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PTN COL 2.4-4    2.4.12    GROUNDWATER

This subsection contains a description of the hydrogeologic conditions present at and in the area around Units 6 & 7. Regional and site-specific data on the physical and hydrogeologic characteristics of the groundwater system and existing and potential use of groundwater is summarized.

2.4.12.1    Description and Onsite Use

This subsection contains a description of the regional and local physiography and geomorphology, groundwater aquifers, geologic formations, and groundwater sources and sinks. Onsite uses of groundwater are also described, including groundwater production wells and groundwater flow requirements for Units 6 & 7.

2.4.12.1.1    Physiography and Geomorphology

Units 6 & 7 are located in Miami-Dade County, Florida, approximately 25 miles south of Miami and approximately 9 miles southeast of Homestead. Units 6 & 7 are located in the Southern Slope sub-province of the Southern Zone of the Florida Platform (a partly submerged peninsula of the continental shelf) in the Atlantic Coastal Plain physiographic province as shown in [Figure 2.4.12-201](#). The plant property is bordered on the east by Biscayne Bay, on the west by the FPL Everglades Mitigation Bank, and on the northeast by Biscayne National Park. The Florida Platform is underlain by approximately 4000 to 15,000 feet of clastic deposits (quartz sands, silt, marl, and clay) and nonclastic deposits of carbonate sediments (shell beds, calcareous sandstone, limestone, dolostone, dolomite, and anhydrite). The sediments range in age from Paleozoic to Recent. A detailed description of the regional and site-specific geology, physiography, and geomorphology is provided in [Subsections 2.5.1.1](#) and [2.5.1.2](#).

The physiographic features near Units 6 & 7 are the Atlantic Coastal Ridge, the Everglades, and the Florida Keys. The geomorphology of Florida has been described in the literature ([References 201](#) and [202](#)) as having three zones: Northern, Central, and Southern. The Units 6 & 7 plant area is in the Southern Zone ([Figure 2.4.12-201](#)). The Units 6 & 7 plant area spans former coastal mangrove swamps and tidal flats along the west margin of Biscayne Bay that were altered to develop the existing units and cooling canals.

The 5900-acre industrial wastewater facility (approximately 2 miles wide and 5 miles long), of which 4370 acres is water (approximately 75 percent), is a predominant feature at the plant property ([Subsection 2.4.12.1.5.3](#)).

The surficial geology of the Units 6 & 7 plant area consisted primarily of organic muck. The organic muck is described as either light gray-dark gray to pale brown with trace amounts of shell fragments and little to no reaction to hydrochloric acid and/or black to brown with organic fibers and strong reaction to hydrochloric acid. The thickness of the muck across the plant area typically varied from 2 to 7 feet, with an average of 3.4 feet (Reference 248). The underlying Miami Limestone is a marine carbonate consisting predominately of oolitic facies of white to gray limestone with fossils (mollusks, bryozoans, and corals).

#### 2.4.12.1.2 Regional Groundwater Aquifers

The hydrostratigraphic framework of Florida consists of a thick sequence of Cenozoic sediments that comprise three major aquifers: (1) the surficial aquifer system, (2) intermediate aquifer system/confining unit, and (3) the Floridan aquifer system (Reference 204). The hydrologic parameters and lithologies of each aquifer system vary widely across the state. A generalized hydrostratigraphic column is presented in Figure 2.4.12-202.

##### 2.4.12.1.2.1 Surficial Aquifer System

The surficial aquifer system is defined by the Southeastern Geological Society Ad Hoc Committee (Reference 204) as the permeable hydrologic unit contiguous with the land surface that is comprised principally of unconsolidated to poorly indurated, siliciclastic deposits. Rocks making up the surficial aquifer system belong to all or part of the Upper Miocene to Holocene Series, consisting mainly of quartz sands, shell beds, and carbonates. In southern Florida, the surficial aquifer system consists of the Tamiami, Caloosahatchee, Fort Thompson, and Anastasia Formations, the Key Largo and Miami Limestones, and the undifferentiated sediments (Reference 204).

The surficial aquifer is under primarily unconfined conditions, although beds of low permeability may cause semi-confined or locally confined conditions to prevail in its deeper parts. The lower limit of the surficial aquifer system coincides with the top of the laterally extensive and vertically persistent beds of much lower permeability. The primary aquifer in the surficial aquifer system in southeastern Florida to which a name has been applied is the Biscayne aquifer, which immediately underlies the plant area. The thickness of the surficial aquifer ranges from approximately 20 to 400 feet (Figure 2.4.12-202).

The Biscayne aquifer has been declared a sole-source aquifer by the EPA. The EPA defines a sole-source aquifer as “an underground water source that supplies



at least 50 percent of the drinking water in the area overlying the aquifer. These areas have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend on the aquifer for drinking water.”

Figure 2.4.12-203 (Reference 205) shows the locations of sole-source aquifers in EPA Region 4, which encompasses the Units 6 & 7 plant area. The figure also contains a description of the Biscayne sole-source aquifer. The Biscayne aquifer in the area of Units 6 & 7 contains saline to saltwater and is not useable as a potable water supply.

#### 2.4.12.1.2.2 Intermediate Aquifer System/Confining Unit

Regionally, a sequence of relatively low-permeability, largely clayey deposits up to 900 feet thick form a confining unit that separates the Biscayne aquifer from the underlying, fresh to saline water Floridan aquifer system. The confining unit also contains transmissive units that can locally act as an aquifer.

The Southeastern Geological Society (Reference 204) defines the intermediate aquifer system/confining unit as all rocks that lie between and collectively retard the exchange of water between the overlying surficial aquifer system and the underlying Floridan aquifer system. In general, the rocks of this system consist of fine-grained siliciclastic deposits interlayered with carbonate strata of Miocene or younger age. In areas where poorly yielding to non-water yielding units occur, the term intermediate confining unit is used. In areas where low to moderate yielding units are interlayered with relatively impermeable confining beds, the term intermediate aquifer system applies. The aquifer's units in this system contain water under confined conditions. The top of the intermediate aquifer system/confining unit coincides with the base of the surficial aquifer system. The base of the intermediate aquifer, or confining unit, is at the top of the vertically persistent, permeable, carbonate section that comprises the Floridan aquifer system. The sediments comprising the intermediate aquifer system/confining unit are widely variable across the state. In the southern part of the state, the Hawthorn Group sediments form both an intermediate confining unit and an intermediate aquifer system. The Hawthorn Group sediments are up to approximately 900 feet thick in southern Florida (Figure 2.4.12-202) (Reference 206). In many areas of the state, permeable carbonates occurring at the base of the Hawthorn Group may be hydraulically connected to the Floridan aquifer system and locally form the top of the Upper Floridan aquifer. The intermediate confining unit provides an effective aquiclude for the Floridan aquifer system throughout the state.

#### 2.4.12.1.2.3 Floridan Aquifer System

The Floridan aquifer system underlies approximately 100,000 square miles in southern Alabama, southeastern Georgia, southern South Carolina, and all of Florida. Potable water is not present everywhere in the aquifer. As defined by Miller ([Reference 207](#)), the Floridan aquifer system is a vertically continuous sequence of interbedded carbonate rocks of Tertiary age that are hydraulically interconnected by varying degrees and with permeabilities several orders of magnitude greater than the hydrogeologic systems above and below. The system may occur as a continuous series of vertically connected carbonate sediments or may be separated by subregional to regional confining beds ([Reference 207](#)). The Floridan aquifer formally consists of three primary hydrogeologic units: the Upper Floridan aquifer, the middle confining unit, and the Lower Floridan aquifer ([Figure 2.4.12-202](#)). Porosity and permeability in the aquifer units vary widely depending on location and formation.

In southern Florida, the Floridan aquifer system is composed of all or parts of the Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, Ocala Limestone, Suwannee Limestone and, possibly, the basal carbonates of the Hawthorn Group in limited areas.

In peninsular Florida, the top of the Floridan aquifer system ranges in elevation from approximately 0 feet National Geodetic Vertical Datum of 1929 (NGVD 29) to more than –1100 feet NGVD 29 with thicknesses ranging from approximately 2300 feet to more than 3400 feet in southern Florida ([Reference 207](#)). Throughout most of southern Florida, the Floridan aquifer system occurs under confined conditions.

#### 2.4.12.1.3 Local Hydrogeology

Two major regional aquifers underlie the area, including all of Miami-Dade County and the Units 6 & 7 plant area: (1) the surficial aquifer system, including the Biscayne aquifer, and (2) the Floridan aquifer system consisting of the Upper Floridan aquifer, the middle confining unit, and the Lower Floridan aquifer. A generalized regional hydrostratigraphic column is presented in [Figure 2.4.12-202](#). A site-specific hydrostratigraphic column, developed from hydrogeologic data obtained from borings drilled up to a maximum depth of approximately 615 feet bgs as part of the Units 6 & 7 geotechnical investigation, ([Reference 248](#)) is presented in [Figure 2.4.12-204](#).

The Biscayne aquifer, as shown in [Figure 2.4.12-205](#), extends from near surface to a depth of approximately 240 feet near Fort Lauderdale and approximately 80 to 115 feet locally ([Figure 2.4.12-206](#)). The Upper Floridan aquifer extends from approximately 1000 to 1200 feet bgs. The middle confining unit extends from approximately 1200 to 2400 feet bgs. The Lower Floridan aquifer extends from approximately 2400 feet bgs to an undetermined depth thought to be greater than 4000 feet bgs in the Miami-Dade County area ([Reference 206](#)). The Boulder Zone in the Lower Floridan aquifer extends from approximately 2800 to greater than 3000 feet bgs at the MDWASD South District Wastewater Treatment Plant ([Reference 208](#)), which is located approximately 9 miles north of Units 6 & 7.

#### 2.4.12.1.3.1 Surficial (Biscayne) Aquifer

The surficial aquifer system comprises all the rocks and sediments from the land surface downward to the top of the intermediate confining unit. These lithologic materials consist primarily of limestones and sandstones with sands, shells, and clayey sand with minor clays and silts. The base of the system is defined by a significant change in hydraulic conductivity. Sedimentary bedrock and unconsolidated sediments in the surficial aquifer system have a wide range of hydraulic properties and locally may be divided into one or more aquifers separated by less permeable or semi-confining units. Within the surficial aquifer system, the major water producing unit is the unconfined Biscayne aquifer that underlies the Units 6 & 7 plant area and most of Miami-Dade County and parts of Broward, Monroe, and Palm Beach counties, as shown in [Figure 2.4.12-205](#). The aquifer contains carbonate rocks, sandstones, and sands extending from an elevation –10 feet NGVD 29 in southern Miami-Dade County and deepening northward to more than –240 feet NGVD 29 in southeastern Palm Beach County and eastern Broward County ([Figure 2.4.12-206](#)). The surficial aquifer system formations include, from oldest to youngest (bottom to top): the Tamiami Formation, Caloosahatchee Formation, Fort Thompson Formation, Anastasia Formation, Key Largo Limestone, Miami Limestone, and Pamlico Sand ([Reference 209](#)). However, the entire sequence of units is not present in any one place. At Units 6 & 7, the formations in the Biscayne aquifer include the limestones of the Miami Limestone, Key Largo Limestone, and Fort Thompson Formation ([Figure 2.4.12-204](#)). The Fort Thompson Formation and Key Largo Limestone (interpreted as the Upper Fort Thompson Formation elsewhere) are the major water producing formations in the Biscayne aquifer ([Reference 210](#)). Site-specific boring data indicate that the maximum thickness of the Biscayne aquifer is approximately 115 feet at Units 6 & 7 ([Reference 248](#)).

The water table occurs primarily within the organic soils (muck) or the Miami Limestone and fluctuates in response to variations in tide levels, water levels in the adjacent canals, recharge, natural discharge, and well withdrawal/injection. The aquifer extends beneath Biscayne Bay and the Atlantic Ocean, and because of the aquifer's high permeability and in response to the lowering of inland groundwater levels as a result of pumpage, saltwater has migrated inland along the base of the aquifer and affects the entire coastal zone. Saltwater moves inland and upward in response to low groundwater levels and moves seaward and downward in response to high groundwater levels (Reference 211).

Biscayne aquifer groundwater use in the immediate vicinity of Units 6 & 7 has been limited as a result of its saline to saltwater composition. Figure 2.4.12-207 (Reference 212) shows the approximate location of the freshwater-saltwater interface in the area. The figure indicates that the saltwater interface at the base of the aquifer is approximately 6 to 8 miles inland of Units 6 & 7. Provisional data from the USGS (Reference 203) showing the 2008 freshwater-saltwater in southeast Florida indicates a similar pattern to that shown in Figure 2.4.12-207.

#### 2.4.12.1.3.2 Intermediate Confining Unit

The intermediate confining unit (upper confining unit for the Upper Floridan aquifer) extends from the base of the surficial aquifer system to the top of the Floridan aquifer system and is characterized by the complex interbedded lithologies of the Hawthorn Group. These lithologies consist primarily of silty clay, calcareous sands, silts, calcareous wackestones, limestones, sandstones, and sands, and obtain a thickness of approximately 600 to 1050 feet at Turkey Point (Reference 217). The top of the Hawthorn Group occurs at approximately –100 to –200 feet MSL in the vicinity of the site. The unit is not exposed at the land surface and is recharged primarily by downward leakage from the overlying surficial aquifer or upward leakage from the Upper Floridan aquifer. Sand beds and limestone lenses comprise the permeable parts of the system, however, the overall hydraulic conductivity of the group is very low and provides good confinement for the underlying Floridan aquifer system.

#### 2.4.12.1.3.3 Floridan Aquifer System

The Floridan aquifer system underlies Units 6 & 7 and all of Florida. The system formally consists of three primary hydrogeologic units: the Upper Floridan aquifer, the middle confining unit, and the Lower Floridan aquifer (Figure 2.4.12-202). In the Miami-Dade County area, the top of the Floridan aquifer system is found at a depth of approximately 900 feet bgs, is approximately 3000 feet thick, and is

directly overlain by the intermediate confining unit. The Floridan aquifer system forms the deepest part of the active groundwater flow system in southeastern Florida ([References 204 and 217](#)).

#### **Floridan Aquifer System: Upper Floridan Aquifer**

The topmost hydrogeologic unit of the Floridan aquifer system is the Upper Floridan aquifer. This unit is overlain by the surficial aquifer system and the intermediate confining unit, of which the latter acts as a confining layer to the Upper Floridan aquifer ([Reference 213](#)). The Upper Floridan aquifer consists of several thin water-bearing zones of high permeability interlayered with thick zones of low permeability. The hydrogeology of the Upper Floridan aquifer varies throughout Florida. In southeastern Florida, the aquifer has been interpreted to include a thinner Suwannee Limestone and extends down into the Avon Park Formation. Confinement is typically better between flow zones in southwestern Florida than in southeastern Florida ([Reference 206](#)). In southeastern Florida, the Upper Floridan aquifer ranges from 100 to greater than 400 feet in thickness as shown in [Figure 2.4.12-208](#). In the vicinity of the Turkey Point plant property area, the Upper Floridan aquifer is approximately 200 feet thick.

Although the Upper Floridan aquifer is a major source of potable groundwater in much of Florida, water withdrawn from the unit in southeastern Florida, including Miami-Dade County, is brackish and variable in quality.

#### **Floridan Aquifer System: Middle Confining Unit**

The middle confining unit of the Floridan aquifer system underlies the Upper Floridan aquifer, separating it from the Lower Floridan aquifer. In many places, the middle confining unit is divided into upper and lower units separated by the Avon Park permeable zone. The middle confining unit contains beds of micritic limestone (wackestone to mudstone), dolomitic limestone, and dolomite (dolostone) that are distinctly less permeable than the strata of the Upper Floridan aquifer and Lower Floridan aquifer. The elevation of the top of the middle confining unit is approximately –1200 feet NGVD 29 and the thickness is greater than 1000 feet in the vicinity of the Turkey Point plant property ([Reference 206](#)).

#### **Floridan Aquifer System: Lower Floridan Aquifer**

The Lower Floridan aquifer in southern Florida consists of a thick sequence of low permeability rocks separated by relatively thin permeable zones ([Reference 207](#)). The aquifer underlies the middle confining unit and extends from a depth of approximately 2400 feet bgs to a depth that is undetermined, but thought to be

greater than 4000 feet bgs in the Miami-Dade County area. The Lower Floridan aquifer includes the lower part of the Avon Park Formation, the Oldsmar Limestone, and the upper part of the Cedar Keys Formation. The base of the Lower Floridan aquifer (or the base of the Floridan aquifer system) is marked by impermeable, massive anhydrite beds of the Cedar Keys Formation ([Reference 207](#)).

A highly permeable zone in the Lower Floridan aquifer (known as the Boulder Zone) occurs in southern Florida. The Boulder Zone contains saltwater and has been permitted by FDEP as a discharge zone for treated sewage and other wastes disposed of through injection wells in South Florida.

In southern Florida, the Lower Floridan aquifer contains thick confining units above the Boulder Zone. These confining units are similar in lithology to the middle confining unit of the Floridan aquifer system ([Reference 217](#)). The base of the Lower Floridan aquifer is below the base of the Boulder Zone, with the lower section consisting of permeable dolomites or dolomitic limestones of the Cedar Keys Formation ([References 215 and 217](#)).

#### 2.4.12.1.4 Site-Specific Hydrogeology

A subsurface investigation was conducted in the Units 6 & 7 plant area between February and June 2008 to evaluate soil, bedrock, and groundwater conditions at depths of up to a maximum of approximately 615 feet bgs. Subsurface data were collected from 94 geotechnical borings, 4 cone penetrometer tests, 2 test pits, 22 groundwater observation wells, and 2 surface water stations. A detailed description of the geotechnical investigation, including the locations of the borings, test pits, and cone penetrometer tests, and the resulting boring logs, laboratory test results, etc. is provided in [Reference 248](#).

Twenty groundwater observation wells, two deep geotechnical piezometers, and the two surface water monitoring stations were installed in the Units 6 & 7 plant area as follows:

- Ten observation well pairs (or 20 individual observation wells) installed across the Units 6 & 7 plant area. These wells were completed to depths ranging from 24 to 110 feet bgs and were installed in the Miami Limestone/Key Largo Limestone and the Fort Thompson Formation.
- Two deep geotechnical piezometers, one at each reactor site, installed to a depth of approximately 135 feet bgs. These two piezometers were installed to

measure pore pressure in the Tamiami Formation and were not part of the groundwater level monitoring network.

- Two surface water monitoring stations (SW-1 and SW-2) installed in the cooling canals surrounding the Units 6 & 7 plant area. The pressure transducers were set several feet below the water level in the cooling canals to allow monitoring of surface water level variations.

Groundwater levels have been collected hourly since the transducers were installed in June 2008.

Figure 2.4.12-209 shows the locations of the 20 observation wells, 2 geotechnical piezometers, and 2 surface water stations in the Units 6 & 7 plant area.

Table 2.4.12-201 presents construction information for the wells. The observation wells are named in three series that represent the location and screened intervals of the wells:

- OW-600 series wells and geotechnical piezometer are located in the Unit 6 power block area and include “U,” “L,” and “D” suffix wells monitoring the Key Largo Limestone, the Fort Thompson Formation, and the upper Tamiami Formation, respectively.
- OW-700 series wells and geotechnical piezometer are located in the Unit 7 power block area and include “U,” “L,” and “D” suffix wells monitoring the Key Largo Limestone, the Fort Thompson Formation, and the upper Tamiami Formation, respectively.
- OW-800 series wells are located outside the power block areas and include “U” and “L” suffix wells that monitor the Key Largo Limestone and the Fort Thompson Formation, respectively.

The boring logs, core photographs, and soil testing data are included in Reference 248, and addressed in Subsection 2.5.4.

A supplemental investigation program was conducted between January and March 2009 to perform aquifer pumping tests at the Units 6 & 7 plant area. This supplemental investigation was performed to determine aquifer properties for construction dewatering evaluation, groundwater modeling, analyses of postulated accidental releases of radioactive liquids, and to support simulation of radial collector well operation. The program consisted of four test wells and fifty temporary pumping test observation wells installed for the purpose of conducting



aquifer pumping tests. Two test wells were located at each reactor site, with one well completed as an open-hole to test the upper Biscayne aquifer (Key Largo Limestone) and one well completed as an open-hole to test the lower Biscayne aquifer (Fort Thompson Formation). The observation wells at each reactor site consisted of five well clusters containing five temporary wells each, installed in the following test zones:

- Upper aquitard (Miami Limestone)
- Upper Biscayne aquifer test zone (Key Largo Limestone)
- Middle aquitard (freshwater limestone unit)
- Lower Biscayne aquifer test zone (Fort Thompson Formation)
- Lower aquitard (Upper Tamiami Formation)

Descriptions and locations of the aquifer pumping test wells and temporary observation wells are presented in [Subsection 2.4.12.2.4.1](#). Explanation as to the classification of aquitards and aquifers is also provided in this subsection.

Groundwater level and surface water level measurements commenced in the 20 observation wells and 2 surface water stations in June 2008. Groundwater level measurements were made using In-Situ Incorporated Level Troll<sup>®</sup> model 500 and Aqua Troll<sup>®</sup> model 200 recording pressure transducers. The model 500 Level Troll measured groundwater level and temperature and the model 200 Aqua Troll measured groundwater level, temperature, and specific conductance. The pressure transducers were networked together for remote reading using a Troll Link telemetry system ([Reference 218](#)).

The results of the geotechnical investigation pertaining to the hydrogeology of the Units 6 & 7 plant area and the supplemental groundwater investigation are described in detail in [Subsections 2.4.12.2.2](#) through [2.4.12.2.5](#).

#### 2.4.12.1.5 Groundwater Sources and Sinks

This subsection describes the regional, local, and site-specific discharge and recharge areas, mechanisms, and characteristics of the different aquifer units.

##### 2.4.12.1.5.1 Groundwater Discharge

Natural discharge of groundwater in the Biscayne aquifer is by seepage into streams, canals, or the ocean, by evaporation, and by transpiration by plants.



Induced discharge is through wells pumped for municipal, industrial, domestic, and agricultural supplies. Evapotranspiration, transpiration, and groundwater discharge are greatest during the wet season when water levels, temperature, and plant growth rates are high. Pumpage of groundwater constitutes a part of the total discharge from the aquifer. The effect of pumpage is amplified because it is greatest during the dry season when recharge and aquifer storage are least. Most of the water that circulates in the surficial aquifer system is discharged by canals (Reference 209). There is very little direct run-off of precipitation; however, regional discharge of the surficial aquifer into drainage canals and directly into Biscayne Bay is estimated to be approximately 15 to 25 inches per year (Reference 219). It is estimated that 20 inches of the approximately 60 inches of annual rainfall in Miami-Dade County are lost directly by evaporation, approximately 20 inches are lost by evapotranspiration after infiltration, 16 to 18 inches are discharged by canals and by coastal seepage, and the remainder are used by humans (References 215 and 219). Nearly 50 percent of the rainfall that infiltrates the Biscayne aquifer is discharged to the ocean, a reflection of the high degree of connection between the aquifer and the canals (Reference 211).

#### 2.4.12.1.5.2 Groundwater Recharge

There are several mechanisms affecting recharge of the surficial/Biscayne aquifer in Miami-Dade County including: (1) infiltration of rainfall or irrigation water through surface materials to the water table; (2) infiltration of surface water imported by run-off from the north in the water conservation areas or by canals; (3) infiltration of urban run-off by way of drains, wells, or ponds; and (4) groundwater inflow from southwestern Broward County (Reference 209).

Recharge by rainfall is greatest during the wet season, from June to November, and recharge by canal seepage is greatest during the dry season, from December to May. The average annual rainfall in Miami-Dade County is approximately 60 inches, of which approximately 38 inches are recharge to the aquifer and 22 inches are lost to evapotranspiration (Reference 219). Recharge occurs over most of Miami-Dade County during rainstorms. The low coastal groundwater levels and the low, but continuous, seaward gradient indicate a very high transmissivity in the aquifer, a high degree of interconnection between the aquifer and the drainage canals, and the effectiveness of the present drainage canals in rapidly dispersing floodwaters (Reference 209).

Recharge to the Floridan aquifer system is directly related to the confinement of the system. The highest recharge rates occur where the Floridan aquifer is unconfined or poorly confined, which occurs in areas where the system is at or

near land surface or where the confining layers are breached by karst or other structural features. The Floridan aquifer system is confined, with upward vertical gradients in the vicinity of the Turkey Point plant property.

#### 2.4.12.1.5.3 Interaction of Cooling Canals With Groundwater

Units 1-4 use the 5900-acre industrial wastewater facility for condenser cooling (Figure 2.4.12-210). The canals are shallow, approximately 3 feet deep, with the exception of the grand canal (main return canal), north discharge canal, south collector canal, and the east return canal, all of which are approximately 18 feet deep. The canals convey warm water south from Units 1 through 5 and return cooled water for Units 1 through 4. The canals do not directly discharge to fresh or marine surface waters; however, because the canals are not lined, water in the canals does interact with groundwater in the unconfined Biscayne aquifer, which immediately underlies the bottom of the cooling canals. Makeup water to replace evaporative and seepage losses from the canals comes from plant process water, rainfall, stormwater run-off, and groundwater infiltration. There is a net inflow to the cooling canals from the saline Biscayne aquifer beneath the canals. The water in the canals has a salinity greater than that of seawater due to the effects of evaporation, with salinity concentrations approximately twice that of Biscayne Bay.

An interceptor ditch adjacent to the west side of the cooling canals and east of the L-31E Canal and levee was constructed at the same time as the cooling canals (Figure 2.4.12-210). The purpose of the interceptor ditch is to keep cooling canal water from influencing groundwater quality west of the canals in the upper portion of the aquifer. This is accomplished by the existence of a natural freshwater hydraulic gradient during the wet season and by pumping water as necessary from the interceptor ditch into the westernmost cooling canal (Canal 32) during the dry season when natural freshwater hydraulic gradients are low. Operation of the interceptor ditch prevents seepage from the cooling canals from moving landward toward the L-31E Canal and thereby helps to maintain existing groundwater quality in the Biscayne aquifer west of the interceptor ditch.

#### 2.4.12.1.6 Onsite Use of Groundwater

Units 1-4 use cooling water from a closed loop system that includes the canal network adjacent to Units 6 & 7. Cooling water for Unit 5 and process water for Units 1, 2, and 5 are obtained from Upper Floridan aquifer production wells. The water is obtained from the three production wells (PW-1, PW-3, and PW-4) shown in Figure 2.4.12-211. A description of these wells is presented in

**Subsection 2.4.12.2.** The Biscayne aquifer at Units 3 & 4 is used for the disposal of domestic wastewater. A single Class V, Group 3 gravity injection well is used to dispose of up to 35,000 gallons per day of domestic reclaimed water at the Units 3 & 4 sewage treatment plant. The well, designated IW-1, is open from 42 to 62 feet bgs and is 8 inches in diameter.

The primary source of makeup water for the circulating water cooling towers is reclaimed water supplied by the MDWASD South District Wastewater Treatment Plant as discussed in **Subsection 2.4.11.1.1**. When reclaimed water cannot supply the quantity and/or quality of water needed for the circulating water system, radial collector wells supplying saltwater are used to supplement the supply. The raw water system is designed to supply 100 percent of the makeup water from either reclaimed water or saltwater, or any combination of both. The ratio of water supplied by the two makeup water sources varies depending on the availability of reclaimed water from the MDWASD South District Wastewater Treatment Plant. The circulating water system is designed to accommodate the differing water quality of the two sources. Additional description of the radial collector wells is presented in **Subsection 2.4.12.2**.

#### 2.4.12.2 Groundwater Sources

This subsection contains a description of the present and projected regional groundwater use at and in the vicinity of Units 6 & 7. Specifically, the description contains information pertaining to existing users, historical groundwater levels, groundwater flow directions and hydraulic gradients, seasonal and long-term variations of groundwater levels, horizontal and vertical hydraulic conductivity and total and effective porosity of the geologic formations, reversibility of groundwater flow, the effects of water use on hydraulic gradients and groundwater levels beneath the site, and groundwater recharge areas. This information has been organized into five subcategories: (1) historical and projected groundwater use, (2) groundwater flow directions, (3) temporal groundwater trends, (4) aquifer properties, and (5) hydrogeochemical characteristics.

##### 2.4.12.2.1 Historical and Projected Groundwater Use

Historical, current, and projected groundwater use in the vicinity of Units 6 & 7 is evaluated in the following subsections using information from the USGS and the SFWMD.

#### 2.4.12.2.1.1 Historical Groundwater Use

Historical freshwater withdrawal of groundwater has been monitored for Miami-Dade County by the USGS ([References 221 and 222](#)). In the Miami-Dade County area, freshwater is restricted to the Biscayne aquifer. Groundwater use has shown a steady increase between the 1960s and the present as shown in [Figure 2.4.12-212](#). The primary groundwater use in the county is for public water supply, followed by agricultural irrigation. Beginning in approximately 1985, a new category of use was introduced—recreational irrigation. This category includes golf course irrigation and other types of turf grass irrigation. [Table 2.4.12-202](#) presents the groundwater use for each category.

The underlying Floridan aquifer typically contains saline water (greater than 250 milligrams per liter of chloride) or saltwater (greater than 19,000 milligrams per liter of chloride) as defined by the SFWMD ([Reference 223](#)). As a result, groundwater use from the Floridan aquifer is limited. In 1990 and 1995, no groundwater use was reported from the Floridan aquifer for Miami-Dade County ([References 224 and 225](#)). In 2000, a water use of 3.68 million gallons per day was reported for the county with a use category of industrial, which includes mining and power generation ([Reference 226](#)).

#### 2.4.12.2.1.2 Current Groundwater Use

[Figure 2.4.12-213](#) shows the current groundwater users in Miami-Dade County based on water use permits filed with the SFWMD ([Reference 227](#)). The figure does not show wells that do not require a water use permit, such as domestic wells, wells used exclusively for fire fighting, or those wells withdrawing saline or saltwater. [Table 2.4.12-203](#) lists the public water supply systems in Miami-Dade County along with the population served ([Reference 228](#)).

In addition to the traditional uses of groundwater, other uses of groundwater are present in South Florida. These include disposal of municipal and industrial wastewater in Class I injection wells and the use of aquifer storage and recovery wells. The aquifer storage and recovery wells are used to inject raw or partially treated water into the aquifer for later extraction and use. The water must meet drinking water standards before injection. [Figure 2.4.12-214](#) shows the typical configuration of Class I injection wells and aquifer storage and recovery wells in South Florida. Aquifer storage and recovery wells are typically completed as open-hole wells in the Upper Floridan aquifer. Class I injection wells are typically completed as open-hole wells in the Boulder Zone portion of the Lower Floridan aquifer, which is below the lowermost underground source of drinking water

(USDW). [Figure 2.4.12-215](#) and [2.4.12-216](#) show the locations of these wells in Florida ([Reference 229](#)).

Units 1-4 use cooling water from a closed loop system that includes the canal network adjacent to Units 6 & 7. Cooling water for Unit 5 and process water for Units 1, 2, and 5 are obtained from Upper Floridan aquifer production wells. [Figure 2.4.12-211](#) shows the locations of the Upper Floridan production wells. These wells (PW-1, PW-3, and PW-4) were commissioned in February 2007. [Figure 2.4.12-217](#) shows the monthly production from each of the wells. The average production of the wells is approximately 180 million gallons per month. Water supply for non-cooling water use at Units 3 & 4 comes from the potable water system of the MDWASD.

The Units 3 & 4 sewage treatment plant has a Biscayne aquifer injection well as described in [Subsection 2.4.12.1.6](#).

#### 2.4.12.2.1.3 Projected Groundwater Use

Projected groundwater use in Miami-Dade County was obtained from the *Lower East Coast Water Supply Plan*, 2005–2006 update ([Reference 230](#)).

[Figure 2.4.12-212](#) contains projections of groundwater use through 2025. The projections combine domestic and public water supply categories into one total value. The water use demand for power generation is expected to grow with the addition of seven planned power plants in the Lower East Coast Planning area.

The Unit 5 cooling water supply is from Upper Floridan aquifer production wells. The maximum pumping rate from the Upper Floridan aquifer is limited to a 90-day average of 14.06 million gallons per day and an annual average supply of 4599 million gallons per year.

Reclaimed water from the MDWASD or saltwater from radial collector wells are the cooling water sources for Units 6 & 7. The total makeup flow required from radial collector wells is estimated to be 86,400 gallons per minute; however, the actual amount of saltwater used will depend on the quality and quantity of reclaimed water available from the MDWASD. The source of saltwater from the radial collector wells will be the offshore portions of the Biscayne aquifer, which underlies Biscayne Bay. Water supply for potable water, service water system makeup, fire protection, and miscellaneous raw water use is from the MDWASD.

The radial collector wells consist of a central concrete caisson excavated to an optimal target depth. The caisson diameter is based on the size of the pumps and number of laterals required. The optimal target depth of the caisson is based on

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the available drawdown and the desired elevation of the laterals. Screened sections are incorporated along the laterals based on site conditions. Once the caisson and laterals are installed, groundwater infiltrates into the laterals and flows back to the caisson. The water is then pumped from the caisson.

Four radial collector wells, each capable of producing approximately 45 million gallons per day, are installed. [Figure 2.4.12-218](#) shows the location of the radial collector wells. At any time, one collector well is in standby mode as a reserve well in the event of an unplanned well outage or scheduled maintenance event. Each radial collector well consists of a central reinforced concrete caisson extending below the ground surface with laterals projecting horizontally from the caisson at depths of approximately 40 feet bgs. The laterals are advanced a distance of up to 900 feet from the caisson. The wells are designed and located to induce infiltration from Biscayne Bay.

The Boulder Zone is permitted by the FDEP as a zone for the discharge of treated sewage and other wastes disposed of through injection wells. The Boulder Zone meets the Florida Department of Environmental Regulations criteria for Class I injection. The Boulder Zone has the following characteristics throughout its extent:

- Deep. The top of the Boulder Zone is 2000 to 3400 feet in depth.
- Confined. There are approximately 800 to 1000 feet of confining limestone and dolomite beds between the Boulder Zone and the base of the USDW.
- Thick. The Boulder Zone is up to 700 feet thick.
- Porous. The Boulder Zone has well developed secondary permeability.
- Highly transmissive. The transmissivity of the Boulder Zone is up to 24.6E06 square feet per day.
- Contains groundwater with total dissolved solids concentration >10,000 milligrams per liter. The average dissolved solids concentration of Boulder Zone groundwater is approximately 37,000 milligrams per liter.

Over 90 Class I injection wells are used to dispose of over 200 million gallons per day of secondary treated wastewater in southeast Florida ([Reference 216](#)).

FPL has applied to the FDEP for a Class V Exploratory Well Construction Permit for construction of an exploratory well (EW-1) and dual-zone monitor well (DZMW-1) for Units 6 & 7 pursuant to the provisions of rule 62-528.603, FAC

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(Reference 229). The purpose of this exploratory well (EW-1) is to investigate the geologic and hydrogeologic feasibility of disposal of non-hazardous cooling water blowdown and other plant wastewater via deep well injection into the Boulder Zone at the site. EW-1 has been designed, and will be constructed, to Class I Industrial deep injection well standards. The conceptual design for EW-1 and DZMW-1 are presented on Figures 2.4.12-245 and 2.4.12-246, respectively.

The injection zone is in the Boulder Zone of the lower Floridan aquifer, which is anticipated to be present at a depth of approximately 2900 feet bgs in the plant area. Approximately 800 to 1000 feet of confining limestone and dolomite beds are anticipated to be present between the injection zone and the base of the USDW.

The design components of the injection wells include determining the allowable injection rate and the area of review. Section 62-528.415 (1)(f)2, FAC (Reference 229) states that the hourly peak injection flow should not exceed a velocity of 10 feet per second. Based on a review of data from other deep injection well systems in southeast Florida, it is anticipated that each injection well will have a permitted injection capacity of up to 18.6 mgd at a peak hourly flow, corresponding to an injection velocity of 10 feet per second (Reference 229). However, it is anticipated that the wells will be operated at an injection rate of approximately 10 mgd.

The wastewater disposal requirements for Units 6 & 7 are a combined total of approximately 20 million gallons per day when using only reclaimed water from the MDWASD as a cooling water source, and as high as 90 million gallons per day when using only saltwater from radial collector wells as a cooling water source. Therefore, the combined disposal volumes are between 20 and 90 million gallons per day when using a combination of reclaimed and saltwater for cooling. For purposes of providing upper bounds for the project, a disposal capacity of 90 million gallons per day is assumed. Based on this disposal capacity, the deep injection wells consist of ten primary wells and two backup wells for use during routine maintenance or in the event of unscheduled shutdowns. Exploratory well EW-1 will be converted to one of the Class I Industrial deep injection wells if the geology and hydrogeology of the site is determined to be appropriate for deep well injection. As part of the injection permit, a dual-zone monitoring well will also be installed. The deep injection wells will be regulated by and fully comply with the requirements of Chapter 62-528 of the FAC (Reference 229) and applicable FDEP rules.



For the purpose of evaluating the injected fluid buoyancy, the most important characteristics of the injected effluent are temperature and total dissolved solids (TDS), because these parameters determine fluid density. The injected effluent temperature will vary seasonally. The maximum and minimum expected temperatures are 91° F and 65° F, respectively. The expected wastewater TDS when using reclaimed water is 2721 milligrams per liter and when using saltwater from the radial collector wells is 57,030 milligrams per liter. Based on the temperature and TDS values, the density of the injected fluid is estimated to range from 996.8 kilograms per cubic meter (100-percent reclaimed water in the summer) to 1042.2 kilograms per cubic meter (100-percent saltwater in the winter). The temperature and TDS concentration in the Boulder Zone are about 50° F and 37,000 milligrams per liter, respectively (Subsection 2.4.12.2.4.3). The density of the Boulder Zone fluid is estimated to be 1028.5 kilograms per cubic meter.

#### 2.4.12.2.2 Groundwater Flow Directions

##### 2.4.12.2.2.1 Biscayne Aquifer

Regional groundwater flow in the Biscayne aquifer is generally toward the east-southeast. Figures 2.4.12-219 and 2.4.12-220 (Reference 212) show potentiometric surface maps of the Biscayne aquifer for May and November of 1993. The potentiometric maps show localized effects from surface water canals and cones of depression associated with groundwater well fields. Based on the regional data, the hydraulic gradient in the vicinity of the Turkey Point plant property is approximately 0.00002 foot per foot. The elevations in NGVD 29 used by the USGS are approximately 1.53 feet higher than the North American Vertical Datum of 1988 (NAVD 88) elevations used for the plant area data (Reference 231).

Potentiometric surface maps for the upper and lower monitoring zones of the Biscayne aquifer in the immediate vicinity of the Units 6 & 7 plant area are shown in Figures 2.4.12-221 through 2.4.12-228. A separate map was prepared for each high- and low-tide time sequence for the upper (Miami and Key Largo Limestones) and lower (Fort Thompson Formation) monitoring zones. The water levels were corrected to equivalent saltwater heads. Also shown on these figures is the flow direction. Appendix 2AA describes the data evaluation process for the transducer generated water level data. The results of this evaluation indicate that the presented data is sufficient.



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These maps indicate that the highest portion of the potentiometric surface in the lower monitoring zone runs from the southwestern portion of the island near OW-735L to the central portion of the island near OW-706L. Flow patterns extend radially in multiple directions from this high spot, but flow patterns are not symmetrically arrayed. The lower monitoring zone potentiometric surfaces and resulting flow patterns are similar for all high and low tide conditions examined.

In the upper monitoring zone, a relative high spot in the potentiometric surface runs from the northwest near OW-812U to the center of the island near OW-706U. A second high spot in the potentiometric surface is evident in the southeast corner of the island near OW-636U. A relatively low region in the potentiometric surface extends from the southwest near OW-735U to east-central portion of the island near OW-805U and OW-606U.

Flow patterns in both monitoring zones are complex. In both zones, the center of the island near OW-706 provides a relative high spot in the potentiometric surface and flow lines extend in multiple directions away from this high spot.

Because of the complexity of the observed flow patterns in the upper and lower monitoring zones, one to three flow path lines were used to calculate horizontal gradients for each potentiometric surface shown in [Figures 2.4.12-221 through 2.4.12-228](#). The average gradient for the two or three flow path lines is shown on each potentiometric surface map for each tidal condition examined. The average horizontal gradient in the upper monitoring zone across all examined tidal conditions is 0.0004 ft/ft, and the average horizontal gradient in the lower monitoring zone is 0.001 ft/ft.

Vertical hydraulic gradients were computed for selected observation well pairs on the site. [Table 2.4.12-204](#) presents the vertical hydraulic gradients determined from these well pairs. The overall vertical hydraulic gradient is generally upward across the plant area. The vertical hydraulic gradients do not vary significantly between high and low tidal cycles.

In general the groundwater flow conditions in the Biscayne aquifer at the Units 6 & 7 plant area can be summarized as follows:

- Flow conditions in the upper monitoring zone indicate a consistent flow direction from the high spots in the potentiometric surface in the northwest and southeast towards the relative low region in the potentiometric surface that runs from the southwest to the east-central of the island. Flow in the low region is generally towards the southwest.

- Flow conditions in the lower monitoring zone indicate a high spot in the potentiometric surface that extends from the southwestern portion of the island to the center of the island. Flow patterns extend in multiple directions from this high spot but the patterns are not symmetrical.
- Vertical hydraulic gradients indicate upward flow potential.
- The vertical (upward) gradient is approximately an order of magnitude larger than the horizontal gradient in the lower monitoring zone. The average horizontal gradient in the lower monitoring zone is, in turn, approximately an order of magnitude larger than the average horizontal gradient in the upper monitoring zone.

#### 2.4.12.2.2.2 Floridan Aquifer

Regional groundwater flow in the Upper Floridan aquifer is generally toward the east. [Figure 2.4.12-229](#) shows a potentiometric surface map of the Upper Floridan aquifer for May 1980 ([Reference 215](#)). The apparent hydraulic gradient in the vicinity of the Turkey Point plant property is approximately 0.00006 foot per foot. As indicated in [Figure 2.4.12-229](#), South Florida is in the brackish to saline portion of the aquifer, and groundwater development has generally been restricted to industrial water supplies.

Determination of groundwater flow directions and hydraulic heads in the Boulder Zone has been unreliable due to the lack of good head data and the transitory effects of ocean tides, Earth tides, and atmospheric tides ([Reference 215](#)). Regional groundwater movement in the Lower Floridan aquifer in southern Florida is estimated to follow the circulation pattern described as follows: 1) cold seawater moves inland through the Lower Floridan aquifer, 2) heating of the seawater in the Lower Floridan aquifer during inland movement results in lower fluid density, 3) upwelling of this seawater from the Lower Floridan aquifer occurs through the middle confining unit, and 4) dilution of the seawater (further reducing fluid density) results in its transport back to the ocean by seaward flowing groundwater in the Upper Floridan aquifer. [Figure 2.4.12-243](#) illustrates this circulation pattern ([Reference 215](#)). This circulation is generally very slow due to the low permeability of the middle confining unit.

#### 2.4.12.2.3 Temporal Groundwater Trends

Regional temporal trends in the Biscayne aquifer groundwater levels are monitored by the USGS ([Reference 232](#)) and the SFWMD ([Reference 233](#)). [Figure 2.4.12-230](#) presents a map of wells and surface water control structures in

the vicinity of the Turkey Point plant property used for long-term monitoring of groundwater and surface water levels. [Figures 2.4.12-231](#) and [2.4.12-232](#) show the hydrographs for these locations. The hydrographs show varying degrees of short-term tidal influence and fluctuations associated with precipitation events. The long-term trends in the wells and surface water indicate a generally steady water level over the period examined. Well G-1183 shows the largest magnitude of fluctuation with water level elevations ranging from –0.59 to 6.38 feet NGVD 29. The remaining wells show a range of fluctuation of less than 3.5 feet.

[Figure 2.4.12-233](#) shows hydrographs of the Biscayne aquifer monitoring wells at Units 6 & 7. Over the period of record, the maximum groundwater elevation in the upper monitoring zone was 0.62 feet NAVD 88 (OW-636U) and the minimum was –3.42 feet NAVD 88 (OW-809U). The maximum groundwater elevation in the lower monitoring zone was 2.15 feet NAVD 88 (OW-735L) and the minimum was –2.45 feet NAVD 88 (OW-805L). A partial listing of water level data from the transducers is presented in [Appendix 2AA](#).

The water level record contains data gaps, which were a result of loss of transducer data due to storm preparation activities, or equipment malfunction. Data telemetry and measurement issues were identified with the In-Situ transducers. The data were reviewed for consistency and accuracy of the water level and specific conductance readings. At the conclusion of this evaluation, a portion of the data were rejected. The causes for data rejection include erratic behavior indicative of a transducer malfunction, and poor agreement between manual and transducer measurements. The portions of the data rejected are identified on the hydrographs in [Figure 2.4.12-233](#).

Regional temporal trends in the Floridan aquifer have been monitored by the USGS ([Reference 234](#)). A hydrograph of a well completed in the Upper Floridan aquifer is shown in [Figure 2.4.12-234](#). The wellhead elevation is 4.50 feet NGVD 29 and the head inside the well ranges from 30 to 42.6 feet MSL (NGVD 29), indicating that the potentiometric surface in this area is above the ground surface.

#### 2.4.12.2.4 Aquifer Properties

This subsection provides a summary of the regional, local, and site-specific hydrogeologic parameters for the different aquifer units. These parameters include transmissivity, storativity (storage coefficient), specific yield, hydraulic conductivity (permeability), and leakage coefficient (leakance). The following are definitions of these properties:

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- Transmissivity — The rate at which a fluid of a specified density and viscosity is transmitted through a unit width of an aquifer or confining bed under a unit hydraulic gradient and is a function of the properties of the fluid, the porous medium, and the thickness of the porous medium (Reference 235).
- Storativity (Storage Coefficient) — The volume of water released from or taken into storage per unit surface area of the aquifer per unit change in head (Reference 235).
- Specific Yield — The ratio of the volume of water a rock or soil will yield by gravity drainage to the volume of the rock or soil (Reference 235).
- Hydraulic Conductivity (permeability) — A coefficient of proportionality describing flow per unit time under a unit hydraulic gradient through a unit area of a porous medium and is a function of the properties of the fluid and the porous medium (Reference 235).
- Leakage Coefficient (Leakance) — The quantity of water that flows across a unit area of the boundary between the main aquifer and its semi-confining bed, typically expressed as seconds<sup>-1</sup> or days<sup>-1</sup>, derived from the relationship  $K'/b'$  where  $K'$  is the hydraulic conductivity of the semi-confining unit and  $b'$  is its thickness (Reference 236).

Typical values of hydraulic conductivity, porosity, and thickness for different formations in Miami-Dade County are shown on Table 2.4.12-205 (Reference 237). The values are based on weighted averages for management of treated waste water and may not be representative of actual conditions.

Table 2.4.12-206 presents aquifer test results for tests performed within 15 miles of Units 6 & 7. Figure 2.4.12-235 shows the locations of these tests. The data were obtained from the SFWMD DBHYDRO database and the Dames & Moore site investigation report (References 233 and 238). The tests were performed in the Biscayne aquifer, the Floridan aquifer, and confining layers. The tests include standard aquifer performance tests and packer tests used for assessment of the injection and confining layers for deep injection well permitting. The Boulder Zone packer tests listed in Table 2.4.12-206 show transmissivities lower than those reported for other regional testing of the Boulder Zone (Subsection 2.4.12.2.4.3). The depths given on the table suggest that the tests were performed in the interval between the top of the Lower Floridan aquifer and the top of the Boulder Zone as determined from cross section Y-Y' in Reference 206.

#### 2.4.12.2.4.1 Surficial/Biscayne Aquifer

Hydrogeologic properties in the Biscayne aquifer vary due to lithology. Along the coast, where the Biscayne aquifer is the thickest, transmissivities are lower because of the silty sand/sandy lithology. In central and south Miami-Dade County, the aquifer is thinner with higher hydraulic conductivity due to the occurrence of cavernous limestone (Reference 211). The permeable limestone content in the aquifer decreases northward and the overall transmissivity of the aquifer decreases with increased sand content.

Transmissivities for the highly permeable limestones and less permeable sandstones and sands of the aquifer in the vicinity of Units 6 & 7 have been estimated to range from less than 1.0E06 gallons per day per foot to 3.0E06 gallons per day per foot (Reference 238). Along the coast, where the Biscayne aquifer is the thickest, transmissivities are lower due to the presence of sandy material. In central and south Miami-Dade County, the aquifer is thinner with higher hydraulic conductivity due to the occurrence of vuggy and highly porous limestone (Reference 211).

According to Parker et al. (Reference 219), the Biscayne aquifer is the most productive of the shallow non-artesian aquifers in the area and is one of the most permeable with transmissivity values (hydraulic conductivity x saturated thickness) for the highly permeable limestones ranging from 4.0E06 to 15.0E06 gallons per day per foot (5.4E05 to 2.0E06 square feet per day) with a median value of 5.0E06 gallons per day per foot (6.7E05 square feet per day) and storage coefficients ranging from 0.047 to 0.247. In Broward County, transmissivities are reported to range from approximately 4.0E05 gallons per day per foot (5.4E04 square feet per day) to 4.0E06 gallons per day per foot (5.4E05 square feet per day) with storage coefficients as high as 0.34 (Reference 239). A generalized distribution of the transmissivities in the Biscayne aquifer is presented in Figure 2.4.12-236 (Reference 240).

Large-capacity municipal wells are commonly completed as open holes and yield from 500 to more than 7000 gpm with only small drawdowns. Specific capacities obtained from pumping tests are on the order of 1000 gpm per foot of draw-down in Miami-Dade County (Reference 211).

A study performed by the USGS (Reference 240) included estimates of specific yield in the Biscayne aquifer based on water level responses to individual rainfall events between the years 1933 and 1966. The results of this study suggested that a range between 20 and 25 percent specific yield may be representative of the

Biscayne aquifer. The main focus of this study was the development of a groundwater flow model of the Biscayne aquifer. The results of the model calibration suggested that a specific yield of 20 percent provided the best match between observed and modeled groundwater levels.

Two studies performed northwest of Turkey Point by the USGS (References 241 and 242) examined the vertical variations in aquifer properties of the Biscayne aquifer. Table 2.4.12-207 presents the results of testing core samples. The locations of the core samples are shown in Figure 2.4.12-235. Figure 2.4.12-237 is a plot of the core properties versus elevation. The core samples were tested for horizontal air permeability, vertical air permeability, porosity, and grain density. The horizontal air permeability test included a maximum permeability and a permeability at 90 degrees to the maximum permeability direction to assess horizontal anisotropy. The studies included a detailed examination of the core samples to determine lithology and fossil assemblages. As a result of this examination, the USGS subdivided the Biscayne aquifer into a series of high frequency depositional cycles that ranged from a freshwater to a marine depositional environment. These depositional cycles control the permeability and porosity of the aquifer. The freshwater and transitional portions of the depositional cycles are characterized by lower permeability (<1000 milliDarcies) and porosity (<20 percent), while the marine portions of the depositional cycles exhibit higher permeability (>1000 milliDarcies) and porosity (20–40 percent). This general observation appears to support the site-specific findings regarding the freshwater limestone layer and the other marine and transitional units identified at the Units 6 & 7 plant area.

The vertical changes in properties as a result of these depositional cycles can be seen on the figure. Figure 2.4.12-238 presents a plot of the vertical anisotropy ratio ( $K_{\text{vertical}}/K_{\text{horizontal}}$ ) versus elevation using the vertical permeability and maximum horizontal permeability determined from the USGS laboratory core testing. The graph indicates that the central tendency of the anisotropy measurements is approximately 1. This value was used as a starting point for groundwater model calibration.

As part of the Units 6 & 7 investigation, ten observation wells were installed in the upper part of the Biscayne aquifer in the Miami Limestone/Key Largo Limestone ("U" suffix wells) and ten observation wells were installed in the lower part of the Biscayne aquifer in the Fort Thompson Formation ("L" suffix wells). The screen depths for the upper (U) wells range from 15 to 28 feet bgs and for the lower ("L") wells range from 98 to 110 feet bgs. The location and installation details of the wells are provided in Figure 2.4.12-209 and Table 2.4.12-201, respectively.

Thirty-one in situ hydraulic conductivity tests (slug tests) were conducted in these wells. These data were imported into AQTESOLV™ for Windows version 4.5 (Reference 243) and evaluated using either the Butler, KGS (Kansas Geologic Survey), McElwee-Zenner, or Springer-Gelhar solution methods. Hydraulic conductivity values obtained for wells screened in the upper part ("U" wells) of the Biscayne aquifer range from 3 feet per day to 319 feet per day with a geometric mean of 61.3 feet per day.

For the wells screened in the lower part ("L" wells) of the aquifer, hydraulic conductivity values range from 1.0 feet per day to 120 feet per day with a geometric mean of 20.1 feet per day. The results of the tests are summarized in Table 2.4.12-208. The results suggest that the rate-limiting recharge of the well filter pack may be influencing the results of the tests. The rate-limiting recharge effect is caused by the formation having a higher hydraulic conductivity than the filter pack material; this results in the filter pack controlling the slug test response rather than the formation. This interpretation is supported by the Units 6 & 7 aquifer pumping tests described below, site vicinity aquifer tests (Reference 238), and other regional studies (Table 2.4.12-206) that suggest much higher hydraulic conductivity values for the aquifer.

Four aquifer pumping tests were conducted in 2009 at Units 6 & 7. These tests were performed to determine the hydrogeologic properties of the Biscayne aquifer units and the overlying or underlying aquitards for use in the design and implementation of the construction dewatering system, development of the site groundwater flow model, and simulation of radial collector well operation in the groundwater model. Two test zones were identified within the Biscayne aquifer: the upper zone, which is located in the Key Largo Limestone; and the lower zone, which is located in the Fort Thompson Formation. The muck and Miami Limestone units are interpreted to have a lower hydraulic conductivity than the underlying Key Largo Limestone. The freshwater limestone layer is interpreted to have a lower hydraulic conductivity than either the overlying Key Largo Limestone or the underlying Fort Thompson Formation. The Tamiami Formation is also interpreted to have a lower hydraulic conductivity than the overlying Fort Thompson Formation. Thus, the Miami Limestone, the freshwater limestone unit, and the Tamiami Formation were treated as aquitards in the subsurface profile. For the conditions at Units 6 & 7, the term aquitard is amended from its usual definition as a low permeability unit to a unit that has a much lower permeability than the aquifer units.

A total of four pumping wells and fifty temporary observation wells were installed for aquifer characterization. Two pumping wells and twenty-five observation wells



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were installed at each reactor site. The pumping wells at Unit 6 were designated PW-6U and PW-6L and at Unit 7 were designated PW-7U and PW-7L with the U/L suffix indicating completion in either the upper (U) or lower (L) Biscayne aquifer test zone. The pumping wells were nominally 30-inches in diameter and were completed as open holes in the test intervals. The upper test zone wells (PW-6U and PW-7U) were both completed to a total depth of 45 feet. The lower test zone wells (PW-6L and PW-7L) were completed to a total depth of 105 feet and 87 feet, respectively. Each aquifer test location had two observation well clusters of five wells each installed at right angles to and approximately 10 feet from the pumping well. Additionally, a shared well cluster of five wells was installed between the two pumping wells at each reactor site at a distance of approximately 25 feet. The observation well clusters at Unit 6 (C6-1 through C6-5) and Unit 7 (C7-1 through C7-5) each included wells designated as A through E that were completed in the following zones:

- Miami Limestone/upper aquitard (A)
- Key Largo Limestone/upper test zone (D)
- Freshwater limestone/middle aquitard (B)
- Fort Thompson Formation/lower test zone (E)
- Tamiami Formation/lower aquitard (C)

Figure 2.4.12-239 presents the configuration of the pumping and observation wells for Units 6 & 7.

Each pumping test was conducted at a constant discharge rate and drawdown data was collected for a period of eight hours, followed immediately by the recovery period during which water level data were collected for an additional eight hours. The discharge rate for each test was selected based on data collected during a step-drawdown test conducted on each pumping well prior to initiation of the 8-hour drawdown test. Discharge rates for the tests ranged from approximately 3300 gpm to 5100 gpm.

The pumping test results were interpreted using the AQTESOLV™ (Reference 243) computer program. This program contains solution options for different hydrogeologic conditions such as unconfined, confined, and leaky conditions. Two interpretation methods were used: the Theis method and the Hantush leaky aquifer with aquitard storage method. The Theis method was



applied to the time-drawdown data, to provide an upper bound on transmissivity, because the Theis method assumes no leakage. The Hantush leaky method with aquitard storage was used to evaluate the distance-drawdown and time-drawdown relationships in the pumping zone observation wells ("D" or "E" series wells). [Table 2.4.12-209](#) presents a summary of the averages of the aquifer test results. Based on these analyses, the average transmissivity for the upper Biscayne aquifer is approximately  $2.3E06$  gallons per day per foot and for the lower Biscayne aquifer it is approximately  $1.3E05$  gallons per day per foot. Details of the pumping tests and the analytical methods are provided in [Appendix 2BB](#).

#### 2.4.12.2.4.2 Intermediate Aquifer System/Confining Unit

The overall hydraulic conductivity of the intermediate confining group (upper confining unit of the Floridan aquifer) is very low and provides good confinement for the underlying Floridan aquifer system. The leakage coefficient of this confining unit is highly variable, especially in the semi-confined areas where the confining beds may be either sandy or clayey. Leakage coefficient values of the upper confining unit, derived from computer model simulations, range from less than 0.01 inches per year per foot in tightly confined areas to more than 1.0 inches per year per foot in semi-confined areas ([Reference 220](#)). According to Bush and Johnston ([Reference 220](#)), leakage coefficients calculated from aquifer test data, in general, are much larger than those obtained from simulation, ranging from 0.44 to 88 inches per year per foot. Their analyses indicate that in the majority of locations, leakage coefficients from aquifer test data are too large to realistically represent the exchange of water between the surficial aquifer and the Upper Floridan aquifer. The values obtained from aquifer test data can reflect not only downward leakage from the surficial aquifer, but upward leakage from permeable rocks beneath the pumped interval, as well as leakage from beds of relatively low permeability that might exist in the pumped interval. These upper confining unit leakage coefficients derived from Floridan aquifer test data are a composite of leakage from all of these sources.

#### 2.4.12.2.4.3 Floridan Aquifer System

The Floridan aquifer system is a confined series of aquifer zones, separated by aquicludes, that is approximately 3000 feet thick in southeastern Florida. Porosity and permeability in the aquifer vary widely depending on location and formation. High permeability values are the result of both fractured limestone and extensive secondary porosity derived from dissolution of carbonates. At the base of the Floridan aquifer system is the Boulder Zone, a highly permeable zone containing

saline water used for underground injection of industrial and domestic wastes in South Florida.

### **Floridan Aquifer System: Upper Floridan Aquifer**

Hydraulic parameters of the Upper Floridan aquifer vary considerably as a result of the wide variation in hydrogeologic conditions encountered at different locations. According to Johnson and Bush ([Reference 244](#)), conditions that most affect transmissivity are the degree of solution development in the aquifer and, to a lesser extent, aquifer thickness. High transmissivities are usually found in the areas having less confinement because circulation of flow helps to develop solution openings in the aquifer.

Transmissivities are lowest (less than 50,000 square feet per day) in the Florida panhandle and southernmost Florida (where the aquifer is confined by thick clay sections and contains thick sections of low-permeability limestone) and are highest (greater than 1 million square feet per day) in the karst areas of central and northern Florida where the aquifer is generally unconfined or semi-confined ([Reference 244](#)). Based on data obtained from 114 aquifer tests, computer simulation, and geologic conditions, Johnson and Bush ([Reference 244](#)) developed the areal distribution of the probable ranges of transmissivity in the Upper Floridan aquifer shown in [Figure 2.4.12-240](#).

Regional storage coefficients calculated from aquifer tests conducted in the Upper Floridan aquifer range from a low of 1.0E-05 to a high of 2.0E-02 with most values in the 1.0E-03 to 1.0E-04 range ([Reference 244](#)).

Dames & Moore ([Reference 214](#)) installed a test production well, designated W-12295 as shown in [Figure 2.4.12-235](#), and four observation wells southwest of the Units 6 & 7 plant area. They conducted a 90-day continuous pumping test of the principal artesian water-bearing zone (Upper Floridan aquifer). The test production well was completed as an open hole between approximately 1130 feet and 1400 feet bgs. Calculated average values for transmissivity, storage coefficient, and leakance obtained from graphical solutions of the test data were 400,000 gallons per day per foot (53,600 square feet per day), 6.0E-04, and 0.002 gallons per day per cubic foot, respectively. Bush and Johnston ([Reference 220](#)) report a transmissivity of approximately 232,000 gallons per day per foot (31,000 square feet per day) for the Upper Floridan aquifer near Units 6 & 7.

The most transmissive zone is generally found at the top of the unit and is estimated to range between 10,000 to 60,000 square feet per day. According to

Bush and Johnston ([Reference 220](#)), wells S-1532 and S-1533 have a calculated transmissivity of 31,000 square feet per day ([Reference 217](#)). Transmissivity of the Upper Floridan aquifer is highest in west central Florida (greater than 100,000 square feet per day) with lower transmissivities (less than 10,000 square feet per day) in central Florida ([Reference 206](#)).

The Upper Floridan aquifer water supply wells used for Unit 5 cooling water and Units 1 & 2 process water included the performance of an aquifer pumping test as part of the well installation process. The results of this test indicate a transmissivity of 244,000 gallons per day per foot, a storage coefficient of  $2.0\text{E-}04$ , and a leakance of  $5.0\text{E-}03$  gallons per day per cubic foot ( $6.7\text{E-}04 \text{ day}^{-1}$ ). These values are consistent with the values reported from other nearby tests in the Upper Floridan aquifer.

#### **Floridan Aquifer System: Middle Confining Unit**

The middle confining unit of the Floridan aquifer system includes most of the Avon Park Formation ([Reference 206](#)). The zones that contain highly transmissive dolomite with cavernous porosity are found in the upper to middle part of the Oldsmar Formation in southeastern Florida. Reese ([Reference 217](#)) places the base of the middle confining unit at the top of the first such zone. The base of the middle confining unit is encountered at a depth of approximately 2460 feet in a well (MDS-I12) drilled in southeastern Miami-Dade County, 230 feet below the top of the Oldsmar Formation ([Reference 206](#)). Based on core sample analysis, packer tests, and aquifer tests conducted at the MDWASD South District Wastewater Treatment Plant site, the hydraulic conductivity of the middle to lower part of the confining unit ranges from  $3.0\text{E-}03$  to 3.0 feet per day ([Reference 217](#)). Vertical hydraulic conductivity measured in eight core samples from a well drilled in eastern Broward County, reported in Reese ([Reference 217](#)), ranged from  $1.3\text{E-}04$  to 0.24 feet per day. Core analyses of the low porosity (<15%) dolostones from the Floridan aquifer middle confining unit in Palm Beach County gave vertical hydraulic conductivities of less than or equal to  $1.7\text{E-}08$  centimeters per second. The lowest recorded value was  $2.7\text{E-}09$  centimeters per second ([Reference 247](#)).

#### **Floridan Aquifer System: Lower Floridan Aquifer**

The Lower Floridan aquifer underlies the middle confining unit and extends from a depth of approximately 2400 feet bgs to a depth that is undetermined, but thought to be greater than 4000 feet bgs in the Miami-Dade County area. This thick sequence of carbonate rocks contains several permeable zones separated by thick confining units ([Reference 207](#)). These confining units are similar in lithology

to the middle confining unit of the Floridan aquifer system (Reference 217). Underlying the confining beds in the lower part of the Lower Floridan aquifer is the highly transmissive Boulder Zone, which is of varying thickness. The base of the Lower Floridan aquifer extends below the base of the Boulder Zone with the lower section consisting of permeable dolomites or dolomitic limestones of the Cedar Keys Formation (References 207, 215, and 217). Because the Lower Floridan aquifer is deeply buried in southern Florida and contains saltwater, the unit has not been intensively drilled or tested; therefore, the hydraulic characteristics are not well known (Reference 207).

#### Boulder Zone

The Boulder Zone is a highly transmissive zone of limestones and dolomites found in the lower Oldsmar Limestone in the Lower Floridan aquifer in southeastern Florida. However, locally the Boulder Zone may range upward to the middle of the Oldsmar Limestone or downward to the top of the Cedar Keys Formation (Reference 207). It consists mostly of massively bedded dolostones within which secondary permeability has been extensively developed. The term "Boulder Zone" is a misnomer because no boulders are present other than large chunks occasionally broken off during drilling. The difficult slow drilling and rough bit behavior, similar to that observed drilling in boulders, encountered while drilling the dolostone, gave rise to the term "Boulder Zone" (Reference 207). The Boulder Zone can be up to 700 feet in thickness (Reference 206). Based on previous studies in the region (References 206, 207, 208, and 214), the Boulder Zone underlies a 13-county area in southern Florida with the elevation of the top of the zone ranging from about –2000 feet NGVD 29 to about –3400 feet NGVD 29, Figure 2.4.12-241 (Reference 210). The Boulder Zone is found at a depth of approximately 2800 feet at Turkey Point.

Transmissivities ranging from 3.2E06 to 24.6E06 square feet per day have been reported for the Boulder Zone (Reference 215). A measured hydraulic conductivity value of approximately 4250 feet per day was obtained from an injection well at the SDWTP, operated by the MDWASD in Miami-Dade County. This value is approximately two orders of magnitude larger than measured values in the overlying portion of the Lower Floridan aquifer and the middle confining unit (Reference 208).

#### 2.4.12.2.5 Hydrogeochemical Characteristics

The state of Florida has conducted an extensive characterization of the background water quality in the major aquifer systems (Reference 245). These

data have been subdivided into properties for each of the water management districts. [Tables 2.4.12-210](#) and [2.4.12-211](#) present typical geochemical parameters for the surficial aquifer, the Floridan aquifer, and precipitation at the Everglades National Park.

Groundwater in the vicinity of the Turkey Point property is not used as a potable water source because of its salinity. The state of Florida has classified these as Class G-III waters to identify groundwater that has no reasonable potential as a future source of drinking water due to high total dissolved solids content ([Reference 240](#)). Field-measured groundwater quality indicator parameters (temperature, pH, dissolved oxygen, specific conductance, turbidity, and oxidation-reduction potential) obtained during the collection of water samples from observation wells (installed in the Biscayne aquifer as part of the site characterization investigation) are summarized in [Table 2.4.12-210](#). The results of laboratory analyses of the water samples are presented in [Table 2.4.12-211](#).

Although the Upper Floridan aquifer is a major source of potable groundwater in much of Florida, water withdrawn from the unit in southeastern Florida, including Miami-Dade County, is brackish and variable with chloride and dissolved solid concentrations greater than 1000 milligrams per liter. Groundwater samples from the Upper Floridan aquifer production wells at Unit 5 ([Table 2.4.12-211](#)) show an average chloride concentration of 2900 milligrams per liter. Chemically, the water in the middle confining unit is similar to seawater, but salinity varies greatly at the top of the unit as the upward moving saline water from the Lower Floridan is blended with the seaward flowing freshwater in the Upper Floridan aquifer ([Reference 215](#)).

Average dissolved solids concentration of Boulder Zone groundwater is approximately 37,000 milligrams per liter total dissolved solids ([Reference 215](#)). There is also a pronounced temperature anomaly present in the Boulder Zone with the lowest observed temperature (approximately 50°F) occurring along the southeastern coast. The temperature increases from the Straits of Florida toward the center of the Florida Plateau, suggesting recharge from cold seawater through the lower part of the Floridan aquifer system. The groundwater circulation pattern is shown on [Figure 2.4.12-243](#) ([Reference 215](#)).

[Figure 2.4.12-242](#) presents a Piper trilinear diagram of the site and regional geochemical data. Examination of the diamond field on the diagram indicates that the site groundwater, Biscayne Bay, and the cooling canals data all plot together on the diagram indicating similar geochemical compositions. These waters are classified as a sodium-chloride type.

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### 2.4.12.3 Subsurface Pathways

Subsurface pathways are described below for the two major aquifers beneath the Units 6 & 7 plant area: the Biscayne aquifer and the Floridan aquifer system.

#### 2.4.12.3.1 Biscayne Aquifer

Regional groundwater flow in the Biscayne aquifer is generally toward the east-southeast in Miami-Dade County ([Reference 209](#)). The Biscayne aquifer groundwater flow direction in the Units 6 & 7 plant area is described in [Subsection 2.4.12.2.2.1](#).

The hydrogeologic conditions at Units 6 & 7 indicate two potential pathways for offsite migration of a postulated accidental release of radionuclides. The most likely pathway is through the Key Largo Limestone, with discharge to the cooling canals and then migration from the cooling canals to Biscayne Bay. An alternate pathway would be through the Fort Thompson Formation with discharge into Biscayne Bay. Neither of these release scenarios would threaten groundwater or surface water supplies. Further description of these pathways, source radionuclides, analytical methods, and subsurface properties is provided in [Subsection 2.4.13](#).

The ground surface at Units 6 & 7 was at approximately sea level. The Biscayne aquifer is generally present within 5 feet of the ground surface, with up to 7 feet of muck deposits covering the aquifer. As part of plant construction, the muck deposits were removed and engineered fill was placed to raise the finish grade to El. 25.5 feet NAVD 88. Additionally, as part of the construction process, a reinforced concrete diaphragm wall and grouting program was used to control groundwater inflow into the excavation ([Subsection 2.5.4.5.4](#) and [2.5.4.6.2](#)).

In order to account for the changes to the pre-construction groundwater flow system, a three-dimensional numerical groundwater flow model was used. The model code used was MODFLOW-2000 ([Reference 246](#)) as implemented in the Visual MODFLOW modeling software. The MODFLOW model is a constant-density, three-dimensional finite-difference model, with modular capability to add various equation solvers and boundary conditions to the basic model. The model developed for Units 6 & 7 used a geometric multigrid (GMG) solver.

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The Biscayne aquifer is represented in the model by six layers: 1) muck, 2) Miami Limestone, 3) Key Largo Limestone, 4) freshwater limestone, 5) Fort Thompson Formation, and 6) Tamiami Formation. The horizontal discretization for most simulations in the model is represented by a telescopic grid that ranges from a coarse grid (200 by 450 feet) at the model perimeter to a fine grid (20 by 20 feet) in the immediate area of Units 6 & 7.

Hydrological features are represented in the model as boundary conditions. The river boundary condition is used to represent the cooling canals and the regional water management canals. Recharge and evapotranspiration boundaries are assigned to the top layer of the model, with properties varying depending on the surface conditions. These conditions include open water (canals), wetlands, and impervious surfaces (Units 1-5). The perimeter of the model is represented by a general head boundary, except in portions of the top layer at Biscayne Bay. The general head boundary represents the influence of conditions beyond the model area, primarily recharge from the Everglades. The top layer in Biscayne Bay is represented in the model as a constant head boundary condition using an average head based on tidal monitoring at Virginia Key. The remaining layers beneath Biscayne Bay are represented as general head boundaries at the perimeter of the model. The bottom layer of the model (Tamiami Formation) is represented as a no flow boundary condition. The vertical seepage upwards or downwards through the Tamiami Formation and the Hawthorn Group is assumed to be negligible relative to the horizontal flow in the Biscayne aquifer.

Calibration of the model was performed by adjusting the river boundary condition conductance and riverbed thickness values in the industrial wastewater facility and regional water management canals and by adjusting hydraulic conductivities. The calibration targets for the model were the average measured groundwater levels in the upper and lower monitoring zones at Units 6 & 7 and two SFWMD wells adjacent to the plant area. The average inflow/outflow between the industrial wastewater facility and Biscayne Bay was also used as a calibration target.

The calibrated model was used to simulate the impacts of construction dewatering, construction of Units 6 & 7 (site grade increase and use of diaphragm walls for groundwater control), and operation of the radial collector wells. The results of these model simulations are presented in [Appendix 2CC](#).

#### 2.4.12.3.2 Floridan Aquifer System

Regional groundwater movement in the Floridan aquifer system in southern Florida is estimated to occur in the following circulation pattern: 1) inland



movement of cold seawater through the Lower Floridan aquifer, 2) heating of the seawater in the Lower Floridan aquifer during inland movement, which results in lower fluid density, 3) upwelling of seawater from the Lower Floridan aquifer through the middle confining unit, and 4) dilution of seawater (further reducing fluid density) and transport of the seawater back to the ocean by seaward flowing groundwater in the Upper Floridan aquifer. [Figure 2.4.12-243](#) illustrates this circulation pattern ([Reference 215](#)). This is generally a very slow circulation pattern due to the low permeability of the middle confining unit.

Over the past 30 years, deep well injection has become an accepted technology for the disposal of liquid wastes in Florida, and currently there are approximately 127 active Class I injection wells in the state. In south Florida, the primary injection unit is the Boulder Zone, which is part of the Lower Floridan aquifer. In 2006, there were 32 active Class I injection wells in southeast Florida (Miami-Dade, Broward, and Palm Beach counties). All Class I injection wells are required to have a dual-zone monitoring system that consists of a zone below the deepest USDW and a zone in the USDW (USDW is defined as an aquifer that contains water with a total dissolved solids concentration of less than 10,000 milligrams/liter). Of the 32 injection systems, 3 systems have documented upward migration (Seacoast Utilities, and Miami-Dade North and South District Regional Wastewater Treatment Plants) into the USDW and 7 other injection systems have upward migration that has remained below the USDW. This upward migration is considered to potentially indicate failure of the well construction methods and not geologically related. The remaining injection wells have no detected vertical migration of injection fluids ([Reference 247](#)). A typical injection well system is shown on [Figure 2.4.12-244](#).

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PTN COL 2.4-4 2.4.12.4 Monitoring or Safeguard Requirements

Groundwater levels at Units 6 & 7 were determined through the use of groundwater observation wells installed in 2008 as part of the site subsurface investigation, and through periodic review of USGS and SFWMD monitoring stations to evaluate changes in groundwater or canal conditions in the general vicinity of the Units 6 & 7.

Consistent with RG 4.21 and the Nuclear Energy Institute (NEI) groundwater initiatives, the groundwater observation well network will be evaluated and an environmental monitoring program developed as part of detailed design activities



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for Units 6 & 7. The groundwater monitoring program will consider the following components:

- Biscayne aquifer — Periodic water level measurements in observation wells and geochemical sampling and analysis of the radial collector wells will detect changes in the Biscayne aquifer that may impact groundwater supply or the accidental release analysis.
- Floridan aquifer — Geochemical and pressure monitoring will be conducted in the Floridan aquifer as mandated by underground injection control regulations Chapter 62-528 FAC ([Reference 229](#)). The underground injection control permit requirements are expected to include monthly reporting of the average, minimum, and maximum injection pressure; flow rate; volume; and annular pressure. The requirement for mechanical integrity tests in the injection well to be performed every five years would also be expected in the permit. The monitoring program will include dual-zone monitor wells located less than 150 feet from the injection wells. The upper zone monitors just above or at the base of the USDW and the lower zone monitors below the base of the USDW and just above the primary confining unit in order to detect any vertical migration of injected fluids into the overlying Upper Floridan and Biscayne aquifers.
- Operational accident monitoring — The effluent and process monitoring program is addressed in [Subsections 11.5.3](#) and [11.5.4](#) and will be implemented in accordance with the schedule in [Subsection 13.3](#).

Groundwater level measurements in Biscayne aquifer observation wells (existing or future) are made during construction and after plant startup. Selection of observation wells included in the program is made before the start of operation based on well condition, position relative to plant site and other observation wells (provide optimal spatial distribution for potentiometric map preparation and vertical hydraulic gradient assessment), and long-term viability of the observation well (likelihood that the well will not be damaged or destroyed).

Geochemical sampling and analysis of the Biscayne and Floridan aquifers are performed during construction and after startup. Analysis includes field parameters (pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen), major cations, major anions, total dissolved solids, silica, and any additional water use or injection well permit-required parameters. Sampling is performed in site water supply wells, selected observation wells, and dual-zone monitoring wells as part of the UIC program.

Operational accident monitoring will be initiated in the unlikely event of a release of liquid effluent from the plant. Quarterly groundwater samples will be collected from downgradient Biscayne aquifer observation wells as needed to identify impact. Selection of downgradient observation wells will be based on flow directions determined from the most recent groundwater level measurements and post-construction groundwater modeling.

Safeguards will be used to minimize the potential for adverse impacts to the groundwater caused by construction and operation of the new units. These safeguards include the use of emergency cleanup procedures to capture and remove surface contaminants, and other measures deemed necessary to prevent or minimize adverse impacts to the groundwater beneath the site.

#### 2.4.12.5 Site Characteristics for Subsurface Hydrostatic Loading

Subsurface hydrostatic loading estimates for Units 6 & 7 structures were evaluated using two approaches. First, a conservative maximum groundwater level of 0.6 meters (2 feet) below grade was evaluated as specified in [DCD Table 2-1](#). The finish grade in the power block area at Units 6 & 7 is El. 25.5 feet NAVD 88. The maximum acceptable groundwater elevation at the site is El. 23.5 feet NAVD 88, which is over 20 feet higher than the current or predicted groundwater levels. The second approach uses the simulated post-construction groundwater level elevation from the numerical groundwater flow model ([Appendix 2CC](#)). The model results for post-construction groundwater conditions indicate an average elevation of approximately –0.5 to –0.6 feet NAVD 88 in the power block area. The maximum hydrostatic loading was estimated using the following formula:

$$\rho_w = z_w \times \gamma_w$$

Where,

$\rho_w$  = hydrostatic pressure (pounds per square foot)

$z_w$  = depth below groundwater level (feet)

$\gamma_w$  = unit weight of water (64.4 pounds per cubic foot for site groundwater in the upper monitoring zone)

[Figure 2.4.12-247](#) presents a graph of subsurface hydrostatic loading. Two lines are provided on the graph: the first represents the upper boundary condition using

the DCD maximum groundwater level, and the second represents the predicted water level in the power block area from the calibrated groundwater flow model.

Subsurface hydrostatic loading on safety-related structures during construction is anticipated to be less than that predicted above as a result of the implementation of construction groundwater control measures.

Construction-related excavation dewatering or groundwater control is required to a depth of approximately 35 feet below pre-construction grade for the reactor building. A discussion of this dewatering is provided in [Subsections 2.5.4.5.4 and 2.5.4.6.2](#).

Groundwater level recovery following backfilling around the plant structures is conducted in a controlled manner to prevent rapid hydrostatic pressure buildup or damage to the backfill materials. Before the start of excavation, a groundwater control and recovery plan will be prepared to describe the system design, installation, and removal.

In summary, based on the groundwater level elevations and the groundwater computer modeling activities, the groundwater depth in both power block areas is below the maximum groundwater level of 2 feet below design grade as specified in [DCD Table 2-1](#). Based on this observation, a permanent dewatering system is not a design feature for Units 6 & 7.

#### 2.4.12.6 References

201. White, W., *The Geomorphology of the Florida Peninsula*, Geological Bulletin 51, Bureau of Geology, Florida Department of Natural Resources, 1970.
202. Randazzo, A., and Jones, D, *The Geology of Florida*, University Press of Florida, Gainesville, 1997.
203. U.S. Geological Survey, *Manual Measurements in the Homestead, FL Area, as of March 2009, Groundwater conditions in Southern Florida*. Available at [http://www.sflorida.er.usgs.gov/edl\\_data/text/hstd\\_gov.html](http://www.sflorida.er.usgs.gov/edl_data/text/hstd_gov.html), accessed May 22, 2009.
204. Southeastern Geological Society, *Hydrogeological Units of Florida*, Special Publication 28, Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1986.

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205. U.S. Environmental Protection Agency (EPA), *Region 4: Ground Water Protection, Sole Source Aquifers in the Southeast*. Available at <http://www.epa.gov/Region4/water/groundwater/r4ssa.html>, accessed August 13, 2008.
206. Reese, R., and Richardson, E., *Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of a Major Avon Park Permeable Zone in Central and Southern Florida*, Scientific Investigations Report 2007-5207, U.S. Geological Survey, 2008.
207. Miller, J.A., *Hydrologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina*, Professional Paper 1403-B, U.S. Geological Survey, 1986.
208. Starr, R.C., Green, T.S., and Hull, L.C., *Evaluation of Confining Layer Integrity Beneath the South District Wastewater Treatment Plant, Miami-Dade Water and Sewer Department, Dade County, Florida*, Idaho National Engineering and Environmental Laboratory Geosciences Research Department, 2001.
209. Fish, J., and Stewart, M., *Hydrogeology of the Surficial Aquifer System, Dade County, Florida*, Water-Resources Investigations Report 90-4108, U.S. Geological Survey, 1991.
210. Miller, J., *The Groundwater Atlas of the United States: Alabama, Florida, Georgia and South Carolina*, HA 730-G, U.S. Geological Survey, 1990.
211. Klein, H., and Hull, J., *Biscayne Aquifer, Southeast Florida*, Water-Resources Investigation 78-107, U.S. Geological Survey, 1978.
212. Langevin, C.D., *Simulation of Ground-Water Discharge to Biscayne Bay, Southeastern Florida*, Water-Resources Investigations Report 00-4251, U.S. Geological Survey, 2001.
213. Stewart, J., *Areas of Natural Recharge to the Floridan Aquifer in Florida*, Map Series 98, U.S. Geological Survey in cooperation with the Florida Department of Environmental Regulations, Florida Geological Survey, 1980.

Turkey Point Units 6 & 7  
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Part 2 — FSAR

- 214. Dames & Moore, *Floridan Aquifer Water Supply Investigation Turkey Point Area Dade County, Florida*, prepared for Florida Power and Light Company, 1975.
- 215. Meyer, F., *Hydrogeology, Ground-water Movement, and Subsurface Storage in the Floridan Aquifer System in Southern Florida, Regional Aquifer-System Analysis-Floridan Aquifer System*, Professional Paper 1403-G, U.S. Geological Survey, 1989.
- 216. Bloetscher, F., and Muniz, A., *Ground Water Protection Council 2006 Annual Meeting: Preliminary Modeling of Class I Injection Wells In Southeast Florida*, 2006.
- 217. Reese, R., *Hydrogeology and the Distribution and Origin of Salinity in the Floridan Aquifer System, Southeastern Florida*, Water-Resources Investigations Report 94-4010, U.S. Geological Survey, 1994.
- 218. In-Situ Incorporated, *In-Situ Inc., ISI Data Center, Site Index*. Available at <http://www.isi-data.com/SiteIndex.aspx>, restricted access), accessed September 22, 2008.
- 219. Parker, G., Ferguson, F., Love, S., et al., *Water Resources of Southeast Florida*, Water-Supply Paper 1255, U.S. Geological Survey, 1955.
- 220. Bush, P., and Johnston, R., *Groundwater Hydraulics, Regional Flow and Groundwater Development of the Floridan Aquifer System in Florida and in parts of Georgia, South Carolina and Alabama*, Professional Paper 1403-C, U.S. Geological Survey, 1988.
- 221. Marella, R.L., *Water Withdrawals, Use, Discharge, and Trends in Florida, 2000*, Scientific Investigations Report 2004-5151, prepared in cooperation with the Florida Department of Environmental Protection, U.S. Geological Survey, 2005.
- 222. Marella, R.L., *Water Use in Florida, 2005 and Trends 1950–2005*, Fact Sheet 2008-3080, prepared in cooperation with the Florida Department of Environmental Protection and the Florida Water Management Districts, U.S. Geological Survey, September 2008.

Turkey Point Units 6 & 7  
COL Application  
Part 2 — FSAR

- 223. South Florida Water Management District, “Basis of Review for Water Use Applications within the South Florida Water Management District,” *Rules of the South Florida Water Management District*, February 2008.
- 224. Marella, R.L., *Water Withdrawals, Use, and Trends in Florida, 1990*, Water-Resources Investigations Report 92-4140, U.S. Geological Survey, 1992.
- 225. Marella, R.L., *Water Withdrawals, Use, Discharge, and Trends in Florida, 1995*, Water-Resources Investigations Report 99-4002, prepared in cooperation with the Florida Department of Environmental Protection, US Geological Survey, 1999.
- 226. Marella, R.L., and Berndt, M.P., *Water Withdrawals and Trends from the Floridan Aquifer System in the Southeastern United States, 1950–2000*, Circular 1278, US Geological Survey, 2005.
- 227. South Florida Water Management District, *Regulatory Data Browsing & Downloading, Water Use Permits*. Available at [https://my.sfwmd.gov/portal/page?\\_pageid=734,1546097&\\_dad=portal&\\_schema=PORTAL](https://my.sfwmd.gov/portal/page?_pageid=734,1546097&_dad=portal&_schema=PORTAL), accessed August 22, 2008.
- 228. Florida Department of Environmental Protection, *Drinking Water, Basic Facility Reports*. Available at <http://www.dep.state.fl.us/water/drinkingwater/bfr.htm>, accessed August 20, 2008.
- 229. Florida Department of Environmental Protection, *Underground Injection Control Program*. Available at <http://www.dep.state.fl.us/water/uic/index.htm>, accessed September 6, 2008.
- 230. South Florida Water Management District, *Lower East Coast Water Supply Plan 2005–006 Update*, 2006.
- 231. National Oceanic and Atmospheric Administration (NOAA), *Orthometric Height Conversion*. Available at [http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert\\_con.prl](http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl), accessed September 24, 2008.

Turkey Point Units 6 & 7  
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232. U.S. Geological Survey, *USGS Ground-Water Daily Data for Florida*. Available at [http://waterdata.usgs.gov/fl/nwis/dv?referred\\_module=gw&county\\_cd=12086&station\\_type\\_cd=\\_\\_\\_\\_Y\\_&format=station\\_list&sort\\_key=site\\_no&group\\_key=NONE&sitefile\\_output\\_format=html\\_table&column\\_name=agency\\_cd&column\\_name=site\\_no&column\\_name=station\\_nm&range\\_selection=days&period=365&begin\\_date=&end\\_date=&date\\_format=YYYY-MM-DD&rdb\\_compression=file&list\\_of\\_search\\_criteria=county\\_cd%2Cstation\\_type\\_cd%2Crealtime\\_parameter\\_selection](http://waterdata.usgs.gov/fl/nwis/dv?referred_module=gw&county_cd=12086&station_type_cd=____Y_&format=station_list&sort_key=site_no&group_key=NONE&sitefile_output_format=html_table&column_name=agency_cd&column_name=site_no&column_name=station_nm&range_selection=days&period=365&begin_date=&end_date=&date_format=YYYY-MM-DD&rdb_compression=file&list_of_search_criteria=county_cd%2Cstation_type_cd%2Crealtime_parameter_selection), accessed April 15, 2009.
233. South Florida Water Management District, *DBHYDRO Browser Menu*. Available at [http://my.sfwmd.gov/dbhydroplsql/show\\_dbkey\\_info.main\\_menu](http://my.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu), accessed September 9, 2008 and April 15, 2009.
234. U.S. Geological Survey, *Ground-Water Levels for Florida*. Available at [http://nwis.waterdata.usgs.gov/fl/nwis/gwlevels?county\\_cd=12086&format=station\\_list&sort\\_key=site\\_no&group\\_key=NONE&sitefile\\_output\\_format=html\\_table&column\\_name=agency\\_cd&column\\_name=site\\_no&column\\_name=station\\_nm&begin\\_date=&end\\_date=&TZoutput=0&date\\_format=YYYY-MM-DD&rdb\\_compression=file&list\\_of\\_search\\_criteria=county\\_cd](http://nwis.waterdata.usgs.gov/fl/nwis/gwlevels?county_cd=12086&format=station_list&sort_key=site_no&group_key=NONE&sitefile_output_format=html_table&column_name=agency_cd&column_name=site_no&column_name=station_nm&begin_date=&end_date=&TZoutput=0&date_format=YYYY-MM-DD&rdb_compression=file&list_of_search_criteria=county_cd), accessed September 13, 2008.
235. Fetter, C.W., *Applied Hydrogeology*, second edition, Macmillan Publishing Company, New York, 1988.
236. Davis, S.N., and DeWeist R.J.M., *Hydrogeology*, John Wiley & Sons, Incorporated, 1966.
237. U.S. Environmental Protection Agency, *Relative Risk Assessment of Management Options for Treated Wastewater in South Florida*, Office of Water, EPA 816-R-03-010, pp. 4–9, April 2003.
238. Dames & Moore, *Geohydrologic Conditions Related to the Construction of Cooling Ponds Florida Power & Light Company Steam Generating Station Turkey Point Florida*, prepared for Brown and Root, Inc., July 1971.
239. Sherwood, C.B., McCoy, H.J., and Galliher, C.F., *Water resources of Broward County*, Florida Bureau of Geology Report of Investigations 65, 1973.

Turkey Point Units 6 & 7  
COL Application  
Part 2 — FSAR

- 240. Merritt, M., *Simulation of the Water-Table Altitude in the Biscayne Aquifer, Southern Dade County Florida, Water Years 1945–89*, Water Supply Paper 2458, U.S. Geological Survey, 1996.
- 241. Cunningham, K.J., Carlson, J.L., Wingard, G.L., Robinson, E., and Wacker, M.A., *Characterization of Aquifer Heterogeneity Using Cyclostratigraphy and Geophysical Methods in the Upper Part of the Karstic Biscayne Aquifer, Southeastern Florida*, Water-Resources Investigations Report 03-4208, U.S. Geological Survey, 2004.
- 242. Cunningham, K.J., Wacker, M.A., Robinson, E., Dixon, J.F., and Wingard, G.L., *A Cyclostratigraphic and Borehole-Geophysical Approach to Development of a Three-Dimensional Conceptual Hydrogeologic Model of the Karstic Biscayne Aquifer, Southeastern Florida*, Scientific Investigations Report 2005-5235, U.S. Geological Survey, 2006.
- 243. Duffield, G.M., *AQTESOLV for Windows Version 4.5 User's Guide*, HydroSOLVE, Inc., Reston, Virginia, 2007.
- 244. Johnston, R., and Bush, P., *Summary of the Hydrology of the Floridan Aquifer System in Florida and Parts of Georgia, South Carolina, and Alabama*, US Geological Survey Professional Paper 1403-A, 1988.
- 245. Florida Geological Survey, *Florida's Ground Water Quality Monitoring Program Background Hydrogeochemistry*, Special Publication 34, October 1992.
- 246. Harbaugh, A.W., Banta, E.R., Hill, M.C., and McDonald, M.G., *MODFLOW-2000, The U.S. Geological Survey Modular Ground-Water Model — User Guide to Modularization Concepts and the Ground-Water Flow Process*, Open-File Report 00-92, U.S. Geological Survey, 2000.
- 247. Maliva, R.G., Guo, W., and Missimer, T., "Vertical migration of municipal wastewater in deep injection well systems, South Florida, USA," *Hydrogeology Journal*, Springer-Verlag, 2007.
- 248. MACTEC Engineering and Consulting, Inc., *Final Data Report-Geotechnical Exploration and Testing: Turkey Point COL Project Florida City, Florida, Rev. 2*, October 6, 2008. Included in COL Application Part 11.



Turkey Point Units 6 & 7  
COL Application  
Part 2 — FSAR

249. Florida Power & Light Company, *Construction Permit Application to Construct a Class V Exploratory Well and Dual-Zone Monitor Well at the Florida Power and Light Company Turkey Point Units 6 & 7*, January 2009.
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**Table 2.4.12-201**  
**Summary of Observation Well Construction Data**

| Well Number | Borehole Depth<br>(feet bgs) | Well Depth<br>(feet bgs) | Coordinates (Florida East State Plane) in feet |          | Screened Interval<br>(feet bgs) | Top of Casing Elevation<br>(feet NAVD 88) | Height of casing<br>(feet ags) | Pad Elevation<br>(feet NAVD 88) |
|-------------|------------------------------|--------------------------|--|----------|---------------------------------|---|--------------------------------|---------------------------------|
|             |                              |                          | Northing                                       | Easting  |                                 |   |                                |                                 |
| OW-606D     | 137.0                        | 136.0                    | 396962.8                                       | 876712.9 | 125–135                         | 1.70                                      | 3.2                            | –1.6                            |
| OW-606L     | 110.0                        | 108.0                    | 396979.9                                       | 876732.6 | 97–107                          | 1.31                                      | 2.8                            | –1.5                            |
| OW-606U     | 30.2                         | 29.0                     | 396938.0                                       | 876734.8 | 18–28                           | 1.37                                      | 3.2                            | –1.8                            |
| OW-621L     | 110.0                        | 109.6                    | 97364.5  | 876970.0 | 98.6–108.6                      | 3.07                                      | 3.0                            | 0.1                             |
| OW-621U     | 30.0                         | 28.4                     | 397375.8                                       | 876930.0 | 17.4–27.4                       | 3.88                                      | 3.3                            | 0.6                             |
| OW-636L     | 111.0                        | 108.1                    | 395290.8                                       | 877257.2 | 97.1–107.1                      | 2.89                                      | 3.4                            | –0.4                            |
| OW-636U     | 29.8                         | 28.0                     | 396960.1                                       | 875864.4 | 17–27                           | 2.82                                      | 3.4                            | –0.6                            |
| OW-706D     | 138.4                        | 135.1                    | 396960.1                                       | 875864.4 | 123.8–133.8                     | 2.22                                      | 3.3                            | –1.1                            |
| OW-706L     | 112.0                        | 111.0                    | 396978.2                                       | 875904.6 | 100–110                         | 2.26                                      | 3.2                            | –1.0                            |
| OW-706U     | 29.0                         | 28.0                     | 396940.1                                       | 875895.7 | 17–27                           | 1.70                                      | 3.2                            | –1.5                            |
| OW-721L     | 109.0                        | 107.0                    | 397321.5                                       | 876120.3 | 96–106                          | 2.06                                      | 3.2                            | –1.2                            |
| OW-721U     | 26.0                         | 25.0                     | 397361.2                                       | 876121.4 | 14–24                           | 2.07                                      | 3.1                            | –1.1                            |
| OW-735L     | 110.0                        | 107.9                    | 395824.3                                       | 875669.5 | 96.9–106.9                      | 2.70                                      | 3.4                            | –0.7                            |
| OW-735U     | 28.0                         | 27.0                     | 395823.3                                       | 875709.2 | 16–26                           | 2.82                                      | 3.3                            | –0.5                            |
| OW-802L     | 110.0                        | 109.0                    | 398817.1                                       | 876255.7 | 98–108                          | 2.16                                      | 3.3                            | –1.2                            |
| OW-802U     | 27.0                         | 26.0                     | 398820.2                                       | 876243.7 | 15–25                           | 2.23                                      | 3.4                            | –1.2                            |
| OW-805L     | 97.0                         | 96.0                     | 396883.0                                       | 877239.5 | 85–95                           | 2.25                                      | 3.7                            | –1.5                            |
| OW-805U     | 30.0                         | 29.0                     | 396842.8                                       | 877240.9 | 18–28                           | 1.28                                      | 2.8                            | –1.6                            |
| OW-809L     | 110.0                        | 106.5                    | 397007.9                                       | 875152.3 | 95.5–105.5                      | 2.38                                      | 3.3                            | –0.9                            |
| OW-809U     | 27.0                         | 26.0                     | 397045.8                                       | 875152.4 | 15–25                           | 2.55                                      | 3.2                            | –0.7                            |
| OW-812L     | 109.0                        | 108.0                    | 368892.8                                       | 875045.5 | 97–107                          | 2.15                                      | 3.3                            | –1.2                            |
| OW-812U     | 27.0                         | 26.0                     | 398933.9                                       | 875043.5 | 15–25                           | 2.22                                      | 3.0                            | –0.8                            |

bgs = Below ground surface  
ags = Above ground surface

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**Table 2.4.12-202**  
**Historical and Projected Groundwater Use in Miami-Dade County**

| Year | Groundwater Use/Projected Use in million gallons per day |          |            |              |              |                  |
|------|--|----------|------------|--------------|--------------|------------------|
|      | Public Supply  | Domestic | Commercial | Agricultural | Recreational | Power Generation |
| 1965 | 202.3  | 9.6      | 5          | 67.9         | —            | 0.3              |
| 1970 | 212.1  | 9.13     | 7.7        | 44.8         | —            | 0.04             |
| 1975 | 270.5  | 9.5      | 3.38       | 87.66        | —            | 0.04             |
| 1977 | 280.15   | 3.98     | 6.73       | 101.06       | —            | 0                |
| 1980 | 314.29   | 18.38    | 19.73      | 86.98        | —            | 0                |
| 1985 | 339.77   | 13.32    | 15.78      | 103.68       | 13.5         | 0                |
| 1990 | 337.69   | 10.75    | 40.34      | 115.01       | 20.55        | 2.26             |
| 1995 | 386.6  | 12.71    | 38.82      | 95.95        | 14.24        | 2.1              |
| 2000 | 394.29   | 4.85     | 41.65      | 86.55        | 8.51         | 2.08             |
| 2005 | 400.01   | 2.78     | 40.08      | 58.06        | 13.4         | 0.42             |
| 2010 | 407.8 <sup>(a)</sup>                                     |          | 41.7       | 92.1         | 10.4         | 14.2             |
| 2015 | 435.2 <sup>(a)</sup>                                     |          | 41.7       | 91.5         | 12           | 14.2             |
| 2020 | 459.6 <sup>(a)</sup>                                     |          | 41.7       | 90.8         | 13.6         | 14.2             |
| 2025 | 483.1 <sup>(a)</sup>                                     |          | 41.7       | 90.2         | 15.1         | 69.8             |

(a) Projected use includes Public Supply and Domestic as a single value.

Sources:

1965–2000 [Reference 221](#)

2005 [Reference 222](#)

2010–2025 [Reference 230](#)

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**Table 2.4.12-203 (Sheet 1 of 5)**  
**Public Water Supply Systems in Miami-Dade County**

| Pws Id  | Type         | Mailing Name                          | City               | Owner Type                        | Pop Served | Sells to Pop | Design Cap  |
|---------|--------------|---------------------------------------|--------------------|-----------------------------------|------------|--------------|-------------|
| 4130077 | Community    | Bal Harbour Village                   | Bal Harbour        | Municipality                      | 3,309      | 0            | 3,672,000   |
| 4130089 | Community    | Bay Harbor Islands Town of            | Bay Harbor Islands | Municipality                      | 5,146      | 0            | 1,500,000   |
| 4130255 | Community    | Florida City                          | Florida City       | Municipality                      | 9,445      | 0            | 4,000,000   |
| 4130588 | Community    | Redlands Mobile Home Park             | Miami              | Investor                          | 160        | 0            | 100,000     |
| 4130604 | Community    | Hialeah City of                       | Hialeah            | Municipality                      | 110,000    | 0            | 40,000,000  |
| 4130645 | Community    | Homestead City of                     | Homestead          | Municipality                      | 39,000     | 385          | 16,900,000  |
| 4130662 | Community    | Indian Creek Village                  | Miami Beach        | Authority/Commis<br>sion/District | 103        | 0            | 1,080,000   |
| 4130833 | Community    | Jones' Trailer Park                   | Miami              | Investor                          | 120        | 0            | 50,000      |
| 4130871 | Community    | Mdwasas - Main System                 | Miami              | Municipality                      | 2,100,000  | 322,608      | 442,740,000 |
| 4130901 | Community    | Miami Beach City of                   | Miami Beach        | Municipality                      | 87,933     | 3309         | 65,000,000  |
| 4130904 | Community    | Miami Springs City of                 | Miami Springs      | Municipality                      | 14,000     | 0            | 5,472,000   |
| 4130970 | Community    | North Bay Village City of             | North Bay Village  | Municipality                      | 6,733      | 0            | 6,480,000   |
| 4130977 | Community    | North Miami City of                   | North Miami        | Municipality                      | 80,000     | 4,809        | 9,300,000   |
| 4131001 | Community    | Opa Locka City of                     | Opa Locka          | Municipality                      | 15,250     | 0            | 6,900,000   |
| 4131202 | Community    | Mdwasas/Rex Utilities                 | Miami              | Investor                          | 41,500     | 0            | 12,030,000  |
| 4131206 | Community    | Rex Utilities Inc/Redavo              | Homestead          | Municipality                      | 385        | 0            | 570,000     |
| 4131312 | Community    | Silver Palm Mobile Homes              | Miami              | Investor                          | 250        | 0            | 122,000     |
| 4131403 | Community    | Americana Village                     | Miami              | Investor                          | 2,100      | 0            | 500,000     |
| 4131424 | Community    | Surfside Town of                      | Surfside           | Municipality                      | 5,600      | 103          | 1,512,000   |
| 4131474 | Community    | Medley Water Department               | Miami              | Municipality                      | 1,098      | 0            | 1,800,000   |
| 4131531 | Community    | Virginia Gardens Village of           | Virginia Gardens   | Municipality                      | 2,212      | 0            | 5,000,000   |
| 4131558 | Community    | West Miami City of                    | West Miami         | Municipality                      | 5,863      | 0            | 1,000,000   |
| 4131618 | Community    | North Miami Beach                     | North Miami Beach  | Municipality                      | 160,000    | 13,146       | 32,000,000  |
| 4134357 | Community    | Fkaa J. Robert Dean W.T.P.            | Florida City       | State                             | 80,500     | 0            | 22,000,000  |
| 4134358 | Community    | Dade Juvenile Residential<br>Facility | Florida City       | Investor                          | 290        | 0            | 35,000      |
| 4134365 | Community    | Hialeah Gardens                       | Hialeah Gardens    | Municipality                      | 19,297     | 0            | 1           |
| 4130048 | Noncommunity | Anderson's Corner Grocery             | Miami              | Investor                          | 35         | 0            | 8,000       |
| 4130053 | Noncommunity | Hightailin' It                        | Miami              | Investor                          | 205        | 0            | 28,000      |
| 4130112 | Noncommunity | Benson Lighting                       | Miami              | Investor                          | 25         | 0            | 36,000      |
| 4130159 | Noncommunity | Brooks (J R) & Son                    | Homestead          | Investor                          | 100        | 0            | 28,000      |
| 4130320 | Noncommunity | Camp Owaissa Bauer                    | Miami              | Municipality                      | 146        | 0            | 183,000     |
| 4130496 | Noncommunity | Franksher Building                    | Miami              | Investor                          | 25         | 0            | 64,000      |

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**Table 2.4.12-203 (Sheet 2 of 5)**  
**Public Water Supply Systems in Miami-Dade County**

| Pws Id  | Type         | Mailing Name                         | City         | Owner Type   | Pop Served | Sells to Pop | Design Cap |
|---------|--------------|--------------------------------------|--------------|--------------|------------|--------------|------------|
| 4130721 | Noncommunity | Miami Everglades Campground          | Miami        | Unknown      | 562        | 0            | 122,000    |
| 4130736 | Noncommunity | Villa De Don Pollo                   | Miami        | Investor     | 599        | 0            | 36,000     |
| 4130793 | Noncommunity | Deluxe Motel                         | Leisure City | Investor     | 50         | 0            | 46,000     |
| 4130811 | Noncommunity | De Leon Harvesting                   | Homestead    | Investor     | 25         | 0            | 36,000     |
| 4130823 | Noncommunity | Dan Lewis Properties                 | Miami        | Investor     | 25         | 0            | 15,000     |
| 4130891 | Noncommunity | Roberts Air                          | Homestead    | Municipality | 25         | 0            | 28,000     |
| 4130893 | Noncommunity | Dade Homestead Gaa - Admin.          | Homestead    | Municipality | 25         | 0            | 28,000     |
| 4130894 | Noncommunity | Dade Homestead Gaa Skydive           | Homestead    | Municipality | 30         | 0            | 28,000     |
| 4130897 | Noncommunity | Dade Landscape Nursery               | Miami        | Municipality | 40         | 0            | 86,000     |
| 4130933 | Noncommunity | Monkey Jungle                        | Miami        | Investor     | 300        | 0            | 122,000    |
| 4130951 | Noncommunity | Last Chance Lounge                   | Florida City | Investor     | 100        | 0            | 5,000      |
| 4131080 | Noncommunity | Pedersen Building                    | Miami        | Investor     | 25         | 0            | 17,000     |
| 4131185 | Noncommunity | Grove Inn                            | Miami        | Investor     | 25         | 0            | 36,000     |
| 4131192 | Noncommunity | Redland Golf & Country Club          | Homestead    | Investor     | 380        | 0            | 57,000     |
| 4131217 | Noncommunity | Rinker Cement Mill                   | Miami        | Investor     | 130        | 0            | 720,000    |
| 4131250 | Noncommunity | America's Best Inn                   | Homestead    | Investor     | 50         | 0            | 61,000     |
| 4131313 | Noncommunity | Silver Palms Methodist Church        | Homestead    | Other        | 200        | 0            | 36,000     |
| 4131454 | Noncommunity | R & R Cafe                           | Homestead    | Investor     | 100        | 0            | 36,000     |
| 4131961 | Noncommunity | Redland Fruit and Spice Park         | Miami        | County       | 55         | 0            | 46,000     |
| 4131962 | Noncommunity | Castellow Hammock Park               | Miami        | County       | 68         | 0            | 1,700      |
| 4134228 | Noncommunity | Chevron Krome                        | Homestead    | Investor     | 25         | 0            | 1,000      |
| 4134234 | Noncommunity | Cemex Materials - Sweetwater         | Miami        | Investor     | 50         | 0            | 5,000      |
| 4134237 | Noncommunity | Jack's Bait & Tackle                 | Florida City | Investor     | 200        | 0            | 3,200      |
| 4134239 | Noncommunity | Liberty (Formerly Shell Gas Station) | Miami        | Investor     | 25         | 0            | 9,600      |
| 4134301 | Noncommunity | Iglesia Buen Samaritano              | Miami        | Investor     | 100        | 0            | 12,000     |
| 4134328 | Noncommunity | Atlantic Fertilizer                  | Homestead    | Investor     | 40         | 0            | 1,000      |
| 4134334 | Noncommunity | Costa Nursery II                     | Miami        | Investor     | 25         | 0            | 1,000      |
| 4134338 | Noncommunity | Benito Juarez Park                   | Homestead    | County       | 100        | 0            | 1,700      |
| 4134363 | Noncommunity | Homestead Jehovah's Witness          | Homestead    | Other        | 100        | 0            | 1          |
| 4134364 | Noncommunity | Dade Corners                         | Miami        | Investor     | 25         | 0            | 10,000     |
| 4134379 | Noncommunity | Bernecker's Nursery                  | Miami        | Investor     | 25         | 0            | 5,000      |
| 4134422 | Noncommunity | South Florida Testing Service        | Hialeah      | Investor     | 50         | 0            | 5,000      |
| 4134430 | Noncommunity | Tom Thumb #122                       | Miami 33170  | Investor     | 25         | 0            | 5,000      |
| 4134431 | Noncommunity | Redland Exxon                        | Miami        | Investor     | 25         | 0            | 5,000      |

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**Table 2.4.12-203 (Sheet 3 of 5)**  
**Public Water Supply Systems in Miami-Dade County**

| Pws Id  | Type         | Mailing Name                     | City               | Owner Type | Pop Served | Sells to Pop | Design Cap |
|---------|--------------|----------------------------------|--------------------|------------|------------|--------------|------------|
| 4134434 | Noncommunity | Community Asphalt                | Hialeah            | Investor   | 25         | 0            | 5,000      |
| 4134439 | Noncommunity | Cemex-F.E.C. Office              | Hialeah            | Investor   | 160        | 0            | 3,000      |
| 4134442 | Noncommunity | Redland Community Church         | Miami              | Investor   | 500        | 0            | 3,000      |
| 4134382 | Noncommunity | Butler's Nursery                 | Miami              | Investor   | 25         | 0            | 5,000      |
| 4134384 | Noncommunity | Cauley Square Tea Room           | Miami              | Investor   | 40         | 0            | 10,000     |
| 4134387 | Noncommunity | Coconut Palm Trading Post        | Homestead          | Investor   | 300        | 0            | 5,000      |
| 4134388 | Noncommunity | Coffey's Market                  | Miami              | Investor   | 35         | 0            | 5,000      |
| 4134393 | Noncommunity | Coopertown                       | Miami              | Investor   | 100        | 0            | 5,000      |
| 4134394 | Noncommunity | Costa Nursery                    | Miami              | Investor   | 150        | 0            | 5,000      |
| 4134400 | Noncommunity | El Nopal                         | Miami              | Investor   | 25         | 0            | 5,000      |
| 4134402 | Noncommunity | Greenleaf Nursery                | Homestead          | Investor   | 25         | 0            | 5,000      |
| 4134404 | Noncommunity | Gulfstream Tomato Growers        | Miami              | Investor   | 100        | 0            | 5,000      |
| 4134414 | Noncommunity | Playpen South (Gator Kicks)      | Miami              | Investor   | 50         | 0            | 5,000      |
| 4134417 | Noncommunity | Redland Tavern                   | Goulds             | Investor   | 40         | 0            | 5,000      |
| 4134420 | Noncommunity | Safari Restaurant                | Miami              | Investor   | 25         | 0            | 5,000      |
| 4134443 | Noncommunity | Comcast Cable                    | Miami              | Other      | 225        | 0            | 3,000      |
| 4134445 | Noncommunity | First Grace Faith Pentecost      | Princeton          | Investor   | 25         | 0            | 3,000      |
| 4134446 | Noncommunity | Kent Motel                       | Goulds             | Investor   | 50         | 0            | 3,000      |
| 4134448 | Noncommunity | Palms Professional Center        | Miami              | Investor   | 25         | 0            | 3,000      |
| 4134451 | Noncommunity | Farm Credit Service              | Homestead Fl 33090 | Investor   | 25         | 0            | 2,720      |
| 4134453 | Noncommunity | Cemex-F.E.C. Shop                | Hialeah            | Investor   | 35         | 0            | 16,000     |
| 4134454 | Noncommunity | Rancho Okeechobee                | Hialeah Gardens    | Investor   | 200        | 0            | 3,000      |
| 4134459 | Noncommunity | Circle D Farms                   | Homestead          | Investor   | 25         | 0            | 3,000      |
| 4134462 | Noncommunity | Redlands Grocery                 | Homestead          | Investor   | 200        | 0            | 3,000      |
| 4134464 | Noncommunity | Sunrise Adult Group Home (15190) | Naranja            | Investor   | 25         | 0            | 3,000      |
| 4134465 | Noncommunity | Sunrise Adult Services (29800)   | Homestead          | Investor   | 80         | 0            | 3,000      |
| 4134468 | Noncommunity | U-Haul Rental & Services         | Miami              | Investor   | 25         | 0            | 3,000      |
| 4134471 | Noncommunity | Certified Auto                   | Miami              | Investor   | 25         | 0            | 3,000      |
| 4134494 | Noncommunity | Dinas Quick Mart                 | Miami              | Investor   | 25         | 0            | 3,000      |
| 4134499 | Noncommunity | Our Lady of Mercy Cemetery       | Doral              | Investor   | 50         | 0            | 2,000      |
| 4134506 | Noncommunity | First Baptist Church Redland     | Homestead          | Other      | 120        | 0            | 2,000      |
| 4134508 | Noncommunity | Aviary Bird Shop                 | Goulds             | Investor   | 25         | 0            | 2,000      |
| 4134512 | Noncommunity | De Leon Bromeliads               | Miami              | Investor   | 54         | 0            | 5,000      |
| 4134516 | Noncommunity | Tom Thumb #127                   | Hialeah            | Investor   | 25         | 0            | 2,400      |

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**Table 2.4.12-203 (Sheet 4 of 5)**  
**Public Water Supply Systems in Miami-Dade County**

| Pws Id  | Type                         | Mailing Name                         | City         | Owner Type   | Pop Served | Sells to Pop | Design Cap |
|---------|------------------------------|--------------------------------------|--------------|--------------|------------|--------------|------------|
| 4134518 | Noncommunity                 | Christ Life Center                   | Miami        | Other        | 485        | 0            | 500        |
| 4134519 | Noncommunity                 | Okeechobee Barrier                   | Miami        | State        | 39         | 0            | 9,600      |
| 4134522 | Noncommunity                 | 1st Baptist Church of Homestead      | Homestead    | Other        | 300        | 0            | 5,000      |
| 4134523 | Noncommunity                 | Women's Club of Homestead            | Homestead    | Other        | 25         | 0            | 3,300      |
| 4134524 | Noncommunity                 | Redland Church of the Nazarene       | Miami        | Other        | 150        | 0            | 7,200      |
| 4134525 | Noncommunity                 | Cemex Hydro-Conduit                  | Miami        | Investor     | 28         | 0            | 1,400      |
| 4134527 | Noncommunity                 | Cemex Employees                      | Miami        | Investor     | 50         | 0            | 0          |
| 4134528 | Noncommunity                 | Fruitcuba                            | Miami        | Investor     | 50         | 0            | 0          |
| 4134529 | Noncommunity                 | Us 1 Motors                          | Miami        | Unknown      | 25         | 0            | 2,000      |
| 4134531 | Noncommunity                 | Tom Thumb 131                        | Homestead    | Investor     | 25         | 0            | 1,000      |
| 4134532 | Noncommunity                 | Sunoco Krome Ave                     | Miami        | Investor     | 25         | 0            | 50         |
| 4134533 | Noncommunity                 | Gator Park                           | Miami        | Investor     | 25         | 0            | 3,000      |
| 4134535 | Noncommunity                 | Vila & Sons                          | Medley       | Investor     | 25         | 0            | 50         |
| 4134536 | Noncommunity                 | Everglades Store                     | Florida City | Investor     | 25         | 0            | 15         |
| 4134537 | Noncommunity                 | Mannheime Foundation                 | Homestead    | Investor     | 50         | 0            | 0          |
| 4134538 | Noncommunity                 | Bt South DbA Boody Trap              | Homestead    | Investor     | 30         | 0            | 120        |
| 4134540 | Noncommunity                 | Chevron Gas Station                  | Miami        | Investor     | 80         | 0            | 320        |
| 4134542 | Noncommunity                 | Las Margaritas Shopping Center       | Miami        | Investor     | 50         | 0            | 3,200      |
| 4134543 | Noncommunity                 | Schnebly Winery                      | Homestead    | Investor     | 25         | 0            | 4,800      |
| 4134544 | Noncommunity                 | Fruteria Cachita                     | Miami        | Investor     | 25         | 0            | 2,000      |
| 4134545 | Noncommunity                 | Cope Produce                         | Homestead    | Investor     | 50         | 0            | 0          |
| 4130322 | Nontransient<br>Noncommunity | Redland Jr. High School              | Homestead    | Municipality | 1,496      | 0            | 144,000    |
| 4130445 | Nontransient<br>Noncommunity | Tropical Research & Education Center | Homestead    | State        | 75         | 0            | 36,000     |
| 4130934 | Nontransient<br>Noncommunity | Montessori Country School            | Homestead    | Investor     | 120        | 0            | 38,000     |
| 4131958 | Nontransient<br>Noncommunity | Sunrise Community                    | Miami        | Investor     | 120        | 0            | 150,000    |
| 4134300 | Nontransient<br>Noncommunity | Redland Christian Academy            | Homestead    | Other        | 300        | 0            | 10,000     |
| 4134385 | Nontransient<br>Noncommunity | Unitarian Universal Congr'n of Miami | Miami        | Investor     | 75         | 0            | 5,000      |

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**Table 2.4.12-203 (Sheet 5 of 5)**  
**Public Water Supply Systems in Miami-Dade County**

| <b>Pws Id</b> | <b>Type</b>                  | <b>Mailing Name</b>                | <b>City</b> | <b>Owner Type</b> | <b>Pop Served</b> | <b>Sells to Pop</b> | <b>Design Cap</b> |
|---------------|------------------------------|------------------------------------|-------------|-------------------|-------------------|---------------------|-------------------|
| 4134498       | Nontransient<br>Noncommunity | Creative Years                     | Miami       | Investor          | 100               | 0                   | 2,000             |
| 4134502       | Nontransient<br>Noncommunity | Christian Family Worship<br>Center | Homestead   | Investor          | 400               | 0                   | 9,600             |
| 4134513       | Nontransient<br>Noncommunity | Miami Intl Airport                 | Miami       | County            | 26,800            | 0                   | 1                 |

Pop = Population note

Cap = Capacity

Source: [Reference 228](#)



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**Table 2.4.12-204 (Sheet 1 of 2)**  
**Vertical Hydraulic Gradients**

| Well Pair | Date/Time       | Tide Condition | Upper Screened Interval Midpoint (feet bgs) | Lower Screened Interval Midpoint (feet bgs) | ΔL (feet) | Upper Reference Head (feet NAVD 88) | Lower Reference Head (feet NAVD 88) | Δh (feet) | Vertical Hydraulic Gradient i (feet/feet) |
|-----------|-----------------|----------------|---|---|-----------|-------------------------------------|-------------------------------------|-----------|---|
| OW-621U/L | 6/29/2008 14:00 | Low            | 22.4  | 103.6                                       | 81.2      | -1.30                               | 0.45                                | 1.75      | 0.022                                     |
| OW-621U/L | 6/29/2008 7:00  | High           | 22.4  | 103.6                                       | 81.2      | -0.98                               | 0.77                                | 1.75      | 0.022                                     |
| OW-621U/L | 8/15/2008 17:00 | Low            | 22.4  | 103.6                                       | 81.2      | -1.09                               | 0.64                                | 1.73      | 0.021                                     |
| OW-621U/L | 8/15/2008 10:00 | High           | 22.4  | 103.6                                       | 81.2      | -0.64                               | 1.08                                | 1.72      | 0.021                                     |
| OW-621U/L | 10/5/2008 8:00  | Low            | 22.4  | 103.6                                       | 81.2      | 0.16                                | 1.82                                | 1.66      | 0.020                                     |
| OW-621U/L | 10/5/2008 1:00  | High           | 22.4  | 103.6                                       | 81.2      | 0.63                                | 2.30                                | 1.67      | 0.021                                     |
| OW-621U/L | 1/21/2009 2:00  | Low            | 22.4  | 103.6                                       | 81.2      | -2.82                               | -0.97                               | 1.85      | 0.023                                     |
| OW-621U/L | 1/20/2009 19:00 | High           | 22.4  | 103.6                                       | 81.2      | -2.18                               | -0.34                               | 1.84      | 0.023                                     |
| OW-636U/L | 6/29/2008 14:00 | Low            | 22  | 102.1                                       | 80.1      | -1.02                               | -0.24                               | 0.78      | 0.010                                     |
| OW-636U/L | 6/29/2008 7:00  | High           | 22  | 102.1                                       | 80.1      | -0.69                               | 0.06                                | 0.75      | 0.009                                     |
| OW-636U/L | 8/15/2008 17:00 | Low            | 22  | 102.1                                       | 80.1      | -0.80                               | -0.01                               | 0.78      | 0.010                                     |
| OW-636U/L | 8/15/2008 10:00 | High           | 22  | 102.1                                       | 80.1      | -0.35                               | 0.39                                | 0.75      | 0.009                                     |
| OW-636U/L | 10/5/2008 8:00  | Low            | 22  | 102.1                                       | 80.1      | 0.35                                | 1.05                                | 0.70      | 0.009                                     |
| OW-636U/L | 10/5/2008 1:00  | High           | 22  | 102.1                                       | 80.1      | 0.83                                | 1.52                                | 0.69      | 0.009                                     |
| OW-735U/L | 6/29/2008 14:00 | Low            | 21  | 101.9                                       | 80.9      | -1.32                               | 2.08                                | 3.41      | 0.042                                     |
| OW-735U/L | 6/29/2008 7:00  | High           | 21  | 101.9                                       | 80.9      | -1.21                               | 2.20                                | 3.40      | 0.042                                     |
| OW-735U/L | 8/15/2008 17:00 | Low            | 21  | 101.9                                       | 80.9      | -1.20                               | 2.19                                | 3.40      | 0.042                                     |
| OW-735U/L | 8/15/2008 10:00 | High           | 21  | 101.9                                       | 80.9      | -0.93                               | 2.46                                | 3.38      | 0.042                                     |
| OW-735U/L | 10/5/2008 8:00  | Low            | 21  | 101.9                                       | 80.9      | 0.18                                | 3.35                                | 3.17      | 0.039                                     |
| OW-735U/L | 10/5/2008 1:00  | High           | 21  | 101.9                                       | 80.9      | 0.40                                | 3.56                                | 3.16      | 0.039                                     |
| OW-805U/L | 6/29/2008 14:00 | Low            | 23  | 90  | 67.0      | -1.32                               | 0.09                                | 1.40      | 0.021                                     |
| OW-805U/L | 6/29/2008 7:00  | High           | 23  | 90  | 67.0      | -0.97                               | 0.44                                | 1.41      | 0.021                                     |
| OW-805U/L | 8/15/2008 17:00 | Low            | 23  | 90  | 67.0      | -1.11                               | 0.28                                | 1.40      | 0.021                                     |
| OW-805U/L | 8/15/2008 10:00 | High           | 23  | 90  | 67.0      | -0.63                               | 0.71                                | 1.34      | 0.020                                     |
| OW-805U/L | 10/5/2008 8:00  | Low            | 23  | 90  | 67.0      | 0.06                                | 1.44                                | 1.37      | 0.021                                     |
| OW-805U/L | 1/21/2009 2:00  | Low            | 23  | 90  | 67.0      | -2.77                               | -1.42                               | 1.35      | 0.020                                     |
| OW-805U/L | 1/20/2009 19:00 | High           | 23  | 90  | 67.0      | -2.14                               | -0.80                               | 1.35      | 0.020                                     |

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**Table 2.4.12-204 (Sheet 2 of 2)**  
**Vertical Hydraulic Gradients**

| Well Pair | Date/Time       | Tide Condition | Upper Screened Interval Midpoint (feet bgs) | Lower Screened Interval Midpoint (feet bgs) | $\Delta L$ (feet) | Upper Reference Head (feet NAVD 88) | Lower Reference Head (feet NAVD 88) | $\Delta h$ (feet) | Vertical Hydraulic Gradient $i$ (feet/feet) |
|-----------|-----------------|----------------|---|---|-------------------|-------------------------------------|-------------------------------------|-------------------|---|
| OW-809U/L | 6/29/2008 14:00 | Low            | 20  | 100.5                                       | 80.5              | -1.22                               | 0.47                                | 1.69              | 0.021                                       |
| OW-809U/L | 6/29/2008 7:00  | High           | 20  | 100.5                                       | 80.5              | -1.14                               | 0.54                                | 1.69              | 0.021                                       |
| OW-809U/L | 8/15/2008 17:00 | Low            | 20  | 100.5                                       | 80.5              | -1.12                               | 0.46                                | 1.58              | 0.020                                       |
| OW-809U/L | 8/15/2008 10:00 | High           | 20  | 100.5                                       | 80.5              | -0.90                               | 0.68                                | 1.58              | 0.020                                       |
| OW-809U/L | 10/5/2008 8:00  | Low            | 20  | 100.5                                       | 80.5              | 0.39                                | 1.88                                | 1.49              | 0.019                                       |
| OW-809U/L | 10/5/2008 1:00  | High           | 20  | 100.5                                       | 80.5              | 0.54                                | 2.04                                | 1.50              | 0.019                                       |
| OW-809U/L | 1/21/2009 2:00  | Low            | 20  | 100.5                                       | 80.5              | -3.01                               | -1.53                               | 1.47              | 0.018                                       |
| OW-809U/L | 1/20/2009 19:00 | High           | 20  | 100.5                                       | 80.5              | -2.39                               | -0.91                               | 1.48              | 0.018                                       |
| OW-812U/L | 6/29/2008 14:00 | Low            | 20  | 102   | 82.0              | -0.99                               | 0.61                                | 1.60              | 0.019                                       |
| OW-812U/L | 6/29/2008 7:00  | High           | 20  | 102   | 82.0              | -0.89                               | 0.73                                | 1.62              | 0.020                                       |
| OW-812U/L | 8/15/2008 17:00 | Low            | 20  | 102   | 82.0              | -0.88                               | 0.73                                | 1.61              | 0.020                                       |
| OW-812U/L | 8/15/2008 10:00 | High           | 20  | 102   | 82.0              | -0.65                               | 0.97                                | 1.62              | 0.020                                       |

bgs = Below ground surface

$\Delta h$  = Lower Reference Head – Upper Reference Head

$\Delta L$  = Lower Screened Interval Midpoint – Upper Screened Interval Midpoint

$i$  =  $\Delta h / \Delta L$  (negative value indicates downward flow potential and positive value indicates upward flow potential)

Reference Head values are estimated using the density of water in the well and correcting the water level to the average density of seawater in Biscayne Bay.

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**Table 2.4.12-205**  
**Representative Hydrogeologic Properties in Miami-Dade County<sup>(a)</sup>**

| Hydrogeologic Unit<br>or Subunit | Hydraulic Conductivity<br>(feet per day) |                          | Porosity | Approximate<br>Depth<br>(feet bgs) | Unit<br>Thickness<br>(feet) |
|----------------------------------|--|--------------------------|----------|------------------------------------|-----------------------------|
|                                  | Horizontal                               | Vertical                 |          |                                    |                             |
| Biscayne aquifer                 | 1524                                     | 15                       | 0.31     | 0–230                              | 230                         |
| Intermediate<br>confining unit   | 90                                       | 0.1–2.38                 | 0.1–0.31 | 230–840                            | 610                         |
| Upper Floridan aquifer           | 42                                       | 0.42–2.38                | 0.1–0.32 | 840–2060                           | 1220                        |
| Middle confining unit            | 4.7                                      | 0.04–1.50 <sup>(b)</sup> | 0.1–0.43 | 2060–2550                          | 490                         |
| Lower Floridan aquifer           | 0.01                                     | 0.1                      | 0.1–0.4  | 2550–2750                          | 200 <sup>(c)</sup>          |
| Boulder Zone                     | 6540                                     | 65                       | 0.2      | 2750–>3250                         | 500                         |

- (a) Values in this table represent weighted averages for risk assessment for management of treated wastewater and thus may not be representative of actual conditions.
- (b) The vertical hydraulic conductivity included here may be two to three orders of magnitude higher than other measurements in South Florida. [Reference 247](#) indicates a vertical hydraulic conductivity range of 3E-04 to 3E-05 feet per day based on core measurements.
- (c) The Lower Floridan aquifer extends below the Boulder Zone; the thickness presented is only for the portion above the Boulder Zone.

Adapted from [Reference 237](#)

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**Table 2.4.12-206 (Sheet 1 of 8)**  
**Regional Aquifer Properties**

| Site   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                | Comments  |
|--|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|------------------------|---|
| Florida Keys Aqueduct Auth Jr Dean WTP-Florida City <sup>(b)</sup> | APT                      | 10/08/2003 0000      | FKAACEW1    | 818,318                     | 403,673                     | 280                    | 10,790                                | 72           | —           | 880                       | 1,353                     | —                       | —                   | —                | Upper Floridan Aquifer | Specific capacity: 15 gpm/ft<br>**Water was blended with raw water from Biscayne aquifer well field and apt initiated as step test to accommodate discharge to sewer system. Initial pump rate of 280 gpm; increased to 500 gpm and 750 gpm for first 24 hours. Rate decreased to 600 gpm for remainder of test as TDS concentration rose at 750 gpm. |
| Florida Keys Aqueduct Auth Jr Dean WTP-Florida City <sup>(b)</sup> | Packer                   | 07/02/2003 0000      | FKAACEW1    | 818,318                     | 403,673                     | 25                     | 29                                    | —            | —           | 1,050                     | 1,150                     | —                       | —                   | —                | Upper Floridan Aquifer | Packer test #1<br>Specific capacity: 0.3 gpm/ft<br>Salt plug in well was not completely purged prior to start of test- the initial static water level assumed to be the level to which the water level in the drill stem recovered at conclusion of test.   |

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**Table 2.4.12-206 (Sheet 2 of 8)**  
**Regional Aquifer Properties**

| Site   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                  | Comments  |
|--|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|--------------------------|---|
| Florida Keys Aqueduct Auth Jr Dean WTP-Florida City <sup>(b)</sup> | Packer                   | 07/09/2003 0000      | FKAACEW1    | 818,318                     | 403,673                     | 85                     | —                                     | —            | —           | 1,220                     | 1,283                     | —                       | —                   | —                | Upper Floridan Aquifer   | Packer test #2<br>Specific capacity: 12 gpm/ft<br>Parameters not analyzed- no typical pump or recovery curves-water level responded so quickly to the start and stop of test.   |
| Florida Keys Aqueduct Auth Jr Dean WTP-Florida City <sup>(b)</sup> | Packer                   | 07/10/2003 0000      | FKAACEW1    | 818,318                     | 403,673                     | 82                     | 2,200                                 | —            | —           | 1,150                     | 1,213                     | —                       | —                   | —                | Upper Floridan Aquifer   | Packer test #3<br>Specific capacity: 3 gpm/ft.  |
| Florida Keys Aqueduct Auth Jr Dean WTP-Florida City <sup>(b)</sup> | Packer                   | 07/22/2003 0000      | FKAACEW1    | 818,318                     | 403,673                     | 60                     | 492                                   | —            | —           | 880                       | 1,040                     | —                       | —                   | —                | Upper Floridan Aquifer   | Packer test #4<br>Specific capacity: 2 gpm/ft.  |
| Homestead Airforce Base <sup>(b)</sup>                             | Step-Draw-down           | 12/25/1991 0000      | G-3314      | 801,450                     | 426,168                     | —                      | 1,000,000                             | —            | —           | 21                        | 48                        | 37,000                  | —                   | —                | Surficial Aquifer System | Step drawdown test. Limits of the aquifer testing resulted in the transmissivity and conductivity values being greater than the values listed. For example the transmissivity may say 1,000,000 but it was actually 1,000,000+. |

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**Table 2.4.12-206 (Sheet 3 of 8)**  
**Regional Aquifer Properties**

| Site  | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                  | Comments  |
|---|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|--------------------------|---|
| Camp Owaissa-Bauer <sup>(b)</sup>           | Step-Draw-down           | 12/25/1991 0000      | G-3315      | 833,217                     | 432,443                     | —                      | 1,000,000                             | —            | —           | 32                        | 69                        | 27,000                  | —                   | —                | Surficial Aquifer System | Step drawdown test. Limits of the aquifer testing resulted in the transmissivity and conductivity values being greater than the values listed. For example the transmissivity may say 1,000,000 but it was actually 1,000,000+. |
| Camp Owaissa-Bauer <sup>(b)</sup>           | Other                    | 12/25/1991 0000      | G-3315      | 833,217                     | 432,443                     | —                      | 65                                    | —            | —           | 94                        | 111.5                     | 3.7                     | —                   | —                | Surficial Aquifer System | Specific capacity test.   |
| Levee 31w (At Structure 175) <sup>(b)</sup> | Other                    | 12/25/1991 0000      | G-3319      | 796,786                     | 394,757                     | —                      | 1,000,000                             | —            | —           | 21                        | 39.3                      | 55,000                  | —                   | —                | Surficial Aquifer System | Step drawdown test. Limits of the aquifer testing resulted in the transmissivity and conductivity values being greater than the values listed. For example the transmissivity may say 1,000,000 but it was actually 1,000,000+. |
| Naval Station <sup>(b)</sup>                | Other                    | 12/25/1991 0000      | G-3320      | 831,332                     | 399,726                     | —                      | 1,000,000                             | —            | —           | 32                        | 80                        | 21,000                  | —                   | —                | Surficial Aquifer System | Step drawdown test. Limits of the aquifer testing resulted in the transmissivity and conductivity values being greater than the values listed. For example the transmissivity may say 1,000,000 but it was actually 1,000,000+. |

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**Table 2.4.12-206 (Sheet 4 of 8)**  
**Regional Aquifer Properties**

| Site   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                  | Comments  |
|--|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|--------------------------|---|
| Homestead Airforce Base Well Field 2 <sup>(b)</sup>                        | Specific Capacity        | 01/01/2000 0000      | HAFB-1      | 852,589                     | 423,035                     | 900                    | 60,000                                | —            | —           | —                         | 30                        | —                       | —                   | —                | Surficial Aquifer System | Transmissivity value was estimated from specific capacity value. Prepared in cooperation with the SFWMD, this data was compiled from Metro-Dade Water and Sewer Authority or from SFWMD files.  |
| Miami-Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/25/1977 0812      | MDWSA_I5    | 876,304                     | 442,461                     | 50                     | 8.54                                  | 0.7          | —           | 2,737                     | 2,759                     | —                       | 1                   | —                | Boulder Zone             | Packer test 1 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.   |
| Miami Dade Water and Sewer Auth. So. District Regional <sup>(b)</sup>      | Packer                   | 08/25/1977 1225      | MDWSA_I5    | 876,304                     | 442,461                     | 4                      | 12.47                                 | 3.2          | —           | 2,697                     | 2,727                     | —                       | —                   | —                | Boulder Zone             | Packer test 2 of 10 Pump adjusted to 7.9 gpm at time 1310 and to 23 gpm at time 1424 leakance was not determined due to very small drawdown in Boulder Zone.  |
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/25/1977 2317      | MDWSA_I5    | 876,304                     | 442,461                     | 24.5                   | 18.97                                 | 3.31         | —           | 2,367                     | 2,397                     | —                       | —                   | —                | Boulder Zone             | Packer test 3 of 10 (parts 1 & 2)—pumped was stopped at 42 min into pumping at rate of 12.8 gpm (part 1); began pumping again at rate of 24.5 gpm for 2.6 hours—transmissivity is average of the two tests. Leakance was not determined due to very small drawdown in Boulder Zone. |

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**Table 2.4.12-206 (Sheet 5 of 8)**  
**Regional Aquifer Properties**

| Site   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer      | Comments  |
|--|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|--------------|---|
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/26/1977 0747      | MDWSA_I5    | 876,304                     | 442,461                     | 61                     | 47.43                                 | 1.55         | —           | 2,407                     | 2,759                     | —                       | —                   | —                | Boulder Zone | Packer test 4 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.   |
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/26/1977 1558      | MDWSA_I5    | 876,304                     | 442,461                     | 42.5                   | 23.98                                 | 1.28         | —           | 1,968                     | 1,998                     | —                       | —                   | —                | Boulder Zone | Packer test 5 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.   |
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/26/1977 1814      | MDWSA_I5    | 876,304                     | 442,461                     | 61                     | 88.48                                 | 0.5          | —           | 2,008                     | 2,759                     | —                       | —                   | —                | Boulder Zone | Packer test 6 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.   |
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/27/1977 1150      | MDWSA_I5    | 876,304                     | 442,461                     | 55                     | 19.38                                 | 1.88         | —           | 2,543                     | 2,573                     | —                       | —                   | —                | Boulder Zone | Packer test 7 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.   |
| Miami Dade Water and Sewer Auth. So. District Regional WTPP <sup>(b)</sup> | Packer                   | 08/27/1977 1628      | MDWSA_I5    | 876,304                     | 442,461                     | 33                     | 44.17                                 | 1.78         | —           | 2,583                     | 2,759                     | —                       | —                   | —                | Boulder Zone | Packer test 8 of 10 pumping rate was increased to 60 gpm at time 1733 Leakance was not determined due to very small drawdown in Boulder Zone. |



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**Table 2.4.12-206 (Sheet 6 of 8)**  
**Regional Aquifer Properties**

| Site   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                  | Comments   |
|--|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|--------------------------|--|
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/28/1977 0130      | MDWSA_I5    | 876,304                     | 442,461                     | 12                     | 35.77                                 | 2.8          | —           | 2,692                     | 2,759                     | —                       | —                   | —                | Boulder Zone             | Packer test 9 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.  |
| Miami Dade Water and Sewer Auth. So. District Regional WWTP <sup>(b)</sup> | Packer                   | 08/28/1977 0554      | MDWSA_I5    | 876,304                     | 442,461                     | 20                     | 13.01                                 | 2.4          | —           | 2,652                     | 2,682                     | —                       | —                   | —                | Boulder Zone             | Packer test 10 of 10 Leakance was not determined due to very small drawdown in Boulder Zone.   |
| Florida City <sup>(b)</sup>  | Specific Capacity        | 01/01/2000 0000      | S-3051      | 826,078                     | 407,075                     | 900                    | 220,000                               | —            | —           | —                         | 47.5                      | —                       | —                   | —                | Surficial Aquifer System | Transmissivity value was estimated from specific capacity value. Prepared in cooperation with the SFWMD, this data was compiled from Metro-Dade Water and Sewer Authority or from SFWMD files. |
| Florida City <sup>(b)</sup>  | Specific Capacity        | 01/01/2000 0000      | S-3052      | 825,987                     | 406,974                     | 590                    | 160,000                               | —            | —           | 40                        | 60                        | —                       | —                   | —                | Surficial Aquifer System | Transmissivity value was estimated from specific capacity value. Prepared in cooperation with the SFWMD, this data was compiled from Metro-Dade Water and Sewer Authority or from SFWMD files. |

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**Table 2.4.12-206 (Sheet 7 of 8)**  
**Regional Aquifer Properties**

| Site                                   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                  | Comments   |
|--|--------------------------|----------------------|-------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|--------------------------|--|
| Harris Park Power Plant <sup>(b)</sup> | Specific Capacity        | 01/01/2000 0000      | S-3060      | 833,747                     | 414,778                     | 3,000                  | 240,000                               | 4            | —           | 40                        | 60                        | —                       | —                   | —                | Surficial Aquifer System | Transmissivity value was estimated from specific capacity value. Prepared in cooperation with the SFWMD, this data was compiled from Metro-Dade Water and Sewer Authority or from SFWMD files. |
| Harris Park Power Plant <sup>(b)</sup> | Specific Capacity        | 01/01/2000 0000      | S-3061      | 833,105                     | 41,4775                     | 3,000                  | 110,000                               | 9            | —           | 40                        | 60                        | —                       | —                   | —                | Surficial Aquifer System | Transmissivity value was estimated from specific capacity value. Prepared in cooperation with the SFWMD, this data was compiled from Metro-Dade Water and Sewer Authority or from SFWMD files. |
| Turkey Point Area – FAS <sup>(b)</sup> | APT                      | 04/24/2006 0000      | TKPT-PW1    | 874,572                     | 402,532                     | 4,500                  | 33,062                                | 72           | 0.0002      | 1003                      | 1242                      | —                       | 3                   | 0.005            | Upper Floridan Aquifer   | Average of results from Hantush-Jacob, leaky confined aquifer solution. Tidal effects negligible.  |

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**Table 2.4.12-206 (Sheet 8 of 8)**  
**Regional Aquifer Properties**

| Site                                   | Test Type <sup>(a)</sup> | Start Test Date Time | Pumped Well    | Pumped Well X-Coord. (feet) | Pumped Well Y-Coord. (feet) | Discharge Rate (g/min) | Transmissivity (ft <sup>2</sup> /day) | Hours Pumped | Storativity | Tested Interval Min. (ft) | Tested Interval Max. (ft) | Horizontal K (feet/day) | No. Monitored Wells | Leakance (1/day) | Aquifer                 | Comments   |
|--|--------------------------|----------------------|----------------|-----------------------------|-----------------------------|------------------------|---------------------------------------|--------------|-------------|---------------------------|---------------------------|-------------------------|---------------------|------------------|-------------------------|--|
| Turkey Point Area - FAS <sup>(b)</sup> | APT                      | 10/16/1974 1000      | W-12295        | 851,079                     | 370,735                     | 5,000                  | 67,750.68                             | 2,160        | 0.005       | 1126                      | 1,400                     | —                       | 5                   | 6.68 E-06        | Floridan Aquifer System | Very long-term (90 day) test. Barometric eff. Est. = 100%. Graphical plots of drawdown vs time indicated that despite the very long duration of the test full equilibrium had not been reached. Recommended values based on drawdowns from the furthest observation wells (r=2000' & r=45,000'). Leakance values are based on drawdown in lower monitor zone (so leakance for middle confining unit). Estimated effective porosity = 0.30. |
| Turkey Point Area <sup>(c)</sup>       | APT                      | 06/1971              | GH-11 (GH-11B) | 864,80                      | 384,465                     | 13,80                  | 401,070                               | 4            | 0.35        | 15                        | 50                        | —                       | 5                   |                  | Biscayne Aquifer        | No apparent tidal influence during the test.   |
| Turkey Point Area <sup>(c)</sup>       | APT                      | 06/1971              | GH-14 (GH-14A) | 873,673                     | 400,465                     | 1,380                  | 133,690                               | 4            | 0.35        | 15                        | 40                        | —                       | 6                   |                  | Biscayne Aquifer        | Tidal fluctuations observed during the test.   |
| Turkey Point Area <sup>(c)</sup>       | APT                      | 06/1971              | GH-14 (GH-14B) | 873,673                     | 400,465                     | 1,380                  | 200,535                               | 2            | 0.2         | 15                        | 50                        | —                       | 6                   | —                | Biscayne Aquifer        | Tidal fluctuations observed during the test.   |

(a) APT = Aquifer pumping test

(b) Reference 233

(c) Reference 238

FAS = Floridan aquifer system

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**Table 2.4.12-207 (Sheet 1 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3672 | 16              | 20                               | 4                                 | HFC5                                 | 0.69   | NM                                  | NM                      | NM       | 27.4                  | 2.68   | core plug   | 1      |
| G-3672 | 17              | 20                               | 3                                 | HFC5                                 | 96.3   | NM                                  | NM                      | NM       | 33.9                  | 2.68   | core plug   | 1      |
| G-3672 | 18.25–18.75     | 20                               | 1.5                               | HFC5                                 | 175  | NM                                  | NM                      | NM       | 37.0                  | 2.66   | core plug   | 1      |
| G-3673 | 17–17.5         | 20                               | 2.75                              | HFC5                                 | 654  | NM                                  | NM                      | NM       | 37.1                  | 2.66   | core plug   | 1      |
| G-3674 | 4.25–5          | 10                               | 5.63                              | HFC5                                 | 515  | NM                                  | NM                      | NM       | 37.5                  | 2.67   | core plug   | 1      |
| G-3675 | 4.25–4.5        | 8                                | 3.62                              | HFC5                                 | 98.1   | NM                                  | NM                      | NM       | 22.0                  | 2.69   | core plug   | 1      |
| G-3675 | 4.5–5           | 8                                | 3.25                              | HFC5                                 | 599  | NM                                  | NM                      | NM       | 29.5                  | 2.67   | core plug   | 1      |
| G-3711 | 4               | 10                               | 6                                 | HFC5                                 | NM   | 25,764                              | 12,875                  | 13,372   | 46.7                  | 2.69   | whole core  | 1      |
| G-3712 | 6.21            | 10                               | 3.79                              | HFC5                                 | NM   | NM                                  | NM                      | 14,159   | 47.8                  | 2.70   | whole core  | 1      |
| G-3714 | 9.46            | 13                               | 3.54                              | HFC5                                 | NM   | NM                                  | NM                      | 9,494    | 49.3                  | 2.67   | whole core  | 1      |
| G-3770 | 4.05–4.22       | 6.7                              | 2.61                              | HFC5                                 | NM   | 4,564                               | 1,531                   | 7,099    | 41.6                  | 2.66   | whole core  | 2      |
| G-3778 | 8.46–8.73       | 16.4                             | 7.76                              | HFC5                                 | NM   | 1,684                               | 79                      | 220      | 40.4                  | 2.70   | whole core  | 2      |
| G-3778 | 9.4–9.67        | 16.4                             | 6.82                              | HFC5                                 | NM   | 11,659                              | 10,201                  | 1,990    | 45.4                  | 2.70   | whole core  | 2      |
| G-3778 | 9.92–10.11      | 16.4                             | 6.39                              | HFC5                                 | NM   | 1,116                               | 966                     | 14,750   | 46.1                  | 2.70   | whole core  | 2      |
| G-3778 | 11.03–11.24     | 16.4                             | 5.27                              | HFC5                                 | NM   | 19,355                              | 19,355                  | 2,291    | 41.6                  | 2.67   | whole core  | 2      |
| G-3778 | 13.08–13.48     | 16.4                             | 3.12                              | HFC5                                 | NM   | 10,178                              | 9,159                   | 3,605    | 43.2                  | 2.69   | whole core  | 2      |
| G-3778 | 13.48–13.90     | 16.4                             | 2.71                              | HFC5                                 | NM   | 8,638                               | 5,757                   | 6,157    | 43.2                  | 2.69   | whole core  | 2      |
| G-3778 | 13.90–14.28     | 16.4                             | 2.31                              | HFC5                                 | NM   | 10,356                              | 10,356                  | 3,727    | 44.7                  | 2.69   | whole core  | 2      |
| G-3778 | 14.28–14.70     | 16.4                             | 1.91                              | HFC5                                 | NM   | 8,357                               | 7,312                   | 2,687    | 44.7                  | 2.68   | whole core  | 2      |
| G-3778 | 15.03–15.36     | 16.4                             | 1.21                              | HFC5                                 | NM   | 10,155                              | 8,884                   | 6,520    | 45.9                  | 2.71   | whole core  | 2      |
| G-3779 | 14.93–15.26     | 16.2                             | 1.07                              | HFC5                                 | NM   | 2,703                               | 2,101                   | 2,121    | 47.0                  | 2.72   | whole core  | 2      |
| G-3779 | 15.26–15.55     | 16.2                             | 0.8                               | HFC5                                 | NM   | 4,178                               | 4,178                   | 2,107    | 46.7                  | 2.72   | whole core  | 2      |
| G-3779 | 15.75–15.96     | 16.2                             | 0.35                              | HFC5                                 | NM   | 17,818                              | 9,646                   | 1,347    | 44.2                  | 2.70   | whole core  | 2      |
| G-3779 | 16.25–16.63     | 16.2                             | –0.23                             | HFC5                                 | NM   | 7,566                               | 3,360                   | 3,195    | 45.5                  | 2.72   | whole core  | 2      |
| G-3779 | 16.63–17.09     | 16.2                             | –0.66                             | HFC5                                 | NM   | 7,805                               | 6,829                   | 2,973    | 47.6                  | 2.72   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 2 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-zo<br>ntal | Hori-zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3779 | 17.51–17.93     | 16.2                             | –1.52                             | HFC5                                 | NM   | 6,717                           | 4,797               | 3,023    | 44.3                  | 2.71   | whole core  | 2      |
| G-3779 | 17.93–18.39     | 16.2                             | –1.96                             | HFC5                                 | NM   | 7,101                           | 4,436               | 2,239    | 44.4                  | 2.71   | whole core  | 2      |
| G-3779 | 18.39–18.77     | 16.2                             | –2.38                             | HFC5                                 | NM   | 8,022                           | 5,728               | 2,168    | 44.5                  | 2.70   | whole core  | 2      |
| G-3791 | 6.42–6.8        | 8                                | 1.39                              | HFC5                                 | NM   | 10,733                          | 10,733              | 4,357    | 44.5                  | 2.71   | whole core  | 2      |
| G-3791 | 7.05–7.38       | 8                                | 0.78                              | HFC5                                 | NM   | 12,695                          | 12,695              | 4,423    | 49.4                  | 2.69   | whole core  | 2      |
| G-3794 | 6.68–7.10       | 9                                | 2.11                              | HFC5                                 | NM   | 2,257                           | 1544                | 2,044    | 42.6                  | 2.70   | whole core  | 2      |
| G-3675 | 6.0             | 8                                | 2.00                              | HFC4                                 | NM   | 9,080                           | 2054                | NM       | 34.7                  | 2.70   | whole core  | 1      |
| G-3683 | 12.5            | 12                               | –0.5                              | HFC4                                 | NM   | 13.8                            | 2.56                | 11.3     | 16.7                  | 2.72   | whole core  | 1      |
| G-3689 | 15.3            | 9                                | –6.3                              | HFC4                                 | NM   | 950                             | 337                 | 0.03     | 18.6                  | 2.72   | whole core  | 1      |
| G-3692 | 10.8            | 9                                | –1.8                              | HFC4                                 | 221.32   | NM                              | NM                  | NM       | 23.3                  | 2.71   | core plug   | 1      |
| G-3694 | 16              | 10                               | –6                                | HFC4                                 | NM   | 83.2                            | 42.5                | 11.8     | 17.3                  | 2.71   | whole core  | 1      |
| G-3696 | 19              | 10                               | –9                                | HFC4                                 | NM   | 1,035                           | 680                 | 5,624    | 12.5                  | 2.71   | whole core  | 1      |
| G-3697 | 12.9            | 9                                | –3.9                              | HFC4                                 | NM   | 0.67                            | 0.5                 | 0.18     | 18.9                  | 2.72   | whole core  | 1      |
| G-3697 | 13              | 9                                | –4                                | HFC4                                 | NM   | 18.2                            | 0.05                | 0.02     | 8.3                   | 2.72   | whole core  | 1      |
| G-3713 | 9.28            | 10                               | 0.72                              | HFC4                                 | NM   | 2,204                           | 1835                | 922      | 27.3                  | 2.70   | whole core  | 1      |
| G-3717 | 11.75           | 9                                | –2.75                             | HFC4                                 | NM   | 7,017                           | 4302                | 248      | 11.0                  | 2.69   | whole core  | 1      |
| G-3721 | 9.75            | 10                               | 0.25                              | HFC4                                 | NM   | 82.5                            | 21.1                | 10.6     | 16.4                  | 2.70   | whole core  | 1      |
| G-3725 | 9.92            | 6                                | –3.92                             | HFC4                                 | NM   | 6,964                           | 3731                | 758      | 14.8                  | 2.69   | whole core  | 1      |
| G-3730 | 9               | 6                                | –3                                | HFC4                                 | NM   | 1,319                           | 47.3                | 262      | 13.7                  | 2.68   | whole core  | 1      |
| G-3731 | 9.67            | 6.7                              | –2.97                             | HFC4                                 | NM   | 144                             | 0.03                | 201      | 5.9                   | 2.69   | whole core  | 1      |
| G-3770 | 4.38-4.59       | 6.7                              | 2.22                              | HFC4                                 | NM   | 2                               | 0.3                 | 0.02     | 10.1                  | 2.70   | whole core  | 2      |
| G-3770 | 4.76-5.01       | 6.7                              | 1.82                              | HFC4                                 | NM   | 1,067                           | 949                 | 1090     | 27.3                  | 2.69   | whole core  | 2      |
| G-3771 | 6.85-7.1        | 6                                | –0.98                             | HFC4                                 | NM   | 0.04                            | 0.04                | 13,108   | 15.0                  | 2.68   | whole core  | 2      |
| G-3771 | 7.1–7.4         | 6                                | –1.25                             | HFC4                                 | NM   | 831                             | 215                 | 2,463    | 10.1                  | 2.68   | whole core  | 2      |
| G-3771 | 7.4–7.7         | 6                                | –1.55                             | HFC4                                 | NM   | 0.02                            | 0.02                | 0.01     | 7.8                   | 2.68   | whole core  | 2      |
| G-3771 | 7.8–8.1         | 6                                | –1.95                             | HFC4                                 | NM   | 694                             | 600                 | 1        | 16.9                  | 2.68   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 3 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3789 | 10.29–10.46     | 8                                | –2.38                             | HFC4                                 | NM   | 10,040                              | 7529                    | 2,118    | 37.2                  | 2.73   | whole core  | 2      |
| G-3790 | 11.6–11.85      | 8                                | –3.72                             | HFC4                                 | NM   | 11,017                              | 9,442                   | 1,727    | 16.8                  | 2.70   | whole core  | 2      |
| G-3790 | 17.43–17.72     | 8                                | –9.58                             | HFC4                                 | NM   | 43                                  | 28                      | 31       | 11.2                  | 2.69   | whole core  | 2      |
| G-3790 | 18.17–18.42     | 8                                | –10.3                             | HFC4                                 | NM   | 708                                 | 567                     | 359      | 15.0                  | 2.70   | whole core  | 2      |
| G-3790 | 18.55–18.71     | 8                                | –10.63                            | HFC4                                 | NM   | 3,813                               | 1,670                   | 997      | 26.0                  | 2.72   | whole core  | 2      |
| G-3791 | 14.11–14.36     | 8                                | –6.24                             | HFC4                                 | NM   | 734                                 | 291                     | 1,750    | 21.6                  | 2.68   | whole core  | 2      |
| G-3791 | 15.45–15.68     | 8                                | –7.56                             | HFC4                                 | NM   | 560                                 | 453                     | 255      | 24.6                  | 2.69   | whole core  | 2      |
| G-3792 | 13.15–13.35     | 8                                | –5.25                             | HFC4                                 | NM   | 1                                   | 0.05                    | 0.01     | 6.9                   | 2.69   | whole core  | 2      |
| G-3794 | 6.82–7.09       | 9                                | 2.04                              | HFC4                                 | NM   | 31                                  | 19                      | 16       | 16.1                  | 2.71   | whole core  | 2      |
| G-3794 | 7.42–7.67       | 9                                | 1.46                              | HFC4                                 | NM   | 799                                 | 671                     | 348      | 21.4                  | 2.71   | whole core  | 2      |
| G-3794 | 8.65–8.92       | 9                                | 0.22                              | HFC4/3                               | NM   | 366                                 | 40                      | 19       | 13.1                  | 2.70   | whole core  | 2      |
| G-3794 | 9.38–9.63       | 9                                | –0.5                              | HFC4                                 | NM   | 869                                 | 810                     | 391      | 16.2                  | 2.72   | whole core  | 2      |
| G-3672 | 20.5            | 20                               | –0.5                              | HFC3                                 | NM   | 750                                 | 280                     | 0.2      | 13.5                  | 2.75   | whole core  | 1      |
| G-3672 | 24              | 20                               | –4                                | HFC3                                 | 3098   | NM                                  | NM                      | NM       | 32.1                  | 2.71   | core plug   | 1      |
| G-3673 | 20–20.75        | 20                               | –0.38                             | HFC3                                 | 1,699  | NM                                  | NM                      | NM       | 19.1                  | 2.70   | core plug   | 1      |
| G-3673 | 23.5–24         | 20                               | –3.75                             | HFC3                                 | 3,704  | NM                                  | NM                      | NM       | 30.9                  | 2.68   | core plug   | 1      |
| G-3673 | 24.5–25         | 20                               | –4.75                             | HFC3                                 | 80.6   | NM                                  | NM                      | NM       | 14.6                  | 2.71   | core plug   | 1      |
| G-3673 | 27.25–27.75     | 20                               | –7.5                              | HFC3                                 | 4,657  | NM                                  | NM                      | NM       | 28.8                  | 2.70   | core plug   | 1      |
| G-3673 | 30.75–31.25     | 20                               | –11                               | HFC3                                 | 9,443  | NM                                  | NM                      | NM       | 20.6                  | 2.69   | core plug   | 1      |
| G-3673 | 32–32.3         | 20                               | –12.15                            | HFC3                                 | 10.1   | NM                                  | NM                      | NM       | 19.3                  | 2.68   | core plug   | 1      |
| G-3674 | 15.5–6          | 10                               | –5.75                             | HFC3                                 | 5,222  | NM                                  | NM                      | NM       | 27.4                  | 2.69   | core plug   | 1      |
| G-3674 | 18              | 10                               | –8                                | HFC3                                 | NM   | 2,428                               | 1,582                   | 0.05     | 21.0                  | 2.70   | whole core  | 1      |
| G-3674 | 18.5–19         | 10                               | –8.75                             | HFC3                                 | 0.01   | NM                                  | NM                      | NM       | 20.8                  | 2.70   | core plug   | 1      |
| G-3675 | 8               | 8                                | 0                                 | HFC3                                 | NM   | 856                                 | 847                     | 0.52     | 21.3                  | 2.70   | whole core  | 1      |
| G-3675 | 9–9.5           | 8                                | –1.25                             | HFC3                                 | 112  | NM                                  | NM                      | NM       | 21.4                  | 2.70   | core plug   | 1      |
| G-3678 | 23.3            | 9                                | –14.3                             | HFC3                                 | NM   | 3,758                               | 1,754                   | 8,662    | 19.7                  | 2.71   | whole core  | 1      |

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**Table 2.4.12-207 (Sheet 4 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3679 | 14.6            | 9                                | -5.6                              | HFC3                                 | 8,818  | NM                                  | NM                      | NM       | 46.6                  | 2.71   | core plug   | 1      |
| G-3679 | 15.6            | 9                                | -6.6                              | HFC3                                 | NM   | 3,410                               | 1,101                   | 14000    | 20.9                  | 2.71   | whole core  | 1      |
| G-3681 | 15.6            | 9                                | -6.6                              | HFC3                                 | NM   | 20.1                                | 2.56                    | 0.72     | 12.8                  | 2.72   | whole core  | 1      |
| G-3688 | 13.3            | 9.5                              | -3.8                              | HFC3                                 | NM   | 0.15                                | 0.07                    | <0.01    | 6.5                   | 2.71   | whole core  | 1      |
| G-3689 | 28.5            | 9                                | -19.5                             | HFC3                                 | NM   | 19,323                              | 19,323                  | 15,112   | 25.8                  | 2.72   | whole core  | 1      |
| G-3690 | 11.7            | 9                                | -2.7                              | HFC3                                 | NM   | 202                                 | 20.8                    | 235      | 10.2                  | 2.73   | whole core  | 1      |
| G-3691 | 22.3            | 8                                | -14.3                             | HFC3                                 | NM   | 6,501                               | 4,332                   | 7,474    | 32.4                  | 2.71   | whole core  | 1      |
| G-3695 | 15.5            | 9.5                              | -6                                | HFC3                                 | NM   | 0.14                                | 0.11                    | 0.02     | 10.6                  | 2.70   | whole core  | 1      |
| G-3695 | 20              | 9.5                              | -10.5                             | HFC3                                 | NM   | 58.5                                | 13.7                    | 532      | 16.7                  | 2.72   | whole core  | 1      |
| G-3696 | 19.5            | 10                               | -9.5                              | HFC3                                 | NM   | 355                                 | 291                     | 0.12     | 13.9                  | 2.71   | whole core  | 1      |
| G-3710 | 19.25           | 10                               | -9.25                             | HFC3                                 | NM   | 11,227                              | 11,227                  | 12,900   | 22.6                  | 2.72   | whole core  | 1      |
| G-3710 | 24.33           | 10                               | -14.33                            | HFC3                                 | NM   | 1,315                               | 998                     | 9,754    | 14.7                  | 2.71   | whole core  | 1      |
| G-3710 | 26.3            | 10                               | -16.3                             | HFC3                                 | 34400  | NM                                  | NM                      | NM       | 35.2                  | 2.72   | core plug   | 1      |
| G-3711 | 27.33           | 10                               | -17.33                            | HFC3                                 | NM   | 1,031                               | 1,007                   | 6.18     | 25.9                  | 2.71   | whole core  | 1      |
| G-3713 | 22.5            | 10                               | -9.83                             | HFC3                                 | NM   | 27.5                                | 0.18                    | 840      | 16.0                  | 2.71   | whole core  | 1      |
| G-3713 | 23.75           | 10                               | -13.75                            | HFC3                                 | NM   | 31,148                              | 29,419                  | 8,171    | 32.3                  | 2.72   | whole core  | 1      |
| G-3714 | 18.83           | 9                                | -9.83                             | HFC3                                 | NM   | 13,356                              | 11,685                  | 11,642   | 36.6                  | 2.71   | whole core  | 1      |
| G-3715 | 16.88           | 9                                | -7.88                             | HFC3                                 | NM   | 2,606                               | 1,968                   | 2,226    | 31.1                  | 2.71   | whole core  | 1      |
| G-3717 | 20.29           | 9                                | -11.29                            | HFC3                                 | NM   | 20,592                              | 18,303                  | 13,217   | 23.4                  | 2.71   | whole core  | 1      |
| G-3717 | 21.25           | 9                                | -12.25                            | HFC3                                 | NM   | 16.3                                | 10.5                    | 92.3     | 20.3                  | 2.70   | whole core  | 1      |
| G-3717 | 23.58           | 9                                | -14.58                            | HFC3                                 | NM   | 8,458                               | 4,229                   | 12,213   | 21.8                  | 2.70   | whole core  | 1      |
| G-3719 | 8.75            | 9                                | 0.25                              | HFC3                                 | NM   | 4.1                                 | 0.12                    | 4.13     | 10.4                  | 2.71   | whole core  | 1      |
| G-3719 | 14.57           | 9                                | -5.57                             | HFC3                                 | NM   | 8,067                               | 6,054                   | 8,532    | 34.8                  | 2.72   | whole core  | 1      |
| G-3720 | 18.71           | 9                                | -9.71                             | HFC3                                 | NM   | 16,478                              | 16,478                  | 11,878   | 38.0                  | 2.73   | whole core  | 1      |
| G-3722 | 15.62           | 10                               | -5.62                             | HFC3                                 | NM   | 1,867                               | 1,787                   | 2,273    | 37.1                  | 2.65   | whole core  | 1      |
| G-3722 | 17.33           | 10                               | -7.33                             | HFC3                                 | NM   | 5,263                               | 4,426                   | 7,190    | 41.7                  | 2.72   | whole core  | 1      |

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**Table 2.4.12-207 (Sheet 5 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3724 | 9.67            | 9                                | -0.67                             | HFC3                                 | NM   | 673                                 | 597                     | 404      | 12.6                  | 2.69   | whole core  | 1      |
| G-3724 | 14.08           | 9                                | -5.08                             | HFC3                                 | NM   | 18,308                              | 7,891                   | 5,100    | 44.6                  | 2.72   | whole core  | 1      |
| G-3725 | 18.83           | 6                                | -12.83                            | HFC3                                 | NM   | 12,191                              | 8,125                   | 6,354    | 41.1                  | 2.72   | whole core  | 1      |
| G-3728 | 9               | 7                                | -2                                | HFC3                                 | NM   | 1,200                               | 1,200                   | 607      | 20.5                  | 2.70   | whole core  | 1      |
| G-3730 | 21.58           | 6                                | -15.58                            | HFC3                                 | NM   | 8,452                               | 6,500                   | 15,894   | 15.5                  | 2.70   | whole core  | 1      |
| G-3731 | 11.75           | 10                               | -1.75                             | HFC3                                 | NM   | 2,595                               | 1,842                   | 1,839    | 31.0                  | 2.71   | whole core  | 1      |
| G-3734 | 9.13            | 8                                | -1.13                             | HFC3                                 | NM   | 15.5                                | 10.9                    | 20.2     | 13.1                  | 2.70   | whole core  | 1      |
| G-3770 | 9-9.29          | 6.7                              | -2.45                             | HFC3                                 | NM   | 0.2                                 | 0.03                    | 0.02     | 12.5                  | 2.70   | whole core  | 2      |
| G-3770 | 9.46-9.67       | 6.7                              | -2.86                             | HFC3                                 | NM   | 20                                  | 11                      | 167      | 14.9                  | 2.69   | whole core  | 2      |
| G-3770 | 9.94-10.23      | 6.7                              | -3.39                             | HFC3                                 | NM   | 1,345                               | 1,125                   | 1142     | 22.7                  | 2.69   | whole core  | 2      |
| G-3770 | 10.86-11.19     | 6.7                              | -4.32                             | HFC3                                 | NM   | 1,637                               | 1,059                   | 648      | 26.4                  | 2.70   | whole core  | 2      |
| G-3770 | 13.9-14.34      | 6.7                              | -7.42                             | HFC3                                 | NM   | 2,389                               | 2,296                   | 20,140   | 46.8                  | 2.70   | whole core  | 2      |
| G-3770 | 14.34-14.74     | 6.7                              | -7.84                             | HFC3                                 | NM   | 3,471                               | 2,726                   | 18,802   | 45.8                  | 2.70   | whole core  | 2      |
| G-3770 | 14.74-15.07     | 6.7                              | -8.2                              | HFC3                                 | NM   | 3,389                               | 3,389                   | 17,827   | 48.3                  | 2.70   | whole core  | 2      |
| G-3770 | 18.49-8.78      | 6.7                              | -11.94                            | HFC3                                 | NM   | 3,278                               | 3,278                   | 13,992   | 26.6                  | 2.69   | whole core  | 2      |
| G-3771 | 8.60-8.85       | 6                                | -2.72                             | HFC3                                 | NM   | 5                                   | 0.2                     | 258      | 12.2                  | 2.69   | whole core  | 2      |
| G-3771 | 8.85-9.1        | 6                                | -2.98                             | HFC3                                 | NM   | 1,511                               | 1151                    | 3,152    | 15.7                  | 2.68   | whole core  | 2      |
| G-3771 | 9.5-9.77        | 6                                | -3.64                             | HFC3                                 | NM   | 263                                 | 188                     | 194      | 14.5                  | 2.69   | whole core  | 2      |
| G-3771 | 9.89-10.1       | 6                                | -4                                | HFC3                                 | NM   | 1,717                               | 1,552                   | 1,277    | 19.7                  | 2.69   | whole core  | 2      |
| G-3771 | 10.23-10.56     | 6                                | -4.4                              | HFC3                                 | NM   | 667                                 | 601                     | 370      | 19.7                  | 2.69   | whole core  | 2      |
| G-3771 | 10.56-10.85     | 6                                | -4.7                              | HFC3                                 | NM   | 2,350                               | 2,268                   | 13,272   | 29.7                  | 2.68   | whole core  | 2      |
| G-3771 | 11.15-11.4      | 6                                | -5.28                             | HFC3                                 | NM   | 329                                 | 270                     | 317      | 24.1                  | 2.70   | whole core  | 2      |
| G-3771 | 11.65-11.94     | 6                                | -5.8                              | HFC3                                 | NM   | 1,427                               | 1,366                   | 363      | 25.9                  | 2.70   | whole core  | 2      |
| G-3771 | 12.52-12.71     | 6                                | -6.62                             | HFC3                                 | NM   | 2,459                               | 2,346                   | 8,483    | 25.2                  | 2.70   | whole core  | 2      |
| G-3771 | 12.98-13.19     | 6                                | -7.08                             | HFC3                                 | NM   | 1,528                               | 1,251                   | 4,877    | 26.9                  | 2.71   | whole core  | 2      |
| G-3771 | 13.60-13.89     | 6                                | -7.74                             | HFC3                                 | NM   | 3,391                               | 3,391                   | 14,564   | 40.3                  | 2.73   | whole core  | 2      |



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**Table 2.4.12-207 (Sheet 6 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zontal | Hori-<br>zontal 90° | Vertical |                       |  |             |        |
| G-3771 | 14.06–14.4      | 6                                | –8.23                             | HFC3                                 | NM   | 2,731                           | 1,306               | 16,468   | 42.1                  | 2.72   | whole core  | 2      |
| G-3771 | 16.5–16.85      | 6                                | –10.68                            | HFC3                                 | NM   | 2,783                           | 2,783               | 15,965   | 17.6                  | 2.69   | whole core  | 2      |
| G-3771 | 16.88–17.09     | 6                                | –10.98                            | HFC3                                 | NM   | 3,427                           | 3,182               | 9,885    | 17.6                  | 2.69   | whole core  | 2      |
| G-3778 | 15.86–16.15     | 16.4                             | 0.4                               | HFC3                                 | NM   | 0.02                            | 0.001               | 0.001    | 7.2                   | 2.70   | whole core  | 2      |
| G-3778 | 16.15–16.44     | 16.4                             | 0.1                               | HFC3                                 | NM   | 0.02                            | 0.02                | 0.3      | 6.1                   | 2.71   | whole core  | 2      |
| G-3778 | 16.69–16.82     | 16.4                             | –0.36                             | HFC3                                 | NM   | 19                              | 0.3                 | 8        | 7.2                   | 2.73   | whole core  | 2      |
| G-3778 | 17.24–17.59     | 16.4                             | –1.02                             | HFC3                                 | NM   | 2,713                           | 2,469               | 301      | 19.3                  | 2.70   | whole core  | 2      |
| G-3778 | 26.01–26.18     | 16.4                             | –9.7                              | HFC3                                 | NM   | NM                              | NM                  | 1,569    | 48.4                  | 2.75   | whole core  | 2      |
| G-3778 | 31.06–31.16     | 16.4                             | –14.71                            | HFC3                                 | NM   | 11,797                          | 5,363               | 951      | 39.7                  | 2.75   | whole core  | 2      |
| G-3778 | 31.75–31.65     | 16.4                             | –15.3                             | HFC3                                 | NM   | 22,704                          | 22,704              | 2,213    | 40.8                  | 2.73   | whole core  | 2      |
| G-3778 | 35–35.17        | 16.4                             | –18.68                            | HFC3                                 | NM   | 3,993                           | 2,966               | 2,253    | 41.5                  | 2.71   | whole core  | 2      |
| G-3778 | 35.54–35.87     | 16.4                             | –19.3                             | HFC3                                 | NM   | 217                             | 4                   | 602      | 24.3                  | 2.70   | whole core  | 2      |
| G-3779 | 21.6–21.85      | 16.2                             | –5.52                             | HFC3                                 | NM   | 0.001                           | 0.001               | 0.001    | 5.5                   | 2.71   | whole core  | 2      |
| G-3779 | 21.95–22.25     | 16.2                             | 5.9                               | HFC3                                 | NM   | 0.2                             | 0.02                | 0.3      | 7.1                   | 2.71   | whole core  | 2      |
| G-3779 | 24.38–24.57     | 16.2                             | –8.28                             | HFC3                                 | NM   | 5,268                           | 4,811               | 1,652    | 46.9                  | 2.79   | whole core  | 2      |
| G-3779 | 25.53–26.03     | 16.2                             | –9.58                             | HFC3                                 | NM   | 7,228                           | 6,424               | 4,169    | 50.2                  | 2.81   | whole core  | 2      |
| G-3779 | 26.95–27.18     | 16.2                             | –10.86                            | HFC3                                 | NM   | 14,754                          | NM                  | 2,103    | 45.5                  | 2.76   | whole core  | 2      |
| G-3779 | 35.06–35.37     | 16.2                             | –19.02                            | HFC3                                 | NM   | 9,319                           | 6,211               | 3,806    | 28.1                  | 2.72   | whole core  | 2      |
| G-3789 | 13.68–13.93     | 8                                | –5.8                              | HFC3                                 | NM   | 2,470                           | 1,082               | 159      | 8.6                   | 2.70   | whole core  | 2      |
| G-3789 | 14.59–14.76     | 8                                | –6.68                             | HFC3                                 | NM   | 7,529                           | 6,694               | 1,333    | 31.4                  | 2.72   | whole core  | 2      |
| G-3789 | 15.85–16.08     | 8                                | –7.96                             | HFC3                                 | NM   | 1,249                           | 1,067               | 512      | 26.0                  | 2.71   | whole core  | 2      |
| G-3789 | 19.63–19.94     | 8                                | –11.78                            | HFC3                                 | NM   | 12,974                          | 12,974              | 3,645    | 31.1                  | 2.74   | whole core  | 2      |
| G-3789 | 20.15–20.44     | 8                                | –12.3                             | HFC3                                 | NM   | 12,213                          | 10,855              | 2,566    | 21.5                  | 2.72   | whole core  | 2      |
| G-3789 | 20.86–21.24     | 8                                | –13.05                            | HFC3                                 | NM   | 5,315                           | 4,961               | 3,274    | 32.6                  | 2.74   | whole core  | 2      |
| G-3789 | 21.49–21.93     | 8                                | –13.71                            | HFC3                                 | NM   | 4,336                           | 3,716               | 4,770    | 29.3                  | 2.74   | whole core  | 2      |
| G-3789 | 22.06–22.56     | 8                                | –14.31                            | HFC3                                 | NM   | 7,484                           | 6,235               | 4,189    | 33.5                  | 2.75   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 7 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-zo<br>ntal | Hori-zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3789 | 25.32-25.47     | 8                                | -17.4                             | HFC3                                 | NM   | 54                              | 1                   | 1,578    | 17.9                  | 2.71   | whole core  | 2      |
| G-3790 | 22.79-23        | 8                                | -14.9                             | HFC3                                 | NM   | 4,478                           | 4,277               | 507      | 27.0                  | 2.73   | whole core  | 2      |
| G-3790 | 24-24.33        | 8                                | -16.16                            | HFC3                                 | NM   | 10,076                          | 7,195               | 2,084    | 27.7                  | 2.73   | whole core  | 2      |
| G-3790 | 31.5-31.88      | 8                                | -3.69                             | HFC3                                 | NM   | 2,566                           | 1,970               | 2,765    | 30.2                  | 2.72   | whole core  | 2      |
| G-3790 | 31.88-32.25     | 8                                | -24.19                            | HFC3/2                               | NM   | 3,335                           | 3,160               | 3,661    | 32.6                  | 2.72   | whole core  | 2      |
| G-3791 | 16.06-16.28     | 8                                | -8.17                             | HFC3                                 | NM   | 0.02                            | 0.02                | 0.02     | 12.7                  | 2.69   | whole core  | 2      |
| G-3791 | 16.47-16.80     | 8                                | -8.64                             | HFC3                                 | NM   | 476                             | 0.2                 | 7        | 14.7                  | 2.70   | whole core  | 2      |
| G-3791 | 19.3-19.59      | 8                                | -11.74                            | HFC3                                 | NM   | 5,258                           | 4,343               | 2,439    | 29.7                  | 2.71   | whole core  | 2      |
| G-3791 | 23.28-23.74     | 8                                | -15.51                            | HFC3                                 | NM   | 4,338                           | 4,049               | 3,037    | 30.0                  | 2.72   | whole core  | 2      |
| G-3791 | 24.41-24.66     | 8                                | -16.54                            | HFC3                                 | NM   | 15,535                          | 13,980              | 2,858    | 30.0                  | 2.72   | whole core  | 2      |
| G-3791 | 24.91-25.24     | 8                                | -17.08                            | HFC3                                 | NM   | 8,994                           | 8,994               | 3,097    | 32.7                  | 2.72   | whole core  | 2      |
| G-3791 | 27.93-28.30     | 8                                | -20.1                             | HFC3                                 | NM   | 10,831                          | 10,831              | 4,639    | 29.6                  | 2.72   | whole core  | 2      |
| G-3791 | 29.25-29.67     | 8                                | -21.46                            | HFC3                                 | NM   | 6,663                           | 3,805               | 4,054    | 19.7                  | 2.70   | whole core  | 2      |
| G-3792 | 14.41-14.58     | 8                                | -6.5                              | HFC3                                 | NM   | 4,247                           | 4,106               | 769      | 17.4                  | 2.70   | whole core  | 2      |
| G-3793 | 6.98-7.27       | 10                               | 2.88                              | HFC3                                 | NM   | 283                             | 271                 | 463      | 13.6                  | 2.71   | whole core  | 2      |
| G-3794 | 12.7-12.89      | 9                                | -3.8                              | HFC3                                 | NM   | 5,268                           | 2,401               | 533      | 20.2                  | 2.71   | whole core  | 2      |
| G-3794 | 17.63-18.01     | 9                                | -8.82                             | HFC3                                 | NM   | 10,356                          | 692                 | 1,032    | 12.8                  | 2.71   | whole core  | 2      |
| G-3794 | 20.18-20.60     | 9                                | -11.39                            | HFC3                                 | NM   | 4,333                           | 3,999               | 1,930    | 23.2                  | 2.70   | whole core  | 2      |
| G-3673 | 46.5-47.25      | 20                               | -26.88                            | HFC2                                 | <0.01  | NM                              | NM                  | NM       | 12.8                  | 2.69   | core plug   | 1      |
| G-3674 | 26.5-27         | 10                               | -16.75                            | HFC2                                 | 5,011  | NM                              | NM                  | NM       | 19.6                  | 2.70   | core plug   | 1      |
| G-3675 | 20.4            | 20                               | -0.4                              | HFC2                                 | <0.01  | NM                              | NM                  | NM       | 6.6                   | 2.68   | core plug   | 1      |
| G-3675 | 23.5            | 8                                | -15.5                             | HFC2                                 | NM   | 0.12                            | 0.06                | <0.01    | 11.3                  | 2.69   | whole core  | 1      |
| G-3675 | 24.5-25         | 8                                | -16.75                            | HFC2                                 | 5027   | NM                              | NM                  | NM       | 22.9                  | 2.68   | core plug   | 1      |
| G-3675 | 31.75-32        | 8                                | -23.88                            | HFC2                                 | <0.01  | NM                              | NM                  | NM       | 12.5                  | 2.70   | core plug   | 1      |
| G-3675 | 50.75-51        | 8                                | -42.88                            | HFC2                                 | 1688   | NM                              | NM                  | NM       | 27.8                  | 2.68   | core plug   | 1      |
| G-3679 | 28.3            | 9                                | -19.3                             | HFC2                                 | 0.3  | NM                              | NM                  | NM       | 25.7                  | 2.72   | core plug   | 1      |

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**Table 2.4.12-207 (Sheet 8 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3681 | 43.3            | 9                                | -34.3                             | HFC2                                 | NM   | 0.08                                | 0.05                    | 0.02     | 11.6                  | 2.72   | whole core  | 1      |
| G-3685 | 28.5            | 9                                | -19.5                             | HFC2                                 | NM   | 10.6                                | 0.71                    | 1,949    | 13.9                  | 2.71   | whole core  | 1      |
| G-3690 | 22              | 9                                | -13                               | HFC2                                 | NM   | 670                                 | 638                     | 711      | 13.8                  | 2.71   | whole core  | 1      |
| G-3697 | 27.5            | 9                                | -18.5                             | HFC2                                 | NM   | 0.45                                | 0.4                     | 0.16     | 23.2                  | 2.72   | whole core  | 1      |
| G-3710 | 30.33           | 10                               | -20.33                            | HFC2                                 | NM   | 4,754                               | 1,357                   | 92.5     | 33.7                  | 2.72   | whole core  | 1      |
| G-3718 | 24.4            | 9                                | -15.4                             | HFC2                                 | 9.49   | NM                                  | NM                      | NM       | 24.1                  | 2.72   | core plug   | 1      |
| G-3718 | 24.38           | 9                                | -15.38                            | HFC2                                 | NM   | 47                                  | 11.3                    | 179      | 24.3                  | 2.70   | whole core  | 1      |
| G-3720 | 22              | 9                                | -13                               | HFC2                                 | NM   | 7.33                                | 0.61                    | 10,875   | 17.0                  | 2.71   | whole core  | 1      |
| G-3721 | 20.5            | 10                               | -10.5                             | HFC2                                 | NM   | 0.14                                | 0.04                    | 0.62     | 20.5                  | 2.81   | whole core  | 1      |
| G-3722 | 29.42           | 10                               | -19.42                            | HFC2                                 | NM   | 9,580                               | 6,385                   | 9,704    | 25.2                  | 2.70   | whole core  | 1      |
| G-3727 | 23.29           | 8                                | -14.29                            | HFC2                                 | NM   | 0.19                                | 0.14                    | 0.01     | 15.2                  | 2.71   | whole core  | 1      |
| G-3729 | 24.12           | 6                                | -18.12                            | HFC2                                 | NM   | 4.51                                | 1.03                    | 570      | 21.8                  | 2.71   | whole core  | 1      |
| G-3731 | 30.71           | 10                               | -20.71                            | HFC2                                 | NM   | 7.23                                | 0.53                    | 10,038   | 18.2                  | 2.72   | whole core  | 1      |
| G-3732 | 25.5            | 6                                | -19.5                             | HFC2                                 | NM   | 28.7                                | 22.9                    | 206      | 11.5                  | 2.71   | whole core  | 1      |
| G-3734 | 24              | 8                                | -16                               | HFC2                                 | NM   | 667                                 | 332                     | 17,567   | 23.4                  | 2.72   | whole core  | 1      |
| G-3733 | 46.25-46.44     | 6                                | -40.34                            | HFC2                                 | NM   | 138                                 | 94                      | 66       | 17.4                  | 2.70   | whole core  | 2      |
| G-3733 | 48.63-48.79     | 6                                | -42.71                            | HFC2                                 | NM   | 101                                 | 18                      | 202      | 23.6                  | 2.71   | whole core  | 2      |
| G-3733 | 49.04-49.42     | 6                                | -43.23                            | HFC2                                 | NM   | 3,932                               | 2,449                   | 59       | 26.1                  | 2.70   | whole core  | 2      |
| G-3733 | 49.67-49.92     | 6                                | -43.8                             | HFC2                                 | NM   | 1,432                               | 249                     | 112      | 21.7                  | 2.70   | whole core  | 2      |
| G-3770 | 20.5-20.79      | 6.7                              | -13.94                            | HFC2                                 | NM   | 3,830                               | 3,458                   | 13,701   | 34.2                  | 2.70   | whole core  | 2      |
| G-3770 | 24.26-24.47     | 6.7                              | -17.66                            | HFC2                                 | NM   | 11,232                              | 11,232                  | 10,294   | 47.7                  | 2.70   | whole core  | 2      |
| G-3770 | 25.03-25.34     | 6.7                              | -18.48                            | HFC2                                 | NM   | 5,616                               | 5,616                   | 14,886   | 32.6                  | 2.70   | whole core  | 2      |
| G-3770 | 25.63-25.92     | 6.7                              | -19.08                            | HFC2                                 | NM   | 1,742                               | 1,421                   | 12,891   | 24.9                  | 2.71   | whole core  | 2      |
| G-3770 | 29.47-29.87     | 6.7                              | -22.97                            | HFC2                                 | NM   | 361                                 | 2                       | 18,551   | 22.2                  | 2.71   | whole core  | 2      |
| G-3770 | 30.04-30.27     | 6.7                              | -23.46                            | HFC2                                 | NM   | 3,073                               | 1,634                   | 10,694   | 28.9                  | 2.70   | whole core  | 2      |
| G-3770 | 37.69-38.02     | 6.7                              | -31.16                            | HFC2                                 | NM   | 4,917                               | 4,917                   | 7,419    | 35.1                  | 2.70   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 9 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3770 | 40.93-41.28     | 6.7                              | -34.4                             | HFC2                                 | NM   | 4,470                               | 2,037                   | 5,524    | 30.8                  | 2.68   | whole core  | 2      |
| G-3770 | 44.88-45.21     | 6.7                              | -38.34                            | HFC2                                 | NM   | NM                                  | 0.6                     | NM       | 30.7                  | 2.69   | whole core  | 2      |
| G-3770 | 45.4-45.63      | 6.7                              | -38.82                            | HFC2                                 | NM   | 7,375                               | 3,361                   | 2,481    | 27.8                  | 2.70   | whole core  | 2      |
| G-3770 | 50.9-51.13      | 6.7                              | -44.32                            | HFC2                                 | NM   | 0.2                                 | 0.2                     | 3        | 17.0                  | 2.70   | whole core  | 2      |
| G-3770 | 51.3-51.72      | 6.7                              | -44.81                            | HFC2                                 | NM   | 14                                  | 0.2                     | 0.1      | 17.7                  | 2.71   | whole core  | 2      |
| G-3770 | 51.72-52.14     | 6.7                              | -45.23                            | HFC2                                 | NM   | 0.2                                 | 0.1                     | 0.1      | 16.6                  | 2.69   | whole core  | 2      |
| G-3770 | 52.29-52.62     | 6.7                              | -45.76                            | HFC2                                 | NM   | 20                                  | 0.3                     | 0.1      | 21.1                  | 2.70   | whole core  | 2      |
| G-3771 | 18.0-18.38      | 6                                | -12.19                            | HFC2                                 | NM   | 983                                 | 248                     | 5        | 19.2                  | 2.71   | whole core  | 2      |
| G-3771 | 18.38-18.67     | 6                                | -12.52                            | HFC2                                 | NM   | 18                                  | 0.07                    | 1        | 18.6                  | 2.71   | whole core  | 2      |
| G-3771 | 18.67-19.02     | 6                                | -12.84                            | HFC2                                 | NM   | 10                                  | 0.5                     | 1,925    | 23.3                  | 2.71   | whole core  | 2      |
| G-3771 | 19.29-19.64     | 6                                | -13.46                            | HFC2                                 | NM   | 2,135                               | 813                     | 16,070   | 24.6                  | 2.70   | whole core  | 2      |
| G-3771 | 19.64-20.02     | 6                                | -13.83                            | HFC2                                 | NM   | 11,534                              | 11,534                  | 15,745   | 24.9                  | 2.70   | whole core  | 2      |
| G-3771 | 20.15-20.48     | 6                                | -14.32                            | HFC2                                 | NM   | 11,316                              | 11,316                  | 16,068   | 31.7                  | 2.71   | whole core  | 2      |
| G-3771 | 20.61-20.98     | 6                                | -14.8                             | HFC2                                 | NM   | 10,615                              | 10,615                  | 17,158   | 30.3                  | 2.71   | whole core  | 2      |
| G-3771 | 25.77-26.14     | 6                                | -19.96                            | HFC2                                 | NM   | 10,341                              | 5,168                   | 17,428   | 15.9                  | 2.70   | whole core  | 2      |
| G-3771 | 27.94-28.27     | 6                                | -22.1                             | HFC2                                 | NM   | 11,646                              | 11,646                  | 15,674   | 25.9                  | 2.70   | whole core  | 2      |
| G-3771 | 29.57-29.84     | 6                                | -23.7                             | HFC2                                 | NM   | 1                                   | 0.04                    | 1        | 13.1                  | 2.71   | whole core  | 2      |
| G-3771 | 29.84-30.07     | 6                                | -23.96                            | HFC2                                 | NM   | 0.04                                | 0.04                    | 0.5      | 13.2                  | 2.71   | whole core  | 2      |
| G-3771 | 30.42-30.57     | 6                                | -24.5                             | HFC2                                 | NM   | 0.2                                 | 0.1                     | 634      | 13.8                  | 2.69   | whole core  | 2      |
| G-3771 | 30.61-30.76     | 6                                | -24.68                            | HFC2                                 | NM   | 7                                   | 0.3                     | 2,057    | 17.5                  | 2.70   | whole core  | 2      |
| G-3771 | 31.58-31.91     | 6                                | -25.74                            | HFC2                                 | NM   | 527                                 | 41                      | 787      | 20.1                  | 2.69   | whole core  | 2      |
| G-3771 | 32.16-32.41     | 6                                | -26.28                            | HFC2                                 | NM   | 7,887                               | 7,887                   | 5,732    | 22.7                  | 2.70   | whole core  | 2      |
| G-3771 | 32.7-32.95      | 6                                | -26.82                            | HFC2                                 | NM   | 215                                 | 37                      | 456      | 17.3                  | 2.70   | whole core  | 2      |
| G-3771 | 32.95-33.24     | 6                                | -27.1                             | HFC2                                 | NM   | 314                                 | 70                      | 492      | 18.5                  | 2.71   | whole core  | 2      |
| G-3771 | 33.24-33.53     | 6                                | -27.38                            | HFC2                                 | NM   | 6,446                               | 6,446                   | 7,001    | 17.7                  | 2.71   | whole core  | 2      |
| G-3771 | 34.18-34.47     | 6                                | -28.32                            | HFC2                                 | NM   | 14,112                              | 14,112                  | 6,410    | 34.9                  | 2.71   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 10 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability ( $K_{air}$ )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                              | Maxi-m<br>um<br>Hori-zo<br>ntal | Hori-zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3771 | 40.49–40.72     | 6                                | –34.6                             | HFC2                                 | NM   | 922                             | 665                 | 749      | 25.1                  | 2.71   | whole core  | 2      |
| G-3771 | 40.91–41.12     | 6                                | –35.02                            | HFC2                                 | NM   | NM                              | 76                  | NM       | 30.2                  | 2.72   | whole core  | 2      |
| G-3771 | 47.93–48.03     | 6                                | –41.98                            | HFC2                                 | NM   | 4                               | 1                   | 81       | 22.2                  | 2.70   | whole core  | 2      |
| G-3771 | 48.23–48.52     | 6                                | –42.38                            | HFC2                                 | NM   | 315                             | 70                  | 394      | 27.6                  | 2.72   | whole core  | 2      |
| G-3771 | 49.06–49.27     | 6                                | –43.16                            | HFC2                                 | NM   | 109                             | 49                  | 38       | 29.2                  | 2.71   | whole core  | 2      |
| G-3771 | 49.27–49.5      | 6                                | –43.38                            | HFC2                                 | NM   | 4,106                           | 2,878               | 803      | 31.0                  | 2.71   | whole core  | 2      |
| G-3771 | 49.65–49.88     | 6                                | –43.76                            | HFC2                                 | NM   | 5,789                           | 5,789               | 5,235    | 34.3                  | 2.71   | whole core  | 2      |
| G-3771 | 50.09–50.15     | 6                                | –44.12                            | HFC2                                 | NM   | 4,550                           | 3,327               | 136      | 25.7                  | 2.71   | whole core  | 2      |
| G-3778 | 38.6–38.88      | 16.4                             | –22.34                            | HFC2                                 | NM   | 109                             | 80                  | 100      | 38.5                  | 2.71   | whole core  | 2      |
| G-3778 | 39.2–39.37      | 16.4                             | –22.88                            | HFC2                                 | NM   | 87                              | 81                  | 273      | 35.6                  | 2.72   | whole core  | 2      |
| G-3778 | 40.96–41.25     | 16.4                             | –24.7                             | HFC2                                 | NM   | 5,985                           | 5,129               | 4,145    | 42.6                  | 2.73   | whole core  | 2      |
| G-3778 | 52.27–52.52     | 16.4                             | –36                               | HFC2                                 | NM   | 2,726                           | 1,890               | 2,321    | 21.3                  | 2.71   | whole core  | 2      |
| G-3778 | 54.16–54.43     | 16.4                             | –37.9                             | HFC2                                 | NM   | 28                              | 4                   | 588      | 22.2                  | 2.71   | whole core  | 2      |
| G-3778 | 55.13–55.23     | 16.4                             | –38.78                            | HFC2                                 | NM   | 77                              | 42                  | 310      | 20.0                  | 2.72   | whole core  | 2      |
| G-3778 | 59.2–59.47      | 16.4                             | –42.94                            | HFC2                                 | NM   | 20,467                          | 20,467              | 2,452    | 23.5                  | 2.70   | whole core  | 2      |
| G-3778 | 59.8–60.05      | 16.4                             | –43.52                            | HFC2                                 | NM   | 18,720                          | 18,720              | 3,490    | 21.5                  | 2.70   | whole core  | 2      |
| G-3779 | 46.8–46.97      | 16.2                             | –30.68                            | HFC2                                 | NM   | 114                             | 91                  | 574      | 37.1                  | 2.73   | whole core  | 2      |
| G-3779 | 47.39–47.6      | 16.2                             | –31.3                             | HFC2                                 | NM   | 358                             | 26                  | 801      | 35.4                  | 2.75   | whole core  | 2      |
| G-3779 | 47.6–47.81      | 16.2                             | –31.5                             | HFC2                                 | NM   | 873                             | 680                 | 57       | 36.0                  | 2.73   | whole core  | 2      |
| G-3779 | 49.18–49.31     | 16.2                             | –33.04                            | HFC2                                 | NM   | 4,595                           | 3,201               | 1,682    | 29.6                  | 2.72   | whole core  | 2      |
| G-3779 | 49.5–49.63      | 16.2                             | –33.36                            | HFC2                                 | NM   | 10,813                          | 7,053               | 893      | 25.6                  | 2.73   | whole core  | 2      |
| G-3779 | 49.88–50.07     | 16.2                             | –33.78                            | HFC2                                 | NM   | 2,137                           | 2,137               | 1,647    | 32.2                  | 2.73   | whole core  | 2      |
| G-3779 | 52.19–52.57     | 16.2                             | –36.18                            | HFC2                                 | NM   | 2,165                           | 1,866               | 4,821    | 16.8                  | 2.71   | whole core  | 2      |
| G-3779 | 54.3–54.68      | 16.2                             | –38.26                            | HFC2                                 | NM   | 49                              | 33                  | 365      | 24.1                  | 2.72   | whole core  | 2      |
| G-3779 | 54.94–55.06     | 16.2                             | –38.8                             | HFC2                                 | NM   | 16                              | 16                  | 926      | 18.4                  | 2.69   | whole core  | 2      |
| G-3779 | 58.21–58.42     | 16.2                             | –42.12                            | HFC2                                 | NM   | 17,621                          | 17,621              | 4,697    | 26.7                  | 2.71   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 11 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability ( $K_{air}$ )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                              | Maxi-m<br>um<br>Hori-zo<br>ntal | Hori-zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3779 | 58.75–58.92     | 16.2                             | –42.64                            | HFC2                                 | NM   | 26,236                          | 26,236              | 2,252    | 23.5                  | 2.70   | whole core  | 2      |
| G-3779 | 59.09–59.26     | 16.2                             | –42.98                            | HFC2                                 | NM   | 25,120                          | 268                 | 2,588    | 12.0                  | 2.69   | whole core  | 2      |
| G-3779 | 59.59–60.01     | 16.2                             | –43.6                             | HFC2                                 | NM   | 9,599                           | 8,638               | 5,542    | 29.4                  | 2.72   | whole core  | 2      |
| G-3789 | 27.67–28        | 8                                | –19.84                            | HFC2                                 | NM   | 1,529                           | 782                 | 2,465    | 23.1                  | 2.72   | whole core  | 2      |
| G-3789 | 28–28.27        | 8                                | –20.14                            | HFC2                                 | NM   | 2,784                           | 2,784               | 1,966    | 23.1                  | 2.71   | whole core  | 2      |
| G-3789 | 28.27–28.58     | 8                                | –20.42                            | HFC2                                 | NM   | 5,618                           | 5,185               | 2,975    | 22.8                  | 2.72   | whole core  | 2      |
| G-3789 | 28.88–29.07     | 8                                | –20.98                            | HFC2                                 | NM   | 5,784                           | 3,439               | 2,170    | 20.8                  | 2.72   | whole core  | 2      |
| G-3789 | 29.24–29.39     | 8                                | –21.32                            | HFC2                                 | NM   | 9,142                           | 8,230               | 1,615    | 22.9                  | 2.72   | whole core  | 2      |
| G-3789 | 29.68–30.03     | 8                                | –21.86                            | HFC2                                 | NM   | 506                             | 250                 | 495      | 22.6                  | 2.73   | whole core  | 2      |
| G-3789 | 31.61–32.15     | 8                                | –23.88                            | HFC2                                 | NM   | 77                              | 46                  | 4        | 29.4                  | 2.73   | whole core  | 2      |
| G-3789 | 32.23–32.56     | 8                                | –24.4                             | HFC2                                 | NM   | 214                             | 184                 | 255      | 32.0                  | 2.73   | whole core  | 2      |
| G-3789 | 33.86–34.19     | 8                                | –26.08                            | HFC2                                 | NM   | 41                              | 0.4                 | 0.1      | 22.1                  | 2.73   | whole core  | 2      |
| G-3789 | 34.4–34.73      | 8                                | –26.56                            | HFC2                                 | NM   | 696                             | 365                 | 184      | 25.1                  | 2.72   | whole core  | 2      |
| G-3789 | 34.9–35.15      | 8                                | –27.02                            | HFC2                                 | NM   | 1,096                           | 888                 | 1,232    | 30.0                  | 2.73   | whole core  | 2      |
| G-3789 | 37.33–37.54     | 8                                | –29.44                            | HFC2                                 | NM   | 0.4                             | 0.2                 | 0.05     | 18.4                  | 2.71   | whole core  | 2      |
| G-3789 | 40.66–40.87     | 8                                | –32.76                            | HFC2                                 | NM   | 38                              | 0.4                 | 61       | 18.1                  | 2.73   | whole core  | 2      |
| G-3789 | 42.57–42.92     | 8                                | –34.74                            | HFC2                                 | NM   | 0.02                            | 0.001               | 2,840    | 13.5                  | 2.71   | whole core  | 2      |
| G-3789 | 52–52.17        | 8                                | –44.08                            | HFC2                                 | NM   | 28                              | 23                  | 89       | 17.9                  | 2.69   | whole core  | 2      |
| G-3789 | 53.10–53.56     | 8                                | –45.33                            | HFC2                                 | NM   | 1,874                           | 1,055               | 238      | 25.8                  | 2.69   | whole core  | 2      |
| G-3790 | 32.25–32.54     | 8                                | –24.4                             | HFC2                                 | NM   | 2,016                           | 1,328               | 3,268    | 28.2                  | 2.72   | whole core  | 2      |
| G-3790 | 34.2–34.45      | 8                                | –26.32                            | HFC2                                 | NM   | 952                             | 713                 | 299      | 37.4                  | 2.72   | whole core  | 2      |
| G-3790 | 39.31–39.69     | 8                                | –31.5                             | HFC2                                 | NM   | 0.2                             | 0.2                 | 0.2      | 26.7                  | 2.72   | whole core  | 2      |
| G-3790 | 40.54–40.96     | 8                                | –32.75                            | HFC2                                 | NM   | 0.08                            | 0.08                | 4,391    | 19.4                  | 2.71   | whole core  | 2      |
| G-3790 | 41.21–41.5      | 8                                | –33.36                            | HFC2                                 | NM   | 0.02                            | 0.02                | 4        | 13.0                  | 2.72   | whole core  | 2      |
| G-3790 | 41.68–41.95     | 8                                | –33.82                            | HFC2                                 | NM   | 9                               | 9                   | 12       | 19.3                  | 2.72   | whole core  | 2      |
| G-3790 | 42.38–42.71     | 8                                | –34.54                            | HFC2                                 | NM   | 3,539                           | 0.05                | 1,796    | 22.5                  | 2.72   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 12 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability (K <sub>air</sub> )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                                    | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3790 | 44.63-44.8      | 8                                | -36.72                            | HFC2                                 | NM   | 24                                  | 7                       | 273      | 14.5                  | 2.71   | whole core  | 2      |
| G-3790 | 49.76-50.01     | 8                                | -41.88                            | HFC2                                 | NM   | 9,569                               | 7,973                   | 2,300    | 21.1                  | 2.71   | whole core  | 2      |
| G-3790 | 50.18-50.42     | 8                                | -42.3                             | HFC2                                 | NM   | 9,077                               | 7,260                   | 8        | 21.5                  | 2.69   | whole core  | 2      |
| G-3790 | 52.98-53.23     | 8                                | -45.1                             | HFC2                                 | NM   | 297                                 | 282                     | 75       | 26.8                  | 2.70   | whole core  | 2      |
| G-3790 | 56.17-56.5      | 8                                | -48.25                            | HFC2                                 | NM   | 309                                 | 2                       | 2        | 19.2                  | 2.70   | whole core  | 2      |
| G-3790 | 57.83-57.71     | 8                                | -50.27                            | HFC2                                 | NM   | 380                                 | 6                       | 0.5      | 22.1                  | 2.70   | whole core  | 2      |
| G-3791 | 30.63-30.88     | 8                                | -22.76                            | HFC2                                 | NM   | 2,101                               | 1,641                   | 1,047    | 37.8                  | 2.70   | whole core  | 2      |
| G-3791 | 32-32.29        | 8                                | -24.14                            | HFC2                                 | NM   | 1,084                               | 658                     | 1,016    | 29.5                  | 2.71   | whole core  | 2      |
| G-3791 | 32.83-33.25     | 8                                | -25.04                            | HFC2                                 | NM   | 8,854                               | 6,885                   | 4,117    | 45.4                  | 2.73   | whole core  | 2      |
| G-3791 | 33.75-34.21     | 8                                | -25.98                            | HFC2                                 | NM   | 8,555                               | 8,555                   | 4,957    | 30.4                  | 2.72   | whole core  | 2      |
| G-3791 | 34.38-34.8      | 8                                | -26.59                            | HFC2                                 | NM   | 8,854                               | 6,885                   | 3,050    | 22.2                  | 2.71   | whole core  | 2      |
| G-3791 | 38.13-38.42     | 8                                | -30.3                             | HFC2                                 | NM   | 6,413                               | 5,557                   | 1,936    | 31.6                  | 2.72   | whole core  | 2      |
| G-3791 | 38.63-38.96     | 8                                | -30.8                             | HFC2                                 | NM   | 8,100                               | 6,942                   | 3,334    | 31.0                  | 2.71   | whole core  | 2      |
| G-3791 | 41.21-41.59     | 8                                | -33.4                             | HFC2                                 | NM   | 1,762                               | 1,560                   | 2,110    | 32.0                  | 2.70   | whole core  | 2      |
| G-3791 | 41.96-42.38     | 8                                | -34.17                            | HFC2                                 | NM   | 2,634                               | 2,406                   | 3,304    | 36.0                  | 2.71   | whole core  | 2      |
| G-3791 | 42.38-42.59     | 8                                | -34.48                            | HFC2                                 | NM   | 4,338                               | 3,407                   | 2,223    | 32.0                  | 2.70   | whole core  | 2      |
| G-3791 | 43.42-43.65     | 8                                | -35.54                            | HFC2                                 | NM   | 16,346                              | 14,529                  | 2,125    | 25.5                  | 2.71   | whole core  | 2      |
| G-3791 | 51.35-51.68     | 8                                | -43.52                            | HFC2                                 | NM   | 2,612                               | 1,729                   | 1,589    | 15.4                  | 2.70   | whole core  | 2      |
| G-3791 | 51.68-52.06     | 8                                | -43.87                            | HFC2                                 | NM   | 2,472                               | 1,831                   | 6        | 17.7                  | 2.70   | whole core  | 2      |
| G-3792 | 26.06-26.39     | 8                                | -18.22                            | HFC2                                 | NM   | 10,954                              | 0.2                     | 764      | 24.2                  | 2.70   | whole core  | 2      |
| G-3792 | 26.39-26.72     | 8                                | -18.56                            | HFC2                                 | NM   | 2,082                               | 2,005                   | 1,405    | 30.1                  | 2.71   | whole core  | 2      |
| G-3792 | 27.14-27.45     | 8                                | -19.3                             | HFC2                                 | NM   | 812                                 | 462                     | 1,337    | 18.3                  | 2.71   | whole core  | 2      |
| G-3792 | 27.83-28.25     | 8                                | -20.04                            | HFC2                                 | NM   | 4,123                               | 4,123                   | 3,265    | 16.9                  | 2.71   | whole core  | 2      |
| G-3792 | 28.25-28.58     | 8                                | -20.42                            | HFC2                                 | NM   | 7,454                               | 6,211                   | 2,502    | 20.1                  | 2.72   | whole core  | 2      |
| G-3792 | 32.82-33.24     | 8                                | -25.03                            | HFC2                                 | NM   | 3,836                               | 564                     | 296      | 18.4                  | 2.71   | whole core  | 2      |
| G-3792 | 34.17-34.50     | 8                                | -26.34                            | HFC2                                 | NM   | 40                                  | 39                      | 1        | 13.4                  | 2.68   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 13 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability ( $K_{air}$ )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                              | Maxi-m<br>um<br>Hori-zo<br>ntal | Hori-zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3792 | 34.50-34.88     | 8                                | -26.69                            | HFC2                                 | NM   | 589                             | 346                 | 0.02     | 15.5                  | 2.69   | whole core  | 2      |
| G-3792 | 34.88-35.09     | 8                                | -26.98                            | HFC2                                 | NM   | 0.1                             | 0.1                 | 0.2      | 10.8                  | 2.69   | whole core  | 2      |
| G-3792 | 38.63-38.96     | 8                                | -30.8                             | HFC2                                 | NM   | 404                             | 265                 | 6        | 19.9                  | 2.70   | whole core  | 2      |
| G-3792 | 43.15-43.53     | 8                                | -35.34                            | HFC2                                 | NM   | 2                               | 0.04                | 0.02     | 13.3                  | 2.70   | whole core  | 2      |
| G-3792 | 45.27-45.5      | 8                                | -37.38                            | HFC2                                 | NM   | 1,736                           | 53                  | 1,517    | 9.9                   | 2.70   | whole core  | 2      |
| G-3792 | 45.6-45.98      | 8                                | -37.79                            | HFC2                                 | NM   | 699                             | 470                 | 3,333    | 8.3                   | 2.69   | whole core  | 2      |
| G-3792 | 50.05-50.3      | 8                                | -42.18                            | HFC2                                 | NM   | 15                              | 0.4                 | 591      | 19.7                  | 2.70   | whole core  | 2      |
| G-3792 | 51.69-51.98     | 8                                | -43.84                            | HFC2                                 | NM   | 13,265                          | 11,938              | 4,010    | 23.4                  | 2.71   | whole core  | 2      |
| G-3792 | 62.71-63.04     | 8                                | -54.88                            | HFC2                                 | NM   | 533                             | 495                 | 155      | 21.5                  | 2.72   | whole core  | 2      |
| G-3792 | 66.81-67.06     | 8                                | -58.94                            | HFC2                                 | NM   | 0.3                             | 0.02                | 0.2      | 13.8                  | 2.71   | whole core  | 2      |
| G-3792 | 67.39-67.72     | 8                                | -59.56                            | HFC2                                 | NM   | 7,869                           | 5,619               | 0.02     | 18.3                  | 2.71   | whole core  | 2      |
| G-3792 | 67.72-68.05     | 8                                | -59.88                            | HFC2                                 | NM   | 8,022                           | 4,199               | 1        | 17.5                  | 2.71   | whole core  | 2      |
| G-3792 | 69.47-69.89     | 8                                | -61.68                            | HFC2                                 | NM   | 273                             | 12                  | 0.03     | 13.8                  | 2.71   | whole core  | 2      |
| G-3792 | 76-76.25        | 8                                | -68.12                            | HFC2                                 | NM   | 23,984                          | 4,012               | 1,387    | 30.8                  | 2.72   | whole core  | 2      |
| G-3793 | 13.88-14.21     | 10                               | -4.04                             | HFC2                                 | NM   | 9,081                           | 3,403               | 3,906    | 22.8                  | 2.70   | whole core  | 2      |
| G-3793 | 17.21-17.63     | 10                               | -7.42                             | HFC2                                 | NM   | 4,268                           | 3,047               | 3,067    | 17.9                  | 2.71   | whole core  | 2      |
| G-3793 | 27-27.21        | 10                               | -17.1                             | HFC2                                 | NM   | 962                             | 3                   | 5        | 22.8                  | 2.71   | whole core  | 2      |
| G-3793 | 28.68-29.01     | 10                               | -18.84                            | HFC2                                 | NM   | 12,480                          | 9,599               | 3,023    | 31.2                  | 2.72   | whole core  | 2      |
| G-3793 | 29.18-29.6      | 10                               | -19.39                            | HFC2                                 | NM   | 19,318                          | 15,000              | 1,502    | 23.4                  | 2.73   | whole core  | 2      |
| G-3793 | 31.75-31.94     | 10                               | -21.84                            | HFC2                                 | NM   | 27,411                          | 21,083              | 1,290    | 27.0                  | 2.72   | whole core  | 2      |
| G-3793 | 32.11-32.36     | 10                               | -22.24                            | HFC2                                 | NM   | 15,136                          | 13,622              | 1,742    | 29.3                  | 2.71   | whole core  | 2      |
| G-3793 | 39.52-39.9      | 10                               | -29.71                            | HFC2                                 | NM   | 929                             | 678                 | 940      | 22.0                  | 2.71   | whole core  | 2      |
| G-3793 | 39.9-40.28      | 10                               | -30.09                            | HFC2                                 | NM   | 1,865                           | 1,678               | 1,626    | 22.8                  | 2.71   | whole core  | 2      |
| G-3793 | 40.44-40.73     | 10                               | -30.58                            | HFC2                                 | NM   | 571                             | 28                  | 1,657    | 20.1                  | 2.72   | whole core  | 2      |
| G-3793 | 41.15-41.42     | 10                               | -31.34                            | HFC2                                 | NM   | 52                              | 41                  | 1,853    | 17.9                  | 2.71   | whole core  | 2      |
| G-3793 | 52.98-53.25     | 10                               | -43.12                            | HFC2                                 | NM   | 3,616                           | 2,218               | 357      | 27.1                  | 2.70   | whole core  | 2      |



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**Table 2.4.12-207 (Sheet 14 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability ( $K_{air}$ )<br>(millidarcies) |                                 |                     |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|---------------------------------|---------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                              | Maxi-m<br>um<br>Hori-zo<br>ntal | Hori-zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3793 | 53.79-53.98     | 10                               | -43.88                            | HFC2                                 | NM   | 327                             | 13                  | 189      | 22.7                  | 2.70   | whole core  | 2      |
| G-3794 | 19.4-19.73      | 9                                | -10.56                            | HFC2                                 | NM   | 439                             | 316                 | 2,251    | 15.0                  | 2.77   | whole core  | 2      |
| G-3794 | 24.18-24.51     | 9                                | -15.34                            | HFC2                                 | NM   | 2,317                           | 1,958               | 3,592    | 22.0                  | 2.71   | whole core  | 2      |
| G-3794 | 30.72-30.97     | 9                                | -21.84                            | HFC2                                 | NM   | 5,055                           | 226                 | 233      | 29.6                  | 2.72   | whole core  | 2      |
| G-3673 | 51-51.5         | 20                               | -31.25                            | HFC1                                 | 34.3   | NM                              | NM                  | NM       | 37.3                  | 2.68   | core plug   | 1      |
| G-3674 | 39.25-40        | 10                               | -29.62                            | HFC1                                 | 77.6   | NM                              | NM                  | NM       | 12.3                  | 2.70   | core plug   | 1      |
| G-3674 | 49-49.75        | 10                               | -39.38                            | HFC1                                 | <0.01  | NM                              | NM                  | NM       | 21.2                  | 2.68   | core plug   | 1      |
| G-3674 | 52.1            | 10                               | -42.1                             | HFC1                                 | 2.19   | NM                              | NM                  | NM       | 18.1                  | 2.69   | core plug   | 1      |
| G-3675 | 64.5-65         | 8                                | -56.75                            | HFC1                                 | <0.01  | NM                              | NM                  | NM       | 17.7                  | 2.69   | core plug   | 1      |
| G-3678 | 33.3            | 9                                | -24.3                             | HFC1                                 | NM   | 2,244                           | 997                 | 18,223   | 16.1                  | 2.71   | whole core  | 1      |
| G-3679 | 36.7            | 9                                | -27.7                             | HFC1                                 | NM   | 1,870                           | 0.54                | 13,498   | 20.7                  | 2.71   | whole core  | 1      |
| G-3731 | 39.08           | 10                               | -29.08                            | HFC1                                 | NM   | 3,530                           | 1,463               | 13,050   | 20.4                  | 2.71   | whole core  | 1      |
| G-3732 | 39.5            | 6                                | -33.5                             | HFC1                                 | 194.3  | NM                              | NM                  | NM       | 10.8                  | 2.71   | core plug   | 1      |
| G-3732 | 42.4-42.7       | 6                                | -36.55                            | HFC1                                 | NM   | NM                              | NM                  | 13,362   | 34.8                  | 2.68   | whole core  | 1      |
| G-3732 | 44              | 6                                | -38                               | HFC1                                 | 165.3  | NM                              | NM                  | NM       | 16.2                  | 2.71   | core plug   | 1      |
| G-3674 | 83.5-84         | 10                               | -73.75                            | Tamiami                              | 16584  | NM                              | NM                  | NM       | 42.6                  | 2.68   | core plug   | 1      |
| G-3770 | 64.59-64.8      | 6.7                              | -58                               | Tamiami                              | NM   | 1,956                           | 1,831               | 1,236    | 28.2                  | 2.74   | whole core  | 2      |
| G-3770 | 64.92-65.38     | 6.7                              | -58.45                            | Tamiami                              | NM   | 1,996                           | 1,996               | 2,862    | 29.0                  | 2.72   | whole core  | 2      |
| G-3770 | 69.88-70.17     | 6.7                              | -63.35                            | Tamiami                              | NM   | 1,983                           | 63                  | 296      | 19.7                  | 2.72   | whole core  | 2      |
| G-3770 | 70.17-70.42     | 6.7                              | -63.6                             | Tamiami                              | NM   | 1,402                           | 1,329               | 343      | 22.6                  | 2.72   | whole core  | 2      |
| G-3770 | 70.42-70.67     | 6.7                              | -63.85                            | Tamiami                              | NM   | 2,186                           | 1,994               | 1,878    | 26.1                  | 2.72   | whole core  | 2      |
| G-3771 | 54.21-54.46     | 6                                | -48.35                            | Tamiami                              | NM   | 13                              | 13                  | 32       | 23.3                  | 2.74   | whole core  | 2      |
| G-3771 | 55.47-55.7      | 6                                | -49.58                            | Tamiami                              | NM   | 36                              | 12                  | 116      | 19.0                  | 2.74   | whole core  | 2      |
| G-3771 | 55.89-56.08     | 6                                | -49.98                            | Tamiami                              | NM   | 39                              | 2                   | 37       | 18.4                  | 2.74   | whole core  | 2      |
| G-3771 | 58.93-59.18     | 6                                | -53.06                            | Tamiami                              | NM   | 2,650                           | 2,467               | 2,490    | 26.3                  | 2.77   | whole core  | 2      |
| G-3771 | 59.93-60.1      | 6                                | -54.02                            | Tamiami                              | NM   | 4,825                           | 4,669               | 2,077    | 38.2                  | 2.79   | whole core  | 2      |

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**Table 2.4.12-207 (Sheet 15 of 15)**  
**Regional Hydrogeologic Properties from Rock Core Samples**

| Boring | Depth<br>(feet) | Surface<br>Elevation<br>(ft MSL) | Midpoint<br>Elevation<br>(ft MSL) | High Frequency Cycle<br>or Formation | Permeability ( $K_{air}$ )<br>(millidarcies) |                                     |                         |          | Porosity<br>(percent) | Grain Density<br>(grams per<br>cubic<br>centimeter) <sup>(a)</sup> | Sample Type | Source |
|--------|-----------------|----------------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|-------------------------|----------|-----------------------|--|-------------|--------|
|        |                 |                                  |                                   |                                      | Steady<br>State                              | Maxi-m<br>um<br>Hori-<br>zo<br>ntal | Hori-<br>zo<br>ntal 90° | Vertical |                       |  |             |        |
| G-3771 | 74.27-74.44     | 6                                | -68.36                            | Tamiami                              | NM   | 4,302                               | 3,625                   | 4,127    | 40.6                  | 2.74   | whole core  | 2      |
| G-3771 | 74.57-74.78     | 6                                | -68.68                            | Tamiami                              | NM   | 7,091                               | 7,091                   | 5,116    | 40.3                  | 2.72   | whole core  | 2      |
| G-3793 | 63.95-64.12     | 10                               | -54.04                            | Tamiami                              | NM   | 20,433                              | 15,889                  | 735      | 11.5                  | 2.69   | whole core  | 2      |
| G-3793 | 64.29-64.62     | 10                               | -54.46                            | Tamiami                              | NM   | 12,171                              | 10,954                  | 2,042    | 14.5                  | 2.69   | whole core  | 2      |
| G-3793 | 64.92-64.96     | 10                               | -54.94                            | Tamiami                              | NM   | 4,964                               | 4,964                   | 465      | 11.2                  | 2.69   | whole core  | 2      |
| G-3794 | 59.23-59.65     | 9                                | -49.44                            | Tamiami                              | NM   | 4,690                               | 3,607                   | 2,006    | 15.7                  | 2.72   | whole core  | 2      |
| G-3794 | 61.02-61.52     | 9                                | -52.27                            | Tamiami                              | NM   | 100                                 | 17                      | 11       | 15.8                  | 2.69   | whole core  | 2      |
| G-3794 | 61.94-62.27     | 9                                | -53.1                             | Tamiami                              | NM   | 2,807                               | 2,010                   | 638      | 26.4                  | 2.74   | whole core  | 2      |
| G-3794 | 63.13-63.38     | 9                                | -54.26                            | Tamiami                              | NM   | 61                                  | 0.1                     | 204      | 10.0                  | 2.72   | whole core  | 2      |
| G-3794 | 64.07-64.57     | 9                                | -55.32                            | Tamiami                              | NM   | 1,952                               | 837                     | 0.03     | 21.0                  | 2.76   | whole core  | 2      |

(a) Reported as grams per centimeter in the references.

Sources: [References 241](#) and [242](#)

MSL = Mean sea level

NM = Not measured

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**Table 2.4.12-208 (Sheet 1 of 4)**  
**Slug Test Hydraulic Conductivity Summary**

| Observation Well | Test Date | Surface Elevation (NAVD 88) | Screened Interval (feet bgs) | Geologic Unit                 | Saturated Thickness (feet) | Solution        | Hydraulic Conductivity in feet per day |        |                 |
|------------------|-----------|-----------------------------|------------------------------|-------------------------------|----------------------------|-----------------|--|--------|-----------------|
|                  |           |                             |                              |                               |                            |                 | Falling                                | Rising | Arithmetic Mean |
| OW-606U Test #1  | 5/20/2008 | -1.4                        | 18-28                        | Miami Limestone               | 29.9                       | KGS             | NC                                     | 97.98  | 97.98           |
| OW-606U Test #1  |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 134.80 | 134.80          |
| OW-606U Test #2  |           |                             |                              |                               |                            | KGS             | NC                                     | 92.02  | 92.02           |
| OW-606U Test #2  |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 123.10 | 123.10          |
| OW-606U Average  |           |                             |                              |                               |                            |                 | N/A                                    | 111.98 | 111.98          |
| OW-606L Test #1  | 5/18/2008 | -1.4                        | 97-107                       | Lower Fort Thompson Formation | 92.0                       | Butler          | 119.90                                 | 30.16  | 75.03           |
| OW-606L Test #1  |           |                             |                              |                               |                            | McElwee-Zenner  | 117.80                                 | NC     | 117.80          |
| OW-606L Test #1  |           |                             |                              |                               |                            | KGS             | NC                                     | 35.04  | 35.04           |
| OW-606L Test #2  |           |                             |                              |                               |                            | Butler          | NC                                     | 67.40  | 67.40           |
| OW-606L Test #2  |           |                             |                              |                               |                            | McElwee-Zenner  | NC                                     | 66.13  | 66.13           |
| OW-606L Average  |           |                             |                              |                               |                            |                 | 118.85                                 | 49.68  | 72.74           |
| OW-621U          | 5/20/2008 | 0.2                         | 17.4-27.4                    | Miami Limestone               | 27.6                       | KGS             | NC                                     | 94.35  | 94.35           |
| OW-621U          |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 68.89  | 68.89           |
| OW-621U Average  |           |                             |                              |                               |                            |                 | N/A                                    | 81.62  | 81.62           |
| OW-621L Test #1  | 5/17/2008 | 0.2                         | 98.6-108.6                   | Lower Fort Thompson Formation | 88.5                       | Butler          | 91.59                                  | 31.07  | 61.33           |
| OW-621L Test #1  |           |                             |                              |                               |                            | KGS             | 71.28                                  | 33.31  | 52.30           |
| OW-621L Test #2  |           |                             |                              |                               |                            | Butler          | NC                                     | 35.72  | 35.72           |
| OW-621L Test #2  |           |                             |                              |                               |                            | KGS             | NC                                     | 30.40  | 30.40           |
| OW-621L Test #3  |           |                             |                              |                               |                            | Butler          | NC                                     | 16.65  | 16.65           |
| OW-621L Test #3  |           |                             |                              |                               |                            | KGS             | NC                                     | 16.66  | 16.66           |
| OW-621L Average  |           |                             |                              |                               |                            |                 | 81.44                                  | 27.30  | 40.84           |
| OW-636U Test #1  | 5/21/2008 | -1.1                        | 17-27                        | Miami Limestone               | 28.9                       | KGS             | NC                                     | 57.27  | 57.27           |
| OW-636U Test #1  |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 50.64  | 50.64           |
| OW-636U Test #2  |           |                             |                              |                               |                            | KGS             | NC                                     | 79.27  | 79.27           |
| OW-636U Test #2  |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 64.33  | 64.33           |
| OW-636U Average  |           |                             |                              |                               |                            |                 | N/A                                    | 62.88  | 62.88           |

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**Table 2.4.12-208 (Sheet 2 of 4)**  
**Slug Test Hydraulic Conductivity Summary**

| Observation Well | Test Date | Surface Elevation (NAVD 88) | Screened Interval (feet bgs) | Geologic Unit                 | Saturated Thickness (feet) | Solution        | Hydraulic Conductivity in feet per day |        |                 |
|------------------|-----------|-----------------------------|------------------------------|-------------------------------|----------------------------|-----------------|--|--------|-----------------|
|                  |           |                             |                              |                               |                            |                 | Falling                                | Rising | Arithmetic Mean |
| OW-636L          | 5/21/2008 | -1.1                        | 97-107.1                     | Lower Fort Thompson Formation | 88.0                       | Butler          | NC                                     | 10.08  | 10.08           |
| OW-636L          |           |                             |                              |                               |                            | KGS             | NC                                     | 10.58  | 10.58           |
| OW-636L          |           |                             |                              |                               |                            | Butler          | NC                                     | 9.425  | 9.43            |
| OW-636L          |           |                             |                              |                               |                            | KGS             | NC                                     | 10.01  | 10.01           |
| OW-636L Average  |           |                             |                              |                               |                            |                 | N/A                                    | 10.02  | 10.02           |
| OW-706U Test #1  | 5/16/2008 | -1.2                        | 17-27                        | Miami Limestone               | 30.7                       | KGS             | 6.423                                  | 31.19  | 18.81           |
| OW-706U Test #1  |           |                             |                              |                               |                            | Springer-Gelhar | 83.78                                  | 30.27  | 57.03           |
| OW-706U Test #1  |           |                             |                              |                               |                            | Hvorslev        | 0.7146                                 | NC     | 0.71            |
| OW-706U Test #1  |           |                             |                              |                               |                            | Bouwer-Rice     | 0.5455                                 | NC     | 0.55            |
| OW-706U Test #2  |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 70.18  | 70.18           |
| OW-706U Test #2  |           |                             |                              |                               |                            | KGS             | NC                                     | 76.09  | 76.09           |
| OW-706U Average  |           |                             |                              |                               |                            |                 | 22.87                                  | 51.93  | 37.40           |
| OW-706L          | 5/16/2008 | -1.2                        | 100-110                      | Lower Fort Thompson Fm        | 82.8                       | Butler          | 21.20                                  | 25.09  | 23.15           |
| OW-706L          |           |                             |                              |                               |                            | KGS             | 21.97                                  | 26.07  | 24.02           |
| OW-706L Average  |           |                             |                              |                               |                            |                 | 21.59                                  | 25.58  | 23.58           |
| OW-721U Test #1  | 5/15/2008 | -1.5                        | 14-24                        | Miami Limestone               | 24.8                       | Springer-Gelhar | 45.50                                  | 27.03  | 36.27           |
| OW-721U Test #1  |           |                             |                              |                               |                            | KGS             | 45.50                                  | 32.46  | 38.98           |
| OW-721U Test #2  |           |                             |                              |                               |                            | Springer-Gelhar | NC                                     | 24.39  | 24.39           |
| OW-721U Test #2  |           |                             |                              |                               |                            | KGS             | NC                                     | 32.47  | 32.47           |
| OW-721U Average  |           |                             |                              |                               |                            |                 | 45.50                                  | 29.09  | 37.29           |
| OW-721L Test #1  | 5/15/2008 | -1.5                        | 96-106                       | Lower Fort Thompson Formation | 90.0                       | Butler          | 2.726                                  | 11.59  | 7.16            |
| OW-721L Test #1  |           |                             |                              |                               |                            | KGS             | 1.13                                   | 2.91   | 1.13            |
| OW-721L Test #2  |           |                             |                              |                               |                            | Butler          | NC                                     | 2.839  | 2.84            |
| OW-721L Test #2  |           |                             |                              |                               |                            | KGS             | NC                                     | 1.325  | 1.33            |
| OW-721L Average  |           |                             |                              |                               |                            |                 | 1.93                                   | 4.67   | 3.30            |

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**Table 2.4.12-208 (Sheet 3 of 4)**  
**Slug Test Hydraulic Conductivity Summary**

| Observation Well | Test Date | Surface Elevation (NAVD 88) | Screened Interval (feet bgs) | Geologic Unit          | Saturated Thickness (feet) | Solution        | Hydraulic Conductivity in feet per day |        |                  |
|------------------|-----------|-----------------------------|------------------------------|------------------------|----------------------------|-----------------|--|--------|------------------|
|                  |           |                             |                              |                        |                            |                 | Falling                                | Rising | Arith-metic Mean |
| OW-735 U Test #1 | 5/15/2008 | -0.8                        | 16-26                        | Miami Limestone        | 26.5                       | Springer-Gelhar | 319.20                                 | 58.21  | 188.70           |
| OW-735 U Test #1 |           |                             |                              |                        |                            | KGS             | 109.50                                 | 84.68  | 97.09            |
| OW-735 U Test #2 |           |                             |                              |                        |                            | Springer-Gelhar | NC                                     | 80.18  | 80.18            |
| OW-735 U Test #2 |           |                             |                              |                        |                            | KGS             | NC                                     | 70.70  | 70.70            |
| OW-735U Average  |           |                             |                              |                        |                            |                 | 214.35                                 | 73.44  | 143.90           |
| OW-735L Test #1  | 5/13/2008 | -0.8                        | 96.9-106.9                   | Lower Fort Thompson Fm | 87.0                       | Butler          | 49.09                                  | 42.01  | 45.55            |
| OW-735L Test #1  |           |                             |                              |                        |                            | KGS             | 20.57                                  | 32.05  | 26.31            |
| OW-735L Average  |           |                             |                              |                        |                            |                 | 34.83                                  | 37.03  | 35.93            |
| OW-802U          | 5/20/2008 | -1.5                        | 15-27                        | Miami Limestone        | 25.8                       | KGS             | NC                                     | 41.06  | 41.06            |
| OW-802U          |           |                             |                              |                        |                            | Springer-Gelhar | NC                                     | 31.90  | 31.90            |
| OW-802U Average  |           |                             |                              |                        |                            |                 | N/A                                    | 36.48  | 36.48            |
| OW-802L          | 5/20/2008 | -1.5                        | 98-08                        | Lower Fort Thompson Fm | 88.0                       | Butler          | NC                                     | 23.28  | 23.28            |
| OW-802L          |           |                             |                              |                        |                            | KGS             | NC                                     | 30.99  | 30.99            |
| OW-802L Average  |           |                             |                              |                        |                            |                 | N/A                                    | 27.14  | 27.14            |
| OW-805U          | 6/6/2008  | -1.6                        | 18-28                        | Miami Limestone        | 32.3                       | KGS             | NC                                     | 101.7  | 101.70           |
| OW-805U          |           |                             |                              |                        |                            | Butler          | NC                                     | 136.4  | 136.40           |
| OW-805U          |           |                             |                              |                        |                            | Springer-Gelhar | NC                                     | 107.1  | 107.10           |
| OW-805U Average  |           |                             |                              |                        |                            |                 | N/A                                    | 115.07 | 115.07           |
| OW-805L          | 6/6/2008  | -1.6                        | 85-95                        | Lower Fort Thompson Fm | 67.5                       | Butler          | NC                                     | 5.269  | 5.27             |
| OW-805L          |           |                             |                              |                        |                            | KGS             | NC                                     | 5.936  | 5.94             |
| OW-805L Average  |           |                             |                              |                        |                            |                 | N/A                                    | 5.60   | 5.60             |
| OW-809U Test #1  | 5/15/2008 | -1.3                        | 15-25                        | Miami Limestone        | 25.5                       | Springer-Gelhar | 91.20                                  | 60.67  | 75.90            |
| OW-809U Test #1  |           |                             |                              |                        |                            | KGS             | 102.90                                 | 82.32  | 92.60            |
| OW-809U Test #2  |           |                             |                              |                        |                            | Springer-Gelhar | NC                                     | 26.86  | 26.86            |
| OW-809U Test #2  |           |                             |                              |                        |                            | KGS             | NC                                     | 35.94  | 35.94            |

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**Table 2.4.12-208 (Sheet 4 of 4)**  
**Slug Test Hydraulic Conductivity Summary**

| Observation Well | Test Date | Surface Elevation (NAVD 88) | Screened Interval (feet bgs) | Geologic Unit          | Saturated Thickness (feet) | Solution        | Hydraulic Conductivity in feet per day |        |                 |
|------------------|-----------|-----------------------------|------------------------------|------------------------|----------------------------|-----------------|--|--------|-----------------|
|                  |           |                             |                              |                        |                            |                 | Falling                                | Rising | Arithmetic Mean |
| OW-809U Average  |           |                             |                              |                        |                            |                 | 97.05                                  | 51.45  | 74.25           |
| OW-809L          | 5/15/2008 | -1.3                        | 95.5-105.5                   | Lower Fort Thompson Fm | 88.0                       | KGS             | 108.60                                 | 36.57  | 72.60           |
| OW-809L          |           |                             |                              |                        |                            | Butler          | 103.70                                 | 33.43  | 68.57           |
| OW-809L Average  |           |                             |                              |                        |                            |                 | 106.15                                 | 35.00  | 70.58           |
| OW-812U          | 5/20/2008 | -1.4                        | 15-25                        | Miami Limestone        | 25.5                       | KGS             | NC                                     | 31.24  | 31.24           |
| OW-812U          |           |                             |                              |                        |                            | Springer-Gelhar | NC                                     | 24.49  | 24.49           |
| OW-812U Average  |           |                             |                              |                        |                            |                 | N/A                                    | 27.87  | 27.87           |
| OW-812L          | 5/20/2008 | -1.4                        | 97-107                       | Lower Fort Thompson Fm | 86.0                       | Butler          | NC                                     | 21.01  | 21.01           |
| OW-812L          |           |                             |                              |                        |                            | KGS             | NC                                     | 21.20  | 21.20           |
| OW-812L Average  |           |                             |                              |                        |                            |                 | N/A                                    | 21.11  | 21.11           |

Source: [Reference 248](#)

bgs = Below ground surface

NAVD 88 = North American Vertical Datum of 1988

N/A = Not Applicable

NC = Not Conducted

KGS = Kansas Geological Survey

For wells with multiple tests, test results were averaged and used to calculate the geometric mean.

Data from these tests are considered not valid due to rate-limiting recharge effects from the filter pack.

Geometric Mean: Upper: 61.3 feet per day

Lower: 20.1 feet per day

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**Table 2.4.12-209**  
**Summary of Aquifer Pumping Test Results**

| Geologic Unit                                | Thickness<br>(ft) | Test Well | Aquifer<br>Transmissivity<br>(gpd/ft) <sup>(a)</sup> | Aquifer<br>Storativity<br>(dimensionless) <sup>(a)</sup> | Hydraulic Conductivity (K <sub>h</sub> or K <sub>v</sub> ) |                     |                     |
|--|-------------------|-----------|--|--|--|---------------------|---------------------|
|  |                   |           |  |  | gpd/ft <sup>2(a)</sup>                                     | ft/d <sup>(a)</sup> | cm/s <sup>(a)</sup> |
| Miami Limestone<br>(K <sub>v</sub> )         | 8                 | PW-6U     | —  | —  | 103  | 14                  | 0.005               |
|  | 13                | PW-7U     | —  | —  | 173  | 23                  | 0.008               |
| Key Largo Limestone<br>(K <sub>h</sub> )     | 33                | PW-6U     | 2,331,000  | 0.00015  | 71,000   | 9,400               | 3.3                 |
|  | 24                | PW-7U     | 2,200,000  | 0.0022   | 92,000   | 12,000              | 4.3                 |
| freshwater limestone<br>(K <sub>v</sub> )    | 11                | PW-6U     | —  | —  | 46   | 6                   | 0.002               |
|  | 19                | PW-7U     | —  | —  | 54   | 7                   | 0.003               |
|  | 11                | PW-6L     | —  | —  | 2  | 0.2                 | 7E-05               |
|  | 19                | PW-7L     | —  | —  | 3  | 0.4                 | 1E-04               |
| Fort Thompson Formation<br>(K <sub>h</sub> ) | 57                | PW-6L     | 122,000  | 0.00016  | 2,140  | 286                 | 0.1                 |
|  | 36                | PW-7L     | 131,200  | 0.0003   | 3,600  | 490                 | 0.2                 |
| Tamiami Formation<br>(K <sub>v</sub> )       | 18                | PW-6L     | —  | —  | 7,940  | 1,061               | 0.4                 |
|  | 18                | PW-7L     | —  | —  | 740  | 100                 | 0.04                |

(a) All values are averages.

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**Table 2.4.12-210**  
**Summary of Groundwater Field Measurements**

| Well ID                                | Sample Date | Temperature (°Celsius) | pH (standard units) | Dissolved Oxygen (milligrams per liter) | Specific Conductance (milliSiemens per centimeter) | Turbidity (Nephelometric Turbidity Units) | Oxidation-Reduction Potential (millivolts) |
|--|-------------|------------------------|---------------------|---|--|---|--|
| OW-606L <sup>(a)</sup>                 | 5/28/2008   | 28.29                  | 7.08                | 9.92                                    | 52.8, 72.4 <sup>(c)</sup>                          | 0.77                                      | -370                                       |
| OW-606U <sup>(a)</sup>                 | 5/28/2008   | 28.71                  | 6.84                | 1.66                                    | 66.9, 62.8 <sup>(c)</sup>                          | 0.34                                      | -344                                       |
| OW-621L <sup>(a)</sup>                 | 6/4/2008    | 27.80                  | 7.06                | 1.66                                    | >99.9, 73.9 <sup>(c)</sup>                         | 0.21                                      | -349                                       |
| OW-621U <sup>(a)</sup>                 | 5/29/2008   | 27.82                  | 7.08                | 0.05                                    | 91.0, 58.3 <sup>(c)</sup>                          | 2.91                                      | -351                                       |
| OW-706L <sup>(a)</sup>                 | 5/29/2008   | 29.61                  | 6.83                | 1.49                                    | 46.4, 48.6 <sup>(c)</sup>                          | 0.20                                      | -351                                       |
| OW-706U <sup>(a)</sup>                 | 5/29/2008   | 30.85                  | 6.65                | 1.13                                    | 76.6, 77.3 <sup>(c)</sup>                          | 0.83                                      | -392                                       |
| OW-721L <sup>(a)</sup>                 | 5/28/2008   | 28.56                  | 6.76                | 1.18                                    | 74.3, 73.7 <sup>(c)</sup>                          | 7.55                                      | -370                                       |
| OW-721U <sup>(a)</sup>                 | 5/28/2008   | 28.92                  | 7.10                | 10.6                                    | 53.1, 63.8 <sup>(c)</sup>                          | 0.36                                      | -364                                       |
| OW-735U <sup>(a)</sup>                 | 5/27/2008   | 29.47                  | 7.00                | 0.02                                    | 86.6, 77.5 <sup>(c)</sup>                          | 0.92                                      | -360                                       |
| OW-802U <sup>(a)</sup>                 | 6/5/2008    | 28.27                  | 6.80                | 1.90                                    | 82.8, 70.8 <sup>(c)</sup>                          | 0.48                                      | -322                                       |
| OW-805U <sup>(a)</sup>                 | 6/5/2008    | 28.26                  | 7.10                | 1.19                                    | 60.9, 59.8 <sup>(c)</sup>                          | 0.32                                      | -346                                       |
| OW-809U <sup>(a)</sup>                 | 5/27/2008   | 30.82                  | 6.98                | 0.01                                    | 83.9, 79.0 <sup>(c)</sup>                          | 0.97                                      | -371                                       |
| ENP Precipitation <sup>(b)</sup>       | mean        | NM                     | 4.98                | NM                                      | 0.016  | NM  | NM   |
| Surficial Aquifer SFWMD <sup>(b)</sup> | median      | 24.8                   | 6.9                 | NM                                      | 0.619  | NM  | NM   |
| Floridan Aquifer SFWMD <sup>(b)</sup>  | median      | 26.3                   | 7.4                 | NM                                      | 1.787  | NM  | NM   |
| Cooling Canal                          | average     | 30.05                  | 8.02                | 8.70                                    | NM   | 1.92                                      | NM   |
| L-31N                                  | average     | NM                     | NM                  | NM                                      | NM   | NM  | NM   |
| Biscayne Bay                           | average     | NM                     | NM                  | NM                                      | NM   | NM  | NM   |
| Upper Floridan Production well         | mean        | NM                     | 7.70                | NM                                      | NM   | 1.1                                       | NM   |

ENP = Everglades National Park NM = Not Measured

(a) [Reference 248](#)

(b) [Reference 245](#)

(c) Samples collected February 3–5, 2009



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**Table 2.4.12-211 (Sheet 1 of 3)**  
**Hydrogeochemical Data**

| Constituent                               |                | TDS  | Calcium            | Iron                    | Magnesium            | Manganese            | Potassium          | Silica                | Silicon                   | Sodium                |
|---|----------------|--|--------------------|-------------------------|----------------------|----------------------|--------------------|-----------------------|---------------------------|-----------------------|
| Location ID                               | Date Collected | mg/L   | mg/L               |                         |                      |                      |                    |                       |                           |                       |
| OW-606L <sup>(a)</sup>                    | 5/28/2008      | 34,320 <sup>(l)</sup> ,<br>47,047 <sup>(i)(j)</sup>    | 632 <sup>(b)</sup> | <0.050U <sup>(c)</sup>  | 1,880 <sup>(b)</sup> | 0.0391               | 549 <sup>(b)</sup> | 3                     | <250 <sup>(b)(c)</sup>    | 15,100 <sup>(b)</sup> |
| OW-606U <sup>(a)</sup>                    | 5/28/2008      | 43,485 <sup>(l)</sup> ,<br>40,804 <sup>(i)(j)</sup>    | 535 <sup>(b)</sup> | 0.318 <sup>(b)(d)</sup> | 1,730 <sup>(b)</sup> | 0.0354               | 525 <sup>(b)</sup> | 0.729                 | <250 <sup>(b)(c)</sup>    | 14,400 <sup>(b)</sup> |
| OW-621L <sup>(a)</sup>                    | 6/4/2008       | 64,935 <sup>(i)(k)</sup> ,<br>48,045 <sup>(i)(j)</sup> | 574 <sup>(b)</sup> | <50 <sup>(b)(c)</sup>   | 1,960 <sup>(b)</sup> | <2 <sup>(b)(c)</sup> | 586 <sup>(b)</sup> | 133 <sup>(d)(e)</sup> | 62.1 <sup>(b)(d)(e)</sup> | 16,300 <sup>(b)</sup> |
| OW-621U <sup>(a)</sup>                    | 5/29/2008      | 59,150 <sup>(l)</sup> ,<br>37,901 <sup>(i)(j)</sup>    | 492 <sup>(b)</sup> | 0.453 <sup>(b)(d)</sup> | 1,600 <sup>(b)</sup> | 0.0368               | 476 <sup>(b)</sup> | 0.637                 | <250 <sup>(b)(c)</sup>    | 13,100 <sup>(b)</sup> |
| OW-706L <sup>(a)</sup>                    | 5/29/2008      | 30,160 <sup>(l)</sup> ,<br>31,610 <sup>(i)(j)</sup>    | 413 <sup>(b)</sup> | 0.531 <sup>(b)(d)</sup> | 1,170 <sup>(b)</sup> | 0.0083               | 327 <sup>(b)</sup> | 8                     | <250 <sup>(b)(c)</sup>    | 9,440 <sup>(b)</sup>  |
| OW-706U <sup>(a)</sup>                    | 5/29/2008      | 49,790 <sup>(l)</sup> ,<br>50,229 <sup>(i)(j)</sup>    | 725 <sup>(b)</sup> | 0.178 <sup>(b)(d)</sup> | 2,150 <sup>(b)</sup> | 0.0435               | 658 <sup>(b)</sup> | 2                     | <250 <sup>(b)(c)</sup>    | 17,500 <sup>(b)</sup> |
| OW-721L <sup>(a)</sup>                    | 5/28/2008      | 48,295 <sup>(l)</sup> ,<br>47,912 <sup>(i)(j)</sup>    | 667 <sup>(b)</sup> | 0.362 <sup>(b)(d)</sup> | 2,020 <sup>(b)</sup> | 0.0462               | 587 <sup>(b)</sup> | 3                     | <250 <sup>(b)(c)</sup>    | 16,300 <sup>(b)</sup> |
| OW-721U <sup>(a)</sup>                    | 5/28/2008      | 34,515 <sup>(l)</sup> ,<br>41,472 <sup>(i)(j)</sup>    | 603 <sup>(b)</sup> | 0.329 <sup>(b)(d)</sup> | 1,890 <sup>(b)</sup> | 0.0581               | 569 <sup>(b)</sup> | 0.848                 | <250 <sup>(b)(c)</sup>    | 15,400 <sup>(b)</sup> |
| OW-735U <sup>(a)</sup>                    | 5/27/2008      | 56,290 <sup>(l)</sup> ,<br>50,351 <sup>(i)(j)</sup>    | 749 <sup>(b)</sup> | 0.133 <sup>(b)(d)</sup> | 2,140 <sup>(b)</sup> | 0.0327               | 655 <sup>(b)</sup> | <0.250 <sup>(c)</sup> | <250 <sup>(b)(c)</sup>    | 17,700 <sup>(b)</sup> |
| OW-802U <sup>(a)</sup>                    | 6/5/2008       | 53,820 <sup>(l)</sup> ,<br>46,022 <sup>(i)(j)</sup>    | 579 <sup>(b)</sup> | <50 <sup>(b)(c)</sup>   | 1,980 <sup>(b)</sup> | <2 <sup>(b)(c)</sup> | 586 <sup>(b)</sup> | 143 <sup>(e)</sup>    | 66.7 <sup>(b)(e)</sup>    | 16,400 <sup>(b)</sup> |
| OW-805U <sup>(a)</sup>                    | 6/5/2008       | 39,585 <sup>(l)</sup> ,<br>38,853 <sup>(i)(j)</sup>    | 447 <sup>(b)</sup> | <50 <sup>(b)(c)</sup>   | 1,570 <sup>(b)</sup> | <2 <sup>(b)(c)</sup> | 493 <sup>(b)</sup> | 107 <sup>(e)</sup>    | 49.9 <sup>(b)(e)</sup>    | 13,200 <sup>(b)</sup> |
| OW-809U <sup>(a)</sup>                    | 5/27/2008      | 54,535 <sup>(l)</sup> ,<br>51,356 <sup>(i)(j)</sup>    | 704 <sup>(b)</sup> | 0.158 <sup>(b)(d)</sup> | 2,040 <sup>(b)</sup> | 0.0281               | 607 <sup>(b)</sup> | <0.250 <sup>(c)</sup> | <250 <sup>(b)(c)</sup>    | 16,700 <sup>(b)</sup> |
| ENP<br>Precipitation <sup>(f)(g)</sup>    | mean           |  | 0.36               |                         | 0.2                  |                      | 0.2                |                       |                           | 1.32                  |
| Surficial Aquifer<br>SFWMD <sup>(g)</sup> | median         | 388  | 98                 | 0.88                    | 3.9                  |                      | 1.3                |                       |                           | 21.1                  |
| Floridan Aquifer<br>SFWMD <sup>(g)</sup>  | median         | 1,138  | 67.2               | <0.05 <sup>(c)</sup>    | 46.4                 |                      | 9.5                |                       |                           | 220.5                 |
| Cooling Canal                             | average        | 54,500   | 720                |                         | 2,050                |                      | 680                | 0.52                  |                           |                       |

Turkey Point Units 6 & 7  
COL Application  
Part 2 — FSAR

**Table 2.4.12-211 (Sheet 2 of 3)**  
**Hydrogeochemical Data**

| Constituent                       |                | TDS    | Calcium | Iron | Magnesium | Manganese | Potassium | Silica | Silicon | Sodium |
|-----------------------------------|----------------|--------|---------|------|-----------|-----------|-----------|--------|---------|--------|
| Location ID                       | Date Collected | mg/L   | mg/L    |      |           |           |           |        |         |        |
| L-31N                             | average        | 370    | 70      |      | 5.35      |           | 6.3       |        |         |        |
| Biscayne Bay                      | average        | 33,757 | 446     |      | 1,270     |           | 421       | 0.32   |         |        |
| Upper Floridan<br>Production well | average        | 5,451  | 149     | 0.28 | 177       | <0.07     | 77        | 12     |         |        |

Turkey Point Units 6 & 7  
COL Application  
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**Table 2.4.12-211 (Sheet 3 of 3)**  
**Hydrogeochemical Data**

| Constituent                            |                | Bromide             | Chloride              | Fluoride             | Sulfate | Nitrate              | Nitrite             | Bicarbonate | Carbonate           | Total Alkalinity | Ammonia <sup>(h)</sup> |
|--|----------------|---------------------|-----------------------|----------------------|---------|----------------------|---------------------|-------------|---------------------|------------------|------------------------|
| Location ID                            | Date Collected | mg/L                |                       |                      |         |                      |                     | mg/L        |                     | mg/L             | mg/L                   |
| OW-606L <sup>(a)</sup>                 | 5/28/2008      | 62.5                | 29,600                | <20.0 <sup>(c)</sup> | 3,860   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 165         | <5.0 <sup>(c)</sup> | 165              | 1.58                   |
| OW-606U <sup>(a)</sup>                 | 5/28/2008      | 56.6                | 27,900                | <20.0 <sup>(c)</sup> | 3,470   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 155         | <5.0 <sup>(c)</sup> | 155              | 0.844                  |
| OW-621L <sup>(a)</sup>                 | 6/4/2008       | 65.9                | 31,300 <sup>(d)</sup> | <20.0 <sup>(c)</sup> | 3,610   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 181         | <5.0 <sup>(c)</sup> | 181              | 1.30                   |
| OW-621U <sup>(a)</sup>                 | 5/29/2008      | 50.6                | 25,500                | <1.0 <sup>(c)</sup>  | 3,210   | <4.0 <sup>(c)</sup>  | <200 <sup>(c)</sup> | 189         | <5.0 <sup>(c)</sup> | 189              | 0.588                  |
| OW-706L <sup>(a)</sup>                 | 5/29/2008      | 37.7 <sup>(e)</sup> | 19,100                | <1.0 <sup>(c)</sup>  | 2,280   | <4.0 <sup>(c)</sup>  | <200 <sup>(c)</sup> | 191         | <5.0 <sup>(c)</sup> | 191              | 0.61                   |
| OW-706U <sup>(a)</sup>                 | 5/29/2008      | 70.5                | 33,300                | <1.0 <sup>(c)</sup>  | 3,850   | <4.0 <sup>(c)</sup>  | <200 <sup>(c)</sup> | 204         | <5.0 <sup>(c)</sup> | 204              | 2.09                   |
| OW-721L <sup>(a)</sup>                 | 5/28/2008      | 64.9                | 31,100                | <20.0 <sup>(c)</sup> | 3,990   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 180         | <5.0 <sup>(c)</sup> | 180              | 1.82                   |
| OW-721U <sup>(a)</sup>                 | 5/28/2008      | 60.1                | 29,900                | <20.0 <sup>(c)</sup> | 3,860   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 164         | <5.0 <sup>(c)</sup> | 164              | 1.68                   |
| OW-735U <sup>(a)</sup>                 | 5/27/2008      | 262                 | 37,500                | <20.0 <sup>(c)</sup> | 4,090   | <4.0 <sup>(c)</sup>  | <200 <sup>(c)</sup> | 179         | <5.0 <sup>(c)</sup> | 179              | 2.15                   |
| OW-802U <sup>(a)</sup>                 | 6/5/2008       | 65.1                | 31,600 <sup>(d)</sup> | <20.0 <sup>(c)</sup> | 3,720   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 178         | <5.0 <sup>(c)</sup> | 178              | 1.40                   |
| OW-805U <sup>(a)</sup>                 | 6/5/2008       | 53.6                | 27,600 <sup>(d)</sup> | <20.0 <sup>(c)</sup> | 3,070   | <0.20 <sup>(c)</sup> | <200 <sup>(c)</sup> | 177         | <5.0 <sup>(c)</sup> | 177              | 0.548                  |
| OW-809U <sup>(a)</sup>                 | 5/27/2008      | 241 <sup>(e)</sup>  | 35,900                | <1.0 <sup>(c)</sup>  | 4,050   | <4.0 <sup>(c)</sup>  | <200 <sup>(c)</sup> | 177         | <5.0 <sup>(c)</sup> | 177              | 2.21                   |
| ENP Precipitation <sup>(f)(g)</sup>    | mean           |                     | 2                     |                      | 1.14    | 0.73                 |                     |             |                     |                  | 0.22                   |
| Surficial Aquifer SFWMD <sup>(g)</sup> | median         |                     | 48                    | 0.2                  | 12      | <0.01 <sup>(c)</sup> |                     | 263         |                     | 251              |                        |
| Floridan Aquifer SFWMD <sup>(g)</sup>  | median         |                     | 420                   | 0.81                 | 176     | <0.01 <sup>(c)</sup> |                     |             |                     | 130              |                        |
| Cooling Canal                          | average        |                     | 30,000                |                      | 3,950   |                      |                     | 165         |                     | 165              | 0.16                   |
| L-31N                                  | average        |                     | 59                    |                      | 26      | 1.05                 |                     | 200         |                     | 200              |                        |
| Biscayne Bay                           | average        |                     | 18,582                |                      | 2,447   |                      |                     | 102         |                     | 102              | 0.1                    |
| Upper Floridan Production well         | average        |                     | 2,909                 | 1.6                  | 661     | <0.01 <sup>(c)</sup> |                     | 196         |                     |                  |                        |

Not analyzed

- (a) Reference 248.  
(b) Spiked analyte recovery is outside stated control limits. Method performance confirmed using Laboratory Control Spike sample results.  
(c) Analyte not detected at or above the method detection limit.  
(d) Method blank contamination. The associated method blank contains the target analyte at a reportable level. These data should be used with caution.  
(e) Estimated result. Result is less than the reporting limit.  
(f) Everglades National Park.  
(g) Reference 245.  
(h) Test conducted on Nitrogen, as Ammonia.  
(i) TDS is estimated as specific conductance in milliSiemens per centimeter x 1000 x 0.65, specific conductance values are listed in Table 2.4.12-210.  
(j) Based on specific conductance measurements collected February 3-5, 2009.  
(k) Assumes specific conductance equals 99 milliSiemens per centimeter.