Union Station/SIT 5.1

Groundwater Monitoring
Union Station
Seattle, Washington

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Prepared for

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1.0 INTRODUCTION

This report describes the groundwater monitoring that was performed at the Union Station property in August 2009. The groundwater monitoring was performed in accordance with Prospective Purchaser Consent Decree 97-2-18936-5SEA between the Washington State Department of Ecology (Ecology) and Union Station Associates and with the associated cleanup action plan (CAP; Landau Associates 1997). Groundwater monitoring completed prior to August 2009 is described in five previous annual reports (Landau Associates 2000, 2002, 2003a,b, and 2004). In addition to describing the groundwater monitoring performed in August 2009, this report includes an evaluation of the groundwater analytical results and groundwater flow directions.

1.1 PROPERTY DESCRIPTION

The Union Station property consists of three parcels located in Seattle, Washington. Figure 1-1 provides a vicinity map; Figure 1-2 shows the Union Station property. The property spans six city blocks and includes portions of the grade level beneath elevated viaduct portions of South Jackson Street, South Airport Way, and 4th Avenue S.

The property was originally part of the South Seattle industrial neighborhood. In 1874, the Seattle Gaslight Company constructed a coal gasification plant at the property on pilings over the mudflats of Duwamish Bay. The area surrounding the pile-supported facility was filled prior to about 1912. Around the turn of the century, Vulcan Iron Works manufactured iron, brass, and steel on the southern portion of the property. In 1911, the Union Station passenger railroad station was constructed at the property. Union Station served passengers until 1971, when Union Pacific discontinued passenger operations at the property. From 1971 until the purchase of the property by Union Station Associates in 1997, the property was essentially dormant. The southernmost terminus of the downtown Seattle transit project bus tunnel was completed at the property along 5th Avenue S. in 1990.

In 1991, the property was placed on the Washington Hazardous Sites List. Subsequently, a remedial investigation/feasibility study (RI/FS; Landau Associates and Hart Crowser 1996) was conducted.

The RI included review of the property's industrial history to confirm that the investigation included the areas likely to have contamination, evaluation of existing soil and groundwater sampling information, and analysis of new soil and groundwater samples. The RI compared chemical testing results for soil and groundwater to screening levels and identified constituents of concern that required additional evaluation. The RI identified carcinogenic polycyclic aromatic hydrocarbons (cPAHs) from the coal gasification process, and metals from the coal gasification process and from the foundry within fill soil that was placed on the former tideflat surface during operation of the historic industries. Concentrations of cPAHs and some metals in some soil samples exceeded cleanup levels. Groundwater analytical results from tests during the RI and from supplemental monitoring performed after the RI and before the Consent Decree showed that groundwater screening levels for cPAHs, petroleum hydrocarbons, benzene, and arsenic were exceeded in samples from some wells at the property. Arsenic was found in an upgradient well at concentrations exceeding those found in property wells. There were also strong indications that a source or sources of petroleum hydrocarbons existed upgradient of the property. No pesticides, polychlorinated biphenyls (PCBs), herbicides, or evidence of dense non-aqueous phase liquids (DNAPL) were detected.

The RI findings were used to develop alternatives to remediate the property. The evaluations of these alternatives were included in the FS. The FS defined cleanup standards, developed and evaluated four cleanup action alternatives, and identified a preferred cleanup action alternative that would adequately protect human health and the environment. Soil cleanup levels were conservatively based on residential use conditions, although the property was zoned International District Mixed and planned property use was commercial with limited potential for direct contact. The point of compliance for soil is throughout the property. Groundwater cleanup levels were based on protection of marine surface water. The point of compliance for groundwater is the property boundary and extends from the uppermost level of the saturated zone vertically to the lowest depth that could potentially be affected by the property. The point of compliance established for groundwater at the property is shown on Figure 1-2. The cleanup action selected by Ecology includes paving, construction soil excavation, groundwater monitoring, contingent groundwater remediation, and institutional controls.

In 1997, Ecology and Union Station Associates entered into a Prospective Purchaser Consent Decree for the property. Since that time, Union Station Associates has implemented the selected remedial action for the property. Paving and construction soil excavation were completed as part of property redevelopment. A restrictive covenant implementing the required institutional controls was recorded on the property deed. Groundwater monitoring began in October 1997 and is described in the remainder of this document and in previous groundwater monitoring reports (Landau Associates 2000, 2002, 2003a,b, and 2004).

Construction at the property is complete. A parking garage was completed on the south parcel in 1999. Construction at the main parcel, including renovation of the Union Station building and construction of a parking garage and four new buildings, was completed in 2001. A new building at the north parcel was completed in 2002.

1.2 CONSENT DECREE REQUIREMENTS FOR GROUNDWATER MONITORING

Groundwater monitoring requirements for the property are described in the CAP and are summarized in Table 3 of the CAP, identified as Table 1-1 in this report. Monitoring wells originally included in the monitoring program were HC-101, HC-102. HC-103, MW-104, MW-105, MW-106, MW-107, and upgradient background wells B-4 and B-6. As described in a previous report (Landau Associates 2000), between 1997 and 1999 wells HC-101, HC-102, MW-106, MW-107, MW-108. and B-6 were abandoned and replaced with monitoring wells in similar locations. In 2000, Ecology approved suspension of water quality monitoring in well HC-103 (Ecology 2000). Just prior to the August 2009 monitoring event, it was discovered that background well B-4 had been paved over during City of Seattle street repairs and was no longer accessible. As a result, a replacement well was installed approximately 20 ft east of well B-4. Installation of this replacement well, identified as well B-4R, is discussed further in Section 3.0. Monitoring wells currently included in the groundwater quality and groundwater level monitoring program are as follows: property wells MW-101R, MW-102R, MW-104, MW-105, MW-107R, MW-108R, and upgradient background wells B-4R and B-6R. HC-103 is monitored only for groundwater level.

Quarterly groundwater monitoring is required for 8 quarters beginning within 3 months of the effective date of the Consent Decree. The CAP also requires that quarterly sampling be performed for 8 quarters beginning the first quarter after all foundations are completed. The CAP establishes that groundwater monitoring frequency be reduced to annual if the upper 95 percent confidence limit on the mean (UCL) for results from compliance monitoring wells is less than or equal to cleanup levels. Annual monitoring is then required until 3 years after foundation loading (building construction) is complete. Groundwater monitoring frequency is then reduced to every 5 years if the UCL for results from compliance monitoring wells is less than or equal to cleanup levels. The CAP also specifies procedures to be implemented if any sample exceeds cleanup levels during monitoring.

A report documenting groundwater monitoring for 8 quarters after foundation loading was complete was submitted to Ecology in August 2000 (Landau Associates 2000). After review of the report, Ecology required an additional year of quarterly monitoring (Ecology 2000). In March 2002, the results for the additional year of groundwater monitoring were submitted in a report to Ecology with recommendations to reduce groundwater monitoring frequency to annual (Landau Associates 2002). In November 2002, Ecology approved reducing groundwater monitoring frequency to annual (Ecology 2002). Annual groundwater monitoring was conducted in 2002, 2003, and 2004. Construction at the main parcel was completed in 2001. Construction at the south parcel was completed in 1999. Therefore, 3 years of groundwater monitoring after foundation loading was complete after the June 2004 monitoring event. Based on the results of the June 2002, 2003, and 2004 sampling events, Ecology approved reducing the groundwater monitoring frequency to every 5 years (Ecology 2005a). Ecology also issued a Certificate of Completion for the property in 2005 (Ecology 2005a), but did not remove the property from the Hazard Ranking List due to the presence of petroleum hydrocarbons in groundwater at the property and upgradient of the property.

This report presents results for the 2009 groundwater monitoring event showing that the compliance well results for contaminants originating on the property comply with cleanup levels. Groundwater data from the past eight sampling events is used for the statistical evaluation.

2.0 B-4 MONITORING WELL REPLACEMENT

In June 2009, prior to initiating the 2009 groundwater monitoring event, it was discovered that upgradient well B-4, which was located within the 5th Avenue right-of-way, had been paved over by the City of Seattle (City) Department of Transportation as a result of City street repairs that occurred sometime between the 2004 and 2009 groundwater monitoring events. Because the well was no longer accessible, a replacement well was installed approximately 20 ft east of well B-4, in the sidewalk on the east side of 5th Avenue South. The new well is identified as B-4R and the location of the well is shown on Figure 1-2. Drilling and construction of the monitoring well was conducted by a State of Washington licensed well driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Ecology; WAC 173-160). The well was constructed of 2-inch diameter, flush-threaded Schedule 40 PVC casing with PVC machine 010-inch slotted screen. Groundwater was encountered at 35 ft below ground surface (BGS) at the time of drilling. The depth interval for the well screen is 31 to 41 ft BGS to allow for groundwater level fluctuation and to intersect the water table.

Following placement of the well screen and casing in the borehole, a filter pack was installed around the well screen. The filter pack extends from the bottom of the end cap to 2 ft above the screen. Filter material consists of commercially prepared, presized, prewashed No. 2-12 Monterey silica sand.

A bentonite chip seal was placed above the sand pack to about 3 ft BGS. The surface of the well was completed with a concrete seal and surface pad extending from the top of the bentonite seal to slightly above the ground surface. A locking steel flush-mount monument was cemented in place from the surface to a depth of about 1.5 ft BGS. The well construction detail is presented with the boring log in Appendix A of this report.

The monitoring well was developed after the bentonite chip seal had been allowed to hydrate in the well annulus for 24 hours. Development was accomplished by surging and over pumping the well using a stainless-steel bailer. Development continued until ten casing volumes of water were removed and turbidity of the discharged water was visibly low.

3.0 GROUNDWATER MONITORING

The groundwater monitoring program consists of both water level and water quality monitoring. The Union Station groundwater monitoring network for water quality currently is comprised of eight monitoring wells: upgradient wells B-4R and B-6R, and property wells MW-101R, MW-102R, MW-104, MW-105, MW-107R, and MW-108R. The monitoring network for groundwater levels includes the eight wells monitored for water quality plus one additional monitoring well, HC-103, monitored only for groundwater level. The location of the monitoring wells is shown on Figure 1-2. Monitoring was conducted in August 2009. Procedures used for groundwater monitoring, which include water level monitoring, groundwater sampling, and laboratory analysis, were consistent with those described in the CAP, or as subsequently modified with Ecology approval. Prior to the September 2001 monitoring event, modifications to some of the procedures described in the CAP were approved by Ecology. These modifications included changes to the cyanide analysis method; addition of analysis for weak acid dissociable cyanide to the list of analytes; changes to the method of laboratory sample handling for cPAH and semivolatile organic compound (SVOC) samples; and the use of monitoring well HC-103 only for groundwater level measurements (Landau Associates 2000 and 2002). Since 2004, Ecology acknowledged the completion of all remedial actions specified in the CAP, except confirmational monitoring, and approved a reduction in groundwater monitoring frequency to every 5 years (Ecology 2005a) and reduction in the required constituents for analysis (Ecology 2005b).

3.1 GROUNDWATER LEVEL MONITORING

At each well location, the groundwater level was measured from a surveyed reference point located at the top of the PVC well casing, to the top of the groundwater using a hand-heldwater level indicator. These measurements were recorded to the nearest 0.01 ft. Table 3-1 provides a summary of well installation dates, well coordinates, and well elevation information, including top and bottom of screen.

3.2 GROUNDWATER SAMPLING, ANALYSIS PROCEDURES, AND MODIFICATIONS

Groundwater sampling procedures were consistent with those described in the CAP. Prior to sample collection, each well was slowly purged using a peristaltic pump with dedicated tubing or a disposable bailer. Because most of the wells are low-yield and produce groundwater with moderate to high turbidity, each well was purged at a rate of less than 1 liter per minute to help minimize turbidity.

Field parameters such as pH, temperature, and conductivity were measured and recorded about every 5 minutes during purging. Purging continued until at least 3 well volumes had been removed or, at well MW-102R, until the well was purged dry.

Sampling was started when sufficient volume became available in the well. Four replicates of field parameters were collected during sampling, if possible; however, due to low-yield conditions at some locations, sufficient volume for all replicates could not be obtained and priority was given to filling sample bottles. For these locations, field parameters obtained at the end of purging were used for sample quality control purposes. In order to minimize turbidity during sampling, a target flow rate of less than 0.2 liter per minute was used during sample collection. All purging and sampling information was recorded on a Groundwater Sample Collection Form as specified in the CAP.

Field instruments were calibrated and maintained in accordance with the manufacturer's instructions and the quality assurance/quality control (QA/QC) requirements identified in the CAP. Purge water was stored onsite in 55-gallon drums pending offsite disposal.

August 2009 groundwater samples were analyzed at Analytical Resources, Inc. (ARI) in Tukwila, Washington for gasoline-range, diesel-range, and motor oil-range petroleum hydrocarbons; PAHs; benzene, toluene, ethylbenzene, and xylenes (BTEX); dissolved arsenic; total dissolved solids (TDS); and total suspended solids (TSS). If a cPAH was not detected, an additional cPAH analysis using selected ion monitoring (SIM) and a large volume injector was used to obtain lower reporting limits for this constituent. Analytical results are discussed in Sections 4.2 and 5.3.

4.0 GROUNDWATER MONITORING RESULTS

As described in Section 3.0, the Union Station groundwater level monitoring network consists of nine monitoring wells that are screened within the shallow fill at or near the property. Eight of the monitoring wells are also used for groundwater quality monitoring. The following sections describe the results of the water quality and groundwater level monitoring conducted in August and September 2009, respectively.

4.1 GROUNDWATER ELEVATIONS

Groundwater elevations measured at each well during the 2009 annual groundwater monitoring event are listed in Table 4-1. Groundwater elevation contours for the monitoring event (shown on Figure 4-1) indicate the groundwater flow is generally toward the west, consistent with the regional groundwater flow toward Elliott Bay to the west (Landau Associates and Hart Crowser 1996). These groundwater contours are similar to the groundwater contour configurations observed prior to March 2001. Figures showing groundwater contours prior to March 2001 are presented in Appendix B. As discussed in previous reports (Landau Associates 2002, 2003a,b, and 2004), the decrease in groundwater elevations at well B-4 starting in March 2001, after the Nisqually earthquake of February 28, 2001, suggested a potential change in groundwater flow direction at that location. Prior to March 2001, the average measured groundwater elevation at well B-4 was 0.54 ft. From March 2001 through June 2004, the average measured groundwater elevation at well B-4 was -2.20 ft, which is lower than the average measured groundwater elevations at the property wells. Although inspections of well B-4 showed no indications of settlement or disturbance to the well, physical changes to the well due the Nisqually earthquake were considered as a possible explanation for the decrease in groundwater elevation at well B-4. The groundwater elevation at replacement well B-4R during this monitoring event was 0.85 ft, which is similar to the groundwater elevations measured at well B-4 prior to March 2001. The higher groundwater elevation at the replacement well suggests that the groundwater flow direction in the vicinity of the Union Station property may have always been to the west and that the decrease in groundwater elevation observed in well B-4 from 2002 to 2004 was likely due to physical changes to the well and/or subsurface in the immediate vicinity of the well. Fluctuations in groundwater elevation since 1997 at each well are graphically presented on Figure 4-2.

4.2 CHEMICAL ANALYSIS RESULTS

ARI conducted the analyses of the groundwater samples for the constituents identified in Section 3.2. Following receipt of the analytical results, the data was validated as described in

Appendix A of the CAP. The results of the data validation performed by Landau Associates and a summary of the data qualifiers are presented in Appendix C.

The analytical results for the property wells and background well B-6R are similar to previous results. Analytical results for petroleum hydrocarbons and related constituents in samples from background well B-4R are lower than previous results. A summary of the analytical results (with data qualifiers added as appropriate) for the August 2009 monitoring event and the seven previous monitoring events at each well is provided in Table 4-2. The associated laboratory data reports are maintained at Landau Associates' office in Edmonds, Washington. The analytical methods, cleanup levels, screening levels, and practical quantitation limits (PQLs) are also shown in Table 4-2.

PQLs for most constituents are listed in the CAP. For those constituents without a PQL in the CAP, a PQL was determined. For diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons, the PQL was calculated from ARI's method reporting limit. For other constituents, the PQL was based on the method reporting limit and PQLs listed in the CAP for similar compounds. An evaluation of compliance with cleanup or screening levels is provided in Section 5.3.

Graphs showing concentrations over time at all wells were constructed for five constituents: diesel-range and gasoline-range petroleum hydrocarbons, benzene, acenaphthene, and arsenic. These constituents were selected because they consistently have had detections above the PQL in at least several wells and, therefore, can be used for comparisons of concentrations between wells over time. Concentration graphs for these five constituents are shown on Figures 4-3 through 4-7.

In general, the concentrations of the five constituents measured at the property wells in 2009 are similar to concentrations measured previously at the property wells. Only a few changes in measured concentrations were observed for the 2009 monitoring event, as described below.

- Concentrations of diesel-range petroleum hydrocarbons in property wells were lower compared to concentrations measured at property wells during recent monitoring events. The highest concentrations of diesel-range petroleum hydrocarbons detected in the property wells have historically occurred at monitoring well MW-101R; however, these concentrations have steadily decreased from 4,200 micrograms per liter (μg/L) in 2002 to 1,500 μg/L in 2009. For the first time, diesel-range petroleum hydrocarbons were not detected at monitoring wells MW-104 and MW-105, and they continued to be below the reporting limit at MW-108R. Diesel-range petroleum hydrocarbons were also not detected for the first time since 2000 at monitoring well MW-102.
- Concentrations of gasoline-range petroleum hydrocarbons in property wells were higher compared to concentrations measured during previous monitoring events. Gasoline-range petroleum hydrocarbons were detected for the first time since March 2002 at well MW-104, although the concentration is within the concentrations measured historically at this well. The concentration of gasoline-range petroleum hydrocarbon at monitoring well MW-105 is the highest concentration measured at this well during the past eight monitoring events, although it also is within the range measured historically at this well.

- The concentration of benzene, a typical gasoline component, also increased at monitoring well MW-105 during this monitoring event, to a value within its previous range, but decreased at well MW-101R to a value slightly less than its previous range. The benzene concentration measured at well MW-101R during this monitoring event is the lowest concentration measured at this well during the past eight monitoring events.
- The concentration of arsenic at property well MW-105 is the lowest concentration measured at well MW-105 during the past eight monitoring events. The concentration of arsenic at property well MW-104 is the highest concentration measured at well MW-104 during the past eight monitoring events.
- At well MW-105, concentrations of cPAHs increased somewhat compared to the previous range of concentrations measured at this well, although the 2009 concentrations were less than those measured in the past at background well B-4. The increase is evaluated further in Section 5.0
- At the upgradient well B-4R, concentrations of four of the five constituents were lower than the concentrations measured during previous events or not detected. Only the dissolved arsenic concentration was greater than the concentrations previously measured at well B-4.
- At upgradient well B-6R, concentrations of the five constituents were similar to previous concentrations detected at this well.

5.0 EVALUATION OF RESULTS

Following completion of the last eight groundwater monitoring events at the property (performed from June 2001 through August 2009), a statistical evaluation was performed to determine compliance with the cleanup levels at each well and, if appropriate, background-based screening levels. Procedures to be used to evaluate exceedances of cleanup levels are described in the CAP. The CAP specifies that basic statistical parameters such as mean and median be developed and that the UCL be calculated for compliance well data to evaluate exceedances of cleanup levels. In accordance with the CAP, the methodology used for demonstrating statistical compliance followed statistical methods from the Ecology Toxics Cleanup Program guidance document, *Statistical Guidance for Ecology Site Managers* (Ecology 1992), the *Supplement to Statistical Guidance for Ecology Site Managers* (Ecology 1993), and MTCAStat97 compliance module. In general, compliance was determined by calculating the UCL for each detected compound at each property well and comparing it to the cleanup level listed in the CAP. For arsenic, cPAHs, and some petroleum hydrocarbon-related constituents, screening levels were calculated based on concentrations found in one of the background wells.

5.1 CALCULATION OF SCREENING LEVELS BASED ON BACKGROUND FOR SOME CONSTITUENTS

This section discusses the development of background-based screening levels for arsenic, petroleum hydrocarbons, petroleum hydrocarbon related compounds (benzene and acenapthene), and cPAHs.

5.1.1 ARSENIC

Arsenic is present in several wells, including background wells B-4R and B-6R, at levels above the cleanup level listed in the CAP. For the past eight sampling events, the highest concentrations have been found in background well B-6R. Therefore, a background-based groundwater screening level was calculated for arsenic using analytical results for background well B-6R. The background-based screening level was calculated in accordance with WAC 173-340-700(4)(d); the Ecology Toxics Cleanup Program guidance document, *Statistical Guidance for Ecology Site Managers* (Ecology 1992) using MTCA Stat97 Background Module; and the concentrations found in background well B-6R from October 1997 to August 2009. The printed report for the background calculations showing the screening level based on the 90th percentile value as well as the data upon which it is based is provided in Appendix D. The background-based screening level was used for comparison with data from all property monitoring wells because it is considered to represent conditions that could be present upgradient of the property.

5.1.2 PETROLEUM HYDROCARBONS AND RELATED CONSTITUENTS

No cleanup levels are included in the CAP for diesel-range, gasoline-range, or motor oil-range petroleum hydrocarbons. As was done in previous evaluations, the process described in Section 5.1.1 above for calculating a screening level based on the 90th percentile value for arsenic was also used for diesel-range and gasoline-range petroleum hydrocarbons, benzene, and acenaphthene.

Previous evaluations of monitoring data have indicated that the source or sources of petroleum hydrocarbons and related constituents was upgradient of the Union Station property (Landau Associates 2000, 2002, 2003a,b, and 2004). As shown on Figures 4-3, 4-4, 4-5, 4-6, and 4-7, and in Table 4-2, concentrations of petroleum-related constituents, except benzene, in monitoring well B-4 have typically exceeded or been similar to concentrations found in property wells. This indicated that groundwater to the west and downgradient of well B-4 had lower concentrations of these constituents than areas east and upgradient of the property. However, concentrations of petroleum and related constituents measured in the groundwater sample collected at replacement well B-4R during the 2009 monitoring event are below the concentrations found previously at well B-4 and the concentrations found in some property wells. This suggests that the offsite source of the petroleum hydrocarbons may no longer be present or the groundwater plume containing these constituents may no longer be present in the immediate vicinity of well B-4/B-4R.

90th percentile values for diesel-range and gasoline-range petroleum hydrocarbons, benzene, and acenaphthene were calculated using two data sets from monitoring well B-4/B-4R: one with all data from October 1997 to August 2009 and one with data from October 1997 to December 2000 and August 2009, which are the periods when the groundwater elevation at monitoring well B-4/B-4R was greater than those measured at nearby property wells. The calculated 90th percentile value is slightly higher for gasoline-range petroleum hydrocarbons, benzene, and acenaphthene using only the data through December 2000 and the August 2009 data, and slightly lower for diesel-range petroleum hydrocarbons using this limited data set, as shown in Table 5-1. For this report, screening levels for these four constituents will be based on the 90th percentile values using concentrations in monitoring well B-4/B-4R from October 1997 through December 2000 and August 2009, when well B-4/B-4R was clearly upgradient of the property. These screening levels, in addition to the cleanup levels specified in the CAP, if any, were used for evaluation of data from property wells. Motor oil-range petroleum hydrocarbons were not detected in property wells; therefore, a background-based screening level was not calculated.

For other petroleum-related constituents that also appear to be migrating onto the property from off of the property, background-based screening levels were not calculated because concentrations in property wells do not exceed the cleanup levels designated in the CAP. The printed reports for background calculations showing the screening level based on the 90th percentile value for diesel-range and gasoline-range petroleum hydrocarbons, acenapthene, and benzene using both data sets are provided in Appendix D.

5.1.3 cPAHs

In general, the process described in Sections 5.1.1 and 5.1.2 above for calculating a background-based screening level based on the 90th percentile value for arsenic, petroleum hydrocarbons, and related compounds was also used for benzo(a)anthracene and chrysene. The highest concentrations of benzo(a)anthracene and chrysene have been found in background well B-4. Therefore, a background-based groundwater screening level was calculated using two data sets from background well B-4/B-4R for each constituent: one data set included all data from October 1997 through August 2009, and another data set included all data from October 1997 through December 2000 and August 2009. For each data set, the 90th percentile values were greater than four times the 50th percentile values; therefore, the values for four times the 50th percentile were used as screening levels. The screening levels were lower using only the data through December 2000 and the August 2009 data. For this report, screening levels for these two constituents will be based on four times the 50th percentile values using concentrations in monitoring well B-4/B-4R from October 1997 through December 2000 and August 2009, when well B-4/B-4R was clearly upgradient of the property. The printed reports for the background calculations showing the screening levels based on four times the 50th percentile value, as well as the data upon which it is based, are provided in Appendix D. The background-based screening level was used for comparison with data from all property monitoring wells because it is considered to represent conditions that could be present upgradient of the property.

5.2 STATISTICAL METHODOLOGY FOR CALCULATION OF UCL

In accordance with Ecology's guidance documents, the procedure for calculating the UCL was determined based on the percent of nondetect values and detected values less than the PQL (i.e., censored data) within a data set, as follows:

- **Case 1:** If the data set contained up to 15 percent censored data, the UCL was calculated. Prior to performing the calculation, the nondetect values were replaced by a value of half the detection limit and the detected values less than the PQL were replaced by a value of the detection limit. The distribution of the sample data was then determined (i.e., normal or lognormal distribution) and the appropriate UCL calculation was made. Ecology's software package (MTCAStat, Version 3.0) was used to determine the distribution of each data set and to calculate the UCL.
- **Case 2:** If the data set contained between 15 percent and 50 percent censored data, the UCL was calculated directly using MTCAStat, Version 3.0. Censored data was addressed by Cohen's method directly in MTCAStat.

- **Case 3:** If the data set contained more than 50 percent, but less than 100 percent censored data, the UCL was set equal to the maximum concentration in the data set.

No guidance is available for performing statistical evaluations on data sets that contain 100 percent censored data. For this evaluation, if a compound was not detected in any of the wells during the eight groundwater monitoring events, then no further evaluation was performed for that compound and the compound was omitted from Table 5-2. If a compound was detected at least once during the eight groundwater monitoring events in at least one of the property wells, the constituent was included in the statistical summary provided in Table 5-2. For those wells where the constituent was not detected, the following procedure was performed:

- **Case 0:** If the data set contained 100 percent censored data, no UCL was calculated and the well was determined to be in compliance.

Table 5-2 lists the statistical procedure (coded by case number) applied to each well data set. Also included in Table5-2 are the percentages of censored and uncensored data for each well.

The data set used in each statistical evaluation consisted of eight data points (i.e., the eight groundwater sampling events from June 2001 to August 2009).

5.3 COMPLIANCE EVALUATION

In accordance with the CAP, a comparison of the UCL to the cleanup level for each constituent detected at each well was performed. If the calculated UCL for a property well was less than or equal to the cleanup level, then it was determined that the well was in compliance for that constituent. In some cases, no UCL was calculated because the analyte was not detected or all of the detected values were less than the PQL, as described below. A summary of cleanup and screening levels, the calculated UCLs, and other statistical parameters required by the CAP for each well is provided in Table 5-2. For some petroleum-related constituents and arsenic, the UCL was also compared to a screening level based on concentrations in background well B-4/B-4R or B-6R. The results of the evaluation were similar to those of previous evaluations. The results of the evaluation for each onsite well are discussed below and summarized in Table 5-3.

5.3.1 MONITORING WELL MW-101R

At monitoring well MW-101R, UCLs were calculated for diesel-range petroleum hydrocarbons, gasoline-range petroleum hydrocarbons, arsenic, a few non-carcinogenic PAHs, and BTEX. No UCL was calculated for the other constituents because all of the data for these constituents were censored (below the PQL). Only the UCLs for benzene, acenaphthene, and arsenic exceed the cleanup levels included in the CAP. The UCLs for these constituents, however, were less than the background-based screening levels. There is no cleanup level for gasoline-range or diesel-range petroleum hydrocarbons in the CAP; therefore, the UCLs for these constituents were compared to the background-based screening levels. Neither background-based screening level was exceeded.

5.3.2 MONITORING WELL MW-102R

At monitoring well MW-102R, UCLs were calculated for arsenic, acenaphthene, diesel-range petroleum hydrocarbons, and naphthalene. No UCL was calculated for the other constituents because all of the data for these constituents were censored. The UCL for arsenic exceeded the cleanup level included in the CAP, but was less than the background-based screening level. All other UCLs were less than the respective cleanup levels in the CAP. There is no cleanup level for diesel-range petroleum hydrocarbons in the CAP. The UCL for diesel-range petroleum hydrocarbons was compared to background-based screening levels. The background-based screening level was not exceeded.

5.3.3 MONITORING WELL MW-104

For monitoring well MW-104, UCLs were calculated for diesel-range petroleum hydrocarbons, acenaphthene, fluorene, phenanthrene, and arsenic. No UCL was calculated for the other constituents because all of the data for these constituents were censored. The UCL for arsenic exceeded the cleanup level included in the CAP, but was less than the background-based screening level. None of the other UCLs exceeded the cleanup levels included in the CAP, or, for diesel-range petroleum hydrocarbons, the background-based screening level.

5.3.4 MONITORING WELL MW-105

For monitoring well MW-105, UCLs were calculated for diesel-range petroleum hydrocarbons, gasoline-range petroleum hydrocarbons, arsenic, several non-carcinogenic PAHs, and BTEX. No UCL was calculated for the other constituents because all of the data for these constituents were censored. The UCL for benzene exceeded the cleanup level included in the CAP and the background-based screening level. The UCLs for arsenic, benzo(a)anthracene, and chrysene exceeded the cleanup levels included in the CAP, but were less than the background-based screening levels. All other UCLs were less than the respective cleanup levels or, for diesel-range and gasoline-range petroleum hydrocarbons, the background-based screening level.

5.3.5 MONITORING WELL MW-107R

For monitoring well MW-107R, UCLs were calculated for diesel-range and gasoline-range petroleum hydrocarbons, arsenic, some SVOCs, and BTEX. No UCL was calculated for the other constituents because all of the data for these constituents were censored. The UCL for arsenic exceeded the cleanup level included in the CAP, but was less than the background-based screening level. No other UCLs exceeded the respective cleanup levels in the CAP or, for diesel-range and gasoline-range petroleum hydrocarbons, the background-based screening level.

5.3.6 MONITORING WELL MW-108R

For monitoring well MW-108R, UCLs were calculated for naphthalene and arsenic. No UCLs were calculated for the other constituents because all the data for these constituents were censored. Only the UCL for arsenic exceeded the cleanup level included in the CAP, but was less than the background-based screening level.

5.4 SUMMARY OF EVALUATION RESULTS

Acenapthene, arsenic, benzene, and two cPAHs, [benzo(a)anthracene and chrysene] were identified in the previous section as exceeding cleanup levels included in the CAP in one or more wells. Each of these constituents has also been found in one of the background wells at concentrations exceeding the cleanup level in the CAP during the past eight monitoring events; therefore, a background-based screening level was calculated for each. A background-based screening level was also calculated for diesel-range and gasoline-range petroleum hydrocarbons. Only the background-based screening level for benzene was exceeded. The UCL for benzene in well MW-105 has typically been slightly greater than the background-based screening level. Each of the constituents exceeding cleanup or background-based screening levels is discussed below and summarized in Table 5-3.

5.4.1 ACENAPHTHENE

Acenaphthene is a typical constituent of diesel as well as coal tar. Acenaphthene was detected at concentrations above the PQL at all property wells, except MW-108R. Acenaphthene has been consistently detected at concentrations above the PQL in samples collected from background well B-4, although the concentrations decreased for each monitoring event beginning in December 2001. During the most recent monitoring event, acenapthene was detected at replacement well B-4R, but at a concentration below the PQL. As described in Section 5.1.2, the background-based screening level is 441 μg/L. Only the UCL calculated for acenaphthene at well MW-101 (350 μg/L) exceeds the CAP cleanup level (225 μg/L). None of the calculated UCLs exceeded the background-based screening level. The historical presence of acenaphthene in monitoring well B-4 at high concentrations relative to concentrations detected on the property indicates that there was an off-property source or sources of acenaphthene. The decrease of acenapthene at well B-4/B-4R suggests that the offsite source is no longer present, or the groundwater plume from the offsite source is no longer in the immediate vicinity of well B-4/B-4R. If the source is no longer present or the plume has moved beyond well B-4/B-4R, the concentrations of acenapthene at the property wells should also decrease over time. Acenapthene has shown a steady decrease at well MW-101R over since 2001. Based on the concentrations measured at well B-4/B-4R, the UCL exceedance of the CAP cleanup level in well MW-101 does not represent contamination originating from the property and, therefore, should not trigger implementation of groundwater treatment or an increase in the frequency of groundwater monitoring.

5.4.2 BENZENE

Benzene is a constituent of gasoline and is typically found in groundwater contaminated from relatively recent spills of gasoline. It can also be associated with coal gasification plants; however, groundwater testing prior to and during the RI did not indicate that benzene was present at the property from the coal gasification plant formerly located on the property. In addition, gasoline and other gasoline-related constituents, such as ethylbenzene, toluene, xylenes, and substituted benzenes, are also detected in property monitoring wells, making it likely that the source of the benzene is gasoline. Benzene, along with other petroleum-related constituents, is apparently migrating in groundwater to the property from off-property.. Benzene has been detected consistently in the past in samples from monitoring well B-4, but was not detected in well B-4R during the August 2009 monitoring event. Although the background-based screening level used for comparison (251 μg/L) was calculated based on the data from monitoring well B-4 and B-4R, it is likely that the data from these wells do not reflect the maximum concentration in groundwater migrating onto the property. Furthermore, the lack of benzene at replacement well B-4R suggests that the offsite source is no longer present, or the groundwater plume from the offsite source is no longer in the immediate vicinity of well B-4/B-4R. The UCLs for wells MW-101R and MW-105 exceed the CAP cleanup level. The UCL for well MW-105 also exceeds the background-based screening level. These exceedances do not represent contamination originating from the property and, therefore, should not trigger implementation of groundwater treatment or an increase in the frequency of groundwater monitoring.

5.4.3 ARSENIC

Arsenic is a naturally occurring metal in soil and groundwater. Ecology determined that the 90th percentile value for background arsenic concentration in soil in the Puget Sound region is 7 milligrams per kilogram (mg/kg; Ecology 1994). Arsenic has been detected in groundwater at concentrations at or above the PQL in all property wells other than well MW-104, in at least five of the past eight monitoring events. Arsenic was detected in well MW-104 at a concentration exceeding the CAP cleanup level for the first time during the August 2009 monitoring event. Because the CAP cleanup level is equal to the PQL, the detections resulted in the UCLs exceeding the CAP cleanup level for all of the property wells. Based on the concentrations measured in well B-6R, the background-based screening level is 36 μg/L. There are no exceedances of the background-based screening level. The presence of arsenic in a background well at concentrations greater than those found in property wells indicates that arsenic is present upgradient of the property. The exceedances of the CAP cleanup level do not represent contamination originating from the property and, therefore, should not trigger implementation of groundwater treatment or an increase in the frequency of groundwater monitoring.

5.4.4 cPAHs

cPAHs are constituents often found in motor oil-range petroleum hydrocarbons and asphalt-based products, as well as coal tar. Two cPAHs, benzo(a)anthracene and chrysene, were detected at concentrations above the PQL at well MW-105. These cPAHs and other cPAHs have typically been detected in samples from background well B-4, although the concentrations measured this monitoring event were below the PQL. Because the CAP cleanup level is equal to the PQL, the detections at well MW-105 resulted in the UCLs exceeding the CAP cleanup level at well MW-105. Based on the concentrations measured in well B-4/B-4R, the background-based screening levels for benzo(a)anthracene and chrysene are 6.6 μg/L and 5.7 μg/L, respectively. There are no exceedances of the background-based screening levels at the property wells. Based on the historical data at well B-4, the UCL exceedances of the CAP cleanup levels in well MW-105 do not represent contamination originating from the property and, therefore, should not trigger implementation of groundwater treatment or an increase in the frequency of groundwater monitoring.

6.0 CONCLUSIONS

Evaluation of historical and current analytical results for the property indicates that there are upgradient sources of gasoline-range and diesel-range petroleum hydrocarbons and related constituents that have migrated in groundwater onto the property. For this reason, groundwater concentrations at well B-4 have historically been used to evaluate compliance for gasoline-range and diesel-range petroleum hydrocarbons, acenaphthene, and benzene in property wells. Sometime since the previous groundwater monitoring event in June 2004, well B-4 was paved over and is no longer accessible. This well was replaced by well B-4R, located approximately 20 ft east of well B-4. The groundwater elevation measured at the replacement well was higher than the elevations measured at the property wells. This indicates that the groundwater flow in the vicinity of the property is to the west and that low groundwater elevations measured at well B-4 beginning in March 2001, after the Nisqually earthquake, were likely a result of physical changes to the well and/or subsurface.

Background-based screening levels were calculated for petroleum hydrocarbons, benzene, acenapthene, and cPAHs using data from well B-4/B-4R and for arsenic using data from B-6R. Data from the entire monitoring period, October 1997 through August 2009, were used to calculate screening levels for each constituent. For petroleum hydrocarbons, benzene, acenapthene, and cPAH data from the period when well B-4/B-4R was clearly upgradient of property wells, October 1997 through December 2000 and August 2009 were also used to calculate screening levels. Calculated values from both data sets were similar. The values from October 1997 through December 2000 and August 2009 were used as background-based screening levels for petroleum hydrocarbons, benzene, acenapthene, and cPAHs and used in compliance evaluations.

For each well, UCLs were calculated for detected constituents and compared to cleanup levels identified in the CAP. The only exceedances of CAP cleanup levels are for acenapthene (wells MW-101R and MW-104); benzene (MW-101R and MW-105); arsenic (MW-101R, MW-102R, MW-104, MW-105, MW-107R, MW-108R); benzo(a)anthracene (MW-105); and chrysene (MW-105). These constituents are also present in at least one of the background wells, indicating they have migrated onto the property from offsite. Only the UCL for benzene in MW-105 exceeds the background-based screening level. There are no exceedances of screening levels for diesel-range or gasoline-range petroleum hydrocarbons in any property well. These results are consistent with the results of previous statistical evaluations. Historical results for groundwater samples at B-4 have consistently demonstrated that petroleum-related constituents were migrating from off-property onto the property (Landau Associates 2000, 2002, 2003a,b, and 2004). Concentrations of petroleum-related constituents in 2009 samples from well B-4R are lower than historical concentrations at B-4, indicating that the offsite source may no be longer present, or the groundwater plume from an offsite source may no longer be in the immediate vicinity of well B-4/B-4R. In any case, because these exceedances do not represent contamination originating on the property, they should not be used to trigger groundwater treatment or an increase in the frequency of groundwater monitoring.

Arsenic was detected in all property wells and in both background wells. The concentrations reported for the background wells were significantly higher than the concentrations reported for the property wells, indicating that arsenic is migrating in groundwater onto the property. A background-based screening level was calculated using the well B-6R data and was used to evaluate compliance. There were no exceedances of the background-based screening level. These arsenic exceedances do not represent contamination originating on the property; therefore, they should not be used to trigger groundwater treatment or an increase in the frequency of groundwater monitoring.

UCLs for two cPAHs [benzo(a)anthracene and chrysene], exceed the CAP cleanup levels at well MW-105, but do not exceed the background-based screening levels. Because the cPAHs exceedances do not represent contamination originating on the property, they should not be used to trigger groundwater treatment or an increase in the frequency of groundwater monitoring.

7.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that the groundwater monitoring frequency remain at every 5 years and that the list of constituents remain the same for the next groundwater monitoring event.

8.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of Union Station Associates, and applicable regulatory agencies, for specific application to the Union Station property groundwater monitoring program. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

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Kristy J. Hendrickson, P.E.
Principal

SJL/KJH/tam

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TABLE 1-1
CONSENT DECREE GROUNDWATER MONITORING AND REMEDIATION

Groundwater Monitoring

Quarterly monitoring for 8 quarters beginning within 3 months of the effective date of the consent decree.

Calculate upper 95% confidence limit (UCL) using the eight quarters of data.

If UCL exceeds cleanup levels, implement groundwater treatment if directed by Ecology to prevent contamination from leaving the site. The parties anticipate that Ecology may revise this cleanup action plan to incorporate new cleanup standards if the cleanup standards are revised by an amendment to the regulations and Ecology determines the use of the new standards is appropriate.

If UCL is less than or equal to cleanup levels, commence annual monitoring.

Annual monitoring until all foundations are completed or until two years after any foundation construction is initiated.

Quarterly sampling for 8 quarters beginning the first quarter after all foundations are completed or the first quarter occurring two years after any foundation construction is initiated.

Calculate upper 95% confidence limit (UCL) using the last eight quarters of data.

If UCL exceeds cleanup levels, implement groundwater treatment if directed by Ecology to prevent contamination from leaving the site. The parties anticipate that Ecology may revise this cleanup action plan to incorporate new cleanup standards if the cleanup standards are revised by an amendment to the regulations and Ecology determines the use of the new standards is appropriate.

If UCL is less than or equal to cleanup levels, commence annual monitoring.

Annual monitoring until foundation loading (building construction) is complete plus 3 additional years.

If any sample exceeds cleanup levels, collect another sample 1 quarter later.

If the second sample is less than cleanup levels, return to annual monitoring.

If the second sample exceeds cleanup levels, commence quarterly monitoring for 1 year (see below).

If no exceedance of cleanup levels has occurred after 3 years, commence monitoring every 5 years.

Monitoring every 5 years.

If any sample exceeds cleanup levels, collect another sample 1 quarter later.

If the second sample is less than cleanup levels, return to annual monitoring for 1 year.

If the second sample exceeds cleanup levels commence quarterly monitoring for 1 year (see below).

If UCL is less than or equal to cleanup levels continue monitoring every 5 years so long as residual hazardous substance concentrations contained onsite exceed site cleanup levels [see WAC 173-340-360 (8)(b)].

Quarterly sampling for 1 year

At end of year, if UCL based on four quarters of data is less than cleanup levels, return to annual monitoring for 3 years

At end of year, if UCL based on four quarters of data is greater than cleanup levels and data show increasing trend and last sample exceeds twice the cleanup level, implement groundwater treatment if directed by Ecology to prevent contamination from leaving the site. Otherwise, continue monitoring for another four quarters.

If, after eight quarters of data have been collected, the UCL based on the eight quarters of data exceed the cleanup level, implement groundwater treatment if directed by Ecology to prevent contamination from leaving the site.

If, after eight quarters of data have been collected, the UCL based on the eight quarters of data is less than the cleanup level, continue monitoring for another four quarters.

If, at the end of the last four quarters, the UCL based on the last eight quarters of data exceeds the cleanup level, implement groundwater treatment if directed by Ecology to prevent contamination from leaving the site.

If, at the end of the last four quarters, the UCL based on the last eight quarters of data is less than the cleanup level, return to annual monitoring for 5 years. If there are no exceedances of cleanup levels during that time, return to monitoring every 5 years.

TABLE 1-1
CONSENT DECREE GROUNDWATER MONITORING AND REMEDIATION

Groundwater Treatment

Minimize present worth of capital and O&M costs to determine the size and estimated operating time of the system.

Performance monitoring.

Quarterly monitoring during groundwater treatment.

Plot data and do statistical evaluation as directed by Ecology to determine when to terminate treatment or when cleanup standards are met.

Post-Treatment Monitoring

Quarterly monitoring for 8 quarters.

If UCL exceeds cleanup levels and trend analysis does not indicate decreasing trend, return to groundwater treatment.

If UCL exceeds cleanup levels and trend analysis indicates decreasing trend, continue monitoring quarterly. If UCL calculated using the last 8 quarters of data exceeds cleanup levels after 12 quarters of data have been collected, return to groundwater treatment.

If UCL is less than or equal to cleanup levels, commence annual monitoring for 3 years.

Annual monitoring for 3 years.

If any sample exceeds cleanup levels, collect another sample 1 quarter later.

If the second sample is less than cleanup levels return to annual monitoring.

If the second sample exceeds cleanup levels commence quarterly monitoring for 1 year and use triggers in quarterly monitoring above.

If no exceedance of cleanup levels has occurred after 3 years, commence monitoring every 5 years.

Monitoring every 5 years.

If any sample exceeds cleanup levels, collect another sample 1 quarter later.

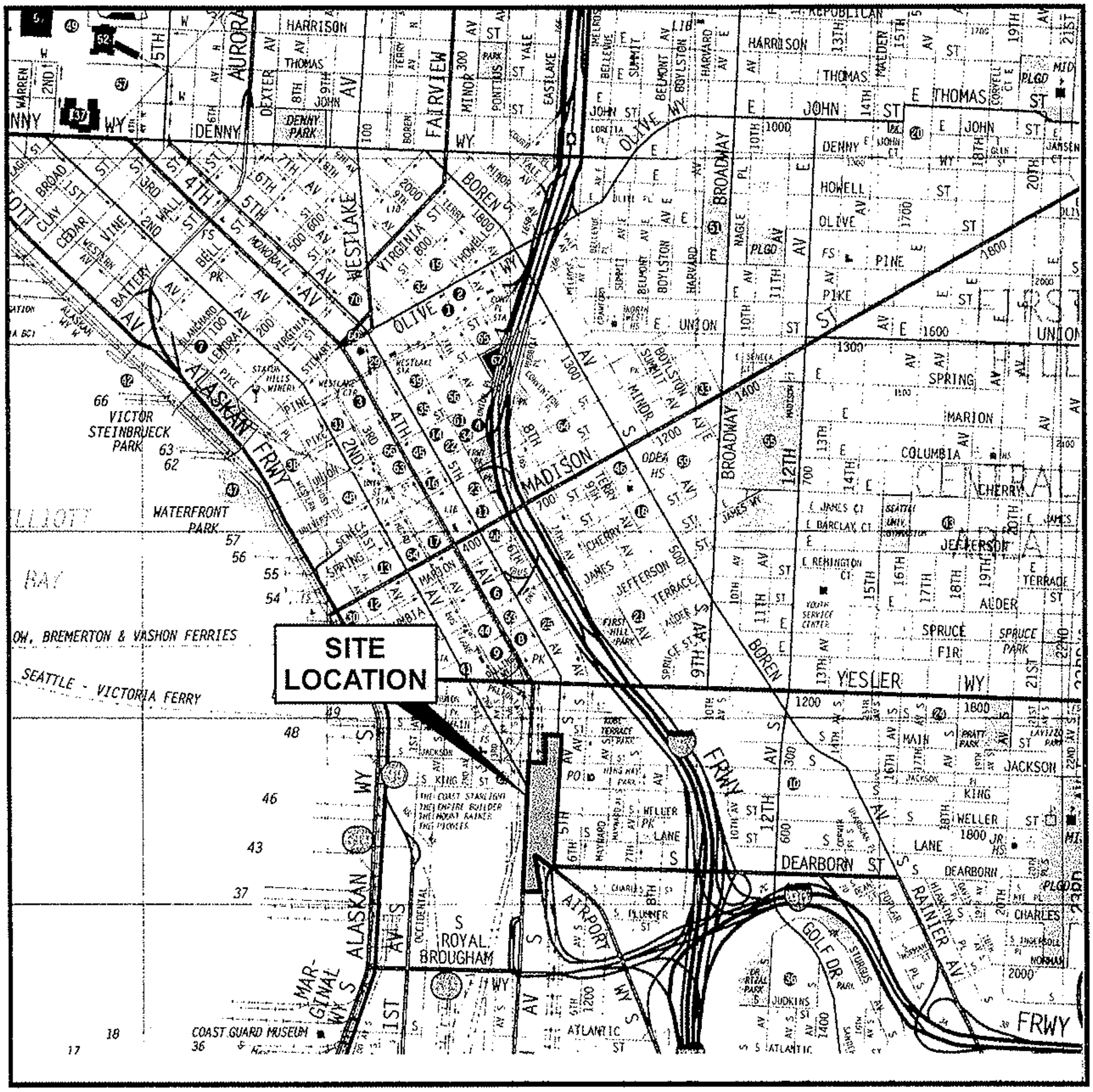
If the second sample is less than cleanup levels return to monitoring every 5 years.

If the second sample exceeds cleanup levels commence quarterly monitoring (see above).

If UCL is less than or equal to cleanup levels, continue monitoring every 5 years so long as residual hazardous substance concentrations contained onsite exceed site cleanup levels [see WAC 173-340-360 (8)(b)].

Notes:

1. This table was prepared for and originally presented in the CAP.
2. As described in Appendix A of the CAP, alternate statistical methods may be used upon approval by Ecology.



0 1/2 1

Scale in Miles

Union Station Seattle, Washington	**Vicinity Map**	Figure 1-1

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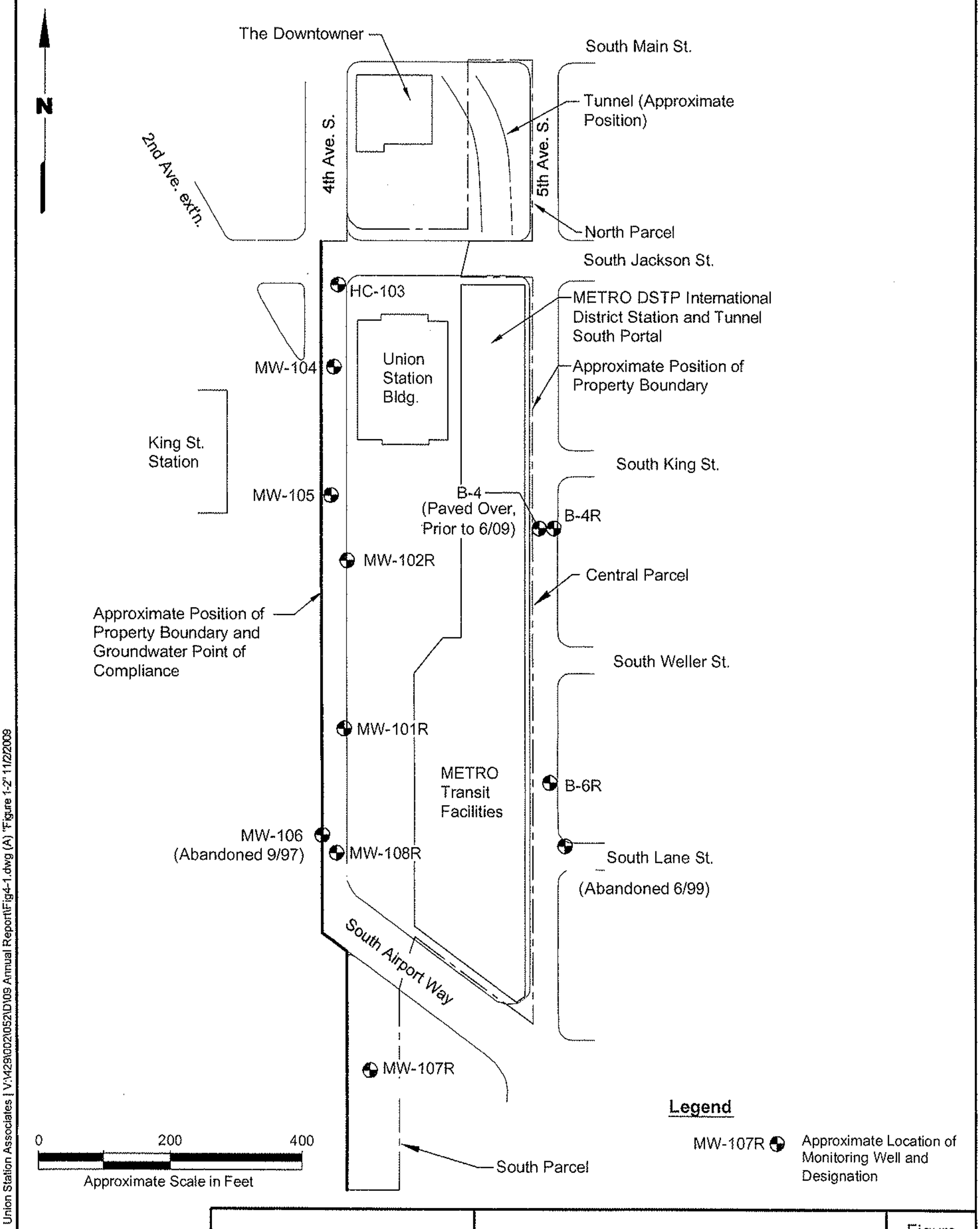

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Union Station Seattle, Washington	**Union Station Groundwater Monitoring Well Locations**	Figure **1-2**

TABLE 3-1
MONITORING WELL SUMMARY
UNION STATION

Well	Installation Date	Abandonment Date	Northing	Easting	Ground Surface Elevation (a)	Reference Elevation (b)	Top of Screen Elevation	Bottom of Screen Elevation	Top of Native Soil Elevation	Notes
HC-101	4-96	3-98	1583.27	1695.87	8.80	9.09	3.8	-6.2	NA	Well was damaged during construction activities and abandoned
MW-101R	3-98	N/A	1583.24	1695.87	9.77	9.06	2.8	-7.2	NA	Replacement well for HC-101; Boring could not be advanced beyond 16 ft BGS.
HC-102	4-96	3-98	1837.46	1700.69	9.30	8.64	4.3	-5.7	NA	Well was damaged during construction activities and abandoned
MW-102R	3-98	N/A	1837.26	1700.58	9.97	8.60	-3.7	-13.7	-14.7	Replacement well for HC-102.
HC-103	4-96	N/A	2253.49	1687.23	10.30	8.99	5.5	-4.5	NA	
MW-104	11-96	N/A	2129.50	1680.99	10.65	9.59	-0.1	-10.1	-12.6	
MW-105	11-96	N/A	1935.82	1676.45	10.07	8.92	-4.5	-14.0	-15.5	
MW-106	11-96	9-97	1422.63	1662.65	9.50	9.07	-1.0	-11.0	-13.5	Well was abandoned to accommodate construction.
MW-107	11-96	10-98	1048.59	1728.86	13.30	12.59	-1.7	-11.7	-12.7	Well was abandoned to accommodate construction.
MW-107R	2-99	N/A	1067.59	1734.64	12.99	12.43	-1.5	-7.0	-10.0	Replacement well for MW-107
MW-108	9-97	4-98	NA	NA	NA	NA	NA	NA	NA	Replacement well for MW-106; well was later damaged during construction activities and abandoned.
MW108R	4-98	N/A	1395.75	1684.25	9.56	8.78	-3.4	-13.4	-14.4	Replacement well for MW-108.
B-4	12-85	Paved over between 6/04 and 8/09	1886.32	1994.74	36.80	36.36	-4.6	-9.6	-12.1	Well was paved over by Seattle DOT
B-4R	08-09	N/A	221730.54 (c)	1271778.6 (c)	36.74	36.35	5.74	-4.26	NA	Replacement well for B-4.
B-6	12-85	6-99	1406.35	2033.29	34.30	34.08	-0.9	-5.7	NA	Well was abandoned to accommodate construction.
B-6R	11-99	N/A	1501.99	2010.27	34.38	34.38	10.4	-9.6	-17.1	Replacement well for B-6.

NA = Not available
N/A = Not applicable.

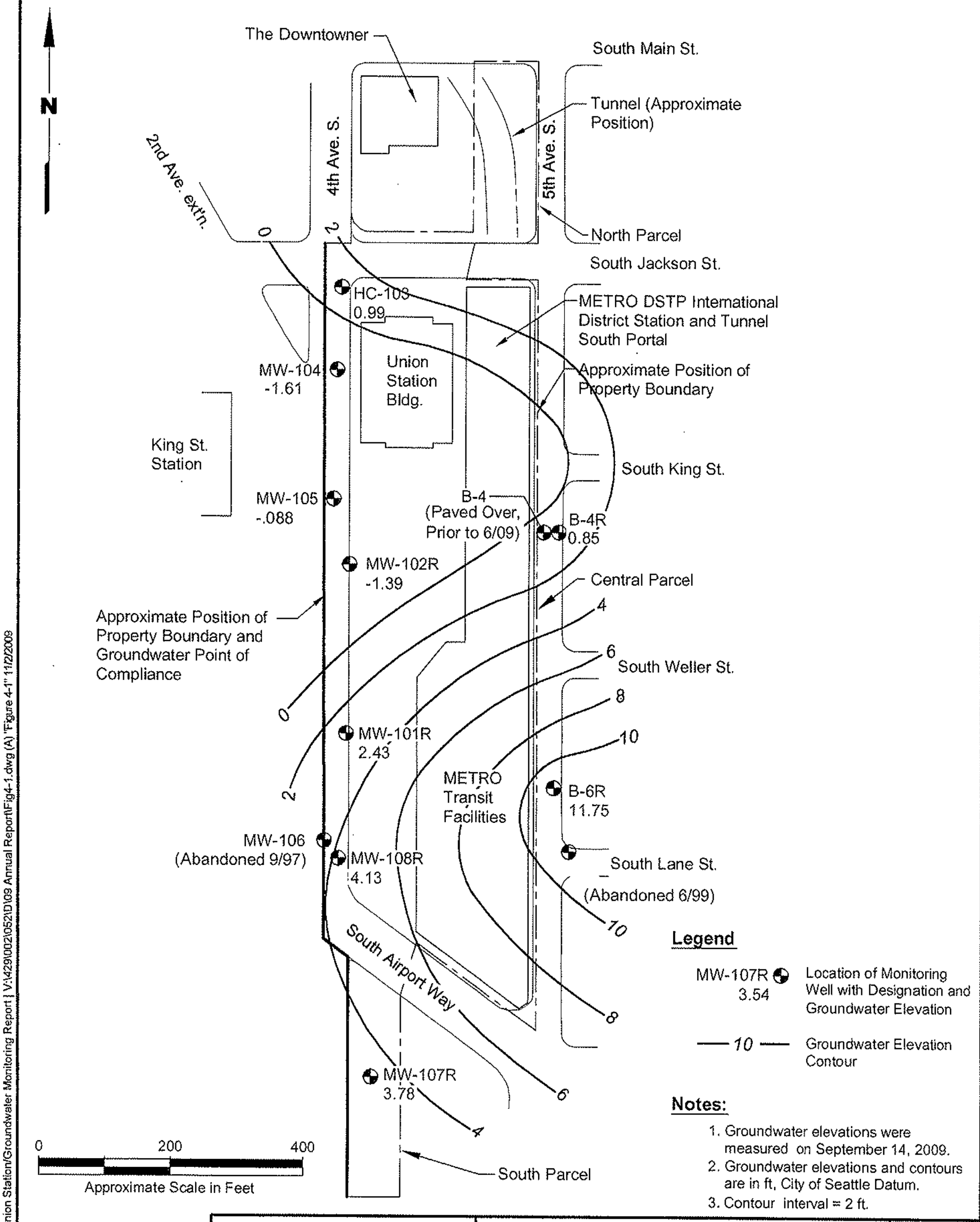
(a) Ground surface elevation at time of well installation.
(b) Reference elevation is used for measuring groundwater levels and represents most current survey information.
(c) Elevations are in NAVD 88 Datum

Note: All elevations are in feet, City of Seattle Datum.

TABLE 4-1
GROUNDWATER ELEVATION SUMMARY
SEPTEMBER 2009
UNION STATION

Well	Measuring Point Elevation	Measured Depth to Groundwater	Groundwater Elevation
B-4R	36.35	35.50	0.85
B-6R	34.38	22.63	11.75
MW-101R	9.06	6.63	2.43
MW-102R	8.60	9.99	-1.39
HC-103	8.99	8.00	0.99
MW-104	9.59	11.20	-1.61
MW-105	8.92	9.80	-0.88
MW-107R	12.43	8.65	3.78
MW-108R	8.78	4.65	4.13

Note: All elevations are in feet, City of Seattle Datum.



Legend

MW-107R 3.54 — Location of Monitoring Well with Designation and Groundwater Elevation

— 10 — Groundwater Elevation Contour

Notes:

1. Groundwater elevations were measured on September 14, 2009.
2. Groundwater elevations and contours are in ft, City of Seattle Datum.
3. Contour interval = 2 ft.

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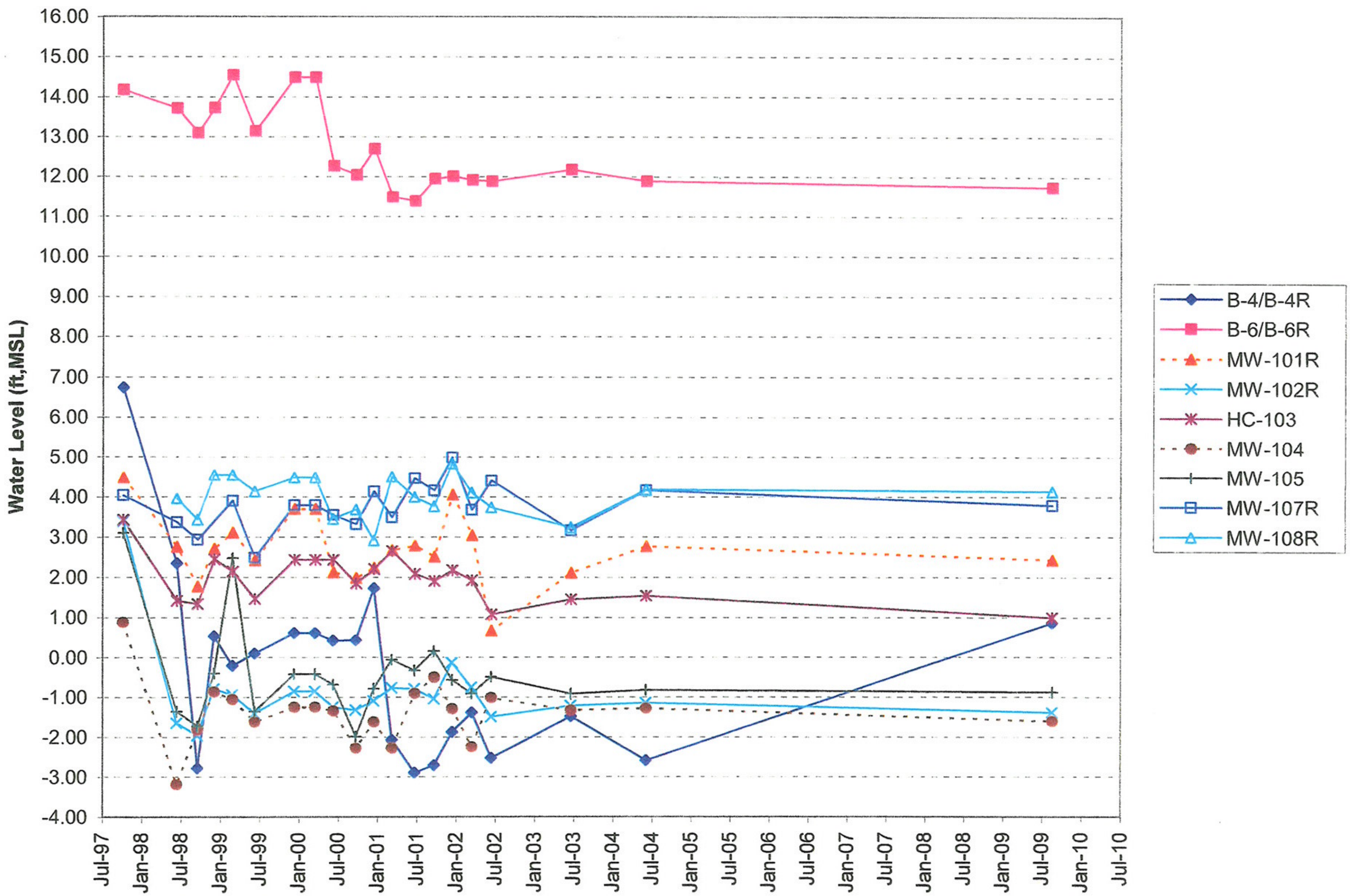
Union Station
Seattle, Washington

Groundwater Elevation Contours: September 2009

Figure **4-1**



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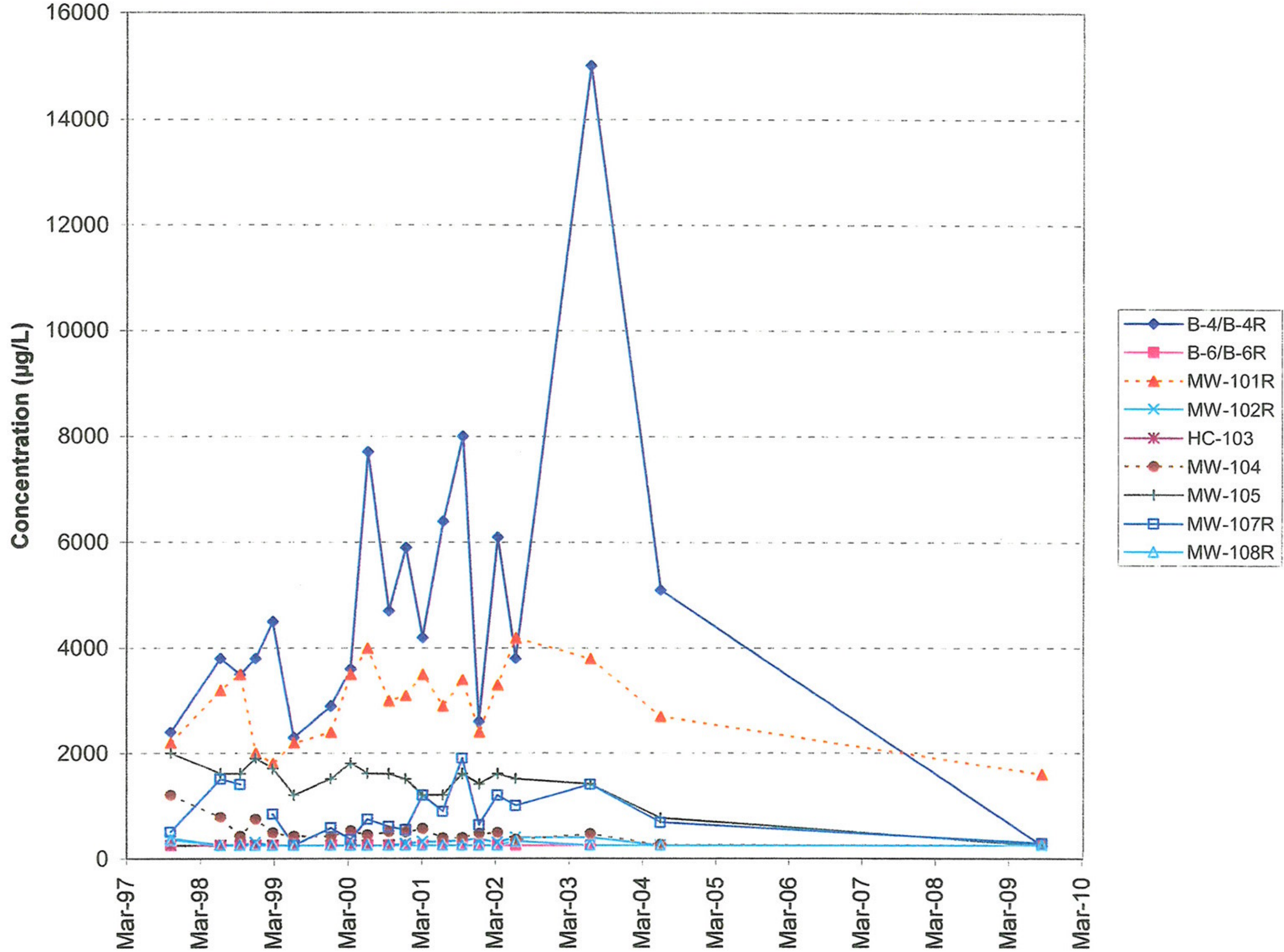
Union Station
Seattle, Washington

Groundwater Elevation Contours
October 1997 through August 2009

Figure
4-2



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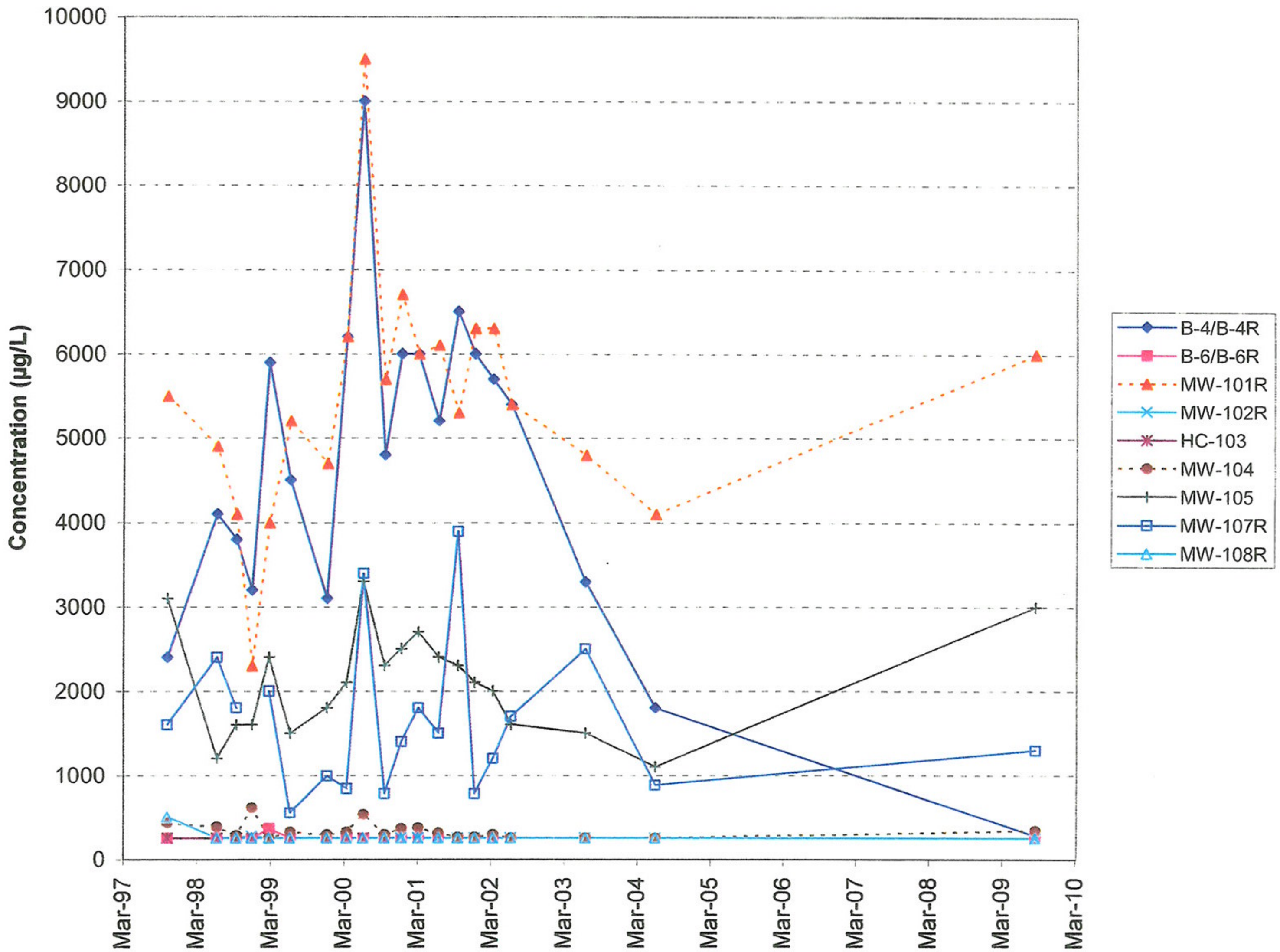
Union Station
Seattle, Washington

Diesel-Range Petroleum Hydrocarbon Concentrations vs. Time

Figure
4-3



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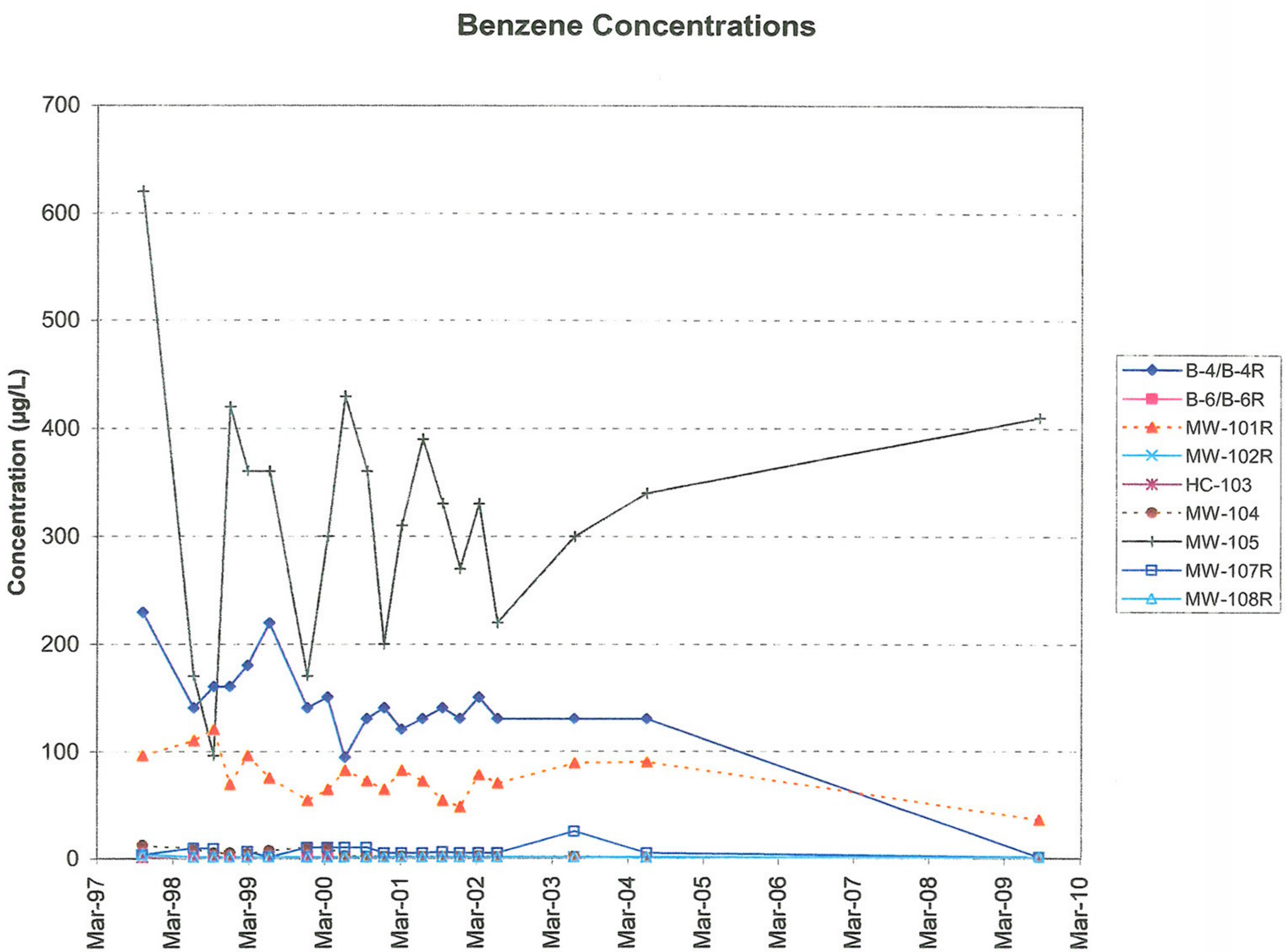
Union Station
Seattle, Washington

Gasoline-Range Petroleum Hydrocarbon Concentrations vs. Time

Figure
4-4



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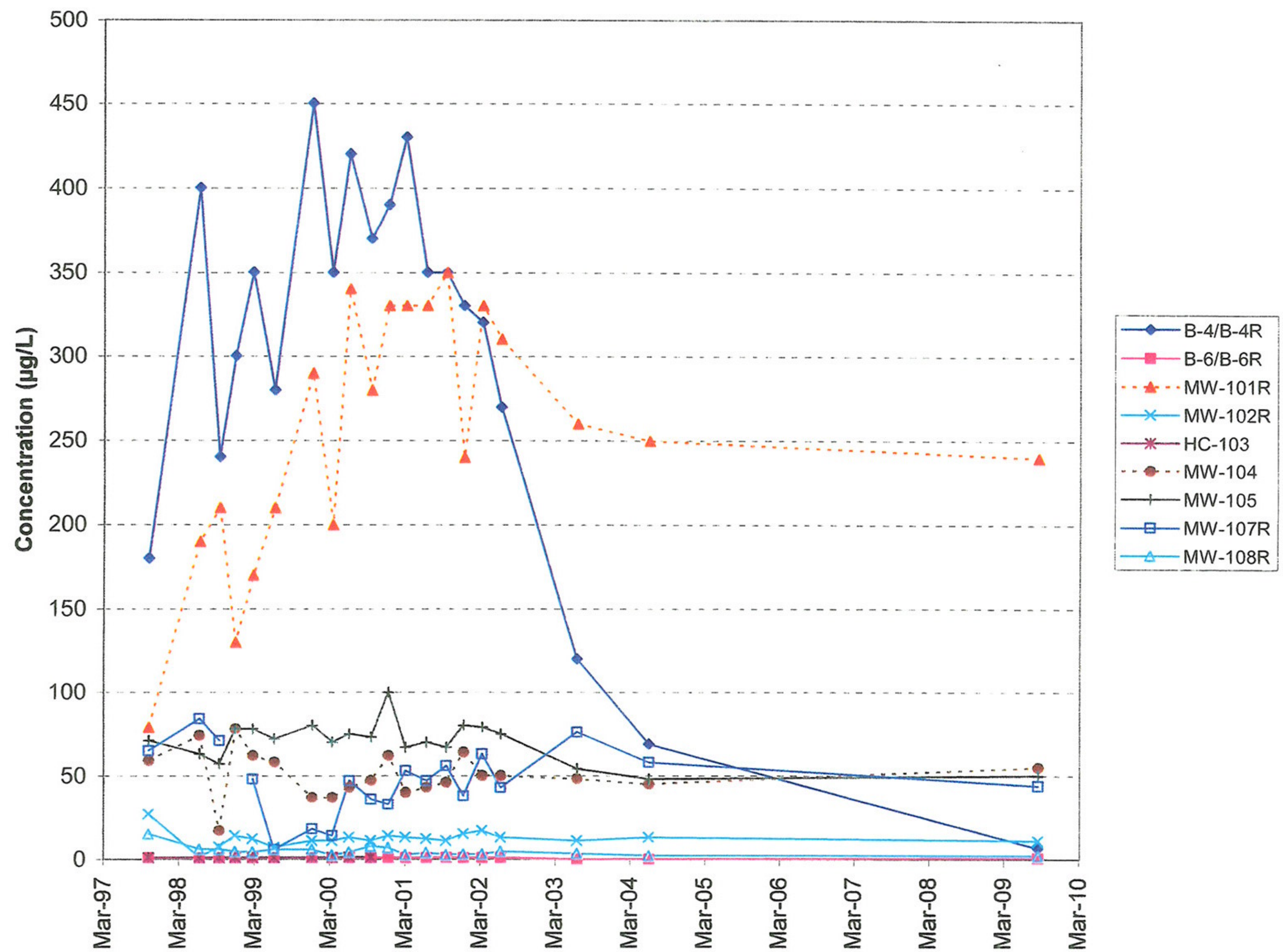
Union Station
Seattle, Washington

Benzene Concentrations vs. Time

Figure
4-5



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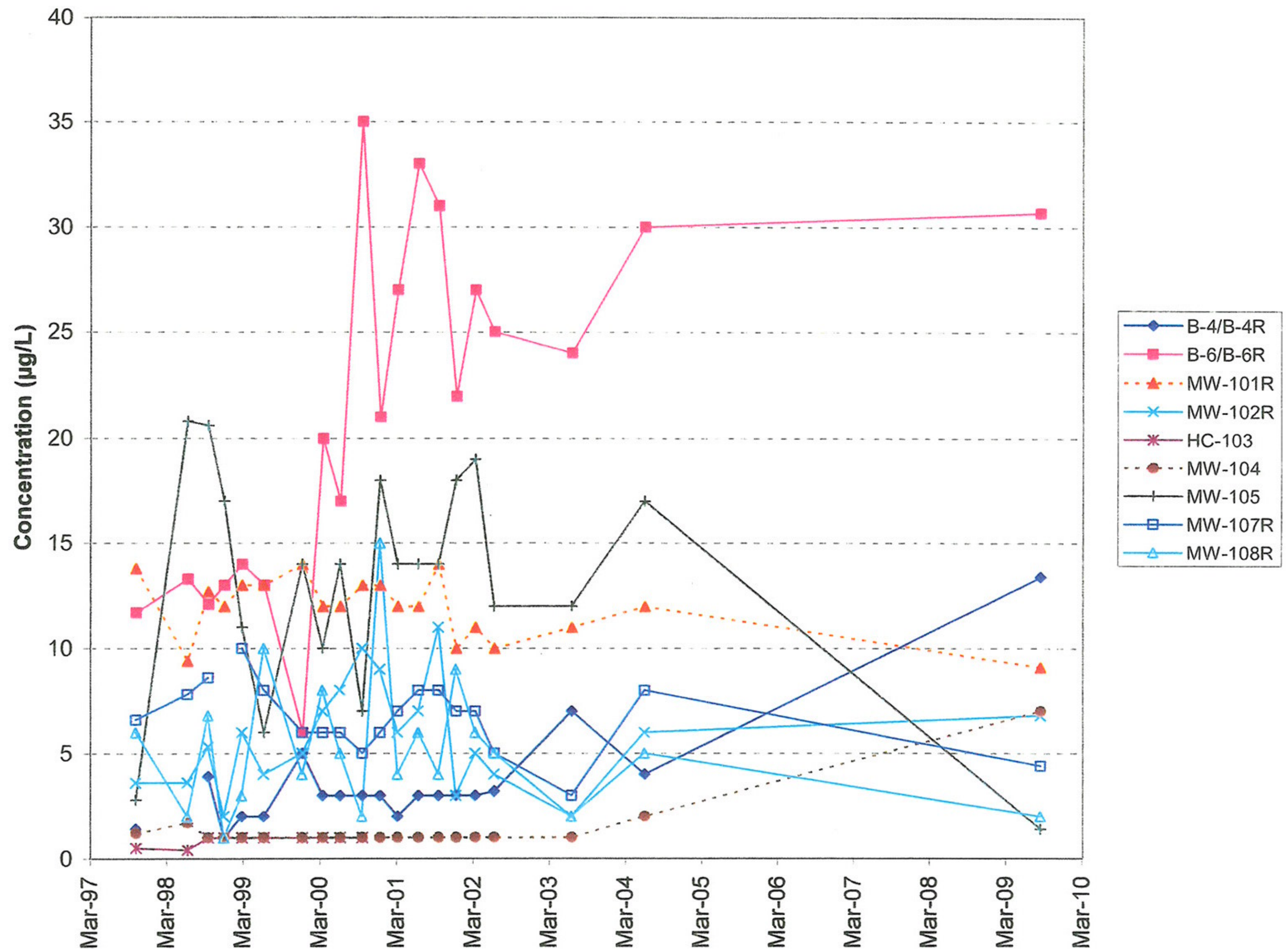
Union Station
Seattle, Washington

Acenaphthene Concentrations vs. Time

Figure 4-6



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Union Station
Seattle, Washington

Arsenic Concentrations vs. Time

Figure 4-7

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	B-4 DH51I 6/22/2001	B-4 DQ61G 9/26/2001	B-4 DY69A 12/19/2001	B-4 EE79H 3/20/2002	B-4 EM41H 6/19/2002	B-4 FP47G/P 06/25/03	B-4 GS18I 06/09/04	B-4R PL85B 08/25/09
TPH (µg/L)												
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	6400 J	8000 J	2600	6100	3800	15000	5100	250 U
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	1200	2900 J	570	2500 U	620	6800	2000	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	5200	6500	6000 J	5700	5400	3300	1800	280
cPAH (µg/L)												
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	1.0	8.3	17	1.4	0.41	2.1	2.0	0.37
Chrysene	8270 (c)	1.0	5.7	1.0	0.83	7.4	1.5	1.3 J	0.36	2.0	1.7	0.45
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.22	4.3	0.61	0.46	0.10 U	0.77	1.1	0.17
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.33	5.6	1.2	1.0	0.10 U	0.86	1.1	0.26
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.34	7.2	1.3	1.0	0.12	1.1	1.2	0.36
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.15	3.6	0.57	0.53	0.10 U	0.55	0.44	0.17
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.98	0.20 U	0.20 M	0.10 U	0.16	0.28	0.10 U
ncPAH (µg/L)												
Naphthalene	8270 (c)	9680		10	3200	2600 J	2700 J	2400 J	1200	710 J	0.41	4.6
2-Methylnaphthalene	8270 (c)			10	510	450	480	510	260	160	0.46	1.0 U
Acenaphthylene	8270 (c)			10	2.0	6.5	3.2	3.0	10	1.6	2.9	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	350	350	330 J	320	270	120	69	6.6
Fluorene	8270 (c)	2422		10	69	120	88	96	78	45	18	1.0 U
Phenanthrene	8270 (c)			10	79	130	110	110	69	46	7.8	1.7
Anthracene	8270 (c)	25900		10	13	22	16	15	10	9.1	4.6	1.0 U
Fluoranthene	8270 (c)	27.1		10	9.3	23	14	11	9.1	8.3	9.0	1.0 U
Pyrene	8270 (c)	777		10	9.8	32	14	11	9.1	12	12	1.0 U
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	3.6	1.0 U	1.0 U	1.0 U	0.53	0.45	1.0 U
BTEX (µg/L)												
Benzene	8260/8021	71	250 (e)	5	130	140	130	150	130	130	130	1.0 U
Toluene	8260/8021	485		5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U
Ethylbenzene	8260/8021	276		5	220	230	190	230	190	160	110	1.0 U
m,p-Xylene	8260/8021			5 (d)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U
o-Xylene	8260/8021				5.4	6.0	5.0 U	5.6	5.0 U	5.0 U	5.0 U	1.0 U
DISSOLVED METALS (µg/L)												
Arsenic	200.8	4	37(e)	4	3	3	3 J	3	3.2	7	4	13
CONVENTIONALS												
Total Dissolved Solids (µg/L)	160.1				810,000 J	780,000 J	770,000	740,000	790,000	790,000	751,000	535,000
Total Suspended Solids (µg/L)	160.2				1,000,000 J	400,000	1,400,000 J	920,000	680,000	270,000	938,000	8,300,000
pH	Field				NM	NM	NM	NM	NM	NM	NM	7.36
Specific Conductance (µmhos)	Field				NM	NM	NM	NM	NM	NM	NM	1398
Temperature (°C)	Field				NM	NM	NM	NM	NM	NM	NM	15.01

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	B-6R DH51D 6/22/2001	B-6R DQ61H 9/26/2001	B-6R DY69B 12/19/2001	B-6R EE79I 3/20/2002	MW-109R Dup of B-6R EE79G 3/20/2002	B-6R EM41I 6/19/2002	B-6R FP47H/Q 06/25/03	B-6R GS18J 06/09/04	B6R PL85A 08/25/09
TPH (µg/L)													
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	250 U	250 U	250 U	250 U	250 U	250	250 U	250 U	250 U
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	250 U	250 U	250 UJ	250 U	250 U	250 U	250 U	250 U	250 U
cPAH (µg/L)													
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.10 U	0.26	0.10 U	0.10 U	0.10 U	0.10 U	0.020	0.035	0.19
Chrysene	8270 (c)	1.0	5.7	1.0	0.10 U	0.23	0.10 U	0.10 U	0.10 U	0.10 U	0.020	0.030	0.21
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.15	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.016	0.15
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.16	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.016	0.11
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.10 U	0.21	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.023	0.19
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.11	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.016	0.11
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U	0.10 U
ncPAH (µg/L)													
Naphthalene	8270 (c)	9880		10	1.0 U	7.1 J	4.9 J	4.0 J	2.9 J	1.0 U	0.14	0.13 U	2.6
2-Methylnaphthalene	8270 (c)			10	1.0 U	1.4	1.0 U	1.0 U	1.0 U	1.0 U	0.090	0.030 U	1.0 U
Acenaphthylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 U	0.010 J	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	1.0 UJ	1.1	1.0 U	1.0 U	1.0 U	1.0 U	0.050	0.14 U	1.0 U
Fluorene	8270 (c)	2422		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.020	0.053	1.0 U
Phenanthrene	8270 (c)			10	1.0 U	1.3	1.0 U	1.0 U	1.0 U	1.0 U	0.080	0.16	1.0 U
Anthracene	8270 (c)	25900		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.040	0.065	1.0 U
Fluoranthene	8270 (c)	27.1		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.060	0.081	1.0 U
Pyrene	8270 (c)	777		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.080	0.11	1.0 U
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 U	0.019	1.0 U
BTEX (µg/L)													
Benzene	8260/8021	71	250 (e)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
Toluene	8260/8021	485		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
Ethylbenzene	8260/8021	276		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
m,p-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.4 U	1.0 U
o-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2	1.0 U
DISSOLVED METALS (µg/L)													
Arsenic	200.8	4	37(e)	4	33	31	22 J	27 J	38 J	25	24	30	31
CONVENTIONALS													
Total Dissolved Solids (µg/L)	160.1				1,200,000 J	1,100,000 J	780,000	780,000 J	1,100,000 J	890,000	790,000	923,000	891,000
Total Suspended Solids (µg/L)	160.2				370,000 J	500,000	1,400,000 J	360,000 J	790,000 J	1,100,000	430,000	940,000	1,040,000
pH	Field				6.66	6.75	NM	6.65	6.90	6.95	7.06	6.89	7.39
Specific Conductance (µmhos)	Field				1698	2370	NM	1340	1733	1348	1708	1570	2392
Temperature (°C)	Field				16.8	16.1	NM	15.0	14.1	16.1	16.8	16.6	15.54

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	MW-101R DH51F 6/22/2001	MW-109 Dup of MW-101R DH51E 6/22/2001	MW-101R DQ61A 9/26/2001	MW-101R DY69C 12/19/2001	MW-101R EE79A 3/20/2002	MW-101R EM41A 6/19/2002	MW-109 Dup of MW-101R EM41B 6/19/2002	MW-101R FP47A/J 06/25/03	MW-109 Dup of MW-101R FP47F/O 06/25/03
TPH (µg/L)													
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	2900	2900	3400	2400	3300	4200	3800	3800	3900
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	6100	7400	5300	6300 J	6300	5400	5400	4800	4800
cPAH (µg/L)													
Benzo(a)anthracene	8270 (c)	1.0	6 6	1.0	0.27	0.29	0.37	0.16	0.25	0.17	0 17	0.20	0.20
Chrysene	8270 (c)	1.0	5.7	1.0	0.18	0.20	0.27	0.15	0.14 J	0.14	0.13	0.15	0.13
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.030	0.020
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.030	0.040
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.040	0.040
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0 010 U
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U
ncPAH (µg/L)													
Naphthalene	8270 (c)	9880		10	3100	3200	4900 J	2000 J	3400 J	3200	3400	2900 J	2000 J
2-Methylnaphthalene	8270 (c)			10	600	570	700	350	570	530	530	490 J	600 J
Acenaphthylene	8270 (c)			10	1.5	1.3	2.4	1.0 J	1.5	2.4	2.1	0.58 J	0.53 J
Acenaphthene	8270 (c)	225	440(e)	10	330 J	330 J	350	240 J	330	310	310	260	280
Fluorene	8270 (c)	2422		10	78	64	70	72	75	83	88	79	90
Phenanthrene	8270 (c)			10	74	63	73	97	77	92	99	63	68
Anthracene	8270 (c)	25900		10	7.1	6.8	6.0	6.9	7.4	6 5	6.4	7.2	8 2
Fluoranthene	8270 (c)	27.1		10	6.1	5.8	5.4	5 4	4.7	5.4	5.2	5 4	5.3
Pyrene	8270 (c)	777		10	6.0	5.5	5.2	5.1	4.2	5.0	5.2	6.1	6.1
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1 0 U	1.0 U	1.0 U	1 0 U	1 0 U	1.0 U	0.010 U	0.010 U
BTEX (µg/L)													
Benzene	8260/8021	71	250 (e)	5	72	64	54	48 J	78	70	69	89	96
Toluene	8260/8021	485		5	14	18	8.4	5.0 UJ	7.6	5.7	5.5	5.0 U	4.1
Ethylbenzene	8260/8021	276		5	250 J	130 J	170	130 J	260	250	240	300	260
m,p-Xylene	8260/8021			5 (d)	83 J	110 J	60	46 J	92	46	43	45	48
o-Xylene	8260/8021			5 (d)	39 J	52 J	27	18 J	37	23	22	17	19
DISSOLVED METALS (µg/L)													
Arsenic	200.8	4	37(e)	4	12	12	14	10 J	11	10	11	11	11
CONVENTIONALS													
Total Dissolved Solids (µg/L)	160.1				1000000 J	1100000 J	1000000 J	1100000	970000	1000000	1000000	960,000	950,000
Total Suspended Solids (µg/L)	160.2				76000 J	98000 J	79000	65000 J	71000	72000	72000	79,000	76,000
pH	Field				6.83	6.81	7.25	NM	6.70	6.92	6.98	6.96	6.96
Specific Conductance (µmhos)	Field				2535	2908	2310	NM	2540	1860	2418	1,510	1,510
Temperature (°C)	Field				14.8	14.9	16.4	NM	14.2	12.8	13.6	14.8	14.8

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	MW-101R GS18F 06/09/04	MW-109 Dup of MW-101R GS18G 06/09/04	MW-101R PL72A 08/24/09	MW-109R Dup of MW-101R PL72E 08/24/09
TPH (µg/L)								
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	2700	2600	1600	1500
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	4100	4100	6000	6000
cPAH (µg/L)								
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.23	0.25	0.28 J	0.43 J
Chrysene	8270 (c)	1.0	5.7	1.0	0.16	0.17	0.20 J	0.33 J
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.048 J	0.048 J	0.10 U	0.10 U
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.048 J	0.071	0.10 U	0.10
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.052	0.060	0.10 U	0.14
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.050 U	0.050 U	0.10 U	0.10 U
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.050 U	0.050 U	0.10 U	0.10 U
ncPAH (µg/L)								
Naphthalene	8270 (c)	9880		10	1800	1800	1500	1400
2-Methylnaphthalene	8270 (c)			10	280	290	440	400
Acenaphthylene	8270 (c)			10	2.0	2.3	1.0 U	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	250	260	240	220
Fluorene	8270 (c)	2422		10	72	79	85	76
Phenanthrene	8270 (c)			10	66	75	93	86
Anthracene	8270 (c)	25900		10	6.5	7.6	7.6	7.1
Fluoranthene	8270 (c)	27.1		10	5.0	5.6	6.8	6.0
Pyrene	8270 (c)	777		10	4.6	5.3	6.2	5.3
Benzo(g,h,i)perylene	8270 (c)			10	0.050 U	0.050 U	1.0 U	1.0 U
BTEX (µg/L)								
Benzene	8260/8021	71	250 (e)	5	90	92	36	36
Toluene	8260/8021	485		5	5.5	6.0	2.2	2.3
Ethylbenzene	8260/8021	276		5	210	230	150	150
m,p-Xylene	8260/8021			5 (d)	38	43	25	25
o-Xylene	8260/8021			5 (d)	17	19	18 J	1.0 UJ
DISSOLVED METALS (µg/L)								
Arsenic	200.8	4	37(e)	4	12	12	9.1	9.5
CONVENTIONALS								
Total Dissolved Solids (µg/L)	160.1				1,250,000	1,390,000	1,130,000	1,080,000
Total Suspended Solids (µg/L)	160.2				284,000 J	90,100 J	60,400	59,300
pH	Field				6.67	6.67	6.88	6.88
Specific Conductance (µmhos)	Field				2,012	2,012	2,899	2,899
Temperature (°C)	Field				15.3	15.3	15.0	15.0

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	MW102R DH51B 6/22/2001	MW-102R DQ61B 9/26/2001	MW-109 Dup of MW102R DQ61I 9/26/2001	MW-102R DY69D 12/19/2001	MW-102R EE79B 3/20/2002	MW-102R EM41C 6/19/2002	MW-102R FP47B/K 06/25/03	MW-102R GS18E 06/09/04	MW-102R PL72B 08/24/09
TPH (µg/L)													
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	320	340	320	370	300	400	400	250 U	250 U
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	250 U	250 U	250 UJ	250 UJ	250 U	250 U	250 U	250 U	250 U
cPAH (µg/L)													
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.030 J	0.12	0.10 U
Chrysene	8270 (c)	1.0	5.7	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.020 J	0.098	0.10 U
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 UJ	0.064	0.10 U
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 UJ	0.068	0.10 U
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 UJ	0.064	0.10 U
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 UJ	0.069	0.10 U
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 UJ	0.074	0.10 U
ncPAH (µg/L)													
Naphthalene	8270 (c)	9880		10	1.0 U	8.4 J	1.0 J	12 J	22 J	1.5	0.060 UJ	0.24 U	3.1
2-Methylnaphthalene	8270 (c)			10	1.0 U	1.8	1.0 U	2.1	2.6	1.0 U	0.12 J	0.67	1.0 U
Acenaphthylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.16 J	0.28	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	12 J	11	12	15 J	17	13	11	13	11
Fluorene	8270 (c)	2422		10	3.2	2.9	3.0	3.4	3.7	2.6	2.9	3.2	2.8
Phenanthrene	8270 (c)			10	4.3	4.3	4.3	3.3	3.8	1.0 U	2.7	3.8	3.5
Anthracene	8270 (c)	25900		10	1.0 U	1.0 U	1.1	1.0 U	1.1	1.0 U	0.84 J	0.98	1.0 U
Fluoranthene	8270 (c)	27.1		10	1.0 U	1.0	1.1	1.0 U	1.0 U	1.0 U	0.48 J	1.0	1.0 U
Pyrene	8270 (c)	777		10	1.0 U	1.0 U	1.0	1.0 U	1.0 U	1.0 U	0.40 J	0.85	1.0 U
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 UJ	0.059	1.0 U
BTEX (µg/L)													
Benzene	8260/8021	71	250 (e)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
Toluene	8260/8021	485		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
Ethylbenzene	8260/8021	276		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
m,p-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.4 U	1.0 U
o-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
DISSOLVED METALS (µg/L)													
Arsenic	200.8	4	37(e)	4	7	11	11	3 J	5	4	2 U	6	6.8
CONVENTIONALS													
Total Dissolved Solids (µg/L)	160.1				2,100,000 J	2,100,000 J	2,000,000 J	1,900,000	1,800,000	1,900,000	1,500,000	1,590,000	1,700,000
Total Suspended Solids (µg/L)	160.2				67,000 J	72,000	83,000	61,000 J	51,000	41,000	51,000	40,600	45,500
pH	Field				6.60	6.53	6.53	6.47	6.64	6.70	6.80	6.65	6.43
Specific Conductance (µmhos)	Field				3,875	3,750	3,750	3,740	3,090	3,753	2,710	2,415	3,262
Temperature (°C)	Field				16.0	16.2	16.1	15.1	14.2	15.0	15.6	15.9	16.18

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	MW-104 DH51C 6/22/2001	MW-104 DQ61C 9/26/2001	MW-104 DY69E 12/19/2001	MW-104 EE79C 3/20/2002	MW-104 EM41D 6/19/2002	MW-104 FP47C/L 06/25/03	MW-104 GS18B 06/09/04	MW-104 PL72D 08/24/09
TPH (µg/L)												
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	380	390	470	480	360	460	260	250 U
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	310	260	260 J	290	250 U	250 U	250 U	340
cPAH (µg/L)												
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.13	0.10 U	0.10 U	0.10 U	0.10 U	0.090	0.070	0.14
Chrysene	8270 (c)	1.0	5.7	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.060	0.047	0.13
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U	0.10 U
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U	0.10 U
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U	0.10 U
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U	0.10 U
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.010 U	0.10 U
ncPAH (µg/L)												
Naphthalene	8270 (c)	9880		10	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U	0.40	0.75 U	4.5
2-Methylnaphthalene	8270 (c)			10	1.0 U	4.9	1.0 U	2.0	1.0 U	9.3	1.5	7.8
Acenaphthylene	8270 (c)			10	1.0 U	1.4	1.0 U	1.0 U	2.3	0.47	0.70	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	43 J	46	64 J	50	50	48	45	55
Fluorene	8270 (c)	2422		10	11	10	11	10	6.8	8.5	4.0	15
Phenanthrene	8270 (c)			10	1.0 U	1.6	1.0 U	1.2	1.0 U	0.010 U	0.36	15
Anthracene	8270 (c)	25900		10	1.3	1.0	1.1	1.2	1.0 U	0.77	0.010 U	1.7
Fluoranthene	8270 (c)	27.1		10	1.5	1.5	1.7	1.4	1.4	1.4	1.4	1.8
Pyrene	8270 (c)	777		10	1.1	1.1	1.4	1.0	1.1	1.3	1.1	1.3
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 U	0.010 U	1.0 U
BTEX (µg/L)												
Benzene	8260/8021	71	250 (e)	5	1.7	1.0	1.6	2.1	1.1	1.5	0.7	1.0
Toluene	8260/8021	485		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
Ethylbenzene	8260/8021	276		5	1.5	1.0 U	1.0 U	1.4	1.0 U	1.1	0.6	1.0 U
m,p-Xylene	8260/8021			5 (d)	2.2	1.8	1.9	2.7	1.9	1.6	1.5	1.0 U
o-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.2 U	1.0 U
DISSOLVED METALS (µg/L)												
Arsenic	200.8	4	37(e)	4	1	1	1 J	1	1.0	1	2	7.0
CONVENTIONALS												
Total Dissolved Solids (µg/L)	160.1				550000 J	530000 J	550000	530000	530000	510000	500000	502000
Total Suspended Solids (µg/L)	160.2				19000 J	5100	11000 J	19000	4900	6200	7900	14800
pH	Field				6.74	7.26	6.82	7.27	7.32	7.26	6.86	7.88
Specific Conductance (µmhos)	Field				955	1020	1270	920	1088	641	930	1314
Temperature (°C)	Field				14.7	16.5	13.2	11.4	14.6	15.4	15.2	16.60

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	MW-105 DH51G 6/22/2001	MW-105 DQ61D 9/26/2001	MW-105 DY69F 12/19/2001	MW-105 EE79D 3/20/2002	MW-105 EM41E 6/19/2002	MW-105 FP47D/M 06/25/03	MW-105 GS18D 06/09/04	MW-105 PL85D 08/25/09
TPH (µg/L)												
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	1200	1600	1400	1600	1500	1400	760	250 U
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	2400 J	2300 J	2100 J	2000	1600 J	1500	1100	3000
cPAH (µg/L)												
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.52	0.41	0.77 J	0.85	0.24	0.24	0.46	1.2
Chrysene	8270 (c)	1.0	5.7	1.0	0.35	0.27	0.56 J	0.66 J	0.16	0.15	0.28	1.1
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.12	0.10 U	0.20 J	0.17	0.10 U	0.030	0.10	0.55
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.13	0.10 U	0.32 J	0.36	0.10 U	0.040	0.12	0.74
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.15	0.10 U	0.40 J	0.41	0.10 U	0.040	0.14	1.0
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.19 J	0.15	0.10 U	0.010 U	0.068	0.48
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 UJ	0.10 U	0.10 U	0.010 U	0.053	0.17
ncPAH (µg/L)												
Naphthalene	8270 (c)	9880		10	770	610 J	860 J	940 J	410	480 J	540	240
2-Methylnaphthalene	8270 (c)			10	110	89	74	96	76	71	62	29
Acenaphthylene	8270 (c)			10	1.2	1.7	1.2	1.0 U	1.1	0.29 J	0.98	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	70	67	80 J	79	75	54	48	50
Fluorene	8270 (c)	2422		10	32	29	35	30	32	24	20	19
Phenanthrene	8270 (c)			10	59	60	73	65	57	40	34	30
Anthracene	8270 (c)	25900		10	7.0	6.4	9.6	8.1	5.8	5.6	4.8	4.3
Fluoranthene	8270 (c)	27.1		10	9.5	8.1	11	11	7.4	5.9	6.5	6.0
Pyrene	8270 (c)	777		10	8.1	6.6	9.8	8.2	6.8	6.1	5.7	4.8
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 U	0.062	1.0 U
BTEX (µg/L)												
Benzene	8260/8021	71	250 (e)	5	390	330	270 J	330	220	310	340	410
Toluene	8260/8021	485		5	23	33	18 J	29	22	32	41	92
Ethylbenzene	8260/8021	276		5	82	69	56 J	68	50	52	49	66
m,p-Xylene	8260/8021			5 (d)	60	56	38 J	47	36	37	39	66
o-Xylene	8260/8021			5 (d)	42	37	29 J	29	21	19	15	24
DISSOLVED METALS (µg/L)												
Arsenic	200.8	4	37(e)	4	14	14	18 J	19	12	12	17	1.4
CONVENTIONALS												
Total Dissolved Solids (µg/L)	160.1				3200000 J	3400000 J	2700000	2700000	3300000	2400000	3510000	3100000
Total Suspended Solids (µg/L)	160.2				85000 J	100000	110000 J	97000	88000	98000	44900	91100
pH	Field				7.01	6.72	6.73	6.87	6.94	7.08	7	NM
Specific Conductance (µmhos)	Field				7525	6230	5850	5460	6830	6610	5262	NM
Temperature (°C)	Field				17.6	18.9	16.6	15.8	17.0	17.3	17.2	NM

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (µg/L)	Background-based Screening Level (a) (µg/L)	Practical Quantitation Limits (µg/L)	MW-107R DH51H 6/22/2001	MW-107R DQ61E 9/26/2001	MW-107R DY69G 12/19/2001	MW-107R EE79E 3/20/2002	MW-107R EM41F 6/19/2002	MW-107R FP47E/N 06/25/03	MW-107R GS18C 06/09/04	MW-107R PL85C 08/25/09
TPH (µg/L)												
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	890	1900	630	1200	1000	1400	680	290
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	1500	3900	780 J	1200	1700	2500	880	1300
cPAH (µg/L)												
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.053	0.10 U
Chrysene	8270 (c)	1.0	5.7	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.051	0.10 U
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.050 U	0.10 U
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.050 U	0.10 U
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.050 U	0.10 U
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.050 U	0.10 U
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.050 U	0.10 U
ncPAH (µg/L)												
Naphthalene	8270 (c)	9880		10	1300	1400 J	990 J	2200 J	1000	1400 J	1200	480
2-Methylnaphthalene	8270 (c)			10	130	150	66	150	77	220	140	100
Acenaphthylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.30 J	0.47	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	47	56	38 J	63	43	76	58	44
Fluorene	8270 (c)	2422		10	14	15	10	17	13	27	19	12
Phenanthrene	8270 (c)			10	9.8	12	7.6	14	8.8	18	14	8.7
Anthracene	8270 (c)	25900		10	1.0 U	1.0	1.0 U	1.0	1.0 U	1.4	1.0	1.0 U
Fluoranthene	8270 (c)	27.1		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.49	0.47	1.0 U
Pyrene	8270 (c)	777		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.44	0.49	1.0 U
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 U	0.050 U	1.0 U
BTEX (µg/L)												
Benzene	8260/8021	71	250 (e)	5	5.0 U	5.7	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U
Toluene	8260/8021	485		5	7.3	22	5.0 UJ	5.0 U	5.0 U	9.0	5.0 U	1.0 U
Ethylbenzene	8260/8021	276		5	47	110	21 J	33	32	72	24	15
m,p-Xylene	8260/8021			5 (d)	32	89	15 J	23	23	45	15	7.8
o-Xylene	8260/8021			5 (d)	20	66	11 J	15	13	30	11	5.9
DISSOLVED METALS (µg/L)												
Arsenic	200.8	4	37(e)	4	8	8	7 J	7	5	3	8	4.4
CONVENTIONALS												
Total Dissolved Solids (µg/L)	160.1				1,900,000 J	1,300,000 J	1,700,000	1,500,000	1,800,000	1,500,000	1,550,000	1,250,000
Total Suspended Solids (µg/L)	160.2				65,000 J	63,000	53,000 J	46,000	48,000	53,000	45,800	38,400
pH	Field				6.84	7.31	6.79	6.85	6.90	6.94	6.85	7.36
Specific Conductance (µmhos)	Field				3,550	2,900	3,710	2,780	3,303	2,630	2,792	3,107
Temperature (°C)	Field				13.6	14.6	12.4	11.9	13.0	14.0	14.0	13.09

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (μg/L)	Background-based Screening Level (a) (μg/L)	Practical Quantitation Limits (μg/L)	MW-108R DH51A 6/22/2001	MW-108R DQ61F 9/26/2001	MW-108R DY69H 12/19/2001	MW-109R Dup of MW108R DY69I 12/19/2001	MW-108R EE79F 3/20/2002	MW-108R EM41G 6/19/2002	MW-108R FP47I/R 06/25/03	MW-108R GS18H 06/09/04	MW-108R PL72C 08/24/09
TPH (μg/L)													
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400(e)	400 (b)	250 U	250 U	250 U	250 U	250 U	330	250 U	250 U	250 U
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (b)	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500(e)	600 (b)	250 UJ	250 J	250 UJ	250 UJ	250 U	250 UJ	250 U	250 U	250 U
cPAH (μg/L)													
Benzo(a)anthracene	8270 (c)	1.0	6.6	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.030	0.10	0.10 U
Chrysene	8270 (c)	1.0	5.7	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.020	0.099	0.10 U
Benzo(b)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.055	0.10 U
Benzo(k)fluoranthene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.074	0.10 U
Benzo(a)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.066	0.10 U
Indeno(1,2,3-cd)pyrene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.070	0.10 U
Dibenzo(a,h)anthracene	8270 (c)	1.0		1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.010 U	0.070	0.10 U
ncPAH (μg/L)													
Naphthalene	8270 (c)	9880		10	30	22 J	31 J	20 J	27 J	49	33 J	11	12
2-Methylnaphthalene	8270 (c)			10	5.4	3.9	4.7	3.7	5.0	7.9	6.2	2.8	1.6
Acenaphthylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.040	0.050 U	1.0 U
Acenaphthene	8270 (c)	225	440(e)	10	3.8 J	2.6	3.0 J	2.3 J	3.0	4.6	3.3	2.1	2.1
Fluorene	8270 (c)	2422		10	1.1	1.0	1.1	1.0 U	1.0	1.4	1.1	1.0	1.0 U
Phenanthrene	8270 (c)			10	1.7	1.8	2.0	1.7	1.6	1.7	1.5	1.9	1.0
Anthracene	8270 (c)	25900		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.22	0.29	1.0 U
Fluoranthene	8270 (c)	27.1		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.16	0.28	1.0 U
Pyrene	8270 (c)	777		10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.21	0.30	1.0 U
Benzo(g,h,i)perylene	8270 (c)			10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.010 U	0.058	1.0 U
BTEX (μg/L)													
Benzene	8260/8021	71	250 (e)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	8260/8021	485		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	8260/8021	276		5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.5	1.0 U	1.0 U
m,p-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
o-Xylene	8260/8021			5 (d)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
DISSOLVED METALS (μg/L)													
Arsenic	200.8	4	37(e)	4	6	4	9 J	14 J	6	5	2 U	5 U	2 U
CONVENTIONALS													
Total Dissolved Solids (μg/L)	160.1				11,000,000 J	11,000,000 J	9,900,000	9,800,000	10,000,000	10,000,000	11,000,000	8,970,000	9,040,000
Total Suspended Solids (μg/L)	160.2				130,000 J	99,000	130,000 J	94,000 J	87,000	84,000	86,000	79,100	60,100
pH	Field				6.72	7.39	6.76	6.77	6.72	6.73	6.71	6.76	6.45
Specific Conductance (μmhos)	Field				18,925	18,800	19,300	19,300	1,800	2,548	21,100	11,900	16,760
Temperature (°C)	Field				15.0	16.2	13.6	13.4	13.1	14.4	15.2	15.4	15.51

TABLE 4-2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
06/01 TO 08/09
UNION STATION

cPAH =Carcinogenic polycyclic aromatic hydrocarbons

NA = Not analyzed for this constituent.

NM = Not measured due to insufficient volume.

U = Indicates the compound was undetected at the listed concentration

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

M = Indicates an estimated value of analyte detected and confirmed by analyst with low spectral match parameters.

Note: All metals samples were field filtered.

(a) Screening level is based on the 90th percentile of the background data obtained from well B4 or B6/B6R.
The 90th percentile was calculated using MTCA stat Background Module V2.0.

(b) PQL calculated from method detection limit.

(c) Analytical results reported from analyses using EPA Method 8270 or EPA Method 8270-SIM

(d) PQL identified for total xylenes in CAP.

TABLE 5-1
90TH PERCENTILE VALUES FOR PETROLEUM-RELATED CONSTITUENTS IN MONITORING WELL B-4/B-4R

Constituent	Based on Data from Oct. 1997 to August 2009	Based on Data from Oct. 1997 to Dec. 2000 and August 2009
Diesel-Range Petroleum Hydrocarbons	8000	6400
Gasoline-Range Petroleum Hydrocarbons	7300	7500
Benzene	230	250
Acenaphthene	430	440
Benzo(a)anthracene	2.8	6.6
Chrysene	2.9	5.7

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - BACKGROUND WELL B4/B4R
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	7	1	13	---	---	2600	15000	6714	4058	6100
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	4	4	50	---	---	1200	6800	3225	2482	2450
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	7	1	13	---	---	1800	6500	4843	1678	5400
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	5.6	1.0	8	6	2	25	---	---	1.0	8.3	2.8	2.7	1.9
Chrysene	8270-SIM	1.0	5.7	1.0	8	5	3	38	---	---	1.3	7.4	2.8	2.6	1.7
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	2	6	75	---	---	1.1	4.3	2.7	2.3	2.7
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	4	4	50	---	---	1.0	5.6	2.2	2.3	1.2
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	5	3	38	---	---	1.0	7.2	2.4	2.7	1.2
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	1	7	88	---	---	3.6	3.6	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	---	---	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	6	2	25	---	---	710	3200	2135	964	2500
2-Methylnaphthalene	8270			10	8	6	2	25	---	---	160	510	395	148	465
Acenaphthylene	8270			10	8	1	7	88	---	---	10	10	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	7	1	13	---	---	69	350	226	141	295
Fluorene	8270	2422		10	8	7	1	13	---	---	18	120	64	40	74
Phenanthrene	8270			10	8	6	2	25	---	---	46	130	91	31	95
Anthracene	8270	25900		10	8	5	3	38	---	---	10	22	15	4	15
Fluoranthene	8270	27		10	8	3	5	63	---	---	11	23	16	6	14
Pyrene	8270	777		10	8	5	3	38	---	---	11	32	16	9	12
Benzo(g,h,i)perylene	8270			10	8	0	8	100	---	---	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	7	1	13	---	---	130	150	118	48	130
Toluene	8260	485		5	8	0	8	100	---	---	--	--	--	--	--
Ethylbenzene	8260	276		5	8	7	1	13	---	---	110	230	166	78	190
m,p-Xylene	8260			5 (n)	8	0	8	100	---	---	--	--	--	--	--
o-Xylene	8260			5 (n)	8	3	5	63	---	---	5.4	6	5.7	0.3	5.6
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	3	5	63	---	---	4.0	13.4	8.1	4.8	7.0

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - BACKGROUND WELL B6R
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	0	8	100	---	---	--	--	--	--	--
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	---	---	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	0	8	100	---	---	--	--	--	--	--
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	0	8	100	---	---	--	--	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	0	8	100	---	---	--	--	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	---	---	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	---	---	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	0	8	100	---	---	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	---	---	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	---	---	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	0	8	100	---	---	--	--	--	--	--
2-Methylnaphthalene	8270			10	8	0	8	100	---	---	--	--	--	--	--
Acenaphthylene	8270			10	8	0	8	100	---	---	--	--	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	0	8	100	---	---	--	--	--	--	--
Fluorene	8270	2422		10	8	0	8	100	---	---	--	--	--	--	--
Phenanthrene	8270			10	8	0	8	100	---	---	--	--	--	--	--
Anthracene	8270	25900		10	8	0	8	100	---	---	--	--	--	--	--
Fluoranthene	8270	27		10.0	8	0	8	100	---	---	--	--	--	--	--
Pyrene	8270	777		10	8	0	8	100	---	---	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	---	---	---	---	---	---	---
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	0	8	100	---	---	--	--	--	--	--
Toluene	8260	485		5	8	0	8	100	---	---	--	--	--	--	--
Ethylbenzene	8260	276		5	8	0	8	100	---	---	--	--	--	--	--
m,p-Xylene	8260			5 (n)	8	0	8	100	---	---	--	--	--	--	--
o-Xylene	8260			5 (n)	8	0	8	100	---	---	--	--	--	--	--
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	8	0	0	---	---	22	33	28	4	29

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - WELL MW101R
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	8	0	0	1	3884 (l)	1600	4200	3038	823	3100
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	0	NC	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	8	0	0	1	6067 (l)	4100	6300	5538	791	5700
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	0	8	100	0	NC	--	--	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	8	0	0	1	3970 (l)	1500	4900	2850	1092	3000
2-Methylnaphthalene	8270			10	8	8	0	0	1	630 (l)	280	700	495	136	510
Acenaphthylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	8	0	0	1	350 (l)	240	350	289	46	285
Fluorene	8270	2422		10	8	8	0	0	1	81 (l)	70	85	77	5	77
Phenanthrene	8270			10	8	8	0	0	1	89 (l)	63	97	79	13	76
Anthracene	8270	25900		10	8	0	8	100	0	NC	--	--	--	--	--
Fluoranthene	8270	27		10	8	0	8	100	0	NC	--	--	--	--	--
Pyrene	8270	777		10	8	0	8	100	0	NC	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	8	0	0	1	87 (l)	36	90	67	19	71
Toluene	8260	485		5	8	5	3	38	2	11 (i)	6	14	8	3	8
Ethylbenzene	8260	276		5	8	8	0	0	1	273 (l)	130	300	215	60	230
m,p-Xylene	8260			5 (n)	8	8	0	0	1	78 (l)	25	92	54	23	46
o-Xylene	8260			5 (n)	8	8	0	0	1	39 (l)	17	39	25	9	21
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	8	0	0	1	12 (l)	9.1	14	11	2	11

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - WELL MW102R
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	2	6	75	3	400 (m)	400	400	400	0	400
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	0	NC	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	0	8	100	0	NC	--	--	--	--	--
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	0	8	100	0	NC	--	--	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	2	6	75	3	22 (m)	12	22	17	7	17
2-Methylnaphthalene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthylene	8270				8	0	8	100	0	NC	--	--	--	--	--
Acenaphthene	8270	225	440 (g)		8	8	0	0	1	17 (j)	11	17	13	2	13
Fluorene	8270	2422		10	8	0	8	100	0	NC	--	--	--	--	--
Phenanthrene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Anthracene	8270	25900		10	8	0	8	100	0	NC	--	--	--	--	--
Fluoranthene	8270	27		10	8	0	8	100	0	NC	--	--	--	--	--
Pyrene	8270	777		10	8	0	8	100	0	NC	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	0	8	100	0	NC	--	--	--	--	--
Toluene	8260	485		5	8	0	8	100	0	NC	--	--	--	--	--
Ethylbenzene	8260	276		5	8	0	8	100	0	NC	--	--	--	--	--
m,p-Xylene	8260			5 (n)	8	0	8	100	0	NC	--	--	--	--	--
o-Xylene	8260			5 (n)	8	0	8	100	0	NC	--	--	--	--	--
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	6	2	25	2	9 (i)	4	11	7	2	6

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - WELL MW104
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	3	5	63	3	480 (m)	460	480	470	10	470
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	0	NC	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	0	8	100	0	NC	--	--	--	--	--
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	0	8	100	0	NC	--	--	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	0	8	100	0	NC	--	--	--	--	--
2-Methylnaphthalene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	8	0	0	1	55 (l)	43	64	50	7	49
Fluorene	8270	2422		10	8	5	3	37.5	2	15 (j)	10	15	11	2	11
Phenanthrene	8270			10	8	1	7	88	3	15 (m)	15	15	15	0	15
Anthracene	8270	25900		10	8	0	8	100	0	NC	--	--	--	--	--
Fluoranthene	8270	27		10	8	0	8	100	0	NC	--	--	--	--	--
Pyrene	8270	777		10	8	0	8	100	0	NC	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	0	8	100	0	NC	--	--	--	--	--
Toluene	8260	485		5	8	0	8	100	0	NC	--	--	--	--	--
Ethylbenzene	8260	276		5	8	0	8	100	0	NC	--	--	--	--	--
m,p-Xylene	8260			5 (n)	8	0	8	100	0	NC	--	--	--	--	--
o-Xylene	8260			5 (n)	8	0	8	100	0	NC	--	--	--	--	--
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	1	7	88	3	7 (m)	7	7	--	--	--

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - WELL MW105
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	7	1	13	1	1600 (j)	760	1600	1351	295	1400
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	0	NC	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	8	0	0	1	2583 (l)	1100	3000	2000	595	2050
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	1	7	88	3	1.2 (m)	1.2	1.2	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	1	7	88	3	1.1 (m)	1.1	1.1	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	1	7	88	3	1.0 (m)	1.0	1.0	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	8	0	0	1	909 (l)	240	940	606	238	575
2-Methylnaphthalene	8270			10	8	8	0	0	1	92 (l)	29	110	76	24	75
Acenaphthylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	8	0		1	76 (l)	48	80	65	13	69
Fluorene	8270	2422		10	8	8	0	0	1	33 (j)	19	35	28	6	30
Phenanthrene	8270			10	8	8	0	0	1	68 (l)	30	73	52	16	58
Anthracene	8270	25900		10	8	0	8	100	0	NC	--	--	--	--	--
Fluoranthene	8270	27		10.0	8	2	6	75	3	11 (m)	11	11	11	0	11
Pyrene	8270	777		10	8	0	8	100	0	NC	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	8	0	0	1	377 (l)	220	410	325	61	330
Toluene	8260	485		5	8	8	0	0	1	92 (j)	18	92	36	24	31
Ethylbenzene	8260	276		5	8	8	0	0	1	71 (l)	49	82	62	12	61
m,p-Xylene	8260			5 (n)	8	8	0		1	66 (j)	36	66	47	12	43
o-Xylene	8260			5 (n)	8	8	0	0	1	36 (l)	15	42	27	9	27
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	7	1	13	1	19 (j)	12	19	15	3	14

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - WELL MW107R
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	7	1	13	1	1903 (l)	630	1900	1100	446	1000
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	0	NC	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	500 (h)	8	8	0	0	1	2812 (l)	780	3900	1720	1031	1400
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	0	8	100	0	NC	--	--	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	8	0	0	1	2200 (j)	480	2200	1246	489	1250
2-Methylnaphthalene	8270			10	8	8	0	0	1	181 (l)	66	220	129	49	135
Acenaphthylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	8	0	0	1	63 (l)	38	76	53	13	52
Fluorene	8270	2422		10	8	8	0	0	1	20 (l)	10	27	16	5	15
Phenanthrene	8270			10	8	4	4	50	2	15 (i)	12	18	15	3	14
Anthracene	8270	25900		10	8	0	8	100	0	NC	--	--	--	--	--
Fluoranthene	8270	27		10	8	0	8	100	0	NC	--	--	--	--	--
Pyrene	8270	777		10	8	0	8	100	0	NC	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	1	7	88	3	5.7 (m)	5.7	5.7	--	--	--
Toluene	8260	485		5	8	3	5	63	3	22 (m)	7.3	22	13	8	9
Ethylbenzene	8260	276		5	8	8	0	0	1	87 (l)	15	110	44	32	33
m,p-Xylene	8260			5 (n)	8	8	0	0	1	71 (l)	7.8	89	31	26	23
o-Xylene	8260			5 (n)	8	8	0	0	1	47 (l)	5.9	65	21	19	14
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	7	1	13	1	8 (j)	4	8	7	1	7

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - WELL MW108R
06/01 TO 08/09
UNION STATION

Analyte	Method	CAP Cleanup Level (a) (µg/L)	Background-based Screening Level (µg/L)	Practical Quantitation Limits (b) (µg/L)	Number of Samples (c)	Number of Detects (>= PQL)	Number of Censored Data (d)	Percent Censored Data	Statistical Case No. (e)	UCL (f)	Minimum Uncensored Data	Maximum Uncensored Data	Mean of Uncensored Data (f)	Std. Dev. of Uncensored Data (f)	Median of Uncensored Data (f)
TPH (µg/L)															
Diesel-Range Petroleum Hydrocarbons	WTPH-Dx		6,400 (g)	400 (h)	8	0	8	100	0	NC	--	--	--	--	--
Motor Oil-Range Petroleum Hydrocarbons	WTPH-Dx			1100 (h)	8	0	8	100	0	NC	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	WTPH-G		7,500 (g)	600 (h)	8	0	8	100	0	NC	--	--	--	--	--
cPAH (µg/L)															
Benzo(a)anthracene	8270-SIM	1.0	6.6	1.0	8	0	8	100	0	NC	--	--	--	--	--
Chrysene	8270-SIM	1.0	5.7	1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(b)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(k)fluoranthene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Benzo(a)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
Dibenzo(a,h)anthracene	8270-SIM	1.0		1.0	8	0	8	100	0	NC	--	--	--	--	--
ncPAH (µg/L)															
Naphthalene	8270	9880		10	8	8	0	0	1	44 (l)	11	49	27	12	29
2-Methylnaphthalene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Acenaphthene	8270	225	440 (g)	10	8	0	8	100	0	NC	--	--	--	--	--
Fluorene	8270	2422		10	8	0	8	100	0	NC	--	--	--	--	--
Phenanthrene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
Anthracene	8270	25900		10	8	0	8	100	0	NC	--	--	--	--	--
Fluoranthene	8270	27		10	8	0	8	100	0	NC	--	--	--	--	--
Pyrene	8270	777		10	8	0	8	100	0	NC	--	--	--	--	--
Benzo(g,h,i)perylene	8270			10	8	0	8	100	0	NC	--	--	--	--	--
BTEX (µg/L)															
Benzene	8260	71	250 (g)	5	8	0	8	100	0	NC	--	--	--	--	--
Toluene	8260	485		5	8	0	8	100	0	NC	--	--	--	--	--
Ethylbenzene	8260	275		5	8	0	8	100	0	NC	--	--	--	--	--
m,p-Xylene	8260			5 (n)	8	0	8	100	0	NC	--	--	--	--	--
o-Xylene	8260			5 (n)	8	0	8	100	0	NC	--	--	--	--	--
DISSOLVED METALS (µg/L)															
Arsenic	200.8	4	37 (g)	4	8	5	3	38	2	7 (i)	4	9	6	2	6

TABLE 5-2
STATISTICAL SUMMARY OF GROUNDWATER DATA - FOOTNOTES
UNION STATION

-- = Not Applicable.

UCL = Upper confidence limit.

NC = Not calculated.

[boxed cell] = UCL exceeds the cleanup level.

(a) Cleanup levels are from Table 1 of the Cleanup Action Plan, unless otherwise indicated.

(b) Practical quanitation limits are from Table 1 of the Cleanup Action Plan, unless otherwise indicated.

(c) The number of samples is equal to the number of samples analyzed.

(d) Censored data consists of nondetected results and detected values less than the PQL.

(e) Statistical Case Nos:

- 0 = Data set consists of 100% censored data
- 1 = Data set consists of not more than 15 % censored data.
- 2 = Data set consists of more than 15 % censored data but less than or equal to 50% censored data.
- 3 = Data set consists of more than 50 % censored data but less than 100 % censored data.

(f) No UCL, mean, standard deviation, or median were calculated for data sets with 100% censored data. Also, no UCL was calculated for background wells B-4 and B-6/B-6R.

(g) Screening level is based on the 90th percentile of the background data obtained from well B4 or B6/B6R. The 90th percentile was calculated using MTCAstat 97 Background Module.

(h) Practical quantitation limit is equal to approximately 10 times the laboratory method detection limit.

(i) Upper confidence limit calculated using MTCAStat 97 Site Module.

(j) The data set was determined to be neither lognormally nor normally distributed by MTCAstat; therefore, in accordance with the Supplement to Statistical Guidance for Ecology Site Managers (Ecology 1993), the upper confidence level was set equal to the maximum concentration in the data set.

(k) Practical quantitation limit based on method reporting limit and PQLs of similar compounds

(l) The data set consists of less than or equal to 15 % censored data (Case No. 1): therefore, in accordance with the Supplement to Statsical Guidance for Ecology Site Managers (Ecology 1993), all nondetected values were replaced with 1/2 the detection limit and all detected values less than the PQL were replaced with the detection limit. Statistics were then performed on the adjusted data.

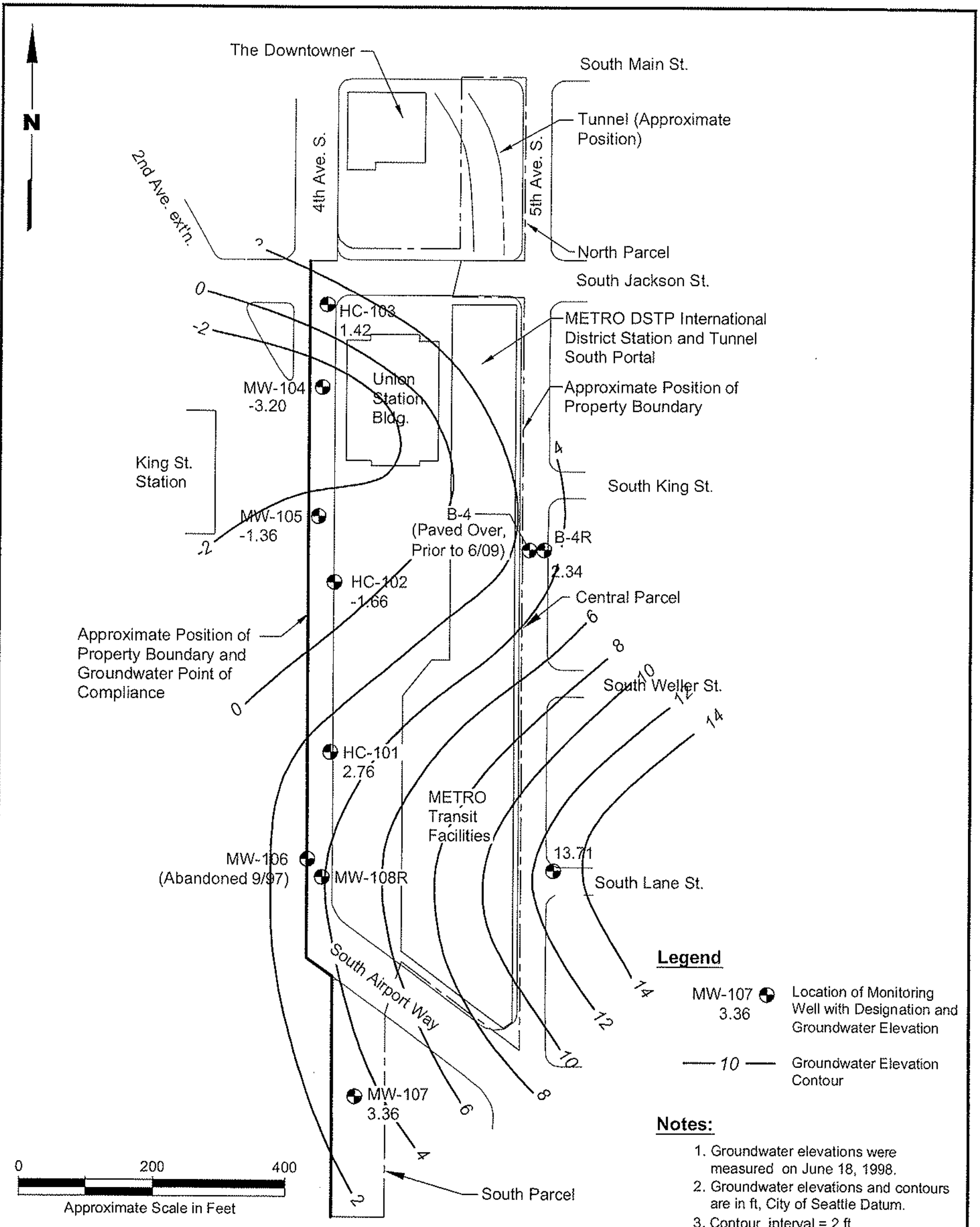
(m) Greater than 50% of the data are censored; therefore, in accordance with the Supplement to Statistical Guidance for Ecology Site Managers (Ecology 1993), the upper 95% confidence limit was set equal to the maximum concentration in the data set.

(n) Practical quantitation limit identified for total xylenes in Cleanup Action Plan.

TABLE 5-3
SUMMARY OF CLEANUP AND SCREENING LEVEL EXCEEDANCES
(Concentrations in μg/L)

Constituent	Location	CAP CUL	Background-based Screening Levels	6/2001 - 8/2009 UCL	3/2001 - 6/2004 UCL	12/2000 - 6/2003 UCL	9/2000 - 6/2002 UCL	9/1999 - 6/2001 UCL	6/1998 - 6/2000 UCL	Comments
Acenaphthene										Apparent off-property sources
	MW-101R	225	440	350	350	350	350	340	276	
Benzene										Apparent off-property sources
	Well MW-101R	71	250	87	87	82	77	78	104	
	Well MW-105	71	250	337	346	350	361	376	373	
Arsenic										Apparent off-property sources
	MW-101R	4	37	12	12	13	13	14	14	
	MW-102R	4	37	9	8	9	9	9	7	
	MW-104	4	37	7						
	MW-105	4	37	19	17	19	19	18	21	
	MW-107R	4	37	8	8	8	8	8	10	
	MW-108R	4	37	7	9	15	15	12	8	
Benzo(a)anthracene										Apparent off-property sources
	MW-105	1.0	6.6	1.2	--	--	--	--	--	
Chrysene										Apparent off-property sources
	MW-105	1.0	5.7	1.1	--	--	--	--	--	

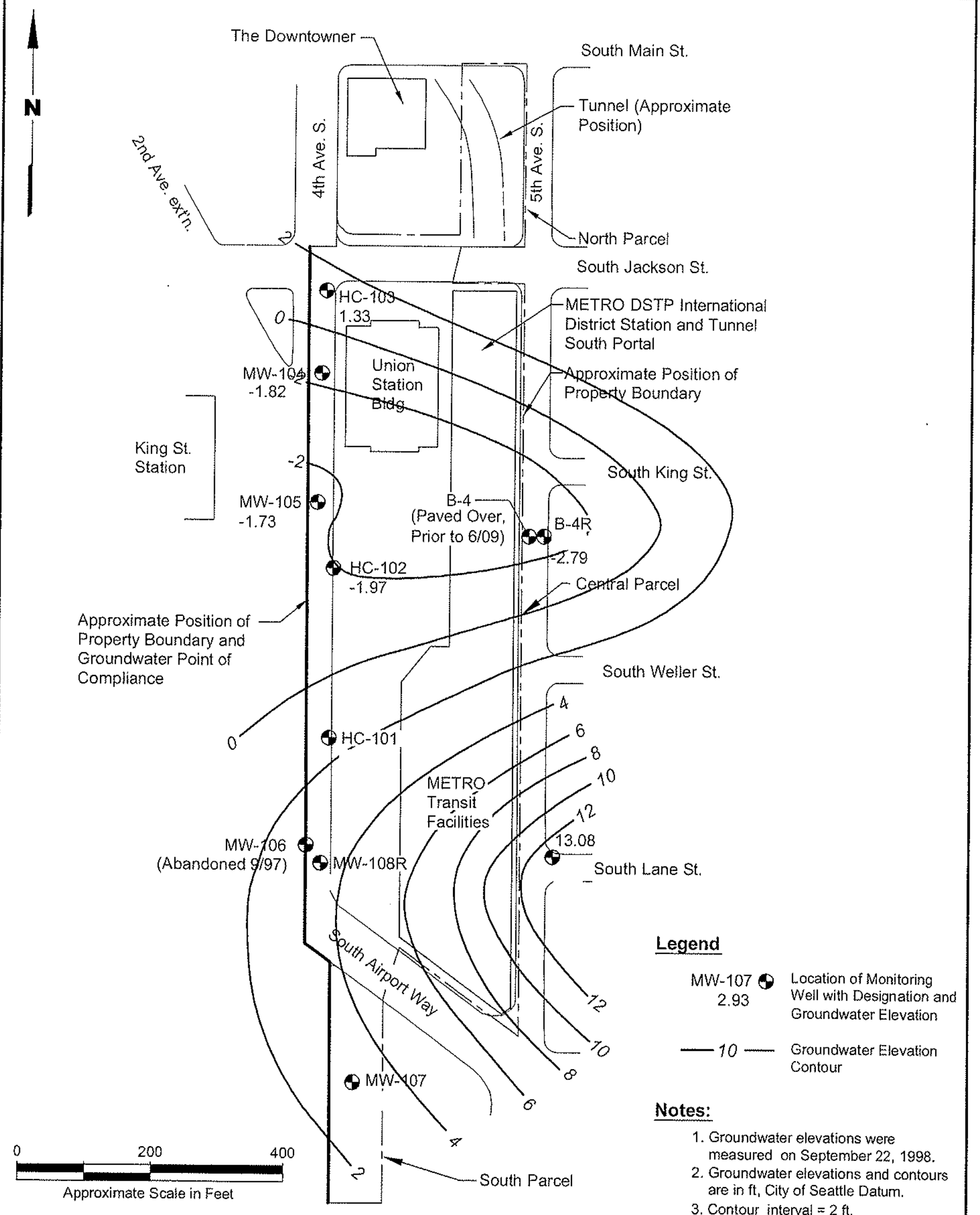
CAP CUL = Cleanup level listed in the Cleanup Action Plan.
UCL = Upper Confidence Limit.
-- = Indicates a UCL was not calculated because all concentrations were below the PQL during the respective period.



Union Station/Groundwater Monitoring Report | V:\429\002\052\D\09 Annual Report\Fig4-1.dwg (A) "Figure B-1" 11/2/2009

LANDAU ASSOCIATES

Union Station Seattle, WA	Groundwater Elevation Contours: June 1998	Figure B-1



Notes:

1. Groundwater elevations were measured on September 22, 1998.
2. Groundwater elevations and contours are in ft, City of Seattle Datum.
3. Contour interval = 2 ft.

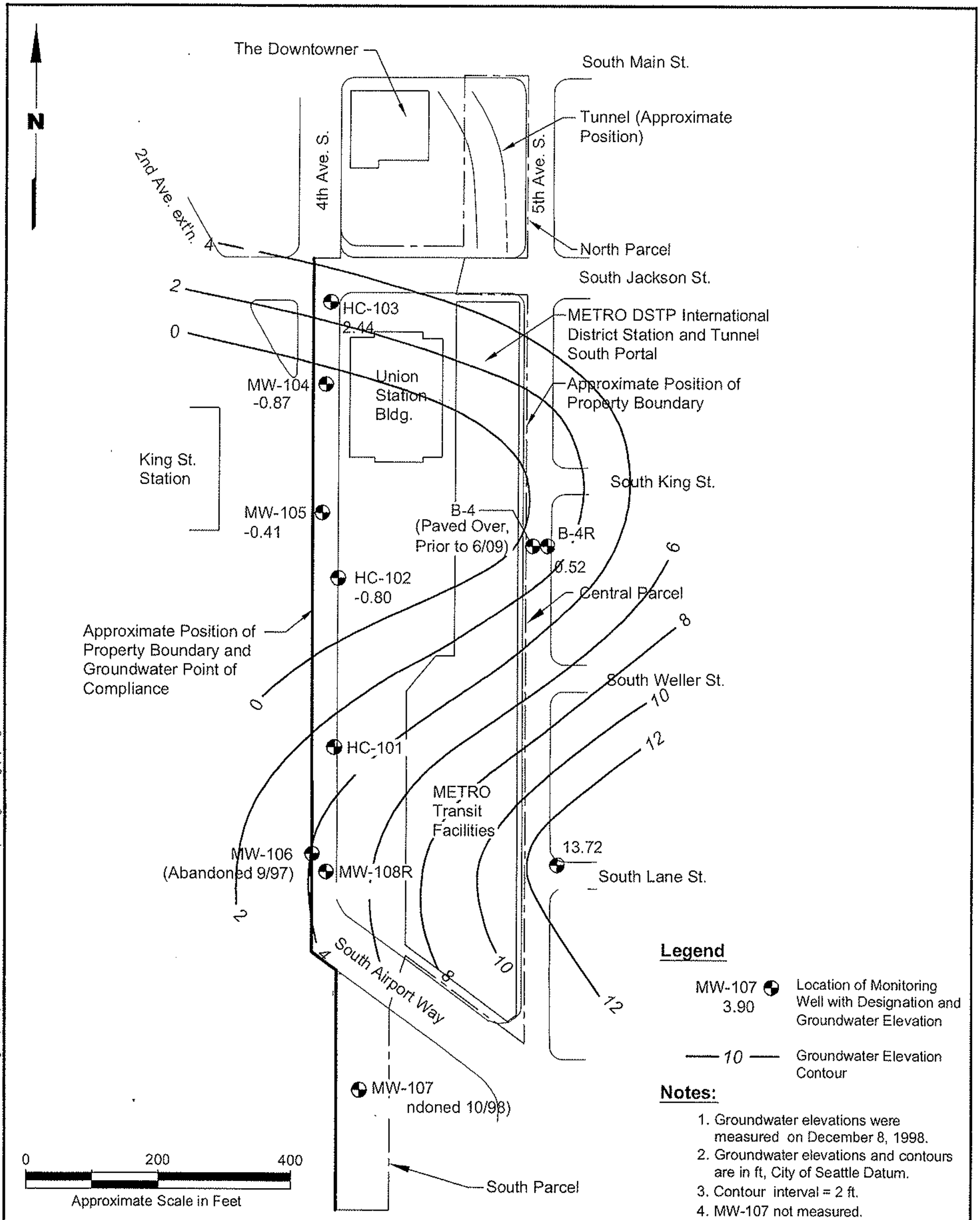
Union Station\Groundwater Monitoring Report | V:\429\002\052\D\09 Annual Report\Fig4-1.dwg (A) "Figure B-2" 11/2/2009

LANDAU ASSOCIATES

Union Station
Seattle, WA

Groundwater Elevation Contours: September 1998

Figure **B-2**

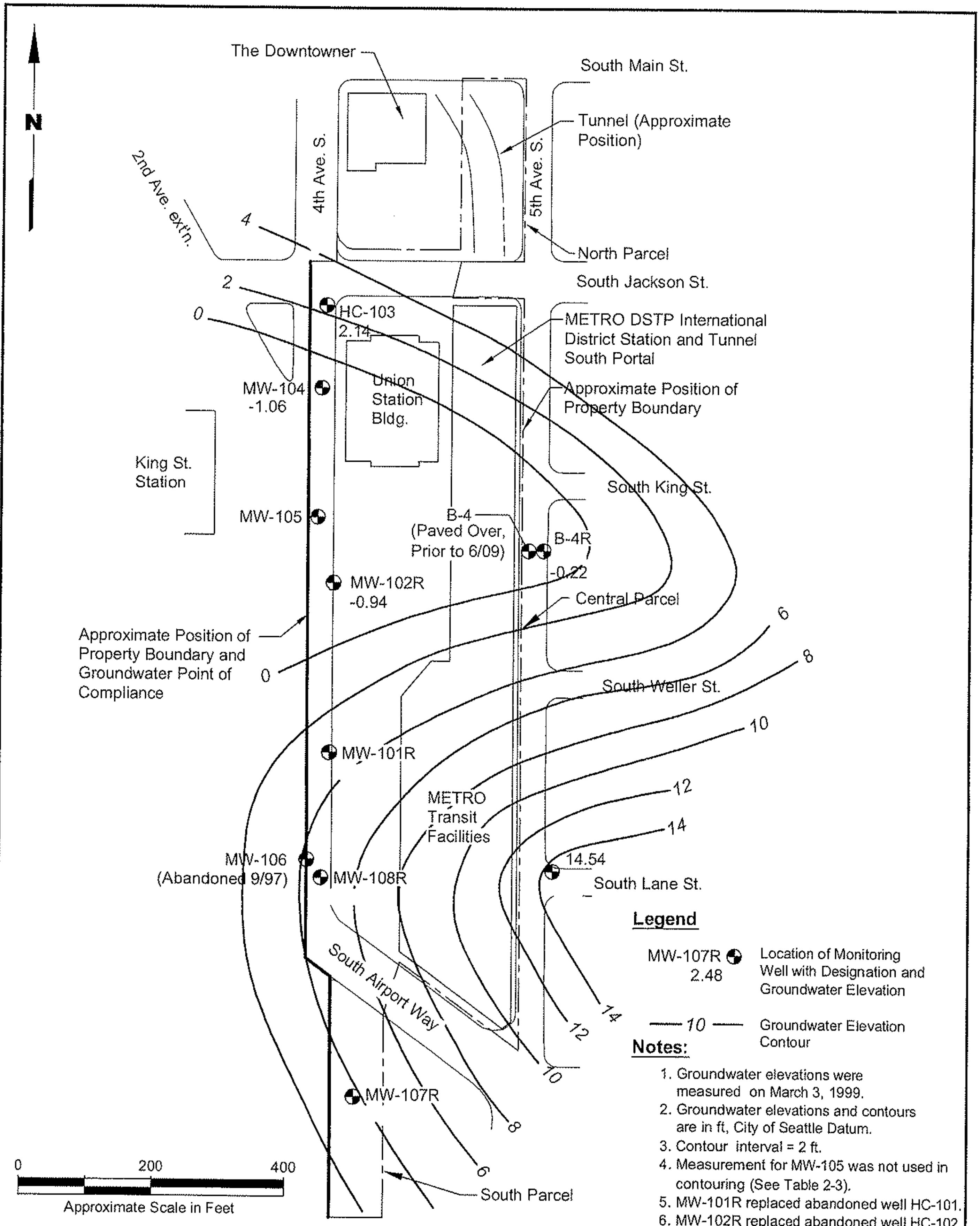


Notes:

1. Groundwater elevations were measured on December 8, 1998.
2. Groundwater elevations and contours are in ft, City of Seattle Datum.
3. Contour interval = 2 ft.
4. MW-107 not measured.

Union Station/Groundwater Monitoring Report | V:\429\002\052\D\09 Annual Report\Fig4-1.dwg (A) "Figure B-3" 11/2/2009

LANDAU ASSOCIATES	Union Station Seattle, WA	**Groundwater Elevation Contours: December 1998**	Figure B-3



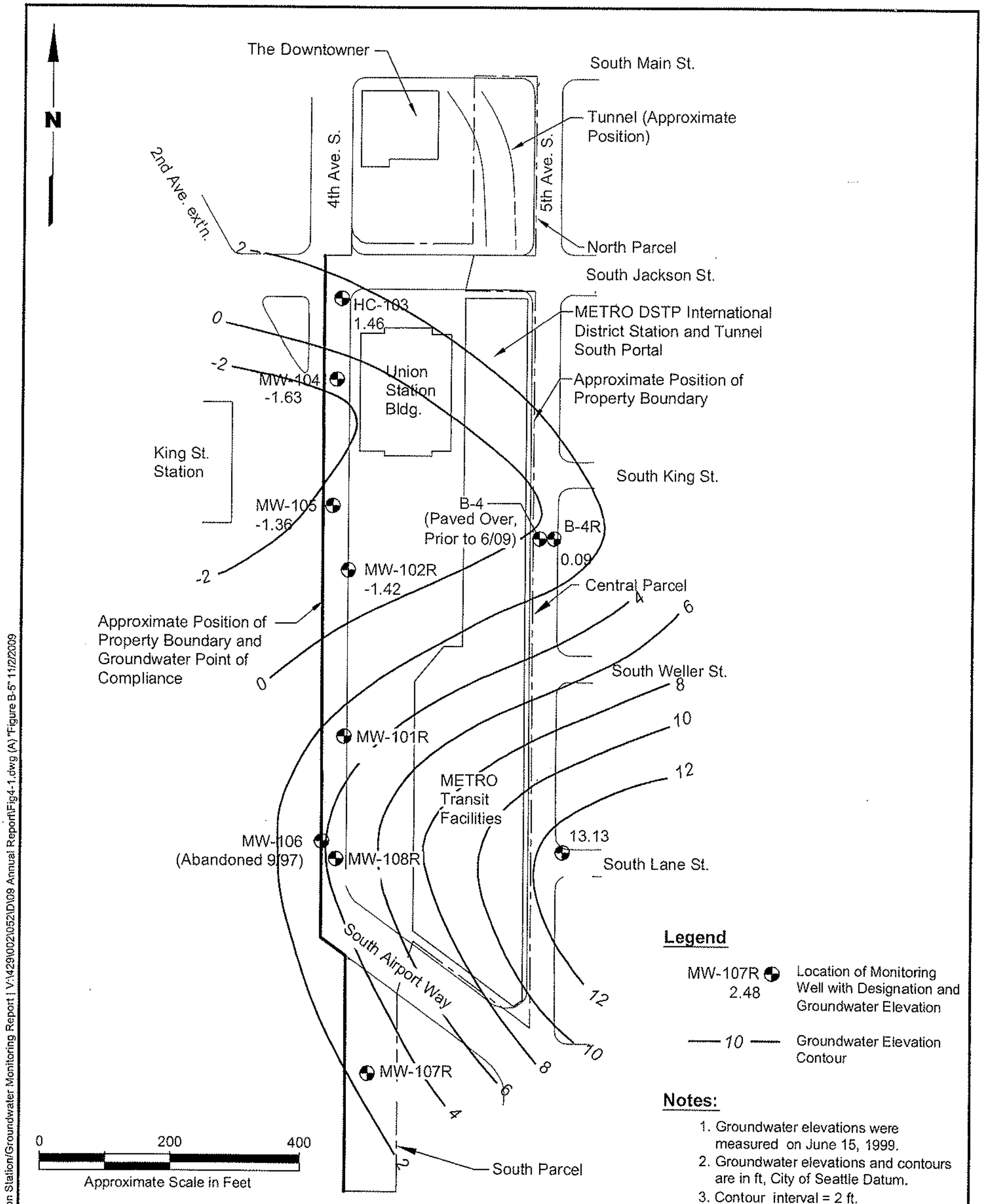
Union Station/Groundwater Monitoring Report | V:\1429\002\052\D109 Annual Report\Fig4-1.dwg (A) "Figure B-4" 11/2/2009

LANDAU ASSOCIATES

Union Station
Seattle, WA

Groundwater Elevation Contours: March 1999

Figure
B-4

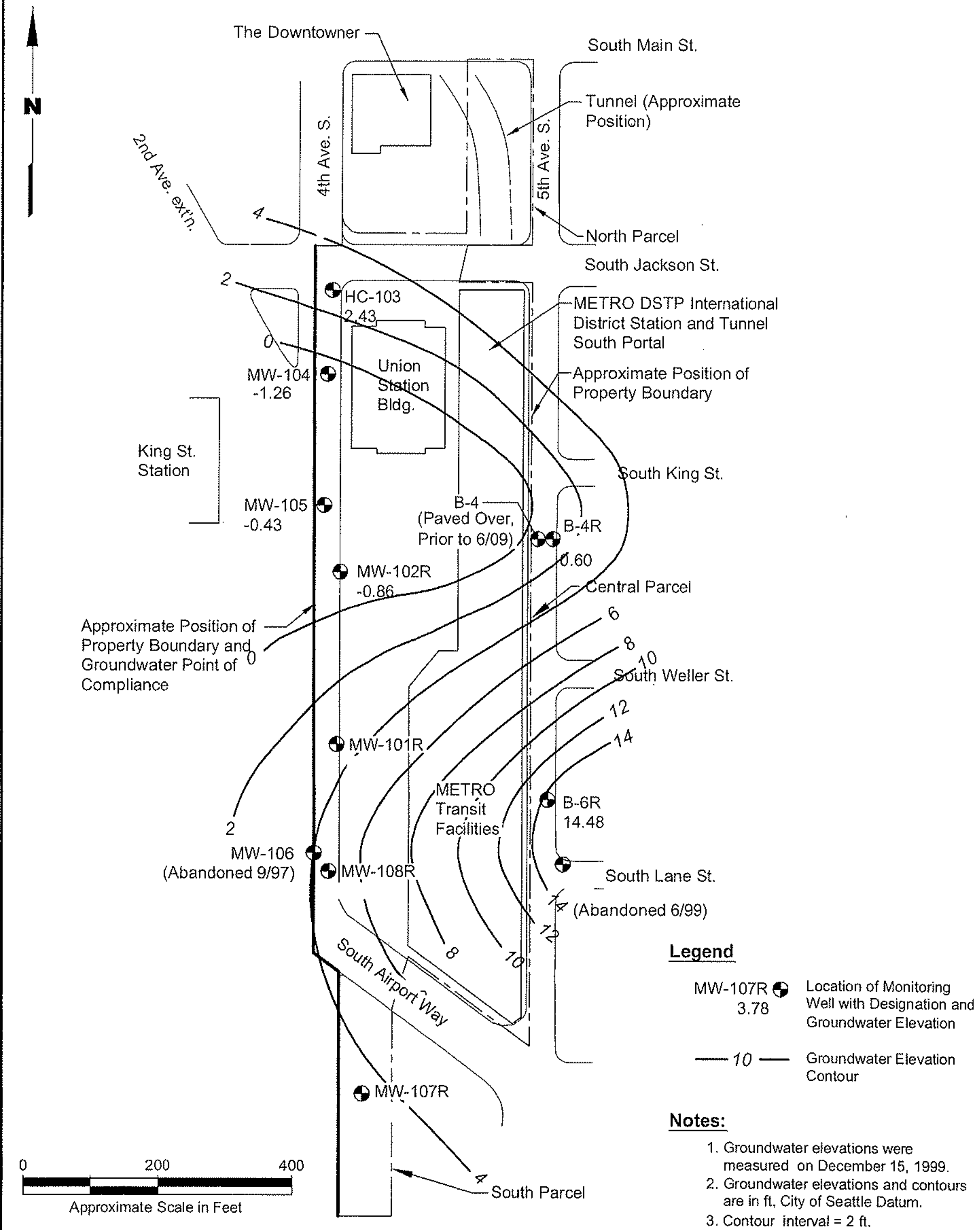


Landau Associates

Union Station
Seattle, WA

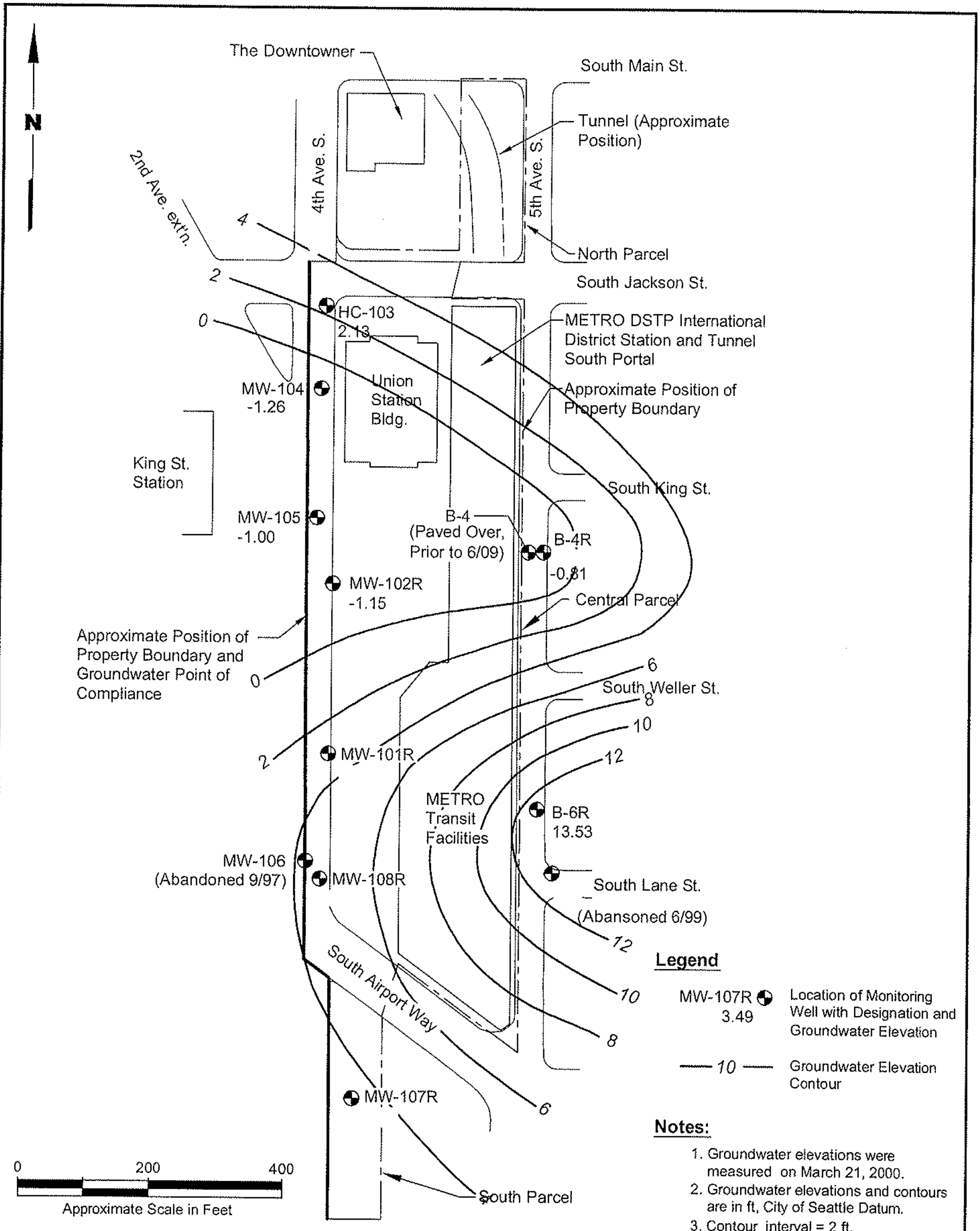
Groundwater Elevation Contours: June 1999

Figure B-5



Union Station/Groundwater Monitoring Report | V:\429\002\052\D\09 Annual Report\Fig4-1.dwg (A) "Figure B-6" 11/2/2009

LANDAU ASSOCIATES	Union Station Seattle, WA	**Groundwater Elevation Contours: December 1999**	Figure **B-6**



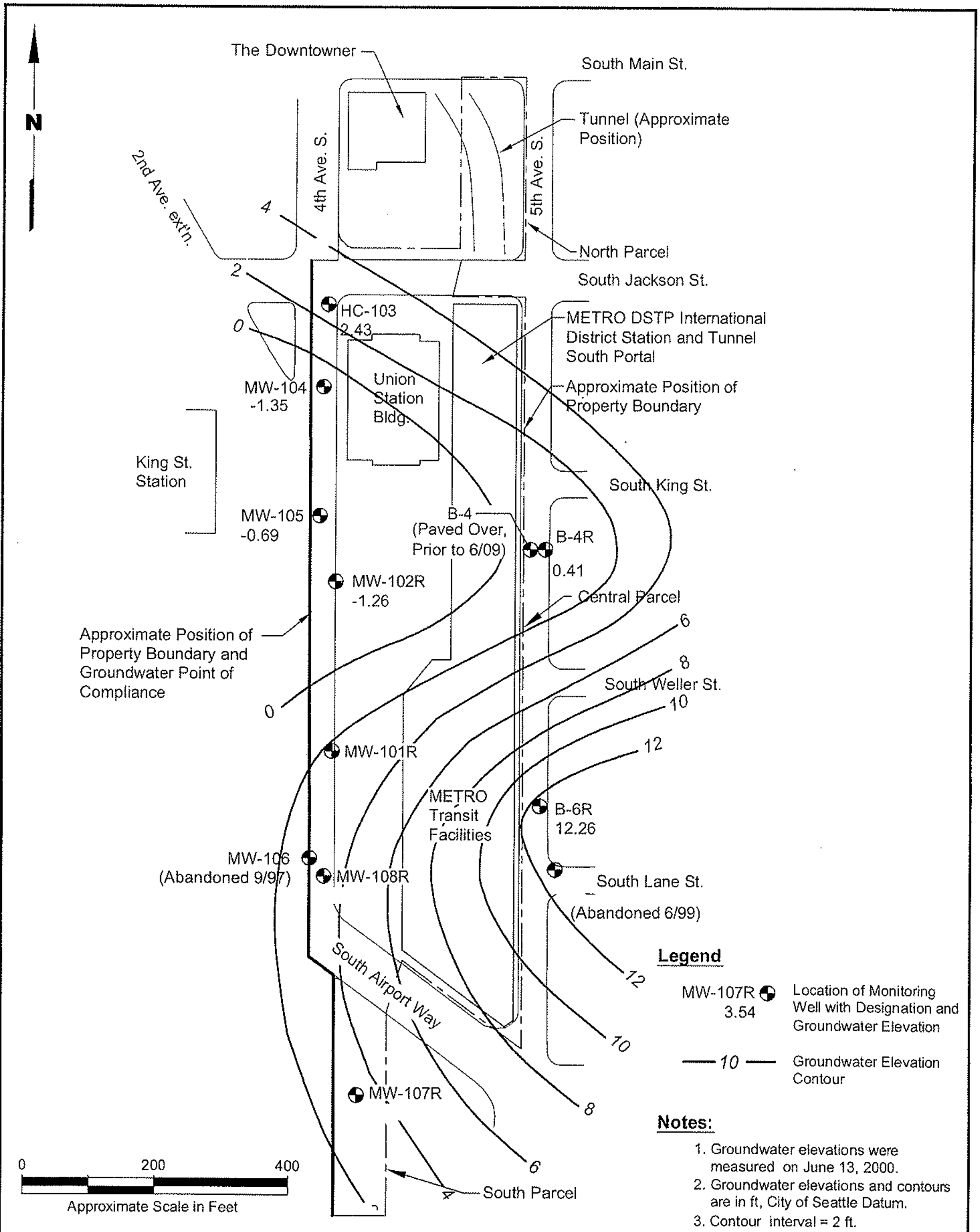
LANDAU ASSOCIATES

Union Station
Seattle, WA

Groundwater Elevation Contours: March 2000

Figure
B-7

Union Station/Groundwater Monitoring Report | V:\429\002\052\D\09 Annual Report\Fig4-1.dwg (A) "Figure B-7" 11/2/2009



Union Station 09 Annual Report | V:\1429\002\052\D109 Annual Report\Fig4-1.dwg (A) "Figure B-8" 11/2/2009

LANDAU ASSOCIATES

Seattle, WA

Groundwater Elevation Contours: June 2000

Figure **B-8**