b. Shallow bedrock monitoring wells (MW-12XXb) were generally completed in the upper 40 - 60 ft of bedrock in an apparent zone of alternating stratigraphy; i.e., claystone, mudstone, limestone, and shale sequences.

c. Bedrock monitoring wells (MW-12XXc) were generally completed in deeper bedrock zones consisting of alternating stratigraphy and competent bedrock.

d. Aquifer pump test well (RW-X) was installed on the northeast portion of CPNPP Units 3 and 4 to investigate hydraulic communication with lake water and undifferentiated fill material that was placed within a former drainage swale.

e. Aquifer pump test observation wells (OW-X) were completed adjacent and surrounding the aquifer pump test well and generally completed in the same depth as the associated pump test well.

~~Groundwater elevation measurements were collected during well gauging activities from November of 2006 to November 2007 and are presented in Table 2.3-30. November 2006 groundwater levels were determined to be unusable, because groundwater gauging data showed evidence of non-equilibrium conditions in the majority of the groundwater monitoring wells. The circumstance was apparently due to insufficient time for groundwater equilibration and concurrent geotechnical drilling operations.~~ RCOL2_02.04.12-12 S01

~~Regolith/Undifferentiated Fill Monitoring Wells~~

~~Of the 16 groundwater monitoring wells screened in the regolith and/or undifferentiated fill (MW-12XXa), 15 wells exhibited steady water level increases from December 2006 to July 2007. Water levels remained constant or decreased slightly from August 2007 to February 2008 in these wells. Overall, the water level trend in the regolith/undifferentiated fill monitoring wells appeared to coincide with rainfall totals at the site.~~

~~Monitoring well MW-1211a was installed on the northeast portion of CPNPP Units 3 and 4 in undifferentiated fill material that was placed within a former drainage swale during construction of CPNPP Units 1 and 2. Water levels in this monitoring well were consistent with the surface water elevation of SCR (775 ft msl) over the monitoring period indicating hydraulic communication between the former drainage swale and SCR.~~

~~Monthly potentiometric surface maps were developed using the groundwater level evaluations presented in Table 2.3-30 with representative maps for the quarter presented in Figure 2.3-27 (Sheets 1 through 4). The potentiometric surface maps show that the general shallow groundwater movement in the vicinity of CPNPP Units 3 and 4 mimics the surface topography with an apparent groundwater divide along the long axis of the site peninsula. On the northern portion of the peninsula, a northerly flow toward SCR is observed, and a southerly flow toward the SSI is observed on the south side of the site peninsula.~~

~~Shallow Bedrock Monitoring Wells~~

~~Of the 16 groundwater monitoring wells screened in shallow bedrock (MW-12XXb), nine contained no, or negligible, amounts of water for up to eight months before exhibiting measurable~~

~~water (greater than 1 ft). These wells exhibited a slow to steady recharge with no indication of reliable equilibrium conditions over the monitoring period.~~ RCOL2_02.04.12-12 S01

~~Well MW-1211b was installed east of CPNPP Unit 3 in the previously discussed undifferentiated fill material. During installation, an effort was made to install this well in bedrock; however, due to the thickness and nature of the undifferentiated fill material, the boring was terminated at the bedrock surface (approximately 75 ft bgs). Water level measurements for this well were consistent with those of regolith monitoring well MW-1211a and the surface water elevation of SCR over the monitoring period; therefore, the groundwater elevation in the monitoring well MW-1211b is not considered to be a measurement of groundwater within the shall bedrock (B-Zone).~~

~~Well MW-1209b was installed northeast of CPNPP Unit 3 in the shallow bedrock below the undifferentiated fill material. Water level measurements for this well were consistent with those of the normal pool elevation of SCR over the monitoring period, showing the shallow bedrock at this location is in communication with SCR; therefore, the groundwater elevation in monitoring well MW-1209b is not considered to be a measurement of groundwater within the shallow bedrock (B-Zone).~~

~~Well MW-1212b was installed southeast of CPNPP Unit 3 in the shallow bedrock at the apparent southern extent of the undifferentiated fill material. Water level measurements for this well were approximately 10 feet above the normal pool elevation of SCR over the monitoring period. Due to its location on the southern side of the undifferentiated fill material, which isolates the groundwater in this portion of the site from that in the location of the nuclear islands, the groundwater elevation in monitoring well MW-1212b was not used to determine groundwater flow direction within the shallow bedrock (B-Zone).~~

~~Only four shallow bedrock (B-Zone) monitoring wells (MW-1201b, MW-1205b, MW-1207b, and MW-1217b) exhibited consistent water levels, indicating equilibrium conditions. After obtaining static conditions between November 29, 2006, and January 23, 2007, groundwater elevations in these four wells stayed within a 13.76 ft range between 820.08 ft msl (MW-1217b; March 24, 2008) and 833.84 (MW-1215b; October 16, 2007). Monitoring well MW-1217b, located near the center point of CPNPP Unit 3, exhibited the greatest variation following attainment of static conditions, showing water level variations within a 6.97 ft range from January 2007 to May 2008. Comparison with recorded rainfall data at the Opossum Hollow Rain Gage did not show a correlation between water level variations and recorded rainfall data during the monitored period.~~

~~Groundwater potentiometric surface maps could not be produced based on only four wells completed in the shallow bedrock (B-Zone) that exhibited consistent equilibrium conditions and evidence that the groundwater within the shallow bedrock is recharged from the perched groundwater within the overlying soils. However, the groundwater levels within the four wells show a general groundwater gradient trend towards SCR and it is expected that the groundwater potentiometric surface will follow that of the overlying soils.~~

~~Bedrock Monitoring Wells~~

~~Of the 14 groundwater monitoring wells screened in bedrock (MW-12XXc) six contained no, or negligible, amounts of water over the monitoring period and eight exhibited a slow to steady recharge with no indication of reliable equilibrium conditions.~~

~~Groundwater potentiometric surface maps could not be produced due to the lack of reliable groundwater, or evidence of non-equilibrium conditions within the deeper C-Zone monitoring wells.~~ RCOL2_02.04.12-12 S01

~~Based on the above-mentioned observations, groundwater at the CPNPP 3 and 4 site appears to be limited to a perched interval within the overlying soils on top of the weathered upper Glen Rose Formation limestone (upper bedrock). Based on the lack of reliable groundwater within the bedrock beneath the site soils, groundwater availability decreases significantly with depth. From site observations, it is concluded that the groundwater within the regolith recharges the weathered, upper portions of the bedrock, with little infiltration to deeper bedrock zones.~~

~~Groundwater flow direction within the regolith is toward SCR. Flow direction of groundwater within the upper bedrock (groundwater B-Zone) appears to flow eastward toward SCR. However, based on the limited groundwater availability within the bedrock, depicted by long-term, non-equilibrium water levels within most bedrock monitoring wells, groundwater flow within the upper bedrock is limited and likely linked to flow within the overlying perched groundwater.~~

~~Due to the lack of reliable groundwater, or evidence of non-equilibrium conditions within the deeper C-Zone monitoring wells, groundwater potentiometric surface maps could not be produced.~~

Following well development, water levels were measured from November 2006 to May 2008 (Table 2.3-30) to characterize seasonal trends in groundwater levels. Additional monitoring events were performed from January 2008 to May 2008 and August 2012 to December 2012 to assess water levels in wells showing evidence of non-equilibrium conditions. Measured groundwater elevations from November 2006 to December 2012 are presented in Table 2.4.12-209. Hydrographs of individual wells are presented on FSAR Figure 2.4.12-209 with rainfall totals for the period of interest. The groundwater elevation data is presented by well/cluster location and include approximate screen elevations for each well in the cluster.

Five shallow bedrock (B-zone) monitoring wells (MW-1204b, MW-1205b, MW-1206b, MW-1213b, and MW-1216b) show a slow and steady increase in water levels over time with little to no fluctuations, also suggesting the water levels within the wells are not in equilibrium with the groundwater within the formation. With the exception of MW-1205c (dry throughout the monitoring period), MW-1207c, and MW-1209c, water levels in the deeper Glen Rose Formation (C-zone) exhibit very slow recharge with static water levels not equalized with the groundwater within the formation.

Available historical information on groundwater and groundwater trends in the Glen Rose Formation is presented in FSAR Subsection 2.4.12.2.3.

Water Levels and Potentiometric Elevations in the Regolith (A-zone)

Groundwater levels steadily increased from December 2006 to July 2007. Water levels remained relatively constant from August 2007 to May 2008. During 2012, water levels generally decreased slightly from August 2012 to December 2012 in association with the severe extended drought conditions occurring during that time in north Texas.

Hydrographs from the regolith/fill material wells (A-zone) indicate some slight fluctuations that may be tied to seasonal rainfall. In some of the A-zone wells, there appears to be a slight increase in water levels that may correspond to the spring season, but there is no significant correlation in the A-zone wells across the site in response to rainfall. RCOL2_02.04.12-12 S01

Monitoring well MW-1211a was installed on the northeast portion of CPNPP Units 3 and 4 in undifferentiated fill material. Water levels in this monitoring well were consistent with the normal pool elevation of SCR (775 ft msl) indicating hydraulic communication between the existing fill in the former drainage swale and SCR. An effort was made to install monitoring well MW-1211b in bedrock; however, due to the thickness and nature of the undifferentiated fill material, the boring was terminated at the bedrock surface (approximately 75 ft below ground surface [bgs]) with a portion of the screened interval within the screened zone of monitoring well MW-1211a. Water level measurements for this well were consistent with those of monitoring well MW-1211a and the normal pool elevation of SCR over the monitoring period; therefore, the groundwater elevation in monitoring well MW-1211b is not considered to be a measurement of groundwater within the shallow bedrock (B-zone) and is not used in this assessment.

Representative potentiometric surface maps for the initial four quarters of gauging activities (2006-2007) and the final gauging event (December 5, 2012) are presented in Figure 2.3-27, Sheets 1 through 6. These potentiometric surface maps show that the general shallow (A-zone) groundwater movement in the vicinity of CPNPP Units 3 and 4 generally mimics the surface topography except in the filled swales, where groundwater drains rapidly to the elevation of SCR. On the northern portion of the peninsula, a northerly flow toward SCR is observed, and a southerly flow toward the Safe Shutdown Impoundment is observed on the south side of the site peninsula. West of the proposed Unit 4, regolith groundwater flow is interpreted to be in the direction of an unfilled swale (proposed western stormwater retention basin location). No permanent streams are present on site, and no surface discharge of groundwater to the land surface has been observed.

Water Levels and Potentiometric Elevations in the Shallow Bedrock (B-zone)

Nine of the 15 wells completed in this zone contained no, or negligible, amounts of water for up to eight months before exhibiting measurable water (greater than 1 ft). The majority of these wells exhibited a slow to steady recharge, with no indication of reliable equilibrium conditions during the 2006 to 2008 monitoring period.

During the November 2006 to May 2008 groundwater gauging activities, seven of the shallow bedrock (B-zone) monitoring wells (MW-1201b, MW-1203b, MW-1207b, MW-1209b, MW-1212b, MW-1215b, and MW-1217b) consistently exhibited equilibrium water levels. Well MW-1209b was installed northeast of CPNPP Unit 3 in the shallow bedrock below the undifferentiated fill material. Water level measurements for this well were consistent with those of the normal pool elevation of SCR over the monitoring period, showing the shallow bedrock at this location is in communication with SCR.

Wells were not gauged between May 5, 2008 and August 17, 2012. During that time period, groundwater levels within the eight shallow bedrock wells that did not show equilibrium conditions had water level rises between 2.41 and 31.30 ft. Two additional shallow bedrock wells

(MW-1202b and MW-1210b) exhibited equilibrium conditions between August 17, 2012 and December 5, 2012. RCOL2_02.04.12-12 S01

Between May 2008 and August 2012, nine monitoring wells (MW-1201b, MW-1202b, MW-1203b, MW-1207b, MW-1209b, MW-1210b, MW-1212b, MW-1215b, and MW-1217b) showed little variation in water levels with only minor fluctuations observed in 2012, indicating the wells remain at equilibrium conditions. Water levels in three additional wells (MW-1200b, MW-1202b, and MW-1210b) showed a slight to significant water level rise between 2008 and 2012 (2.41 to 31.30 ft change) and now show equilibrium indications (declining or fluctuating water levels since August 2012). MW-1216b exhibited a rapid rise between November 2006 and May 2008 (average 16.07 ft/yr rise), a significant reduction in the rate of rise between 2008 and 2012 (average 0.91 ft/yr rise), and then a rapid rise between August and December 2012. While still exhibiting a general increase in water level, it is expected MW-1216b is most likely at equilibrium conditions.

The four remaining shallow bedrock wells (MW-1204b, MW-1205b, MW-1206b, and MW-1213b) showed a slight to moderate water level rise between 2008 and 2012 (6.70 to 21.23 ft change). Water levels within these four wells have continued to exhibit a slow, steady rise in water level between August and December 2012; however, all four wells show a slowing trend in the average groundwater rate of rise (calculated in average ft per year) from the historic (pre-2012) gauging events to the current monitoring period (FSAR Table 2.4.12-213). Although still rising, the slowing trend in water level rise shows these wells are nearing equilibrium conditions.

Comparison with recorded rainfall data at the Opossum Hollow Rain Gage did not show a distinctive correlation between water level variations and recorded rainfall data during the monitored period.

Representative potentiometric surface maps for the initial gauging activities (2006-2008) could not be produced as only seven shallow bedrock wells (B-Zone) exhibited indications of equilibrium conditions; however, the groundwater levels within the equilibrium shallow bedrock wells show a general groundwater gradient trend towards SCR. Based on the results of the 2012 gauging program, a representative potentiometric surface map for the shallow bedrock is presented in Figure 2.3-27, Sheet 6, using wells in which the water levels have reached equilibrium. This shows a similar groundwater trend to that in the regolith with a northerly flow toward SCR and influence from the filled swales observed. To the west of the proposed Unit 4, regolith groundwater flow appears to be westward towards an unfilled swale (proposed western stormwater retention basin location).

Water Levels and Potentiometric Elevations in the Bedrock Monitoring Wells (C-zone)

During the November 2006 to May 2008 groundwater gauging activities, one bedrock (C-zone) monitoring well (MW-1205c) remained dry for the entire monitoring period. The remaining 14 bedrock monitoring wells exhibited steady increases in water levels with no indications of equilibrium conditions within the well.

All indications are that MW-1205c remained dry during the May 2008 to August 2012 monitoring hiatus and for the 2012 gauging period. Between May 2008 and August 2012, all other bedrock wells showed a slight to significant water level rise (2.70 to 28.60 ft change); however, water levels in MW-1207c and MW-1209c have shown declining or fluctuating water levels since August 2012 and indicate equilibrium conditions. In particular, MW-1209c has equalized to the water level in MW-1209b and SCR, which is evidence of a hydraulic connection between the near-shore weathered bedrock and SCR in this vicinity. RCOL2_02.04.12-12 S01

Water levels within the remaining 12 bedrock wells have continued to exhibit a slow, steady rise in water level between August and December 2012 with no indications of equilibrium conditions, although some showed a slowing trend in the rate of water level increase (FSAR Table 2.4.12-213).

None of the bedrock monitoring wells shows a correlation between precipitation events and change in the rate of increases in water level within the well.

Groundwater potentiometric surface maps could not be produced due to evidence of non-equilibrium conditions within most of the deeper C-zone monitoring wells.

General Vertical Gradients

Hydraulic heads observed at the site primarily decrease downwards, indicating downward vertical gradients in the subsurface materials underlying the site. FSAR Figure 2.4.12-209 (Sheets 1 through 60) presents the water levels for each well, with the position of each well screen and approximate elevations of the various stratigraphic units intersected by the well. Gradients are downward from the regolith into the Engineering "A" bedrock at all but one location (MW-1216, November and December 2012). Gradients are also downward from the Engineering "A" bedrock unit into the Engineering "B" bedrock unit. Similarly, hydraulic gradients from the shallow bedrock of Engineering "A" and "B" units to the deeper bedrock within the Glen Rose (identified as Engineering "C-F") are consistently downward. From site observations, it is concluded that the groundwater within the regolith recharges the weathered, upper portions of the bedrock, with little infiltration to deeper bedrock zones.

The apparent upward hydraulic gradient observed at the MW-1216 location is an anomalous indication when compared to the remainder of the site. The water levels within MW-1216a and MW-1216b are approximately at the same elevation with a slight upward gradient observed in November and December of 2012. Due to the rapid dewatering of the regolith from the current drought and the slow water movement within the Glen Rose Formation limestone, the apparent upward hydraulic gradient observed at MW-1216 is most likely the result of environmental stresses dewatering the regolith faster than the shallow bedrock and not an indication of consistent upward groundwater movement from the bedrock to the regolith at this location.

Groundwater flow direction within the regolith is toward SCR. Flow direction of groundwater within the shallow bedrock (B-Zone) appears to flow eastward toward SCR. However, based on the limited groundwater availability within the bedrock, depicted by long-term, non-equilibrium water levels within most bedrock monitoring wells, groundwater flow within the upper bedrock is limited and likely linked to flow within the overlying perched groundwater in the regolith.

Twin Mountains Formation RCOL2_02.04.12-12 S01

Groundwater beneath the CPNPP Units 3 and 4 occurs in two zones, separated by the Glen Rose Formation limestone aquitard. The uppermost zone is perched water residing in the surficial soils and uppermost weathered Glen Rose Formation limestone bedrock. As stated previously, the groundwater found in the uppermost bedrock is attributed to recharge from the overlying soils and is transient, based on precipitation amount. The next zone occurs in the Twin Mountains Formation (TMF), beneath the Glen Rose Formation limestone aquitard. This zone is the nearest "permanent" groundwater source with potentiometric surfaces at least 150 feet below the elevation of the building foundations on site.

Aquifer Pump Test and Observation Wells

One aquifer test well (RW-1) and three pump test observation wells (OW-1, OW-2, and OW-3) were installed at the site in February 2007 to investigate hydraulic communication with lake water and undifferentiated fill material that was placed within a former drainage swale during construction of CPNPP Units 1 and 2 on the northeast portion of CPNPP Units 3 and 4. Monthly water level measurements collected from March to November 2006 in these wells consistently exhibited water levels of approximately 775 ft msl over the monitoring period indicating direct communication with SCR. These wells were not included in the development of potentiometric surface maps.

2.3.1.5.6 Groundwater Velocity

The rate of flow (velocity) of groundwater depends on the hydraulic conductivity and porosity of the medium through which it is moving and the hydraulic gradient. It is assumed that a release from either unit would first encounter the engineered fill surrounding the A/B and R/B. This engineered fill material is connected to the fill surrounding various site systems, but in particular to the ESW piping tunnels and UHS basins, since these are embedded at an equal depth as the A/B and R/B (FSAR Figures 2.4.12-212). Portions of the engineered fill surrounding these systems are in contact with the existing fill to the east of Unit 3 and to the north of Unit 4; therefore, a release from the unit will flow within the engineered fill until it comes in contact with the existing fill. As stated in Subsection 2.3.1.5.5, the existing fill is in communication with SCR and has a higher hydraulic conductivity; therefore, groundwater within the engineered fill surrounding the A/B and R/B will be drained through the contact with the existing fill into SCR. ~~As the hydrogeologic properties of the engineered fill are unknown at this time, the groundwater transport time through the engineered fill will be considered negligible and any release will be conservatively assumed to begin at the engineered fill/existing fill boundary closest to SCR.~~ RCOL2_02.04.12-9 S04

Single well slug tests were performed on six monitoring wells using the Bouwer & Rice method in April of 2007 at the CPNPP Units 3 and 4 site. Of the six wells tested, three were screened in the regolith/undifferentiated fill zone, and three were screened in the shallow bedrock zone. Hydraulic conductivity for the wells screened in the regolith/undifferentiated fill zone ranged from 2.93×10^{-5} cm/s to 5.00×10^{-4} cm/s. Hydraulic conductivity for the wells screened in the shallow bedrock zone ranged from 6.29×10^{-6} cm/s to 1.37×10^{-5} cm/s.

A step test and 72-hr pumping test were performed on aquifer pump test well RW-1 in April of 2007. To investigate groundwater communication with SCR, pump test well RW-1 was installed in an area of undifferentiated fill within a former drainage swale on the northeast portion of CPNPP Units 3 and 4. The step test was performed to determine the pumping rate for the 72-hr pumping test. Data for the step test and 72-hr pumping test were analyzed using the Cooper-Jacob Step Test and Theis Recovery Test methods. The results of the 72-hr pump test estimated hydraulic conductivity at 1.70 x 10^{-3} cm/s during pumping and 3.5 x 10^{-3} cm/s during recovery.

~~Due to site grading activities during plant construction, maximum groundwater elevations within the plant site will be limited to the invert elevation of the southern and western drainage trench, which has a maximum elevation of 820 ft msl. Recharge to the upper bedrock zone in the plant site will be restricted by drainage into this trench; therefore limiting the maximum conservative groundwater post construction elevation in the plant site to 820 ft. msl.~~ RCOL2_02.04.12-9 S04

Currently at the site, regolith and undifferentiated fill comprise the majority of the shallow geologic materials, with much of the regolith present at elevations greater than the planned site grade of 822 ft msl. Under post-construction conditions, the regolith and parts of the undifferentiated fill will be removed across the power block area, and the site will be underlain primarily by limestone bedrock of the Glen Rose Formation (FSAR Figure 2.5.4-215). Surface cuts will be extensive across the site, while areas of fill placement are expected to be more limited (FSAR Figure 2.4.12-216).

The current soil and rock material comprising the hydrologic A-zone (undifferentiated fill and regolith) and B-zones (shallow bedrock) discussed in FSAR Subsection 2.4.12.2.4 will be removed for construction of plant foundations, resulting in the removal of the perched groundwater from the power block area. Some regolith will remain to the west and south of the main plant construction area, with existing fill remaining where currently present in northern and eastern portions of the site.

The Glen Rose Formation bedrock has a low overall hydraulic conductivity, as determined from packer tests and slug tests completed at the site. Regolith and undifferentiated fill overlying the bedrock exhibit higher hydraulic conductivity values than the underlying bedrock, consistent with characteristics of a porous medium. A portion of the subsurface flow through the bedrock occurs along bedding and joint planes that are sub-horizontal in orientation. Thus, groundwater movement through the subsurface is limited by the physical properties of the subsurface materials underlying the regolith and undifferentiated fill.

A two-dimensional, site-specific, single-layer transient numerical groundwater model was developed to predict the effects of CPNPP Units 3 and 4 construction on groundwater elevations surrounding the safety-related plant structures. The flow model covers an area extending approximately 3,318 ft west to east and 2,091 ft south to north (measured parallel to numerical model grid orientation) with the model domain centered on the power block area.

To predict post-construction groundwater flow conditions, the model accounts for the different hydraulic conductivity value of the fill material associated with the excavated areas for Units 3 and 4 and the presence of the existing fill swales (north of Unit 4 and east of Unit 3), as well as changes in groundwater recharge due to site modifications, and assumed changes in vegetative cover patterns. Hydraulic conductivity values used in the model are at the lower end of the range anticipated for each material present in the subsurface at the site, providing conservatism relative to calculated water levels by simulating slower movement of water and greater buildup of heads

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in the model. Low values for specific yield (equivalent to effective porosity for the materials simulated) were assigned in the model, resulting in conservative (higher) calculated heads. Higher-than-expected recharge rates were developed from a theoretical PMP event (Section 2.4.4). These recharge values are applied to the model in addition to the defined average annual recharge amount, resulting in even higher calculated heads than would otherwise be expected. The theoretical PMP event simulated in the numerical model is 10 times the maximum 48-hour rainfall event total for the model area, and translates to a recharge rate greater than the amount actually expected at the site during extreme rainfall events. Additionally, recharge is assumed to occur across the entire site (with the exception of power block buildings and UHS basins), thereby allowing for greater infiltration than if the presence of other buildings and site drainage features were taken into account. The various conservative assumptions result in a bounding assessment of groundwater levels and groundwater/leakage paths.

The results of this numerical model indicate that the post-construction maximum groundwater elevation within the engineered fill surrounding the power block area, outside of the ESW pipe tunnels and pipe chase, is no greater than 795 ft msl. This includes the Turbine Building, the Ultimate Heat Sink Related Structures (UHSRS), and the Power Source Fuel Storage Vaults (PSFSV). The interior portions of the ESW pipe tunnels, surrounding both Unit 3 and Unit 4 Reactor Building Complexes (R/B Complexes), form closed basins with a minimum upper elevation of 804 ft msl. The ESW pipe chase interior wall is integral to the R/B Complex and is not in contact with the engineered fill. Because there is no visible drainage pathway from these areas until water levels reach 804 ft msl, it is conservatively assumed that any surface infiltration reaching these locations will not move away and will build up to a groundwater elevation of 804 ft msl before overtopping the ESW pipe tunnels. Therefore, the defined maximum groundwater elevation against the exterior walls of the Unit 3 and Unit 4 R/B Complexes is 804 ft msl with 795 ft msl against the integrated ESW pipe chase (between the reactor building and turbine building).

Modeling results indicate water levels anticipated to be present at the site under post-construction conditions are lower than the DCD criteria of 821 ft msl. Calculated water levels are below the elevations of surface water conveyances and ditches; therefore, groundwater discharge to surface water is not expected to be a major factor in the subsurface flow system.

Based on the grain size distribution of the on-site soils (Fugro 2007a), the total porosity was determined by averaging the porosity range for sand, silt, and clay. The average total porosity of the on-site regolith/undifferentiated fill (soils) is assumed to be 0.45. To estimate the effective porosity of the on-site soils, the arithmetic mean of the effective porosities for fine grained sand, silt, and clay were averaged (ANL 1993). The average effective porosity of the on-site regolith/undifferentiated fill is assumed to be 0.20.

RCOL2_02.04.12-9 S04

~~The bedrock is comprised of limestone from the Glen Rose Formation. The shallow bedrock porosity values from geotechnical borings B-1007 and B-1029 were used to estimate the porosity in the vicinity of the Unit 3 Auxiliary Building A/B and groundwater monitoring well MW-1215b. The porosity values from geotechnical borings B-2000, B-2008, and B-2029 were used to estimate the porosity values in the vicinity of the Unit 4 A/B and groundwater monitoring well MW-1217b.~~

~~The results of the geotechnical analysis performed at the CPNPP Units 3 and 4 site indicated that an average porosity of the shallow bedrock (limestone and shale) is 25.6 percent and the~~

~~average total porosity of limestone is 11.9 percent. The Argonne National Laboratory publication, "Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil," dated April 1993 (ANL 1993) references an arithmetic mean of the effective porosity for limestone of 14 percent. Consequently, the most conservative approach when determining velocity and travel time is to use the measured 11.9 percent porosity value which provides a higher calculated velocity through the shallow bedrock.~~ RCOL2_02.04.12-9 S04

~~Groundwater pathways are considered from the Units 3 and 4 Auxiliary Buildings, where the Boric Acid Tank (BAT) is located, to SCR, which is the nearest potential receptor. Placement of engineered fill surrounding the A/B, R/B, ESW piping, UHS basins, and circulating water piping will affect the direction and flow rate of groundwater infiltrating from the remaining bedrock. Portions of the engineering fill surrounding these subsurface structures are in communication with the existing fill on the site (FSAR Figure 2.4.12-212). The existing fill is in communication with SCR, and due to the low hydraulic conductivity of the bedrock, it is expected that groundwater infiltrating into the engineered fill will migrate through the engineered fill into the existing fill and then enter SCR, with little to no groundwater transport through the upper bedrock. Since the geohydrologic properties of the engineered fill are unknown at this time, groundwater transport time through the engineered fill is conservatively assumed to be negligible.~~

~~Two postulated groundwater pathway scenarios, Unit 3 to SCR through the existing fill east of Unit 3, and Unit 4 to SCR through the existing fill north of Unit 4, represent the most conservative pathways from a two-reactor site where groundwater flow is possibly in different directions from each unit (FSAR Figure 2.4.12-212). Both flow paths utilize a conservative, straight-line flow path approach from the point of release and the shortest distance and highest measured hydraulic conductivity for the pathway assessed. A straight-line flow path is considered the most conservative as the actual groundwater pathways are expected to be tortuous, resulting in longer transport times and hydraulic conductivities (Kh) that are expected to be lower than the highest measured.~~

~~To estimate groundwater travel time through the existing fill, the effective porosity of the site soil (0.20) is used as a conservative estimate. As post-construction groundwater levels within the existing fill are unknown, groundwater elevation within the existing fill is conservatively assumed to be at the maximum expected groundwater level of 820 ft msl. The normal operating pool elevation for SCR is 775 ft. msl; however, the minimum operating SCR pool elevation of 770 ft msl is used to produce the highest conservative hydraulic gradient.~~

~~The swale east of Unit 3 was filled with the excavation debris from Units 1 and 2; thus, it is considered to be a haphazard mélange of clay through boulder size material with some debris present. The swale north of Unit 4 appears to have been constructed in a more methodical manner to support building foundations. Construction data for the swale fills are not available; however, based upon evidence from visual observations, data obtained from the geotechnical drilling program, results of the pump and slug test analysis performed on monitoring wells within the individual existing fill materials, no connection between the two filled areas, and the appearance of different placement methods and dates of the swale fill materials, it is assumed the fill properties are sufficiently different to allow the conservative use of the individual hydraulic conductivities from each swale fill testing in the groundwater pathway analysis. For the groundwater velocity and travel time assessment described below, the groundwater pathway 1 hydraulic conductivity (Kh), measured from observation well RW-1 recovery test (3.50×10^{-3}~~

~~cm/s) represents the hydraulic conductivity measured in the existing fill east of Unit 3. The groundwater pathway 2 Kh, measured from monitoring well MW-1219a slug testing (5.00 x 10-4 cm/s) represents the hydraulic conductivity measured in the existing fill north of Unit 4.~~ RCOL2_02.04.12-9 S04

~~For groundwater pathway 1 (FSAR Figure 2.4.12-213), it is assumed that an instantaneous release from the BAT would travel out of the Unit 3 A/B into the engineered fill surrounding the A/B and R/B. It would then travel to the closest engineered/existing fill interface, located to the east of the Unit 3 turbine building. For conservatism, it is assumed that the transport time to the fill interface will be negligible. It will then travel 600 ft through the existing fill to the closest release location in SCR. The travel time from the release point to SCR via the existing fill east of Unit 3 is conservatively estimated at 145 days.~~

~~For groundwater pathway 2 (FSAR Figure 2.4.12-214), it is assumed that an instantaneous release from the BAT would travel out of the Unit 4 A/B into the engineered fill surrounding the A/B and R/B. It would then travel to the closest engineered/existing fill interface, located to the north of the Unit 4 UHS basin. For conservatism, it is assumed the transport time to the fill interface will be negligible. It will then travel 350 ft through the existing fill to the closest release location in SCR. The travel time from the release point to SCR via the existing fill north of Unit 4 is conservatively estimated at 346 days.~~

A two-dimensional single layer groundwater model was developed to evaluate horizontal post-construction groundwater flow in the existing fill, engineered fill, and Glen Rose Formation limestone at the CPNPP site. A multi-layer groundwater model was developed to evaluate vertical post-construction groundwater flow through the Glen Rose Formation limestone to the Twin Mountains Formation (TMF).

The single-layer flow model covers an area extending approximately 2520 ft west to east and 1910 ft south to north with the model domain centered on the power block area as shown in FSAR Figure 2.4.12-219. The model domain is subdivided into rows and columns (Figure 2.4.12-219) using a variably-spaced rectangular grid necessary for the finite-difference flow equation. The grid spacing ranges in size from less than 5 ft in the immediate vicinity of the power block to a maximum of 150 ft around the perimeter of the model domain. The grid is refined in the power block area to allow more detailed representation of model features and better lateral resolution of the calculated groundwater surface elevation.

The flow model for evaluating the vertical pathway covers a spatial area approximately 285 ft by 147 ft, with the model area subdivided into five layers (FSAR Figures 2.4.12-214 and 2.4.12-219). Within the power block area, model cells falling within the reactor buildings for Units 3 and 4 are specified as inactive in Layer 1, since no groundwater flow will occur through these structures. However, the underlying cells in Layers 2 through 5 are active in the model since groundwater movement can occur underneath the building areas. Based on the site geotechnical evaluation (FSAR Section 2.5), the vertical pathway from each unit is essentially identical (hydrogeologic properties and distance to underlying formations); therefore, the evaluation of vertical migration at a location situated at Unit 4 is considered representative for vertical groundwater movement from both units.

2.3.1.5.6.1 Aquifer Parameters

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The key hydraulic parameters for each of the subsurface materials represented in the pathway models include hydraulic conductivity (K) and effective porosity (η_e); for purposes of these evaluations involving primarily unconfined groundwater systems, η_e is considered equivalent to specific yield (S_y). Four materials present in the subsurface at the site are represented in either the horizontal pathway and/or the vertical pathway model: engineered fill, existing fill, bedrock of the Glen Rose Formation, and bedrock of the TMF.

Various sources are used for engineered fill during construction of CPNPP Units 3 and 4. Based on engineered fill descriptions provided in FSAR Subsection 2.5.4.5.4.1.1, a range of values for K and S_y was estimated for the existing fill materials. Estimated K values range from a low of 6.31×10^{-4} cm/sec (1.79 ft/day) to a high of 1.65×10^{-1} cm/sec (468 ft/day). Estimated S_y values, equivalent to η_e in the model, is estimated to range from 0.17 to 0.2.

Two areas of existing fill are present, one on the northern side of Unit 4 and one on the eastern side of Unit 3. Estimated K values for the existing fill and for the bedrock are provided in Section 2.4.12.4.6.2. Testing during the 2007 COL site investigation indicate that the K value for the eastern area of existing fill ranges from 1.7×10^{-3} cm/sec (4.82 ft/day) to 3.5×10^{-3} cm/sec (9.9 ft/day) and the northern area of existing fill to be 5.0×10^{-4} cm/sec (1.42 ft/day).

Estimated K values for the Glen Rose Formation bedrock have been derived from packer tests as well as from a limited number of slug tests at the site. Estimated K values developed from the packer tests are very low, on the order of 1×10^{-8} to 1×10^{-9} cm/s (2.8×10^{-5} ft/day to 2.8×10^{-6} ft/day), with some packer tests reporting values of zero, indicating no water movement through the tested zone. Estimated K values reported for the bedrock based on slug tests ranged from 1.37×10^{-5} cm/s (0.039 ft/day) to 6.29×10^{-6} cm/s (0.0178 ft/day). The packer test results are considered more representative of the K of the Glen Rose Formation bedrock.

The porosity of the Glen Rose Formation ranges from an average total porosity of 25.6 percent for the shallow bedrock (consisting of limestone and shale), to an average total porosity of 11.9 percent for deeper limestone (Subsection 2.4.12.2.5.1). The η_e of a geologic material is often lower than the total porosity of the material, though in competent rock the two porosities may be similar. The value of 11.9 percent for the η_e is less than the site-specific average total porosity determined for the shallow Glen Rose Formation bedrock. Because of the competent nature of the deeper Glen Rose Formation bedrock, the η_e for this material is interpreted to be the same as the total porosity, and the value of 0.119 was also assigned for η_e in the deeper Glen Rose Formation limestone.

An average K for the TMF is reported to be 9 ft/day (USGS 2011). Porosity of the sandstone samples retrieved during the 2007 CPNPP pre-COL investigation ranges from 0.19 to 0.37, with an average value of 0.27 (FSAR Subsection 2.5.4.2.3.1.3).

2.3.1.5.6.1.1 Aquifer Parameters for Horizontal Pathway Model RCOL2_02.04.12-9 S04

Three subsurface materials are represented in the horizontal pathway model: engineered fill, existing fill, and bedrock of the Glen Rose Formation. To provide a conservative estimate of the rate of groundwater movement along the horizontal pathway, the highest of the projected K values for the engineered fill and existing fill were used in the horizontal pathway model; this maximizes the groundwater flow rate calculated in the model. For the Glen Rose Formation bedrock, the lower of the K results reported from slug tests (6.29×10^{-6} cm/sec) was used in the model. This value is closer to the K value determined from the packer tests, yet still higher than the packer test values to provide conservatism to the K parameter in the model.

The shoreline of SCR serves as the major hydraulic boundary for the site. The boundary of the numerical model domain coincident with SCR was defined as a constant head boundary having an elevation of 772 ft msl, which is below the minimum recorded SCR elevation since the initial filling of the reservoir in 1979. Additionally, the water level at model cells adjacent to the BATs at each unit was assigned a constant head at one foot below grade (821 ft msl), the maximum groundwater elevation limit required by the DCD (FSAR Table 2.0-1R). This value is significantly above the maximum post construction groundwater elevation of 804 ft msl within the area encircled by the ESW pipe tunnels (FSAR Subsection 2.4.12.5). Using the maximum groundwater elevation and minimum SCR elevation provides conservative maximum (bounding) hydraulic gradients for the calculated pathways.

2.3.1.5.6.1.2 Aquifer Parameters for Vertical Pathway Model

Based on similar subsurface conditions underlying each unit (hydrogeologic properties and distance to underlying formations), the vertical pathway from each unit are essentially identical. Similar to the horizontal pathway analysis, the water level at model cells adjacent to the BAT at each unit was assigned a constant head of 821 ft msl with downward gradients established to the TMF. This value is significantly above the maximum post construction groundwater elevation of 804 ft msl within the area encircled by the ESW pipe tunnels (FSAR Subsection 2.4.12.5).

Three subsurface materials are represented in the vertical pathway model: engineered fill, bedrock of the Glen Rose Formation, and bedrock of the TMF. Estimated K and S_y values for the engineered fill were assigned the same values in the vertical pathway model as in the horizontal pathway model; however, because the particles are released at the base of the engineered fill and travel downward, the hydraulic properties of the engineered fill do not exert a substantial influence on the vertical pathway calculations.

For the Glen Rose Formation bedrock, the lower of the K results reported from slug tests (6.29×10^{-6} cm/sec or 0.0178 ft/day) was used for the horizontal K in the model.

The numerical MODFLOW model also incorporates a vertical anisotropy (vertical K) in the MODFLOW simulation. The vertical anisotropy is the ratio of horizontal (K_h) to vertical (K_v) K, or K_h/K_v, and can be related to bedding planes and laminae of the subsurface geologic materials. K_v is generally less than K_h, and vertical anisotropy values of 1 to 1000 are reported in model applications. Coarse grained materials (such as sand and gravel) are expected to have low vertical anisotropy values, with higher values occurring in fine grained materials and consolidated subsurface formations. Given the vertical head differences observed in monitoring wells at the site (FSAR Figure 2.4.12-209), the vertical anisotropy for bedrock at the site is expected to be higher than for the granular materials. A vertical anisotropy of 10 was used in the vertical pathway model to be representative of the Glen Rose Formation limestone and is conservative as it is in the low range of vertical anisotropy, yielding faster vertical groundwater travel times than higher anisotropy values. RCOL2_02.04.12-9 S04

The K and η_e values for the TMF are assigned at 9 ft/day and 0.19, respectively.

2.3.1.5.6.1.3 Pathway Modeling Results

For each of the directional pathways being evaluated (horizontal groundwater movement and vertical groundwater movement), a groundwater flow model was created in MODFLOW using parameter values for the basic pathway model setups as previously described. Groundwater pathways for each model setup were calculated using MODPATH. After each model was constructed and the resulting pathway details were identified, sensitivity analyses were completed to evaluate the impacts on the pathway travel time and distances associated with changes to MODFLOW model parameters. The fastest and shortest pathways calculated from each unit are illustrated in FSAR Figure 2.4.12-220; a summary of the calculated distance and time of travel for each pathway is provided in Table 2.3-31.

With one exception, all pathways showed groundwater moves from the BAT areas from both Units 3 and 4 to the eastern existing fill and then discharging to SCR. One pathway showed movement from the Unit 3 BAT location through the Unit 3 UHS basins, then discharging to SCR through the retaining wall buildup fill at the northeast corner of the Unit 3 UHS basins.

The pathway with the fastest travel time at Unit 3 extends west from the BATs, moving through engineered fill on the west and then north side of the unit, moving between the UHS basins, and exiting to SCR through engineered fill to the northeast of the unit, through the retaining wall to be constructed northeast of Unit 3. Since this retaining wall has not yet been designed, for groundwater pathway modeling purposes the engineered fill is assumed to be in direct contact with SCR and groundwater will discharge directly to SCR with no overland flow. The pathway is calculated to be 1194 feet in length with a particle travel time of 62 days. This pathway is illustrated in cross section in FSAR Figure 2.4.12-213.

The pathway with the fastest travel time from Unit 4 takes a path that begins by moving eastward then south through engineered fill, subsequently moving through the area of engineered fill south of the units and exiting to SCR through existing fill east of Unit 3. The pathway is calculated to be 3966 feet in length with a particle travel time of 531 days.

The vertical pathway is calculated to be 186 feet long with a travel time of 8115 days (FSAR Figure 2.4.12-214). The pathway begins at the base of the excavation adjacent to the BATs and extends through the bedrock of the Glen Rose Formation to the top of the underlying TMF.

Parameters modified for the sensitivity analysis and the results for the fastest pathway from Unit 3 are shown in Table 2.3-31. Most sensitivity runs were completed by adjusting parameters to more conservative values from the base model setup; given that conservative parameters were used to set up the base run for the pathway analysis, selection of even more conservative values results in site conditions that are improbable for the geologic materials present. RCOL2_02.04.12-9 S04

~~Groundwater gradients, velocities, and travel times are summarized in Table 2.3-31.~~ Additional information on groundwater flow characteristics are provided in CPNPP Units 3 and 4 FSAR Subsection 2.4.12.

2.3.1.5.7 Surface Soil Profiles

The site is underlain by a sedimentary rock sequence which, at the surface, has been weathered to a clayey, silty, sandy overburden soil with some rock fragments. No alluvium sediments were encountered during the 2006 and 2007 geotechnical drilling program in the vicinity of the CPNPP Units 3 and 4 build area, although they may exist in other portions of the site. Drilling and excavation experience at the site shows that the residual soil transition through weathered rock to hard, unweathered bedrock can be gradual in the natural shallow subsurface profile in some places, or can consist of soil in direct contact with hard bedrock in other places. Most of the CPNPP site is situated in areas disturbed by previous construction activities associated with the construction of the existing CPNPP Units 1 and 2 structures. Those areas are covered with undifferentiated and engineered fill, gravel roadways and parking areas, and concrete building foundation pads.

The soils occurring on the CPNPP site are described in the Hood and Somervell counties soil survey information provided by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service's on-line Soil Data Mart website (USDA 2007). A total of 18 soil mapping phases representing 17 soil series occur within the CPPNP site boundary. Descriptions of each soil series are provided in Table 2.3-32, and the location of the soil mapping phases are shown on Figure 2.3-28.

The two soil types mapped in the vicinity of the CPNPP Units 3 and 4 build areas include the Tarrant – Bolar association and Tarrant – Purves association. Physical properties for these soil types indicate clay content ranges of 20 to 60 percent, moist bulk densities of 1.10 to 1.55 g/cc, saturated hydraulic conductivities between 4.2×10^{-5} cm/sec and 1.4×10^{-3} cm/sec, and available water capacities of 0.05 to 0.18 In/In (USDA 2007a).

Hydraulic conductivities calculated during the 2006 to 2007 groundwater investigation ranged from 2.93×10^{-5} cm/sec in regolith soils to 3.5×10^{-3} cm/sec in undifferentiated fill material. Recharge rates, soil moisture characteristics, and moisture content in the vadose zone are discussed in CPNPP Units 3 and 4 FSAR 2.4.12.

2.3.2 WATER USE

This section describes surface water and groundwater in the vicinity of the CPNPP site that could affect or be affected by the construction and operation of CPNPP Units 3 and 4. Information provided in this section includes descriptions of the types of consumptive and non-consumptive water uses, identification of their locations, and qualification of water withdrawals and returns. A detailed assessment of local area facility water use is discussed in this section.

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~~TABLE 2.3-30 (Sheet 1 of 3)~~

~~GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS~~

Monitoring Point	November 29, 2006	December 27, 2006	January 23, 2007	February 20, 2007	March 19, 2007	April 10, 2007	May 16, 2007	June 13, 2007	July 16, 2007	August 13, 2007	September 13, 2007	October 16, 2007	November 15, 2007
MW-1200b	Dry	Dry	Dry	Dry	794.34	794.80	795.56	796.08	796.55	796.87	797.22	797.47	797.66
MW-1200c	Dry	Dry	Dry	Dry	Dry	Dry	Dry	754.00	754.07	754.06	754.06	754.06	754.04
MW-1201a	845.34	849.60	850.58	849.89	854.22	855.66	856.23	857.50	858.64	857.57	856.86	856.01	855.42
MW-1201b	813.31	830.41	830.63	830.77	830.93	831.12	830.70	830.95	830.95	830.32	830.75	830.9	830.35
MW-1201c	778.13	778.14	778.14	778.58	779.11	779.54	780.23	780.75	781.37	781.85	782.38	782.96	783.45
MW-1202b	788.69	788.74	789.16	789.74	790.36	790.84	791.62	792.27	792.97	793.56	795.21	794.84	795.52
MW-1202c	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1203a	846.36	848.08	849.03	849.63	851.43	854.84	855.01	855.18	857.18	856.26	854.64	853.12	852.95
MW-1203b	Dry	813.23	816.09	819.29	822.47	825.16	828.23	830.10	832.20	833.64	834.43	835.11	835.57
MW-1203c	Dry	Dry	Dry	Dry	788.35	788.96	789.94	790.71	791.65	792.45	793.32	794.19	794.96
MW-1204a	819.96	822.86	823.35	823.58	823.41	824.15	824.17	825.01	825.04	824.96	824.69	824.38	824.17
MW-1204b	789.68	789.74	790.07	790.63	791.16	791.65	792.54	793.25	794.20	794.93	795.65	796.57	797.23
MW-1204c	Dry	752.33	752.44	752.63	752.75	752.84	753.08	753.30	753.68	754.07	754.33	754.54	754.74
MW-1205a	845.03	845.23	845.22	845.15	845.09	845.07	845.52	847.53	850.13	850.09	850.16	849.54	848.40
MW-1205b	Dry	Dry	Dry	798.24	798.58	798.84	799.26	799.57	799.98	800.28	800.6	800.95	801.25
MW-1205c	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1206a	808.40	808.49	808.56	808.57	808.58	808.58	808.56	808.59	815.07	814.80	814.61	814.46	814.34
MW-1206b	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	783.16	783.32	783.47	783.58
MW-1206c	Dry	747.16	747.15	747.15	747.15	Dry	747.97	748.23	748.53	748.80	749.1	749.41	749.70
MW-1207a	835.00	837.24	841.20	840.08	840.34	840.99	840.33	840.34	840.54	839.89	839.95	839.75	839.61
MW-1207b	809.15	828.68	830.16	829.17	829.35	831.55	828.29	829.45	830.48	828.01	827.66	826.95	826.49
MW-1207c	Dry	779.27	780.53	781.91	783.23	784.34	786.08	787.44	788.89	790.05	791.34	792.62	793.74
MW-1208a	781.82	780.85	781.89	781.93	781.92	781.97	781.94	783.48	785.35	785.56	784.95	784.34	783.88
MW-1209a	Dry	Dry	769.39	770.47	771.62	772.51	774.12	783.28	785.45	785.58	784.93	784.3	783.79
MW-1209b	750.61	773.18	774.68	775.16	775.36	775.37	775.19	775.14	775.09	774.97	775.13	775.17	775.11
MW-1209c	Dry	709.85	711.91	714.05	716.16	717.89	720.64	722.70	725.05	726.92	729.24	731.96	734.24

~~TABLE 2.3-30 (Sheet 2 of 3)~~
~~GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS~~

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Monitoring Point	November 29, 2006	December 27, 2006	January 23, 2007	February 20, 2007	March 19, 2007	April 10, 2007	May 16, 2007	June 13, 2007	July 16, 2007	August 13, 2007	September 13, 2007	October 16, 2007	November 15, 2007
MW-1210b	Dry	Dry	Dry	783.38	784.05	784.50	785.08	785.44	785.74	785.95	786.09	786.19	786.25
MW-1210c	Dry	748.31	748.31	748.33	748.33	748.33	748.34	748.34	748.36	748.38	748.38	748.37	748.37
MW-1211a	775.33	775.09	775.36	775.25	775.28	775.27	775.17	775.07	775.06	775.03	775.12	775.21	775.16
MW-1211b	775.31	774.06	775.35	775.23	775.25	775.24	775.14	775.05	775.03	775.02	775.10	775.19	775.13
MW-1212a	785.79	787.11	787.34	787.55	787.48	787.75	787.29	787.89	788.49	787.33	787.27	787.21	786.86
MW-1212b	785.22	785.04	785.27	784.85	784.54	784.94	785.09	784.50	784.55	784.08	784.75	785.33	783.73
MW-1212c	735.07	735.65	736.08	736.55	736.99	737.34	737.88	738.29	738.78	739.18	739.64	740.16	740.59
MW-1213b	Dry	Dry	Dry	781.40	782.27	783.02	784.21	785.22	786.42	787.44	788.52	789.61	790.58
MW-1213c	756.60	756.36	756.37	756.41	756.41	756.45	756.48	756.51	756.54	756.56	756.59	756.63	756.66
MW-1214a	777.79	777.95	779.90	780.72	779.32	782.06	783.37	784.14	783.81	782.51	780.37	778.47	777.80
MW-1215a	834.26	833.79	835.25	835.93	836.21	837.27	837.26	839.70	841.18	841.41	841.89	841.81	841.42
MW-1215b	808.52	831.35	831.27	831.64	831.60	832.10	831.80	832.91	833.74	833.55	833.54	833.84	833.12
MW-1215c	Dry	Dry	Dry	Dry	Dry	777.46	777.99	778.40	778.89	779.28	779.69	780.14	780.52
MW-1216a	827.19	827.79	828.10	828.57	828.35	828.59	828.99	829.62	830.69	830.82	830.47	830.18	829.87
MW-1216b	Dry	800.52	802.43	804.16	805.51	806.37	807.42	808.10	808.83	809.62	810.71	812.11	813.73
MW-1216c	Dry	Dry	Dry	Dry	Dry	Dry	778.73	778.96	779.20	779.37	779.6	779.82	780.00
MW-1217a	830.28	829.52	829.45	829.45	829.45	829.45	829.45	829.44	830.31	829.70	829.57	829.54	829.54
MW-1217b	800.55	810.94	820.76	824.72	825.06	823.82	820.08	820.38	821.13	822.28	823.83	825.64	827.00
MW-1217c	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	774.04	774.36	774.58	774.75
MW-1218a	823.41	824.06	827.35	826.24	825.62	830.78	830.97	831.32	831.23	828.84	826.36	823.96	823.53
MW-1219a	788.91	788.99	789.22	789.47	789.52	790.96	791.58	793.14	794.04	793.50	792.25	790.66	789.73
RW-1	_(a)	_(a)	_(a)	_(a)	775.18	775.17	775.07	774.97	774.97	774.94	775.03	775.10	775.05
OW-1	_(a)	_(a)	_(a)	_(a)	775.23	775.21	775.12	775.01	775.01	774.97	775.07	775.16	775.10
OW-2	_(a)	_(a)	_(a)	_(a)	775.18	775.16	775.07	774.98	774.97	774.94	775.03	775.13	775.06
OW-3	_(a)	_(a)	_(a)	_(a)	775.60	775.59	775.50	775.40	775.39	775.37	775.46	775.56	775.48

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~~TABLE 2.3-30 (Sheet 3 of 3)~~
~~GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS~~

~~Monitoring Point~~	~~November 29, 2006~~	~~December 27, 2006~~	~~January 23, 2007~~	~~February 20, 2007~~	~~March 19, 2007~~	~~April 10, 2007~~	~~May 16, 2007~~	~~June 13, 2007~~	~~July 16, 2007~~	~~August 13, 2007~~	~~September 13, 2007~~	~~October 16, 2007~~	~~November 15, 2007~~
~~Brazos River Glen Rose Station (USGS 08091000[b])~~	~~569.37~~	~~569.34~~	~~569.68~~	~~569.37~~	~~569.40~~	~~572.33~~	~~574.01~~	~~573.03~~	~~574.41~~	~~571.54~~	~~572.51~~	~~571.35~~	~~570.58~~
~~Squaw Creek Reservoir (USGS 08091730[b])~~	~~775.40~~	~~775.23~~	~~775.42~~	~~775.19~~	~~_(a)~~	~~775.36~~	~~775.39~~	~~775.31~~	~~775.33~~	~~775.40~~	~~775.46~~	~~775.48~~	~~775.38~~
~~Lake Granbury (USGS 08090900[b])~~	~~691.14~~	~~691.53~~	~~692.15~~	~~692.32~~	~~692.37~~	~~692.37~~	~~692.54~~	~~692.48~~	~~692.30~~	~~692.38~~	~~692.29~~	~~692.44~~	~~691.90~~
~~USGS 08091000~~	~~4.37~~	~~4.34~~	~~4.68~~	~~4.37~~	~~4.40~~	~~7.33~~	~~9.01~~	~~8.03~~	~~9.41~~	~~6.54~~	~~7.51~~	~~6.35~~	~~5.58~~
~~Gauge Datum - 565' asl~~	~~569.37~~	~~569.34~~	~~569.68~~	~~569.37~~	~~569.40~~	~~572.33~~	~~574.01~~	~~573.03~~	~~574.41~~	~~571.54~~	~~572.51~~	~~571.35~~	~~570.58~~

a) ~~No Data Available~~

b) ~~Provisional Data~~

~~Notes:~~
~~Elevations provided are in ft msl.~~
~~Monitoring Points illustrated on Figure 2.3-26~~
~~(USGS 2007c)~~

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TABLE 2.3-30 (Sheet 1 of 6)
GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS

Monitoring Point	MW-1200b	MW-1200c	MW-1201a	MW-1201b	MW-1201c	MW-1202b	MW-1202c	MW-1203a	MW-1203b	MW-1203c
11/29/2006	Dry	Dry	845.34	813.31	778.13	788.69	Dry	846.36	Dry	Dry
12/27/2006	Dry	Dry	849.60	830.41	778.14	788.74	Dry	848.08	813.23	Dry
1/23/2007	Dry	Dry	850.58	830.63	778.14	789.16	Dry	849.03	816.09	Dry
2/20/2007	Dry	Dry	849.89	830.77	778.58	789.74	Dry	849.63	819.29	Dry
3/19/2007	794.34	Dry	854.22	830.93	779.11	790.36	Dry	851.43	822.47	788.35
4/10/2007	794.80	Dry	855.66	831.12	779.54	790.84	Dry	854.84	825.16	788.96
5/16/2007	795.56	Dry	856.23	830.70	780.23	791.62	Dry	855.01	828.23	789.94
6/13/2007	796.08	754.00	857.50	830.95	780.75	792.27	Dry	855.18	830.10	790.71
7/16/2007	796.55	754.07	858.64	830.95	781.37	792.97	Dry	857.18	832.20	791.65
8/13/2007	796.87	754.06	857.57	830.32	781.85	793.56	Dry	856.26	833.64	792.45
9/13/2007	797.22	754.06	856.86	830.75	782.38	795.21	Dry	854.64	834.43	793.32
10/16/2007	797.47	754.06	856.01	830.90	782.96	794.84	Dry	853.12	835.11	794.19
11/15/2007	797.66	754.04	855.42	830.35	783.45	795.52	Dry	852.95	835.57	794.96
1/23/2008	798.09	754.04	855.33	831.19	784.64	797.10	Dry	853.99	836.69	796.67
2/22/2008	798.45	754.07	855.48	831.60	785.20	797.71	754.13	854.13	837.17	797.37
3/24/2008	798.98	754.07	856.47	831.42	785.74	798.35	754.25	856.04	837.26	798.12
4/25/2008	799.54	754.07	856.92	831.75	786.37	798.96	754.36	856.43	837.21	798.85
5/28/2008	800.04	754.07	855.88	831.46	786.94	799.52	754.46	855.88	836.77	799.57
8/17/2012	806.57	756.77	854.16	830.43	808.77	830.82	760.43	852.17	837.07	819.65
9/12/2012	806.59	756.82	853.58	830.30	808.91	829.81	760.53	852.36	836.05	819.86
10/19/2012	806.58	756.87	853.02	830.38	809.13	828.54	760.66	851.48	837.20	820.14
11/14/2012	806.53	756.90	852.08	830.29	809.24	827.74	760.73	850.55	837.36	820.26
12/5/2012	806.55	756.94	851.72	830.51	809.38	827.20	760.82	850.06	837.55	820.38

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TABLE 2.3-30 (Sheet 2 of 6)
GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS

Monitoring Point	MW-1204a	MW-1204b	MW-1204c	MW-1205a	MW-1205b	MW-1205c	MW-1206a	MW-1206b	MW-1206c
11/29/2006	819.96	789.68	Dry	845.03	Dry	Dry	808.40	Dry	Dry
12/27/2006	822.86	789.74	752.33	845.23	Dry	Dry	808.49	Dry	747.16
1/23/2007	823.35	790.07	752.44	845.22	Dry	Dry	808.56	Dry	747.15
2/20/2007	823.58	790.63	752.63	845.15	798.24	Dry	808.57	Dry	Dry
3/19/2007	823.41	791.16	752.75	845.09	798.58	Dry	808.58	Dry	Dry
4/10/2007	824.15	791.65	752.84	845.07	798.84	Dry	808.58	Dry	Dry
5/16/2007	824.17	792.54	753.08	845.52	799.26	Dry	808.56	Dry	747.97
6/13/2007	825.01	793.25	753.30	847.53	799.57	Dry	808.59	Dry	748.23
7/16/2007	825.04	794.20	753.68	850.13	799.98	Dry	815.07	Dry	748.53
8/13/2007	824.96	794.93	754.07	850.09	800.28	Dry	814.80	783.16	748.80
9/13/2007	824.69	795.65	754.33	850.16	800.60	Dry	814.61	783.32	749.10
10/16/2007	824.38	796.57	754.54	849.54	800.95	Dry	814.46	783.47	749.41
11/15/2007	824.17	797.23	754.74	848.40	801.25	Dry	814.34	783.58	749.70
1/23/2008	823.91	798.78	755.19	846.06	802.26	Dry	814.05	783.83	750.33
2/22/2008	823.80	799.38	755.54	845.76	802.75	Dry	813.95	783.97	750.64
3/24/2008	824.09	800.04	755.85	845.60	803.31	Dry	813.79	784.15	750.91
4/25/2008	824.45	800.73	756.21	845.65	803.82	Dry	813.67	784.66	751.25
5/28/2008	824.49	801.36	756.49	846.30	804.29	Dry	813.62	785.04	751.51
8/17/2012	822.76	817.68	766.03	850.15	819.47	Dry	811.24	791.74	762.94
9/12/2012	822.65	817.75	766.16	849.79	819.67	Dry	811.22	791.75	763.08
10/19/2012	822.55	817.93	766.34	848.77	819.97	Dry	811.23	791.78	763.28
11/14/2012	822.42	818.04	766.47	847.65	820.12	Dry	811.23	791.78	763.43
12/5/2012	822.36	818.16	766.58	846.89	820.34	Dry	811.24	791.80	763.55

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TABLE 2.3-30 (Sheet 3 of 6)
GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS

Monitoring Point	MW-1207a	MW-1207b	MW-1207c	MW-1208a	MW-1209a	MW-1209b	MW-1209c	MW-1210b	MW-1210c	MW-1211a	MW-1211b
11/29/2006	835.00	809.15	Dry	781.82	Dry	750.61	Dry	Dry	Dry	775.33	775.31
12/27/2006	837.24	828.68	779.27	780.85	Dry	773.18	709.85	Dry	748.31	775.09	774.06
1/23/2007	841.20	830.16	780.53	781.89	769.39	774.68	711.91	Dry	748.31	775.36	775.35
2/20/2007	840.08	829.17	781.91	781.93	770.47	775.16	714.05	783.38	748.33	775.25	775.23
3/19/2007	840.34	829.35	783.23	781.92	771.62	775.36	716.16	784.05	748.33	775.28	775.25
4/10/2007	840.99	831.55	784.34	781.97	772.51	775.37	717.89	784.50	748.33	775.27	775.24
5/16/2007	840.33	828.29	786.08	781.94	774.12	775.19	720.64	785.08	748.34	775.17	775.14
6/13/2007	840.34	829.45	787.44	783.48	783.28	775.14	722.70	785.44	748.34	775.07	775.05
7/16/2007	840.54	830.48	788.89	785.35	785.45	775.09	725.05	785.74	748.36	775.06	775.03
8/13/2007	839.89	828.01	790.05	785.56	785.58	774.97	726.92	785.95	748.38	775.03	775.02
9/13/2007	839.95	827.66	791.34	784.95	784.93	775.13	729.24	786.09	748.38	775.12	775.10
10/16/2007	839.75	826.95	792.62	784.34	784.30	775.17	731.96	786.19	748.37	775.21	775.19
11/15/2007	839.61	826.49	793.74	783.88	783.79	775.11	734.24	786.25	748.37	775.16	775.13
1/23/2008	839.53	828.72	796.43	783.56	783.55	774.76	739.28	786.64	748.34	774.78	774.76
2/22/2008	840.09	828.93	797.66	783.52	783.45	774.96	741.32	787.00	748.34	775.12	775.05
3/24/2008	841.52	831.37	799.10	783.35	783.26	775.25	743.23	787.27	748.37	774.31	774.29
4/25/2008	841.68	831.16	800.82	783.64	783.58	775.37	745.26	787.50	748.37	775.48	775.45
5/28/2008	839.81	829.40	802.28	783.54	783.46	774.84	747.11	787.53	748.44	774.87	774.85
8/17/2012	839.74	827.99	814.75	782.01	780.18	774.95	775.17	789.94	752.67	774.61	775.06
9/12/2012	839.80	828.07	814.67	782.00	781.69	775.11	775.04	789.86	752.73	774.99	774.97
10/19/2012	839.70	828.18	814.57	781.98	781.68	775.29	774.88	789.79	752.83	775.25	775.24
11/14/2012	839.51	828.04	814.53	781.97	781.67	775.27	774.74	789.94	752.88	775.19	775.15
12/5/2012	839.22	828.15	814.56	781.96	781.67	775.24	774.64	790.11	752.93	775.22	775.18

TABLE 2.3-30 (Sheet 4 of 6)
GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS

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Monitoring Point	**MW-1212a**	**MW-1212b**	**MW-1212c**	**MW-1213b**	**MW-1213c**	**MW-1214a**	**MW-1215a**	**MW-1215b**	**MW-1215c**	**MW-1216a**	**MW-1216b**	**MW-1216c**
11/29/2006	785.79	785.22	735.07	Dry	756.60	777.79	834.26	808.52	Dry	827.19	Dry	Dry
12/27/2006	787.11	785.04	735.65	Dry	756.36	777.95	833.79	831.35	Dry	827.79	800.52	Dry
1/23/2007	787.34	785.27	736.08	Dry	756.37	779.90	835.25	831.27	Dry	828.10	802.43	Dry
2/20/2007	787.55	784.85	736.55	781.40	756.41	780.72	835.93	831.64	Dry	828.57	804.16	Dry
3/19/2007	787.48	784.54	736.99	782.27	756.41	779.32	836.21	831.60	Dry	828.35	805.51	Dry
4/10/2007	787.75	784.94	737.34	783.02	756.45	782.06	837.27	832.10	777.46	828.59	806.37	Dry
5/16/2007	787.29	785.09	737.88	784.21	756.48	783.37	837.26	831.80	777.99	828.99	807.42	778.73
6/13/2007	787.89	784.50	738.29	785.22	756.51	784.14	839.70	832.91	778.40	829.62	808.10	778.96
7/16/2007	788.49	784.55	738.78	786.42	756.54	783.81	841.18	833.74	778.89	830.69	808.83	779.20
8/13/2007	787.33	784.08	739.18	787.44	756.56	782.51	841.41	833.55	779.28	830.82	809.62	779.37
9/13/2007	787.27	784.75	739.64	788.52	756.59	780.37	841.89	833.54	779.69	830.47	810.71	779.60
10/16/2007	787.21	785.33	740.16	789.61	756.63	778.47	841.81	833.84	780.14	830.18	812.11	779.82
11/15/2007	786.86	783.73	740.59	790.58	756.66	777.80	841.42	833.12	780.52	829.87	813.73	780.00
1/23/2008	787.39	784.24	741.53	792.74	756.86	777.81	839.57	833.24	781.45	829.13	817.82	780.45
2/22/2008	787.42	784.65	741.86	793.71	757.00	778.52	839.11	833.09	781.89	828.71	820.19	780.64
3/24/2008	787.36	784.94	742.37	794.59	757.00	781.74	839.35	832.65	782.31	828.76	822.09	780.85
4/25/2008	787.71	785.31	742.75	795.58	757.31	781.83	839.70	833.51	782.79	829.26	823.15	781.09
5/28/2008	787.56	784.37	743.24	796.45	757.43	781.05	839.87	833.31	783.25	829.49	823.31	781.30
8/17/2012	786.99	782.71	758.91	817.68	763.54	778.34	840.23	832.24	803.62	829.26	827.17	790.91
9/12/2012	787.08	783.36	759.22	817.77	763.61	778.47	840.23	832.25	803.66	828.89	827.27	791.04
10/19/2012	787.26	783.73	759.67	817.90	763.74	778.65	840.20	832.25	804.27	828.79	828.17	791.24
11/14/2012	787.16	783.20	759.96	818.01	763.83	778.36	839.55	831.73	804.50	828.54	829.02	791.37
12/5/2012	787.24	782.64	760.20	818.04	763.91	778.15	839.00	831.80	804.70	828.09	829.74	791.48

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TABLE 2.3-30 (Sheet 5 of 6)
GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS

Monitoring Point	MW-1217a	MW-1217b	MW-1217c	MW-1218a	MW-1219a	SCR[1] (8091730)	Brazos River[1] (08091000)	Lake Granbury[1] (08090900)
11/29/2006	830.28	800.55	Dry	823.41	788.91	775.44	566.16	691.37
12/27/2006	829.52	810.94	Dry	824.06	788.99	775.25	566.13	691.55
1/23/2007	829.45	820.76	Dry	827.35	789.22	775.47	566.47	692.19
2/20/2007	829.45	824.72	Dry	826.24	789.47	775.35	566.16	692.41
3/19/2007	829.45	825.06	Dry	825.62	789.52	ND	566.19	692.41
4/10/2007	829.45	823.82	Dry	830.78	790.96	775.38	569.12	692.43
5/16/2007	829.45	820.08	Dry	830.97	791.58	775.43	570.80	692.54
6/13/2007	829.44	820.38	Dry	831.32	793.14	775.33	569.82	692.52
7/16/2007	830.31	821.13	Dry	831.23	794.04	775.35	571.20	692.31
8/13/2007	829.70	822.28	774.04	828.84	793.50	775.41	568.33	692.40
9/13/2007	829.57	823.83	774.36	826.36	792.25	775.47	569.30	692.32
10/16/2007	829.54	825.64	774.58	823.96	790.66	775.49	568.14	692.49
11/15/2007	829.54	827.00	774.75	823.53	789.73	775.40	567.36	691.93
1/23/2008	829.52	827.02	775.10	823.52	790.31	774.94	567.11	691.69
2/22/2008	829.53	825.28	775.28	825.72	791.01	775.22	567.24	691.88
3/24/2008	829.54	823.08	775.45	829.54	791.92	775.46	569.16	ND
4/25/2008	829.53	821.33	775.63	830.20	792.53	775.67	573.89	692.44
5/28/2008	829.52	820.17	775.79	826.56	792.59	775.17	568.41	692.36
8/17/2012	828.56	822.43	783.78	823.07	788.78	775.15	566.58	689.33
9/12/2012	828.55	822.40	783.78	823.76	788.78	775.27	566.60	688.71
10/19/2012	829.55	826.28	784.09	824.24	788.72	775.44	566.62	688.43
11/14/2012	829.55	827.32	784.21	823.26	788.57	775.32	566.63	687.91
12/5/2012	829.54	827.71	784.30	822.95	788.68	775.40	566.64	687.59

TABLE 2.3-30 (Sheet 6 of 6)
GROUNDWATER AND SURFACEWATER ELEVATION MEASUREMENTS

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Note 1: USGS Gage, Maximum Daily Elevation
Elevations provided are in ft msl
Dry - no water developed in the well at the time of gauging.
ND - No data for the specified day.

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~~TABLE 2.3-31~~
~~GROUNDWATER VELOCITIES AND TRAVEL TIMES~~

	~~**Path 1**~~	~~**Path 2**~~
~~**Release Elevation (E_h) (ft msl)**~~	~~820.00~~	~~820.00~~
~~**Discharge Elevation (E_l) (ft msl)**~~	~~770.00~~	~~770.00~~
~~**Distance to SCR (L)(ft)**~~	~~600~~	~~350~~
~~**Hydraulic Gradient (Eh-El)/L**~~	~~0.0833~~	~~0.1429~~
~~**Velocity (V) (ft/day)**~~	~~4.13~~	~~1.01~~
~~**Travel Time (T) (days)**~~	~~145~~	~~346~~

~~Path 1 is from Unit 3 east to SCR; Path 2 is from Unit 4 north to SCR~~

~~Equation for Velocity: $V = (K_h (E_h-E_l)/L)/\eta$~~

~~Equation for Travel Time: $T = L/V$~~

~~Path 1 fill K_h is 3.50×10^{-3} cm/sec (9.92 ft/day) from RW-1 recovery test.~~

~~Path 2 fill K_h is 5.00×10^{-4} cm/sec (1.42 ft/day) from MW-1219a slug test.~~

~~Conversions: 1day = 86,000 seconds; 1 foot = 30.48 centimeters.~~

~~Assumptions:~~

1. ~~Engineered fill is conservatively assumed as having negligible transport time.~~
2. ~~Engineered fill is assumed to be fully saturated to level of the perimeter trench drains.~~
3. ~~Release elevation is assumed to be the elevation of trench drain transposed to the edge of the existing fill at the pathway release point (E_h at 820 ft msl).~~
4. ~~Discharge elevation is assumed to be the elevation of the SCR minimum operating pool (E_l at 770 ft msl).~~
5. ~~Pathway distance is assumed to be the shortest distance from the pathway release point to the shoreline of SCR.~~
6. ~~Existing fill (large rubble, sand, and gravel) is assumed to have 20% effective porosity (η=0.20).~~

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TABLE 2.3-31

GROUNDWATER VELOCITIES AND TRAVEL TIMES

MODPATH Run	K (ft/d) Engineered Fill	K (ft/d) Glen Rose Bedrock	K (ft/d) Northern Existing Fill	K (ft/d) Eastern Existing Fill	Porosity (%) Engineered Fill	Porosity (%) Glen Rose Bedrock	Porosity (%) Existing Fill	Vertical Anisotropy (Kh/Kv)	Pathway Distance (3) (ft)	Hydraulic Gradient (4)	Travel Time (d)
Unit 3 - Fastest Horizontal Pathway	468	1.783E-02	1.4	9.9	17	11.9	17	na	1194	0.041	62
Unit 3 - Shortest Horizontal Pathway	468	1.783E-02	1.4	9.9	17	11.9	17	na	1074	0.046	1556
Unit 4 - Fastest Horizontal Pathway	468	1.783E-02	1.4	9.9	17	11.9	17	na	3966	0.012	531
Unit 4 - Shortest Horizontal Pathway	468	1.783E-02	1.4	9.9	17	11.9	17	na	3392	0.014	776
Vertical Pathway	468	1.780E-02	na	na	17	11.9	na	10	186	1.19	8115
Sensitivity 1 (Horizontal)	468	3.900E-02	1.4	9.9	17	11.9	17	na	1200	0.041	62
Sensitivity 2 (Horizontal)	468	1.810E-03	1.4	9.9	17	11.9	17	na	1196	0.041	62
Sensitivity 3 (Horizontal)	468	1.783E-02	1.4	9.9	15	5.0	15	na	1194	0.041	55
Sensitivity 4 (Vertical)	468	1.780E-02	na	na	17	5.0	na	10	186	1.19	3410
Sensitivity 5 (Vertical)	468	1.780E-02	na	na	17	11.9	na	5	186	1.19	1932

na - not applicable

Notes:

1. Groundwater elevation at the BAT was conservatively assumed to be 821 ft msl.
2. For the horizontal pathway analysis, SCR elevation was assumed to be 772 ft msl for all modeling runs.
3. Pathway distance is calculated for the horizontal pathway analysis. For the vertical analysis it is a constant value.
4. Dimensionless. Calculated for difference of hydraulic head from 821 ft msl to 772 ft msl over the pathway distance
   Horizontal Runs - Calculated for difference of hydraulic head from 821 ft msl to 772 ft msl over the horizontal pathway distance
   Vertical Runs - Calculated for difference of hydraulic head from 821 ft msl to 600 ft msl over the vertical pathway distance
5. Horizontal sensitivity runs are based on the pathway with the fastest groundwater travel time.

CTS-01520
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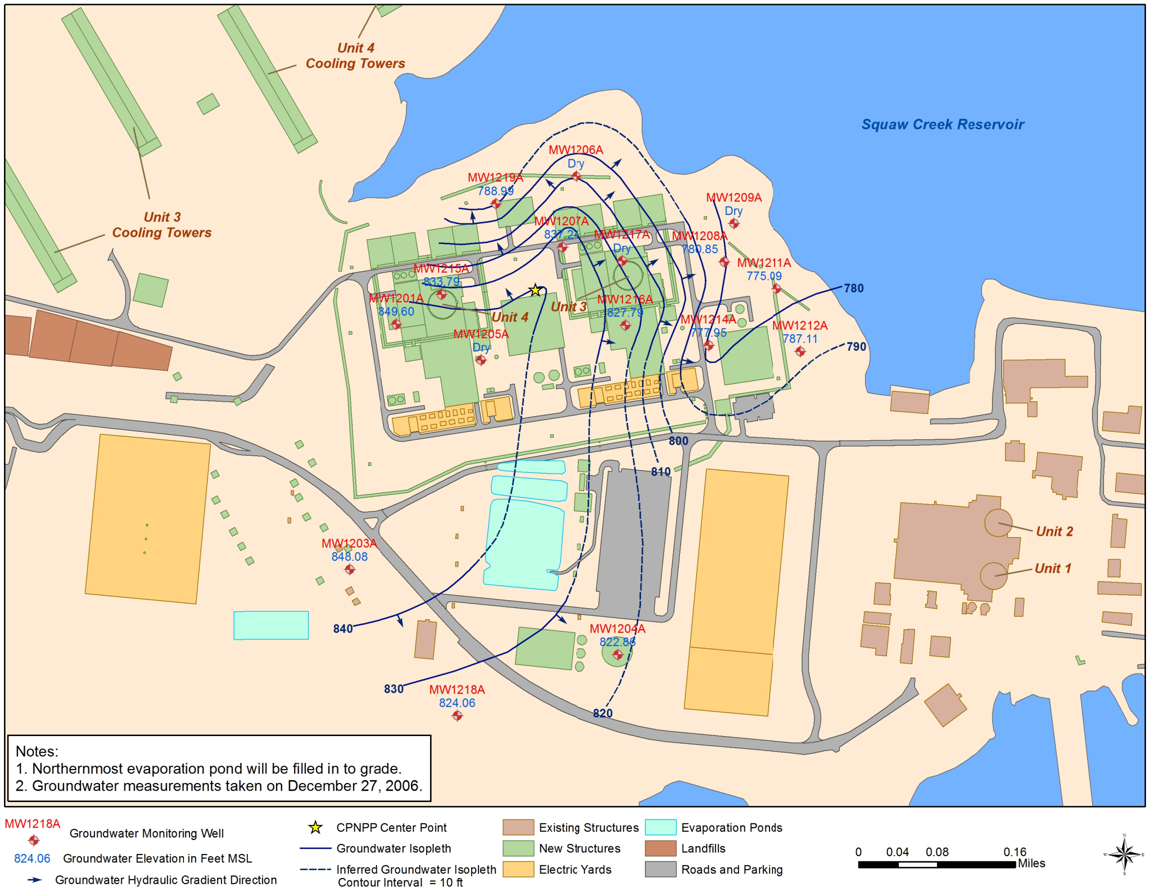

Figure 2.3-27 ~~December 2006~~ Potentiometric Surface Maps ~~(A-Wells)~~ (Sheet 1 of ~~4~~6)

CTS-01520
RCOL2_02.0
4.12-12 S01

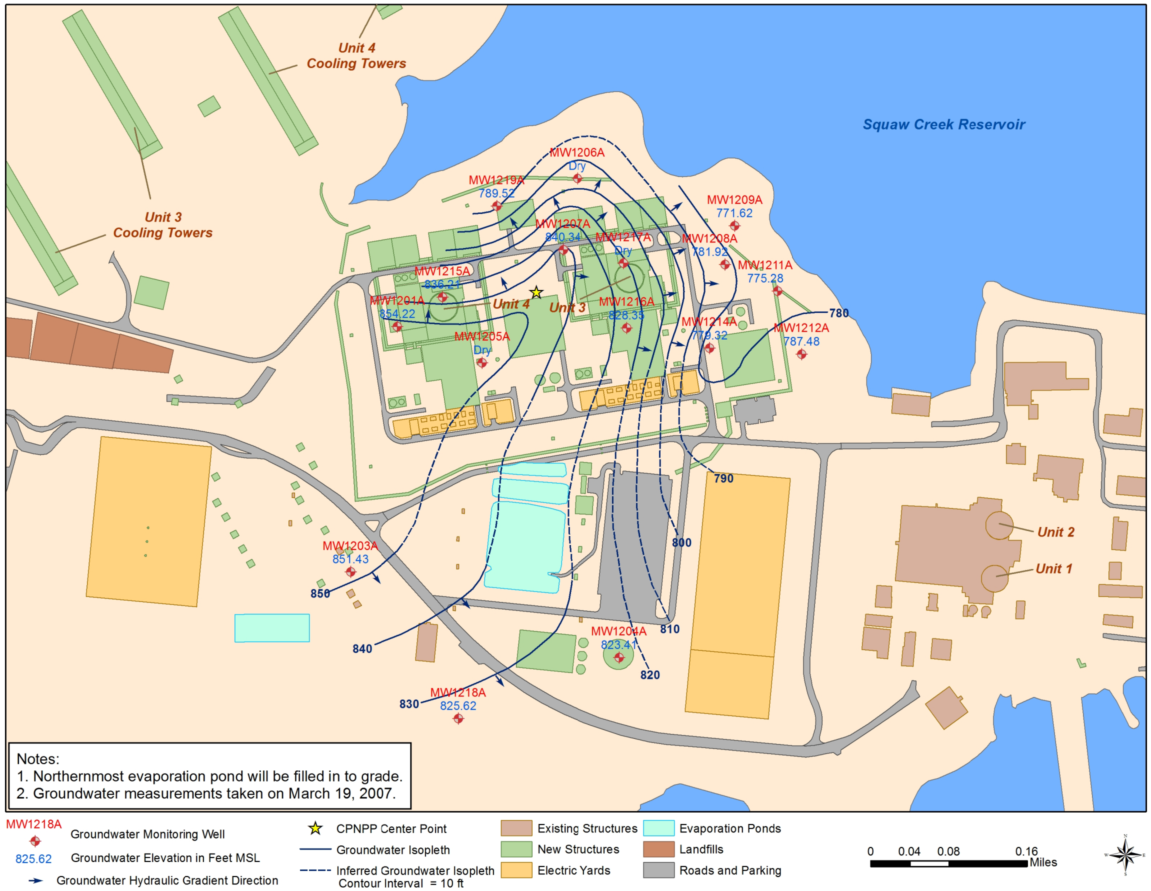

Figure 2.3-27 ~~March 2007~~ Potentiometric Surface Maps ~~(A-Wells)~~ (Sheet 2 of ~~4~~6)

CTS-01520
RCOL2_02.0
4.12-12 S01

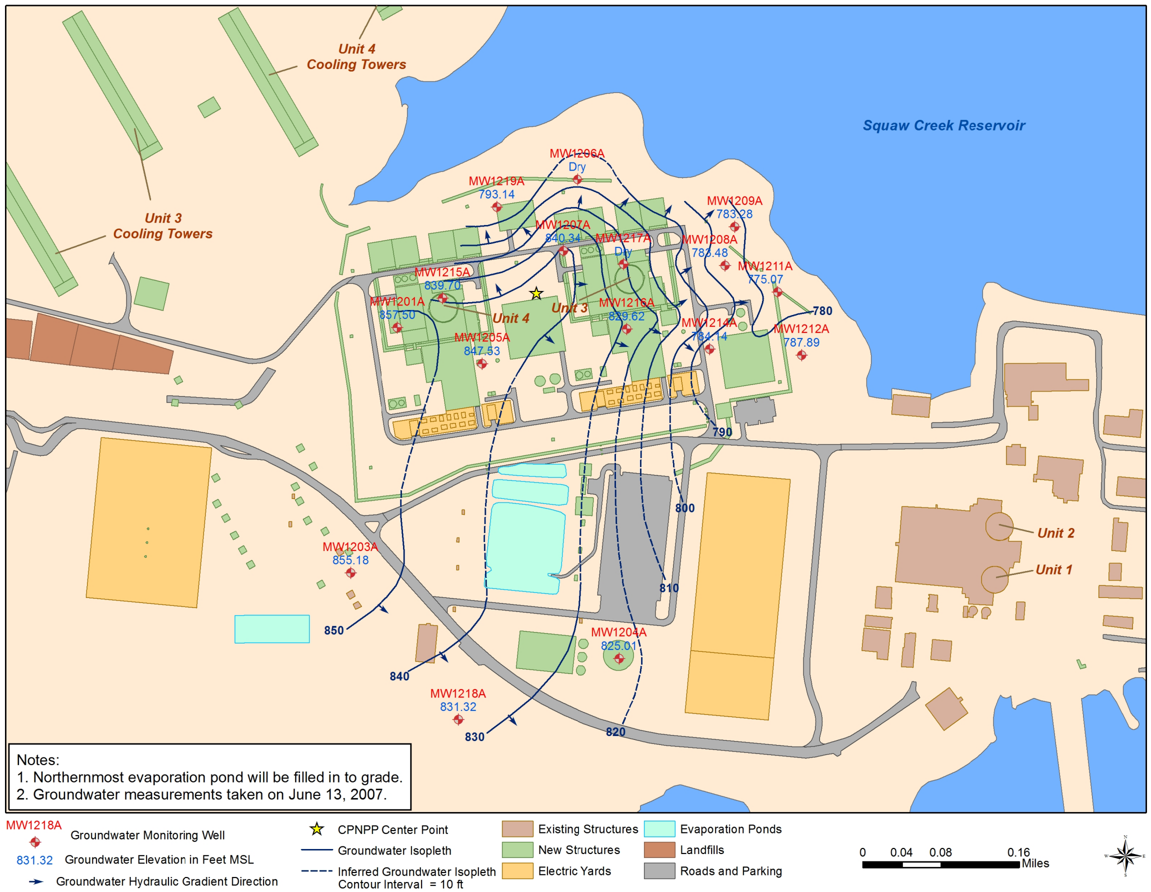

Figure 2.3-27 ~~June 2007~~ Potentiometric Surface Maps ~~(A-Wells)~~ (Sheet 3 of ~~4~~6)

CTS-01520
RCOL2_02.0
4.12-12 S01

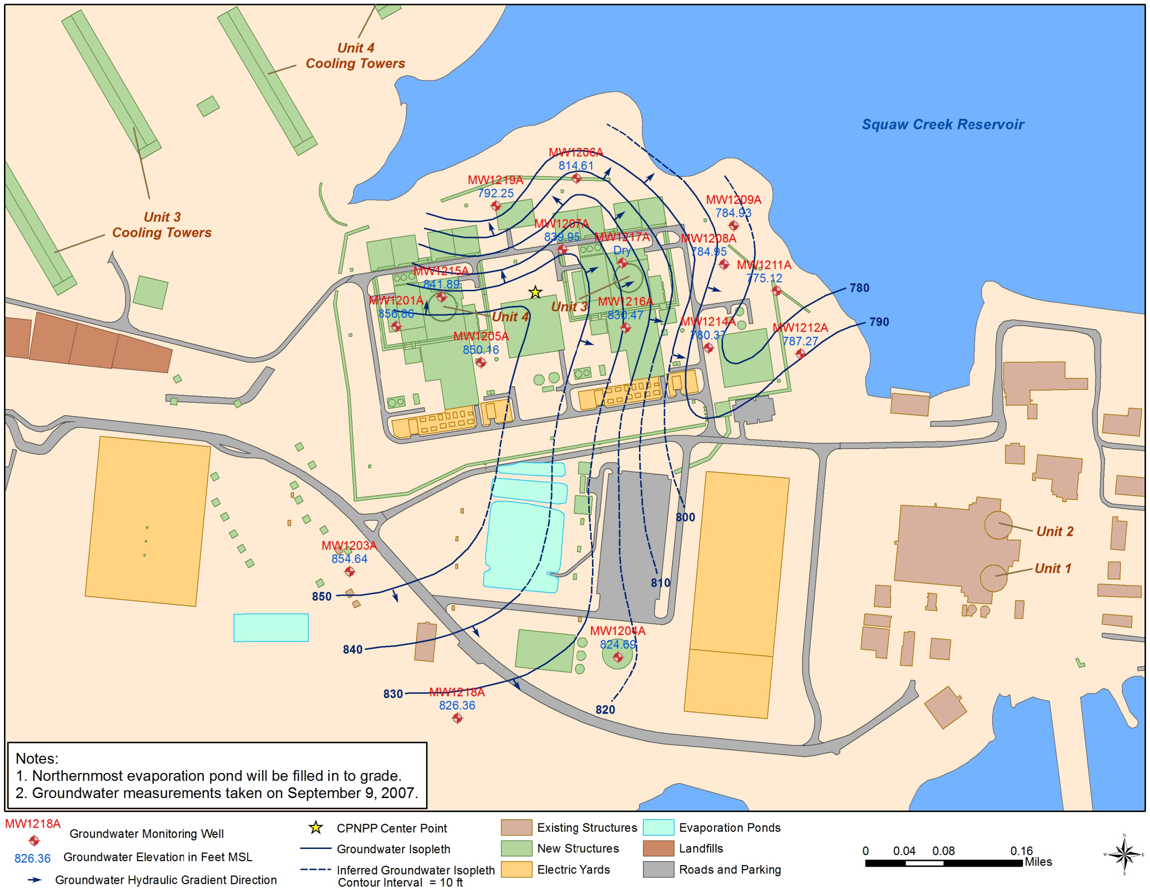

Figure 2.3-27 ~~September 2007~~ Potentiometric Surface Maps ~~(A-Wells)~~ (Sheet 4 of ~~4~~6)

RCOL2_02.0
4.12-12 S01

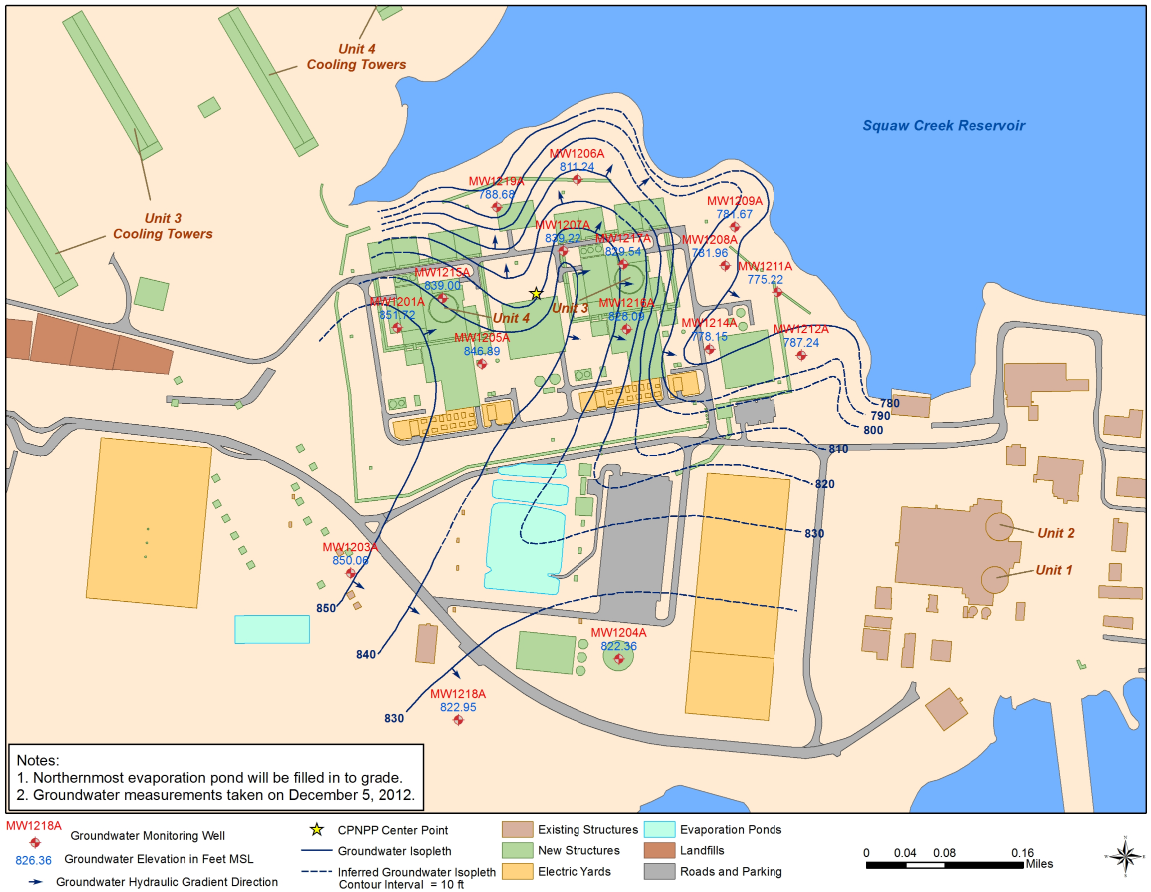

Figure 2.3-27 Potentiometric Surface Maps (Sheet 5 of 6)

RCOL2_02.0
4.12-12 S01

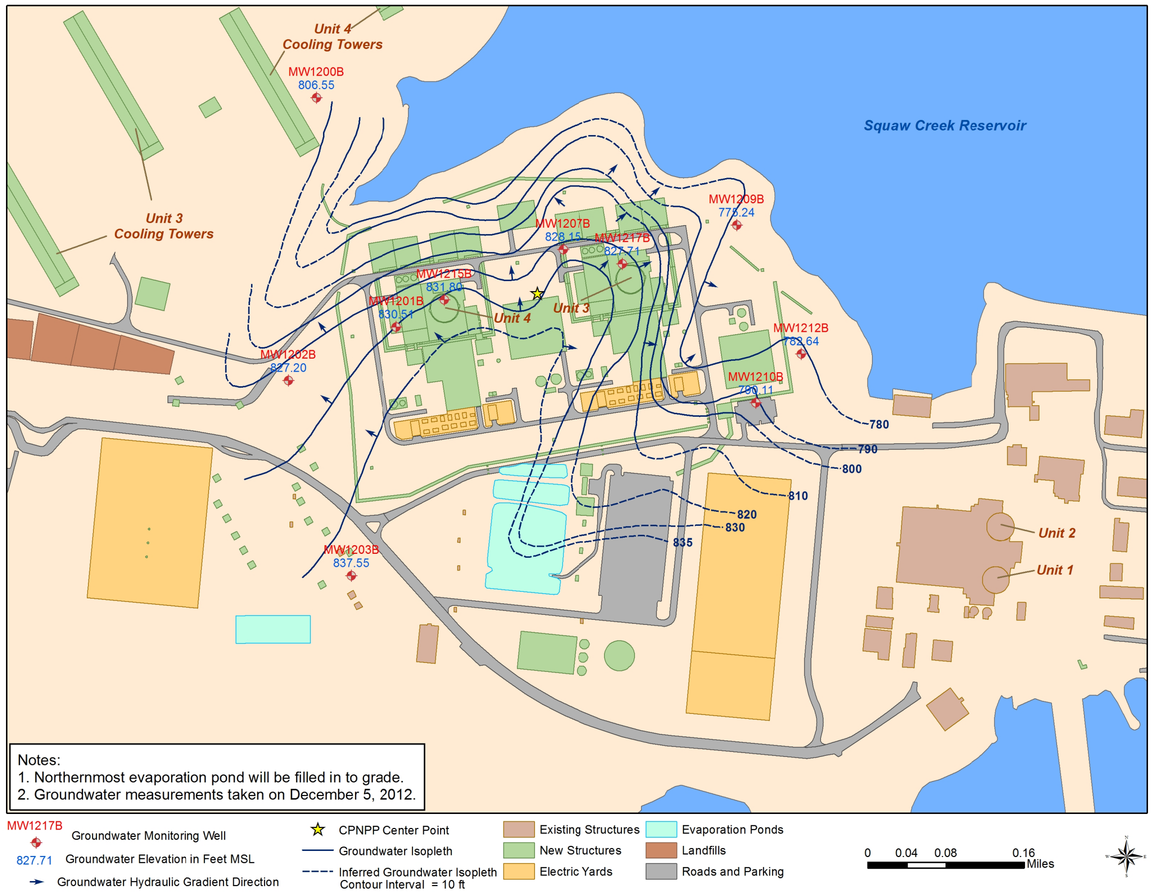

Figure 2.3-27 Potentiometric Surface Maps (Sheet 6 of 6)