CHINO BASIN

RECYCLED WATER GROUNDWATER RECHARGE PROGRAM

START-UP PERIOD REPORT FOR VICTORIA BASIN

February 8, 2012

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February 8, 2012

Regional Water Quality Control Board, Santa Ana Region
Attention: Mr. Gary Stewart
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Subject: Transmittal of the Start-Up Period Report for Victoria Basin Chino Basin Recycled Water Groundwater Recharge Program

Dear Mr. Stewart:

The Inland Empire Utilities Agency (IEUA) and the Chino Basin Watermaster (CBWM) hereby submit the *Start-Up Period Report for Victoria Basin* for the *Recycled Water Groundwater Recharge Program* being implemented by IEUA and CBWM. This document is submitted pursuant to requirements in the following documents:

- California Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2007-0039 Water Recycling Requirements for Inland Empire Utilities Agency and Chino Basin Watermaster, Chino Basin Recycled Water Groundwater Recharge Program, Phase I and Phase II Projects, June 29, 2007,
- California Regional Water Quality Control Board, Santa Ana Region, Monitoring and Reporting Program No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects San Bernardino County,
- California Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2009-0057, Amending Order No. R8-2007-0039, Water Recycling Requirements For Inland Empire Utilities Agency and Chino Basin Watermaster Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects, San Bernardino County, October 23, 2009, and
- IEUA and CBWM, 2010, Start-Up Protocol Plan for Victoria Basin, May 27, 2010.

The following items highlight the Start-Up Period Report findings of the Victoria Basin:

- The start-up period for Victoria Basin began after CDPH review of the Start-Up Protocol Plan. The start-up period began September 2, 2010 through July 7, 2011and was extended beyond 180 days to allow for subsurface travel time estimation of storm water recharged during the record 2010/11 storm season.
- Measured infiltration rates during the Victoria Basin start-up period ranged from 0.1 and 0.6 feet per day and depend on wetted basin area, the water depth, and maintenance need.

- Electrical conductivity (EC) is an effective tracer of recycled water and is useful for estimating travel times to all lysimeter depths at Victoria Basin.
- Recharged recycled water was detected at all lysimeters depths at Victoria Basin. Recharge water travel time to the deepest lysimeter (35 feet) was approximately 72 days. Recycled water was not detected at groundwater sampled from monitoring well VCT-1/1 during the start-up period, thus this travel time for recharge water could not yet be estimated beyond the 334 days between the initial recharge and the last well sample.
- Soil-Aquifer Treatment (SAT) was very effective at removing total organic carbon (TOC) in the upper 35 feet of sediment at Victoria Basin and this depth is recommended as the compliance point.
- Increased TOC removal with depth indicates further reduction in TOC may occur beyond 35 feet. Victoria Basin achieved 78% SAT removal efficiency for TOC at 35 feet deep.
- Based on the final 20-sample rolling average TOC of 0.9 mg/L at the 35-foot lysimeter, the maximum Recycled Water Contribution (RWC) equation in the recharge program's permit (RWC limit = 0.5 mg/L / TOC average) suggest a 55% maximum RWC is attainable. However, for surface of recharge of recycled water produced with tertiary treatment the Order R8-2007-0039 limits the recommend RWC maximum to 50%.
- SAT is effective at removing total nitrogen (TN) in the upper 35 feet of sediment at Victoria Basin. The average SAT removal efficiency for TN was 82%. All TN values from all depth lysimeters were within the TN compliance limit of 5 mg/L with SAT. At 35-feet deep, the average TN during the start-up period was 0.6 mg/L.
- Recharged recycled water traveled to all lysimeter depths and SAT is most effective at TOC removal by the 35-foot depth. However, an alternative monitoring plan is proposed for Victoria Basin due to the approximately 72 day travel time to 35 feet. The proposed alternative monitoring plan includes weekly sampling from the delivery pipeline during recharge activities and the use of SAT removal efficiency of 78% and 82% for TOC and TN, respectively, to adjust the sample for SAT during recharge. For the initial year of monitoring following submission of this report, monthly sampling of the 35-foot deep lysimeter will continue for TOC, TN, and EC.
- The Start-Up Period Report includes an RWC Management Plan to forecast the next 120 months of recharge with recycled water to maintain compliance with the proposed 50% RWC limit. The RWC Management Plan will be updated annually and submitted to CDPH in the Annual Report for the Recycled Water Groundwater Recharge Program.

If you have any questions, please do not hesitate to call us.

Best regards,

Patrick O. Sheilds
Executive Manager of Operations

Ken Jeske
Interim Chief Executive Officer

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1. Introduction

Inland Empire Utilities Agency (IEUA) and Chino Basin Watermaster (CBWM) are co-permit holders for the Chino Basin Recycled Water Groundwater Recharge Program. IEUA and CBWM maintain and operate the program's recharge facilities together with Chino Basin Water Conservation District and San Bernardino County Flood Control District. The recharge program is an integral part of CBWM's Optimum Basin Management Plan goals of enhancing water supply reliability and improving groundwater quality in the Chino Basin. These goals are to be met by increasing the recharge of storm water, imported water, and recycled water.

IEUA initiates groundwater recharge using recycled water at permitted recharge sites by following and reporting on a minimum 6-month long start-up period of recycled water delivery and intensive water quality testing. The locations of Recycled Water Groundwater Recharge Program basins including Victoria Basin are shown on Figure 1-1. The Victoria Basin was modified for the recharge program under the Chino Basin Facilities Improvement Project (CBFIP) following the release of the Chino Basin Phase I Recycled Water Groundwater Recharge Project Title 22 Engineering Report (CH2MHill, 2003).

The Victoria Basin Start-Up Period was conducted in accordance with the protocols approved by California Department of Public Health (CDPH) [formerly California Department of Health Services (CDHS)] and set forth in the Start-Up Protocol Plan for Victoria Basin (IEUA 2010). This report documents the testing results, the soil-aquifer treatment (SAT) efficiencies at Victoria Basin for the removal of total organic carbon (TOC) and total nitrogen (TN), and the subsequent determination of the maximum recycled water contribution (RWC) limit associated with the reduced TOC concentrations at a chosen compliance point (e.g. a lysimeter or monitoring well).

1.1 Requirements of Order No. R8-2007-0039

The Chino Basin Recycled Water Groundwater Recharge Program is subject to the following requirements set forth by the Regional Water Quality Control Board Santa Ana Region:

- Order No. R8-2007-0039 Water Recycling Requirements for Inland Empire Utilities Agency and Chino Basin Watermaster, Chino Basin Recycled Water Groundwater Recharge Program, Phase I and Phase II Projects, June 29, 2007,
- Monitoring and Reporting Program No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects, June 29, 2007, and
- California Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2009-0057, Amending Order No. R8-2007-0039, Water Recycling Requirements for Inland Empire Utilities Agency and Chino Basin Watermaster Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects, San Bernardino County, October 23, 2009.

Recharge of recycled water at the Victoria Basin was permitted by Order No. R8-2007-0039. Section F.4 of Order No. R8-2007-0039 describes the requirements for the Start-Up Period Report:

> The Start-Up Period report shall include: site specific determinations of percolation rates, soil aquifer treatment efficiency and optimum depths and locations of lysimeters to obtain representative compliance samples of recycled water after soil aquifer treatment. The report shall specify the date that the Start-Up Period ended. The report shall make recommendations for final compliance lysimeter placement and the monitoring plan to be employed during the initial year of operation, the initial year maximum average RWC and corresponding TOC limit, and generalized method that will be used to track recharge water in the vadose zone. The analytical results from weekly lysimeter samples shall be evaluated and reported along with conclusions regarding soil aquifer treatment (SAT) performance. This report is subject to approval by the CDHS [sic, now CDPH] and the Regional Board Executive Officer. The report recommendations shall be implemented upon approval.

Order No. R8-2009-0057 amended R8-2007-0039 to extend the previously 60-month volume-based RWC compliance calculation to 120 months and to allow that RWC calculation to include groundwater underflow as diluent water.

1.2 Organization of the Start-Up Period Report

Section 2 of this report describes the installation of the lysimeters and monitoring well. Section 3 details the recharge operations during the start-up period. Sections 4 and 5 discuss the lysimeter sampling and monitoring results and the SAT removal efficiency in terms of TOC and TN. Section 6 describes the determination of the start-up period and recommendation of the compliance point. Section 7 discusses the determination of the basin's maximum RWC limit and a RWC Management Plan to ensure that the RWC limit is not exceeded in the future. Section 8 is a proposed water quality monitoring plan for the initial year after the start-up period, and Section 9 lists cited references.

2. Lysimeter and Well Installation

Figure 2-1 shows the location of the lysimeter cluster and the two nested monitoring wells used to collect water samples during the start-up period. Also shown on Figure 2-1 are the north and south cells that make up Victoria Basin, the storm water diversions from Etiwanda and San Sevaine Channels, a storm channel entering the northwest corner of the basin, and the recycled water delivery pipeline turnout to the basin.

In June 2010, a cluster of seven lysimeters were installed along the bottom of the west side Victoria Basin at a ground elevation of approximately 1320 feet above Mean Sea Level. The lysimeter cluster is comprised of individual lysimeters at depths of 5, 10, 15, 20, 25, 30, and 35 feet. The lysimeter construction drawings are included in Appendix A. The Victoria Basin lysimeter construction process is summarized in the *Start-Up Protocol Plan for Victoria Basin* (IEUA, 2010). Throughout the report text, tables, and figures, water samples from the lysimeters are referred to as VCT-xx, where xx equals the nominal depth of the porous tip of the lysimeter below ground surface (bgs). Depending on context, the surface water samples collected at each lysimeter are referred to as a 00-depth sample or surface water sample. These samples represent grab samples of surface water collected from the basin near the lysimeter installation. During the start-up period, surface water depth in Victoria Basin ranged from about 2 to 7 feet.

Monitoring well VCT-1 was constructed in March 2010 and is located north of Victoria Street at the southwest corner of Victoria Basin. The monitoring well consists of a 4-inch diameter casing named VCT-1/1 (screened from 330 to 380 feet) and a 2-inch diameter piezometer named VCT-1/2 (screened from 630 to 690 feet). The shallower casing was installed with a larger diameter to facilitate both water level monitoring and sampling of the recharged water. The deeper casing was installed with a smaller diameter casing to allow measurement of water levels. The two casings are separated by an aquitard. The original well design was for a single casing for sampling, but due to encountered formations the second piezometer casing was added to collect additional long-term water level data. The casings were completed above ground with the elevation of the top of the well casings being at approximately 1331 feet above Mean Sea Level. At the time of construction, depth to water in VCT-1/1 was approximately 320 feet below the top casing.

Monitoring well VCT-2 was constructed in January 2010 and is located on the north side of Baseline Ave just east of Interstate 15. The monitoring well consists of a 2-inch diameter piezometer named VCT-2/1 (screened from 360 to 400 feet) and a 4-inch diameter casing named VCT-2/2 (screened from 610 to 650 feet). The deeper casing was installed with a larger diameter to facilitate both water level monitoring and sampling of the recharged water at similar depths to the nearby production wells. The shallower casing was installed with a smaller diameter casing to allow measurement of water levels. The two casings are separated by an aquitard. The original well design was for a single casing for sampling, but due to encountered formations the second piezometer casing was added to collect additional long-term water level data. The well is completed in a below ground vault. At the time of construction, depth to water in VCT-2/2 was approximately 582 feet below the top of the well casing.

3. Recharge Operations

3.1 Volume of Historical Diluent Water Recharged

Recharge in Victoria Basin was estimated from field observations, recorded water depths from storm water activities, and from periodic stream gauging of dry weather flows. Table 3-1 lists the historical diluent water direct recharge volumes at Victoria Basin for July 2005 through September 2011. Diluent water is all water recharged that is not recycled water, e.g. imported water and locally originating water (dry weather and storm water flows).

Table 3-1 shows only water directly recharged in the basin and does not included groundwater underflow. Groundwater underflow recharges at another location and flows under the basin to comingle with direct recharge. Groundwater underflow as discussed in Section 7 will be used as a diluent water source when evaluating the percentage of recycled water recharge from the site.

Victoria Basin was improved from its flood control function to include groundwater recharge as part of the CBFIP basin improvements. The basin was excavated deeper to increase storage capacity. New infrastructure included water level sensors, inlets from San Sevaine and Etiwanda Creeks, a new low level outlet, and the motorization and automation of the inlets and low level outlet gates. Since initial recharge operation in 2005, annual diluent water recharge has ranged from 259 acre-feet (AF) (storm water only) to 1,959 AF (both storm water and imported water).

Although not tabulated as in-basin recharge in Table 3-1, groundwater underflow will be credited as diluent water in the 120-month running average RWC calculation (discussed in Section 7). For Victoria Basin, groundwater underflow is estimated at approximately 1,667 AFY (139 AFM) using a previously approved methodology (NWRI, 2010). Victoria Basin groundwater underflow is also underflow to the San Sevaine Basins, which are located approximately 4,000 feet northeast and up gradient of Victoria Basin. Underflow in this region will thus be divided between Victoria and San Sevaine Basins in their respective RWC calculations in proportion with their respective needs. Direct recharge of diluent and recycled water at these basins will not be shared.

3.2 Recharge Operations during the Start-Up Period

Water delivered to Victoria Basin during the start-up period included recycled water, local runoff and storm water from a city storm channel entering the basin in the northwest corner. Local runoff and storm water were also delivered to the basin via the Etiwanda Channel entering the basin in the northeast corner. Although shown on Figure 2-1, the storm water inlet from San Sevaine Channel was not completed until November 2011.

Storm water recharge was estimated using measured increases in basin water depth correlated with the depth-to-volume relationship of the basin's stage-storage curve. A correction for infiltration during storms was applied using the basin's measured infiltration rates and the storm duration. Table 3-2 lists daily water deliveries to Victoria Basin during the start-up period. Negative values in Table 3-2 indicate a volume drained from the basin. Table 3-3 lists the monthly deliveries during the start-up period and the 120-month running average of percent recycled water to the total recharge, as will ultimately be required for the maximum RWC limit compliance. While an RWC calculation is provided on the first month of RW recharge, 120 months of data may not be available until 10 years of recharge operations. Groundwater underflow is included as a diluent water source in the RWC calculations in Table 3-3 beginning with the first month of recycled water recharge following the October 2009 permit amendment to allow such use (RWQCB, 2009).

3.3 Estimated Infiltration Rates

Infiltration rates of Victoria Basin cells were measured and generally range from 0.1 to 0.6 feet per day. Table 3-4 contains measured infiltration rates and data used to make these estimates. Rates labeled in the table as "Victoria" were calculated with the northern cell and southern cell of the basin in hydraulic equilibrium (flow gate open between cells). Infiltration rates listed as "Victoria North" or "Victoria South" were calculated for those cells when the flow gates were closed. Infiltration rates can vary by individual cell due to water depth, seasonal impacts, and maintenance needs. For instance, deeper water can contact higher infiltration rate soils not yet adversely impacted by fine-grained sediment introduced by storm water and thereby periodically have higher rates. Rates in Table 3-4 are measured during periods without water inflow.

4. Surface Water and Lysimeter Sampling Results

4.1 Surface Water, Lysimeter, and Monitoring Well Sampling Results

The monitoring schedule from the CDPH-approved *Start-Up Protocol Plan for Victoria Basin* (IEUA, 2010) included weekly sampling for surface water and lysimeter water, and analyses for:

- Electrical Conductivity (EC),
- TOC,
- Nitrate as Nitrogen (NO_3-N), Nitrite as Nitrogen (NO_2-N), Ammonia as Nitrogen (NH_3-N), and Total Kjeldahl Nitrogen (TKN), and
- TN, calculated as the sum of NO_3-N, NO_2-N and TKN.

Monitoring well VCT-1/1 and VCT-2/2 were also monitored quarterly for these same water quality parameters. The lysimeter and monitoring well data are summarized in Tables 4-1 through 4-5. While time-series graphs and tabularized data are presented in this section, they are interpreted and discussed in Section 5 (Soil-Aquifer Treatment Efficiency) and Section 6 (Start-Up Period).

TN results that are non-detect (<0.6 mg/L) are graphed and averaged at half the detection limit. If not all nitrogen species results are non-detect and the sum of their concentrations is less than 0.6 mg/L and greater than 0.3 mg/L, then TN is reported as <0.6 mg/L but graphed and averaged with the summed value. If there is insufficient sample to analyze for TKN, then NH_3-N is substituted for TKN into the calculation of TN. This is done as the other components of TKN (e.g. organic nitrogen and NH_3-N) are typically removed during the wastewater treatment process. If following collection of the TOC sample there is insufficient sample to analyze for NO_3-N, TKN, or NH_3-N, then TN is not calculated.

Time-series graphs of EC from the Victoria Basin lysimeters and the two monitoring wells (VCT-1/1 and VCT-2/2) are presented on Figure 4-1a and Figure 4-1b, respectively. Time-series graphs of TOC from the Victoria Basin lysimeters and two monitoring wells are presented on Figure 4-2a and Figure 4-2b, respectively. Time-series graphs of TN from Victoria Basin lysimeters and two monitoring wells are presented on Figure 4-3a and Figure 4-3b, respectively. In the upper part of all of the time-series graphs, horizontal series denote periods when various sources of water were routed into Victoria Basin.

The EC of water measured in the Victoria Basin lysimeters was persistently higher (by 250 to 500 µmhos/cm) than the water recharged in the basin (Figure 4-1a). An explanation may be that an impurity in the backfill materials used in the lysimeter construction is slowly leaching a low concentration of dissolved solids into the water. Nevertheless, changes in source waters recharged at Victoria Basin were detectable at each of the lysimeters based on EC variation trends when compared between lysimeters depths. However the higher EC makes it impractical to estimate percent recycled water at the lysimeters.

4.2 Recharge Travel Times

The travel time for recharge water to reach the various sample depths is critical to the evaluation of the start-up period data and development of future monitoring protocols. Surface water travel times to the lysimeters were evaluated to identify offset times for the pairing of surface and lysimeter trend data. Travel time data trends are also important for the development of monitoring plans such that the collected lysimeter or monitoring well samples can be referenced to a prior surface water sample. Travel times along recharge flow paths were estimated by comparison of EC time-series variations of surface water and of water at the lysimeter and monitoring well.

Exact matching of water parameter concentrations is not always possible due to many reasons, including but not limited to the following:

- Daily recharge volumes over the study period are not constant, resulting in variations in surface water depth and percent water saturation of underlying soils.
- Recharge waters blend with water already in the soil which can mute chemical changes from correlative changes in the surface water.
- Seasonal water quality changes (such as in EC) in background groundwater at monitoring wells can be more significant than changes in the vadose zone using the overlying lysimeters.

The initial arrival or indication of a parameter with increased depth can represent the quickest travel time, but the peak arrival may be delayed and be more suitable for purposes of sample comparison. While intrinsic parameters such as EC can be used to conservatively estimate travel times, the parameters TOC and TN are not suitable tracers, because their concentrations change through SAT as they travel through the soil.

4.2.1 Lysimeter Monitoring

Recharge travel times from the basin surface to the various depth lysimeters can typically be estimated by observation of delays in transition from lower EC diluent water to higher EC recycled water. The travel time estimates can vary throughout the start-up period depending on changes in basin operation, basin soil conditions, and sediment saturation. Evaluation of the lysimeter EC data shows that all of the lysimeters responded to changes in source water EC as recharged in the Victoria Basin.

From the correlation of EC changes, general travel times to each lysimeters can be estimated. Travel times vary slightly through the start-up period due to variations in basin operation, infiltration rates, and saturation of the sediments. The travel times were estimated by tracking changes in EC trends (shown on Figure 4-1a) following the storm event of December 17, 2010 and the resumption of recycled water recharge on January 10, 2010. The travel times to the 5, 10, 15, 20, 25, and 35-foot lysimeter are estimated to be approximately 7, 30, 34, 42, 52 , 63, and 72 days, respectively.

Some sampling events during this time were not conducted when high surface water levels (from the storm) covered the road to the lysimeter site. Precisely tracking all storm events in the subsurface becomes more difficult with short duration, smaller volume events as they resulted in small variations in EC over period of time not discernible with eh weekly sampling frequency. The estimated subsurface travel times (expressed as feet per day) are consistent with the measured infiltration rates (less than 0.6 foot per day).

4.2.2 Well Monitoring

Monitoring wells VCT-1/1 and VCT-2/2 were sampled quarterly during the start-up period. Monitoring well VCT-1 is located immediately southwest of Victoria Basin. Monitoring well VCT-2 is located roughly half a mile to the south-southwest of Victoria Basin along the north side of Baseline Avenue. The casing for VCT-1/1 is constructed into the first groundwater encountered during drilling and is screened from 330 to 380 feet bgs. The casing for VCT-2/2 is constructed deeper in the aquifer than VCT-1/1 to monitoring that groundwater pumped at a nearby well field. VCT-2/2 is screened from 610 to 650 feet bgs. Only the deeper casing of VCT-2 was used for sampling events.

Monitoring travel time to a well can often be characterized by changes in water levels and/or intrinsic water quality parameters of the recharge water, such as EC. Figure 4-1b is a time-series graph of EC in both of the Victoria Basin monitoring wells, but for comparison also shows the EC of Victoria Basin surface water and 35-foot deep lysimeters. The EC data for these two wells are listed in Table 4-5. Prior to recharge of recycled water at Victoria Basin, the groundwater EC varied between 300 and 340 µmhos/cm for VCT-1/1 and between 265 and 330 µmhos/cm for VCT-2/2. Following initiation of recycled water recharge at Victoria Basin in September 2010 through November 2011, there has been no observable change in groundwater EC at these wells that would indicate recycled water recharge arrival at these locations. Thus the travel time for recharged recycled water could not yet be estimated beyond the 334 days between the initial recharge and the last well sampling event presented (August, 2011).

Trending of groundwater TN and TOC at VCT-1/1 and VCT-2/2 also indicate no observable TOC and TN change that would indicate recycled water recharge arrival at these locations. TOC and TN time-series trends for monitoring wells VCT-1/1 and VCT-2/2 are shown on Figure 4-2b and Figure 4-3b respectively. For comparison, both of these figures also show the data from Victoria Basin surface water and the 35-foot deep lysimeter. For its sampling on August 2, 2001, VCT-2/2 shows a 0.7 mg/L increase in TOC, but no corresponding change in EC or TN that would suggest this TOC change as an indicator of recycled water arrival.

5. Soil-Aquifer Treatment Efficiency: TOC & TN Removal

SAT is a natural biodegradation process occurring beneath a recharge basin as recharge water flows through shallow soil where TOC and TN concentrations are reduced. As allowed in Order R8-2007-0039, demonstrated SAT reduction of TOC concentration can be a significant influence on the RWC limit based on the formula:

$$TOC_{average} = \frac{0.5mg/L}{RWC_{average}}$$

Figure 5-1 is a graph of the average TOC and TN concentrations as a function of increasing depth at Victoria Basin. Data for this graph come from Table 4-2 and Table 4-4. The surface water grab sample is represented by the 0-foot depth, while the other depths correspond to the lysimeter depths, in feet. The TOC values plotted correspond to the data after October 12, 2010 when recycled water was first detected at the 35-foot lysimeter through June 28, 2011 when filamentous algal mats developed in the basin following the start of imported water recharge on May 24, 2011. During this later time period, the physical quality of the imported water created TOC values atypical of the delivered recycled water. As such, the last day of the start-up period is the first arrival of atypical TOC concentrations arrive at the 35 foot lysimeter (July 7, 2011).

At Victoria Basin, SAT removal of TOC and TN continues over time and generates fairly consistent concentrations with depth despite TOC and TN concentration variations in the surface water. Figure 5-1 shows noticeable decreases in average TOC and TN concentration with increased depth. TOC is reduced to an average low of 1.0 mg/L at the 35-foot lysimeter. TN is removed to and below the detection limit of 0.6 mg/L, and is consistently less than the 5-mg/L compliance limit for recharge with recycled water. Both the TOC and TN removals trends suggest that while SAT reduction continues to at least 35 feet bgs, SAT may continue with greater depth through the unsaturated zone. Depth to groundwater at Victoria Basin during the start-up period was approximately 320 feet bgs.

Figure 4-2a is a time-series graph of TOC from the Victoria Basin surface water and lysimeter samples. Data for this figure are found in Table 4-2. In the upper part of all the time-series graphs presented in this report, horizontal bars denote periods when various sources of water were diverted into Victoria Basin. Note that with each successive depth of sample collection and over time, TOC concentrations are generally lower than at shallower depths.

SAT removal efficiencies for TOC (and TN) were estimated using the 35-foot lysimeter. Because percent recycled water could not be accurately estimated using the available EC data (see section 4.1), SAT removal efficiencies were estimated without regard to pairing surface water samples with lysimeters sharing a similar percent recycled water. Instead comparison was made using an average of surface water TOC (and TN) and an average of lysimeter sample TOC (and TN). However, past startup period reports for the IEUA recharge facilities have shown that TOC and TN removal efficiencies are as high with a blend of water sources (imported, storm, recycled) as they are when they are predominately recycled water. The long travel times (about 72 days) to the 35-foot depth and the variable nature of the surface water EC make pairing and comparisons of individual data points inappropriate for estimating SAT removal efficiencies. Instead, the average TOC and TN value from the lysimeter was used for the period. Corresponding average surface water TOC and TN were used for comparison, but with the data range offset backwards 72 days for the travel time to the 35-foot lysimeter. As shown in the middle of Table 5-1, **the SAT removal efficiencies for TOC during this period averaged 78% for the final 20 samples from the 35-foot lysimeter.** The 78% SAT removal efficiency for TOC was essentially consistent both for 20-sample running average (78%) at the end of the start-up period and for the longer averaging period (79%) when recycled water arrived at the 35-foot lysimeter through the end of the start-up period.

Figure 4-3a is a time-series graph of TN from the Victoria Basin surface water and lysimeter samples. Data for this figure are found in Table 4-4. TN concentrations decrease with depth as recycled water recharge progresses. While TN concentration reduction through SAT does not increase the volume of recycled water that can be recharged under Order R8-2007-0039, it does assist in consistently meeting the TN compliance limit of 5 mg/L. During the start-up period, TN of the surface water was a maximum of 5.8 mg/L, a minimum of nondetect (<0.6 mg/L), and an average of 3.2 mg/L. Only three of the weekly surface water TN samples exceeded the 5-mg/L permit limit prior to SAT. All 35-foot lysimeter TN samples were less than the limit of 5-mg/L. The average TN at the 35-foot lysimeter following the arrival of recycled water was 0.8 mg/L for the final 20 samples of the start-up period. As shown in the bottom of Table 5-1 **for the 35-foot lysimeter, the SAT removal efficiencies for TN averaged 82% for the final 20 samples of the start-up period**.

6. Start-Up Period

6.1 Determination of the Start-Up Period

Order R8-2007-0039 establishes a start-up period for each recharge basin in the Chino Basin Recycled Water Groundwater Recharge Program (Finding 11, page 4):

> . . . a Start-Up Period will be used at the outset of recycled water recharge operations. The purposes of each Start-Up Period are to establish site characteristics, including percolation rates, the physical characteristics of the vadose zone and soil aquifer treatment efficiency, and to establish a sampling regime, based on these characteristics, that is representative of recycled water following soil aquifer treatment. The length of the Start-Up Period at each basin will be contingent on site characteristics, including percolation rates and recycled water transit time in the subsurface. The Start-up Period shall last up to 180 days following commencement of recharge of recycled water to each basin, except if recharge of recycled water at that basin is significantly interrupted, for example due to storm event(s). . . . This Order requires IEUA to submit for CDHS [sic, now CDPH] and Regional Board approval a proposed Start-Up Period protocol at least two weeks prior to beginning each Start-Up Period. A Start–Up Period report will be prepared at the close of each Start-Up Period and will include recommendations for the optimum depths and locations for placement of lysimeters that will be used to measure compliance, and for a compliance-monitoring program. The report will also include recommendations for the maximum running monthly average Recycled Water Contribution and maximum running average Total Organic Carbon (TOC) limit for the initial year of recharge operations following the Start-Up Period.

The start-up period for each basin will be long enough to demonstrate effective TOC removal. As long as TOC concentrations continue to decline over time, the basin is still deemed to be in the start-up period, up to 180 days unless interrupted.

Recycled water start-up period for the Victoria Basin began on September 2, 2010 and ended July 7, 2011. After the initial 180 days (through March 1, 2011), storm water was still prevalent in the surface water as indicated by EC and provided an opportunity to further evaluate recycled water TOC and TN removal efficiencies and further evaluate travel times to the various lysimeter depths. Diluent water was not available prior to the start-up period, which would have allowed such estimates at the beginning of the start-up period. Following discussion with the CDPH staff, the start-up period was extended through the storm season to allow sufficient time to again detect recycled water at the lysimeters. The start-up period ended July 7, 2011.

6.2 Compliance Point Selection

As demonstrated by EC on Figure 4-1a, all lysimeters at Victoria Basin received water representative of recharged water and fluctuated following changes in recharge water EC. There appears to be no geologic features that would cause anomalous results. Travel time does increase as expected to greater depth. At the 35-foot depth, the lysimeter samples are a blend of source water recharged over a few weeks rather than a more distinct recharge volume delivered over days. As discussed previously in Section 5, SAT is quite effective at Victoria Basin and additional reduction of TOC occurs with increasing depth. Therefore, **the 35-foot bgs lysimeter was selected to be the compliance point lysimeter.**

6.3 Alternative Monitoring Plan

Section B.6 of Order R8-2007-00039 allows either lysimeter monitoring or an "alternative-monitoring plan" be used to demonstrate both SAT performance and compliance with requirements of the order. The compliance point may be any point prior to groundwater that is predominately recycled water. Order R8-2007-0039 states in Section B.6:

> . . . An alternative-monitoring plan may be approved upon submission of sampling results that demonstrate that an equal level of public health protection is achieved. (See also Provision G.8 and G.9.) Upon development of a soil-aquifer treatment factor using recharge demonstration studies, lysimeter based compliance monitoring may be replaced with recycled water measurements leaving the treatment plant and the application of the treatment factor with prior approval by the CDHS[sic] and the Regional Board Executive Officer.

The need for an alternate monitoring plan at Victoria Basin occurs due to the long travel time between the delivery of water to the Victoria Basin and percolation to the 35-foot deep lysimeter. IEUA and CBWM therefore propose an alternative sampling plan for monitoring recycled water recharge at Victoria Basin. As discussed in Section 5, the SAT is quite effective to the testing depth of 35 feet and likely continues as recharge water migrates downward to groundwater at depths of 320 feet below the recharge basin. For the alternative monitoring plan a longer sampling interval than the typical weekly frequency is proposed due to the 72-day travel time to 35 feet. **As an alternate monitoring plan, it is therefore recommended that weekly pipeline samples be collected during recycled water recharge at Victoria Basin and apply SAT removal efficiencies for both TOC and TN (78% and 82% respectively) to account for the benefits of SAT.**

As described in Section 8 Initial Year Monitoring Plan, it is also proposed that one year of monthly samples be collected from the 35-foot lysimeter when recycled water has been recharged at Victoria Basin in the past 3 months. Monthly sampling will occur approximately within one week of the 15^{th} day of each month.

6.4 Maximum RWC Determination

The maximum RWC is determined as specified within Order R8-2007-0039. Finding 12 of the Order states:

> This Order does not establish maximum average recycled water contributions (RWC) at each basin, but requires the users to determine the maximum average RWC through the Start-Up Period for each recharge basin. The determined RWC must be approved by CDHS [sic, now CDPH] and the Regional Board.

Recycled Water Quality Specification Section A.10 states,

> At each recharge basin, the monthly average TOC concentration of the recycled water prior to reaching the regional groundwater table shall not exceed the average TOC value calculated from the following formula:
>
> TOCaverage = 0.5 mg/L ÷ RWCaverage

Section B.6 of Order R8-2007-0039 states:

> Compliance with average TOC concentration limits specified in Recycled Water Quality Specifications A.11., above, shall be determined based on a lysimeter-based monitoring program performed at each

> individual recharge basin and allowing for recycled water percolation to the lysimeters to demonstrate soil aquifer treatment efficiency, unless recycled water TOC compliance can be demonstrated prior to recharge. Compliance shall be based on the running average of the most recent 20 lysimeter sample test results representative of recycled water samples.

The 20-sample rolling average TOC concentrations for the 35-foot lysimeter was calculated with the sample data ending July 7, 2011. As shown in Table 5-1, **the 20-sample rolling average TOC concentration was 0.91 mg/L.** Order R8-2007-0039 limits the maximum RWC to 50% for recycled water produced by tertiary treatment that is subsequently used for recharge by surface spreading. The 50% maximum RWC corresponds to a running average of 1.0 mg/L. As the 35-foot lysimeter 20-sample running average is less than 1.0 mg/L, **the RWC limit for Victoria Basin is set at the maximum allowable 50%.**

7. RWC Management Plan

RWC management is needed to keep a basin's volume-based RWC within the maximum RWC limit determined by the 20-sample rolling average TOC. A basin's volume-based RWC is determined by a 120-month rolling average ratio of recycled water volume to total recharge volume. Total recharge volume is the combined recharge volume from all sources including storm water, local runoff, groundwater underflow, imported water, and recycled water. Per Order R8-2009-0057, during the start-up period and up to 120-months after initiation of recycled water recharge, the volume-based RWC may exceed the maximum RWC limit, but must be within the limit by month 120.

Order R8-2009-0057, Section F.20

> The Discharger shall submit a RWC Management Plan to the CDPH and the Regional Board that includes estimates of future average RWCs based on anticipated recharge operations over the first 120 months of recycled water recharge at each recharge site. The RWC Management Plan shall be submitted with the Start-Up Period Report and updated with IEUA's annual report to the Regional Board during the first 120-months and shall clearly identify the plan to achieve compliance with the maximum recycled water contribution by the 120th month at each recharge site. IEUA shall update the basin-specific RWC plans annually to reflect the estimated diluent water and recycled water contributions for the upcoming year. For the purpose of the diluent water projections, implementation of a weighted averaging should be considered when it is known that imported water supplies will not be available for purposes of recharging the aquifer. The underflow of the Chino Basin aquifer may be used as a source of diluent water. CDPH may consider crediting a fraction of the flow as diluent water, which would be dependent on the accuracy of the method used to measure the flow, its distribution, and the ability to meet the other diluent water criteria in the draft regulation.

An RWC Management Plan is developed for a recharge site by preparing a history of past recharge and then determining future recharge that will keep the volume-based RWC within the maximum RWC limit. Future recharge must be estimated. Future diluent water is estimated based on past availability of the various sources of diluent water and is expressed as monthly averages for the recharge sites historical recharge. Recycled water recharge is then added to the plan at regular intervals to keep the RWC in compliance. The RWC generally has five distinct time periods: 1) Historical Diluent, 2) Start-Up Period, 3) Short-Term Compliance, 4) Start-Up Period Roll Off, and 5) Long-Term Stability.

Historical Diluent Recharge is that period of diluent water recharge prior to initiation of recharge using recycled water. Start-Up Period Recharge is the approximately 6 months of predominately recycled water recharge during the start-up period when a rapid rise in the volume-based RWC may occur. Short-Term Compliance (Interval 3) is the period when the volume-based RWC is brought to within the RWC compliance limit by month 120. Start-Up Period Roll Off (Interval 4) is an approximately 6-month long period when the recharge for the start-up period drops off from the rolling-average RWC and is characterized by a potentially rapid decrease in the volume-based RWC. Long-Term Stability (Interval 5) is the period after the first 120 months of recharge using recycled water when a long-term average diluent water history is available and recycled water deliveries can be regularly scheduled to maintain RWC limit compliance. Intervals 3, 4, and 5 had the potential for more rapid changes in RWC until the 2009 permit amendment (RWQCB, 2009) lessened that potential by allowing underflow as diluent water and a 120-month RWC calculation.

The initial RWC Management Plan for Victoria Basin is presented in Table 7-1 and graphed on Figure 7-1. The first 60 months of historical data are shown on Figure 7-1. Actual data are shown as dark colored solid lines and symbols while the following 120 months of planned deliveries are shown as solid lines and symbols of a similar, yet lighter color. While an RWC calculation is provided starting on the first month of RW recharge, 120 months of data may not be available until 10 years of recharge operations.

The Victoria Basin RWC Management Plan will be updated with each Annual Report of the Recycled Water Groundwater Recharge Program to show current actual recharge and revised planned deliveries. As of December 2011, the volume ratio of recycled water to all recharge (volume-based RWC) was 17% and is less than the proposed 50% maximum RWC for Victoria Basin. The RWC Management Plan is conservative with respect to planned recharge of imported water, stormwater and recycled water sources. Due to the unpredictability of imported water availability, none is forecast for planned recharge, but will be listed as actual recharge once it occurs. Forecast stormwater and dry weather recharge are based on historical average monthly recharge since the inception of the recharge program in 2005. Recycled water delivery is then forecast up to the basin's recharge capacity and then lowered should the forecast RWC exceed the RWC limit with higher conditions. With these assumptions, the forecast actual RWC (recharge volume based) will be conservatively high until actual source water recharge occurs.

The Victoria Basin RWC Management Plan incorporates groundwater underflow as diluent water. Underflow was first used in October 2009 when the recharge permit was amended to allow its use. The groundwater underflow of Victoria Basin is also the underflow for the up gradient San Sevaine Basin. There are no production wells in between these two sites that would remove underflow from reaching the more downgradient site. An NWRI expert panel found IEUA's method of estimating underflow (a Darcian calculation) to be reasonable (NWRI, 2010). IEUA estimated underflow for both sites to be of 3,335 AF per year (278 AF/month). Prior to this Start-Up Report, the groundwater underflow common to Victoria and San Sevaine Basins was divided evenly between the two sites for tracking each basin's RWC in the 2010 Annual Report for the Chino Basin Recycled Water Groundwater Recharge Program (IEUA and CBWM, 2011). Even division of groundwater underflow provided a 139 AF/month credit to each site. However, the division of groundwater underflow credit following the 2010 Annual Report is 105 AF/month for Victoria Basin and 173 AF/month for San Sevaine Basins. This division allows the most recycled water recharge using each site's recharge capacities, recharge history, and their proposed maximum RWC limits. With future annual reports, the planned groundwater underflow credit will forecast this 105 and 173 AF/month division unless an imbalance in diluent water for RWC compliance is predicted based on actual prior recharge at either the San Sevaine or Victoria Basins.

8. Initial Year Monitoring Plan

The start-up period reporting requirements include an initial year monitoring plan. As discussed in the prior sections and as shown in the tables and graphs included in this report, recycled water TN compliance criteria are met consistently at all lysimeters and TOC is reduced 79% through SAT to a depth of 35 feet. Due to these outstanding results and trends seen in the lysimeter data, **it is recommended that the initial year monitoring plan consist of weekly sampling from the delivery pipeline and applying a SAT removal efficiency of 78% and 82% for TOC and TN compliance, respectively.** For the initial year, it is recommended that sampling also include monthly sampling of TOC, TN, and EC from the 35-foot lysimeter when recharge of recycled water has occurred in the prior 3 months. Following confirmation of continued SAT performance during the initial year of monitoring, it is recommended that the lysimeter monitoring be replaced with only monitoring of recycled water from the delivery pipeline.

The application of SAT removal efficiency in the alternative monitoring plan is consistent with the existing alternative monitoring plans for 8th Street, Brooks, RP3, Turner, and Ely Basins wherein TN and TOC efficiency factors are applied to pipeline samples based on SAT removal efficiencies measured during their respective start-up periods. The initial year of operation is defined herein to be the 365 days beginning with the recycled water recharge following submission of the Start-Up Period Report. The future pipeline sampling location will be the sampling port on the recycled water pipeline turnout at the GenOn (formerly RRI Energy and formerly Reliant Energy) immediately north of IEUA's Regional Plant No. 4 (RP-4) in Rancho Cucamonga. The GenOn sampling point has been used for quarterly and annual sampling for the past several years, and is a common sampling location for other IEAU recharge basin's alternate monitoring plans. The delivery pipeline at the GenOn sample location generally has daily recycled water flow and typically contains a blend of recycled water from both IEUA's Regional Plant No. 1 and Regional Plant No. 4.

9. References

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California Regional Water Quality Control Board, Santa Ana Region, 2007b, Monitoring and Reporting Program No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects San Bernardino County.

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IEUA, 2010, Start-Up Protocol Plan for Victoria Basin, May 27, 2010.

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National Water Resources Institute, 2010, Final Report of the February 8-9, 2010, Meeting of the Independent Advisory Panel, for the Inland Empire Utilities Agency's Groundwater Recharge Permit Amendment, April 14, 2010.

Wildermuth Environmental, Inc., 1999, Chino Basin Optimum Basin Management Program, Phase 1 Report, Prepared for the Chino Basin Watermaster, 1999.

TABLES

Table 3-1
Victoria Basin
Historical Diluent Water Direct Recharge
(acre-feet)

Fiscal Year	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2005/06	0	0	0	49	0	9	26	43	110	59	29	12	336
2006/07	9	3	3	8	4	89	15	70	8	35	7	9	259
2007/08	0	0	5	8	49	66	180	61	2	7	46	3	427
2008/09	3	3	2	4	35	74	15	95	13	3	3	0	250
2009/10	1	0	0	39	19	89	153	174	0	20	0	1	496
2010/11	3	2	2	15	34	242	18	72	59	5	75	3	530
2011/12	4	124	158	30	25	9							

Notes:

1) Table 3-1 does not list the groundwater underflow volume credited for diluent water.
2) Table 7-1 contains a breakdown of diluent water recharge including storm water, imported water, and groundwater underflow.

Table 3-2
Victoria Basin
Daily Water Deliveries During the Start-Up Period

Date	Diluent Water (AF) [1, 2]			Recycled Water
	Import	Local	(AF) [2]	(AF)
09/01/10	0.0	0.1	0.1	0.0
09/02/10	0.0	0.1	0.1	3.9
09/03/10	0.0	0.1	0.1	0.0
09/04/10	0.0	0.1	0.1	0.0
09/05/10	0.0	0.1	0.1	0.0
09/06/10	0.0	0.1	0.1	0.0
09/07/10	0.0	0.1	0.1	5.0
09/08/10	0.0	0.1	0.1	4.9
09/09/10	0.0	0.1	0.1	0.0
09/10/10	0.0	0.1	0.1	3.9
09/11/10	0.0	0.1	0.1	0.0
09/12/10	0.0	0.1	0.1	0.0
09/13/10	0.0	0.1	0.1	0.0
09/14/10	0.0	0.1	0.1	2.2
09/15/10	0.0	0.1	0.1	0.0
09/16/10	0.0	0.1	0.1	4.0
09/17/10	0.0	0.1	0.1	4.0
09/18/10	0.0	0.1	0.1	0.0
09/19/10	0.0	0.1	0.1	0.0
09/20/10	0.0	0.1	0.1	6.0
09/21/10	0.0	0.1	0.1	6.0
09/22/10	0.0	0.1	0.1	15.7
09/23/10	0.0	0.1	0.1	9.1
09/24/10	0.0	0.1	0.1	0.0
09/25/10	0.0	0.1	0.1	0.0
09/26/10	0.0	0.1	0.1	0.0
09/27/10	0.0	0.1	0.1	0.0
09/28/10	0.0	0.1	0.1	0.0
09/29/10	0.0	0.1	0.1	0.0
09/30/10	0.0	0.1	0.1	2.5
10/01/10	0.0	0.1	0.1	4.3
10/02/10	0.0	0.1	0.1	10.3
10/03/10	0.0	0.1	0.1	10.2
10/04/10	0.0	0.1	0.1	9.9
10/05/10	0.0	0.1	0.1	10.3
10/06/10	0.0	0.1	0.1	10.3
10/07/10	0.0	0.1	0.1	10.1
10/08/10	0.0	0.1	0.1	10.3
10/09/10	0.0	0.1	0.1	10.2
10/10/10	0.0	0.1	0.1	10.3
10/11/10	0.0	0.1	0.1	9.4
10/12/10	0.0	0.1	0.1	7.1
10/13/10	0.0	0.1	0.1	3.7
10/14/10	0.0	0.1	0.1	6.5
10/15/10	0.0	0.1	0.1	7.8
10/16/10	0.0	0.1	0.1	7.8
10/17/10	0.0	0.1	0.1	6.3
10/18/10	0.0	0.1	0.1	0.0
10/19/10	0.0	2.9	2.9	0.0
10/20/10	0.0	0.1	0.1	0.0
10/21/10	0.0	3.7	3.7	0.0
10/22/10	0.0	0.1	0.1	0.0
10/23/10	0.0	0.1	0.1	0.0
10/24/10	0.0	0.1	0.1	0.0
10/25/10	0.0	5.1	5.1	0.0
10/26/10	0.0	0.1	0.1	0.0
10/27/10	0.0	0.1	0.1	0.0
10/28/10	0.0	0.1	0.1	0.0
10/29/10	0.0	0.1	0.1	0.0
10/30/10	0.0	0.6	0.6	1.6
10/31/10	0.0	0.1	0.1	6.8
11/01/10	0.0	0.1	0.1	5.1
11/02/10	0.0	0.1	0.1	2.6
11/03/10	0.0	0.1	0.1	3.9
11/04/10	0.0	0.1	0.1	10.0
11/05/10	0.0	0.1	0.1	14.4
11/06/10	0.0	0.1	0.1	14.6
11/07/10	0.0	0.1	0.1	15.3
11/08/10	0.0	0.1	0.1	14.0
11/09/10	0.0	0.1	0.1	15.1
11/10/10	0.0	0.1	0.1	14.7
11/11/10	0.0	0.1	0.1	9.3
11/12/10	0.0	0.1	0.1	9.3
11/13/10	0.0	0.1	0.1	8.6
11/14/10	0.0	0.1	0.1	5.6
11/15/10	0.0	0.1	0.1	2.0

(CONTINUED)
Table 3-2
Victoria Basin
Daily Water Deliveries During the Start-Up Period

Date	Diluent Water (AF) [1, 2]			Recycled Water
	Import	Local	(AF) [2]	(AF)
11/16/10	0.0	0.1	0.1	0.0
11/17/10	0.0	0.1	0.1	0.0
11/18/10	0.0	0.1	0.1	0.0
11/19/10	0.0	0.1	0.1	0.0
11/20/10	0.0	34.7	34.7	0.0
11/21/10	0.0	9.3	9.3	0.0
11/22/10	0.0	0.1	0.1	0.0
11/23/10	0.0	1.9	1.9	0.0
11/24/10	0.0	-2.9	-2.9	-8.8
11/25/10	0.0	-4.0	-4.0	-11.9
11/26/10	0.0	-4.8	-4.8	-14.3
11/27/10	0.0	-2.5	-2.5	-7.5
11/28/10	0.0	0.1	0.1	0.0
11/29/10	0.0	0.1	0.1	6.6
11/30/10	0.0	0.1	0.1	8.4
12/01/10	0.0	0.0	0.0	5.5
12/02/10	0.0	0.0	0.0	4.6
12/03/10	0.0	0.0	0.0	2.6
12/04/10	0.0	0.0	0.0	2.7
12/05/10	0.0	5.0	5.0	1.8
12/06/10	0.0	0.0	0.0	0.0
12/07/10	0.0	0.0	0.0	0.0
12/08/10	0.0	0.0	0.0	0.0
12/09/10	0.0	0.0	0.0	0.0
12/10/10	0.0	0.0	0.0	0.0
12/11/10	0.0	0.0	0.0	0.0
12/12/10	0.0	0.0	0.0	0.0
12/13/10	0.0	0.0	0.0	3.8
12/14/10	0.0	0.0	0.0	8.8
12/15/10	0.0	0.0	0.0	8.9
12/16/10	0.0	0.0	0.0	3.5
12/17/10	0.0	19.5	19.5	0.0
12/18/10	0.0	50.3	50.3	0.0
12/19/10	0.0	77.5	77.5	0.0
12/20/10	0.0	14.0	14.0	0.0
12/21/10	0.0	16.7	16.7	0.0
12/22/10	0.0	30.6	30.6	0.0
12/23/10	0.0	13.1	13.1	0.0
12/24/10	0.0	0.0	0.0	0.0
12/25/10	0.0	0.0	0.0	0.0
12/26/10	0.0	5.9	5.9	0.0
12/27/10	0.0	0.0	0.0	0.0
12/28/10	0.0	0.0	0.0	0.0
12/29/10	0.0	9.3	9.3	0.0
12/30/10	0.0	0.1	0.1	0.0
12/31/10	0.0	0.1	0.1	0.0
01/01/11	0.0	0.1	0.1	0.0
01/02/11	0.0	0.1	0.1	0.0
01/03/11	0.0	9.0	9.0	0.0
01/04/11	0.0	1.1	1.1	0.0
01/05/11	0.0	1.1	1.1	0.0
01/06/11	0.0	1.1	1.1	0.0
01/07/11	0.0	1.1	1.1	0.0
01/08/11	0.0	1.1	1.1	0.0
01/09/11	0.0	0.1	0.1	0.0
01/10/11	0.0	0.1	0.1	3.9
01/11/11	0.0	0.1	0.1	3.9
01/12/11	0.0	0.1	0.1	3.9
01/13/11	0.0	0.1	0.1	3.9
01/14/11	0.0	0.1	0.1	3.9
01/15/11	0.0	0.1	0.1	4.0
01/16/11	0.0	0.2	0.2	3.9
01/17/11	0.0	0.2	0.2	4.1
01/18/11	0.0	0.2	0.2	3.8
01/19/11	0.0	0.2	0.2	4.5
01/20/11	0.0	0.2	0.2	5.0
01/21/11	0.0	0.2	0.2	4.4
01/22/11	0.0	0.2	0.2	3.9
01/23/11	0.0	0.2	0.2	3.9
01/24/11	0.0	0.2	0.2	3.9
01/25/11	0.0	0.2	0.2	3.9
01/26/11	0.0	0.2	0.2	3.8
01/27/11	0.0	0.2	0.2	4.2
01/28/11	0.0	0.2	0.2	4.1
01/29/11	0.0	0.2	0.2	4.1
01/30/11	0.0	0.2	0.2	1.9
01/31/11	0.0	0.2	0.2	2.7

(CONTINUED)

Table 3-2
Victoria Basin
Daily Water Deliveries During the Start-Up Period

Date	Diluent Water (AF) [1, 2]			Recycled Water
	Import	Local	(AF) [2]	(AF)
02/01/11	0.0	0.2	0.2	4.0
02/02/11	0.0	0.2	0.2	4.0
02/03/11	0.0	0.2	0.2	4.0
02/04/11	0.0	0.2	0.2	4.1
02/05/11	0.0	0.2	0.2	4.0
02/06/11	0.0	0.2	0.2	4.1
02/07/11	0.0	0.2	0.2	4.0
02/08/11	0.0	0.2	0.2	4.0
02/09/11	0.0	0.2	0.2	4.1
02/10/11	0.0	0.2	0.2	4.0
02/11/11	0.0	0.2	0.2	5.1
02/12/11	0.0	0.2	0.2	6.0
02/13/11	0.0	0.2	0.2	6.0
02/14/11	0.0	0.2	0.2	6.0
02/15/11	0.0	0.2	0.2	3.6
02/16/11	0.0	9.0	9.0	0.0
02/17/11	0.0	0.0	0.0	0.0
02/18/11	0.0	10.6	10.6	0.0
02/19/11	0.0	8.2	8.2	0.0
02/20/11	0.0	0.0	0.0	0.0
02/21/11	0.0	0.0	0.0	0.0
02/22/11	0.0	0.0	0.0	0.0
02/23/11	0.0	0.0	0.0	0.0
02/24/11	0.0	0.0	0.0	0.0
02/25/11	0.0	0.0	0.0	0.0
02/26/11	0.0	41.5	41.5	0.0
02/27/11	0.0	0.0	0.0	0.0
02/28/11	0.0	0.0	0.0	0.0
03/01/11	0.0	0.0	0.0	0.0
03/02/11	0.0	0.0	0.0	0.0
03/03/11	0.0	0.0	0.0	0.0
03/04/11	0.0	0.0	0.0	0.0
03/05/11	0.0	0.0	0.0	0.0
03/06/11	0.0	0.0	0.0	0.0
03/07/11	0.0	2.0	2.0	0.0
03/08/11	0.0	0.0	0.0	0.0
03/09/11	0.0	0.0	0.0	0.0
03/10/11	0.0	0.0	0.0	1.1
03/11/11	0.0	0.0	0.0	5.2
03/12/11	0.0	0.0	0.0	5.9
03/13/11	0.0	0.0	0.0	5.8
03/14/11	0.0	0.0	0.0	6.3
03/15/11	0.0	0.0	0.0	5.7
03/16/11	0.0	0.0	0.0	6.0
03/17/11	0.0	0.0	0.0	2.9
03/18/11	0.0	0.0	0.0	0.0
03/19/11	0.0	0.0	0.0	0.0
03/20/11	0.0	4.5	4.5	0.0
03/21/11	0.0	9.4	9.4	0.0
03/22/11	0.0	4.3	4.3	0.0
03/23/11	0.0	2.2	2.2	0.0
03/24/11	0.0	2.4	2.4	0.0
03/25/11	0.0	7.6	7.6	0.0
03/26/11	0.0	5.5	5.5	0.0
03/27/11	0.0	6.2	6.2	0.0
03/28/11	0.0	5.7	5.7	0.0
03/29/11	0.0	5.5	5.5	0.0
03/30/11	0.0	3.0	3.0	0.0
03/31/11	0.0	0.0	0.0	0.0
04/01/11	0.0	1.0	1.0	0.0
04/02/11	0.0	1.0	1.0	0.0
04/03/11	0.0	1.0	1.0	0.0
04/04/11	0.0	1.0	1.0	0.0
04/05/11	0.0	1.0	1.0	0.0
04/06/11	0.0	0.0	0.0	0.0
04/07/11	0.0	0.0	0.0	0.0
04/08/11	0.0	0.0	0.0	0.0
04/09/11	0.0	0.0	0.0	0.0
04/10/11	0.0	0.0	0.0	0.0
04/11/11	0.0	0.0	0.0	0.0
04/12/11	0.0	0.0	0.0	0.0
04/13/11	0.0	0.0	0.0	0.0
04/14/11	0.0	0.0	0.0	0.0
04/15/11	0.0	0.0	0.0	0.0

(CONTINUED)
Table 3-2
Victoria Basin
Daily Water Deliveries During the Start-Up Period

Date	Diluent Water (AF) [1, 2]			Recycled Water
	Import	Local	(AF) [2]	(AF)
04/16/11	0.0	0.0	0.0	0.0
04/17/11	0.0	0.0	0.0	0.0
04/18/11	0.0	0.0	0.0	0.0
04/19/11	0.0	0.0	0.0	0.0
04/20/11	0.0	0.0	0.0	0.0
04/21/11	0.0	0.0	0.0	0.0
04/22/11	0.0	0.0	0.0	0.0
04/23/11	0.0	0.0	0.0	0.0
04/24/11	0.0	0.0	0.0	0.0
04/25/11	0.0	0.0	0.0	0.0
04/26/11	0.0	0.0	0.0	0.0
04/27/11	0.0	0.0	0.0	0.0
04/28/11	0.0	0.0	0.0	0.0
04/29/11	0.0	0.0	0.0	0.0
04/30/11	0.0	0.0	0.0	0.0
05/01/11	0.0	0.1	0.1	0.0
05/02/11	0.0	0.1	0.1	0.0
05/03/11	0.0	0.1	0.1	0.0
05/04/11	0.0	0.1	0.1	4.3
05/05/11	0.0	0.1	0.1	5.9
05/06/11	0.0	0.1	0.1	8.5
05/07/11	0.0	0.1	0.1	9.5
05/08/11	0.0	0.1	0.1	9.8
05/09/11	0.0	0.1	0.1	9.9
05/10/11	0.0	0.1	0.1	7.7
05/11/11	0.0	0.1	0.1	6.6
05/12/11	0.0	0.1	0.1	6.0
05/13/11	0.0	0.1	0.1	6.1
05/14/11	0.0	0.1	0.1	6.0
05/15/11	0.0	0.1	0.1	5.9
05/16/11	0.0	0.1	0.1	4.6
05/17/11	0.0	0.1	0.1	0.0
05/18/11	0.0	4.2	4.2	0.0
05/19/11	0.0	0.1	0.1	1.9
05/20/11	0.0	0.1	0.1	0.0
05/21/11	0.0	0.1	0.1	0.0
05/22/11	0.0	0.1	0.1	0.0
05/23/11	5.0	0.1	5.1	0.0
05/24/11	10.0	0.1	10.1	0.0
05/25/11	10.0	0.1	10.1	0.0
05/26/11	10.0	0.1	10.1	4.9
05/27/11	10.0	0.1	10.1	8.5
05/28/11	10.0	0.1	10.1	8.6
05/29/11	10.0	0.1	10.1	8.6
05/30/11	3.8	0.1	3.8	8.6
05/31/11	0.0	0.1	0.1	8.6
06/01/11	0.0	0.1	0.1	8.6
06/02/11	0.0	0.1	0.1	8.6
06/03/11	0.0	0.1	0.1	2.7
06/04/11	0.0	0.1	0.1	0.0
06/05/11	0.0	0.1	0.1	0.0
06/06/11	0.0	0.1	0.1	-5.0
06/07/11	0.0	0.1	0.1	-6.9
06/08/11	0.0	0.1	0.1	-2.0
06/09/11	0.0	0.1	0.1	0.0
06/10/11	0.0	0.1	0.1	0.0
06/11/11	0.0	0.1	0.1	0.0
06/12/11	0.0	0.1	0.1	0.0
06/13/11	0.0	0.1	0.1	0.0
06/14/11	0.0	0.1	0.1	0.0
06/15/11	0.0	0.1	0.1	0.0
06/16/11	0.0	0.1	0.1	0.0
06/17/11	0.0	0.1	0.1	0.0
06/18/11	0.0	0.1	0.1	0.0
06/19/11	0.0	0.1	0.1	0.0
06/20/11	0.0	0.1	0.1	0.6
06/21/11	0.0	0.1	0.1	7.6
06/22/11	0.0	0.1	0.1	7.0
06/23/11	0.0	0.1	0.1	7.0
06/24/11	0.0	0.1	0.1	7.1
06/25/11	0.0	0.1	0.1	7.0
06/26/11	0.0	0.1	0.1	7.0
06/27/11	0.0	0.1	0.1	6.6
06/28/11	0.0	0.1	0.1	2.6
06/29/11	0.0	0.1	0.1	0.5
06/30/11	0.0	0.1	0.1	1.7

(CONTINUED)
Table 3-2
Victoria Basin
Daily Water Deliveries During the Start-Up Period

Date	Diluent Water (AF) [1, 2]			Recycled Water
	Import	Local	(AF) [2]	(AF)
07/01/11	0.0	0.1	0.1	3.5
07/02/11	0.0	0.1	0.1	5.5
07/03/11	0.0	0.1	0.1	5.4
07/04/11	0.0	0.1	0.1	5.4
07/05/11	0.0	0.1	0.1	5.5
07/06/11	0.0	0.1	0.1	6.6
07/07/11	0.0	0.1	0.1	9.4
07/08/11	0.0	0.1	0.1	6.6
07/09/11	0.0	0.1	0.1	0.0
07/10/11	0.0	0.1	0.1	0.0
07/11/11	0.0	0.1	0.1	0.0
07/12/11	0.0	0.1	0.1	0.0
07/13/11	0.0	0.1	0.1	0.0
07/14/11	0.0	0.1	0.1	0.0
07/15/11	0.0	0.1	0.1	0.0
07/16/11	0.0	0.1	0.1	0.0
07/17/11	0.0	0.1	0.1	0.0
07/18/11	0.0	0.1	0.1	0.0
07/19/11	0.0	0.1	0.1	0.0
07/20/11	0.0	0.1	0.1	0.0
07/21/11	0.0	0.1	0.1	0.0
07/22/11	0.0	0.1	0.1	0.0
07/23/11	0.0	0.1	0.1	0.0
07/24/11	0.0	0.1	0.1	0.0
07/25/11	0.0	0.1	0.1	0.0
07/26/11	0.0	0.1	0.1	0.0
07/27/11	0.0	0.1	0.1	0.0
07/28/11	0.0	0.1	0.1	0.0
07/29/11	0.0	0.1	0.1	0.0
07/30/11	0.0	0.1	0.1	4.6
07/31/11	0.0	0.1	0.1	9.4
08/01/11	0.0	0.0	0.0	9.3
08/02/11	0.0	0.0	0.0	6.1
08/03/11	0.0	0.0	0.0	0.0
08/04/11	0.0	0.0	0.0	3.2
08/05/11	0.0	0.0	0.0	4.9
08/06/11	0.0	0.0	0.0	4.9
08/07/11	0.0	0.0	0.0	4.8
08/08/11	0.0	0.0	0.0	4.8
08/09/11	0.0	0.0	0.0	4.8
08/10/11	0.0	0.0	0.0	4.9
08/11/11	6.7	0.0	6.7	1.8
08/12/11	10.4	0.0	10.5	0.0
08/13/11	11.4	0.0	11.5	0.0
08/14/11	11.2	0.0	11.2	0.0
08/15/11	8.2	0.0	8.2	0.0
08/16/11	2.4	0.0	2.5	0.0
08/17/11	2.2	0.0	2.3	0.0
08/18/11	2.5	0.0	2.5	0.0
08/19/11	2.3	0.0	2.4	0.0
08/20/11	2.3	0.0	2.3	0.0
08/21/11	2.4	0.0	2.4	0.0
08/22/11	2.3	0.0	2.4	0.0
08/23/11	2.5	0.0	2.5	0.2
08/24/11	3.3	0.0	3.3	2.3
08/25/11	5.2	0.0	5.2	0.0
08/26/11	6.5	0.0	6.5	0.0
08/27/11	7.7	0.0	7.7	0.0
08/28/11	9.1	0.0	9.1	0.0
08/29/11	8.4	0.0	8.4	0.0
08/30/11	8.8	0.0	8.9	0.0
08/31/11	6.9	0.0	7.0	0.0
09/01/11	5.9	0.0	5.9	0.0
09/02/11	6.1	0.0	6.1	0.0
09/03/11	8.7	0.0	8.7	0.0
09/04/11	9.0	0.0	9.0	0.0
09/05/11	8.9	0.0	8.9	0.0
09/06/11	9.2	0.0	9.2	0.0
09/07/11	9.0	0.0	9.0	0.0
09/08/11	8.4	0.0	8.5	0.0
09/09/11	7.8	0.0	7.8	0.0
09/10/11	7.2	0.0	7.2	0.0
09/11/11	6.7	0.0	6.7	0.0
09/12/11	6.4	0.0	6.4	0.0
09/13/11	6.2	0.0	6.2	0.0
09/14/11	6.3	0.0	6.4	0.0
09/15/11	6.2	0.0	6.2	0.0

(CONTINUED)

Table 3-2
Victoria Basin
Daily Water Deliveries During the Start-Up Period

Date	Diluent Water (AF) [1, 2]			Recycled Water
	Import	Local	(AF) [2]	(AF)
09/16/11	2.2	0.0	2.2	0.0
09/17/11	2.1	0.0	2.2	0.0
09/18/11	2.3	0.0	2.3	0.0
09/19/11	3.0	0.0	3.0	0.0
09/20/11	3.3	0.0	3.3	0.0
09/21/11	3.5	0.0	3.5	0.0
09/22/11	3.3	0.0	3.3	0.0
09/23/11	3.5	0.0	3.5	0.0
09/24/11	3.2	0.0	3.2	0.0
09/25/11	2.7	0.0	2.7	0.0
09/26/11	2.4	0.0	2.4	0.0
09/27/11	2.4	0.0	2.4	0.0
09/28/11	3.4	0.0	3.4	0.0
09/29/11	6.3	0.0	6.3	0.0
09/30/11	2.8	0.0	2.8	0.0

Note:

1. Table 3-2 does not list the groundwater underflow volume credited for diluent water.
2. Negative values indicate water removed from the basin by draining.

Table 3-3
Victoria Basin Historical Monthly Water Deliveries and RWC

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Period
2005/06	Jul '05	-61	0.	0.		0.	0.	0.	0.	0.		
	Aug '05	-60	0.	0.		0.	0.	0.	0.	0.		
	Sep '05	-59	49.	0.		49.	49.	0.	0.	49.		
	Oct '05	-58	0.	0.		0.	49.	0.	0.	49.		
	Nov '05	-57	9.4	0.		9.4	58.4	0.	0.	58.4		
	Dec '05	-56	25.8	0.		25.8	84.2	0.	0.	84.2		
	Jan '06	-55	42.6	0.		42.6	126.9	0.	0.	126.9		
	Feb '06	-54	109.8	0.		109.8	236.7	0.	0.	236.7		
	Mar '06	-53	58.7	0.		58.7	295.4	0.	0.	295.4		
	Apr '06	-52	28.7	0.		28.7	324.1	0.	0.	324.1		
	May '06	-51	12.	0.		12.	336.1	0.	0.	336.1		
	Jun '06	-50	8.7	0.		8.7	344.8	0.	0.	344.8		
2006/07	Jul '06	-49	3.1	0.		3.1	347.9	0.	0.	347.9		
	Aug '06	-48	3.	0.		3.	350.9	0.	0.	350.9		
	Sep '06	-47	8.1	0.		8.1	359.	0.	0.	359.		
	Oct '06	-46	4.	0.		4.	363.	0.	0.	363.		
	Nov '06	-45	88.8	0.		88.8	451.8	0.	0.	451.8		
	Dec '06	-44	14.7	0.		14.7	466.5	0.	0.	466.5		
	Jan '07	-43	69.7	0.		69.7	536.2	0.	0.	536.2		
	Feb '07	-42	8.2	0.		8.2	544.4	0.	0.	544.4		
	Mar '07	-41	35.	0.		35.	579.4	0.	0.	579.4		
	Apr '07	-40	7.	0.		7.	586.4	0.	0.	586.4		
	May '07	-39	9.	0.		9.	595.4	0.	0.	595.4		
	Jun '07	-38	0.	0.		0.	595.4	0.	0.	595.4		
2007/08	Jul '07	-37	0.	0.		0.	595.4	0.	0.	595.4		
	Aug '07	-36	5.	0.		5.	600.4	0.	0.	600.4		
	Sep '07	-35	8.	0.		8.	608.4	0.	0.	608.4		
	Oct '07	-34	49.	0.		49.	657.4	0.	0.	657.4		
	Nov '07	-33	66.	0.		66.	723.4	0.	0.	723.4		
	Dec '07	-32	180.	0.		180.	903.4	0.	0.	903.4		
	Jan '08	-31	61.	0.		61.	964.4	0.	0.	964.4		
	Feb '08	-30	2.	0.		2.	966.4	0.	0.	966.4		
	Mar '08	-29	7.	0.		7.	973.4	0.	0.	973.4		
	Apr '08	-28	46.	0.		46.	1,019.4	0.	0.	1,019.4		
	May '08	-27	3.	0.		3.	1,022.4	0.	0.	1,022.4		
	Jun '08	-26	3.	0.		3.	1,025.4	0.	0.	1,025.4		
2008/09	Jul '08	-25	3.	0.		3.	1,028.4	0.	0.	1,028.4		
	Aug '08	-24	2.	0.		2.	1,030.4	0.	0.	1,030.4		
	Sep '08	-23	4.	0.		4.	1,034.4	0.	0.	1,034.4		
	Oct '08	-22	35.	0.		35.	1,069.4	0.	0.	1,069.4		
	Nov '08	-21	74.	0.		74.	1,143.4	0.	0.	1,143.4		
	Dec '08	-20	15.	0.		15.	1,158.4	0.	0.	1,158.4		HISTORICAL
	Jan '09	-19	95.	0.		95.	1,253.4	0.	0.	1,253.4		
	Feb '09	-18	13.	0.		13.	1,266.4	0.	0.	1,266.4		
	Mar '09	-17	3.	0.		3.	1,269.4	0.	0.	1,269.4		
	Apr '09	-16	3.	0.		3.	1,272.4	0.	0.	1,272.4		
	May '09	-15	0.	0.		0.	1,272.4	0.	0.	1,272.4		
	Jun '09	-14	1.	0.		1.	1,273.4	0.	0.	1,273.4		
2009/10	Jul '09	-13	0.	0.		0.	1,273.4	0.	0.	1,273.4		
	Aug '09	-12	0.	0.		0.	1,273.4	0.	0.	1,273.4		
	Sep '09	-11	37.	2.		39.	1,312.4	0.	0.	1,312.4		
	Oct '09	-10	19.	0.		19.	1,331.4	0.	0.	1,331.4		
	Nov '09	-9	89.	0.		89.	1,420.4	0.	0.	1,420.4		
	Dec '09	-8	153.	0.		153.	1,573.4	0.	0.	1,573.4		
	Jan '10	-7	174.	0.		174.	1,747.4	0.	0.	1,747.4		
	Feb '10	-6	0.	0.		0.	1,747.4	0.	0.	1,747.4		
	Mar '10	-5	20.	0.		20.	1,767.4	0.	0.	1,767.4		
	Apr '10	-4	0.	0.		0.	1,767.4	0.	0.	1,767.4		
	May '10	-3	1.	0.		1.	1,768.4	0.	0.	1,768.4		
	Jun '10	-2	3.	0.		3.	1,771.4	0.	0.	1,771.4		
2010/11	Jul '10	-1	2.	0.		2.	1,773.4	0.	0.	1,773.4	0%	
	Aug '10	0	2.	0.		2.	1,775.4	67.	67.	1,842.4	4%	
	Sep '10	1	15.	0.	139.	154.	1,929.3	153.	220.	2,149.3	10%	
	Oct '10	2	34.	0.	139.	173.	2,102.3	117.	337.	2,439.3	14%	
	Nov '10	3	242.	0.	139.	381.	2,483.2	42.	379.	2,862.2	13%	
	Dec '10	4	18.	0.	139.	157.	2,640.2	86.	465.	3,105.2	15%	
	Jan '11	5	72.	0.	139.	211.	2,851.1	67.	532.	3,383.1	16%	START-UP
	Feb '11	6	59.	0.	139.	198.	3,049.1	39.	571.	3,620.1	16%	
	Mar '11	7	5.	0.	139.	144.	3,193.1	0.	571.	3,764.1	15%	
	Apr '11	8	6.	68.8	139.	213.8	3,406.8	141.	712.	4,118.8	17%	
	May '11	9	3.	0.	105.	108.	3,514.8	61.	773.	4,287.8	18%	
	Jun '11	10	4.	0.	105.	109.	3,623.8	62.	835.	4,458.8	19%	
2011/12	Jul '11	11	1.	122.7	105.	228.7	3,852.5	52.	887.	4,739.5	19%	
	Aug '11	12	0.	158.3	105.	263.3	4,115.8	0.	887.	5,002.8	18%	
	Sep '11	13	30.	0.	105.	135.	4,250.8	0.	887.	5,137.8	17%	Historical
	Oct '11	14	25.	0.	105.	130.	4,380.8	15.	902.	5,282.8	17%	
	Nov '11	15	9.	0.	105.	114.	4,494.8	25.	927.	5,421.8	17%	
	Dec '11	16	68.	0.	105.	173.	4,667.8	0.	927.	5,594.8	17%	

Notes:

DW = Diluent Water; Total DW is the sum of Storm Water & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.
RW = Recycled Water
RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.
While an RWC calculation is provided starting on the first month of RW recharge, 120 months of data may not be available until 10 years of recharge operations.
RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period
The RWC maximum determined from the Start-Up Period is discussed in Section 6.4.

Table 3-4
Victoria Basin: Infiltration Rate Measurements

Basin	Start Date/Time, T	Water Depth, H (feet)	End Date/Time	Water Depth, H (feet)	dT (days)	dH (feet)	Infiltration Rate (feet/day)
Victoria	03/02/06 00:30	2.07	03/03/06 00:21	1.82	0.99	0.25	0.25
Victoria	03/03/06 00:21	1.82	03/05/06 11:51	1.67	2.48	0.15	0.06
Victoria	03/05/06 11:51	1.67	03/06/06 11:20	1.44	0.98	0.23	0.24
Victoria	03/07/06 16:31	1.45	03/08/06 19:09	1.17	1.11	0.28	0.25
Victoria	12/01/07 00:03	6.13	12/02/07 00:00	5.54	1.00	0.59	0.59
Victoria	12/01/07 08:03	5.78	12/02/07 03:03	5.54	0.79	0.24	0.30
Victoria	12/02/07 00:00	5.54	12/03/07 00:03	5.23	1.00	0.31	0.31
Victoria	12/02/07 03:03	5.54	12/03/07 15:18	5.05	1.51	0.49	0.32
Victoria	12/03/07 00:03	5.23	12/04/07 00:00	4.98	1.00	0.25	0.25
Victoria	12/03/07 15:18	5.05	12/04/07 14:18	4.77	0.96	0.28	0.29
Victoria	01/05/08 15:14	10.26	01/06/08 15:14	9.83	1.00	0.43	0.43
Victoria	01/06/08 15:14	9.83	01/08/08 10:41	9.49	1.81	0.34	0.19
Victoria North	01/29/08 10:24	9.84	01/31/08 12:18	9.08	2.08	0.76	0.37
Victoria North	01/19/08 00:01	7.01	01/22/08 14:20	6.50	3.60	0.51	0.14
Victoria North	01/29/08 06:43	9.94	01/30/08 07:42	9.57	1.04	0.37	0.36
Victoria North	01/30/08 07:42	9.57	01/31/08 23:05	9.04	1.64	0.53	0.32
Victoria North	01/31/08 23:05	9.04	02/03/08 02:05	8.49	2.13	0.55	0.26
Victoria	02/04/08 14:05	8.51	02/06/08 21:05	8.01	2.29	0.50	0.22
Victoria	02/06/08 21:05	8.01	02/09/08 21:22	7.50	3.01	0.51	0.17
Victoria	02/09/08 21:22	7.50	02/12/08 20:12	6.99	2.95	0.51	0.17
Victoria	02/12/08 20:12	6.99	02/16/08 11:12	6.50	3.63	0.49	0.14
Victoria	02/16/08 11:12	6.50	02/20/08 13:12	6.11	4.08	0.39	0.10
Victoria North	01/28/08 16:04	10.53	01/29/08 10:24	9.84	0.76	0.69	0.90
Victoria North	01/07/08 13:03	10.04	01/10/08 00:01	9.03	2.46	1.01	0.41
Victoria North	01/10/08 00:01	9.03	01/13/08 18:35	8.03	3.77	1.00	0.26
Victoria North	01/13/08 18:35	8.03	01/19/08 00:01	7.01	5.23	1.02	0.20
Victoria	02/24/08 11:40	7.71	02/28/08 06:40	7.21	3.79	0.50	0.13
Victoria	05/23/08 21:02	1.61	05/27/08 10:02	1.01	3.54	0.60	0.17
Victoria	05/27/08 10:02	1.01	05/30/08 03:02	0.70	2.71	0.31	0.11
Victoria	02/10/09 14:16	7.75	02/13/09 05:40	7.32	2.64	0.43	0.16
Victoria	02/14/09 07:34	6.97	02/14/09 21:30	6.49	0.58	0.48	0.83
Victoria	02/17/09 22:09	7.74	02/20/09 15:01	7.25	2.70	0.49	0.18
Victoria	02/20/09 15:01	7.25	02/23/09 12:02	6.74	2.88	0.51	0.18
Victoria	02/23/09 12:02	6.74	02/27/09 02:00	6.25	3.58	0.49	0.14
Victoria	02/27/09 02:00	6.25	03/02/09 12:46	5.76	3.45	0.49	0.14
Victoria	2/6/2010 18:52	11.88	2/7/2010 19:13	11.36	1.01	0.52	0.51
Victoria	1/23/2010 2:06	11.95	1/25/2010 2:07	11.06	2.00	0.89	0.44
Victoria	1/27/2010 16:07	10.07	1/29/2010 13:09	9.01	1.88	1.06	0.56
Victoria	1/29/2010 13:09	9.01	1/31/2010 11:39	8.04	1.94	0.97	0.50
Victoria	1/31/2010 11:39	8.04	2/3/2010 0:01	7.02	2.52	1.02	0.41
Victoria	2/3/2010 0:01	7.02	2/5/2010 19:52	6.11	2.83	0.91	0.32
Victoria	2/11/2010 6:02	11.50	2/12/2010 10:02	10.97	1.17	0.53	0.45
Victoria	2/12/2010 10:02	10.97	2/13/2010 14:02	10.01	1.17	0.96	0.82
Victoria	2/13/2010 14:02	10.01	2/15/10 9:02	8.97	1.79	1.04	0.58
Victoria	2/15/10 9:02	8.97	2/17/2010 12:30	8.04	2.14	0.93	0.43
Victoria	2/23/2010 2:32	7.42	2/24/2010 3:32	7.00	1.04	0.42	0.40
Victoria	2/28/2010 17:43	8.54	3/1/2010 7:43	8.31	0.58	0.23	0.39
Victoria	10/18/2010 15:46	6.81	10/20/2010 7:52	6.32	1.67	0.49	0.29
Victoria	10/18/2010 12:23	6.87	10/21/2010 5:21	6.11	2.71	0.76	0.28
Victoria	10/23/2010 7:56	5.84	10/25/2010 0:59	5.38	1.71	0.46	0.27
Victoria	10/25/2010 0:59	5.38	10/29/2010 7:47	4.96	4.28	0.42	0.10
Victoria	11/22/2010 3:10	8.69	11/23/2010 18:36	7.99	1.64	0.70	0.43
Victoria North	11/27/2010 22:33	3.54	11/29/2010 0:01	3.40	1.06	0.14	0.13

Table 4-1
Victoria Basin: Surface Water and Lysimeter Results
Electrical Conductivity
(µmhos/cm)

Date	Surface Water	Lysimeter Depth (ft bgs)						
	0	5	10	15	20	25	30	35
06/09/10	585		690	985	690		475	375
06/15/10	420	510	690	1030	780	1420	450	340
06/22/10	690		850	930	840		420	
06/29/10	870		955	975	710		425	395
07/07/10	630		1140	1020	915		465	450
07/13/10	1040		1210	900	940		530	440
07/21/10	1580		1340	1000	1010	2150	630	460
07/27/10	705		1490	965	1030		695	480
08/03/10			1650	1100	1200		740	500
08/11/10	795			1260			725	510
08/18/10	855		1970	1460			700	
08/25/10	No sampling this week							
09/01/10	No sampling this week							
09/08/10	720	1360		1390	1360	2230	820	
09/14/10	695				925		1220	980
09/21/10	725				820		1190	1010
09/27/10	720	985	1230	965	755	2180	1080	1040
10/05/10	710	910	1210	1010	810	1930	1010	980
10/12/10	705	908	1174	1096	912	1687	989	826
10/19/10	690	875	1100	1020	890	1660	920	795
10/27/10	670	945	1060	990	895	1760	860	770
11/03/10	640	800	1020	995	900	1730	830	740
11/09/10	695	780	990	990	930	1640	835	725
11/16/10	725	810	1000	950	900	1590	810	730
11/23/10	Lysimeters inaccessible due to high water level from rain event							
11/30/10	550	760	1040	1050	905	1410	755	715
12/07/10	520	645	1040	1020	960	1760	740	690
12/14/10	575	620	1020	965	950	1790	790	760
12/21/10	Lysimeters inaccessible due to high water level from rain event							
12/28/10	Lysimeters inaccessible due to high water level from rain event							
01/04/11	Lysimeters inaccessible due to high water level from rain event							
01/11/11	150	375	990	805	840	1670	790	655
01/18/11	455	325	910	740	850	1800	830	715
01/26/11	540	355	865	635	835	1680	820	750
02/01/11	590	450	805	560	750	1450	755	710
02/08/11	600	550	765	510	680	1420	710	680
02/16/11	600	610	770	485	610	1360	660	615
02/23/11	560	660	790	530	570	1400	615	540
03/03/11	235	690	820	600	575	1390	565	475
03/08/11	235	675	850	650	605	1380	580	430
03/15/11	480	600	870	715	680	1380	580	395
03/24/11	230	Lysimeters inaccessible due to high water level from rain event						
03/30/11	220	Lysimeters inaccessible due to high water level from rain event						
04/05/11	220	565	960	670	750	1260	645	440
04/12/11		Lysimeters inaccessible due to high water level from rain event						
04/19/11	240	475	965	645	755	1370	705	500
04/26/11	260	440	895	645	700	1340	710	550
05/04/11	405	455	885	655	705	1290	700	575
05/10/11	625	470	845	660	685	1210	680	560
05/17/11	630	500	830	645	680	1150	650	540
05/26/11	525	620	850	620	620	1110	630	520
06/02/11	480	Lysimeters inaccessible due to high water level due to imported water deliveries						
06/09/11	510	690	900	630	610	1200	730	410
06/15/11	495	640	925	705	620	1260	745	430
06/21/11	575	625	940	760	670	1310	750	450
06/28/11	615	610	920	775	680	1230	755	500
07/07/11	640	660	950	760	725	1160	755	565
07/14/11	650	725	960	715	690	1100	735	590
07/20/11	640	735	975	710	685	1120	740	600
07/27/11	655	730	985	745	635	1150	760	
08/03/11	670	715	980	805	720	1220	775	
08/09/11	670	725	955	815			755	
08/16/11	545	775	1010	865			780	
Notes	(blank)	Insufficient sample from lysimeter result in parameter not being analyzed						

Table 4-2
Victoria Basin: Surface Water and Lysimeter Results
Total Organic Carbon
(mg/L)

Date	Surface Water	Lysimeter Depth (ft bgs)						
	0	5	10	15	20	25	30	35
06/09/10	15.7		3.59	3.30	3.43		3.41	2.22
06/15/10	6.87	1.91	2.96	3.28	3.02		2.77	1.62
06/22/10	9.63		2.90	2.90	3.02		2.46	
06/29/10	10.9		3.01	2.78	3.12		2.78	2.14
07/07/10	9.64		3.26	3.03	3.18			
07/13/10	9.72		3.23	2.43	2.59		2.49	1.55
07/21/10	11.1		3.37	2.19	2.22	4.05	3.17	1.50
07/27/10	16.8		3.51	2.44	2.76		2.84	1.86
08/03/10			2.91	2.16	2.75		2.47	1.21
08/11/10	10.3			3.69			2.15	2.23
08/18/10	11.9		2.90	1.78			1.99	
08/25/10	No sampling this week							
09/01/10	No sampling this week							
09/08/10	4.91				5.04		2.22	
09/14/10	6.96				2.12		2.69	2.20
09/21/10	5.24				2.55		2.54	2.23
09/27/10	6.64	2.57	2.73	2.05	2.09	2.50	2.19	1.73
10/05/10	5.31	2.48	2.13	2.12	2.28	2.50	2.21	1.41
10/12/10	4.93	2.48	2.10	1.98	2.21	2.44	2.87	1.27
10/19/10	4.70	2.27	1.79	1.82	2.07	2.11	2.59	1.32
10/27/10	5.39	2.05	1.98	1.81	2.30	2.09	2.77	1.42
11/03/10	5.47	2.10	1.80	1.70	2.25	2.34	2.99	1.18
11/09/10	4.51	1.93	1.68	1.64	1.93	2.02	2.60	1.16
11/16/10	3.78	1.77	1.62	1.43	1.77	1.84	2.76	1.25
11/23/10	Lysimeters inaccessible due to high water level from rain event							
11/30/10	4.27	1.67	1.55	1.35	1.58	1.68	1.85	1.11
12/07/10	4.24	1.70	1.70	1.44	1.67	1.97	1.43	0.96
12/14/10	4.17	1.67	1.50	1.46	1.64	1.79	1.43	1.21
12/21/10	Lysimeters inaccessible due to high water level from rain event							
12/28/10	Lysimeters inaccessible due to high water level from rain event							
01/04/11	Lysimeters inaccessible due to high water level from rain event							
01/11/11	3.02	1.70	1.54	1.07	1.68	1.68	1.43	0.97
01/18/11	3.48	1.86	1.52	1.12	1.67	1.70	1.33	1.09
01/26/11	3.67	1.68	1.48	1.11	1.64	1.73	1.27	1.09
02/01/11	4.47	1.73	1.52	1.27	1.72	1.86	1.53	1.12
02/08/11	5.01	1.62	1.70	1.19	1.69	1.62	1.31	1.08
02/16/11	5.20	1.88	1.82	1.31	1.96	1.69	1.59	1.41
02/23/11	4.41	1.56	1.59	1.12	1.69	1.63	1.20	1.07
03/03/11	3.47	1.52	1.63	1.37	1.61	1.52	1.15	0.94
03/08/11	3.47	1.45	1.40	1.05	1.46	1.48	1.06	0.79
03/15/11	4.04	1.71	1.48	1.23	1.63	1.64	1.19	0.86
03/24/11	3.28	Lysimeters inaccessible due to high water level from rain event						
03/30/11	4.79	Lysimeters inaccessible due to high water level from rain event						
04/05/11	3.04	1.47	1.42	1.18	1.52	1.45	1.23	0.79
04/12/11		Lysimeters inaccessible due to high water level from rain event						
04/19/11	4.29	1.61	1.74	1.09	1.63	1.41	1.53	0.80
04/26/11	4.90	1.74	2.02	1.27	1.63	1.44	1.94	0.82
05/04/11	5.30	1.79	1.34	1.20	1.60	1.28	1.15	0.84
05/10/11	5.72	1.51	1.15	1.06	1.53	1.29	1.24	0.77
05/17/11	6.27	1.51	1.28	1.17	1.52	1.21	1.07	0.93
05/26/11	5.56	1.50	1.43	0.99	1.39	1.16	1.14	0.80
06/02/11	5.54	Lysimeters inaccessible due to high water level due to imported water deliveries						
06/09/11	5.92	1.48	1.43	1.04	1.22	1.30	1.11	0.70
06/15/11	6.35	1.49	1.95	0.95	1.12	1.22	1.00	0.63
06/21/11	6.18	1.71	1.64	1.03	1.21	1.30	1.11	1.10
06/28/11	5.79	1.56	1.59	1.35	1.41	1.64	0.97	0.78
07/07/11	6.78	1.87	1.72	1.33	2.08	1.93	1.82	0.98
07/14/11	6.86	3.38	2.39	1.45	2.27	3.05	2.46	1.96
07/20/11	10.1	2.99	1.96		1.64	1.49		1.16
07/27/11	6.80	2.05	1.77	1.31	1.95	1.91	1.52	
08/03/11	9.69	2.07	1.81	1.41	1.75	2.03	1.50	
08/09/11	16.6	3.38	2.32	1.55		1.85	1.87	
08/16/11	11.1	2.26	2.06	1.32		1.84	1.09	

Notes (blank) Insufficient sample from lysimeter result in parameter not being analyzed

Depth Profile (Figure 5-1)

Depth	0	5	10	15	20	25	30	35
Avg TOC	4.7	1.7	1.6	1.3	1.7	1.7	1.6	1.0

10/12/10 = first RW at 35 feet 07/07/11 = Last date used in averages due to anomalous data on 7/14 and later

Table 4-3
Victoria Basin: Surface Water and Lysimeter Results
Nitrogen Speciation
(mg/L)

Date	Surface Water					Lysimeter Depth (ft bgs)																																		
	0					5					10					15					20					25					30					35				
	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN	NH_3-N	NO_3-N	NO_2-N	TKN	TN
06/09/10	<0.1	<0.1	0.13	1.5	1.6						<0.1	1.1	0.19	1.3	2.5	<0.1	<0.1	0.14	<0.5	<0.6	<0.1	<0.1	0.12	<0.5	<0.6						<0.1	0.7	0.15	<0.5	0.9	<0.1	0.4	0.18	<0.5	<0.6
06/15/10	<0.1	<0.1	0.18	0.8	1.0	<0.1	1.0	0.22	<0.5	1.4	<0.1	0.5	0.18	<0.5	0.9	<0.1	<0.1	0.13	<0.5	<0.6	<0.1	<0.1	0.11	<0.5	<0.6		0.6	0.25			<0.1	0.1	0.14	<0.5	<0.6	<0.1	<0.1	0.15	<0.5	<0.6
06/22/10	<0.1	<0.1	0.13	1.7	1.9						<0.1	0.3	0.20	<0.5	0.8	<0.1	<0.1	0.13	<0.5	<0.6	<0.1	<0.1	0.14	<0.5	<0.6						<0.1	<0.1	0.15	<0.5	<0.6					
06/29/10	0.2	<0.1	0.02	2.5	2.5						<0.1	0.3	0.29	<0.5	0.9	<0.1	<0.1	0.02	<0.5	<0.6	<0.1	<0.1	0.25	<0.5	<0.6						<0.1	<0.1	0.03	<0.5	<0.6	<0.1	<0.1	0.30	<0.5	<0.6
07/07/10	<0.1	<0.1	0.14	0.8	0.9						<0.1	0.2	0.22	<0.5	0.7	<0.1	<0.1	0.15	<0.5	<0.6	<0.1	0.1	0.19	<0.5	<0.6							<0.1	0.19				<0.1	0.22		
07/13/10	<0.1	<0.1	0.07	2.3	2.4						<0.1	0.2	0.19	<0.5	0.7	<0.1	<0.1	0.15	<0.5	<0.6	<0.1	<0.1	0.19	<0.5	<0.6						<0.1	<0.1	0.15	<0.5	<0.6	<0.1	<0.1	0.20	<0.5	<0.6
07/21/10	<0.1	<0.1	0.09	2.7	2.8						<0.1	0.2	0.20	0.8	1.1	<0.1	<0.1	0.15	0.6	0.8	<0.1	<0.1	0.21	0.5	0.8	<0.1	<0.1	0.17	<0.5	<0.6	<0.1	<0.1	0.16	<0.5	<0.6	<0.1	<0.1	0.21	<0.5	<0.6
07/27/10	<0.1	<0.1	0.13	1.6	1.7						<0.1	0.2	0.20	<0.5	0.7	<0.1	<0.1	0.19	1.2	1.4	<0.1	<0.1	0.25	<0.5	<0.6						<0.1	<0.1	0.18	0.6	0.8	<0.1	<0.1	0.25	<0.5	<0.6
08/03/10											<0.1	0.4	0.19	<0.5	0.8	<0.1	<0.1	0.17	<0.5	<0.6	<0.1	0.1	0.25	<0.5	0.6						<0.1	<0.1	0.18	0.5	0.7	<0.1	<0.1	0.24	<0.5	<0.6
08/11/10	<0.1	<0.1	0.16	1.0	1.2											<0.1	<0.1	0.17	<0.5	<0.6											<0.1	0.2	0.17	<0.5	<0.6	<0.1	<0.1	0.25	<0.5	<0.6
08/18/10	0.4	<0.1	0.17	1.8	1.9						<0.1	0.22	0.21	0.5	1.0	<0.1	<0.1	0.15	<0.5	<0.6											<0.1	0.3	0.21	<0.5	<0.6					
09/08/10	<0.1	4.1	0.20	1.5	5.8		4.2	0.29									<0.1	0.23			<0.1	<0.1	0.27	0.7	1.0		<0.1	0.23			<0.1	0.2	0.19	<0.5	<0.6					
09/14/10	<0.1	2.3	0.17	1.6	4.0																<0.1	0.1	0.25	<0.5	0.6						<0.1	0.2	0.19	<0.5	<0.6		1.8	0.25		
09/21/10	<0.1	2.8	0.27	<0.5	3.1																<0.1	<0.1	0.22	<0.5	<0.6						<0.1	<0.1	0.25	<0.5	<0.6		1.7	0.27		
09/27/10	<0.1	1.6	0.07	2.0	3.7	0.11	1.2	0.16	1.0	2.4	<0.1	0.4	<0.01	0.5	0.9	<0.1	0.1	<0.01	0.9	1.0	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	0.3	<0.01	<0.5	<0.6	<0.1	1.5	<0.01	<0.5	1.5
10/05/10	0.1	2.9	0.21	1.5	4.7	0.15	0.8	0.45	0.9	2.2	<0.1	0.3	0.31	<0.5	0.8	<0.1	0.1	0.29	<0.5	<0.6	<0.1	<0.1	0.25	<0.5	<0.6	<0.1	0.2	0.29	0.6	1.1	<0.1	<0.1	0.32	<0.5	<0.6	<0.1	0.7	0.26	<0.5	0.9
10/12/10	<0.1	3.1	0.21	1.8	5.1	0.13	<0.1	0.26	0.8	1.1	<0.1	0.1	0.29	0.5	0.9	<0.1	<0.1	0.29	0.5	0.9	<0.1	<0.1	0.23	0.5	0.8	<0.1	0.2	0.27	0.7	1.2	<0.1	<0.1	0.26	<0.5	<0.6	<0.1	1.9	0.21	<0.5	2.1
10/19/10	<0.1	2.3	0.21	1.7	4.2	<0.1	0.3	0.27	0.7	1.2	<0.1	<0.1	0.27	<0.5	<0.6	<0.1	<0.1	0.27	0.5	0.8	<0.1	<0.1	0.23	<0.5	<0.6	0.12	0.2	0.26	0.5	1.0	<0.1	<0.1	0.22	<0.5	<0.6	<0.1	0.7	0.20	<0.5	0.9
10/27/10	0.7	2.0	0.09	2.2	4.3	0.10	1.5	0.09	<0.5	1.9	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	0.13	0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	0.6	<0.6	<0.1	0.3	<0.01	<0.5	<0.6
11/03/10	0.4	2.6	0.25	1.6	4.4	<0.1	1.7	0.09	0.6	2.4	<0.1	0.4	<0.01	<0.5	0.7	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	0.7	<0.01	<0.5	0.7
11/09/10	0.2	3.3	<0.01	1.3	4.5	0.10	1.5	0.03	<0.5	1.8	<0.1	0.4	<0.01	<0.5	<0.6	<0.1	0.5	0.11	<0.5	0.9	<0.1	0.3	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	0.7	<0.01	<0.5	0.7
11/16/10	<0.1	4.4	0.13	1.1	5.6	<0.1	0.7	0.28	0.6	1.6	<0.1	0.3	0.16	0.6	1.0	<0.1	0.8	0.44	0.7	2.0	<0.1	0.3	0.20	1.0	1.5	<0.1	0.2	0.14	1.6	1.9	<0.1	<0.1	0.16	0.9	1.0	<0.1	1.4	0.13	0.9	2.4
11/30/10	0.1	3.0	0.15	1.0	4.1	<0.1	1.0	0.25	<0.5	1.5	<0.1	0.2	0.20	0.7	1.1	<0.1	<0.1	0.22	<0.5	<0.6	<0.1	0.1	0.19	0.8	1.1	<0.1	0.4	0.20	0.5	1.1	<0.1	<0.1	0.30	<0.5	<0.6	<0.1	1.5	0.15	<0.5	1.6
12/07/10	0.2	2.7	0.12	1.5	4.3	<0.1	2.5	0.15	0.9	3.5	<0.1	0.3	<0.01	0.6	0.9	<0.1	<0.1	<0.01	0.8	0.8	<0.1	0.2	0.12	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	<0.1	0.24	<0.5	<0.6	<0.1	1.1	0.11	<0.5	1.3
12/14/10	0.2	2.8	0.12	1.4	4.4	<0.1	1.7	0.13	<0.5	2.1	<0.1	0.3	0.15	0.5	1.0	<0.1	<0.1	0.18	<0.5	<0.6	<0.1	0.2	0.13	0.8	1.1	<0.1	0.2	0.17	1.0	1.3	<0.1	0.2	0.22	0.9	1.3	<0.1	0.1	0.17	0.7	1.0
01/11/11	0.1	0.7	0.08	<0.5	0.8	<0.1	0.6	0.18	<0.5	1.0	0.11	0.2	0.17	<0.5	0.6	<0.1	0.3	0.23	<0.5	0.8	<0.1	0.6	0.20	0.7	1.5	<0.1	0.2	0.17	<0.5	<0.6	0.22	0.1	0.18	<0.5	<0.6	<0.1	1.6	0.13	<0.5	1.7
01/18/11	<0.1	2.2	0.11	0.8	3.1	<0.1	0.5	0.17	<0.5	0.9	<0.1	0.2	0.12	0.6	0.9	<0.1	<0.1	0.15	0.6	0.8	<0.1	0.5	0.11	0.6	1.2	<0.1	0.2	0.06	<0.5	<0.6	0.14	0.2	0.09	0.7	1.0	<0.1	0.3	0.11	<0.5	<0.6
01/26/11	<0.1	2.5	0.10	0.5	3.2	<0.1	0.7	0.14	<0.5	1.1	<0.1	0.1	0.11	<0.5	<0.6	<0.1	<0.1	0.17	<0.5	<0.6	<0.1	0.3	0.10	<0.5	0.7	<0.1	0.3	<0.01	<0.5	<0.6	0.17	0.3	0.09			<0.1	<0.1	0.09		
02/01/11	<0.1	2.9	0.07	0.7	3.7	<0.1	1.0	0.11	<0.5	1.4	<0.1	0.2	0.15	<0.5	0.6	<0.1	<0.1	0.13	<0.5	<0.6	<0.1	0.1	0.23	<0.5	0.6	<0.1	0.4	0.17	<0.5	<0.6	0.18	0.3	0.15	<0.5	<0.6	<0.1	<0.1	0.05	<0.5	<0.6
02/08/11	<0.1	2.5	0.10	1.1	3.7	<0.1	0.7	0.09	<0.5	1.1	<0.1	0.2	0.09	<0.5	<0.6	<0.1	<0.1	0.18	<0.5	<0.6	<0.1	0.1	0.15	<0.5	<0.6	<0.1	0.3	<0.01	<0.5	<0.6	0.14	0.2	0.10	0.5	0.8	<0.1	<0.1	0.08	<0.5	<0.6
02/16/11	<0.1	2.3	0.07	0.8	3.2	<0.1	0.8	0.10	<0.5	1.1	<0.1	0.2	0.12	<0.5	0.6	<0.1	0.2	0.14	<0.5	<0.6	<0.1	0.2	0.15	<0.5	0.6	<0.1	0.3	0.15	<0.5	<0.6	0.14	0.1	0.15	<0.5	<0.6	<0.1	<0.1	0.15	<0.5	<0.6
02/23/11	<0.1	1.6	0.14	1.1	2.8	<0.1	0.7	0.11	0.7	1.5	<0.1	0.2	0.15	<0.5	0.6	<0.1	0.3	0.18	<0.5	0.7	<0.1	0.5	0.22	<0.5	1.0	<0.1	0.2	0.12	<0.5	<0.6	0.10	<0.1	0.19	<0.5	<0.6	<0.1	<0.1	0.19	<0.5	<0.6
03/03/11	0.1	0.7	0.12	0.9	1.6	<0.1	0.6	0.16	0.5	1.3	<0.1	0.2	0.20	<0.5	0.6	<0.1	0.3	0.20	<0.5	0.7	<0.1	0.6	0.22	<0.5	1.0	<0.1	0.2	0.20	<0.5	<0.6	<0.1	<0.1	0.24	<0.5	<0.6	<0.1	<0.1	0.23	<0.5	<0.6
03/08/11	0.1	0.6	0.12	0.8	1.5	<0.1	0.6	0.09	0.5	1.2	<0.1	0.2	0.11	<0.5	0.6	<0.1	0.3	0.12	0.5	1.0	<0.1	0.5	0.13	<0.5	0.9	<0.1	0.2	0.12	<0.5	<0.6	0.10	<0.1	0.18	<0.5	<0.6	<0.1	<0.1	0.19	<0.5	<0.6
03/15/11	<0.1	2.5	0.12	0.6	3.3	<0.1	0.4	0.13	<0.5	0.8	<0.1	0.2	0.13	<0.5	0.6	<0.1	0.3	0.13	<0.5	0.7	<0.1	0.5	0.13	<0.5	0.8	<0.1	0.2	0.16	<0.5	<0.6	<0.1	<0.1	0.20	<0.5	<0.6	<0.1	0.1	0.17	<0.5	<0.6
03/24/11	<0.1	0.7	0.08	<0.5	0.7																																			
03/30/11	<0.1	0.4	0.12	1.0	1.5																																			
04/05/11	<0.1	0.2	0.08	0.6	0.9	<0.1	0.2	0.04	<0.5	<0.6	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	0.3	<0.01	<0.5	0.6	<0.1	0.4	<0.01	<0.5	0.6	<0.1	0.4	0.03	<0.5	<0.6	<0.1	0.1	0.09	<0.5	<0.6	<0.1	0.9	0.06	<0.5	0.9
04/19/11	<0.1	<0.1	0.13	<0.5	<0.6	<0.1	<0.1	0.21	<0.5	<0.6	<0.1	<0.1	0.07	<0.5	<0.6	<0.1	<0.1	0.08	<0.5	<0.6	<0.1	0.2	0.07	<0.5	0.6	<0.1	0.3	0.06	<0.5	<0.6	<0.1	<0.1	0.11	<0.5	<0.6	<0.1	0.4	0.09	<0.5	<0.6
04/26/11	<0.1	<0.1	0.10	0.5	0.6	<0.1	<0.1	0.18	<0.5	<0.6	<0.1	<0.1	0.08	<0.5	<0.6	<0.1	<0.1	0.07	<0.5	<0.6	<0.1	0.3	0.09	<0.5	0.6	<0.1	0.2	0.03	<0.5	<0.6	<0.1	<0.1	0.08	<0.5	<0.6	<0.1	0.3	0.07	<0.5	<0.6
05/04/11	<0.1	0.6	<0.01	1.0	1.6	<0.1	0.5	<0.01	<0.5	0.7	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	0.3	<0.01	<0.5	0.6	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.1	<0.01	0.8	0.9	<0.1	0.2	<0.01	0.6	0.8
05/10/11	0.1	1.6	0.05	1.2	2.9	<0.1	0.8	0.13	<0.5	1.2	<0.1	0.2	0.08	<0.5	<0.6	<0.1	<0.1	0.10	<0.5	<0.6	<0.1	0.2	0.06	<0.5	0.6	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	0.1	0.07	<0.5	<0.6	<0.1	0.2	0.08	<0.5	<0.6
05/17/11	0.3	0.8	0.04	1.3	2.2	<0.1	1.1	0.12	<0.5	1.4	<0.1	0.2	0.08	<0.5	<0.6	<0.1	<0.1	0.14	<0.5	<0.6	<0.1	0.1	0.08	<0.5	<0.6	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	0.1	0.08	<0.5	<0.6	<0.1	0.2	0.09	<0.5	<0.6
05/26/11	0.3	0.5	0.01	0.6	1.1	<0.1	1.1	<0.01	<0.5	1.4	<0.1	0.3	<0.01	<0.5	<0.6	0.10	<0.1	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	<0.5	<0.6	0.11	0.2	<0.01	<0.5	<0.6	0.17	0.3	<0.01	<0.5	<0.6
06/02/11	0.1	0.7	<0.01	1.1	1.8																																			
06/09/11	0.4	0.7	0.01	0.9	1.6	<0.1	0.8	<0.01	<0.5	1.1	<0.1	0.3	<0.01	<0.5	<0.6	<0.1	0.8	0.03	<0.5	1.1	<0.1	1.1	<0.01	<0.5	1.3	<0.1	0.3	<0.01	<0.5	<0.6	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	0.4	<0.01	<0.5	<0.6
06/15/11	<0.1	0.4	0.01	1.1	1.5	<0.1	0.7	<0.01	<0.5	0.9	<0.1	0.3	<0.01	<0.5	0.6	<0.1	0.7	0.02	<0.5	0.9	<0.1	1.1	<0.01	<0.5	1.4	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.1	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	<0.5	<0.6
06/21/11	<0.1	0.9	<0.01	1.3	2.3	<0.1	0.9	<0.01	0.5	1.4	<0.1	0.4	<0.01	<0.5	0.6	<0.1	0.5	0.01	<0.5	0.8	<0.1	1.0	<0.01	<0.5	1.3	<0.1	0.3	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	<0.5	<0.6
06/28/11	<0.1	0.7	0.04	1.7	2.5	<0.1	1.7	0.04	0.6	2.3	<0.1	0.4	0.04	<0.5	0.7	<0.1	0.5	<0.01	<0.5	0.7		1.1	0.02			<0.1	0.3	0.07	<0.5	0.6	<0.1	0.3	0.06	<0.5	0.6	<0.1	0.4	0.12	<0.5	0.8
07/07/11	<0.1	<0.1	<0.01	1.8	1.8	<0.1	1.2	<0.01	<0.5	1.5	<0.1	0.4	<0.01	<0.5	0.7	<0.1	0.5	<0.01	<0.5	0.8	<0.1	1.0	<0.01	<0.5	1.3	<0.1	0.5	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.6	0.01	<0.5	0.6
07/14/11	<0.1	0.4	<0.01	1.9	2.3	<0.1	1.0	<0.01	0.6	1.6	0.1	0.4	<0.01	<0.5	0.7	0.1	0.8	<0.01	<0.5	1.1		1.0	<0.01				0.5	<0.01			<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.5	<0.01	0.7	1.2
07/20/11	0.8			8.1		<0.1	0.9	<0.01	<0.5	1.2	<0.1	0.5	<0.01	<0.5	0.8	<0.1	1.2	<0.01	<0.5	1.5	<0.1	1.0	<0.01	<0.5	1.3	<0.1	0.6	<0.01	<0.5	0.6	<0.1	0.2	<0.01	<0.5	<0.6	<0.1	0.5	<0.01	<0.5	<0.6
07/27/11	<0.1	<0.1	<0.01	<0.5	<0.6	<0.1	1.2	<0.01	<0.5	1.5	<0.1	0.6	<0.01	<0.5	0.9	<0.1	1.4	<0.01	<0.5	1.7		1.3	<0.01			<0.1	0.6	<0.01	<0.5	0.6	<0.1	0.2	<0.01	<0.5	<0.6					
08/03/11	<0.1	<0.1	<0.01	1.9	1.9	<0.1	1.0	<0.01	0.7	1.7	<0.1	0.6	<0.01	<0.5	0.9	<0.1	1.3	<0.01	0.6	1.9		1.8	<0.01			<0.1	0.5	<0.01	<0.5	<0.6	<0.1	0.2	<0.01	0.5	0.7					
08/09/11	<0.1	<0.1	<0.01	2.0	2.0	<0.1	0.9	<0.01	<0.5	1.2	<0.1	0.7	<0.01	<0.5	1.0	<0.1	1.1	<0.01	<0.5	1.4	<0.1	1.8	<0.01	<0.5	1.8						<0.1	0.2	<0.01	<0.5	<0.6					
08/16/11	<0.1	<0.1	<0.01	1.5	1.5	<0.1	1.0	<0.01	0.5	1.5	<0.1	0.6	<0.01	<0.5	0.9	<0.1	0.2	<0.01	<0.5	0.5	<0.1	1.8	<0.01	<0.5	1.8						<0.1	1.0	<0.01	<0.5	1.0					

Notes (blank) Insufficient sample from lysimeter result in parameter not being analyzed

Table 4-4
Victoria Basin: Surface Water and Lysimeter Results
Total Nitrogen
(mg/L)

Date	Surface Water	Lysimeter Depth (ft bgs)						
	0	5	10	15	20	25	30	35
06/09/10	1.6		2.5	<0.6	<0.6		0.9	0.8
06/15/10	1.0	1.4	0.9	<0.6	<0.6		<0.6	<0.6
06/22/10	1.9		0.8	<0.6	<0.6		<0.6	
06/29/10	2.5		0.9	<0.6	<0.6		<0.6	0.6
07/07/10	0.9		0.7	<0.6	<0.6			
07/13/10	2.4		0.7	<0.6	<0.6		<0.6	<0.6
07/21/10	2.8		1.1	0.8	0.8	<0.6	<0.6	<0.6
07/27/10	1.7		0.7	1.4	<0.6		0.8	<0.6
08/03/10			0.8	<0.6	0.6		0.7	<0.6
08/11/10	1.2			<0.6			<0.6	<0.6
08/18/10	1.9		1.0	<0.6			0.7	
08/25/10	No sampling this week							
08/26/10	No sampling this week							
09/08/10	5.8				1.0		0.7	
09/14/10	4.0				0.6		0.6	
09/21/10	3.1				<0.6		<0.6	
09/27/10	3.7	2.4	0.9	1.0	<0.6	<0.6	<0.6	1.5
10/05/10	4.7	2.2	0.8	<0.6	<0.6	1.1	0.6	0.9
10/12/10	5.1	1.1	0.9	0.9	0.8	1.2	<0.6	2.1
10/19/10	4.2	1.2	<0.6	0.8	<0.6	1.0	<0.6	0.9
10/27/10	4.3	1.9	<0.6	<0.6	<0.6	<0.6	0.6	<0.6
11/03/10	4.4	2.4	0.7	<0.6	<0.6	<0.6	<0.6	0.7
11/09/10	4.5	1.8	0.6	0.9	<0.6	<0.6	<0.6	0.7
11/16/10	5.6	1.6	1.0	2.0	1.5	1.9	1.0	2.4
11/23/10	Lysimeters inaccessible due to high water level from rain event							
11/30/10	4.1	1.5	1.1	<0.6	1.1	1.1	<0.6	1.6
12/07/10	4.3	3.5	0.9	0.8	<0.6	<0.6	<0.6	1.3
12/14/10	4.4	2.1	1.0	<0.6	1.1	1.3	1.3	1.0
12/21/10	Lysimeters inaccessible due to high water level from rain event							
12/28/10	Lysimeters inaccessible due to high water level from rain event							
01/04/11	Lysimeters inaccessible due to high water level from rain event							
01/11/11	0.8	1.0	0.6	0.8	1.5	0.7	<0.6	1.7
01/18/11	3.1	0.9	0.9	0.8	1.2	<0.6	1.0	<0.6
01/26/11	3.2	1.1	<0.6	<0.6	0.7	<0.6		
02/01/11	3.7	1.4	<0.6	<0.6	0.6	0.8	0.7	<0.6
02/08/11	3.7	1.1	<0.6	<0.6	<0.6	<0.6	0.8	<0.6
02/16/11	3.2	1.1	<0.6	<0.6	<0.6	0.7	<0.6	<0.6
02/23/11	2.8	1.5	<0.6	0.7	1.0	<0.6	<0.6	<0.6
03/03/11	1.6	1.3	0.6	0.7	1.0	0.6	<0.6	<0.6
03/08/11	1.5	1.2	<0.6	1.0	0.9	<0.6	<0.6	<0.6
03/15/11	3.3	0.8	0.6	0.7	0.8	<0.6	<0.6	<0.6
03/24/11	0.7	Lysimeters inaccessible due to high water level from rain event						
03/30/11	1.5	Lysimeters inaccessible due to high water level from rain event						
04/05/11	0.9	<0.6	<0.6	0.6	0.6	0.6	<0.6	0.9
04/12/11		Lysimeters inaccessible due to high water level from rain event						
04/19/11	<0.6	<0.6	<0.6	<0.6	<0.6	0.6	<0.6	<0.6
04/26/11	0.6	<0.6	<0.6	<0.6	0.6	<0.6	<0.6	<0.6
05/04/11	1.6	0.7	<0.6	<0.6	<0.6	<0.6	0.9	0.8
05/10/11	2.9	1.2	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
05/17/11	2.2	1.4	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
05/26/11	1.1	1.4	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
06/02/11	1.8	Lysimeters inaccessible due to high water level due to imported water deliveries						
06/09/11	1.6	1.1	<0.6	1.1	1.3	<0.6	<0.6	0.7
06/15/11	1.5	0.9	<0.6	0.9	1.4	<0.6	<0.6	<0.6
06/21/11	2.3	1.4	0.6	0.8	1.3	<0.6	<0.6	<0.6
06/28/11	2.5	2.3	0.7	0.7		0.6	0.6	0.8
07/07/11	1.8	1.5	0.7	0.8	1.3	0.8	<0.6	0.6
07/14/11	2.3	1.6	0.7	1.1			<0.6	1.2
07/20/11		1.2	0.8	1.5	1.3	0.6	<0.6	0.8
07/27/11	<0.6	1.5	0.9	1.7		0.6	<0.6	
08/03/11	1.9	1.7	0.9	1.9		0.8	0.7	
08/09/11	2.0	1.2	1.0	1.4		1.8	<0.6	
08/16/11	1.5	1.5	0.9	0.5		1.8	1.0	
Notes	(blank)	Insufficient sample from lysimeter result in parameter not being analyzed						

Depth Profile (Figure 5-1)

Depth (feet)	0	5	10	15	20	25	30	35
Average TN	2.7	1.3	0.6	0.7	0.8	0.6	0.6	0.7
	10/12/10 = first RW at 35 feet		07/07/11 = Last date used in averages due to anomalous data on 7/14 and later					

Table 4-5
Victoria Basin: Monitoring Well VCT-1/1 and VCT-2-2
Water Quality Results

MONITORING WELL VCT-1/1							
Date	EC (µmhos/cm)	TOC mg/L	NH_3-N mg/L	NO_2-N mg/L	NO_3-N mg/L	TKN mg/L	TN mg/L
2/4/2010	300	0.15	<0.1	<0.02	1.7	<0.5	1.7
5/12/2010	325	0.61	<0.1	0.1	1.6	<0.5	1.7
8/31/2010	340	0.34	<0.1	0.0	2.2	<0.5	2.2
10/13/2010	335	0.33	<0.1	0.2	1.9	<0.5	2.1
2/8/2011	325	0.21	<0.1	0.1	1.5	<0.5	1.6
5/19/2011	345	0.54	0.3	0.0	1.2	<0.5	1.2
8/1/2011	350	0.15	<0.1	0.1	1.4	<0.5	1.5

MONITORING WELL VCT-2/2							
Date	EC (µmhos/cm)	TOC mg/L	NH_3-N mg/L	NO_2-N mg/L	NO_3-N mg/L	TKN mg/L	TN mg/L
12/21/2009	265	0.7	<0.1	0.1	2.0	<0.5	2.1
5/12/2010	330	0.15	<0.1	0.1	4.9	<0.5	5.0
9/8/2010	300	0.43	<0.1	0.2	3.6	1.1	4.9
11/10/2010	275	0.14	<0.1	<0.02	1.8	<0.5	1.8
3/14/2011	290	0.13	<0.1	0.2	1.9	<0.5	2.1
5/19/2011	265	0.28	<0.1	0.2	1.5	<0.5	1.7
8/2/2011	300	1.04	<0.1	0.2	1.2	0.8	2.2

Table 5-1
Victoria Basin: SAT Removal Efficiencies for TOC and TN

Event	Date	Notes
Start of RW Recharge in Basin	09/02/10	
First Arrival of RW Recharge at 35-ft Lysimeter	11/13/10	72 days after 9/2/10
End of Start-Up Period at 35-ft Lysimeter	07/07/11	
Recharge of RW for End of Start-Up period at 35-ft Lysimeter	04/26/11	72 days after 7/7/11
Start of 20-Sample Average, Lysimeter Data	02/17/11	20 wks prior to 7/7/11
Start of 20-Sample Average, Surface Water Data	12/07/10	20 wks prior to 4/26/11

	SAT Removal Efficiency for TOC		
	Surface Water TOC (mg/L) 20 back from 04/26/11	**35-foot Lysimeter TOC (mg/L)** 20 back from 07/07/11	**SAT Eff. (%)**
20-Sample Rolling Average (at end of the Start-up Period	4.08	0.92	78%
	09/02/10 to 04/24/11	11/13/10 to 07/07/11	**SAT Eff. (%)**
Minimum	3.02	0.63	
Maximum	6.96	1.41	
Full Start-Up Period Average (all 35-ft SUP data with RW, 27 samples)	4.52	0.96	79%

	SAT Removal Efficiency for TN		
	Surface Water TN (mg/L) 20 back from 04/26/11	**35-foot Lysimeter TN (mg/L)** 20 back from 07/07/11	**SAT Eff. (%)**
20-Sample Rolling Average (at end of the Start-up Period	2.8	0.5	82%
	09/02/10 to 04/26/11	11/13/10 to 07/07/11	**SAT Eff. (%)**
Minimum	<0.6	<0.6	
Maximum	5.8	2.4	
Full Start-Up Period Average (all 35-ft SUP data with RW, 27 samples)	3.2	0.7	79%

Table 7-1
RWC Management Plan for Victoria Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Period
2005/06	Jul '05	-62	0.	0.		0.	0.	0.	0.	0.	0%	HISTORICAL
	Aug '05	-61	0.	0.		0.	0.	0.	0.	0.	0%	
	Sep '05	-60	0.	0.		0.	0.	0.	0.	0.	0%	
	Oct '05	-59	49.	0.		49.	49.	0.	0.	49.	0%	
	Nov '05	-58	0.	0.		0.	49.	0.	0.	49.	0%	
	Dec '05	-57	9.4	0.		9.4	58.4	0.	0.	58.4	0%	
	Jan '06	-56	25.8			25.8	84.2	0.	0.	84.2	0%	
	Feb '06	-55	42.6	0.		42.6	126.9	0.	0.	126.9	0%	
	Mar '06	-54	109.8	0.		109.8	236.7	0.	0.	236.7	0%	
	Apr '06	-53	58.7	0.		58.7	295.4	0.	0.	295.4	0%	
	May '06	-52	28.7	0.		28.7	324.1	0.	0.	324.1	0%	
	Jun '06	-51	12.	0.		12.	336.1	0.	0.	336.1	0%	
2006/07	Jul '06	-50	8.7	0.		8.7	344.8	0.	0.	344.8	0%	
	Aug '06	-49	3.1	0.		3.1	347.9	0.	0.	347.9	0%	
	Sep '06	-48	3.	0.		3.	350.9	0.	0.	350.9	0%	
	Oct '06	-47	8.1	0.		8.1	359.	0.	0.	359.	0%	
	Nov '06	-46	4.	0.		4.	363.	0.	0.	363.	0%	
	Dec '06	-45	88.8	0.		88.8	451.8	0.	0.	451.8	0%	
	Jan '07	-44	14.7	0.		14.7	466.5	0.	0.	466.5	0%	
	Feb '07	-43	69.7	0.		69.7	536.2	0.	0.	536.2	0%	
	Mar '07	-42	8.2	0.		8.2	544.4	0.	0.	544.4	0%	
	Apr '07	-41	35.	0.		35.	579.4	0.	0.	579.4	0%	
	May '07	-40	7.	0.		7.	586.4	0.	0.	586.4	0%	
	Jun '07	-39	9.	0.		9.	595.4	0.	0.	595.4	0%	
2007/08	Jul '07	-38	0.	0.		0.	595.4	0.	0.	595.4	0%	
	Aug '07	-37	0.	0.		0.	595.4	0.	0.	595.4	0%	
	Sep '07	-36	5.	0.		5.	600.4	0.	0.	600.4	0%	
	Oct '07	-35	8.	0.		8.	608.4	0.	0.	608.4	0%	
	Nov '07	-34	49.	0.		49.	657.4	0.	0.	657.4	0%	
	Dec '07	-33	66.	0.		66.	723.4	0.	0.	723.4	0%	
	Jan '08	-32	180.	0.		180.	903.4	0.	0.	903.4	0%	
	Feb '08	-31	61.	0.		61.	964.4	0.	0.	964.4	0%	
	Mar '08	-30	2.	0.		2.	966.4	0.	0.	966.4	0%	
	Apr '08	-29	7.	0.		7.	973.4	0.	0.	973.4	0%	
	May '08	-28	46.	0.		46.	1,019.4	0.	0.	1,019.4	0%	
	Jun '08	-27	3.	0.		3.	1,022.4	0.	0.	1,022.4	0%	
2008/09	Jul '08	-26	3.	0.		3.	1,025.4	0.	0.	1,025.4	0%	
	Aug '08	-25	3.	0.		3.	1,028.4	0.	0.	1,028.4	0%	
	Sep '08	-24	2.	0.		2.	1,030.4	0.	0.	1,030.4	0%	
	Oct '08	-23	4.	0.		4.	1,034.4	0.	0.	1,034.4	0%	
	Nov '08	-22	35.	0.		35.	1,069.4	0.	0.	1,069.4	0%	
	Dec '08	-21	74.	0.		74.	1,143.4	0.	0.	1,143.4	0%	
	Jan '09	-20	15.	0.		15.	1,158.4	0.	0.	1,158.4	0%	
	Feb '09	-19	95.	0.		95.	1,253.4	0.	0.	1,253.4	0%	
	Mar '09	-18	13.	0.		13.	1,266.4	0.	0.	1,266.4	0%	
	Apr '09	-17	3.	0.		3.	1,269.4	0.	0.	1,269.4	0%	
	May '09	-16	3.	0.		3.	1,272.4	0.	0.	1,272.4	0%	
	Jun '09	-15	0.	0.		0.	1,272.4	0.	0.	1,272.4	0%	
2009/10	Jul '09	-14	1.	0.		1.	1,273.4	0.	0.	1,273.4	0%	
	Aug '09	-13	0.	0.		0.	1,273.4	0.	0.	1,273.4	0%	
	Sep '09	-12	0.	0.		0.	1,273.4	0.	0.	1,273.4	0%	
	Oct '09	-11	37.	2.		39.	1,312.4	0.	0.	1,312.4	0%	
	Nov '09	-10	19.	0.		19.	1,331.4	0.	0.	1,331.4	0%	
	Dec '09	-9	89.	0.		89.	1,420.4	0.	0.	1,420.4	0%	
	Jan '10	-8	153.	0.		153.	1,573.4	0.	0.	1,573.4	0%	
	Feb '10	-7	174.	0.		174.	1,747.4	0.	0.	1,747.4	0%	
	Mar '10	-6	0.	0.		0.	1,747.4	0.	0.	1,747.4	0%	
	Apr '10	-5	20.	0.		20.	1,767.4	0.	0.	1,767.4	0%	
	May '10	-4	0.	0.		0.	1,767.4	0.	0.	1,767.4	0%	
	Jun '10	-3	1.	0.		1.	1,768.4	0.	0.	1,768.4	0%	
2010/11	Jul '10	-2	3.	0.		3.	1,771.4	0.	0.	1,771.4	0%	
	Aug '10	-1	2.	0.		2.	1,773.4	0.	0.	1,773.4	0%	
	Sep '10	0	2.	0.		2.	1,775.4	67.	67.	1,842.4	4%	START-UP
	Oct '10	1	15.	0.	139.	154.	1,929.3	153.	220.	2,149.3	10%	
	Nov '10	2	34.	0.	139.	173.	2,102.3	117.	337.	2,439.3	14%	
	Dec '10	3	242.	0.	139.	381.	2,483.2	42.	379.	2,862.2	13%	
	Jan '11	4	18.	0.	139.	157.	2,640.2	86.	465.	3,105.2	15%	
	Feb '11	5	72.	0.	139.	211.	2,851.1	67.	532.	3,383.1	16%	
	Mar '11	6	59.	0.	139.	198.	3,049.1	39.	571.	3,620.1	16%	
	Apr '11	7	5.	0.	139.	144.	3,193.1	0.	571.	3,764.1	15%	
	May '11	8	6.	68.8	139.	213.8	3,406.8	141.	712.	4,118.8	17%	
	Jun '11	9	3.	0.	105.	108.	3,514.8	61.	773.	4,287.8	18%	

(CONTINUED)

Table 7-1

RWC Management Plan for Victoria Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Period
2011/12	Jul '11	10	4.	0.	105.	109.	3,623.8	62.	835.	4,458.8	19%	Start Up
	Aug '11	11	1.	122.7	105.	228.7	3,852.5	52.	887.	4,739.5	19%	
	Sep '11	12	0.	158.3	105.	263.3	4,115.8	0.	887.	5,002.8	18%	Hist-
	Oct '11	13	30.	0.	105.	135.	4,250.8	0.	887.	5,137.8	17%	orical
	Nov '11	14	25.	0.	105.	130.	4,380.8	15.	902.	5,282.8	17%	
	Dec '11	15	9.	0.	105.	114.	4,494.8	25.	927.	5,421.8	17%	
	Jan '12	16	68.		105.	173.	4,667.8	0.	927.	5,594.8	17%	
	Feb '12	17	86.		105.	191.	4,858.8	0.	927.	5,785.8	16%	
	Mar '12	18	32.		105.	137.	4,995.8	100.	1,027.	6,022.8	17%	
	Apr '12	19	21.		105.	126.	5,121.8	170.	1,197.	6,318.8	19%	
	May '12	20	15.		105.	120.	5,241.8	180.	1,377.	6,618.8	21%	
	Jun '12	21	5.		105.	110.	5,351.8	190.	1,567.	6,918.8	23%	
2012/13	Jul '12	22	3.		105.	108.	5,459.8	180.	1,747.	7,206.8	24%	
	Aug '12	23	1.		105.	106.	5,565.8	0.	1,747.	7,312.8	24%	PLANNED
	Sep '12	24	2.		105.	107.	5,672.8	0.	1,747.	7,419.8	24%	
	Oct '12	25	22.		105.	127.	5,799.8	180.	1,927.	7,726.8	25%	
	Nov '12	26	24.		105.	129.	5,928.8	170.	2,097.	8,025.8	26%	
	Dec '12	27	83.		105.	188.	6,116.8	110.	2,207.	8,323.8	27%	
	Jan '13	28	68.		105.	173.	6,289.8	140.	2,347.	8,636.8	27%	
	Feb '13	29	86.		105.	191.	6,480.8	120.	2,467.	8,947.8	28%	
	Mar '13	30	32.		105.	137.	6,617.8	160.	2,627.	9,244.8	28%	
	Apr '13	31	21.		105.	126.	6,743.8	170.	2,797.	9,540.8	29%	
	May '13	32	15.		105.	120.	6,863.8	180.	2,977.	9,840.8	30%	
	Jun '13	33	5.		105.	110.	6,973.8	190.	3,167.	10,140.8	31%	
2013/14	Jul '13	34	3.		105.	108.	7,081.8	180.	3,347.	10,428.8	32%	
	Aug '13	35	1.		105.	106.	7,187.8	0.	3,347.	10,534.8	32%	
	Sep '13	36	2.		105.	107.	7,294.8	0.	3,347.	10,641.8	31%	
	Oct '13	37	22.		105.	127.	7,421.8	180.	3,527.	10,948.8	32%	
	Nov '13	38	24.		105.	129.	7,550.8	170.	3,697.	11,247.8	33%	
	Dec '13	39	83.		105.	188.	7,738.8	110.	3,807.	11,545.8	33%	
	Jan '14	40	68.		105.	173.	7,911.8	140.	3,947.	11,858.8	33%	
	Feb '14	41	86.		105.	191.	8,102.8	120.	4,067.	12,169.8	33%	
	Mar '14	42	32.		105.	137.	8,239.8	160.	4,227.	12,466.8	34%	
	Apr '14	43	21.		105.	126.	8,365.8	170.	4,397.	12,762.8	34%	
	May '14	44	15.		105.	120.	8,485.8	180.	4,577.	13,062.8	35%	
	Jun '14	45	5.		105.	110.	8,595.8	190.	4,767.	13,362.8	36%	
2014/15	Jul '14	46	3.		105.	108.	8,703.8	180.	4,947.	13,650.8	36%	
	Aug '14	47	1.		105.	106.	8,809.8	0.	4,947.	13,756.8	36%	
	Sep '14	48	2.		105.	107.	8,916.8	0.	4,947.	13,863.8	36%	
	Oct '14	49	22.		105.	127.	9,043.8	180.	5,127.	14,170.8	36%	
	Nov '14	50	24.		105.	129.	9,172.8	170.	5,297.	14,469.8	37%	
	Dec '14	51	83.		105.	188.	9,360.8	110.	5,407.	14,767.8	37%	
	Jan '15	52	68.		105.	173.	9,533.8	140.	5,547.	15,080.8	37%	
	Feb '15	53	86.		105.	191.	9,724.8	120.	5,667.	15,391.8	37%	
	Mar '15	54	32.		105.	137.	9,861.8	160.	5,827.	15,688.8	37%	
	Apr '15	55	21.		105.	126.	9,987.8	170.	5,997.	15,984.8	38%	
	May '15	56	15.		105.	120.	10,107.8	180.	6,177.	16,284.8	38%	
	Jun '15	57	5.		105.	110.	10,217.8	190.	6,367.	16,584.8	38%	
2015/16	Jul '15	58	3.		105.	108.	10,325.8	180.	6,547.	16,872.8	39%	
	Aug '15	59	1.		105.	106.	10,431.8	0.	6,547.	16,978.8	39%	
	Sep '15	60	2.		105.	107.	10,538.8	0.	6,547.	17,085.8	38%	
	Oct '15	61	22.		105.	127.	10,616.8	180.	6,727.	17,343.8	39%	
	Nov '15	62	24.		105.	129.	10,745.8	170.	6,897.	17,642.8	39%	
	Dec '15	63	83.		105.	188.	10,924.4	110.	7,007.	17,931.4	39%	
	Jan '16	64	68.		105.	173.	11,071.6	140.	7,147.	18,218.6	39%	
	Feb '16	65	86.		105.	191.	11,220.	120.	7,267.	18,487.	39%	
	Mar '16	66	32.		105.	137.	11,247.2	160.	7,427.	18,674.2	40%	
	Apr '16	67	21.		105.	126.	11,314.5	170.	7,597.	18,911.5	40%	
	May '16	68	15.		105.	120.	11,405.8	180.	7,777.	19,182.8	41%	
	Jun '16	69	5.		105.	110.	11,503.8	190.	7,967.	19,470.8	41%	
2016/17	Jul '16	70	3.		105.	108.	11,603.1	180.	8,147.	19,750.1	41%	
	Aug '16	71	1.		105.	106.	11,706.	0.	8,147.	19,853.	41%	
	Sep '16	72	2.		105.	107.	11,810.	0.	8,147.	19,957.	41%	
	Oct '16	73	22.		105.	127.	11,928.9	180.	8,327.	20,255.9	41%	
	Nov '16	74	24.		105.	129.	12,053.9	170.	8,497.	20,550.9	41%	
	Dec '16	75	83.		105.	188.	12,153.1	110.	8,607.	20,760.1	41%	
	Jan '17	76	68.		105.	173.	12,311.4	140.	8,747.	21,058.4	42%	
	Feb '17	77	86.		105.	191.	12,432.7	120.	8,867.	21,299.7	42%	
	Mar '17	78	32.		105.	137.	12,561.4	160.	9,027.	21,588.4	42%	
	Apr '17	79	21.		105.	126.	12,652.4	170.	9,197.	21,849.4	42%	
	May '17	80	15.		105.	120.	12,765.4	180.	9,377.	22,142.4	42%	
	Jun '17	81	5.		105.	110.	12,866.4	190.	9,567.	22,433.4	43%	

(CONTINUED)

Table 7-1

RWC Management Plan for Victoria Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Period
2017/18	Jul '17	82	3.		105.	108.	12,974.4	180.	9,747.	22,721.4	43%	PLANNED
	Aug '17	83	1.		105.	106.	13,080.4	0.	9,747.	22,827.4	43%	
	Sep '17	84	2.		105.	107.	13,182.4	0.	9,747.	22,929.4	43%	
	Oct '17	85	22.		105.	127.	13,301.4	180.	9,927.	23,228.4	43%	
	Nov '17	86	24.		105.	129.	13,381.4	170.	10,097.	23,478.4	43%	
	Dec '17	87	83.		105.	188.	13,503.4	110.	10,207.	23,710.4	43%	
	Jan '18	88	68.		105.	173.	13,496.4	140.	10,347.	23,843.4	43%	
	Feb '18	89	86.		105.	191.	13,626.4	120.	10,467.	24,093.4	43%	
	Mar '18	90	32.		105.	137.	13,761.4	160.	10,627.	24,388.4	44%	
	Apr '18	91	21.		105.	126.	13,880.4	170.	10,797.	24,677.4	44%	
	May '18	92	15.		105.	120.	13,954.4	180.	10,977.	24,931.4	44%	
	Jun '18	93	5.		105.	110.	14,061.4	190.	11,167.	25,228.4	44%	
2018/19	Jul '18	94	3.		105.	108.	14,166.4	180.	11,347.	25,513.4	44%	
	Aug '18	95	1.		105.	106.	14,269.4	0.	11,347.	25,616.4	44%	
	Sep '18	96	2.		105.	107.	14,374.4	0.	11,347.	25,721.4	44%	
	Oct '18	97	22.		105.	127.	14,497.4	180.	11,527.	26,024.4	44%	
	Nov '18	98	24.		105.	129.	14,591.4	170.	11,697.	26,288.4	44%	
	Dec '18	99	83.		105.	188.	14,705.4	110.	11,807.	26,512.4	45%	
	Jan '19	100	68.		105.	173.	14,863.4	140.	11,947.	26,810.4	45%	
	Feb '19	101	86.		105.	191.	14,959.4	120.	12,067.	27,026.4	45%	
	Mar '19	102	32.		105.	137.	15,083.4	160.	12,227.	27,310.4	45%	
	Apr '19	103	21.		105.	126.	15,206.4	170.	12,397.	27,603.4	45%	
	May '19	104	15.		105.	120.	15,323.4	180.	12,577.	27,900.4	45%	
	Jun '19	105	5.		105.	110.	15,433.4	190.	12,767.	28,200.4	45%	
2019/20	Jul '19	106	3.		105.	108.	15,540.4	180.	12,947.	28,487.4	45%	
	Aug '19	107	1.		105.	106.	15,646.4	0.	12,947.	28,593.4	45%	
	Sep '19	108	2.		105.	107.	15,753.4	0.	12,947.	28,700.4	45%	
	Oct '19	109	22.		105.	127.	15,841.4	180.	13,127.	28,968.4	45%	
	Nov '19	110	24.		105.	129.	15,951.4	170.	13,297.	29,248.4	45%	
	Dec '19	111	83.		105.	188.	16,050.4	110.	13,407.	29,457.4	46%	
	Jan '20	112	68.		105.	173.	16,070.4	140.	13,547.	29,617.4	46%	
	Feb '20	113	86.		105.	191.	16,087.4	120.	13,667.	29,754.4	46%	
	Mar '20	114	32.		105.	137.	16,224.4	160.	13,827.	30,051.4	46%	
	Apr '20	115	21.		105.	126.	16,330.4	170.	13,997.	30,327.4	46%	
	May '20	116	15.		105.	120.	16,450.4	180.	14,177.	30,627.4	46%	
	Jun '20	117	5.		105.	110.	16,559.4	190.	14,367.	30,926.4	46%	
2020/21	Jul '20	118	3.		105.	108.	16,664.4	180.	14,547.	31,211.4	47%	
	Aug '20	119	1.		105.	106.	16,768.4	0.	14,547.	31,315.4	46%	
	Sep '20	120	2.		105.	107.	16,873.4	0.	14,480.	31,353.4	46%	
	Oct '20	121	22.		105.	127.	16,846.5	180.	14,507.	31,353.5	46%	
	Nov '20	122	24.		105.	129.	16,802.5	170.	14,560.	31,362.5	46%	
	Dec '20	123	83.		105.	188.	16,609.6	110.	14,628.	31,237.6	47%	
	Jan '21	124	68.		105.	173.	16,625.6	140.	14,682.	31,307.6	47%	
	Feb '21	125	86.		105.	191.	16,605.7	120.	14,735.	31,340.7	47%	
	Mar '21	126	32.		105.	137.	16,544.7	160.	14,856.	31,400.7	47%	
	Apr '21	127	21.		105.	126.	16,526.8	170.	15,026.	31,552.8	48%	
	May '21	128	15.		105.	120.	16,433.	180.	15,065.	31,498.	48%	
	Jun '21	129	5.		105.	110.	16,435.	190.	15,194.	31,629.	48%	

Notes:

DW = Diluent Water; Total DW is the sum of Storm Water & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

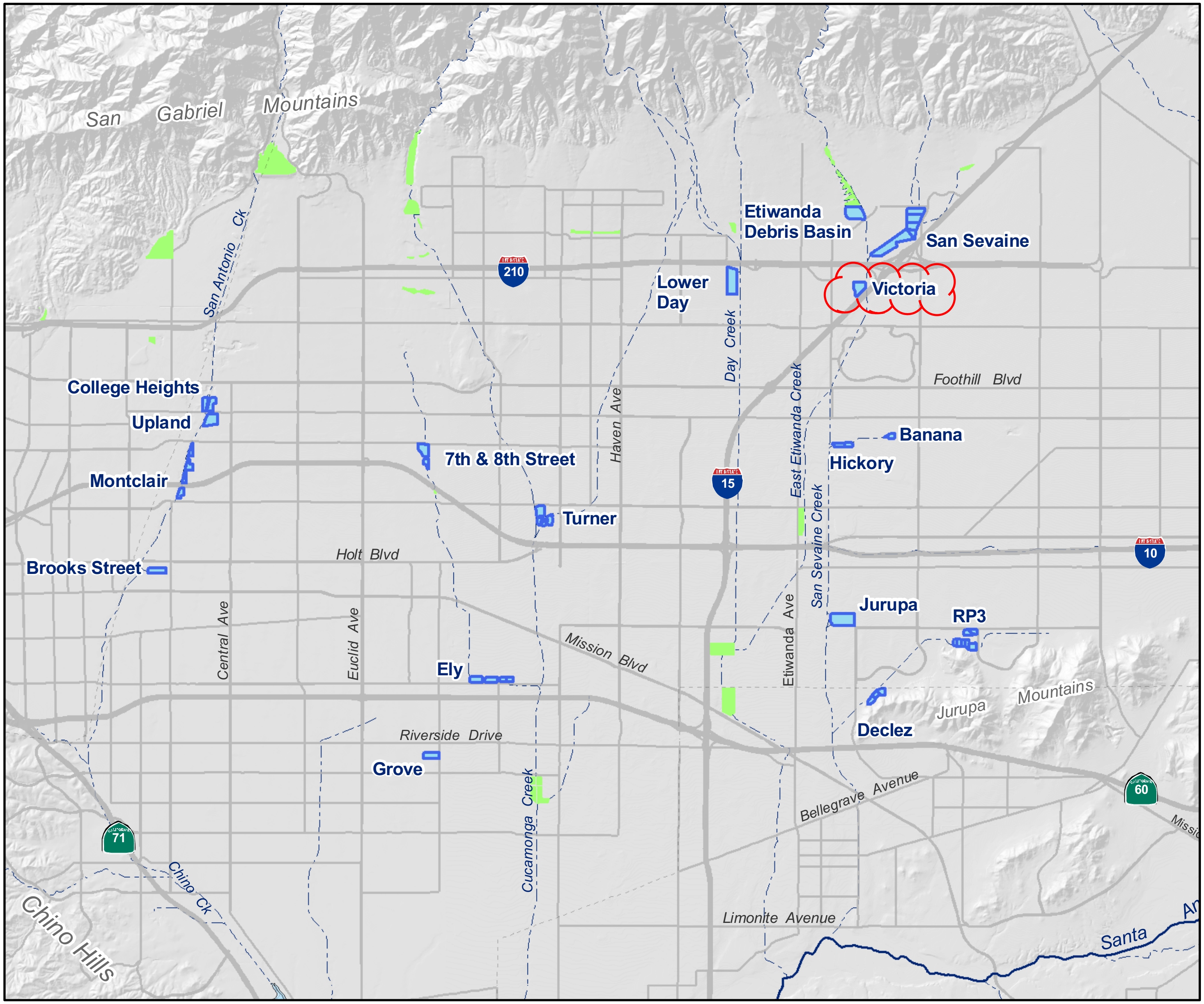
RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

While an RWC calculation is provided starting on the first month of RW recharge, 120 months of data may not be available until 10 years of recharge operations.

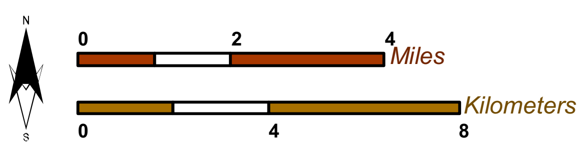
RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period

FIGURES



Main Map Features

- Recharge Basins in the Recycled Water Groundwater Recharge Program
- Non-program basins
- Rivers and Streams



Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Chino Basin Recycled Water Groundwater Recharge Programs

Basin Locations

Figure 1-1

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Figure 2-1
Location of Facilites at Victoria Basin

Recycled Water Pipeline

0 500 1,000 Feet

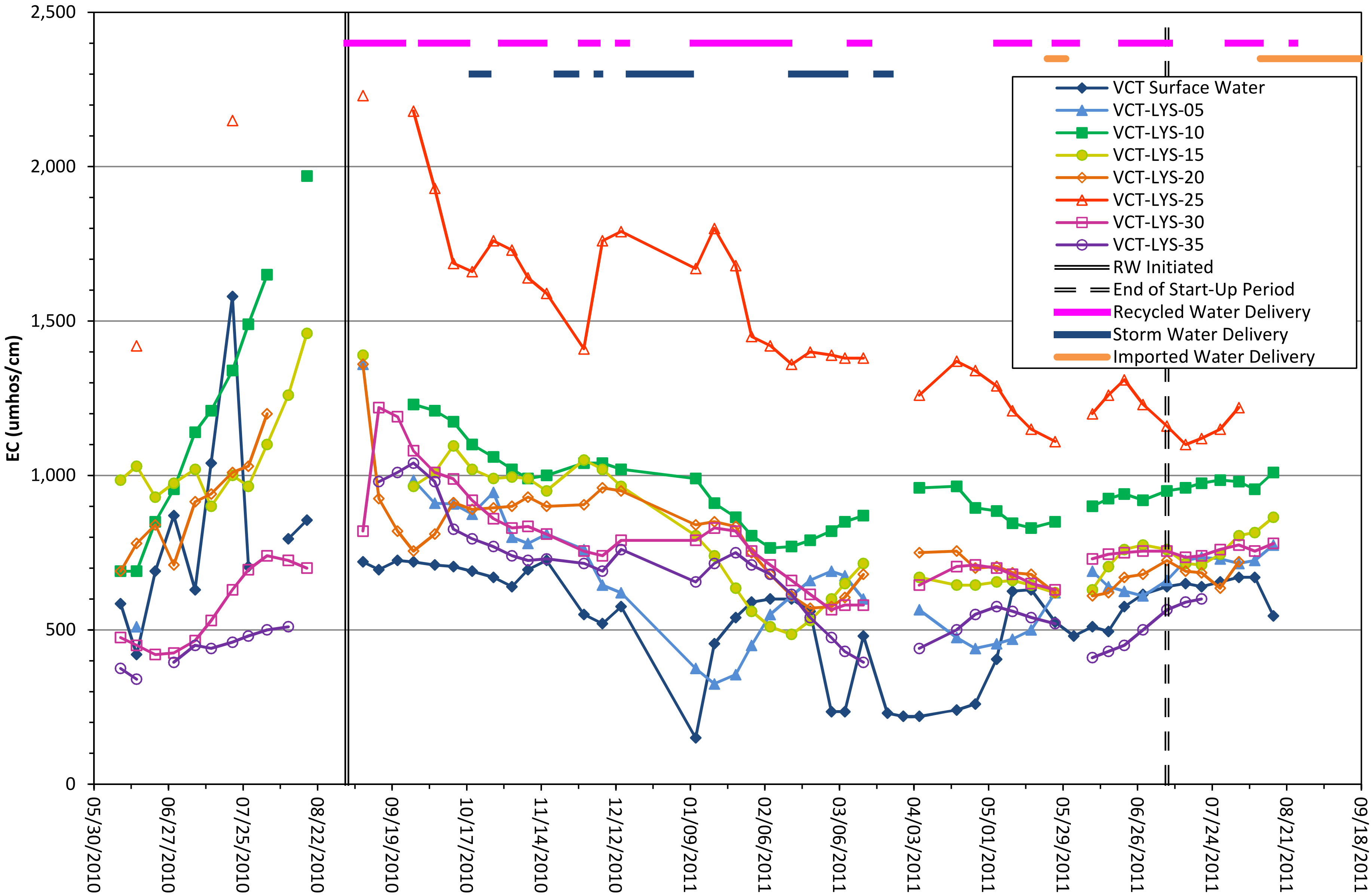


FIGURE 4-1a
VICTORIA BASIN LYSIMETERS
ELECTRICAL CONDUCTIVITY TIME SERIES

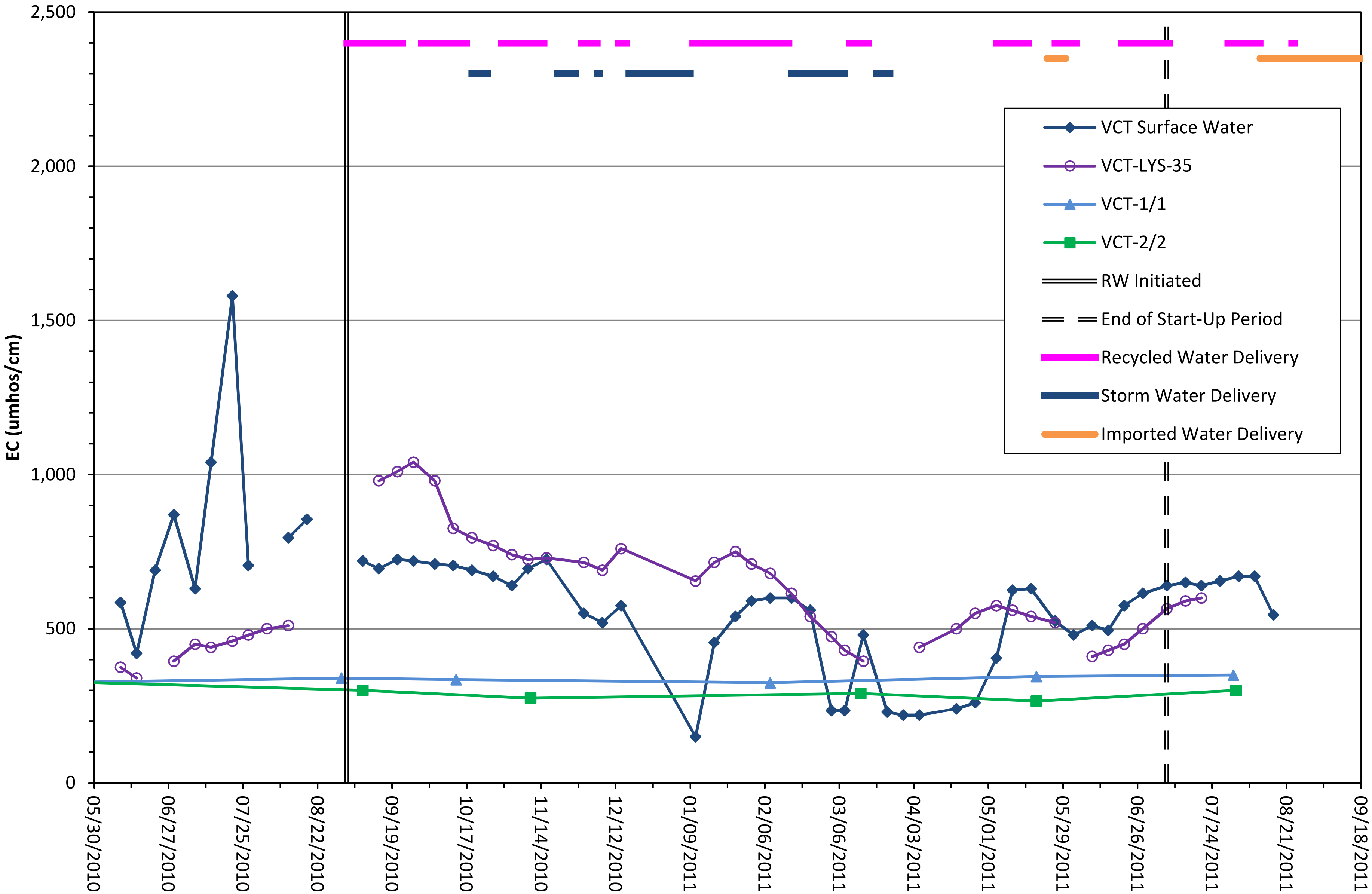


FIGURE 4-1b
VICTORIA BASIN MONITORING WELLS
ELECTRICAL CONDUCTIVITY TIME SERIES

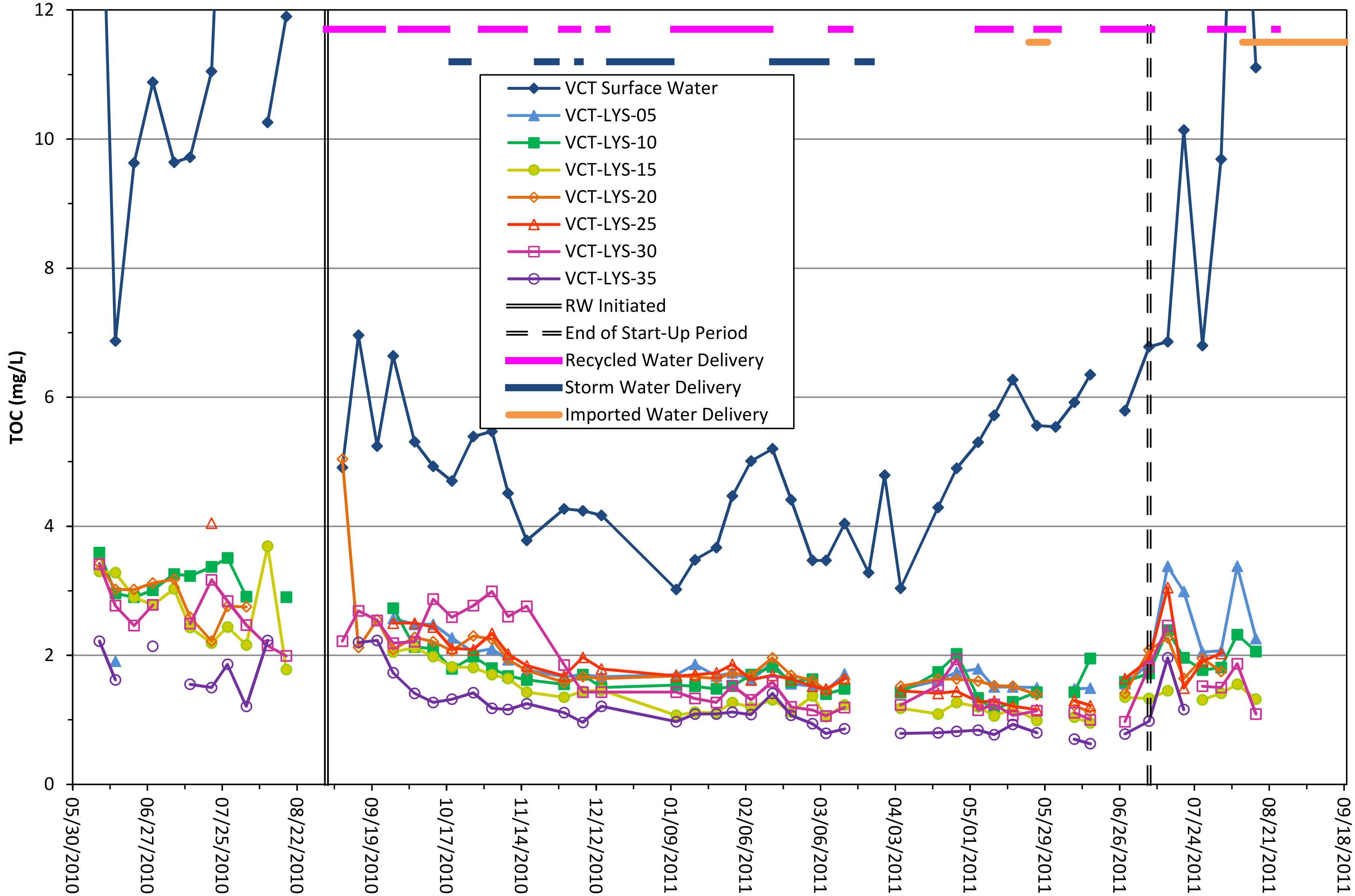


FIGURE 4-2a
VICTORIA BASIN LYSIMETERS
TOTAL ORGANIC CARBON TIME SERIES

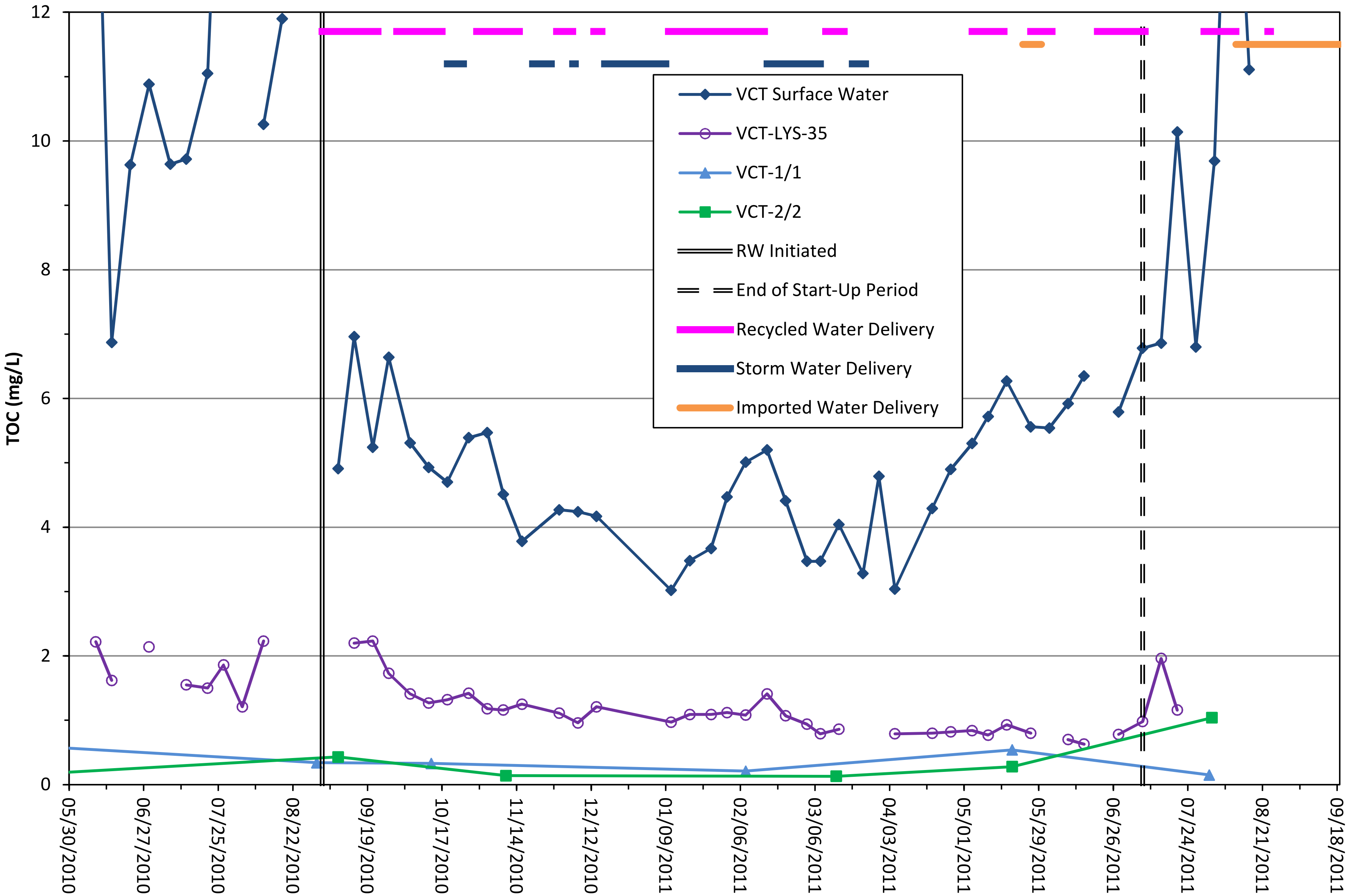


FIGURE 4-2b
VICTORIA BASIN MONITORING WELLS
TOTAL ORGANIC CARBON TIME SERIES

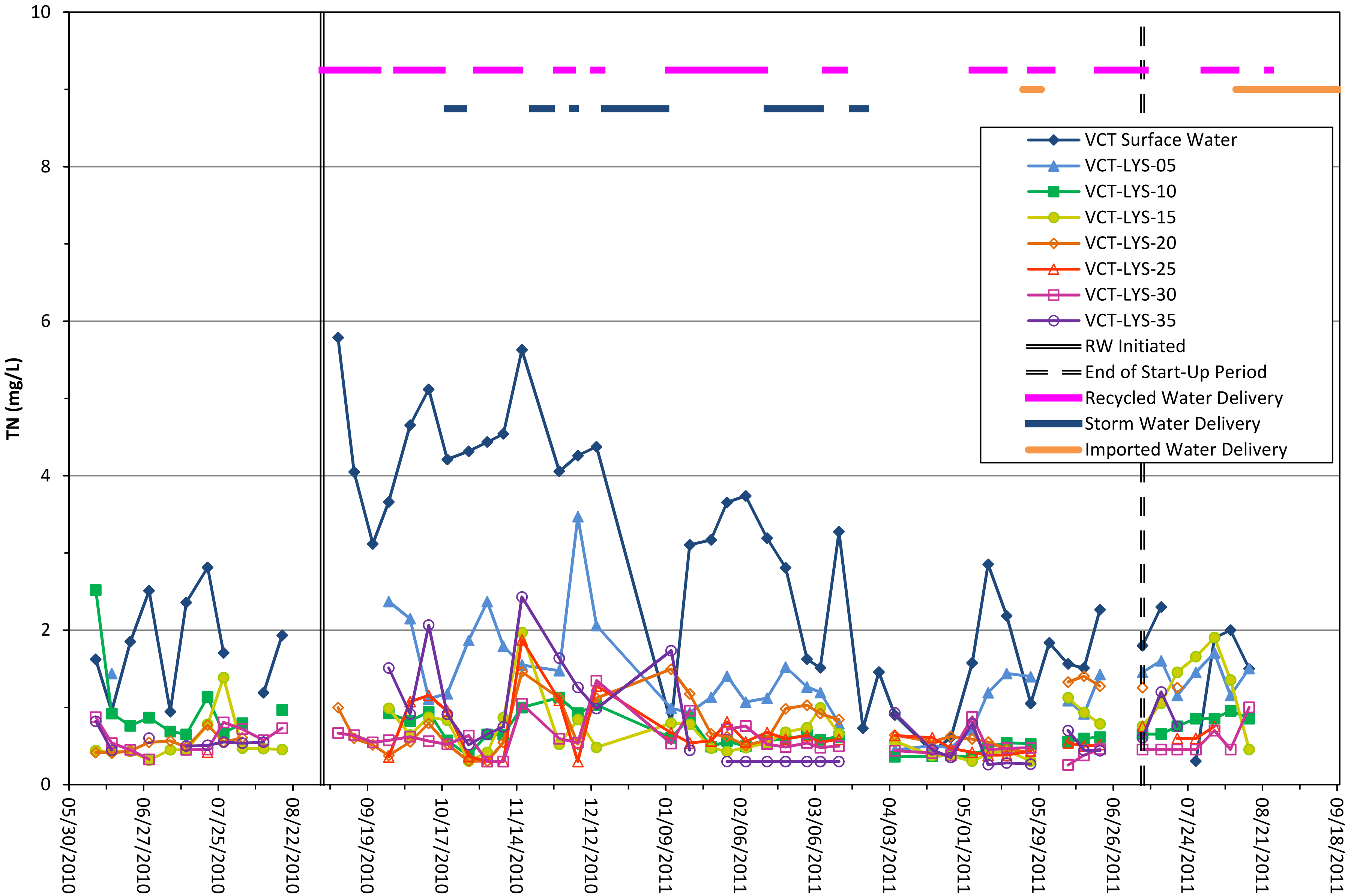


FIGURE 4-3a
VICTORIA BASIN LYSIMETERS
TOTAL NITROGEN TIME SERIES

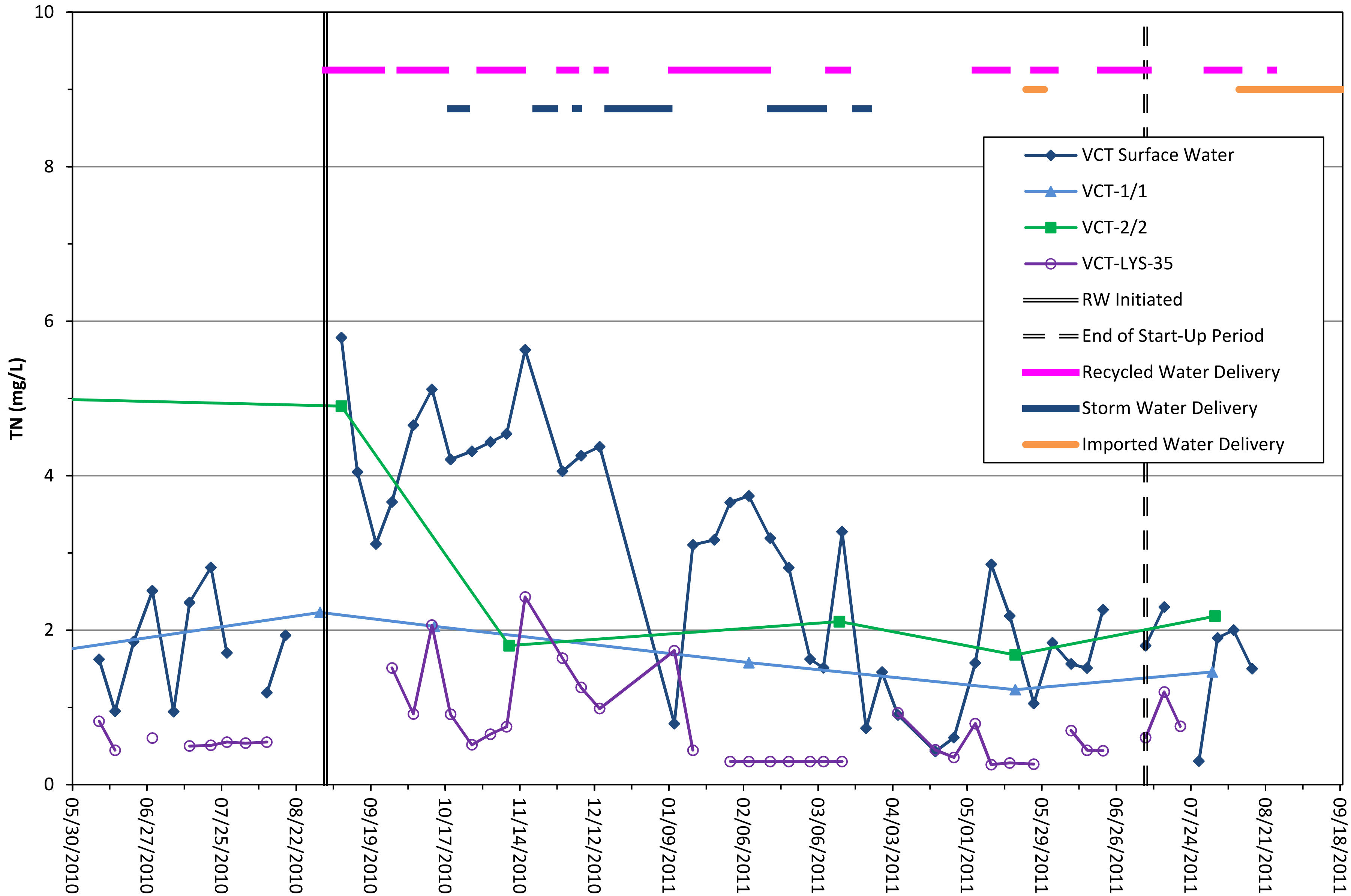


FIGURE 4-3b
VICTORIA BASIN MONITORING WELLS
TOTAL NITROGEN TIME SERIES

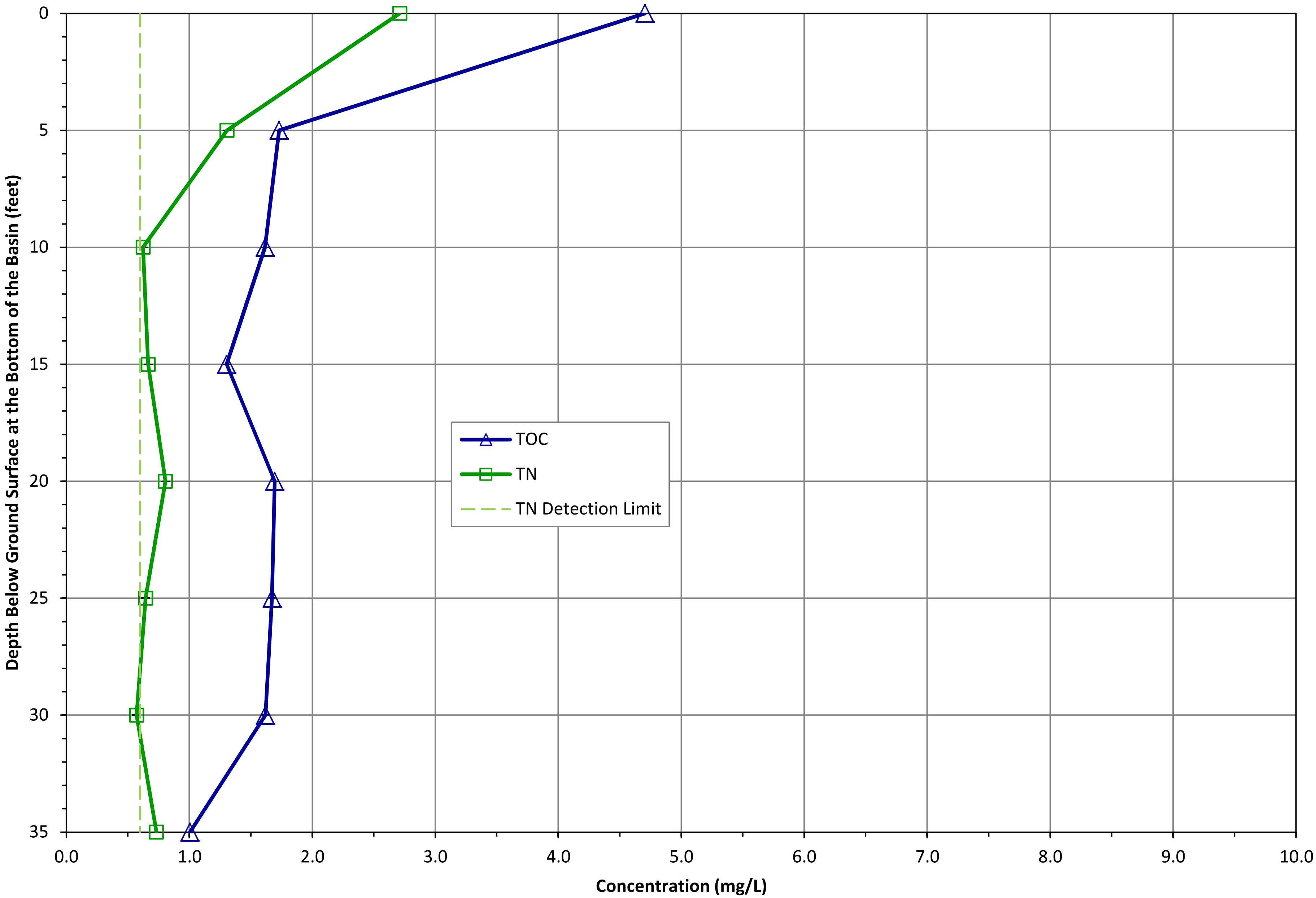


FIGURE 5-1
VICTORIA BASIN
DEPTH PROFILE OF AVERAGE TOC AND TN

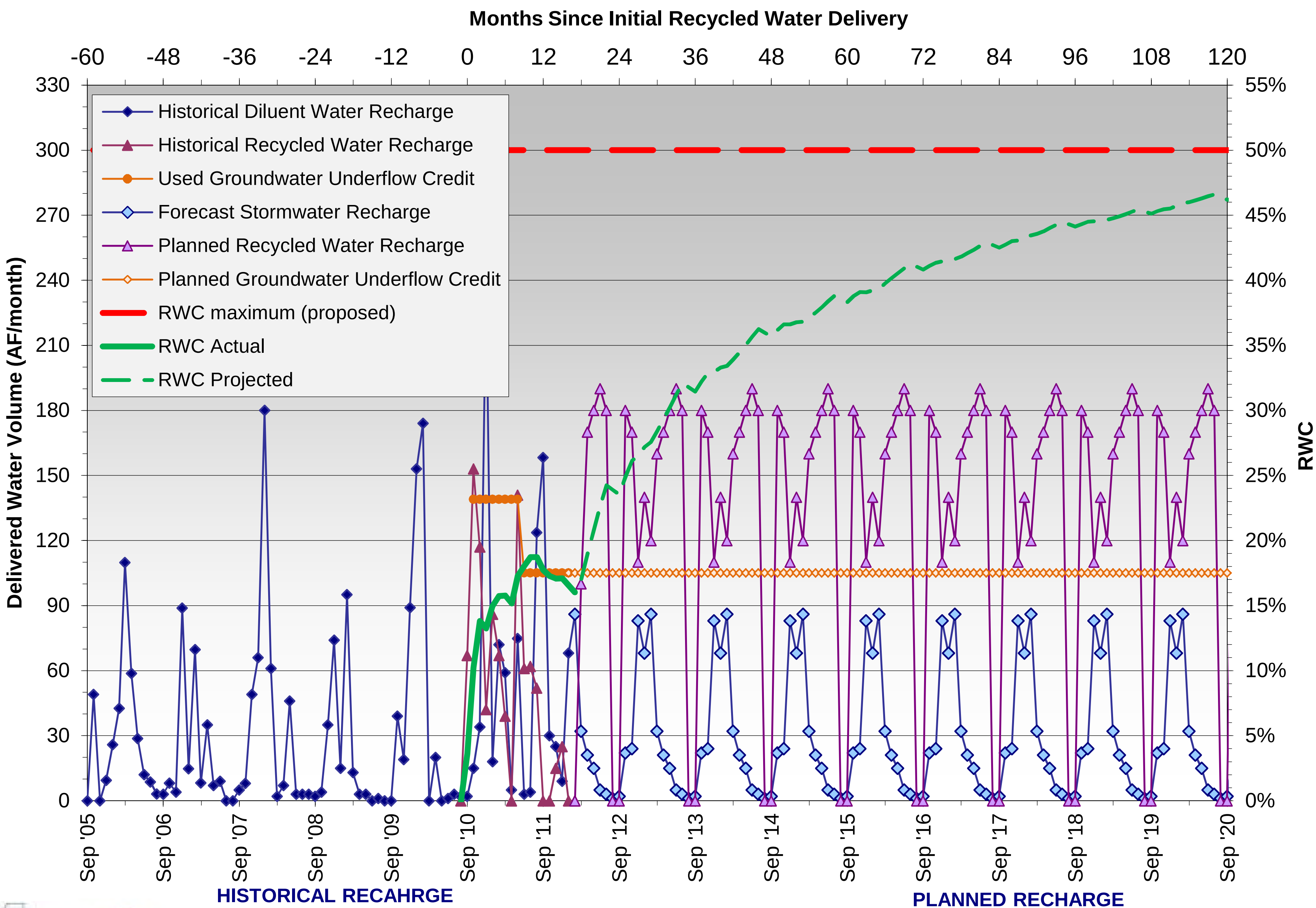


FIGURE 7-1
VICTORIA BASIN
RWC MANAGEMENT PLAN

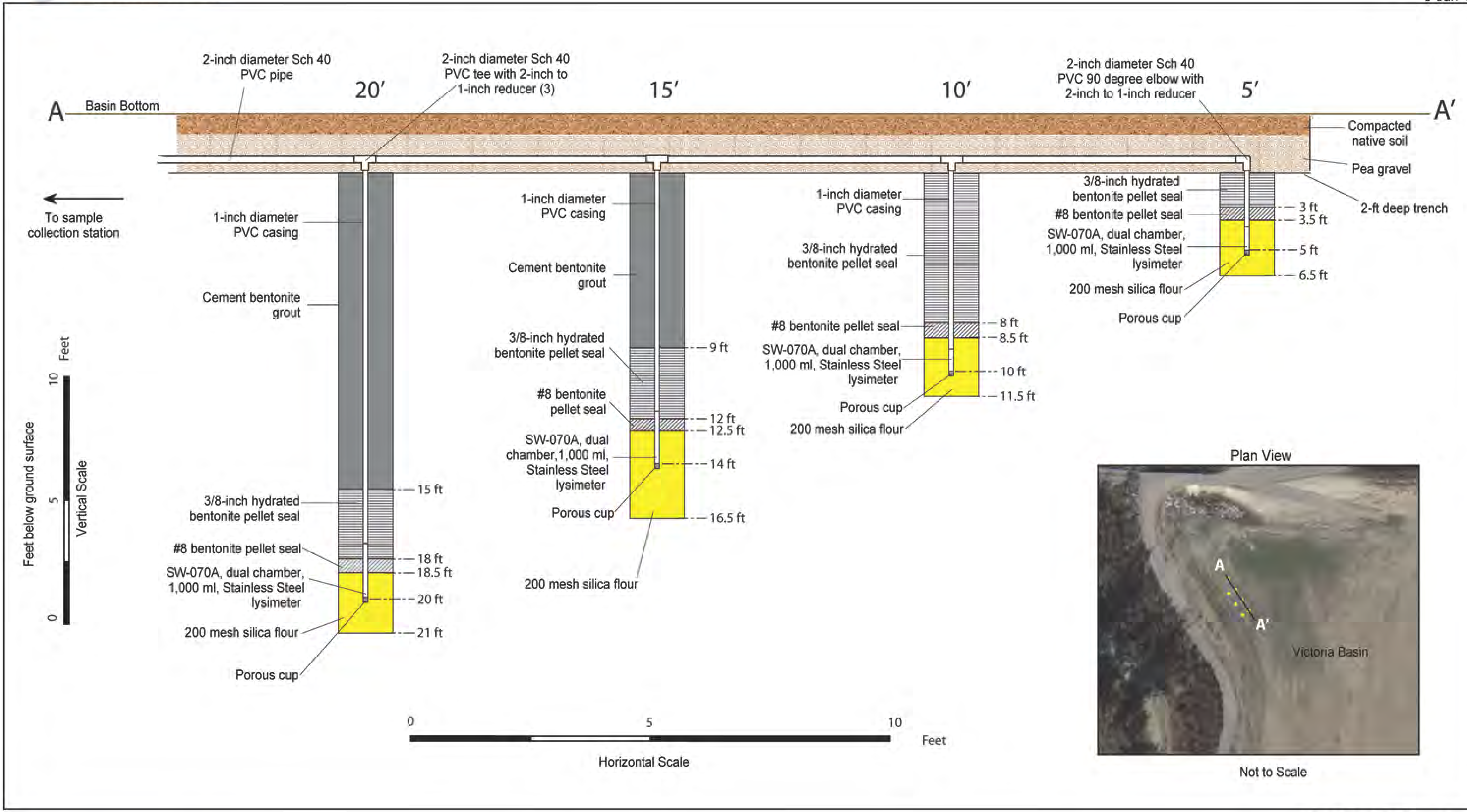
APPENDIX A

LYSIMETER AND MONITORING WELL CONSTRUCTION DRAWINGS

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

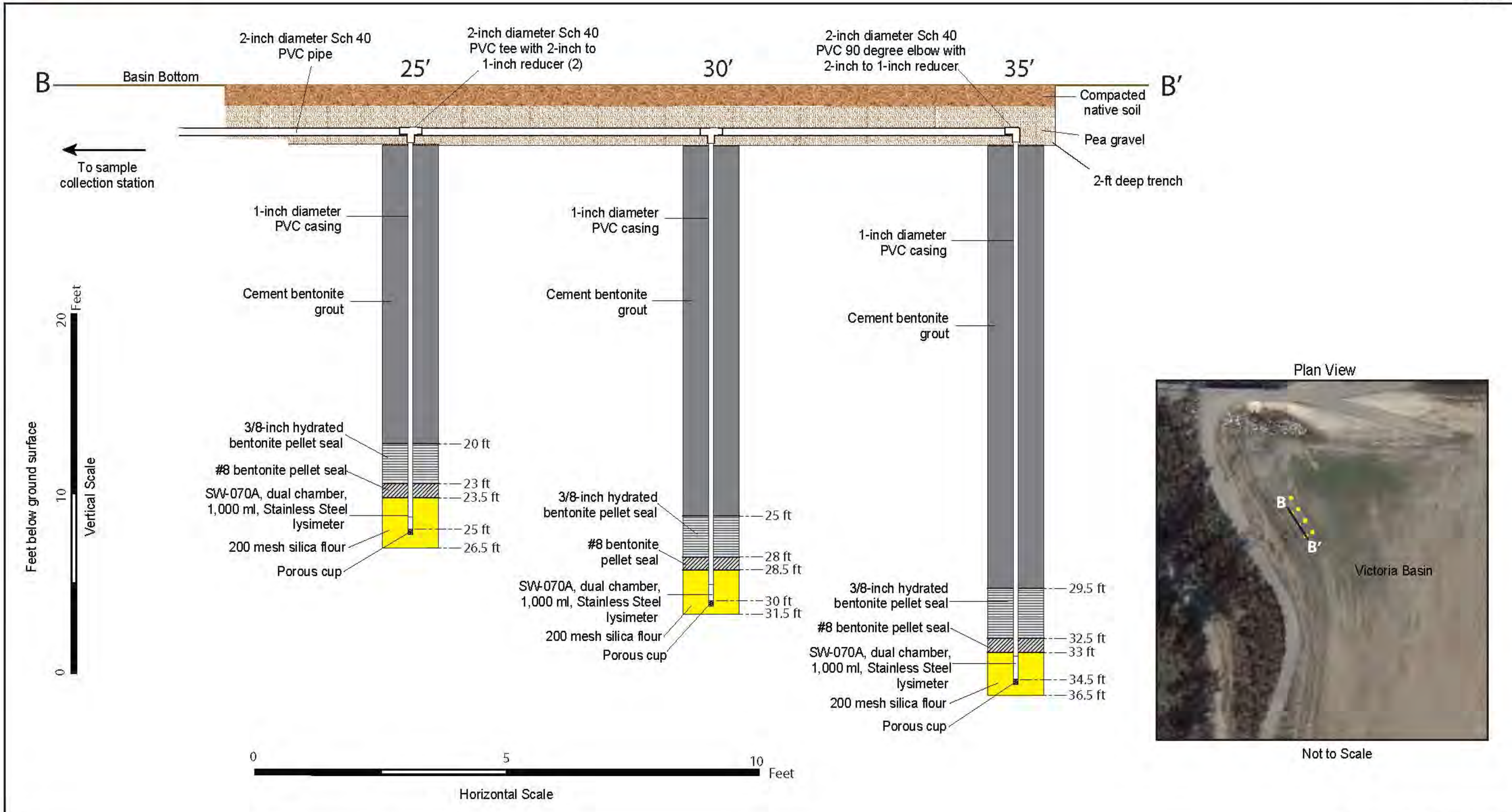
Results of Lysimeter Drilling, Construction and Testing

9-Jun-10

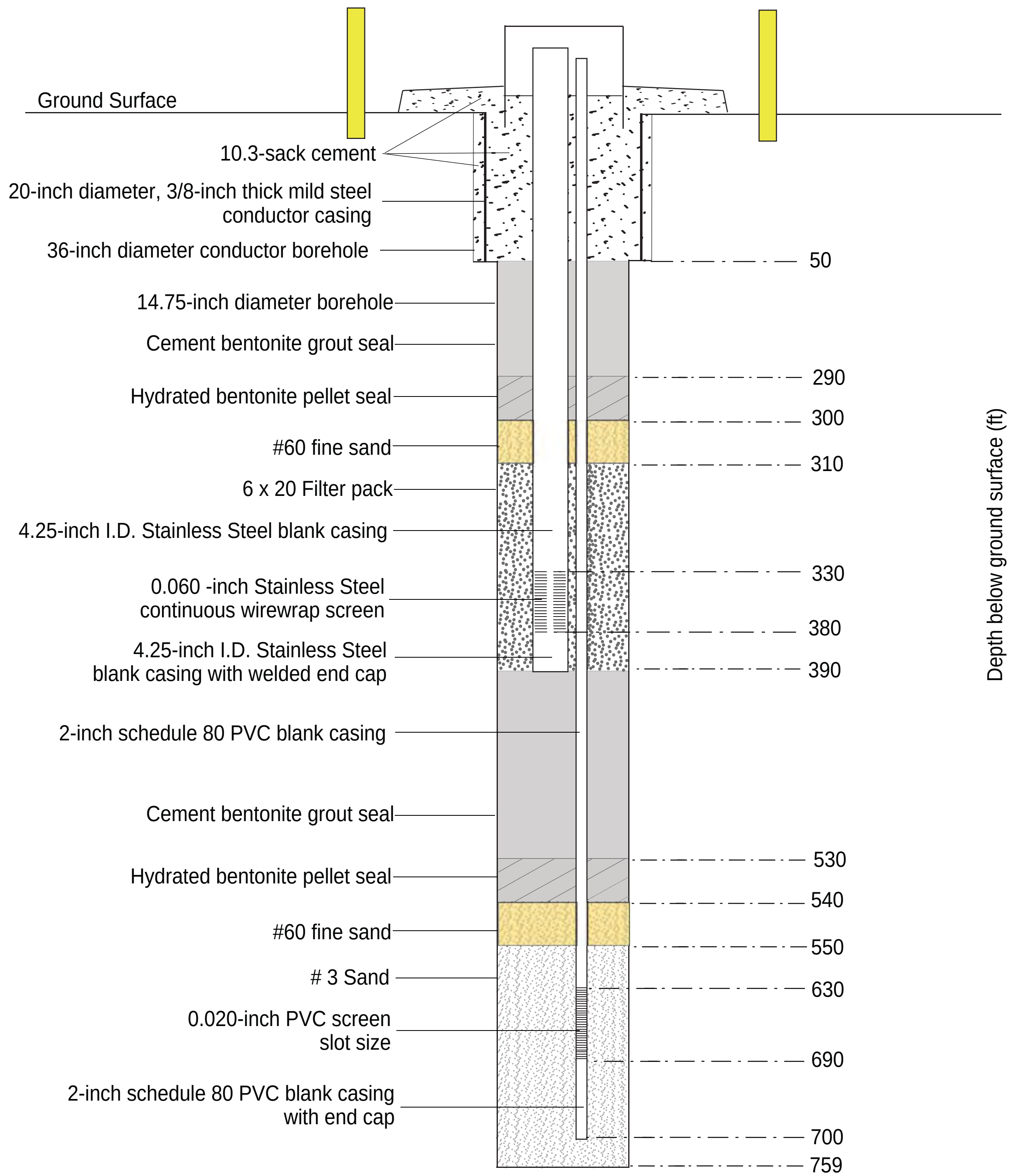


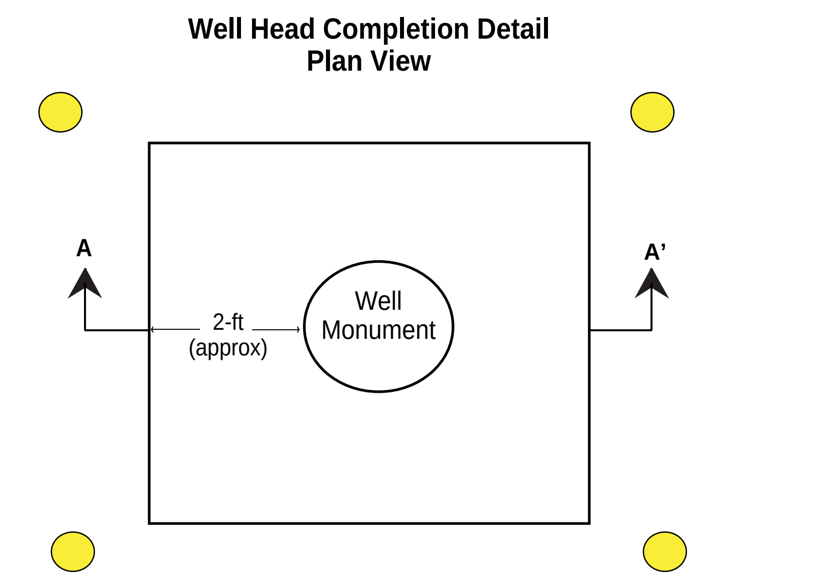
Thomas Harder & Co.
Groundwater Consulting

As Built Diagram
Victoria Basin
Cross Section A-A'
Figure 9a

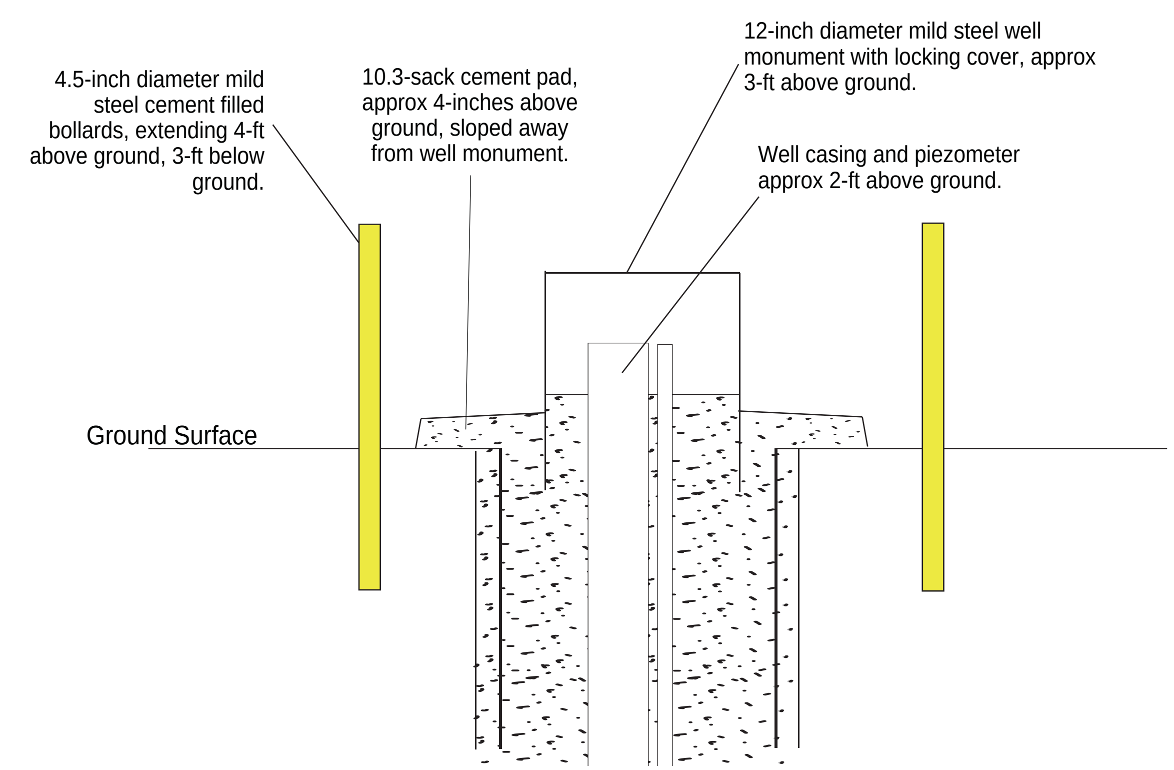


As Built Diagram
Victoria Basin
Cross Section B-B′
Figure 9b





Not to scale



Section A-A'

As Built Diagram
MW-VCT1
Figure 6

Lithologic Log

Client:	IEUA	**Drilling Contractor:**	Best Drilling and Pump, Inc.
Borehole/ Well No:	MW-VCT1	**Drilling Method:**	Fluid Reverse
Project Number:	08-010-101	**Borehole Diameter**	14 3/4 "
Project:	Monitoring Well Installation	**Location of boring/ Well:**	
Start Date:	1/13/10	X:	117° 30.703
Finish Date:	3/16/10	Y:	34° 07.290
Logged By:	AH		

Depth	Graphic Log	Color	Sample Description
0	SM	7.5YR 3/3 Dark Brown	SILTY SAND: Fine grained sand; with medium grained sand; some coarse grained sand; trace fine to coarse gravel; subrounded; 15-20 percent silt; gravel to 28 mm; granitic.
	SP-SM	7.5YR 4/6 Strong Brown	SAND with SILT: Fine grained sand; with medium grained sand; some coarse grained sand; trace fine to coarse gravel; subrounded; 10-15 percent silt; gravel to 48 mm; granitic.
-20		7.5YR 4/6 Strong Brown	SAND with SILT: Same as above.
		7.5YR 4/6 Strong Brown	SAND with SILT: Same as above; cobbles to 3.5 inches.
-40		7.5YR 5/4 Brown	SAND with SILT: Fine grained sand; some medium grained sand; trace coarse grained sand; trace fine to medium gravel; subangular; 15 percent silt; gravel to 32 mm; granitic.
		2.5YR 3/4 Dark Reddish Brown	SAND with GRAVEL: Coarse grained sand; some medium grained sand; trace fine grained sand; with fine gravel; subanguar; 5-10 percent silt; gravel to 7 mm; metamorphic.
-60		7.5 YR 5/4 Brown	SAND: Medium grained sand; with coarse grained sand; trace fine grained sand; some fine gravel; trace coarse gravel; subangular to angular; 5-10 percent silt; gravel to 32 mm; metamorphic.
	SM	7.5 YR 5/3 Brown	SILTY SAND: Fine to medium gained sand; some coarse grained sand; trace fine gravel; subangular; 30 percent silt; gravel to 19 mm; metamorphic and granitic; trace clay.
-80	ML	2.5YR 6/4 Light Yellowish Brown	SILT with SAND: 75 percent silt; 10 percent clay, as balls; 15 percent fine to medium grained sand; some coarse grained sand; subangular; metamorphic.
	CL	10YR 4/4 Dark Yellowish Brown	SANDY CLAY: 70 percent clay; 30 percent fine to medium grained sand; with coarse grained sand. CLAY: Medium plasticity; high dry strength; slow dilatency.
-100			

Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT1
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
	SM	10YR 5/3 Brown	SILTY SAND: Fine to medium grained sand; some coarse grained sand; subrounded to subangular; 30 percent silt; metamorphic and granitic.
		10YR 5/3 Brown	SILTY SAND: Same as above. 5-10 percent clay with high plasticity; high dry strength and no dilatency.
-120	CL	2.5Y 5/6 Light Olive Brown	SANDY CLAY: 70 percent clay; 20 percent fine to medium grained sand; with coarse grained sand. CLAY: Medium plasticity; high dry strength; slow dilatency.
	SM-ML	2.5Y 5/4 Light Olive Brown	SILTY CLAYEY SAND/ SANDY SILT and CLAY: Fine to medium grained sand; some coarse grained sand; subrounded to subangular. 45-60 percent silt and clay: clay has moderate plasticity; high dry strength and no dilatency.
-140	CL	2.5Y 5/3 Light Olive Brown	SANDY CLAY: 70 percent clay; 20 percent fine to medium grained sand; with coarse grained sand; subrounded to subangular; granitic and metamorphic. CLAY: High plasticity; high dry strength; no dilatency.
	SM	2.5Y 7/2 Light Gray	SILTY SAND: Fine to medium grained sand; some coarse grained sand; subrounded; 20 percent silt; granitic.
-160		10YR 6/4 Light Yellowish Brown	SILTY SAND: Medium to coarse grained sand; with fine grained sand; some fine gravel; subangular; 35-40 percent silt; gravel to 19 mm; metamorphic.
		10YR 6/4 Light Yellowish Brown	SILTY SAND: Same as above.
-180	SP-SM	10YR 5/2 Grayish Brown	SAND: Fine to medium grained sand; trace coarse grained sand; subrounded; 5-10 percent silt; metamorphic.
	SM	10YR 6/6 Brownish Yellow	SILTY SAND: Fine to medium grained sand; trace coarse grained sand; subrounded to subangular; 35-40 percent silt; metamorphic and granitic.
-200	CL	2.5Y 5/4 Light Olive Brown	SANDY CLAY: 70 percent clay; 30 percent fine to medium grained sand; subrounded to subangular. CLAY: Low plasticity; medium dry strength; slow dilatency.
		2.5Y 5/4 Light Olive Brown	SANDY CLAY: Same as above; increasing coarse sand fraction.
-220	ML	2.5Y 5/6 Light Olive Brown	SANDY SILT: 65-75 percent silt; 25-35 percent fine to medium grained sand; trace coarse grained sand; subrounded to subangular.
	SM	2.5Y 6/6 Olive Yellow	SILTY SAND with GRAVEL: Fine to coarse grained sand; with fine to coarse gravel; subangular; 35-45 percent silt; gravel to 22 mm.
-240			

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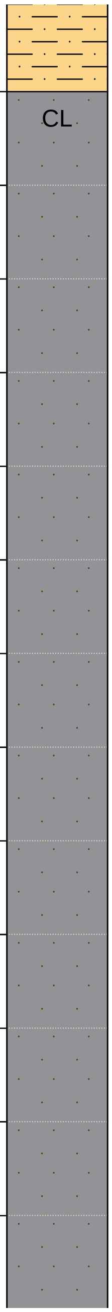
Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT1
Client:	IEUA
Project No.:	08-010-101



Depth	Color	Sample Description
-240	2.5Y 6/6 Olive Yellow	SILTY SAND with GRAVEL: Same as above.
	10YR 6/4 Light Yellowish Brown	SANDY CLAY: 70 percent clay; 30 percent fine to medium grained sand; some coarse grained sand; trace fine gravel to 13 mm. CLAY: Medium plasticity; high dry strength; slow dilatency.
-260	10YR 6/4 Light Yellowish Brown	SANDY CLAY: Same as above.
	10YR 6/4 Light Yellowish Brown	SANDY CLAY: Same as above.
-280	10YR 6/4 Light Yellowish Brown	SANDY CLAY: Same as above.
	10YR 5/4 Yellowish Brown	CLAY with SAND: 95 percent clay; 5 percent fine to medium grained sand; trace fine gravel to 7 mm. CLAY: High plasticity; high dry strength; no dilatency.
-300	10YR 5/4 Yellowish Brown	CLAY with SAND: Same as above; increasing sand fraction.
	10YR 5/6 Yellowish Brown	CLAY with SAND: Same as above; increasing sand fraction.
-320	10YR 6/3 Pale Brown	CLAY with SAND: Same as above.
	2.5Y 6/4 Light Yellowish Brown	SANDY CLAY: 65-75 percent clay; 25-35 percent medium to coarse grained sand; some fine to medium grained sand; subangular to angular. CLAY: High plasticity; high dry strength; no dilatency.
-340	10YR 5/4 Yellowish Brown	SANDY CLAY: Same as above; decreasing coarse sand fraction; 20 percent sand; trace fine gravel.
	2.5Y 5/4 Light Olive Brown	SANDY CLAY: 75-85 percent clay; 25-35 percent medium grained sand with fine grained sand; trace coarse grained sand; trace fine gravel to 19 mm. CLAY: High plasticity; high dry strength; no dilatency.
-360	2.5Y 5/4 Light Olive Brown	SANDY CLAY: Same as above.
	7.5 YR 4/4 Brown	CLAY with SAND: 90 percent clay; 10 percent fine to medium grained sand; some coarse grained sand; subrounded to subangular. CLAY: High plasticity; high dry strength; no dilatency.
-380		

Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT1
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
-380	SP-SM	2.5Y 5/4 Light Olive Brown	SILTY SAND: Fine to medium grained sand; trace coarse grained sand; subangular; 25-35 percent silt; granitic and metamorphic.
		2.5Y 5/4 Light Olive Brown	SILTY SAND: Same as above; 20-30 percent silt; trace fine gravel to 11 mm;
-400	CL	10YR 6/4 Light Yellowish Brown	CLAY with SAND: 90-95 percent clay; 5 percent fine to medium grained sand; subrounded. CLAY: High plasticity; high dry strength; no dilatency.
	SC	5 YR 4/4 Reddish Brown	CLAYEY SAND: Fine to coarse grained sand; some fine gravel; subrounded; 35-45 percent clay; gravel to 16 mm; metamorphic. CLAY: Medium plasticity; high dry strength; slow dilatency.
-420	CL	10YR 5/6 Yellowish Brown	CLAY with SAND: 85-90 percent clay; 10-15 percent fine to medium grained sand; trace coarse grained sand. CLAY: Medium plasticity; high dry strength; slow dilatency.
		10YR 5/4 Yellowish Brown	CLAY with SAND: Same as above.
-440		10YR 4/6 Dark Yellowish Brown	SANDY CLAY: 80-85 percent clay; 15-20 percent fine to medium grained sand; some coarse grained sand; trace gravel to 25 mm. CLAY: Medium plasticity; high dry strength; no dilatency.
		10YR 5/6 Yellowish Brown	SANDY CLAY: 70-80 percent clay; 20-30 percent medium grained sand; some coarse grained sand; some fine grained sand. CLAY: High plasticity; high dry strength; no dilatency.
-460		10YR 4/3 Brown	CLAY with SAND: 85-90 percent clay; 10-15 percent fine to medium grained sand; some coarse grained sand. CLAY: Medium plasticity; high dry strength; slow dilatency.
		10YR 5/4 Yellowish Brown	SANDY CLAY: 80-90 percent clay; 10-20 percent fine grained sand; some medium grained sand; trace coarse grained sand. CLAY: High plasticity; high dry strength; no dilatency.
-480		10YR 5/6 Yellowish Brown	CLAY with SAND: 80-90 percent clay; 10-20 percent fine to medium grained sand; trace coarse grained sand; trace fine gravel to 18mm. CLAY: Medium plasticity; high dry strength; no dilatency.
	SM	10YR 4/3 Brown	SILTY SAND: Fine to coarse grained sand; trace fine gravel; subrounded; 15-25 percent silt; gravel to 15 mm; granitic and metamorphic.
-500	SW-SM	10YR 6/4 Light Yellowish Brown	SAND with SILT: Fine to coarse grained sand; trace fine gravel; subrounded; 10-15 percent silt; gravel to 11 mm; granitic and metamorphic.
	SM	10YR 6/4 Light Yellowish Brown	SILTY SAND: Medium to coarse grained sand; some fine grained sand; trace fine gravel; subrounded to subangular; 15-25 percent silt; gravel to 16 mm; granitic and metamorphic.
-520			

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Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT1
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
-520		10YR 5/6 Yellowish Brown	SILTY SAND with GRAVEL: Medium to coarse grained sand; with fine grained sand; with fine gravel; subrounded to subangular; 25-35 percent silt; gravel to 19 mm; granitic and metamorphic; chert grains.
		10YR 5/4 Yellowish Brown	SILTY SAND: Fine to coarse grained sand; trace fine gravel; subrounded; 25-35 percent silt; gravel to 12 mm; granitic and metamorphic.
-540	SP-SM	10YR 6/6 Brownish Yellow	SAND with SILT: Medium to coarse grained sand; trace fine grained sand; trace fine gravel; subrounded; 10-15 percent silt; gravel to 8 mm; granitic and metamorphic.
	SM	10YR 5/4 Yellowish Brown	SILTY SAND: Medium to coarse grained sand; some fine gravel; subrounded to subangular; 20-30 percent silt; gravel to 10 mm; granitic and metamorphic.
-560		10YR 5/6 Yellowish Brown	SILTY SAND: Medium to coarse grained sand; some fine grained sand; some fine gravel; subrounded to subangular; 25-35 percent silt; gravel to 10mm; granitic and metamorphic.
		10YR 5/8 Yellowish Brown	SILTY SAND: Fine to coarse grained sand; some fine gravel; subrounded; 25-35 percent silt; 5-10 percent clay, as balls; gravel to 19mm; granitic and metamorphic.
-580		10YR 5/8 Yellowish Brown	SILTY SAND: Medium to coarse grained sand; some fine grained sand; trace fine gravel; subrounded; 25-35 percent silt; gravel to 8 mm; quartz; chert; granitic and metamorphic.
	SW-SM	10YR 6/4 Light Yellowish Brown	SAND with SILT: Fine to coarse grained sand; some fine gravel; subrounded; 5-10 percent silt; gravel to 5 mm; granitic and metamorphic.
-600	SM	10YR 6/6 Brownish Yellow	SILTY SAND: Medium to coarse grained sand; some fine grained sand; rounded to subrounded; 20-25 percent silt; 5-10 percent clay, as balls; metamorphic.
	CL	10YR 5/6 Yellowish Brown	CLAY: 90-95 percent clay; 5-10 percent fine to medium grained sand; trace coarse grained sand. CLAY: Medium plasticity; high dry strength; slow dilatency.
-620	SC/CL	10YR 6/6 Brownish Yellow	CLAYEY SAND/ SANDY CLAY: 45-55 percent clay; 45-55 percent medium to coarse grained sand. CLAY: Low plasticity; high dry strength; slow dilatency.
	SM	2.5Y 5/4 Light Olive Brown	SILTY SAND: Medium to coarse grained sand; trace fine grained sand; some gravel; subrounded to subangular; 25-35 percent silt; gravel to 21 mm; granitic and metamorphic.
-640	SC	10YR 5/4 Yellowish Brown	CLAYEY SAND: Fine to coarse grained sand; some fine gravel; subrounded to subangular; 25-35 percent clay; gravel to 10 mm; chert; metamorphic.
	CL	2.5YR 5/6 Light Olive Brown	SANDY CLAY: 80-90 percent clay; 10-20 percent fine to medium grained sand; trace coarse grained sand. CLAY: Medium plasticity; high dry strength; no dilatency.

Appendix A

Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT1
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
-660	ML	2.5YR 5/4 Light Olive Brown	SANDY SILT: 60-70 percent silt; 10-15 percent clay; 20-30 percent medium to coarse grained sand; trace fine gravel to 15 mm. CLAY: Low plasticity; slow dilatency.
	SW-SM	2.5YR 5/4 Light Olive Brown	SAND: Fine to coarse grained sand; subrounded; 5-10 percent silt; trace clay; metamorphic.
-680	SM	2.5YR 6/4 Light Yellowish Brown	SILTY SAND: Fine to coarse grained sand; subrounded; 15-20 percent silt; trace clay; chert grains; metamorphic.
	CL	2.5YR 5/4 Light Olive Brown	SANDY CLAY: 80-90 percent clay; 10-20 percent fine to medium grained sand; trace coarse grained sand. CLAY: Medium plasticity; high dry strength; slow dilatency.
-700		2.5YR 5/4 Light Olive Brown	SANDY CLAY: Same as above.
		2.5YR 5/6 Light Olive Brown	SANDY CLAY: 70-80 percent clay; 20-30 percent fine to medium grained sand; some coarse grained sand. CLAY: Medium plasticity; high dry strength; no dilatency.
-720		2.5YR 5/4 Light Olive Brown	SANDY CLAY: 80-85 percent clay; 15-20 percent fine to medium grained sand; some coarse grained sand; trace fine gravel to 8 mm. CLAY: Low to medium plasticity; high dry strength; slow dilatency.
		2.5YR 5/4 Light Olive Brown	SANDY CLAY: 60-70 percent clay; 30-40 percent fine to coarse grained sand; some fine gravel to 12 mm. CLAY: Low to medium plasticity; high dry strength; slow dilatency.
-740	SM	2.5YR 5/3 Light Olive Brown	SILTY SAND with GRAVEL: Fine to coarse grained sand; with fine gravel; subrounded to subangular; 15-25 percent silt; gravel to 13 mm; chert grains; granitic and metamorphic.
			Sample not recovered. Borehole total depth = 759 ft bgs.
-760			

Notes:

Grain Size distribution and percentages are approximate.

Soil Types classified based on Unified Soil Classification System.

Soil Color based on Munsell Soil Color Charts.

Samples from 0 to 50 feet were collected from bucket auger cuttings.

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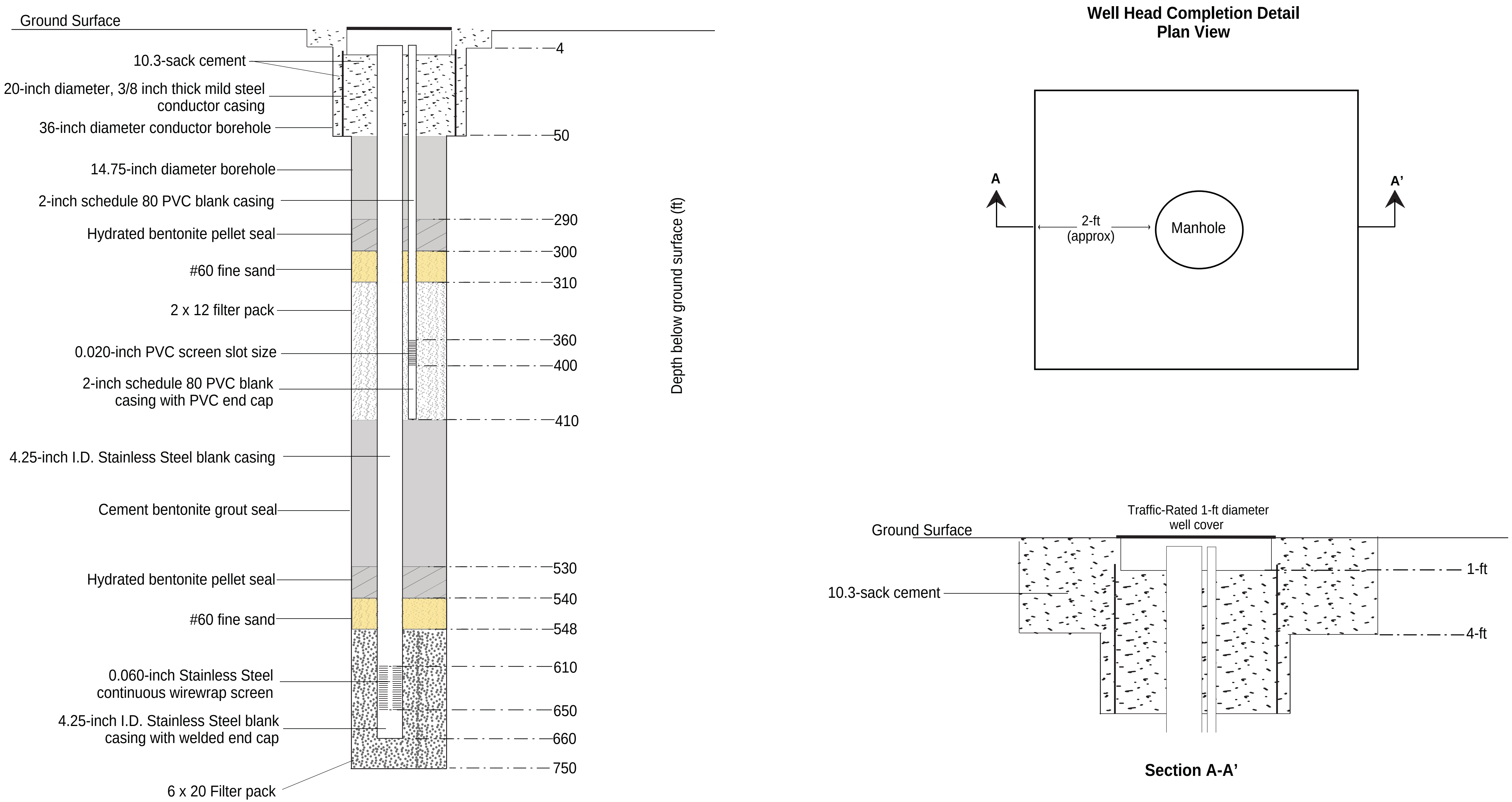
Ground Surface
10.3-sack cement
20-inch diameter, 3/8 inch thick mild steel conductor casing
36-inch diameter conductor borehole
14.75-inch diameter borehole
2-inch schedule 80 PVC blank casing
Hydrated bentonite pellet seal
#60 fine sand
2 x 12 filter pack
0.020-inch PVC screen slot size
2-inch schedule 80 PVC blank casing with PVC end cap
4.25-inch I.D. Stainless Steel blank casing
Cement bentonite grout seal
Hydrated bentonite pellet seal
#60 fine sand
0.060-inch Stainless Steel continuous wirewrap screen
4.25-inch I.D. Stainless Steel blank casing with welded end cap
6 x 20 Filter pack
4
50
290
300
310
360
400
410
530
540
548
610
650
660
750
Depth below ground surface (ft)
Well Head Completion Detail
Plan View
A
A'
2-ft
(approx)
Manhole
Traffic-Rated 1-ft diameter well cover
Ground Surface
10.3-sack cement
1-ft
4-ft
Section A-A'

Not to scale

Lithologic Log

Client:	IEUA	**Drilling Contractor:**	Best Drilling and Pump, Inc.
Borehole/ Well No:	MW-VCT2	**Drilling Method:**	Fluid Reverse
Project Number:	08-010-101	**Borehole Diameter**	14 3/4 "
Project:	Monitoring Well Installation	**Location of boring/ Well:**	
Start Date:	11/23/09	X:	117° 30.448
Finish Date:	1/8/10	Y:	34° 07.710
Logged By:	AH		

Depth	Graphic Log	Color	Sample Description
0	SM	7.5YR 5/4 Brown	SILTY SAND: Fine grained sand; trace medium grained sand; trace coarse gravel and cobbles to 80 mm; sand is subangular; gravel and cobbles are rounded to subrounded; 30 percent silt; trace mica; slightly moist.
	SW	7.5YR 5/4 Brown	SAND with GRAVEL: Fine to coarse grained sand; with coarse gravel; some fine gravel; sand is subangular; gravel is subrounded to angular; 5 percent silt; sand comprized primarily of quartz and mica; granitic; gravel is granitic and metasedimentary.
-20		7.5YR 5/4 Brown	SAND with GRAVEL: Fine to coarse grained sand; with fine to coarse gravel; trace cobbles; subrounded to subangular; 10 percent silt; primarily quartz; granitic; micaceous.
	SP	7.5YR 5/4 Brown	SILTY SAND: Fine grained sand; trace medium and coarse grained sand; subangular; 15-25 percent silt; trace mica.
-40		7.5YR 5/4 Brown	SILTY SAND: Fine grained sand; trace medium grained sand; trace coarse grained sand; some fine to coarse gravel; subrounded to subangular; 30 percent silt; micaceous; granitic; euhedral feldspars.
		5YR 6/4 Light Reddish Brown	SAND: Coarse grained sand; with medium grained sand; trace fine grained sand; trace fine to coarse gravel to 35 mm; less than 5 percent silt; primarily quartz; less than 1 percent clay.
-60	SM	5YR 4/2 Dark Reddish Brown	SILTY SAND with CLAY: Fine to coarse grained sand; some fine gravel; subangular to angular; 20 percent silt; 15 percent clay; primarily quartz; metamorphic. CLAY: Moderate plasticity; slow dilatency; occurs as balls; sandy.
		5YR 5/4 Reddish Brown	SILTY SAND with CLAY: Same as above; trace coarse gravel to 35 mm.
-80	SP	5YR 4/2 Dark Reddish Brown	GRAVELLY SAND: Coarse grained sand; trace fine and medium grained sand; subangular to angular, less than 1 percent silt; with fine to coarse gravel to 28 mm; metamorphic.
		5YR 6/3 Light Reddish Brown	GRAVELLY SAND: Same as above.
-100			

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Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT2
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
		5YR 4/2 Dark Reddish Brown	GRAVELLY SAND: Same as above.
	GW	5YR 4/3 Reddish Brown	GRAVEL: Fine to coarse gravel to 50 mm; some fine to medium grained sand; angular; metamorphic; less than 1 percent clay.
-120	CL	5YR 4/2 Dark Reddish Brown	CLAY: 90-95 percent clay; 5-10 percent fine grained sand; trace medium grained sand; subrounded. CLAY: Moderate plasticity; high dry strength; low toughness; no dilatency.
		5YR 5/4 Reddish Brown	CLAY: Same as above.
-140	GW	5YR 5/4 Reddish Brown	GRAVEL with SAND: Fine to coarse gravel to 35 mm; some coarse grained sand; trace fine to medium grained sand; subangular; metamorphic; less than 5 percent clay.
		5YR 5/2 Reddish Brown	GRAVEL: Fine to coarse gravel to 52 mm; trace fine to coarse sand; subangular; less than 5 percent silt; metamorphic and granitic.
-160		7.5YR 4/4 Brown	GRAVEL: Same as above; increasing fine grained sand; increasing silt; less than 1 percent clay.
	SP	7.5YR 4/3 Brown	SAND: Fine to medium grained sand; with coarse grained sand; some fine gravel; subangular to angular; 10 percent silt; sedimentary; granitic; metamorphic; less than 1 percent clay.
-180	ML	7.5YR 3/1 Very Dark Gray	SANDY SILT: 60 percent silt.; 40 percent fine to medium grained sand; some coarse grained sand; subrounded; some coarse gravel to 30 mm; granitic.
		7.5YR 4/2 Brown	SANDY SILT: Same as above; less than 1 percent clay.
-200		7.5YR 5/3 Brown	SANDY SILT: Same as above; 80 percent silt.
		7.5YR 5/2 Brown	SANDY SILT: Same as above; 80 percent silt.
-220	SM	7.5YR 4/3 Brown	GRAVELY SAND with SILT: Coarse grained sand; with medium grained sand; some fine grained sand; subangular; 15 percent silt; with fine gravel to 17 mm; granitic.
	CL	7.5YR 4/3 Brown	CLAY: 80-90 percent clay; 10-20 percent medium to coarse grained sand; trace fine to coarse gravel to 28 mm; metamorphic.CLAY: Moderate plasticity; high dry strength; moderate dilatency.
-240			

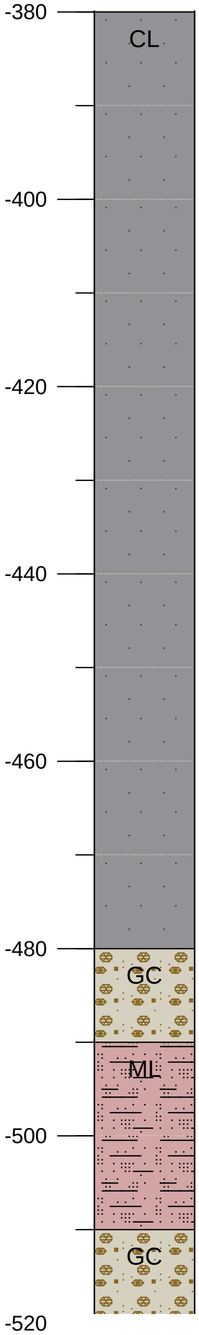
Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT2
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
-240		7.5YR 3/2 Dark Brown	CLAY: Same as above; increasing silt content.
	ML	7.5YR 4/3 Brown	SANDY SILT with GRAVEL: 35-45 percent silt; 30 percent medium to coarse grained sand; with fine grained sand; with fine to coarse gravel; subrounded; gravel to 17 mm; metamorphic.
-260	CL	10YR 4/3 Brown	CLAY: 80-90 percent clay; 10-20 percent fine grained sand; trace medium grained sand; less than 5 percent gravel. CLAY: High plasticity; medium toughness; high dry strength; no dilatency.
		5YR 4/6 Yellowish Red	CLAY: Same as above.
-280		5YR 5/6 Yellowish Red	CLAY: Same as above; clay occurs as balls; high toughness.
		5YR 4/3 Reddish Brown	CLAY: Same as above.
-300		5YR 4/3 Reddish Brown	CLAY: Same as above.
		5YR 5/4 Reddish Brown	CLAY: Same as above; no gravel.
-320		5YR 5/4 Reddish Brown	SILTY CLAY: 50-60 percent clay; 40 percent silt; less than 5 percent sand. CLAY: Low plasticity; high dry strength; moderate dilatency; occurs as balls.
		5YR 4/4 Reddish Brown	CLAY: 80-90 percent clay. 10-20 percent fine to medium grained sand; some coarse grained sand; subrouned; primarily quartz.
-340	GM	5YR 4/6 Yellowish Red	SILTY GRAVEL with SAND: Fine to coarse gravel; with medium to coarse grained sand; with fine grained sand; angular; 20 percent silt; less than 5 percent clay balls; metamorphic.
	CL	5YR 5/4 Reddish Brown	CLAY: 85-95 percent clay; 5-10 percent fine to medium grained sand; trace coarse sand; subrounded. CLAY: High dry strength.
-360		5YR 5/4 Reddish Brown	CLAY: Same as above.
	GC	5YR 5/6 Strong Brown	CLAYEY GRAVEL: Coarse gravel; with fine gravel; trace medium grained sand; angular; 25 percent clay; metamorphic. CLAY: Moderate plasticity; high dry strength; moderate dilatency.
-380			

Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT2
Client:	IEUA
Project No.:	08-010-101



Color	Sample Description
7.5YR 4/4 Brown	CLAY: 85-95 percent clay; 5-10 percent fine to medium grained sand; subrounded; fine to coarse gravel to 35 mm. CLAY: Moderate plasticity; moderate toughness; high dry strength; moderate dilatency.
2.5Y 4/4 Olive Brown	CLAY with GRAVEL: 85 percent clay; 15 percent fine gravel; subangular; metamorphic. CLAY: Low plasticity; high dry strength; moderate dilatency; sandy; soft.
10YR 4/6 Dark Yellowish Brown	CLAY: 85-95 percent clay; 5-15 percent fine to medium grained sand; some fine to coarse gravel to 35 mm, subrounded. CLAY: Moderate plasticity; moderate toughness; high dry strength; moderate dilatency; bluish green.
7.5YR 5/6 Strong Brown	CLAY: Same as above.
7.5YR 5/4 Brown	CLAY: Same as above; 5 percent gravel.
7.5YR 5/4 Brown	CLAY: Greater than 95 percent clay; high toughness; high plasticity; high dry strength; no dilatency.
7.5YR 4/3 Brown	CLAY: Same as above. SAND: 5 percent; medium grained sand; trace coarse sand; trace fine gravel; subangular.
5YR 4/4 Reddish Brown	CLAY: Same as above; increasing sand fraction.
5YR 4/4 Reddish Brown	SANDY CLAY: 85 percent clay; 15 percent fine to medium grained sand; trace coarse grained sand; subangular; granitic. CLAY: Moderate plasticity; high dry strength; moderate dilatency.
5YR 4/3 Reddish Brown	SANDY CLAY: Same as above.
10YR 4/3 Brown	CLAYEY GRAVEL: Fine to coarse gravel to 32 mm; trace fine to coarse grained sand; subangular to angular; 35 percent clay; metamorphic. CLAY: High dry strength; blue to tan; sandy.
10YR 4/3 Brown	SANDY SILT: 75-85 percent silt; 15-20 percent fine to medium grained sand; some coarse grained sand; trace fine to coarse gravel; subangular to angular; metamorphic.
10YR 4/4 Dark Yellowish Brown	SANDY SILT: Same as above; increasing gravel fraction.
10YR 4/4 Dark Yellowish Brown	CLAYEY GRAVEL: Fine to coarse gravel; some fine to coarse grained sand; subangular; 35 percent clay; gravel to 40 mm; metamorphic. CLAY: Moderate plasticity; no dilatency; high dry strength; various colors.

Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT2
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
-520		10YR 4/4 Dark Yellowish Brown	CLAYEY GRAVEL: Same as above.
	CL	10YR 4/4 Dark Yellowish Brown	SANDY CLAY: 75-85 percent clay; 15-25 percent fine to coarse grained sand; trace fine gravel; subrounded; granitic and metamorphic. CLAY: High plasticity; no dilatency; high dry strength.
-540		2.5Y 5/3 Light Olive Brown	SANDY CLAY: Same as above; clay occurs as balls, various colors.
		2.5Y 4/3 Olive Brown	SANDY CLAY: Same as above.
-560		2.5Y 4/4 Reddish Brown	SANDY CLAY: Same as above; some fine gravel; trace coarse gravel; subrounded; gravel to 22 mm; granitic.
		2.5Y 5/4 Light Olive Brown	SANDY GRAVELLY CLAY: 70 percent clay; 15 percent fine to coarse grained sand; 15 percent fine to coarse gravel to 22 mm; subangular. CLAY: High plasticity; high toughness; high dry strength; no dilatency; sandy.
-580	GW-GC	7.5YR 5/6 Strong Brown	GRAVEL with CLAY: Fine to coarse gravel to 41 mm; subangular; 10 percent clay; metamprohic. CLAY: Moderate plasticity; high toughness; high dry strength; occurs as balls.
	CL	7.5YR 5/6 Strong Brown	CLAY: 85-95 percent clay; 5-15 percent fine to medium grained sand; trace coarse grained sand; trace fine gravel to 20 mm; subangular to angular. CLAY: High plasticity; high toughness; high dry strength; no dilatency; various colors.
-600		7.5YR 5/4 Brown	CLAY: Same as above; increasing sand and gravel fraction.
		7.5YR 5/4 Brown	CLAY: Same as above; increasing sand and gravel fraction.
-620		7.5YR 5/6 Strong Brown	SANDY CLAY with GRAVEL: 65-75 percent clay; 20-25 percent medium to coarse grained sand; with fine grained sand; with fine to coarse gravel to 21 mm; subrounded; metamorphic. CLAY: Moderate plasticity; high toughness; high dry strength; slow dilatency; various colors.
		7.5YR 5/4 Brown	CLAY: 90-95 percent; high plasticity; high toughness; very high dry strength; no dilatency, some sand and fine gravel; subangular.
-640	GC	7.5YR 5/6 Strong Brown	GRAVEL with CLAY: Fine to coarse gravel to 26 mm; subangular; 15 percent clay; metamorphic; trace fine to medium grained sand. CLAY: High toughness; moderate plasticity; no dilatency; high dry strength.
	SM	10YR 6/4 Light Yellowish	SILTY SAND with GRAVEL: Coarse grained sand; with fine to coarse gravel; some medium grained sand; some fine grained sand; subangular; 25-30 percent silt; gravel tp 22 mm; granitic; metamorphic.

Borehole Lithologic Log

Borehole/ Well No.:	MW-VCT2
Client:	IEUA
Project No.:	08-010-101

Depth	Graphic Log	Color	Sample Description
		Brown	
-660	SC	10YR 5/4 Yellowish Brown	CLAYEY SAND with GRAVEL: Medium to coarse grained sand; with fine gravel; some coarse gravel; some fine grained sand; subrounded to subangular; 20-25 percent clay; granitic. CLAY: Moderate plasticity; high toughness; high dry strength. fine gravel; some coarse gravel to 23 mm; subangular; sedimentary and metamorphic.
		10YR 5/4 Yellowish Brown	CLAYEY SAND with GRAVEL: Same as above; decreasing clay content.
-680		10YR 4/4 Dark Yellowish Brown	CLAYEY SAND with GRAVEL: Same as above; decreasing clay content.
	CL	10YR 4/4 Dark Yellowish Brown	CLAY with SAND: 85-90 percent clay 10-15 percent medium to coarse grained sand; some fine grained sand; some fine gravel; trace coarse gravel; subrounded to subangular; sedimentary; metamorphic. CLAY: High plasticity; high dry strength; no dilatency; tan color; slightly sandy.
-700		10YR 5/4 Yellowish Brown	CLAY with SAND: Same as above.
		10YR 5/6 Yellowish Brown	CLAY with SAND: Same as above; 25-35 percent sand.
-720	SC	10YR 5/4 Yellowish Brown	CLAYEY SAND with GRAVEL: Coarse grained sand; some medium grained sand; trace fine grained sand; with fine to coarse gravel; subrounded to subangular; 35-45 percent clay; metamorphic. CLAY:igh plasticity; high dry strength; no dilatency.
		10YR 5/6 Yellowish Brown	CLAYEY SAND: Same as above.
-740		10YR 5/6 Yellowish Brown	CLAYEY SAND: Same as above; 25-35 percent clay.
		10YR 5/3 Brown	Sample not recovered. Borehole total depth = 755 ft bgs.
-760			

Notes:

Grain Size distribution and percentages are approximate.

Soil Types classified based on Unified Soil Classification System.

Soil Color based on Munsell Soil Color Charts.

Samples from 0 to 50 feet were collected from bucket auger cuttings.

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