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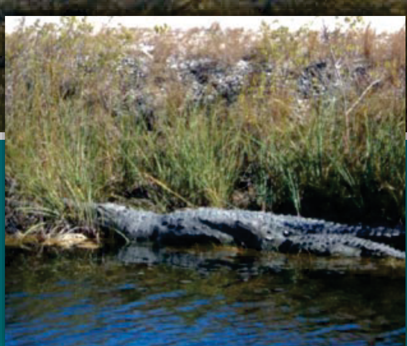
Turkey Point Plant

Comprehensive Pre-Uprate Monitoring Report

Units 3 & 4 Uprate Project

October 31, 2012



Prepared for:

FPL

Prepared by:

ecology and environment, inc.
Global Environmental Specialists

present the data and, depending upon the findings, a decision could be made whether to formally publish a report.

The USGS assessed the depths at which the results could be reasonably interpreted and concluded the depth was typically limited to 12.5 to 15 m below the Bay bottom. The USGS stated that the data are considered to have a vertical resolution no better than 5 m and the horizontal resolution is generally considered to be ½ the electrode spacing (5 m).

Based primarily on the lack of depth penetration, it is FPL's interpretation that the CRP survey will not be very helpful to further delineate the extent of CCS water at depth nor conclusively discriminate between water of different densities and variations in the subsurface geology without the aid of substantial data collection. The porewater and surface water sampling in Biscayne Bay already provide insights into whether there is a measurable influence of the CCS in Biscayne Bay. As such, FPL recommends that further efforts associated with the CRP not be conducted. FPL also does not recommend the use of DTS to track warmer CCS water in the ground since the well temperature data indicate little to no thermal influences away from the CCS.

5.4 Water and Salt Balance Model

Tetra Tech GEO developed a model of the water and salt balance for the CCS. The purpose of this model is to quantify the volumes of water and mass of salt entering and exiting the CCS over a period of time. This analysis builds upon a prior study of the CCS water balance (Golder 2008) by revising methods of calculation for the various components of the CCS and by incorporating new hydrological, chemical, and meteorological data collected in and around the CCS between September 2010 and June 2012. The model described herein is an extension and update of the water and salt balance model presented in the 2011 Annual Monitoring Report (FPL 2011b). This section describes the conceptual model of the CCS water and salt balance, key calculations, and results to illustrate the components of the water and salt balance model. All assumptions are clearly indicated. These calculations are performed in an Excel spreadsheet, which is provided in a separate data file. Findings regarding the operation of the CCS are based upon the results of the current calibrated water and salt balance model and are provided herein.

5.4.1 Conceptual Model

The first step in the modeling process is the development of a hydrological conceptual model (HCM). All data available for the site are assimilated in the HCM in a framework that facilitates the development of a quantitative model. Such data includes information about the bathymetry of the CCS, Biscayne Bay, ID and SFWMD canal L-31E. The flow and chemical characteristics of these water bodies and of the underlying groundwater are thoroughly monitored. These monitoring data are also incorporated in the HCM and helped to formulate a control volume that is primarily comprised of the CCS.

A control volume defines the entity being analyzed. The transfer of water and salt within the control volume is not characterized. Rather, the water and salt balance model focuses upon the transfer of water and salt into and out of the control volume. The control volume analyzed is comprised of the canals of the CCS and the adjacent ID. Raised earth berms between the individual canals are not considered as a part of the control volume. The base of the control volume is assumed to be the bottom of the ID and the cooling canals, whose elevation ranges from approximately -3 feet NAVD 88 to approximately -30 feet NAVD 88. This interpretation of the control volume was developed based upon the hydrological monitoring plan in place for the CCS. The components of the water balance model for this control volume are depicted in Figure 5.4-1. In this figure, canal L-31E is red, the ID is green, discharge cooling canals are purple, return canals are dark blue, and Biscayne Bay is light blue.

Water elevation and quality are recorded at seven stations throughout the CCS, three locations in the ID, three stations in canal L-31E, two locations in other adjacent canals, seven locations in Biscayne Bay (four of which measure only salinity), and fourteen wells in Biscayne Aquifer (at 3 depths each); it is important to note that, based upon the control volume, only shallow groundwater monitoring stations contributed to the characterization of groundwater elevations and groundwater quality in this analysis. The surface and subsurface monitoring locations, in addition to data provided by SFWMD and FPL, facilitate straightforward calculation of the components of water and salt transfer into and out of the control volume:

- Surface water monitoring stations in canal L-31E and the ID permit a straightforward calculation of lateral seepage of water and salt between L-31E and the control volume;
- Surface water monitoring stations in the southern collector canal of the control volume and a monitoring station in a canal adjacent and parallel to the southern face of the control volume provide a means to calculate the seepage of water and salt through the southern face of the control volume;
- Surface water monitoring stations in the CCS return canals and in Biscayne Bay facilitate the calculation of seepage between Biscayne Bay and the control volume;
- Surface water monitoring stations in the CCS canals and groundwater monitoring stations beneath and adjacent to the CCS help to define water flow and salt transport through the bottom of the proposed control volume;
- Meteorological stations in the CCS and immediately to the north and south provide data to calculate the loss of water from the control volume to evaporation; and
- Next Generation Weather Radar (NEXRAD) precipitation data provided by SFWMD informed an accurate assessment of water gained by the CCS from rainfall.

Intermediate modeling results, based upon the control volume and the HCM presented herein, were presented to SFWMD for a calibration period between September 2010 and December 2011 (Andersen 2012). Based upon the intermediate results, FPL received concurrence from SFWMD on the proposed control volume and HCM.

5.4.2 Bathymetry

Certain components of the water and salt balance model require an understanding of the control volume's surface area. For instance, precipitation-based inflow to the control volume is a function of the amount of rainfall (e.g., in inches) and the surface area of the water body onto which the rain was deposited. Also, the conductances for the bottom seepage zone are a function of the water surface area. Due to the sloping sidewalls of the canals in the CCS, the water surface area changes as the water elevations in the CCS change. Based upon a detailed survey of the CCS bathymetry (Morgan and Eklund 2010), a relationship between surface area of the control volume (sub-divided into 5 zones, Figure 5.4-2) and water elevation was defined. Thus, because water elevations in the CCS vary daily so, too, does the water surface area (surface area is proportional to the water elevation); the time-varying surface areas for each of the 5 zones in Figure 5.4-2 are known for the calibration period. Likewise, the bathymetric survey results permitted the characterization of the relationship between the CCS water elevations and CCS storage volume; like surface area, storage volume decreases as water elevations decrease. This refined understanding of surface area and volume of the CCS significantly improved the performance of the model and eliminated much uncertainty with respect to the inflows to and outflows from the control volume.

5.4.3 Water Balance Calculations

As Figure 5.4-1 depicts, the water balance for the proposed control volume is comprised of seepage (lateral through the sides and vertical through the bottom), blowdown (additional water pumped from other units to the CCS), precipitation (including runoff from earth berms between canals) and evaporation. Water pumped into and out of the CCS from Units 1 through 4 is also a component of inflow to and outflow from the control volume; however, these flows are assumed to be equal and have a net zero effect on the water and salt balance. Seepage to and from the control volume comprises a significant component of the water balance. The approach to calculating seepage to and from the control volume, as well as necessary assumptions, is provided below. Other means by which water is transferred (e.g., evaporation) are calculated in distinct manners and are discussed separately. Calculations were performed for a 22-month period from September 2010 through June 2012. This period marks an extension of that which was defined in the preliminary model presented in the 2011 Annual Report (FPL 2011b). Average flows into and out of the control volume were calculated for each day of this period. The average daily flows were summed to estimate the amount of water that enters or exits the control volume during each month and the entire 22-month period. These calculations are intended to demonstrate and validate the methodology, as well as illustrate the hydrologic mechanisms by which the CCS functions.

The general equation for seepage flow employed in the water balance analysis is:

$$Q = C \times \Delta h \qquad (1)$$

Where:

- Q ≡ Volumetric flow, [Length3/Time]
- Δh ≡ Head gradient between control volume and external source/sink, [Length]
- C ≡ Conductance of the media between the control volume and the external source/sink with which it is transferring water, [Length2/Time]

$$C = \frac{K * A}{D} \tag{2}$$

Where:

- K ≡ Hydraulic conductivity of the media through which water flows, [Length/Time]
- A ≡ Area of the face of the control volume through which water flows, [Length2]
- D ≡ Distance water flows between the external source/sink and the control volume, [Length]

In accordance with widely accepted modeling convention, flow into the control volume is positive (+) and flow out of the control volume is negative (-). Calculated flows are reported in 10^6 gallons per day (millions of gallons per day [MGD]).

The mass flux into or out of the control volume is calculated by multiplying the volumetric flow by the salinity of the body of water from which the water is flowing. Salinity was monitored at all groundwater and surface water stations employed in the ensuing calculations and was reported in the practical salinity scale (PSS-78), which is equivalent to grams per liter (g/L). Calculated mass fluxes are reported in thousands of pounds per day (lb x 1000/day).

The data monitoring locations, seepage face dimensions (where relevant), additional equations, and assumptions that support the estimation of the individual components of the water balance for the control volume are discussed below. Draft results of water and salt balance for the entire 22-month period are discussed in Section 5.4.5 and are provided at the end of Section 5.4.

5.4.3.1 Seepage To/From L-31E (Western Seepage)

Three surface water monitoring stations record the water elevations and salinities in L-31E (TPSWC-1, TPSWC-2, and TPSWC-3). Three corresponding stations (at similar longitudes) record water elevations and salinities in the ID (TPSWID-1, TPSWID-2, and TPSWID-3). The locations of these monitoring stations are plotted in Figure 5.4-3.

Using data recorded at these monitoring stations, the seepage through the west face of the control volume was calculated. In order to calculate this seepage, the western face of the control volume was subdivided into two sub-faces (Figure 5.4-3). For this calculation, the following assumptions were made and seepage face dimensions estimated:

- TPSWC-1, TPSWC-2, and TPSWC-3 were used to interpolate water elevations and salinity along the L-31E;
- TPSWID-1, TPSWID-2, and TPSWID-3 were used to interpolate water elevations and salinity along the ID;
- The northernmost section of the west seepage face is approximately 18,800 ft long; the southernmost section of the west seepage face is approximately 10,200 ft long;
- Along the northernmost section of the west seepage face, L-31E and the ID are separated by approximately 950 ft; the average separation between the two canals in the southernmost portion is approximately 2,434 ft; and

- Elevation of base of the ID is approximately -20 ft NAVD 88.

The subdivision of seepage through the west face of the control volume is based on the orientation of L-31E. The conductance of and seepage through each of the sub-faces were calculated using Equations (1) and (2). The resulting component of the water balance is presented in Table 5.4-1. Salt balance estimates for this seepage face were calculated by multiplying the salinities in the sources of water by the calculated flow (Table 5.4-2). For instance, where the flow was to be calculated into the control volume, the salinity of L-31E would be multiplied by the calculated flow to derive the mass flux of this balance component.

5.4.3.2 Southern Seepage

Seepage through the south face of the proposed control volume is primarily driven by the water elevations in the southern end of the CCS and in the canal adjacent and parallel to the southern edge of the control volume. One monitoring station records water elevations and salinity in the southern end of the CCS (TPSWCCS-4). Likewise, one monitoring station measures water elevations and salinity in the adjacent canal (TPSWC-4). These monitoring stations are plotted in Figure 5.4-4.

Using observed data recorded at these monitoring stations, the seepage through the south face of the control volume was calculated. For this calculation, the following assumptions were made and seepage face dimensions estimated:

- Water elevations and salinities recorded in TPSWC-4 are representative of the southern external canal;
- Water elevations and salinities recorded in TPSWCCS-4 are representative of the southern CCS collector canal;
- The depth of the southern CCS canal is assumed to be that at TPSWCCS-4, where the canal bottom is an approximate elevation of -22 ft NAVD 88; and
- The length of the seepage face is approximately 9,300 ft.

The southern external canal is 155 ft south of and parallel to the southern edge of the CCS.

The application of data observed at TPSWC-4 to the entire southern canal was necessitated by the absence of other monitoring stations in this external canal. Likewise, TPSWCCS-4 is by far the most proximate and relevant monitoring station to the seepage face. The conductance for this seepage face was calculated using Equation (2). The flow through this seepage face was subsequently calculated by Equation (1) using water elevation differences between the two monitoring stations. The calculation flow associated with this component of the water balance is provided in Table 5.4-1. Salinities of the source water were multiplied by the calculated flows in order to estimate the salt mass flux and total mass through this seepage face (Table 5.4-2).

5.4.3.3 Eastern Seepage

Seepage through the eastern face is assumed to flow into the control volume from Biscayne Bay or out of the control volume into Biscayne Bay. In order to calculate this seepage, the eastern face of the control volume was subdivided into two sub-faces (Figure 5.4-5). Canal depths at these two locations and stage variation within the CCS necessitated the subdivision of the eastern seepage face. The elevation of the canal bottom at TPSWCCS-5 is approximately -22 ft NAVD 88; the elevation of the canal bottom in the vicinity of TPSWCCS-6 is lower (approximately -30 ft NAVD 88). Water characteristics in Biscayne Bay are observed at a number of monitoring stations along the seepage face; the monitoring station with the longest period of record for water elevations is TPBBSW-3.

Using observed water elevations from relevant monitoring stations, the seepage through the east face of the control volume was calculated. For this calculation, the following assumptions were made and seepage face dimensions estimated:

- TPSWCCS-5 water elevations and salinities effectively reflect conditions in the return canal adjacent to the southernmost seepage sub-face;
- TPSWCCS-6 water elevations and salinities effectively reflect conditions in the return canal adjacent to the northernmost seepage sub-face (TPSWCCS-5 salinity employed when data was not available for TPSWCCS-6);
- Reliable water elevations at TPSWCCS-6 were not available for much of September 2010 and all of April and May 2011; water elevations during these times were estimated from the measurements at TPSWCCS-5 by adding the average difference in water elevations between the two sensors to TPSWCCS-6; likewise, water elevations measured at TPSWCCS-6 were adjusted and employed as surrogates for TPSWCCS-5 water elevations when the latter were not available;
- TPBBSW-3 water elevations and salinities are representative of Biscayne Bay along the eastern seepage face of the return canals (TPBBSW-10 water elevations and TPBBSW-4 salinities were employed when data for TPBBSW-3 were not available);
- TPBBSW-10 water elevations and salinities are representative of Biscayne Bay along the intake canal seepage face (water elevation and salinity measurements at TPBBSW-3 and -4 were employed when data were not available for TPBBSW-10);
- The average elevation of the canal bottom along the southernmost seepage sub-face is assumed to be -22.5 ft NAVD 88 (elevation at TPSWCCS-5);
- Interval-valued bathymetric data defines a range of depths below water for the northernmost seepage sub-face between 20 ft and 40 ft. Based on this data, an approximate elevation of the canal bottom was defined to be -30 ft NAVD 88;
- The length of the southernmost seepage sub-face is approximately 22,500 ft; and
- The length of the northernmost seepage sub-face is approximately 8,340 ft.

The conductance for this seepage face was calculated using Equation (2). The flow through this seepage face was subsequently calculated by Equation (1) using water elevation differences between the each of the two monitoring stations in the control volume and the Biscayne Bay monitoring station. The calculation of flow associated with this component of the water balance is provided in Table 5.4-1. Salinities of the source water were multiplied by the calculated flows in order to estimate the salt mass flux and total mass through this seepage face (Table 5.4-2).

5.4.3.4 Northern Face Seepage

Seepage through the northern face of the control volume (Figure 5.4-6) is defined by the difference in water elevations between the northernmost discharge canal of the CCS and shallow groundwater elevations to the north of the control volume. TPSWCCS-1 is the most proximate monitoring station to the northern seepage face. Groundwater elevations were adjusted for freshwater equivalency and interpolated along a transect that is parallel to the northern edge of the CCS, starts at a point with the same latitude as TPGW-12 and same longitude at TPSWCCS-1, intersects TPGW-12, and terminates at a point with the same latitude at TPGW-12 and the same longitude as plant outflow meter TPFM-1 (Figure 5.4-6). Groundwater elevations along this transect were interpolated based on data recorded at shallow monitoring wells TPGW-6, TPGW-10, and TPGW-12. Freshwater equivalent heads were calculated using Equation (3).

$$h_f = (h - z) \times \left(\frac{\rho}{\rho_f} - 1\right) + h \tag{3}$$

Where:

- h_f ≡ freshwater equivalent head, [Length]
- h ≡ measured water elevation at the sensor, [Length]
- z ≡ elevation of the sensor, [Length]
- ρ ≡ measured density of water, [Mass/Length^3]
- ρ_f ≡ freshwater density (0.997 g/cm^3)

Using freshwater equivalent water elevations from the CCS monitoring station and interpolated shallow groundwater elevations along the transect, the seepage through the north face of the control volume was calculated. For this calculation, the following assumptions were made and seepage face dimensions estimated:

- Water elevations, densities, and salinities recorded in TPSWCCS-1 applied to the entire north canal of the control volume (TPSWCCS-7 data were used when TPSWCCS-1 data were not reliable);
- A hydraulic gradient was calculated along a straight line between TPGW-6 and TPGW-12; this gradient was employed to estimate groundwater elevations along the transect west of TPGW-12;
- A hydraulic gradient was calculated along a straight line between TPGW-12 and TPGW-10; the gradient was employed to estimate groundwater elevations along the transect east of TPGW-12;
- The salinity at TPGW-12 was assumed to apply across the length of the transect;
- Length of the seepage face is the lateral distance between TPSWCCS-1 and the plant discharge pump station;
- The distance between the northern edge of the CCS and the transect is the difference between the latitudes of TPGW-12 and TPFM-1;

- Based on bathymetry data, the elevation of the bottom of the CCS varied from -11.5 to -25 ft NAVD 88 along the northern canal.

The conductance for this seepage face was calculated using Equation (2). The flow through this seepage face was subsequently calculated by Equation (1) using water elevation differences between the monitoring station in the control volume and interpolated shallow groundwater elevations along the transect. The calculation of flow associated with this component of the water balance is provided in Table 5.4-1. Salinities of the source water were multiplied by the calculated flows in order to estimate the salt mass flux and total mass through this seepage face (Table 5.4-2).

5.4.3.5 Bottom Seepage

The calculation of flow through the bottom of the control volume employed monitoring data from five shallow groundwater wells located beneath and adjacent to control volume (TPGW-1, TPGW-3, TPGW-11, TPGW-12, TPGW-13) and four monitoring stations in the CCS (TPSWCCS-1, TPSWCCS-2, TPSWCCS-4, TPSWCCS-5). For this calculation, the control volume was subdivided into four zones (Figure 5.4-7), based on the locations of the CCS monitoring stations and the conceptualization of bottom seepage to and from the control volume (primarily downward flow in the northern and middle portions of the discharge cooling canals; primarily upward flow in the return canals). The seepage through each zone of the control volume was calculated; bottom seepage was calculated by summing the flows through the four zones.

Surface water elevations and salinity for each zone were defined to be those measured at the monitoring station within the zone (e.g., water elevations and salinity observed at TPSWCCS-1 and TPSWCCS-7 were applied to Zone A; Zone B: TPSWCCS-2; Zone C: TPSWCCS-4; Zone D: TPSWCCS-5). In general, water elevations decreased from Zone A to Zone D. Groundwater elevations beneath each zone were defined based upon proximate groundwater monitoring stations (Zone A: TPGW-1, TPGW-10, and TPGW-12; Zone B: TPGW-13; Zone C: TPGW-3 and TPGW-11; Zone D: TPGW-11). Groundwater salinity flowing into each zone was characteristic of the salinity measured at each zone's relevant groundwater monitoring station (Zone A: average of TPGW-1 and TPGW-12; Zone B: TPGW-13; Zone C: TPGW-10; Zone D: TPGW-10); the inflowing groundwater at Zones C and D was assumed to have a fraction (80% and 90%, respectively) of the salinity measured at TPGW-10 due to the mixing of regional freshwater and saline water. The thickness of the seepage face varied amongst the zones, since the approximate average elevation of canal bottoms for each zone varied (as approximated from bathymetric survey data).

The calculation of seepage through the bottom of the control volume was predicated on the following simplifying assumptions:

- Groundwater elevations beneath each zone are reflected by the groundwater elevations at underlying or proximate monitoring wells, as described above;
- The elevation of the canal bottom as representative for each zone was interpreted from bathymetric survey data and assumed to be constant throughout the zone;

- The surface water elevation and salinity observed at a monitoring station within each zone was applied to the entire zone, as described above;
- Water elevations employed in the seepage flow calculation were not adjusted for density. This assumption was made because although the concentration of the CCS water and the groundwater beneath the CCS may be different from ground or surface waters at other locations, the concentration of the CCS water and the concentration of groundwater immediately beneath the CCS at a given monitoring location are approximately the same. Because the concentrations are the same, the densities are the same, and no adjustment to account for density difference is required to compute flows; and
- Water elevations measured at TPGW-11M acted as surrogates for TPGW-11S water elevations when the latter were not available.

Based on these assumptions, the conductance of and flows through the four zones were calculated using Equations (2) and (1), respectively. The calculated flow is provided in Table 5.4-1. Mass flux was calculated by multiplying the volumetric flow by the salinity of the source (Table 5.4-2).

5.4.3.6 Evaporation

The estimation of evaporative loss from the control volume is a unique case of evaporation from a surface water body due to the elevated heat of water entering the CCS from the FPL Turkey Point power plant and the variability of salinity of water in the control volume. The elevated heat of water has the general effect of increasing evaporative loss, whereas salinity is inversely proportional to the rate of evaporation (Salhotra et al. 1985).

Numerous approaches for estimating evaporation have been developed; they generally fall into two categories: energy balance methods and Dalton Law methods. The former method is widely applied to surface water bodies in spite of being a "costly and time-consuming method" (Mosner and Aulenbach 2003). This approach to calculating evaporative losses requires calculation of individual components of energy flux into and out of the control volume due to solar radiation, surface water, groundwater and precipitation. Evaporative loss is then indirectly estimated as the difference between net energy flux from the control volume and the sum of the individual calculated energy flux components (Lensky et al. 2005; Mosner and Aulenbach 2003). This indirect approach can necessitate the detailed measurement of solar radiation, fraction of penetrating solar radiation, brine mass and cloud cover and can be unreliable for water bodies with elevated temperatures (Leppanen and Harbeck 1960; Bowen 1926).

The Dalton Law approach, on the other hand, relies upon an understanding of the vapor pressure gradient between the surface water and the overlying air, as well as the wind speed above the surface water. Use of this method is limited in practice since wind speed is often the least known parameter in evaporation estimation (Lensky et al. 2005).

For the control volume, wind speeds are measured at 15-minute intervals at meteorological station TPM-1 (Figure 5.4-8) and at 1-hour intervals north and south of the control volume. As such, the Dalton Law approach is employed herein to estimate the rate of evaporative loss, E, from the control volume. The general form of the equation is:

$$E = f(W) \cdot \{\beta \cdot e_{sat}(T_S) - \psi \cdot e_{sat}(T_A)\} \qquad \text{[Length/Time]} \qquad (4)$$

Where:

- $f(W)$ ≡ wind function; W is wind speed, [Length/Time]
- β ≡ coefficient of water activity
- $e(T)$ ≡ saturation vapor pressure [Mass/(Length × $Time^2$)]
- T_S, T_A ≡ temperature of surface water and air, respectively [°C]
- ψ ≡ relative humidity [%]

The wind function, f(W), is an empirically derived formula that uses wind speed at 2 meters above surface to quantify to the effect of air convection above the water surface on the rate of evaporation. The thermal loading of the Turkey Point power plant can increase forced convection at the north end of the control volume. Approaches to explicitly consider free and forced convection are available (Adams et al. 1990), though they are tailored to estimating energy lost due to evaporation, rather than water lost due to evaporation. Though free and forced convection are not explicitly characterized herein, the wind function employed in these calculations was derived for heated cooling water and based upon the following equation:

$$f(W) = 0.301 + 0.113 \cdot W \qquad (5)$$

where wind, W, is measured in meters per second (m/s) (Williams and Tomasko 2009). In order to achieve a well-calibrated model, a coefficient C_W was incorporated into Equation (5) and was ultimately adjusted during calibration:

$$f(W) = C_W \times (0.301 + 0.113 \cdot W) \qquad (6)$$

The coefficient of water activity, β, varies in the range [0, 1] and is intended to account for the reduced evaporation from saline water bodies. It decreases with increasing salinity; at salinity levels in the CCS, β does not vary significantly (Salhotra et al. 1985) and is conservatively assumed to be 0.9; this value for β is empirically consistent with salinities approximately equal to 100 PSU (Salhotra et al. 1985).

The saturation vapor pressure relationship used in these calculations accounts for elevated water saturation gradients that result from heated water and provides reliable estimates of saturation vapor pressure for temperatures, T, up to 40 °C (Jobson and Schoelhamer 1987):

$$e_{sat}(T) = \exp\left(52.4185 - \frac{6788.6}{T - 273.16} - 5.0016 \cdot \ln(T + 273.16)\right). \qquad (7)$$

Temperature of the surface water is measured at monitoring stations TPSWCCS-1, TPSWCCS-2, TPSWCCS-4, and TPSWCCS-5. Air temperature and relative humidity are measured at meteorological station TPM-1.

In order to estimate evaporative loss, the control volume was subdivided into four zones (Figure 5.4-8). Zone 1 covers the northern area of the discharge canals; wind speeds applied to this zone are measured north of the control volume and water temperatures are measured at TPSWCCS-1. Zone 2 covers the middle area of the discharge canals; wind speeds applied to this zone are measured at TPM-1 and water temperatures are measured at TPSWCCS-2. Zone 3 covers the south area of the discharge canals; wind speeds applied to this zone are measured south of the control volume and water temperatures are measured at TPSWCCS-4. Zone 4 covers the return canals; wind speeds applied to this zone are measured at TPM-1 and water temperatures are measured at TPSWCCS-5. The surface area from which water is lost to evaporation in each of these zones changes through time with the changing water elevations in the CCS, and is calculated based upon the 5 zones presented in Figure 5.4-2.

Additional assumptions made in order to estimate evaporative flux include:

- The air temperature and relative humidity measured at TPM-1 are applicable to the entire control volume;
- Wind speeds north and south of the control volume were measured at 10 meters above ground surface; an empirical relationship between wind speed and elevation was used to estimate wind speeds at 2 meters above ground surface at these stations; and
- Wind speeds employed in evaporative loss calculations were daily averaged values.

Calculated water flow from the control volume due to evaporation is provided in Table 5.4-1. No salt mass is lost from the control volume to evaporation.

5.4.3.7 Precipitation

Precipitation is measured at the site at meteorological station TPM-1 every 15 minutes, and these data informed the precipitation-based inflow in an earlier version of the model (FPL 2011b). However, a more accurate understanding of spatially-varying precipitation-based inflow was derived from NEXRAD rainfall data and provided by SFWMD. SFWMD converted NEXRAD precipitation data into daily rainfall amounts for the 5 zones depicted in Figure 5.4-2. Coupled with a detailed understanding of the changing surface areas for these zones, the NEXRAD data produced an accurate definition of the daily volumetric inflow of water to the control volume from precipitation. This approach to the calculation of precipitation-based inflow significantly improved the model's match to observed water elevations and salinities in the CCS, as well as eliminated the uncertainty introduced by applying TPM-1 rainfall amounts to the entire CCS. Quantities of water entering the control volume due to precipitation are provided in Table 5.4-1. No salt enters the control volume through the precipitation. Runoff into the control volume from earth berms between canals was initially assumed to be 50% of precipitation that falls on the berms. This percentage was adjusted during calibration.

5.4.3.8 Blowdown

Blowdown refers to water added to the control volume from a number of sources: the Unit 5 cooling tower (originally Floridan aquifer water), Miami-Dade wastewater, and Units 1 through 4. Flow from blowdown into the control volume was initially assumed to be a constant 7.8 MGD; this is an approximate value employed in a previous study of the CCS water balance

(Golder 2008). Estimates and measurements of blowdown contributions to the model were revised based upon available measurements and institutional knowledge. Added water from Units 3 and 4 were assumed to be freshwater (non-saline); Unit 5 blowdown salinities are not known with certainty and were adjusted to between 20% and 80% of seawater (35 PSU) to improve calibration to observed salinities. Inflows to the control volume are presented in Table 5.4-1 for water and Table 5.4-2 for salt mass.

5.4.3.9 Pumped Interceptor Ditch Water

The operation of the interceptor ditch requires that large volumes of water be pumped intermittently from the interceptor ditch in order to create seaward flow from L-31E. This pumped water is a blend of ID water and groundwater and is subsequently added to the CCS, comprising a component of inflow to the control volume that is much larger than the regional inflow through the western face of the control volume. Interceptor ditch operation occurs primarily between the months of January and June; pump rates have been as high as 50 MGD and average 4.5 MGD over the 22-month calibration period. The incorporation of this pumped water in the water and salt balance model significantly improved the simulation of water elevations and salinities over prior modeling efforts.

5.4.4 Storage

The gain/loss of water and salt mass within the control volume during some period of time results in a change in the control volume's water and salt mass storage. Increased water storage, for instance, occurs when more water enters the control volume than exits. Storage, then, can be estimated by summing all of the components of the water (and salt) balance. When the net flow is positive (into the control volume) during a specified period of time, the storage of control volume increases. Conversely, a net negative (out of the control volume) flow implies a decrease in storage during a specified time period.

Another manner in which a change in storage can be estimated relies on direct measurements of water elevations and salinities within the control volume. A change in water elevation within the control volume can be calculated as a difference between water elevations at the beginning and end of a specified time period. The product of this change in water elevations and the surface area of the control volume provide an estimate of the change in the volume of water contained in the control volume during that period of time. Estimates of daily storage changes derived from this method are used to further calibrate the water and salt balance model to ensure an accurate simulation of temporal trends CCS water elevation and salinity.

5.4.5 Results and Discussion

The individual components of the water and salt balance were simulated for each month from September 2010 through June 2012, as well as for the collective 22-month period. The individual components of flow are summed in order to calculate a simulated change in volume for each month and for the 22-month period. These simulated changes in storage were compared to observed changes in CCS water and salt storage for each month and the entire calibration period. Errors between the simulated and observed storage changes were minimized by adjusting key variables associated with the flow balance model; this process is called calibration. The calibration process ensures that the model can accurately reflect the average changes in CCS storage over the 22-month time frame, while also effectively capturing day-to-day changes in CCS water and mass storage. Calibration of the water and salt balance model was achieved by adjusting hydraulic conductivities of the aquifer materials adjacent to and beneath the CCS that factor into the calculation of seepage to/from groundwater and Biscayne Bay. Additional adjustable parameters include an evaporation factor that adjusts the coefficients in the wind function (Equation 6), the amount of runoff that enters the control volume as percentage of precipitation, the amount of Unit 5 cooling tower water that is lost to evaporation before entering the CCS, and the salinity of the Unit 5 blowdown as a percentage of seawater. The calibrated model parameter values are provided in Table 5.4-3.

The horizontal hydraulic conductivities laterally adjacent to the control volume were calibrated to range between 150 ft/day and 450 ft/day. The calibrated vertical conductivities beneath the control volume ranged from 0.1 ft/day to 2.6 ft/day. The northern portion of the discharge canals and return canals, where it is assumed deeper canals intersect a high flow zone underlying the muck and Miami limestone, were calibrated to have higher vertical hydraulic conductivities (1 ft/day and 2.6 ft/day, respectively). Lower vertical conductivities were calibrated for the mid- and southern portions of the discharge canals, as well as the southern portion of the return canals (0.1 ft/day).

Results of the simulated 22-month water and salt balance model are provided in Tables 5.4-1 and 5.4-2, respectively. Monthly balance results follow in Table 5.4-4 through Table 5.4-47. The modeled net flow of water, as calculated by the summing the components of the water balance for the 22-month calibration period, is denoted as the "Modeled Change in CCS Storage" and was calculated to be an average outflow of 0.62 MGD over the 22-month calibration period. The observed change in storage, which is the difference in the volume of water in the CCS between the final and first days of the calibration period, divided by the number of days in the period, was observed to be 0.11 MGD. Thus, the model correctly simulated an *increase* in CCS storage (a gain of water over the 22-month period). Though the model overestimated the change in storage by approximately 0.51 MGD, this error is small relative to the observed monthly changes in storage, which range between and loss of 46.6 MGD (October 2010) and a gain of 52.1 MGD (September 2010).

Likewise, the model correctly simulated a loss of salt over the 22-month period at rate of 607.9 (lb x 1000)/day. The observed rate of salt outflow was calculated by multiplying the average observed salinity in the CCS on the final and first day of the calibration period by the corresponding CCS volumes on those days. The difference between these two products, divided by the number of days in the calibration period, provides the net outflow of salt, 591 (lb x 1000)/day. As in the case of water flow, the model overestimates the rate of salt flow from the control volume; however, the overestimation is small (16.9 (lb x 1000/day) relative to the monthly average flows, which range from an outflow of 13790 (lb x 1000)/day (October 2010) to an inflow of 8659 (lb x 1000)/day (June 2011).

The model's capability to simulate day-to-day changes in average CCS water elevations and salinity is illustrated in Figure 5.4-9, which plots modeled average CCS water elevations and observed average CCS water elevations for each day in the 22-month calibration period. The observed values reflect the mean of daily-averaged water elevations across the seven sensors in the CCS. Simulated water elevations are calculated by dividing the simulated daily change in CCS storage by the average daily CCS surface area and adding the resulting value (which reflects a change in water level) to the previous day's simulated water elevation. It is evident from this figure that the model effectively captures the general trend in CCS water elevations over the 22-month period, and accurately simulates average CCS water elevations throughout much of the calibration period.

Similarly, Figure 5.4-10 demonstrates the model's ability to simulate average CCS salinity. Observed salinities are the mean of daily averaged salinities measured in the CCS sensors. The simulated CCS salinities are calculated in a manner similar to the CCS water elevations. The simulated daily net flow of salt is divided by the simulated volume of water in the CCS, which results in a change in salinity. This change in salinity is added to the simulated salinity calculated for the previous day to produce a simulated salinity for the current day. As in the case of water elevations, the model performs very well with respect to simulating both the temporal trends in CCS salinity and the magnitude of daily salinities throughout the calibration period.

Inspection of Tables 5.4-4 through 5.4-47 reveals clear trends in wet and dry season flow. For instance, bottom seepage, one of the most dominating components of the balance model, demonstrates a dichotomy associated with flow direction. Net flow through the bottom of the CCS is generally out between the months of September through February. This suggests that lower groundwater elevations from the end of the wet season through the middle of the dry season cause outward flow from the CCS. Conversely, higher water groundwater elevations during much of the wet season, drives flow into the CCS. Intuitively, precipitation-based inflows to the CCS are greater during the wet season; average inflow from precipitation during the wet season is more than twice that for the dry season.

Two major revisions that are included in this year's water and salt balance are the use of a surveyed bathymetric surface of the CCS and the use of a more spatially detailed precipitation function that relies on NEXRAD data derived by SFWMD. These two revisions are described below.

Though the surface area and storage of the CCS changes daily, as water and salt flow into and out of the CCS, the 9-month water and salt balance model (FPL 2011b) employed a constant surface area and assumed volume throughout the entire calibration period. However, based upon a bathymetric survey (Morgan and Eklund 2010), detailed information regarding CCS water surface area and volume was incorporated into the current water and salt balance model. This information provided a quantifiable relationship between CCS water elevations and both surface area and volume, such that daily averages of CCS water surface area and volume could be calculated from observed CCS water elevations. These relationships were critical to understanding how much water and salt was gained to and lost from the system on a daily and monthly basis, as wells as how these gains and losses impacted the daily water elevations and salinities in the CCS. As a result of their incorporation, the bathymetric data improved the accuracy of the model in simulating the changing water elevations and salinities in the CCS throughout the 22-month calibration period.

In addition to a detailed assessment of measured CCS storage characteristics, the simulation of precipitation-based inflows to the control volume was improved due to the availability of SFWMD-derived NEXRAD data. The NEXRAD data provided an accurate representation of the spatial variability in precipitation across the CCS. The spatially-variable daily rainfalls were defined for the five zones for which detailed water surface area data were available. Thus, the accuracy of precipitation inflow to the model due to spatial variability was improved through use of NEXRAD data and the more accurate surface area obtained from the bathymetric data (the model computes inflow volumes as the product of daily precipitation and CCS surface area).

Incorporation of the NEXRAD data, coupled with the detailed understanding of CCS surface areas, proved to be a key element in facilitating a model match to observed monthly flows, water elevations, and salinities. The superiority of the current model calibration, relative to that which employed solely TPM-1 precipitation data, suggests that the NEXRAD data be employed in future applications of the water and salt balance model. Though precipitation data from TPM-1 are not currently used to evaluate rainfall-based freshwater inflow to the CCS, these data are valuable inasmuch as they validate NEXRAD precipitation data. However, additional rain gauges located in the vicinity of the CCS provide no value to this model; the continued measurement of precipitation at these gauges is unnecessary.

The accurate simulation of changing CCS inflows, outflows, water elevations and salinities is complex due to the different components of the balance model and their varying impacts upon CCS water and salt storage. For instance, vertical flows into and out of the control volume are substantially larger than horizontal flows, and have a greater impact upon CCS water elevation. The salinity of inflowing water, however, can vary depending upon the source of the water. For example, horizontal flow from the west (L-31E) is non-saline and has a pronounced mitigating impact upon CCS salinities; vertical flow from groundwater beneath portions of the discharge canals is hyper-saline and generally increases the salinity of the CCS. The correct balance of both water and salt mass flow is difficult to procure. This complexity, however, constrains the number of possible solutions to the correct simulation of water and salt balance and bolsters confidence in the resulting calibrated model.

In spite of the complexity, this relatively simple spreadsheet-based model accurately simulates the processes that govern and impact the operation of the CCS. The accuracy of the model is evidenced by the model's ability to accurately simulate average net water and salt flows for the 22-month calibration period (Table 5.4-1 and Table 5.4-2) and for each individual month in the calibration period (Table 5.4-4 to Table 5.4-47). The simulation of transient water elevations and salinities in the CCS (Figure 5.4-9 and Figure 5.4-10) further demonstrates the quality of the model calibration.

The ability to model complex dynamics associated with the CCS over a 22-month timeframe demonstrates the value of the model as a tool for understanding how the CCS has and will operate under varying meteorological, hydrological, and operational conditions. The model's accuracy underpins FPL's firm understanding of processes that control the CCS and the manner in which the CCS interacts with the adjacent aquifer and water bodies. Additionally, the model accuracy validates the fact that the most appropriate data are being collected to effectively capture CCS operations, identify interactions between the CCS and the surrounding environment, and support FPL's comprehension of historical and future operations of the CCS.

Table 5.4-1. Water Balance for 22-Month Period (September 2010 through June 2012)

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.49	329.66
	E. Seepage	6.47	4329.53
	N. Seepage	0.00	2.28
	S. Seepage	0.74	493.67
	Bot Seepage	7.31	4887.72
	Precipitation and Runoff	24.20	16192.89
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.37	247.70
	Unit 5 Blowdown	0.87	583.87
	ID Pumping	4.59	3068.24
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**45.05**	**30135.56**
Out of CCS	W. Seepage	-0.06	-1.87
	E. Seepage	-1.77	-1186.58
	N. Seepage	-0.01	-3.92
	S. Seepage	0.00	-1.20
	Bot Seepage	-11.09	-7420.00
	Precipitation and Runoff	0.00	0.00
	Evaporation	-31.49	-21067.54
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-44.43**	**-29681.12**
Modeled Change in CCS Storage:		**0.62**	**454.44**
Observed Change in CCS Storage:		**0.11**	**74.55**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-2. Salt Balance for 22-Month Period (September 2010 through June 2012)

Water Balance Component		lb/day (x 1000)	Mass (lb x 1000)
Into CCS	W. Seepage	3.77	2519.53
	E. Seepage	1913.88	1280384.11
	N. Seepage	0.76	505.87
	S. Seepage	145.99	97668.79
	Bot Seepage	2021.90	1352651.06
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	50.98	34108.26
	ID Pumping	649.59	434574.13
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**4786.86**	**3202411.74**
Out of CCS	W. Seepage	-56.00	-37464.48
	E. Seepage	-656.46	-439170.75
	N. Seepage	-2.69	-1797.60
	S. Seepage	-0.78	-523.83
	Bot Seepage	-4678.82	-3130127.24
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-5394.74**	**-3609083.91**
Modeled Change in CCS Storage:		**-607.88**	**-406672.17**
Observed Change in CCS Storage:		**-590.61**	**-395118.74**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-3. Calibrated Model Parameter Values

Calibrated Model Parameter	Units	Value
Zone A Vertical Hydraulic Conductivity	ft/day	1.0
Zone B Vertical Hydraulic Conductivity	ft/day	0.10
Zone C Vertical Hydraulic Conductivity	ft/day	0.10
Zone D Vertical Hydraulic Conductivity	ft/day	2.6
North Seepage Face Horizontal Hydraulic Conductivity	ft/day	300
West Seepage Face Horizontal Hydraulic Conductivity	ft/day	450
South Seepage Face Horizontal Hydraulic Conductivity	ft/day	150
East Seepage Face Horizontal Hydraulic Conductivity	ft/day	400
Evaporation Factor (Equation 6)	Unitless	0.57
Runoff as Percentage of Rainfall (added to precipitation	Unitless	46%
Percentage of Unit 5 Blowdown Lost to Evaporation	Unitless	80%
Concentration of Unit 5 Blowdown as Percentage of Seawater (35 PSU)	Unitless	20%

Key: ft = Foot. PSU = Practical salinity units.

Table 5.4-4. Water Balance for September 2010

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.35	10.41
	E. Seepage	4.33	129.87
	N. Seepage	0.01	0.27
	S. Seepage	0.76	22.84
	Bot Seepage	2.36	70.86
	Precipitation and Runoff	81.96	2458.65
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.64
	Unit 5 Blowdown	0.98	29.36
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**91.03**	**2730.92**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-2.42	-72.73
	N. Seepage	0.00	-0.05
	S. Seepage	0.00	0.00
	Bot Seepage	-8.93	-267.82
	Precipitation and Runoff	0.00	0.00
	Evaporation	-37.98	-1139.48
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-49.34**	**-1480.08**
Modeled Change in CCS Storage:		**41.69**	**1250.84**
Observed Change in CCS Storage:		**52.14**	**1564.08**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-5. Salt Balance for September 2010

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.73	21.79
	E. Seepage	1000.37	30011.06
	N. Seepage	1.95	58.53
	S. Seepage	31.45	943.47
	Bot Seepage	492.65	14779.60
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	57.18	1715.41
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**1584.33**	**47529.85**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-977.74	-29332.09
	N. Seepage	-0.60	-18.07
	S. Seepage	0.00	0.00
	Bot Seepage	-4536.14	-136084.31
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-5514.48**	**-165434.47**
Modeled Change in CCS Storage:		**-3930.15**	**-117904.62**
Observed Change in CCS Storage:		**1464.29**	**43928.58**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-6. Water Balance for October 2010

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.12	3.73
	E. Seepage	0.30	9.19
	N. Seepage	0.00	0.09
	S. Seepage	0.61	18.96
	Bot Seepage	0.75	23.20
	Precipitation and Runoff	14.14	438.35
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.93
	Unit 5 Blowdown	0.75	23.11
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**16.95**	**525.56**
Out of CCS	W. Seepage	-0.01	-0.16
	E. Seepage	-9.77	-302.98
	N. Seepage	0.00	-0.12
	S. Seepage	-0.01	-0.34
	Bot Seepage	-22.44	-695.59
	Precipitation and Runoff	0.00	0.00
	Evaporation	-26.68	-827.09
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-58.91**	**-1826.27**
Modeled Change in CCS Storage:		**-41.96**	**-1300.71**
Observed Change in CCS Storage:		**-46.60**	**-1444.52**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-7. Salt Balance for October 2010

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.23	7.14
	E. Seepage	59.81	1854.15
	N. Seepage	0.61	19.05
	S. Seepage	2.18	67.44
	Bot Seepage	332.43	10305.45
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	43.54	1349.79
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**438.81**	**13603.03**
Out of CCS	W. Seepage	-50.77	-1573.99
	E. Seepage	-3777.60	-117105.67
	N. Seepage	-1.42	-43.87
	S. Seepage	-4.41	-136.56
	Bot Seepage	-8516.95	-264025.54
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-12351.15**	**-382885.62**
Modeled Change in CCS Storage:		**-11912.34**	**-369282.60**
Observed Change in CCS Storage:		**-13790.42**	**-427502.87**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-8. Water Balance for November 2010

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.14	4.32
	E. Seepage	1.94	58.25
	N. Seepage	0.00	0.08
	S. Seepage	0.53	15.95
	Bot Seepage	1.20	35.95
	Precipitation and Runoff	27.97	839.20
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.64
	Unit 5 Blowdown	0.50	14.98
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**32.58**	**977.38**
Out of CCS	W. Seepage	-0.03	-0.94
	E. Seepage	-3.16	-94.92
	N. Seepage	0.00	-0.06
	S. Seepage	-0.01	-0.20
	Bot Seepage	-14.43	-433.05
	Precipitation and Runoff	0.00	0.00
	Evaporation	-26.01	-780.31
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-43.65**	**-1309.48**
Modeled Change in CCS Storage:		**-11.07**	**-332.11**
Observed Change in CCS Storage:		**-5.02**	**-150.50**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-9. Salt Balance for November 2010

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.34	10.17
	E. Seepage	457.48	13724.36
	N. Seepage	0.61	18.16
	S. Seepage	19.19	575.66
	Bot Seepage	388.92	11667.59
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	29.18	875.37
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**895.71**	**26871.32**
Out of CCS	W. Seepage	-306.18	-9185.32
	E. Seepage	-1187.68	-35630.52
	N. Seepage	-0.82	-24.62
	S. Seepage	-2.61	-78.43
	Bot Seepage	-5336.39	-160091.80
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-6833.69**	**-205010.69**
Modeled Change in CCS Storage:		**-5937.98**	**-178139.37**
Observed Change in CCS Storage:		**-2876.16**	**-86284.89**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-10. Water Balance for December 2010

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.40	12.46
	E. Seepage	7.28	225.71
	N. Seepage	0.00	0.00
	S. Seepage	0.48	14.92
	Bot Seepage	3.90	120.81
	Precipitation and Runoff	3.90	120.88
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.93
	Unit 5 Blowdown	0.72	22.33
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**16.97**	**526.05**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.20	-6.10
	N. Seepage	-0.01	-0.25
	S. Seepage	0.00	-0.04
	Bot Seepage	-11.51	-356.87
	Precipitation and Runoff	0.00	0.00
	Evaporation	-24.73	-766.57
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-36.45**	**-1129.82**
Modeled Change in CCS Storage:		**-19.48**	**-603.78**
Observed Change in CCS Storage:		**-12.72**	**-394.29**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. ID = Interceptor Ditch.
MGD = Millions of gallons per day.

Table 5.4-11. Salt Balance for December 2010

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	1.44	44.71
	E. Seepage	1890.00	58590.08
	N. Seepage	0.00	0.00
	S. Seepage	90.83	2815.76
	Bot Seepage	990.62	30709.15
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	42.08	1304.34
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**3014.97**	**93464.05**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-72.24	-2239.56
	N. Seepage	-2.87	-88.91
	S. Seepage	-0.53	-16.39
	Bot Seepage	-4163.59	-129071.18
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-4239.23**	**-131416.04**
Modeled Change in CCS Storage:		**-1224.26**	**-37951.99**
Observed Change in CCS Storage:		**-1555.92**	**-48233.42**

Key: CCS = Cooling Canal System. lb = Pound.

Table 5.4-12. Water Balance for January 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.83	25.80
	E. Seepage	3.98	123.23
	N. Seepage	0.00	0.00
	S. Seepage	0.41	12.85
	Bot Seepage	2.62	81.37
	Precipitation and Runoff	19.86	615.73
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.93
	Unit 5 Blowdown	0.82	25.40
	ID Pumping	4.91	152.24
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**33.73**	**1045.54**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-1.67	-51.90
	N. Seepage	-0.01	-0.27
	S. Seepage	0.00	0.00
	Bot Seepage	-15.15	-469.50
	Precipitation and Runoff	0.00	0.00
	Evaporation	-24.18	-749.43
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-41.00**	**-1271.10**
Modeled Change in CCS Storage:		**-7.28**	**-225.56**
Observed Change in CCS Storage:		**-2.54**	**-78.88**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-13. Salt Balance for January 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	3.18	98.49
	E. Seepage	1077.95	33416.50
	N. Seepage	0.01	0.42
	S. Seepage	78.05	2419.52
	Bot Seepage	683.66	21193.44
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	47.87	1483.96
	ID Pumping	185.05	5736.69
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**2075.77**	**64349.02**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-654.00	-20273.95
	N. Seepage	-3.51	-108.76
	S. Seepage	0.00	0.00
	Bot Seepage	-6108.34	-189358.53
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-6765.85**	**-209741.24**
Modeled Change in CCS Storage:		**-4690.07**	**-145392.21**
Observed Change in CCS Storage:		**-910.35**	**-28220.95**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-14. Water Balance for February 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.59	16.65
	E. Seepage	10.09	282.47
	N. Seepage	0.00	0.00
	S. Seepage	0.84	23.51
	Bot Seepage	9.24	258.62
	Precipitation and Runoff	0.71	19.81
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.06
	Unit 5 Blowdown	0.70	19.46
	ID Pumping	2.25	63.03
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**24.70**	**691.62**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.15	-4.31
	N. Seepage	-0.01	-0.34
	S. Seepage	0.00	0.00
	Bot Seepage	-14.17	-396.64
	Precipitation and Runoff	0.00	0.00
	Evaporation	-29.42	-823.64
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-43.75**	**-1224.93**
Modeled Change in CCS Storage:		**-19.05**	**-533.31**
Observed Change in CCS Storage:		**-14.26**	**-399.40**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-15. Salt Balance for February 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	2.03	56.74
	E. Seepage	2692.11	75379.20
	N. Seepage	0.00	0.00
	S. Seepage	140.71	3939.92
	Bot Seepage	2305.86	64564.13
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	40.60	1136.86
	ID Pumping	73.70	2063.56
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**5255.02**	**147140.42**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-67.69	-1895.27
	N. Seepage	-5.44	-152.45
	S. Seepage	0.00	0.00
	Bot Seepage	-6339.60	-177508.74
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-6412.73**	**-179556.46**
Modeled Change in CCS Storage:		**-1157.72**	**-32416.04**
Observed Change in CCS Storage:		**1264.60**	**35408.76**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-16. Water Balance for March 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.67	20.71
	E. Seepage	8.33	258.32
	N. Seepage	0.00	0.04
	S. Seepage	0.92	28.50
	Bot Seepage	9.57	296.60
	Precipitation and Runoff	7.23	224.04
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.93
	Unit 5 Blowdown	0.66	20.55
	ID Pumping	9.37	290.40
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**37.04**	**1148.09**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.12	-3.80
	N. Seepage	0.00	-0.11
	S. Seepage	0.00	0.00
	Bot Seepage	-9.55	-295.97
	Precipitation and Runoff	0.00	0.00
	Evaporation	-30.85	-956.26
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-40.52**	**-1256.14**
Modeled Change in CCS Storage:		**-3.49**	**-108.05**
Observed Change in CCS Storage:		**3.19**	**99.02**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-17. Salt Balance for March 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	3.43	106.48
	E. Seepage	2496.42	77388.93
	N. Seepage	0.30	9.25
	S. Seepage	187.39	5809.16
	Bot Seepage	2394.47	74228.63
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	38.73	1200.58
	ID Pumping	774.24	24001.46
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**5894.98**	**182744.50**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-59.27	-1837.47
	N. Seepage	-1.57	-48.55
	S. Seepage	0.00	0.00
	Bot Seepage	-4384.63	-135923.56
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-4445.47**	**-137809.58**
Modeled Change in CCS Storage:		**1449.51**	**44934.91**
Observed Change in CCS Storage:		**2504.94**	**77653.08**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-18. Water Balance for April 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.53	15.82
	E. Seepage	11.76	352.70
	N. Seepage	0.00	0.00
	S. Seepage	1.13	33.79
	Bot Seepage	13.19	395.55
	Precipitation and Runoff	10.50	315.01
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.64
	Unit 5 Blowdown	1.13	33.95
	ID Pumping	7.46	223.80
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**45.98**	**1379.27**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	0.00	0.00
	N. Seepage	-0.01	-0.32
	S. Seepage	0.00	0.00
	Bot Seepage	-9.86	-295.69
	Precipitation and Runoff	0.00	0.00
	Evaporation	-31.86	-955.93
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-41.73**	**-1251.94**
Modeled Change in CCS Storage:		**4.24**	**127.33**
Observed Change in CCS Storage:		**-7.85**	**-235.45**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-19. Salt Balance for April 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	3.77	113.23
	E. Seepage	3758.99	112769.81
	N. Seepage	0.00	0.00
	S. Seepage	294.59	8837.65
	Bot Seepage	3318.51	99555.44
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	66.10	1983.01
	ID Pumping	751.05	22531.49
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**8193.02**	**245790.62**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	0.00	0.00
	N. Seepage	-4.51	-135.23
	S. Seepage	0.00	0.00
	Bot Seepage	-4200.79	-126023.58
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-4205.29**	**-126158.82**
Modeled Change in CCS Storage:		**3987.73**	**119631.80**
Observed Change in CCS Storage:		**-4057.29**	**-121718.78**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-20. Water Balance for May 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.68	21.08
	E. Seepage	19.10	592.18
	N. Seepage	0.00	0.00
	S. Seepage	1.31	40.72
	Bot Seepage	20.78	644.29
	Precipitation and Runoff	7.08	219.47
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.29	8.93
	Unit 5 Blowdown	1.16	35.93
	ID Pumping	14.81	459.13
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**65.22**	**2021.73**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	0.00	0.00
	N. Seepage	-0.02	-0.72
	S. Seepage	0.00	0.00
	Bot Seepage	-15.50	-480.56
	Precipitation and Runoff	0.00	0.00
	Evaporation	-37.32	-1156.97
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-52.85**	**-1638.25**
Modeled Change in CCS Storage:		**12.37**	**383.48**
Observed Change in CCS Storage:		**11.51**	**356.77**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-21. Salt Balance for May 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	12.42	384.92
	E. Seepage	6362.11	197225.56
	N. Seepage	0.00	0.00
	S. Seepage	433.44	13436.66
	Bot Seepage	5223.08	161915.41
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	67.70	2098.75
	ID Pumping	3405.55	105571.94
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**15504.30**	**480633.24**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	0.00	0.00
	N. Seepage	-11.06	-342.71
	S. Seepage	0.00	0.00
	Bot Seepage	-7418.52	-229974.09
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-7429.57**	**-230316.80**
Modeled Change in CCS Storage:		**8074.72**	**250316.44**
Observed Change in CCS Storage:		**6228.37**	**193079.32**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-22. Water Balance for June 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.75	22.58
	E. Seepage	15.32	459.74
	N. Seepage	0.00	0.00
	S. Seepage	1.28	38.38
	Bot Seepage	22.07	662.08
	Precipitation and Runoff	8.20	246.08
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.47	14.23
	Unit 5 Blowdown	1.02	30.60
	ID Pumping	16.13	483.83
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**65.25**	**1957.53**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	0.00	-0.11
	N. Seepage	-0.02	-0.60
	S. Seepage	0.00	0.00
	Bot Seepage	-12.21	-366.29
	Precipitation and Runoff	0.00	0.00
	Evaporation	-40.23	-1206.80
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-52.46**	**-1573.79**
Modeled Change in CCS Storage:		**12.79**	**383.74**
Observed Change in CCS Storage:		**10.30**	**309.07**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-23. Salt Balance for June 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	18.78	563.38
	E. Seepage	5643.47	169304.22
	N. Seepage	0.00	0.00
	S. Seepage	447.06	13411.94
	Bot Seepage	5591.99	167759.66
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	59.59	1787.60
	ID Pumping	4597.36	137920.85
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**16358.26**	**490747.65**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-1.84	-55.08
	N. Seepage	-9.89	-296.60
	S. Seepage	0.00	0.00
	Bot Seepage	-6075.97	-182279.20
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-6087.70**	**-182630.88**
Modeled Change in CCS Storage:		**10270.56**	**308116.77**
Observed Change in CCS Storage:		**8658.55**	**259756.64**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-24. Water Balance for July 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.91	28.14
	E. Seepage	2.01	62.39
	N. Seepage	0.00	0.00
	S. Seepage	0.47	14.67
	Bot Seepage	7.60	235.47
	Precipitation and Runoff	46.74	1449.08
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.48	14.76
	Unit 5 Blowdown	1.13	35.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**59.34**	**1839.51**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-4.11	-127.34
	N. Seepage	-0.01	-0.26
	S. Seepage	-0.02	-0.61
	Bot Seepage	-13.34	-413.61
	Precipitation and Runoff	0.00	0.00
	Evaporation	-41.06	-1272.84
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-58.54**	**-1814.66**
Modeled Change in CCS Storage:		**0.80**	**24.85**
Observed Change in CCS Storage:		**9.24**	**286.59**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-25. Salt Balance for July 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	12.43	385.28
	E. Seepage	673.04	20864.34
	N. Seepage	0.00	0.00
	S. Seepage	142.73	4424.78
	Bot Seepage	1535.56	47602.47
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	65.96	2044.75
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**2429.73**	**75321.62**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-2055.70	-63726.75
	N. Seepage	-4.13	-128.16
	S. Seepage	-9.25	-286.73
	Bot Seepage	-6701.62	-207750.29
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-8770.71**	**-271891.94**
Modeled Change in CCS Storage:		**-6340.98**	**-196570.32**
Observed Change in CCS Storage:		**3237.34**	**100357.40**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-26. Water Balance for August 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.02	0.75
	E. Seepage	6.85	212.30
	N. Seepage	0.00	0.07
	S. Seepage	0.77	23.82
	Bot Seepage	11.40	353.50
	Precipitation and Runoff	39.06	1210.89
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.47	14.56
	Unit 5 Blowdown	1.04	32.25
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**59.62**	**1848.14**
Out of CCS	W. Seepage	-0.01	-0.40
	E. Seepage	-0.38	-11.79
	N. Seepage	0.00	-0.02
	S. Seepage	0.00	0.00
	Bot Seepage	-8.82	-273.37
	Precipitation and Runoff	0.00	0.00
	Evaporation	-37.78	-1171.15
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-46.99**	**-1456.73**
Modeled Change in CCS Storage:		**12.63**	**391.41**
Observed Change in CCS Storage:		**20.17**	**625.23**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-27. Salt Balance for August 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.17	5.26
	E. Seepage	2391.19	74126.89
	N. Seepage	0.62	19.11
	S. Seepage	111.17	3446.41
	Bot Seepage	4186.36	129777.23
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	60.78	1884.07
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**6750.29**	**209258.97**
Out of CCS	W. Seepage	-483.19	-14978.79
	E. Seepage	-16.77	-519.93
	N. Seepage	-0.29	-9.02
	S. Seepage	0.00	0.00
	Bot Seepage	-3409.18	-105684.58
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-3909.43**	**-121192.33**
Modeled Change in CCS Storage:		**2840.86**	**88066.64**
Observed Change in CCS Storage:		**4028.64**	**124887.94**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-28. Water Balance for September 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.39	11.72
	E. Seepage	4.04	121.17
	N. Seepage	0.00	0.01
	S. Seepage	0.63	18.90
	Bot Seepage	3.05	91.40
	Precipitation and Runoff	38.92	1167.54
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.49	14.73
	Unit 5 Blowdown	0.98	29.36
	ID Pumping	5.74	172.08
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**54.23**	**1626.91**
Out of CCS	W. Seepage	-0.01	-0.33
	E. Seepage	-0.82	-24.55
	N. Seepage	0.00	-0.14
	S. Seepage	0.00	0.00
	Bot Seepage	-9.62	-288.60
	Precipitation and Runoff	0.00	0.00
	Evaporation	-40.57	-1217.25
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-51.03**	**-1530.87**
Modeled Change in CCS Storage:		**3.20**	**96.04**
Observed Change in CCS Storage:		**-5.14**	**-154.17**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-29. Salt Balance for September 2011

	Water Balance Component	lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	1.34	40.22
	E. Seepage	1119.18	33575.49
	N. Seepage	0.07	2.07
	S. Seepage	81.28	2438.27
	Bot Seepage	888.78	26663.45
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	57.18	1715.41
	ID Pumping	406.90	12207.06
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**2554.73**	**76641.96**
Out of CCS	W. Seepage	-371.91	-11157.19
	E. Seepage	-322.30	-9669.08
	N. Seepage	-2.27	-68.02
	S. Seepage	0.00	0.00
	Bot Seepage	-4756.06	-142681.75
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-5452.53**	**-163576.04**
Modeled Change in CCS Storage:		**-2897.80**	**-86934.09**
Observed Change in CCS Storage:		**-3663.57**	**-109906.97**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-30. Water Balance for October 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.35	10.96
	E. Seepage	2.49	77.18
	N. Seepage	0.00	0.06
	S. Seepage	0.74	23.06
	Bot Seepage	2.99	92.81
	Precipitation and Runoff	55.25	1712.81
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.47	14.43
	Unit 5 Blowdown	0.75	23.11
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**63.05**	**1954.43**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-3.95	-122.51
	N. Seepage	0.00	-0.15
	S. Seepage	0.00	0.00
	Bot Seepage	-14.38	-445.78
	Precipitation and Runoff	0.00	0.00
	Evaporation	-29.09	-901.94
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-47.43**	**-1470.37**
Modeled Change in CCS Storage:		**15.61**	**484.05**
Observed Change in CCS Storage:		**8.79**	**272.51**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-31. Salt Balance for October 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.70	21.81
	E. Seepage	1244.83	38589.87
	N. Seepage	0.23	7.27
	S. Seepage	48.75	1511.19
	Bot Seepage	2437.55	75564.10
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	43.54	1349.79
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**3775.61**	**117044.03**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-440.32	-13649.83
	N. Seepage	-2.39	-74.02
	S. Seepage	0.00	0.00
	Bot Seepage	-1825.99	-56605.81
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-2268.70**	**-70329.66**
Modeled Change in CCS Storage:		**1506.92**	**46714.37**
Observed Change in CCS Storage:		**-3871.33**	**-120011.08**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-32. Water Balance for November 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.22	6.64
	E. Seepage	5.82	174.56
	N. Seepage	0.00	0.13
	S. Seepage	0.68	20.31
	Bot Seepage	4.03	120.94
	Precipitation and Runoff	1.29	38.61
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.42	12.59
	Unit 5 Blowdown	0.50	14.98
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**12.96**	**388.76**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.43	-12.93
	N. Seepage	0.00	-0.04
	S. Seepage	0.00	0.00
	Bot Seepage	-6.95	-208.54
	Precipitation and Runoff	0.00	0.00
	Evaporation	-33.96	-1018.90
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-41.35**	**-851.65**
Modeled Change in CCS Storage:		**-28.39**	**-462.88**
Observed Change in CCS Storage:		**-25.56**	**-766.91**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-33. Salt Balance for November 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.72	21.55
	E. Seepage	1026.23	30786.95
	N. Seepage	0.75	22.36
	S. Seepage	92.38	2771.44
	Bot Seepage	633.86	19015.69
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	29.18	875.37
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**1783.11**	**53493.35**
Out of CCS	W. Seepage	-1.42	-42.48
	E. Seepage	-175.61	-5268.21
	N. Seepage	-0.83	-24.90
	S. Seepage	0.00	0.00
	Bot Seepage	-3795.03	-113851.04
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-3972.89**	**-119186.63**
Modeled Change in CCS Storage:		**-2189.78**	**-65693.28**
Observed Change in CCS Storage:		**-3673.05**	**-110191.36**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-34. Water Balance for December 2011

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.49	15.07
	E. Seepage	8.46	262.14
	N. Seepage	0.00	0.09
	S. Seepage	0.76	23.45
	Bot Seepage	7.25	224.86
	Precipitation and Runoff	1.82	56.48
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.54	16.69
	Unit 5 Blowdown	0.72	22.33
	ID Pumping	9.14	283.37
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**29.18**	**904.48**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.09	-2.71
	N. Seepage	0.00	-0.08
	S. Seepage	0.00	0.00
	Bot Seepage	-7.26	-225.18
	Precipitation and Runoff	0.00	0.00
	Evaporation	-27.94	-866.27
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-35.30**	**-1094.23**
Modeled Change in CCS Storage:		**-6.12**	**-189.75**
Observed Change in CCS Storage:		**-11.66**	**-361.51**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-35. Salt Balance for December 2011

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	1.39	43.13
	E. Seepage	1598.07	49540.20
	N. Seepage	0.61	18.79
	S. Seepage	155.78	4829.10
	Bot Seepage	1112.42	34485.04
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	42.08	1304.34
	ID Pumping	431.13	13365.08
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**3341.47**	**103585.67**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-44.16	-1369.05
	N. Seepage	-1.21	-37.57
	S. Seepage	0.00	0.00
	Bot Seepage	-4135.25	-128192.86
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-4180.63**	**-129599.47**
Modeled Change in CCS Storage:		**-839.16**	**-26013.81**
Observed Change in CCS Storage:		**-3828.22**	**-118674.85**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-36. Water Balance for January 2012

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.79	24.34
	E. Seepage	10.17	315.38
	N. Seepage	0.00	0.01
	S. Seepage	0.84	25.94
	Bot Seepage	9.89	306.52
	Precipitation and Runoff	2.87	89.01
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.53	16.35
	Unit 5 Blowdown	0.89	27.50
	ID Pumping	15.39	476.96
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**41.36**	**1282.01**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.01	-0.39
	N. Seepage	-0.01	-0.33
	S. Seepage	0.00	0.00
	Bot Seepage	-11.42	-354.05
	Precipitation and Runoff	0.00	0.00
	Evaporation	-28.41	-880.83
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-39.86**	**-1235.60**
Modeled Change in CCS Storage:		**1.50**	**46.42**
Observed Change in CCS Storage:		**-9.98**	**-309.33**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-37. Salt Balance for January 2012

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	3.23	100.03
	E. Seepage	2454.87	76100.84
	N. Seepage	0.09	2.88
	S. Seepage	183.33	5683.23
	Bot Seepage	2919.37	90500.59
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	51.82	1606.43
	ID Pumping	2219.37	68800.40
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**7832.08**	**242794.40**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-6.39	-198.09
	N. Seepage	-5.00	-154.85
	S. Seepage	0.00	0.00
	Bot Seepage	-5281.53	-163727.51
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-5292.92**	**-164080.44**
Modeled Change in CCS Storage:		**2539.16**	**78713.95**
Observed Change in CCS Storage:		**-2625.35**	**-81385.79**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-38. Water Balance for February 2012

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.59	17.09
	E. Seepage	4.87	141.21
	N. Seepage	0.00	0.13
	S. Seepage	0.61	17.71
	Bot Seepage	5.40	156.46
	Precipitation and Runoff	36.40	1055.68
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.47	13.50
	Unit 5 Blowdown	0.78	22.68
	ID Pumping	1.50	43.56
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**50.62**	**1468.02**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.66	-19.12
	N. Seepage	0.00	-0.02
	S. Seepage	0.00	0.00
	Bot Seepage	-7.93	-230.08
	Precipitation and Runoff	0.00	0.00
	Evaporation	-27.84	-807.25
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-36.43**	**-1056.46**
Modeled Change in CCS Storage:		**14.19**	**411.56**
Observed Change in CCS Storage:		**12.36**	**358.44**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-39. Salt Balance for February 2012

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	2.62	75.86
	E. Seepage	1490.74	43231.51
	N. Seepage	1.06	30.70
	S. Seepage	139.50	4045.55
	Bot Seepage	2043.67	59266.34
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	45.68	1324.84
	ID Pumping	189.46	5494.29
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**3912.73**	**113469.10**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-11.04	-320.18
	N. Seepage	-0.31	-8.86
	S. Seepage	0.00	0.00
	Bot Seepage	-2808.80	-81455.07
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-2820.14**	**-81784.11**
Modeled Change in CCS Storage:		**1092.59**	**31684.99**
Observed Change in CCS Storage:		**3362.46**	**97511.42**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-40. Water Balance for March 2012

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.43	13.35
	E. Seepage	6.60	204.74
	N. Seepage	0.01	0.40
	S. Seepage	0.86	26.63
	Bot Seepage	9.11	282.49
	Precipitation and Runoff	2.46	76.17
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.32	9.78
	Unit 5 Blowdown	0.99	30.56
	ID Pumping	4.10	126.99
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**24.87**	**771.10**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.22	-6.83
	N. Seepage	0.00	-0.01
	S. Seepage	0.00	0.00
	Bot Seepage	-4.37	-135.32
	Precipitation and Runoff	0.00	0.00
	Evaporation	-28.85	-894.42
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-33.44**	**-1036.58**
Modeled Change in CCS Storage:		**-8.56**	**-265.48**
Observed Change in CCS Storage:		**-11.24**	**-348.30**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-41. Salt Balance for March 2012

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	1.91	59.15
	E. Seepage	2072.56	64249.32
	N. Seepage	2.96	91.61
	S. Seepage	199.90	6197.01
	Bot Seepage	2790.33	86500.25
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	57.59	1785.20
	ID Pumping	187.62	5816.11
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**5312.86**	**164698.66**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-16.20	-502.25
	N. Seepage	-0.13	-4.04
	S. Seepage	0.00	0.00
	Bot Seepage	-1733.97	-53753.20
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-1750.31**	**-54259.48**
Modeled Change in CCS Storage:		**3562.55**	**110439.17**
Observed Change in CCS Storage:		**-500.48**	**-15514.87**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-42. Water Balance for April 2012

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.69	20.65
	E. Seepage	7.18	215.31
	N. Seepage	0.01	0.15
	S. Seepage	0.84	25.21
	Bot Seepage	9.86	295.67
	Precipitation and Runoff	52.17	1565.03
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.35	10.44
	Unit 5 Blowdown	0.98	29.41
	ID Pumping	9.76	292.86
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**81.82**	**2454.73**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-0.11	-3.36
	N. Seepage	0.00	-0.03
	S. Seepage	0.00	0.00
	Bot Seepage	-5.44	-163.10
	Precipitation and Runoff	0.00	0.00
	Evaporation	-30.35	-910.52
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-35.90**	**-1077.01**
Modeled Change in CCS Storage:		**45.92**	**1377.72**
Observed Change in CCS Storage:		**33.69**	**1010.73**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-43. Salt Balance for April 2012

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	6.91	207.36
	E. Seepage	2259.55	67786.52
	N. Seepage	1.18	35.26
	S. Seepage	228.24	6847.28
	Bot Seepage	2634.67	79039.99
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	57.26	1717.78
	ID Pumping	1035.51	31065.19
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**6223.31**	**186699.39**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-54.03	-1620.98
	N. Seepage	-0.59	-17.72
	S. Seepage	0.00	0.00
	Bot Seepage	-2899.81	-86994.31
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-2954.43**	**-88633.01**
Modeled Change in CCS Storage:		**3268.88**	**98066.38**
Observed Change in CCS Storage:		**4132.59**	**123977.58**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-44. Water Balance for May 2012

Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.58	18.00
	E. Seepage	0.22	6.82
	N. Seepage	0.01	0.44
	S. Seepage	0.28	8.68
	Bot Seepage	1.06	32.81
	Precipitation and Runoff	42.56	1319.51
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.36	11.22
	Unit 5 Blowdown	0.97	30.04
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**46.05**	**1427.54**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-6.10	-189.16
	N. Seepage	0.00	-0.01
	S. Seepage	0.00	-0.01
	Bot Seepage	-11.72	-363.27
	Precipitation and Runoff	0.00	0.00
	Evaporation	-29.06	-900.80
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-46.88**	**-1453.25**
Modeled Change in CCS Storage:		**-0.83**	**-25.72**
Observed Change in CCS Storage:		**-2.89**	**-89.62**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

Table 5.4-45. Salt Balance for May 2012

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	3.99	123.80
	E. Seepage	66.83	2071.87
	N. Seepage	3.32	103.06
	S. Seepage	36.12	1119.86
	Bot Seepage	476.73	14778.51
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	56.61	1755.02
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**643.62**	**19952.13**
Out of CCS	W. Seepage	0.00	0.00
	E. Seepage	-2630.79	-81554.38
	N. Seepage	-0.18	-5.65
	S. Seepage	-0.18	-5.72
	Bot Seepage	-4991.24	-154728.51
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-7622.40**	**-236294.26**
Modeled Change in CCS Storage:		**-6978.78**	**-216342.13**
Observed Change in CCS Storage:		**-4664.11**	**-144587.53**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.

Table 5.4-46. Water Balance for June 2012

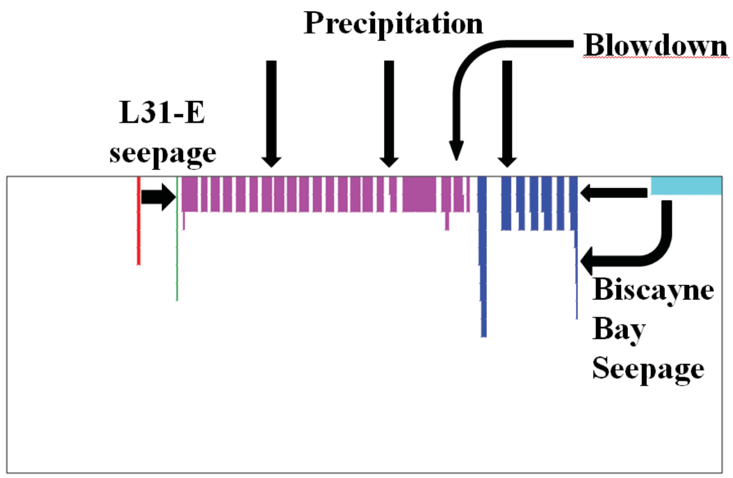
Water Balance Component		Flow (MGD)	Volume (gal x 10^6)
Into CCS	W. Seepage	0.31	9.37
	E. Seepage	1.49	44.65
	N. Seepage	0.01	0.29
	S. Seepage	0.50	14.87
	Bot Seepage	3.52	105.45
	Precipitation and Runoff	31.83	954.85
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.19	5.80
	Unit 5 Blowdown	1.03	30.98
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**38.88**	**1166.26**
Out of CCS	W. Seepage	0.00	-0.03
	E. Seepage	-4.30	-129.06
	N. Seepage	0.00	-0.01
	S. Seepage	0.00	0.00
	Bot Seepage	-8.70	-261.14
	Precipitation and Runoff	0.00	0.00
	Evaporation	-28.76	-862.90
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-41.77**	**-1253.15**
Modeled Change in CCS Storage:		**-2.90**	**-86.88**
Observed Change in CCS Storage:		**-3.50**	**-105.04**

Key: CCS = Cooling Canal System. gal = Gallons. ID = Interceptor Ditch. MGD = Millions of gallons per day.

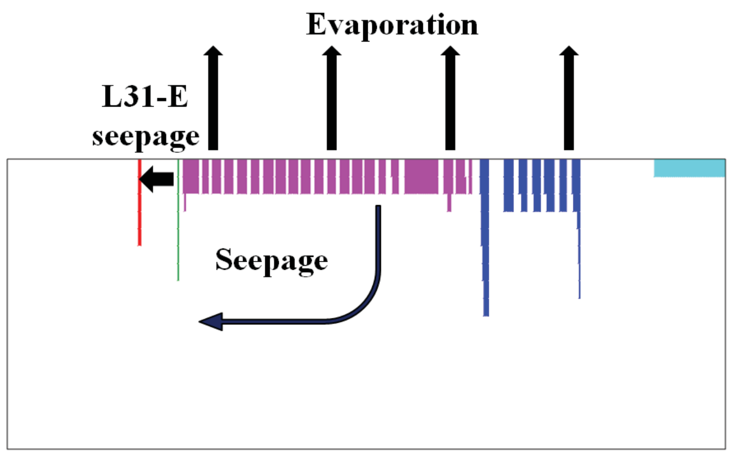
Table 5.4-47. Salt Balance for June 2012

Water Balance Component		lb/day (x1000)	Mass (lb x 1000)
Into CCS	W. Seepage	0.97	29.03
	E. Seepage	326.55	9796.41
	N. Seepage	2.25	67.36
	S. Seepage	69.92	2097.49
	Bot Seepage	1092.63	32778.88
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	60.32	1809.60
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total In:	**1552.63**	**46578.77**
Out of CCS	W. Seepage	-17.56	-526.71
	E. Seepage	-1746.75	-52402.41
	N. Seepage	-0.17	-5.02
	S. Seepage	0.00	0.00
	Bot Seepage	-3478.73	-104361.78
	Precipitation and Runoff	0.00	0.00
	Evaporation	0.00	0.00
	Unit 3, 4 Added Water	0.00	0.00
	Unit 5 Blowdown	0.00	0.00
	ID Pumping	0.00	0.00
	Plant Outflow	Equal to Intake	
	Plant Intake	Equal to Outflow	
	Total Out:	**-5243.20**	**-157295.92**
Modeled Change in CCS Storage:		**-3690.57**	**-110717.15**
Observed Change in CCS Storage:		**-2740.38**	**-82211.41**

Key: CCS = Cooling Canal System. ID = Interceptor Ditch. lb = Pound.



(A)



(B)

Figure 5.4-1. Flow (A) Into and (B) Out of the Proposed Control Volume, Shown in Cross-Section.

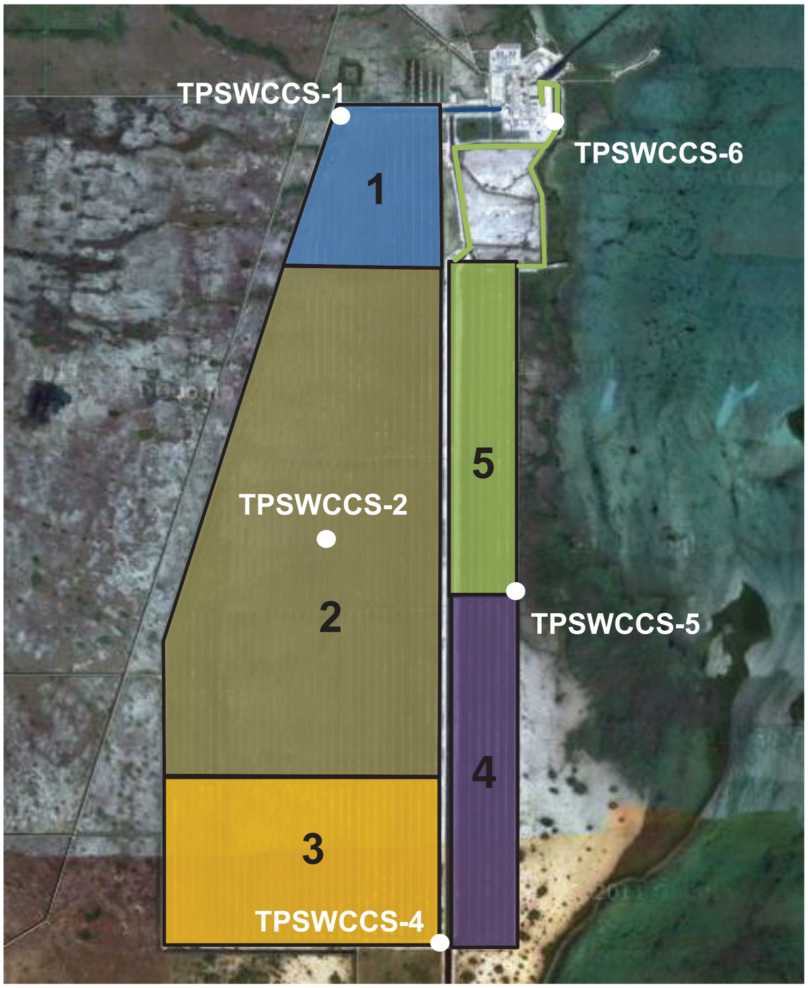


Figure 5.4-2. Locations of the Five Zones Where the Time-Varying Surface Areas and Storage Volumes are Known.

Figure 5.4-3. Locations of L-31E and ID Monitoring Stations; Conceptualized Seepage from L-31E into the ID is Shown.

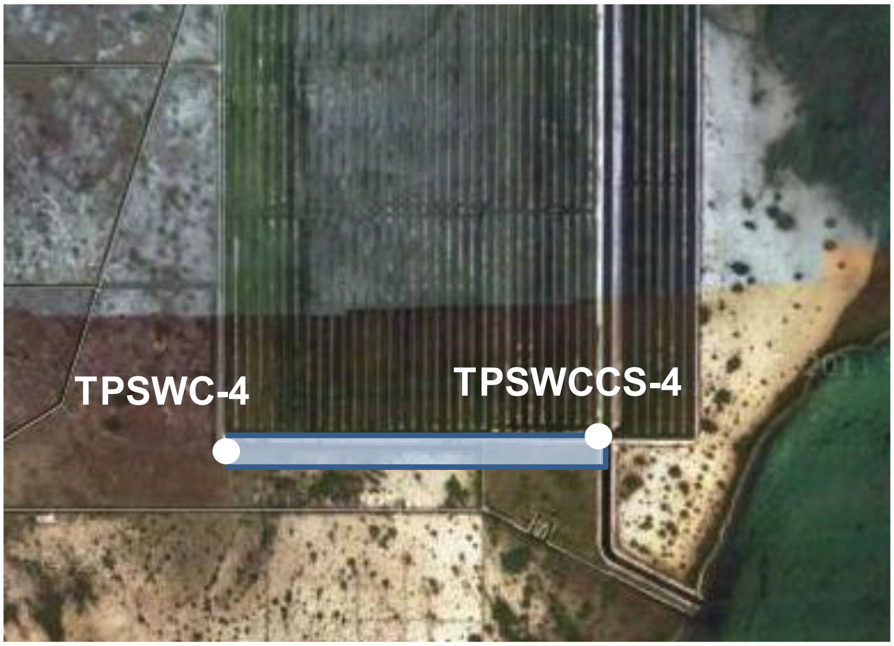


Figure 5.4-4. Locations of TPSWCCS-4 and TPSWC-4 Monitoring Stations; Conceptualized Seepage from Southern Collector Canal into the CCS is Shown.

Figure 5.4-5. Locations of TPSWCCS-5, TPSWCCS-6 and TPBBSW-3 Monitoring Stations; Conceptualized Seepage from Biscayne Bay into the CCS is Shown.

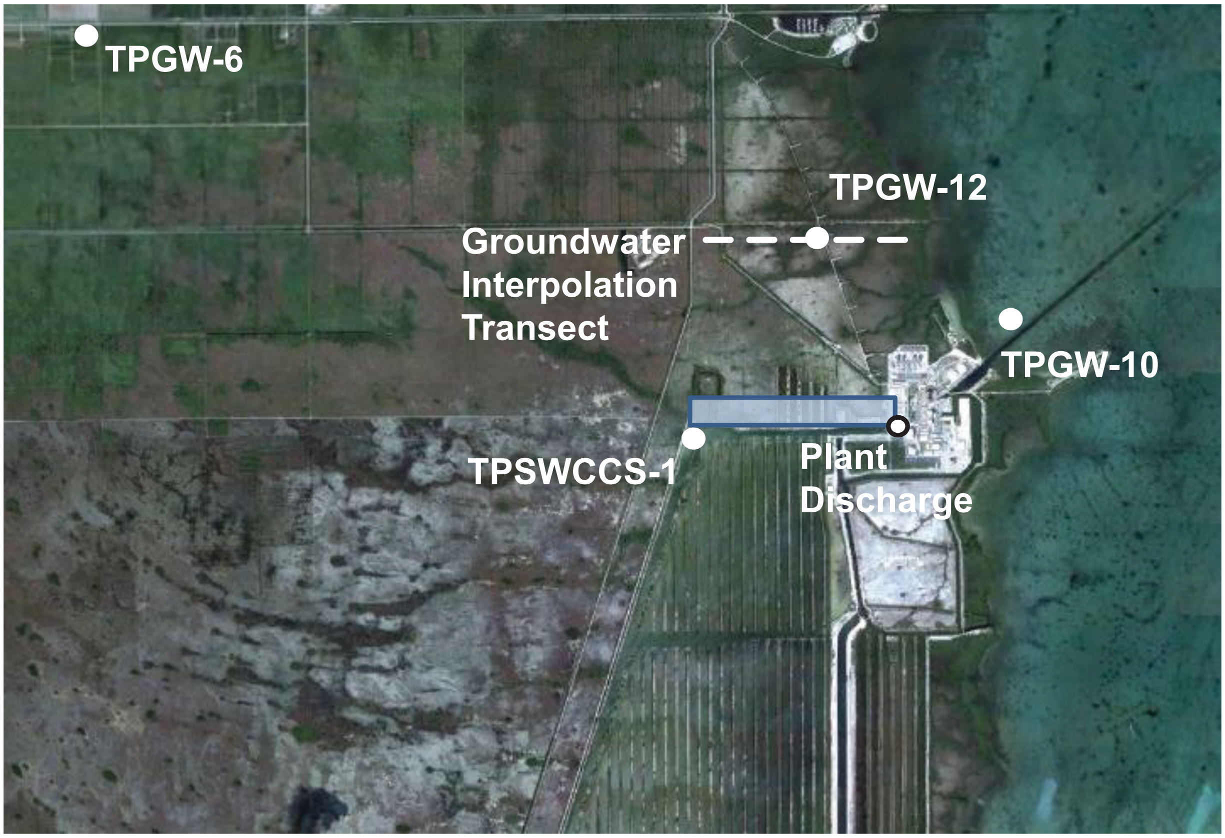


Figure 5.4-6. Locations of TPGW-6, TPGW-10, and TPGW-12 Shallow Groundwater Monitoring Stations, TPSWCCS-1 Surface Water Monitoring Station, and TPFM-1 Plant Outflow Meter; Conceptualized Seepage from the CCS into the Shallow Groundwater is Shown.

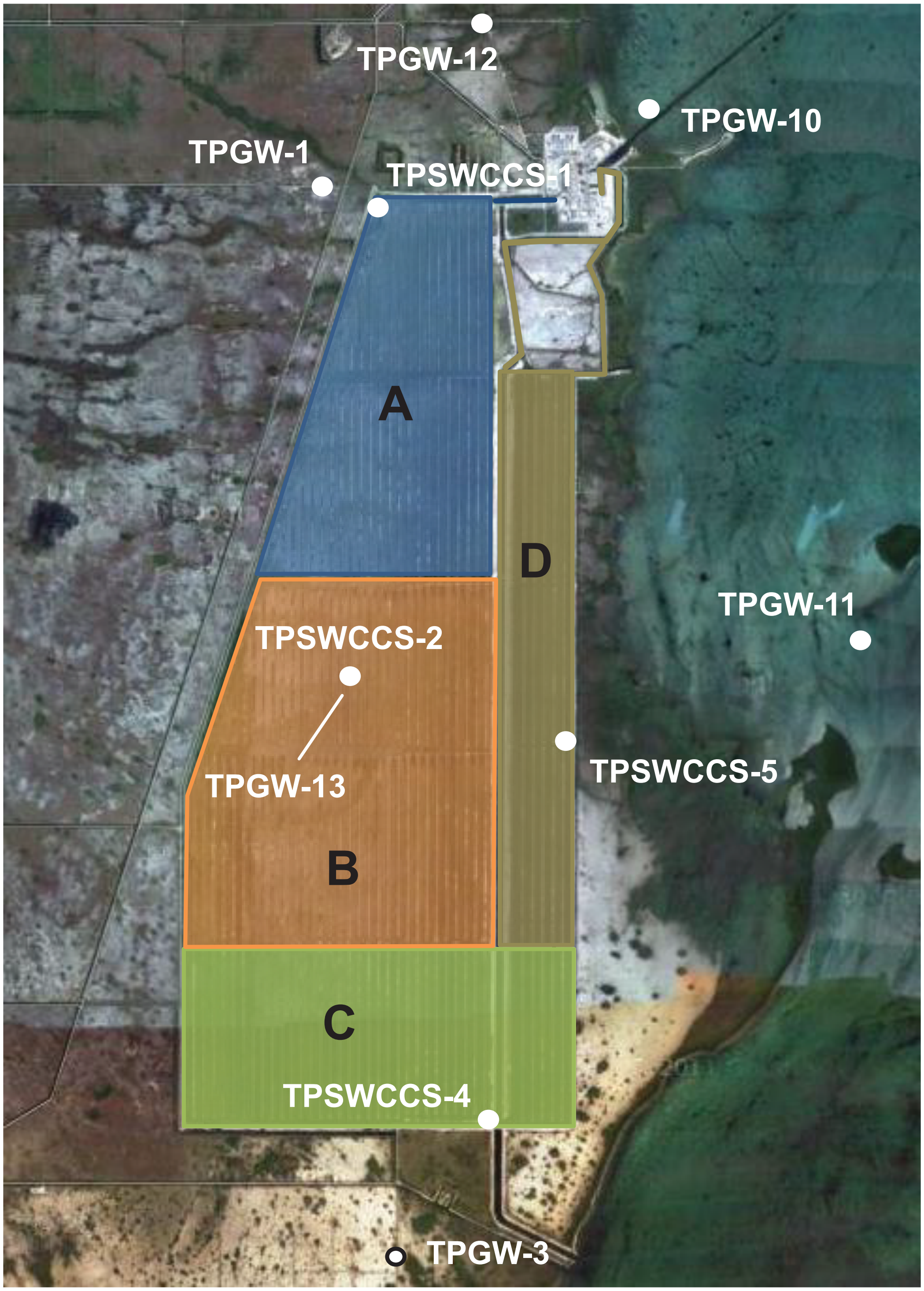


Figure 5.4-7. Locations of TPGW and TPSWCCS Monitoring Stations and Four Zones that Subdivide the Control Volume (Zone A Extends Eastward along the Northern Canal to Plant Outflow, Zone D Extends North to the Plant Intake).

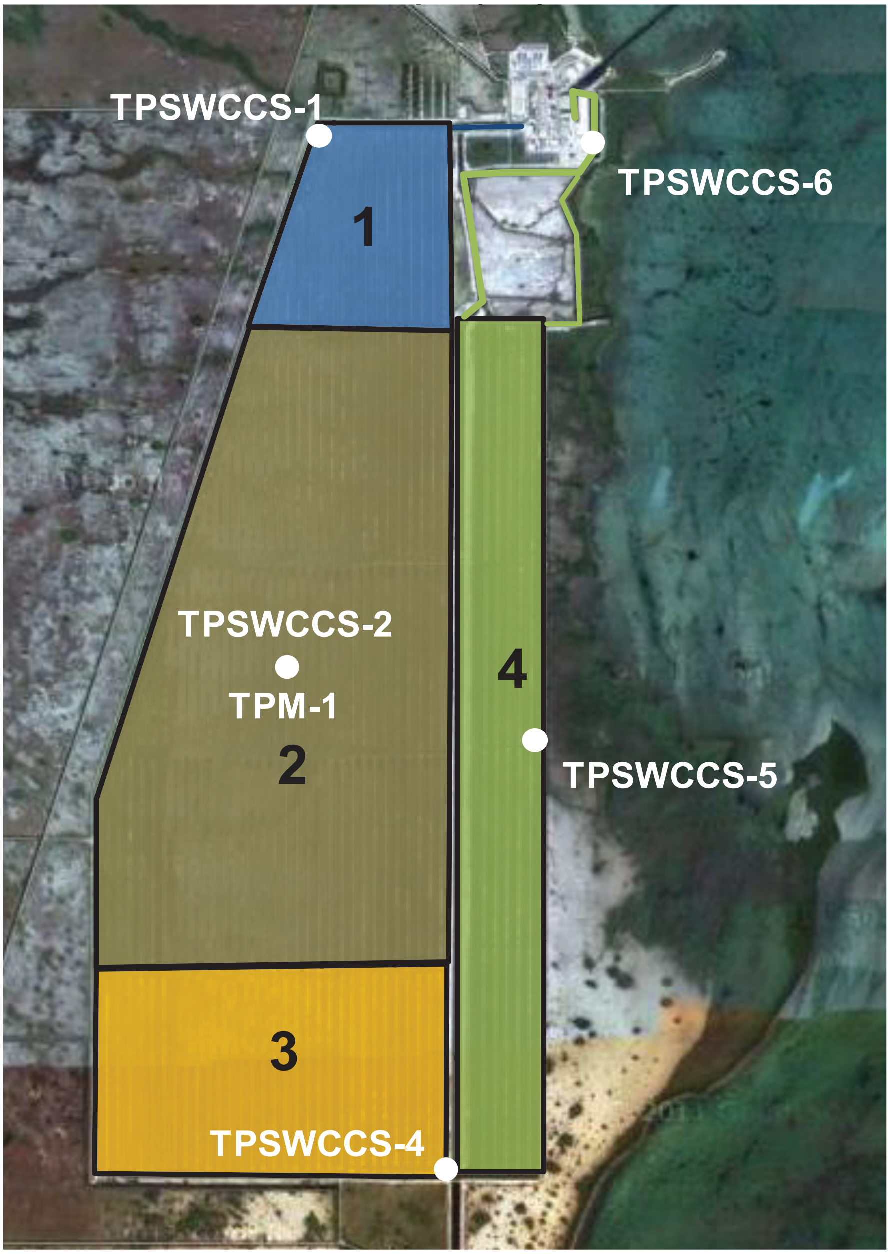


Figure 5.4-8. Locations of CCS Monitoring Stations, Meteorological Station TPM-1 and Four Zones that Subdivide the Control Volume (Zone 1 Extends Eastward along the Northern Canal to Plant Outflow, Zone 4 Extends North to the Plant Intake).

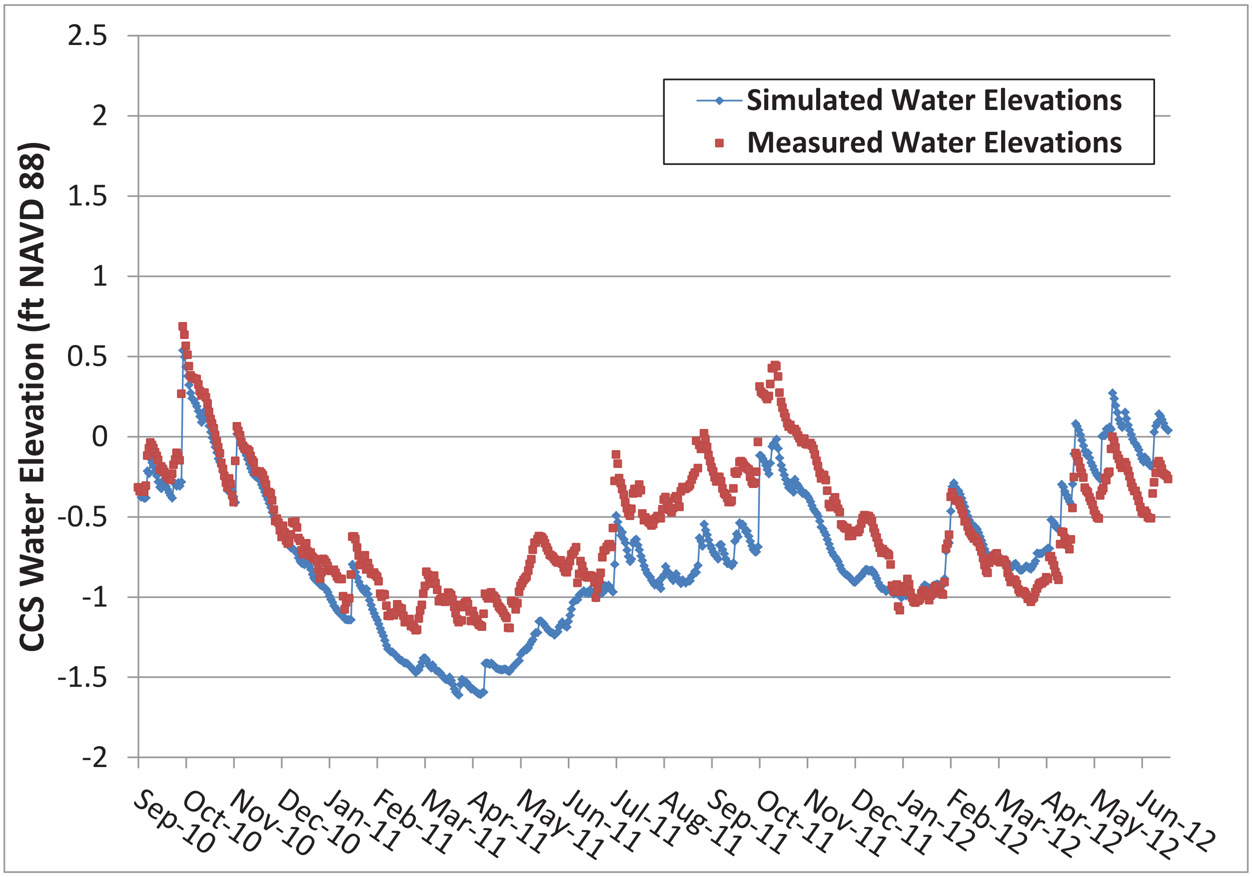


Figure 5.4-9. Modeled Versus Measured Water Elevations in the CCS over the 22-Month Period; Used to Validate the Conceptual Model and Calibrate the Water Balance Model to Temporal Trends in Water Elevation.

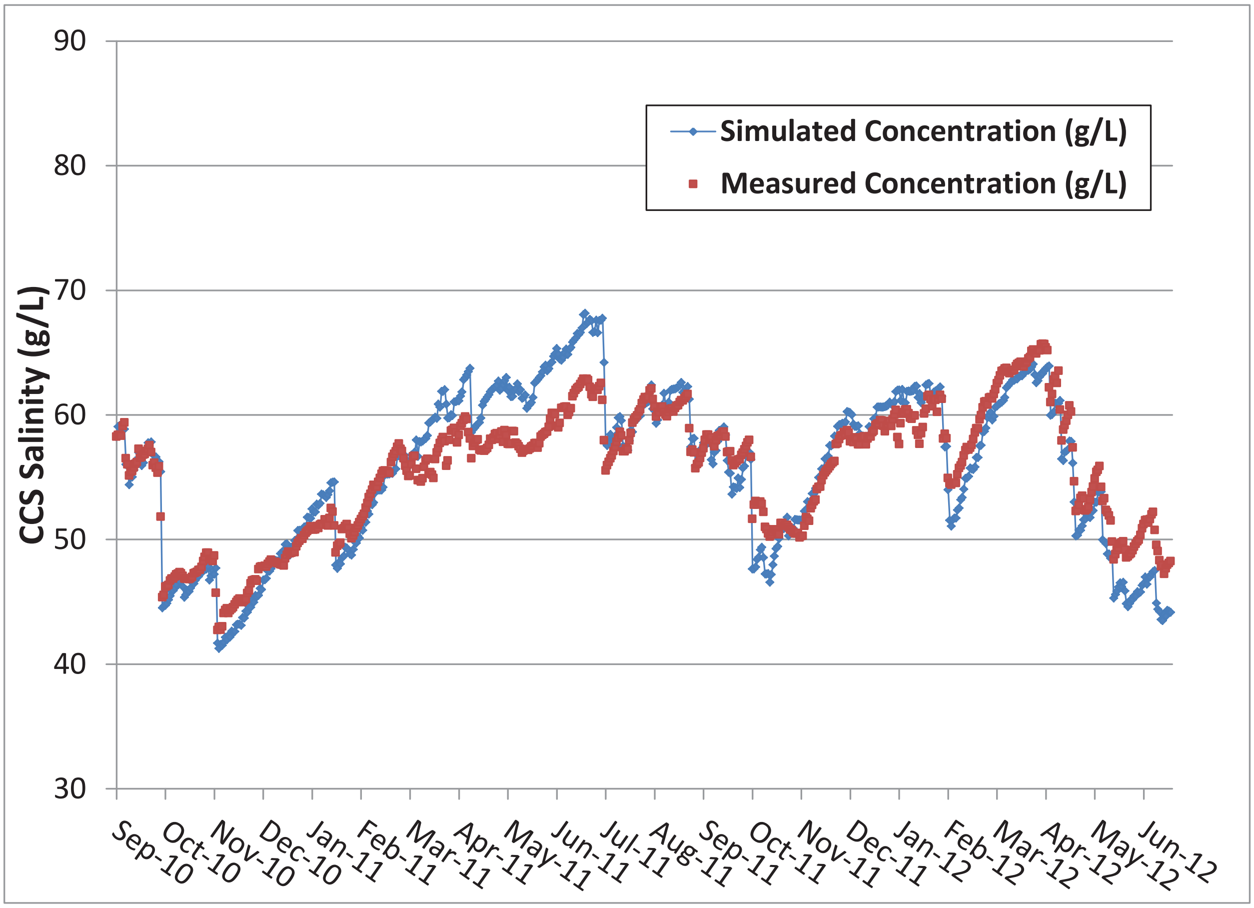


Figure 5.4-10. Modeled Versus Measured Salinities in the CCS over the 22-Month Period; Used to Validate the Conceptual Model and Calibrate the Salt Balance Model to Temporal Trends in Salinity.