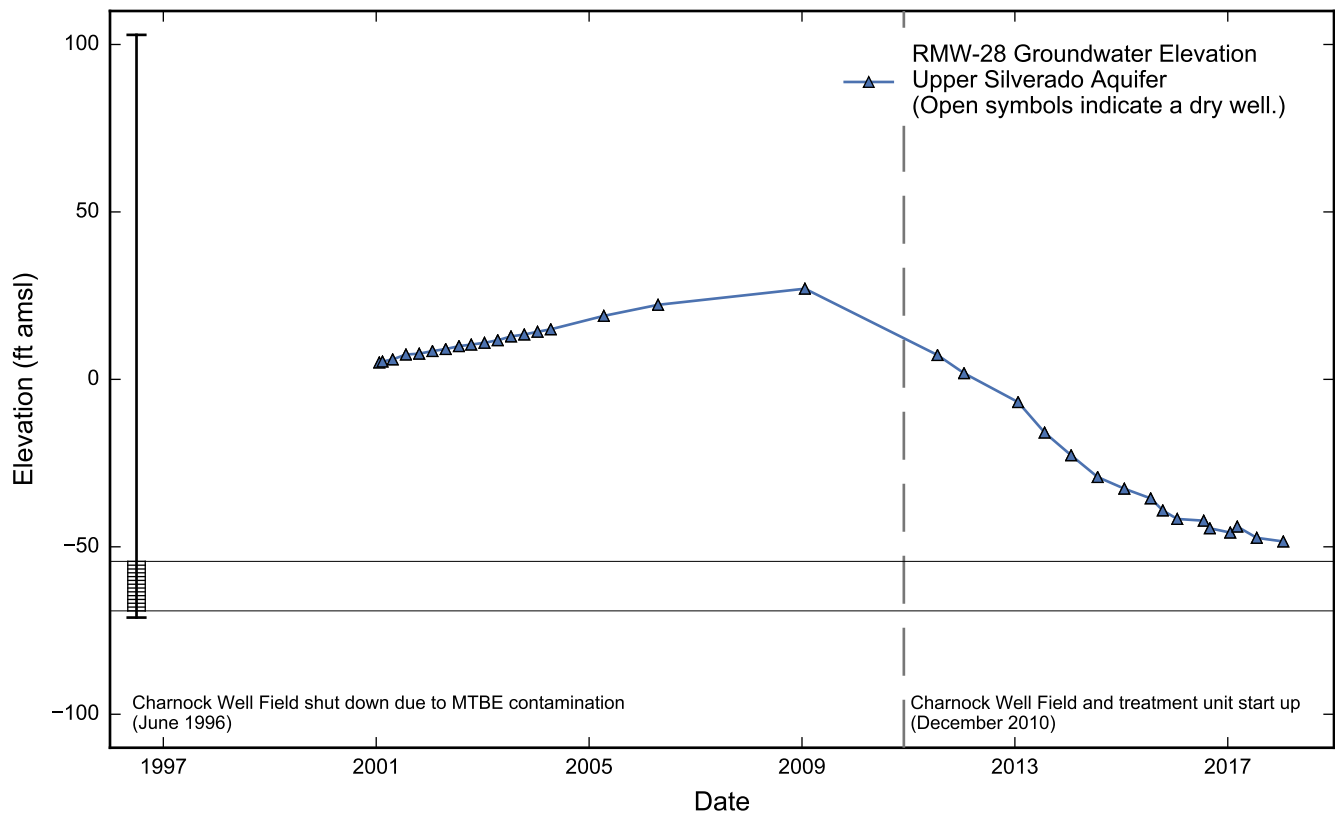


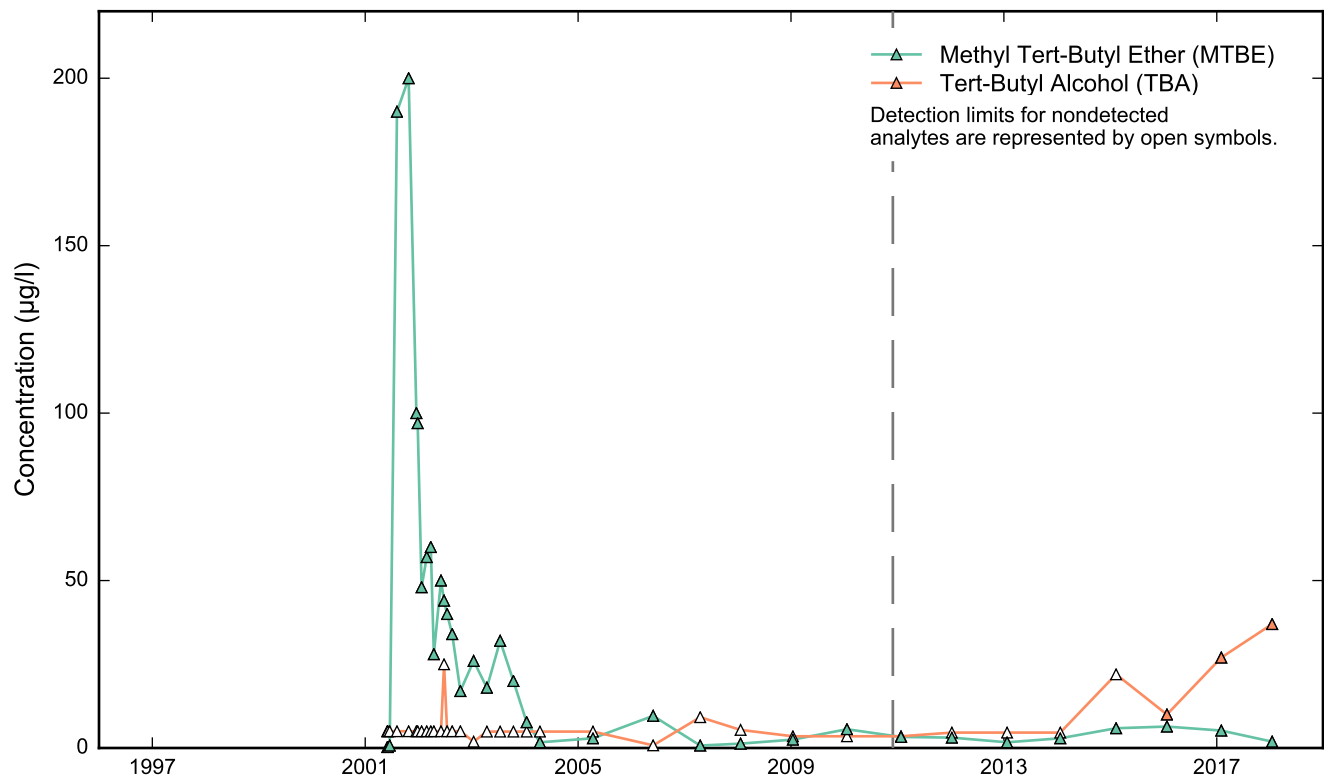
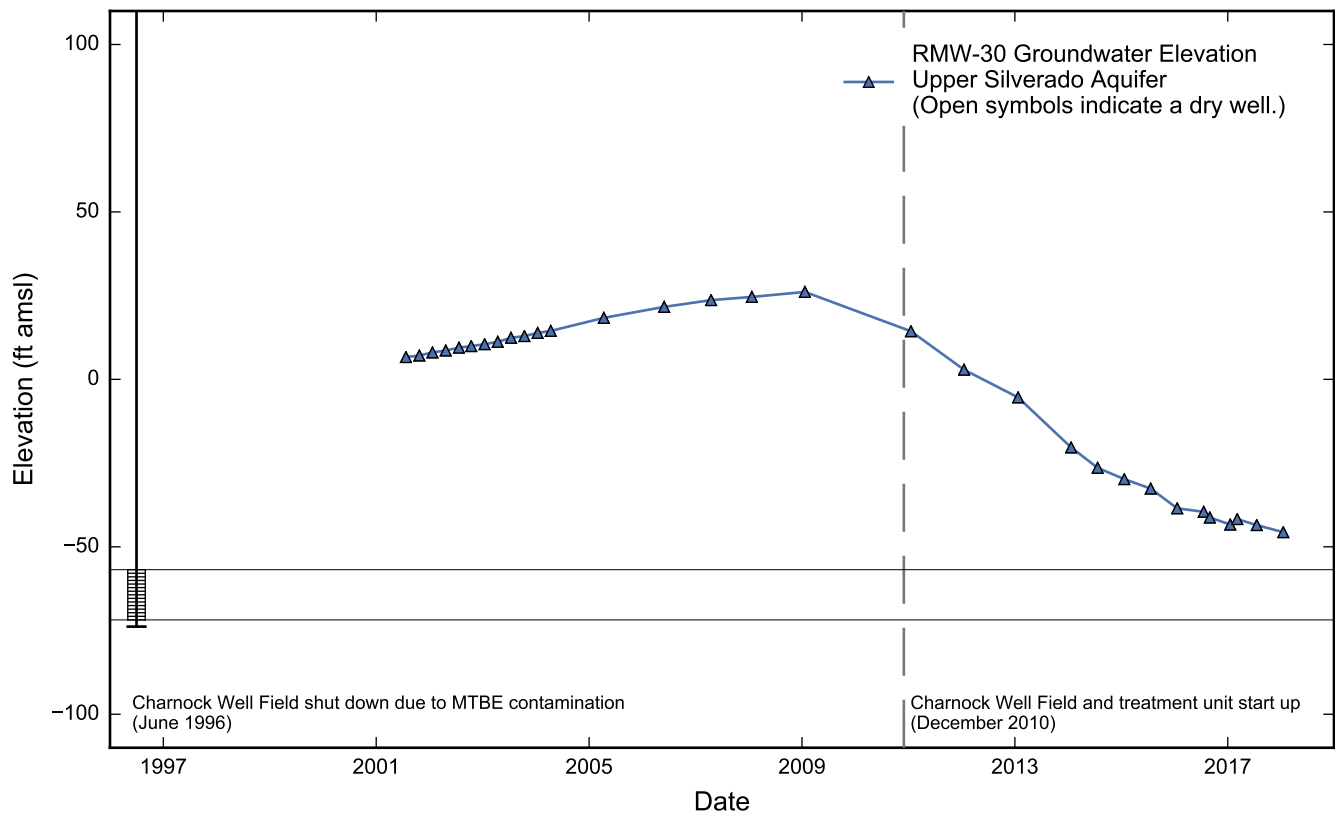


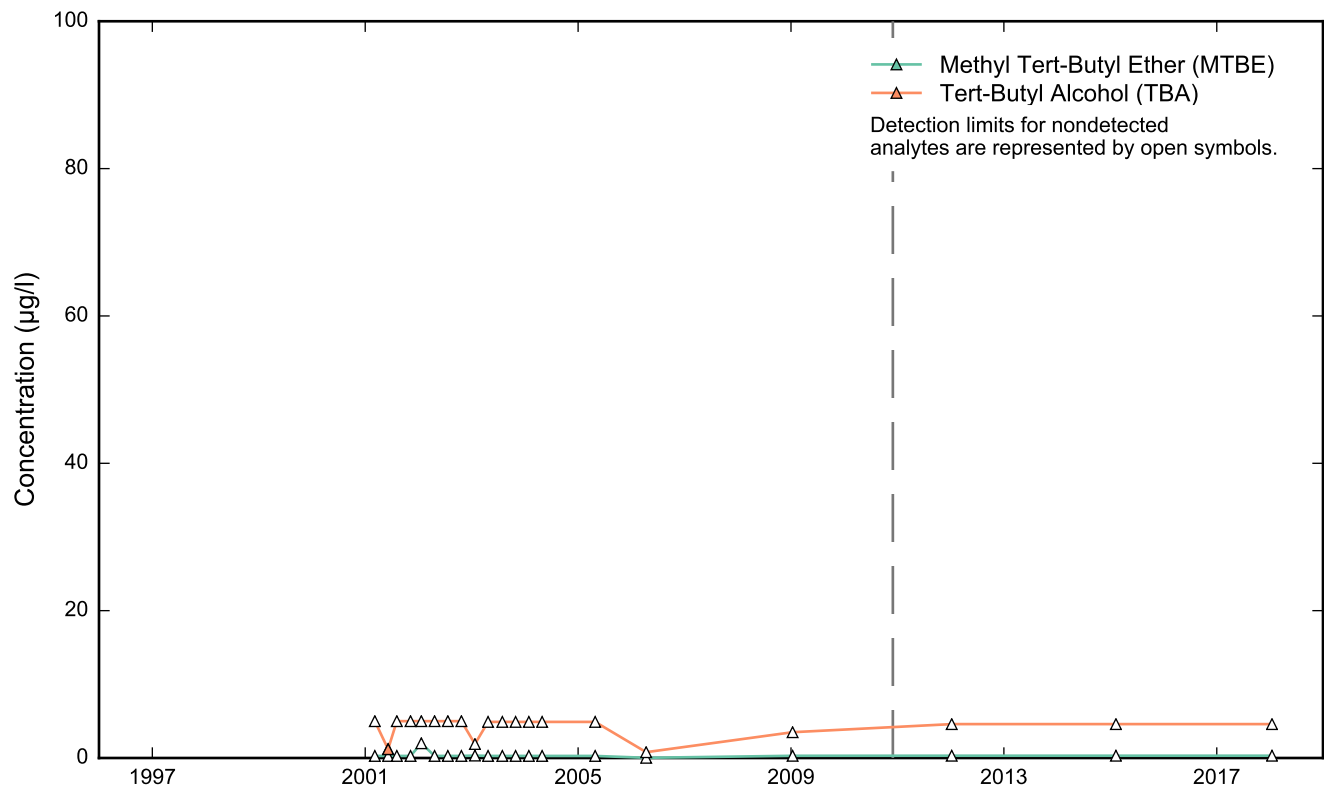
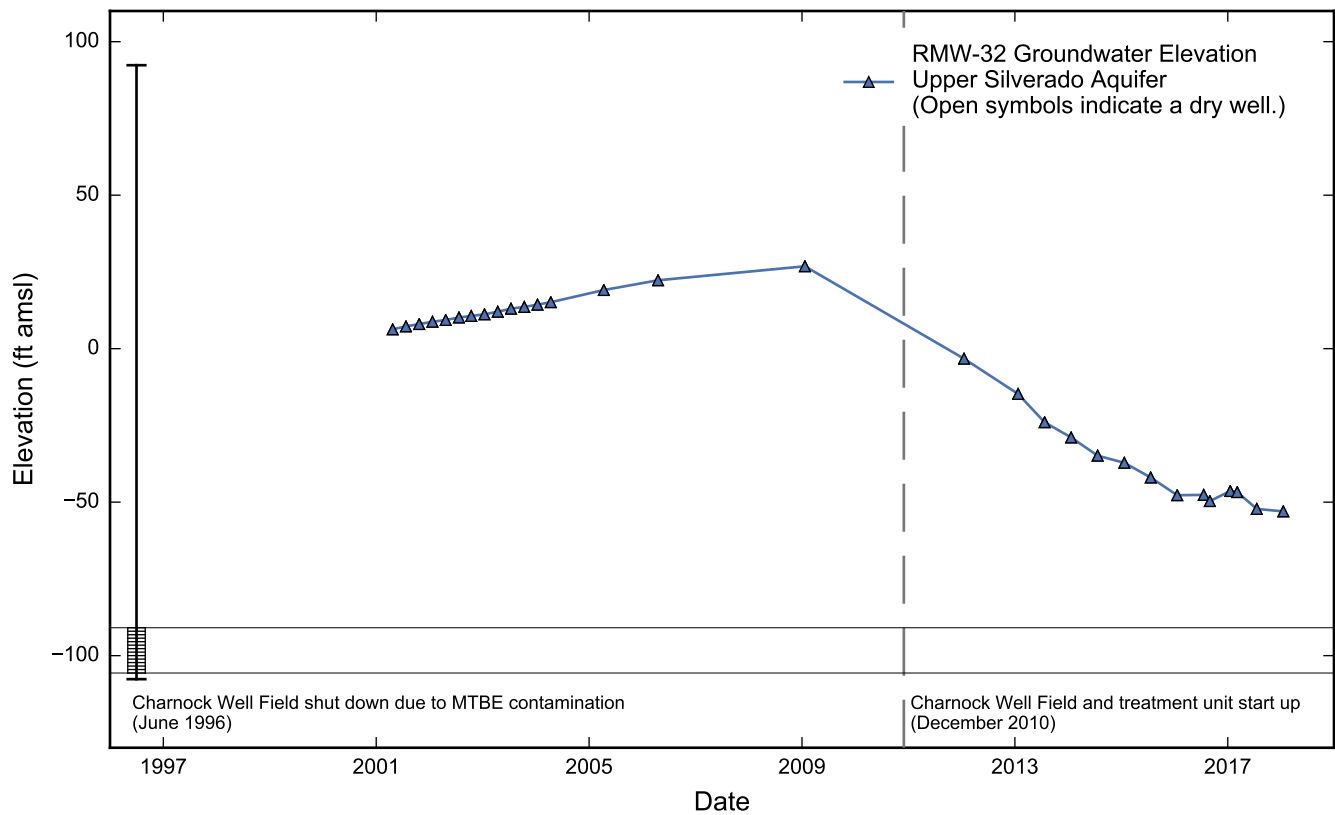


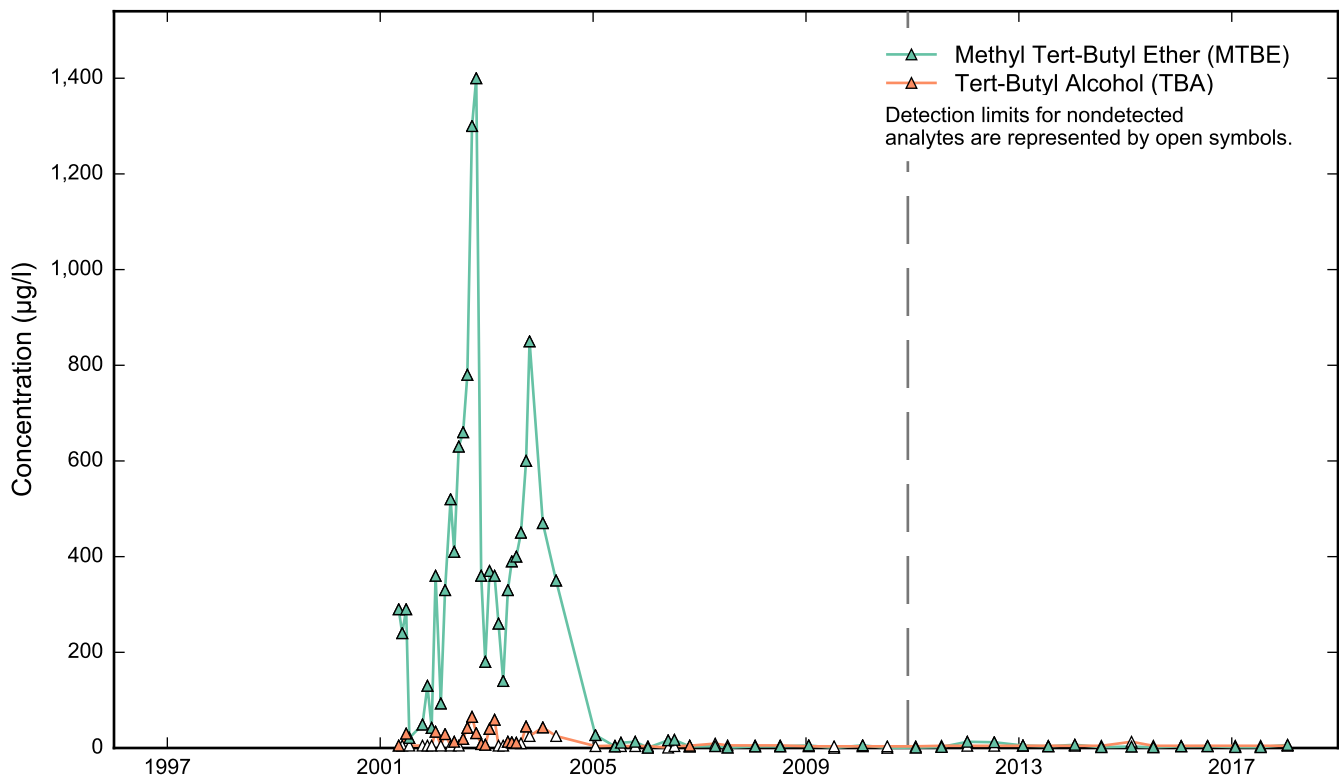
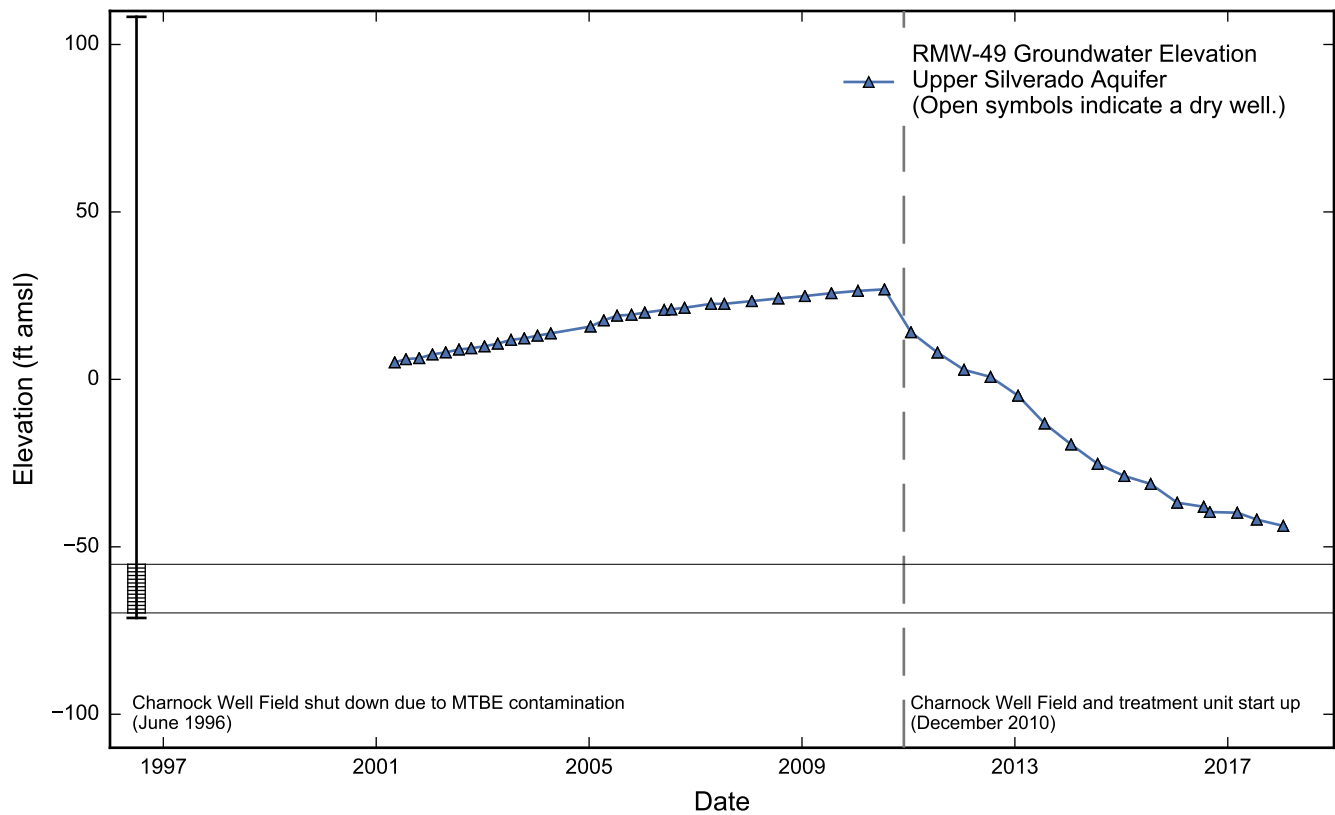


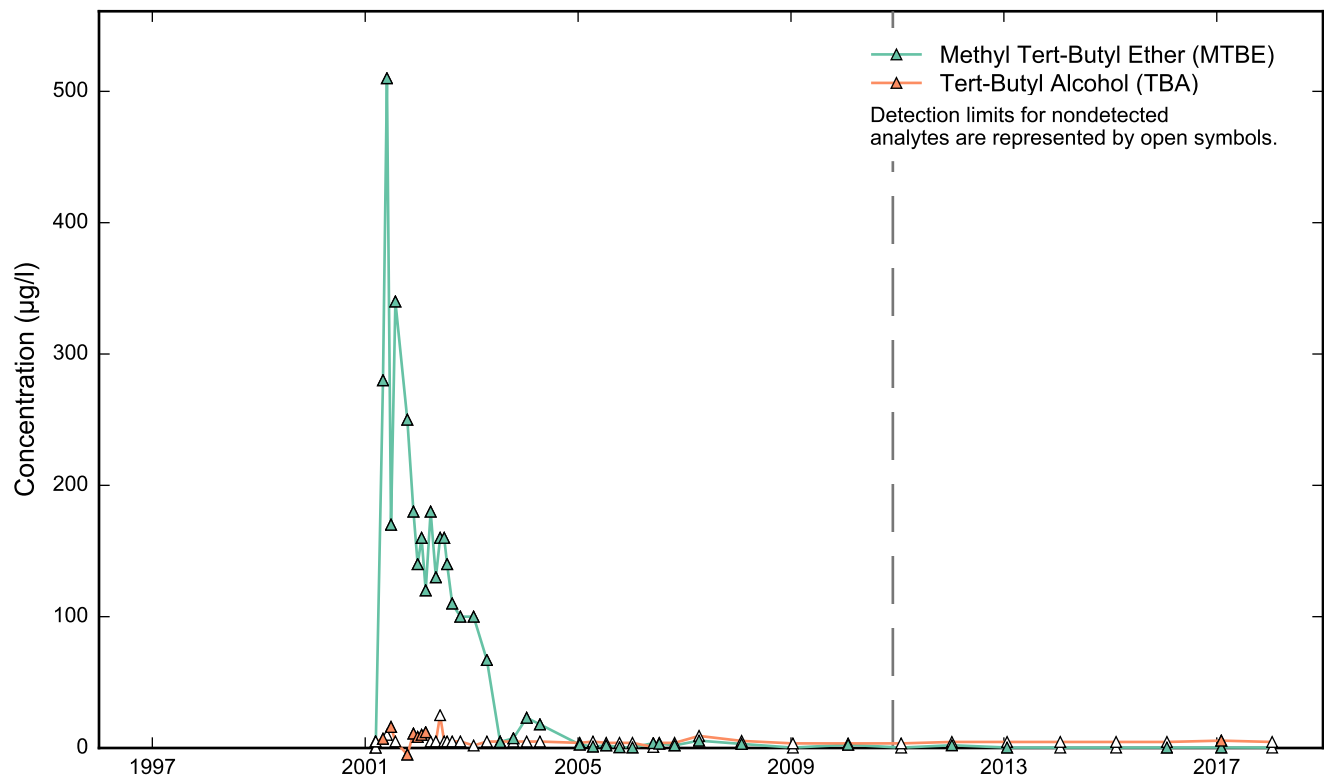
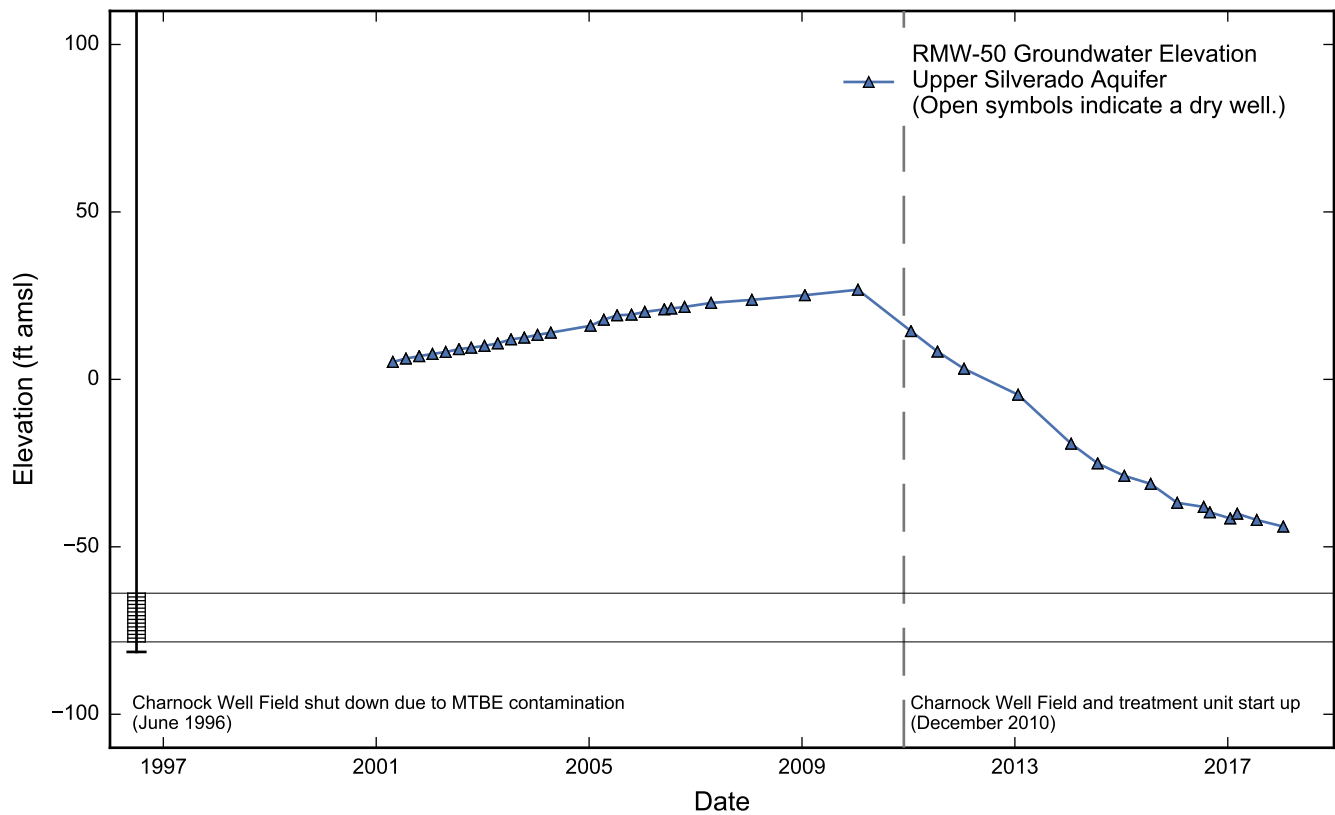


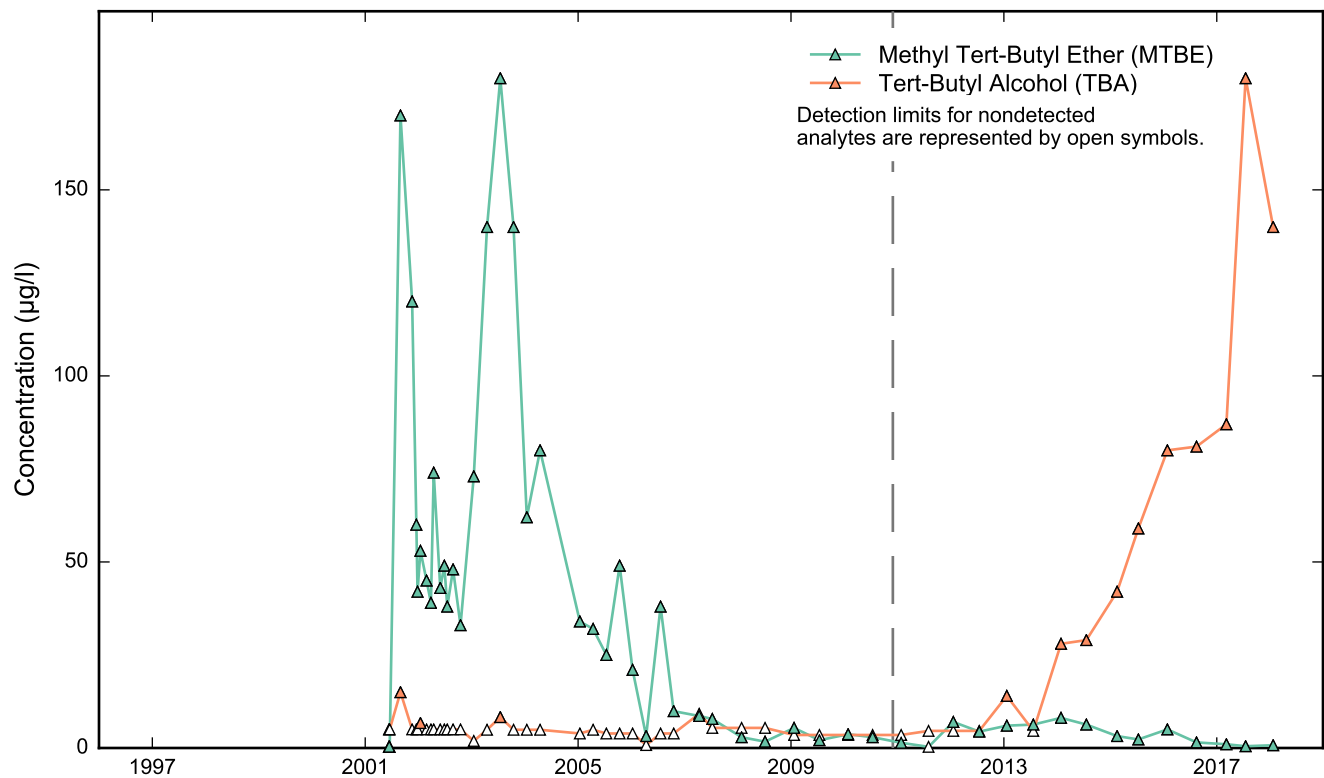
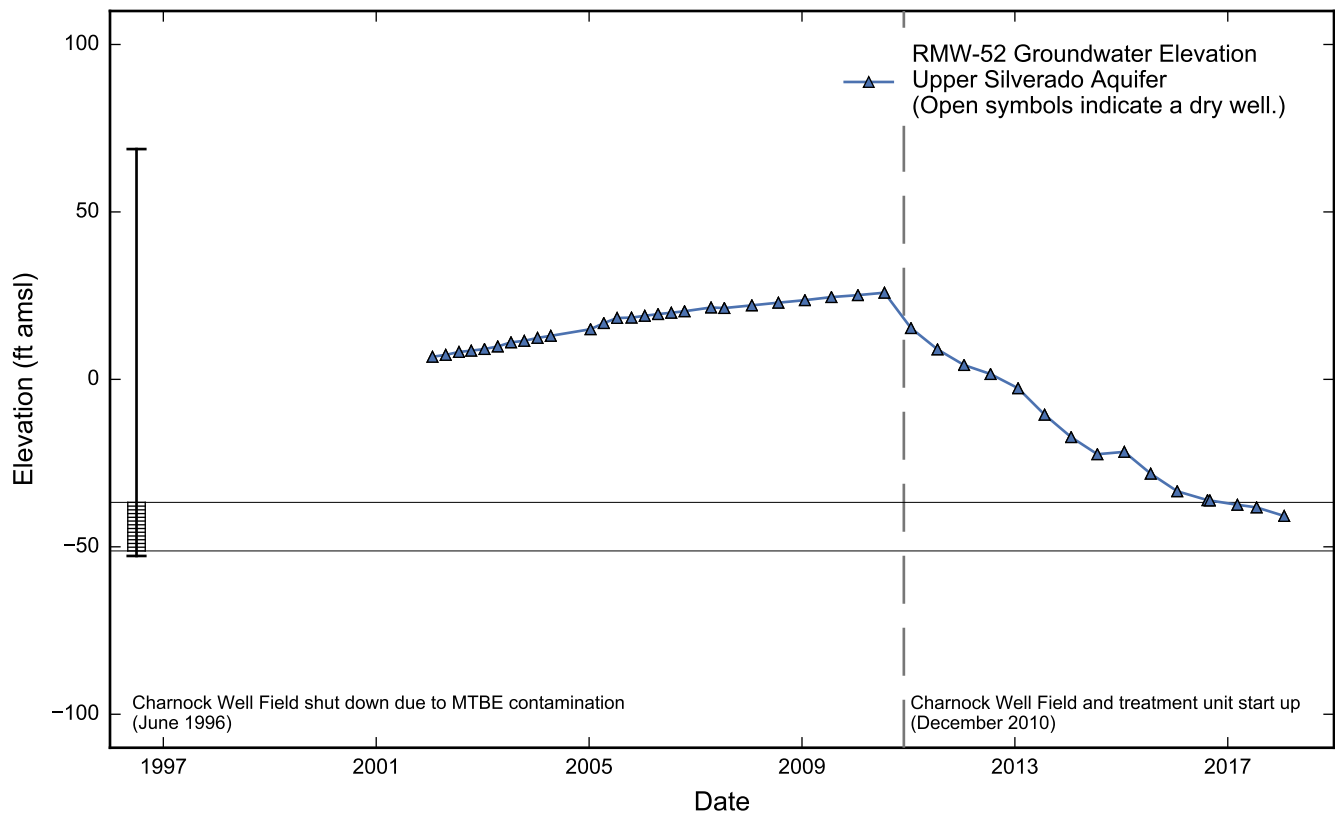


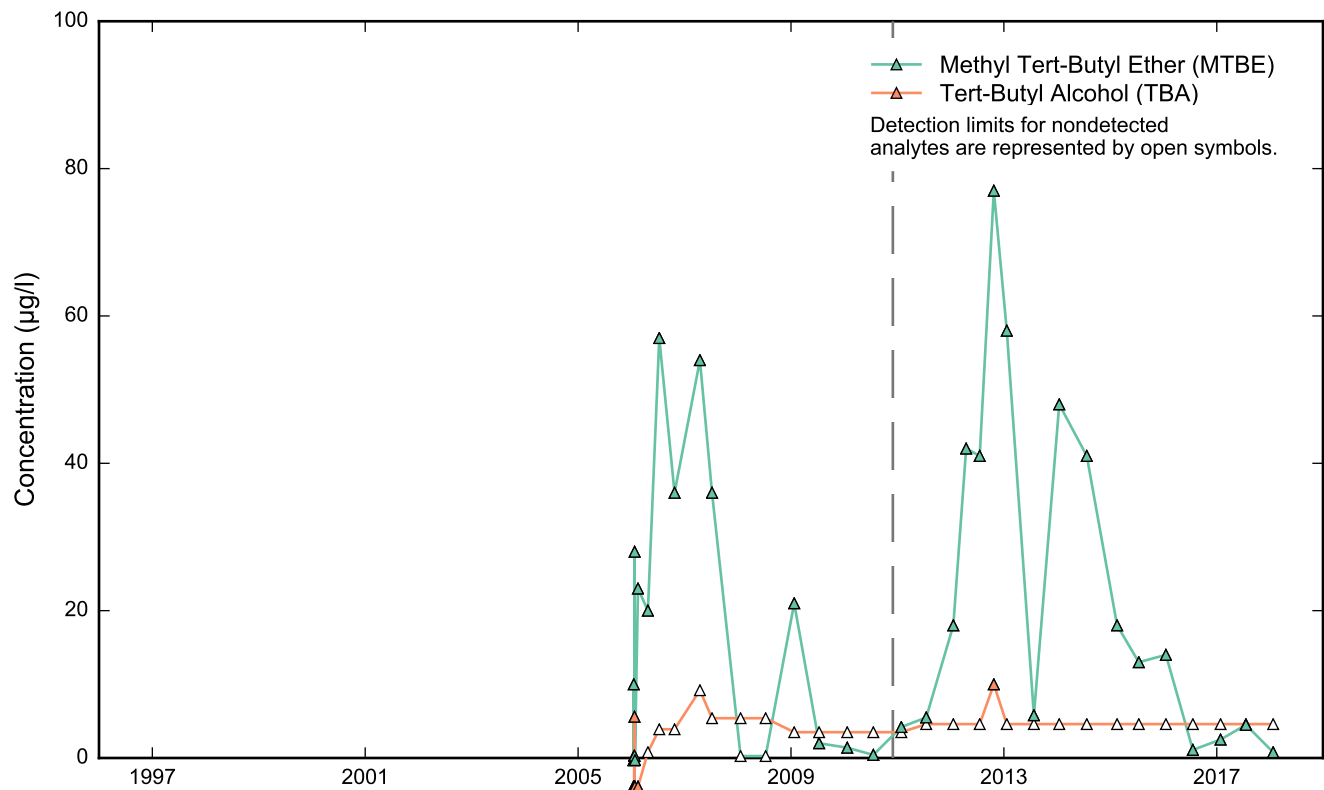
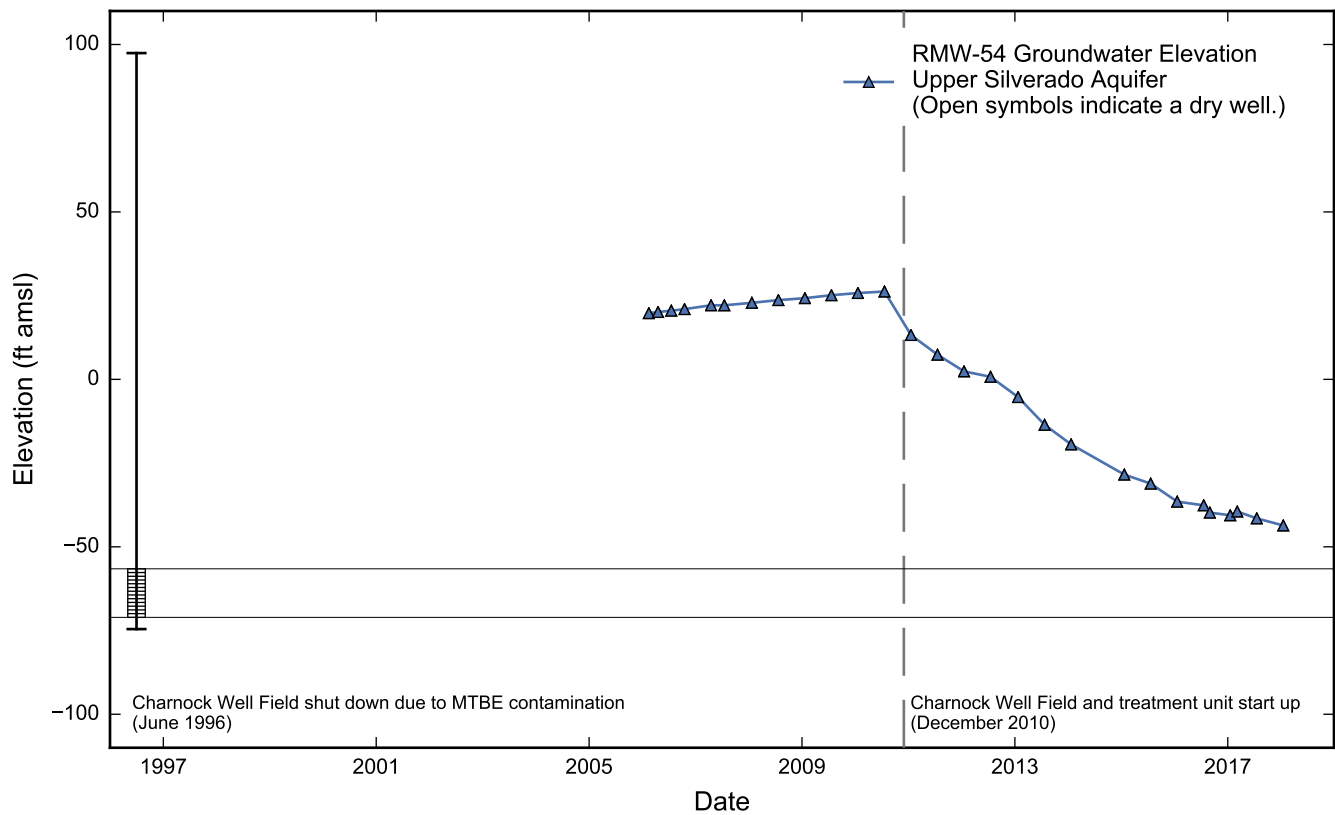


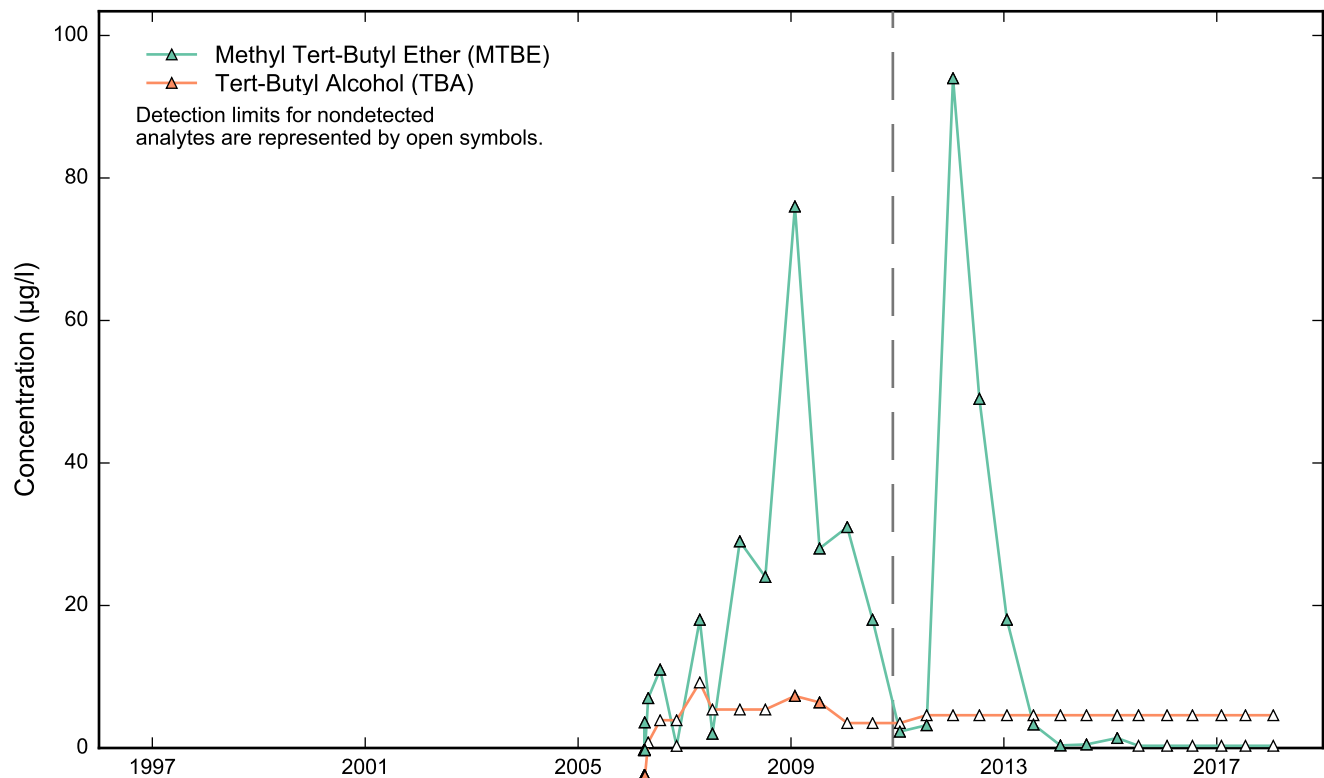
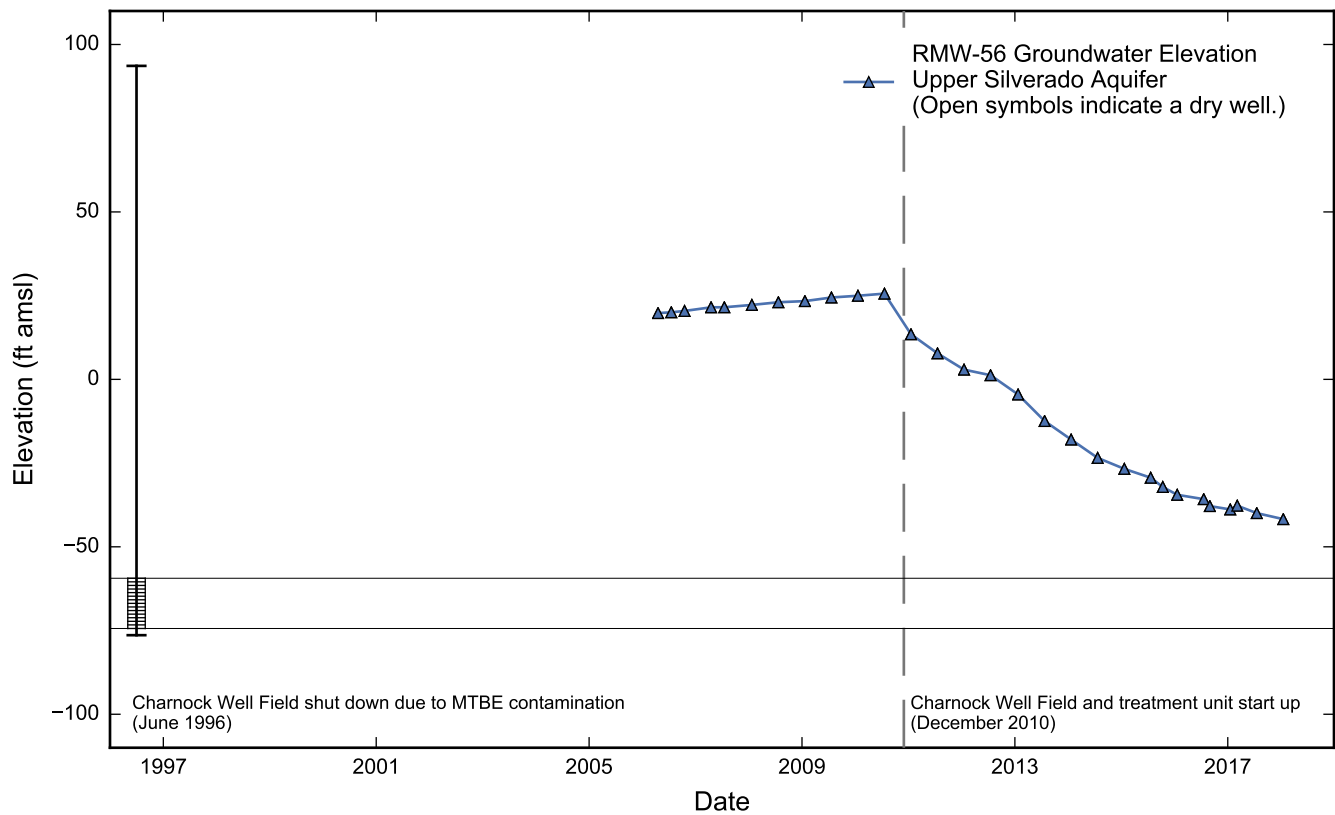


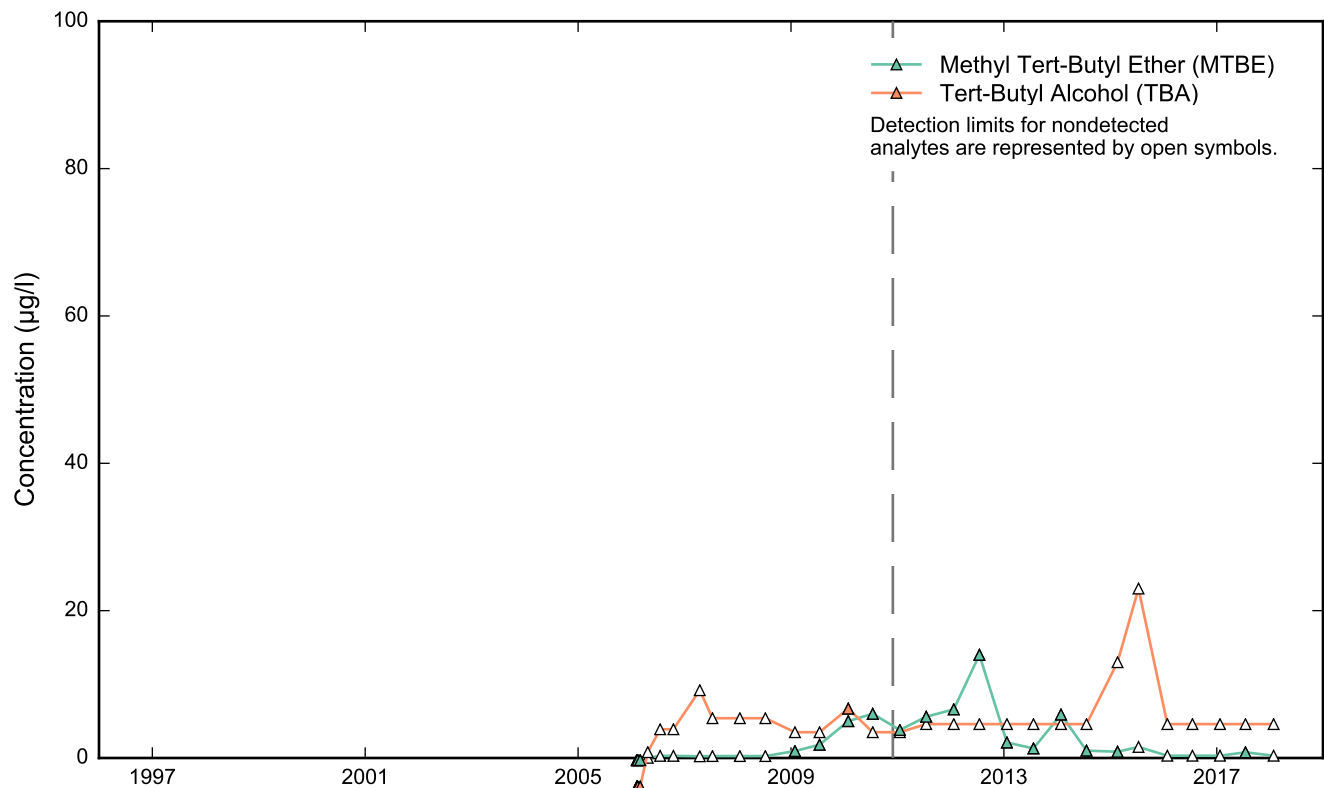
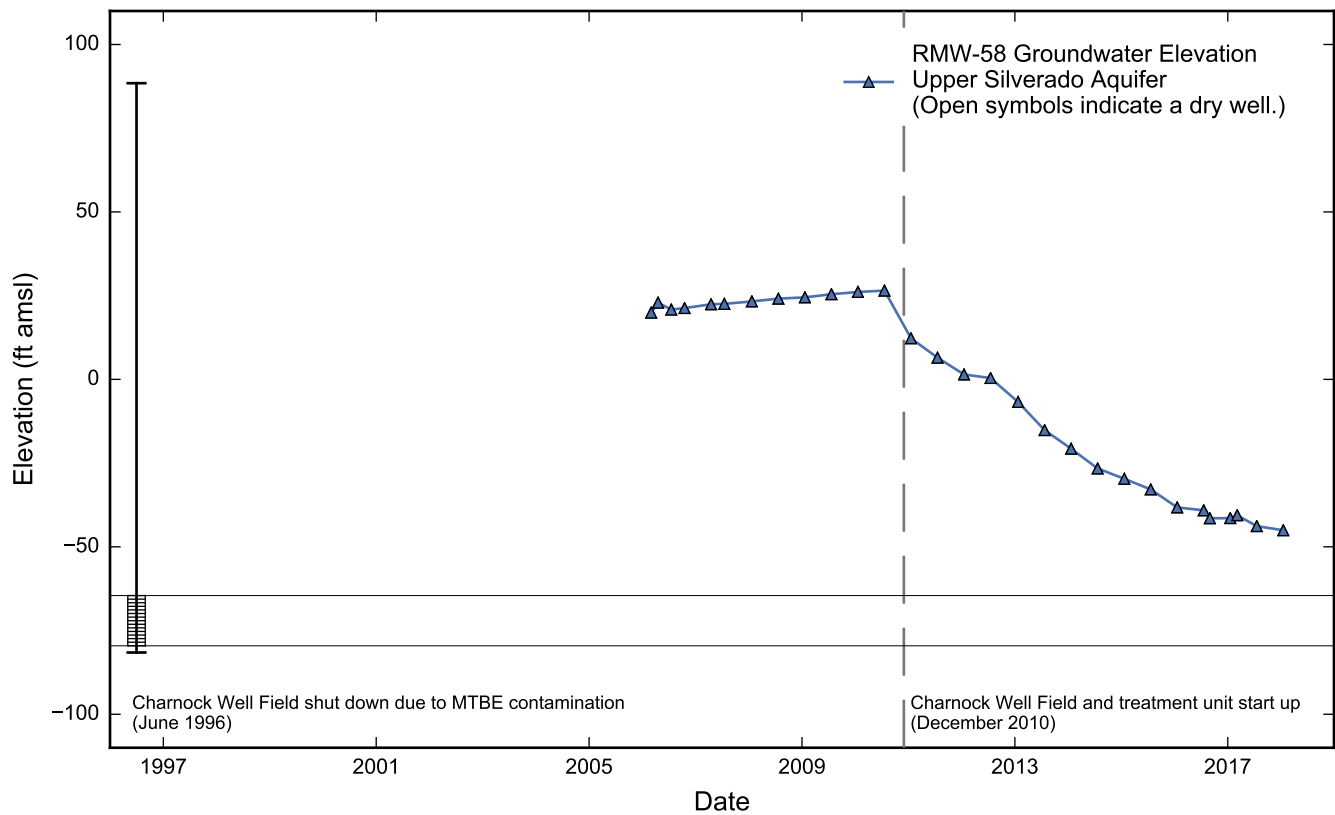








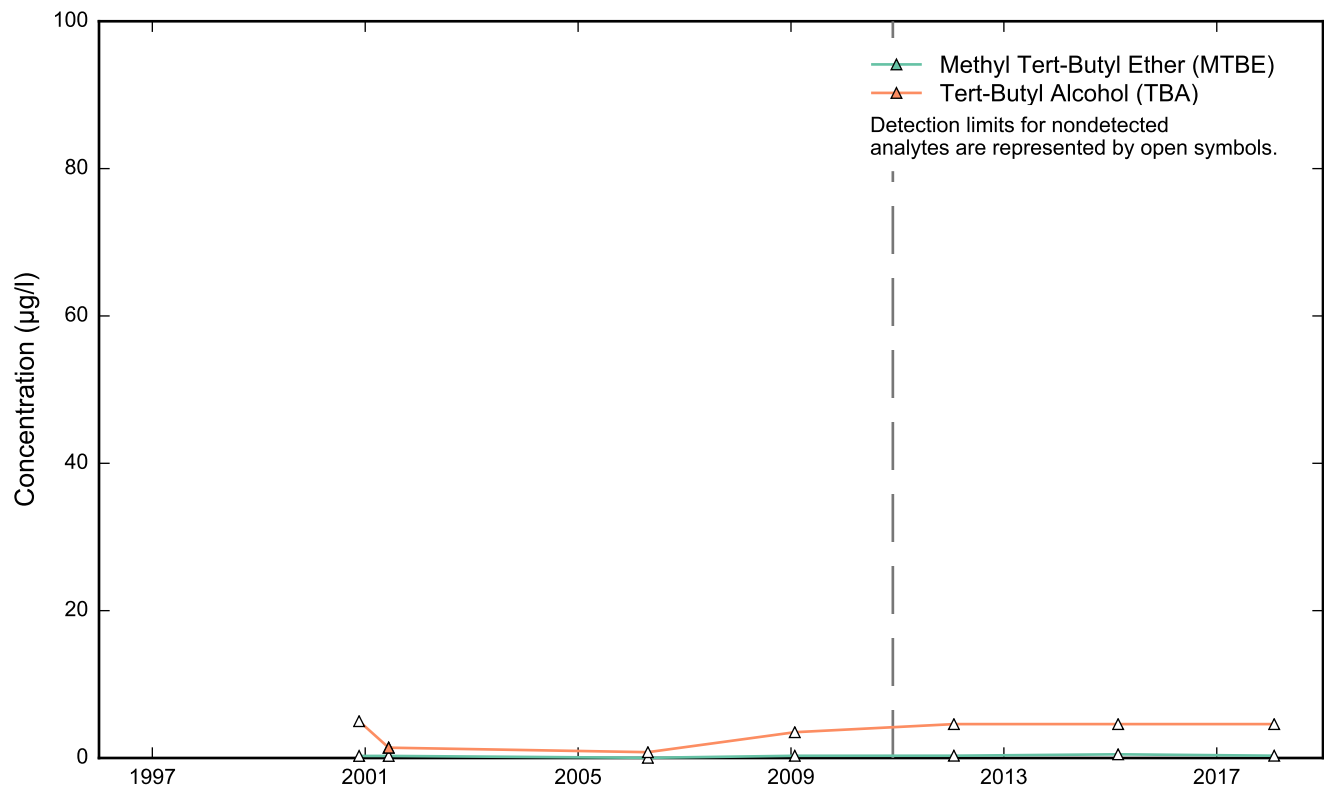
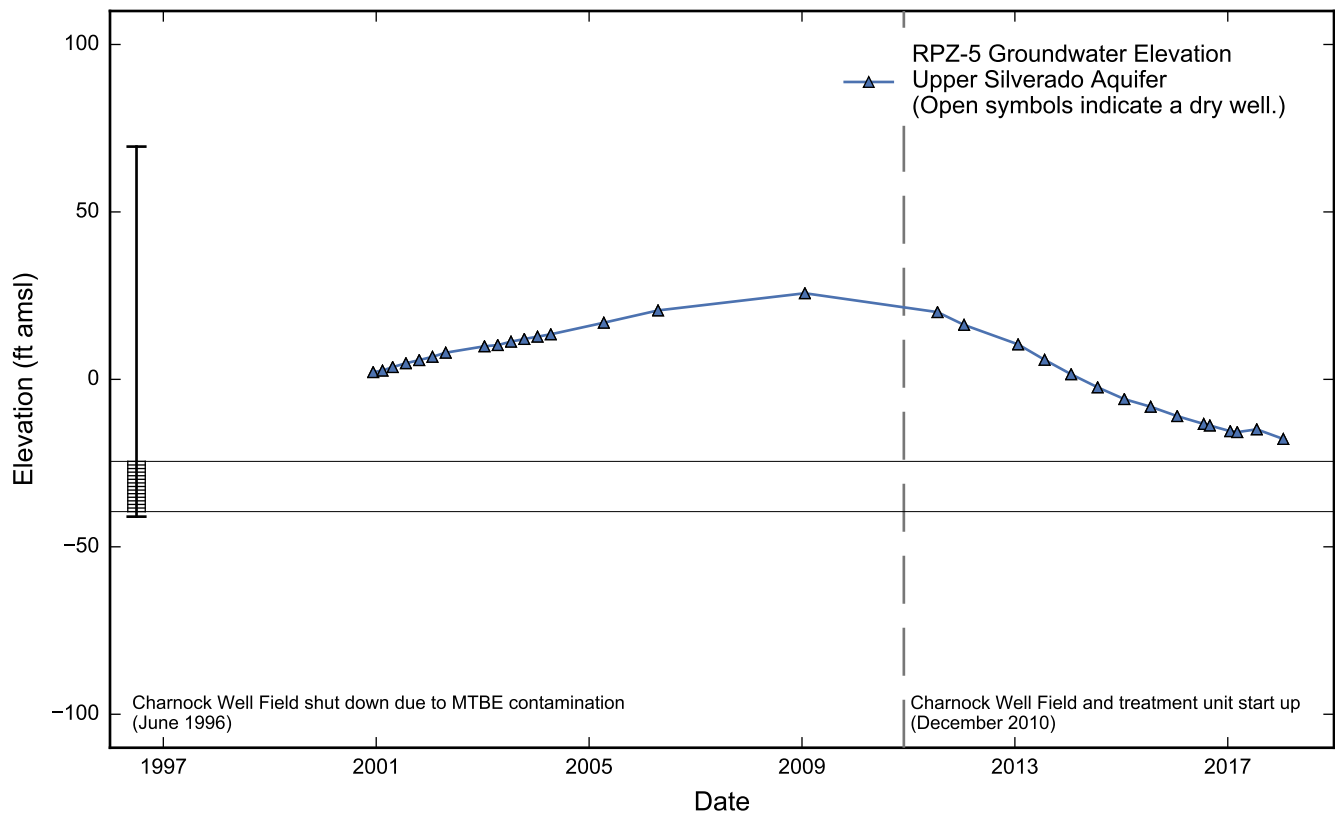


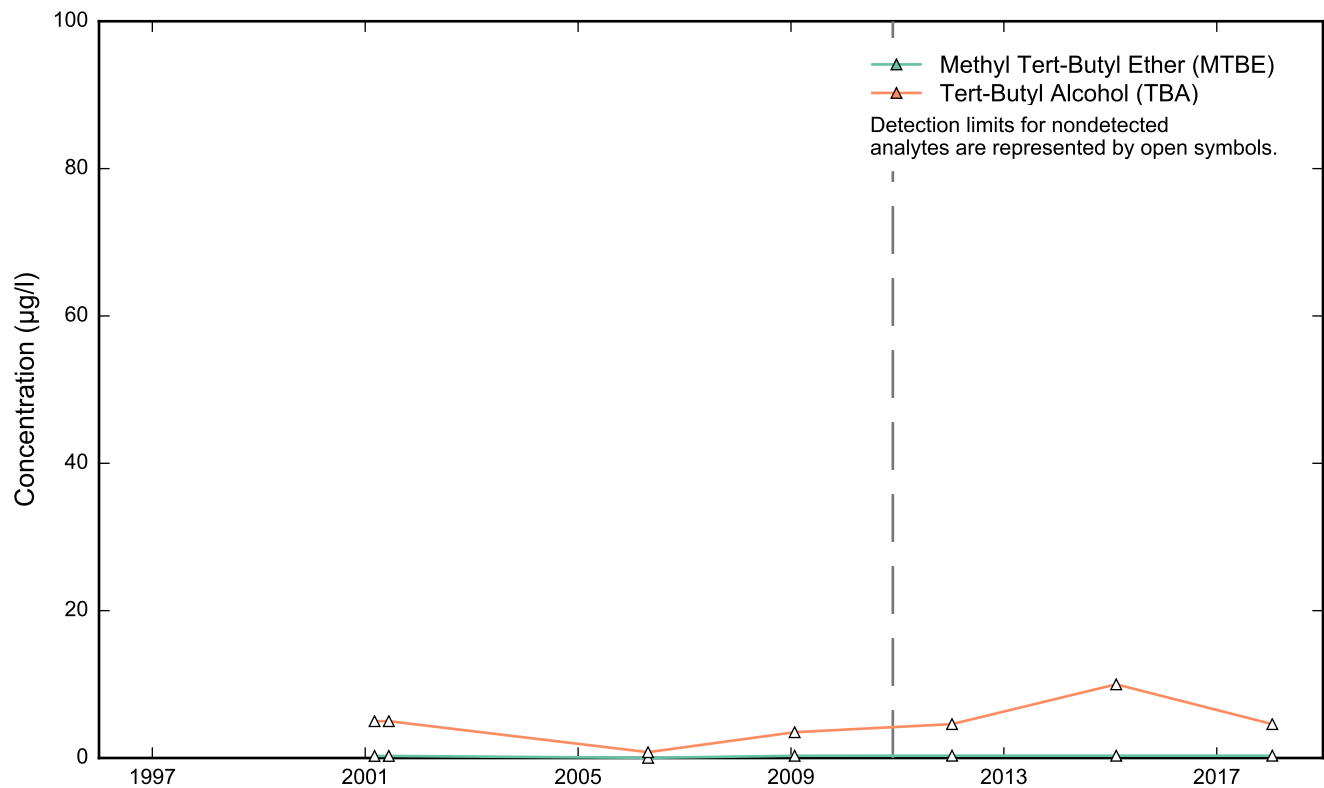
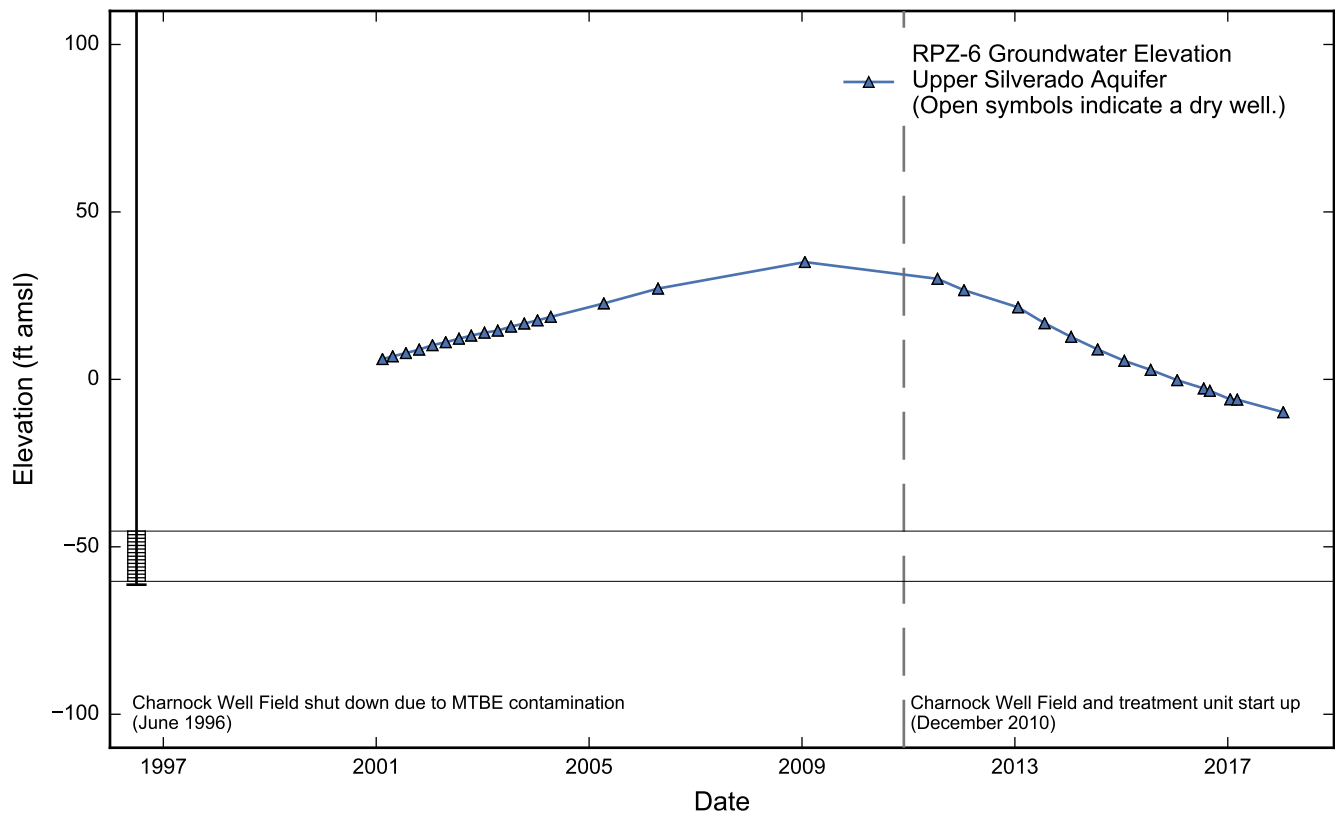


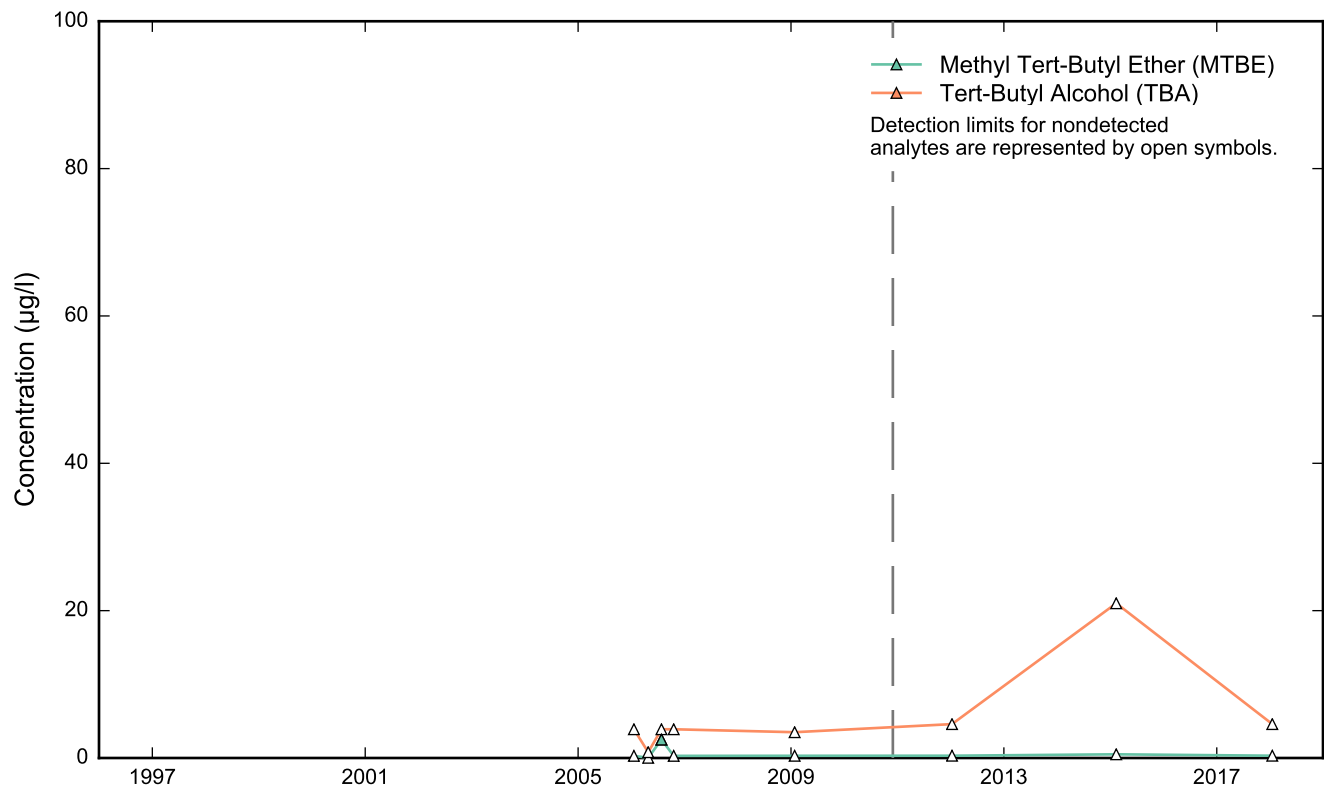
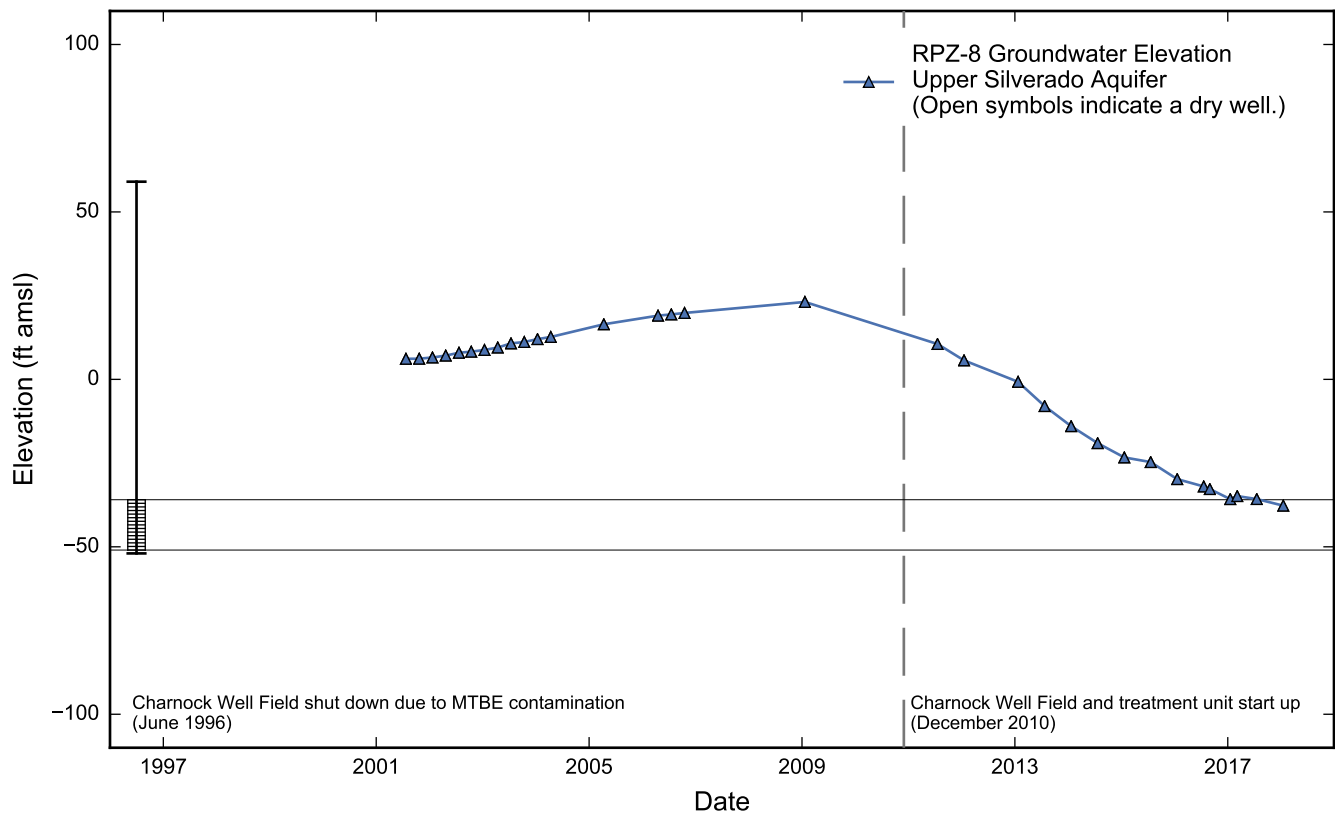
**Groundwater Elevation and Concentration Trends, RMW-58**  
Charnock Sub-Basin  
Los Angeles, California

Figure

**2-20**





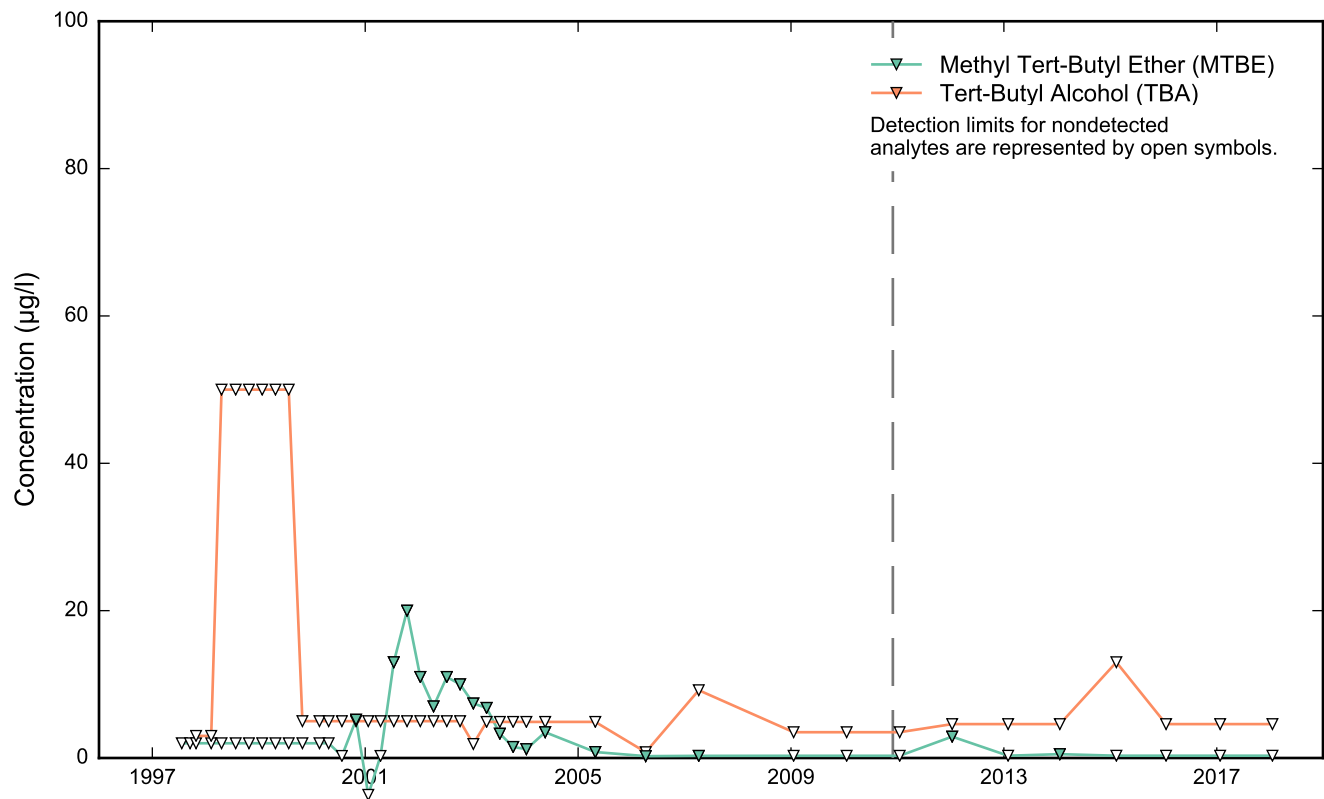
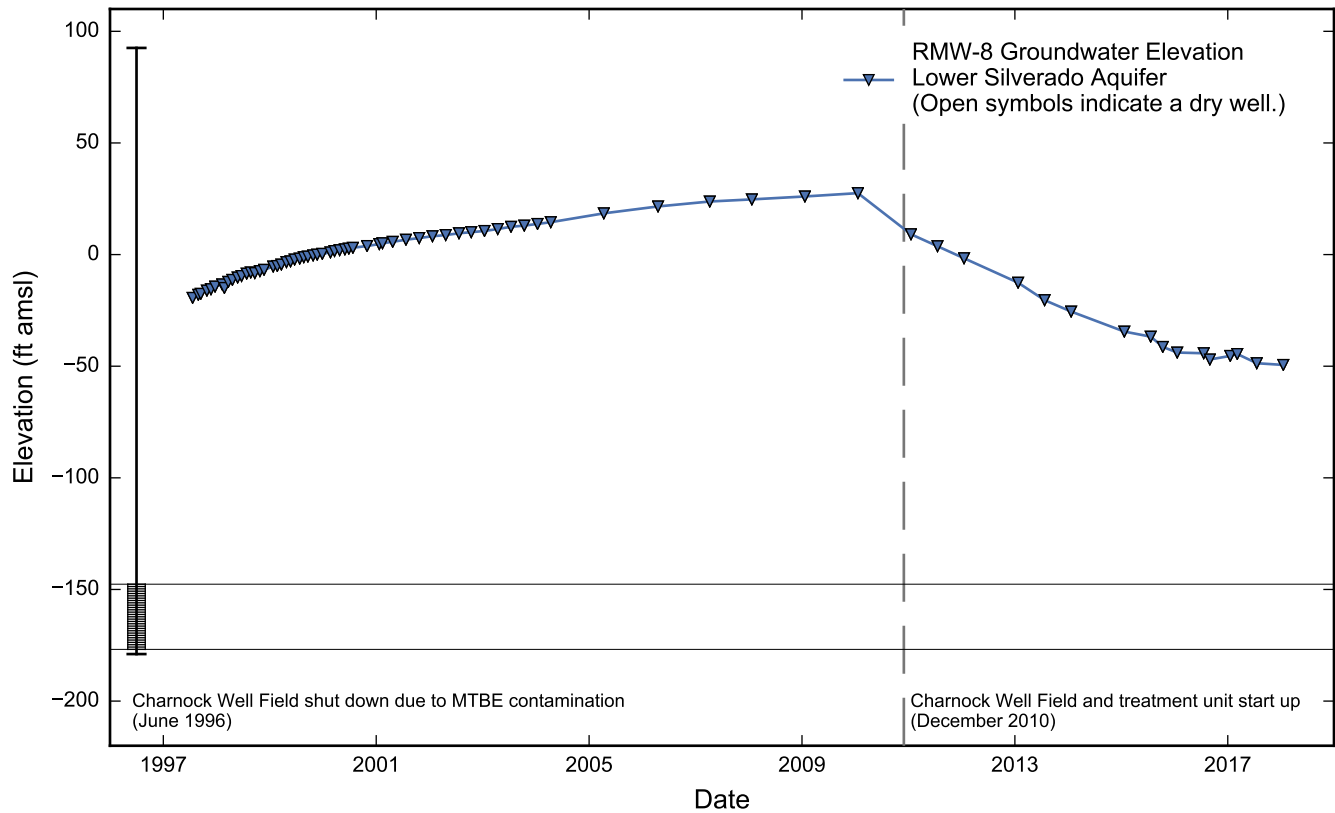


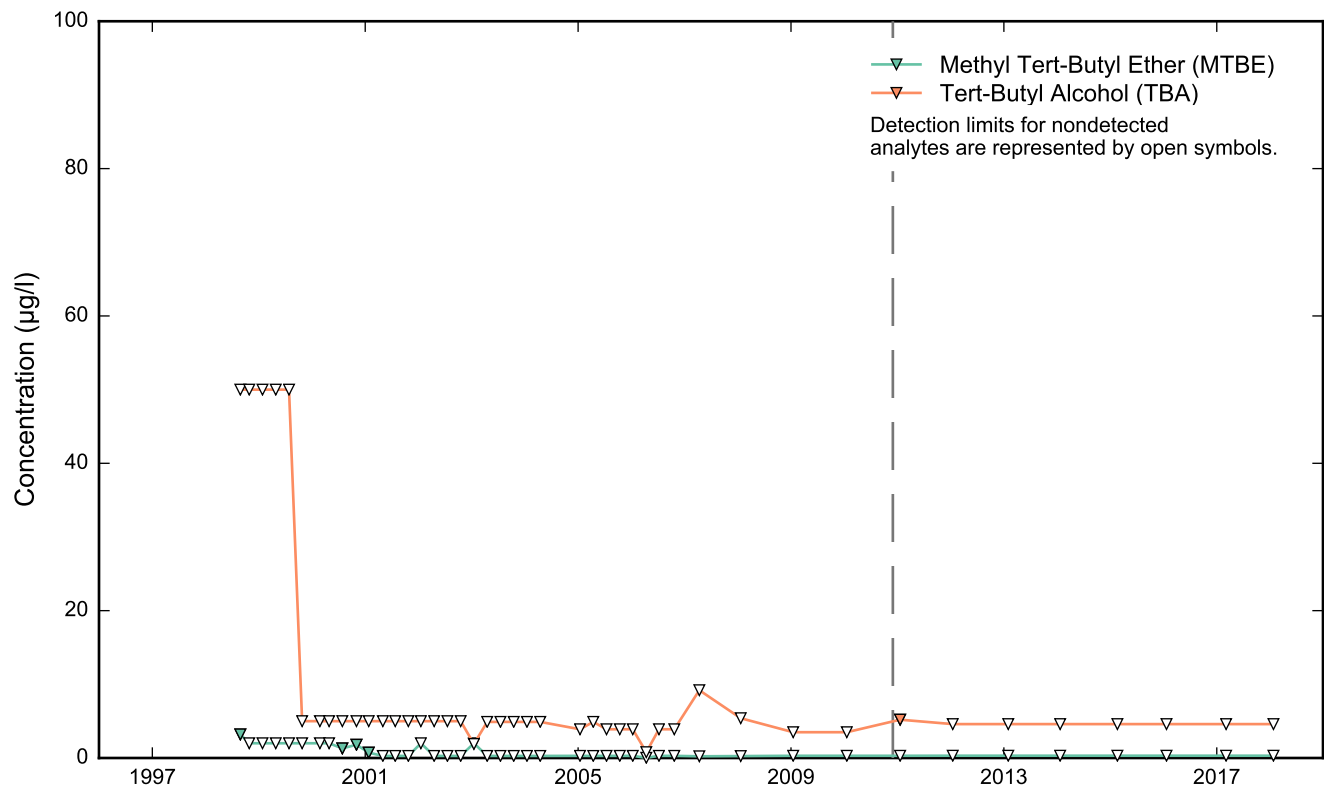
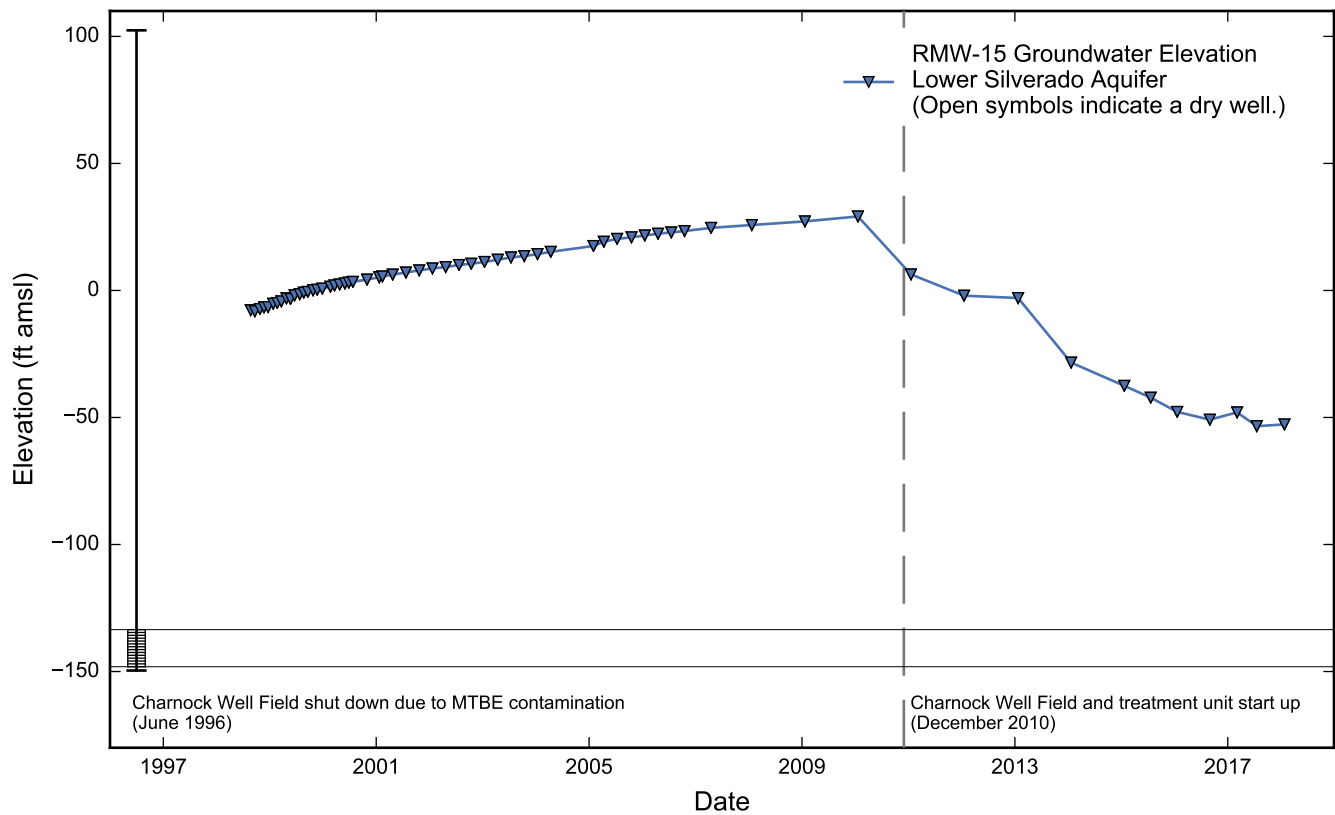
**Groundwater Elevation and Concentration Trends, RPZ-8**  
Charnock Sub-Basin  
Los Angeles, California

Figure

**2-23**

## **Lower Silverado Aquifer Wells**





**Groundwater Elevation and Concentration Trends, RMW-15**  
Charnock Sub-Basin  
Los Angeles, California

Figure

**3-2**